Sundial Homes (4th Line) Limited

Fourth Line Milton

Transportation Impact Study

C|G|H
TRANSPORTATION

Sundial Homes Fourth Line Transportation Impact Study

Prepared for:

Sundial Homes (4th Line) Limited

Prepared by:

628 Haines Road
Newmarket, ON
L3Y 6V5

April 2023

PN: 2021-014

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1 Introduction

Prior to completion of the first submission (May 2021) of this Traffic Impact Study (TIS), an outline of the TIS was submitted to Town of Milton and the Region of Halton staff in the form of a Terms of Reference (TOR) document. The responses from the Region of Halton staff as well as Town of Milton staff were considered in the preparation of this TIS, and some were addressed through the comment-response document that was prepared. Additionally, the responses and approvals of the Terms of Reference document submitted by the traffic consultants for the adjacent development property directly to the north (considered in the Boyne Secondary Plan area) were used to maintain a consistent approach for all Boyne Secondary Plan area properties. The submitted Terms of Reference for this development, the comments on the TOR from Town and Region staff, the responses to these comments, as well as the responses to the adjacent traffic consultant's Terms of Reference documents can be found in Appendix A.

Additionally, following the TIS submission dated May 2021, comments from both Town of Milton and Region of Halton staff on this TIS have been received and considered in the preparation of this TIS. These comments, correspondence with Town and Region staff regarding these comments, as well as the prepared responses to these comments have been included in Appendix A.

1.1 Proposed Development

The proposed Sundial Homes (4th Line) Limited ("Sundial Homes") development in the Boyne Secondary Plan area is bounded by Britannia Road to the South, Fourth Line to the west, and James Snow Parkway to the east, and is located at the southeastern corner of the lands considered within the Boyne Secondary Plan area. These lands are currently zoned as a Future Development (FD) zone.

The proposed development consists of 253 detached homes, 546 townhomes, and 295 high density apartment units. Additionally, an elementary school, and village square (park area) have been proposed. Three site accesses are proposed for the Sundial Homes lands. Access #1 will be located at the intersection of James Snow Parkway and Street 1 (the east-west collector road) and is approximately 455 metres north of Britannia Road, measured intersection centreline to intersection centreline. Access #2 will be located at the intersection of Britannia Road and Street 2 (the north-south collector road / Trudeau Drive) and is approximately 330 metres west of James Snow Parkway, measured intersection centreline to intersection centreline. Access #3 will be located at the intersection of Fourth Line and Street 1 and is approximately 415 metres north of Britannia Road, measured intersection centreline to intersection centreline. Connections to the land uses to the north as well as a local connection on the south side of the site to what is now Britannia Road will be provided. While this local connection (Street 8) will serve as an access to residents in the development, it will also provide benefit to the existing houses to remain on Britannia Road on the northeast corner of Old Britannia Road and Fourth Line. Street 8 will allow for improved snow clearing, emergency vehicle access, and also serves as a connection to the elementary school and village square land uses within the subject development lands.

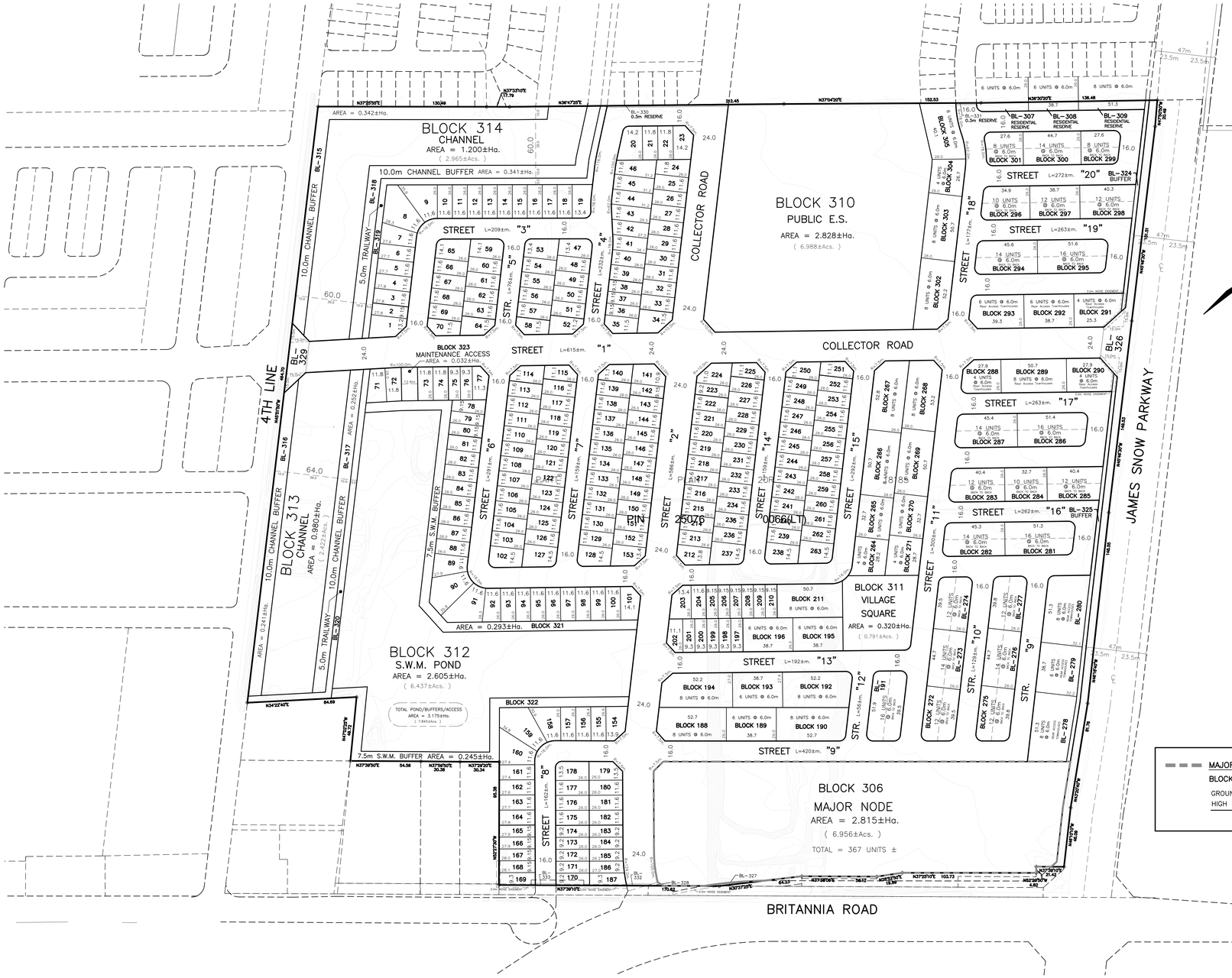
For analysis purposes within this report, it has been assumed that the proposed development will be built and operational by 2026. Halton Region staff have also requested that an additional 2026 analysis scenario at the future intersection of James Snow Parkway and Street 1 be analyzed to understand the impact of the subject development trip generation, in the unlikely event that the planned widening of James Snow Parkway is not complete by 2026. The analysis horizons will therefore include 2021 existing conditions, the 2026 full build out conditions, and the additional 2026 analysis scenario. These horizons are consistent with those considered in the Boyne Secondary Plan Survey Road Network Assessment (2017), prepared by GHD Ltd.

Figure 1 illustrates the Study Area Context and Figure 2 illustrates the proposed concept plan.

Figure 1: Site Context

DRAFT PLAN OF SUBDIVISION
PART OF LOT 6, CONCESSION 5, NEW SURVEY
(GEOGRAPHIC TOWNSHIP OF TRAFALGAR)
TOWN OF MILTON
REGIONAL MUNICIPALITY OF HALTON

SCALE 1:1250



DRAFT PLAN T–

KEY PLAN

SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE March 8, 2023

SUNIL PERERA
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF MILTON FOR APPROVAL.

OWNER

SUNDIAL HOMES (4th LINE) LIMITED

4576 YONGE STREET
SUITE 500
TORONTO, ONTARIO
M2N 6N4

ROBERT YANOWSKI
PRESIDENT

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED = 36.670±Ha. (90.614±Acs)

	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
DETACHED DWELLINGS					
LOTS 3–33, 39–51, 53–57, 59–63, 65–69, 71–74, 81–113, 116–139, 143–164, 175–182, 203–204, 212–222, 226–249 and 252–263 MIN. LOT FRONTAGE=11.6m. MIN LOT AREA=301.60sq.m.		199	199	6.390	15.790
LOTS 1–2, 34–38, 52, 58, 64, 70, 75–80, 114–115, 140–142, 165–174, 183–187, 197–202, 205–210, 223–225 and 250–251 MIN. LOT FRONTAGE=9.15m. MIN LOT AREA=237.90sq.m.		54	54	1.696	4.191
STREET TOWNHOUSES					
BLOCKS 188–190, 192–196, 211, 264–271 and 302–305 MIN. UNIT FRONTAGE=6.0m.	21		140	2.442	6.034
REAR ACCESS TOWNHOUSES					
BLOCKS 278–280 and 288–293 MIN. UNIT FRONTAGE=6.0m.	9		54	1.053	2.602
BACK TO BACK TOWNHOUSES					
BLOCKS 191, 272–277, 281–287 and 294–301 MIN. UNIT FRONTAGE=6.0m.	22		280	2.457	6.071
MAJOR NODE					
BLOCK 306	1		367 *	2.815	6.956
SUBTOTAL	53	253	1,094 *	16.853	41.644
BLOCK 307–309 – RESIDENTIAL RESERVE BLOCKS	3			0.089	0.219
BLOCK 310 – PUBLIC ELEMENTARY SCHOOL	1			2.828	6.988
BLOCK 311 – VILLAGE SQUARE	1			0.320	0.791
BLOCK 312 – STORMWATER MANAGEMENT POND	1			2.605	6.437
BLOCKS 313–314 – CHANNEL	2			2.180	5.387
BLOCKS 315–318 – CHANNEL BUFFER	4			1.176	2.906
BLOCKS 319–320 – TRAILWAY	2			0.329	0.814
BLOCKS 321–322 – S.W.M. BUFFER	2			0.538	1.329
BLOCK 323 – MAINTENANCE ACCESS	1			0.032	0.079
BLOCKS 324–325 – BUFFER	2			0.117	0.290
BLOCKS 326–329 – ROAD WIDENING	4			0.482	1.191
BLOCKS 330–333 – 0.3m RESERVE	4			0.007	0.019
STREETS				9.114	22.520
24.0m WIDE TOTAL LENGTH=1,201±m. AREA= 2.882±Ha.					
16.0m WIDE TOTAL LENGTH=3,914±m. AREA= 6.262±Ha.					
TOTAL LENGTH=5,115±m. AREA= 9.144±Ha.					
TOTAL	80	253	1,094 *	36.670	90.614

MAJOR NODE BREAKDOWN

BLOCK 306

GROUND RELATED TOWNHOUSES	= 72 UNITS =	20%
HIGH DENSITY / APARTMENT	= 295 UNITS =	80%
TOTAL = 367 UNITS*		

NOTE – CANADIAN GEODETIC DATUM ELEVATIONS RELATED TO

NOTE – * SUBJECT TO FINAL CALCULATION

KLM PLANNING PARTNERS INC.
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TEL: (905)669-4055 FAX: (905)669-0097 design@klmplanning.com
Planning ● Design ● Development

PROJECT No. P-2181
SCALE 1:1250 APRIL 4, 2023
(2181DES31- 4TH LINE) - (2181MAS2 & 2181TOPO)
DWG. No. - 23:8

2 Existing Conditions

2.1 Area Road Network

James Snow Parkway

James Snow Parkway (Regional Road 4) is a major arterial road with a two-lane cross-section within the Study Area. A gravel shoulder is present on the east side of the road and curbs and gutters are provided on the west side. No sidewalks are provided. Halton Region reserves a 47-metre right-of-way for this road for a C4 Urban Cross-section within the Study Area. A 70 km/h posted speed limit applies.

Britannia Road

Britannia Road (Regional Road 6) is a major arterial road with a two-lane cross-section within the Study Area. Gravel shoulders are present on both sides of the road and no sidewalks are provided. Halton Region reserves a 47-metre right-of-way for this road for a C4 Urban Cross-section within the Study Area. Britannia Road has a two-lane urban cross-section with a posted speed limit of 60 km/h.

Fourth Line

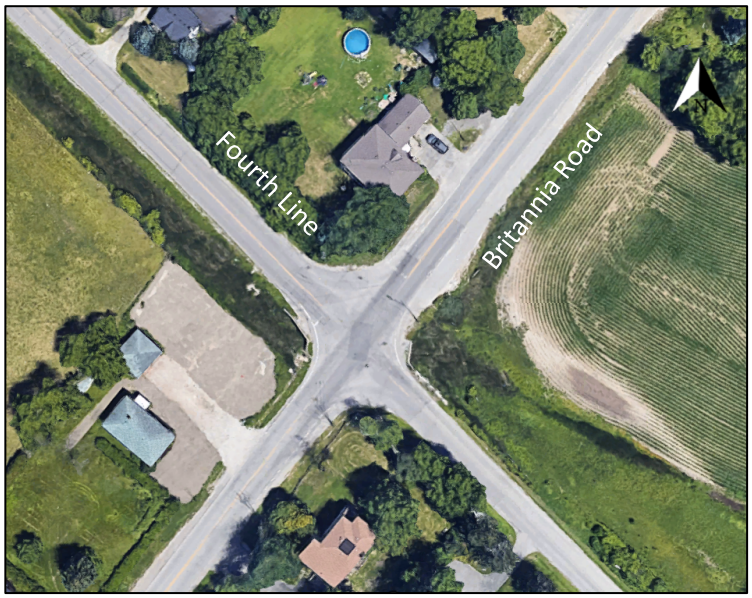
Fourth Line is a Town of Milton collector road with a two-lane rural cross section within the Study Area. No sidewalks are provided. A 60 km/h posted speed limit applies north of Britannia Road and a 70 km/h posted speed limit applies south of Britannia Road.

2.2 Existing Intersections

James Snow Parkway / Britannia Road

The intersection of James Snow Parkway and Britannia Road is a three-legged signalized intersection. The southbound approach consists of a right-turn lane and an auxiliary left-turn lane. The westbound approach consists of a through lane and an auxiliary right-turn lane. The eastbound approach has a through lane and an auxiliary left-turn lane. Pedestrian crossings are located on the north and west legs of the intersection. No turn restrictions are noted.

Fourth Line / Britannia Road
The intersection of Fourth Line and Britannia Road is a signalized intersection. All four approaches consist of a shared left-turn / through / right-turn lane. No pedestrian crossings are indicated. No turn restrictions are noted.



2.3 Active Transportation

The proposed development is in an area of Milton that is currently not developed and therefore limited cycling and pedestrian infrastructure is provided within the Study Area. The signalized intersection of James Snow Parkway at Britannia Road has some pedestrian infrastructure (crosswalks and pedestrian signal heads) but there are no sidewalk connections beyond the intersection. No cycling facilities currently exist within the Study Area.

2.4 Existing Transit

While no local transit service is provided directly within the Study Area, GO Transit provides both bus and train service to the Town of Milton. The Milton GO Station is on the Milton GO line and is also used by GO Bus route 21, 21A, 21B, 21N, 27, 27A, and 27C. The Milton GO Station is approximately six kilometres from the proposed development and is located northwest of the future development at 780 Main Street East.

Additionally, GO Bus routes 21, 21A, 21B, 21N, 27, 27A, and 27C service Milton with multiple stops on Derry Road north of the Study Area.

2.5 Collision Analysis

Collision data has been provided for the Study Area intersections and road network by Halton Region. Data for five years (2016-2020) prior to the commencement of this TIS has been analyzed. Figure 3 illustrates the Study Area analyzed as part of the collision analysis, and Table 1 summarizes the total collisions for the intersections and road segments of interest. Collision data is included in Appendix B.

Figure 3: Study Area Analyzed for Collisions

Table 1: Summary of Collision Locations

Intersections / Segments	Number	%
	109	**100%**
Britannia Road @ James Snow Parkway	34	31.19%
Britannia Road @ Fourth Line	27	24.77%
James Snow Parkway btwn Britannia Road and Louis St Laurent Avenue	6	5.50%
Britannia Road btwn Fourth Line and Thompson Road South	21	19.27%
Britannia Road btwn Fourth Line and James Snow Parkway	11	10.09%
Britannia Road btwn Fifth Line and James Snow Parkway	10	9.18%

Overall, the majority of the Study Area collisions were noted at the intersection of Britannia Road and James Snow Parkway as well as the intersection of Britannia Road and Fourth Line. Collisions were also recorded on the various road segments within the Study Area as noted above.

Table 2, and Table 3 summarize the collision types and conditions at the intersections of Britannia Road at James Snow Parkway, and Britannia Road at Fourth Line, respectively.

Table 4, Table 5, Table 6, and Table 7 summarize the collision types and conditions on the segment of James Snow Parkway between Britannia Road and Louis St Laurent Avenue, Britannia Road between Fourth Line and Thompson Road South, Britannia Road between Fourth Line and James Snow Parkway, and Britannia Road between Fifth Line and James Snow Parkway, respectively.

The intersection of Britannia Road and James Snow Parkway experienced 34 collisions between 2016-2020. The majority of collisions occurred in daylight (58.83%) with most collisions categorized as rear end collision types

(47.06%). Rear end collisions are typical of congested intersections. Weather conditions are considered a potential contributing factor for 35.29% of the reported collisions. No fatal collisions were noted.

Table 2: Britannia Road @ James Snow Parkway Collision Summary

		Number	%
Total Collisions		**34**	**100%**
Light	Daylight	20	58.83%
	Dawn	2	5.88%
	Dark	10	29.41%
	Dark – artificial	2	5.88%
Initial Impact Type	Angle	2	5.88%
	Rear end	16	47.06%
	Sideswipe	3	8.82%
	Turning Movement	2	5.88%
	SMV Other	11	32.36%
Environment	Clear	22	64.71%
	Rain	8	23.53%
	Snow	4	11.76%

The intersection of Britannia Road and Fourth Line experienced 27 collisions between 2016-2020. The majority of collisions occurred in daylight (81.48%) with most collisions categorized as rear end collision types at 62.96%. Rear end collisions are typical of congested intersections. Weather conditions are considered a potential contributing factor for 22.22% of the reported collisions. No fatal collisions were noted.

Table 3: Britannia Road at Fourth Line Collision Summary

		Number	%
Total Collisions		**27**	**100%**
Light	Daylight	22	81.48%
	Dusk	1	3.70%
	Dark	24	14.82%
Initial Impact Type	Angle	7	25.93%
	Rear end	17	62.96%
	Turning Movement	1	3.70%
	SMV Other	2	7.41%
Environment	Clear	21	77.78%
	Rain	3	11.11%
	Snow	3	11.11%

The road segment of James Snow Parkway between Britannia Road and Louis St Laurent Avenue experienced six collisions between 2016-2020. The majority of collisions occurred in daylight (50.00%) with most collisions categorized as rear end collision types (66.66%). Rear end collisions are typical of congested road segments. Weather conditions are considered a potential contributing factor for 33.34% of the reported collisions. No fatal collisions were noted.

Table 4: James Snow Parkway btwn Britannia Road and Louis St Laurent Avenue Collision Summary

		Number	%
Total Collisions		**6**	**100%**
Light	Daylight	3	50.00%
	Dawn	1	16.67%
	Dark	1	16.67%
	Dark - artificial	1	16.66%

Initial Impact Type	Rear End	4	66.66%
	Turning Movement	1	16.67%
	SMV Other	1	16.67%
Environment	Clear	4	66.66%
	Rain	1	16.67%
	Freezing Rain	1	16.67%

The road segment of Britannia Road between Fourth Line and Thompson Road South experienced 21 collisions between 2016-2020. The majority of collisions occurred in daylight (80.95%) with most collisions categorized as rear end collision types (57.15%). Rear end collisions are typical of congested road segments. Weather conditions are considered a potential contributing factor for 23.81% of the reported collisions. No fatal collisions were noted.

Table 5: Britannia Road btwn Fourth Line and Thompson Road South Collision Summary

		Number	**%**
Total Collisions		**21**	**100%**
Light	Daylight	17	80.95%
	Dark	3	14.29%
	Dark - artificial	1	4.76%
Initial Impact Type	Approaching	1	4.76%
	Angle	2	9.52%
	Rear end	12	57.15%
	Turning Movement	2	9.52%
	SMV Other	4	19.05%
Environment	Clear	16	76.19%
	Rain	3	14.29%
	Snow	2	9.52%

The road segment of Britannia Road between Fourth Line and James Snow Parkway experienced 11 collisions between 2016-2020. Most of the collisions occurred in daylight (54.55%) with most collisions categorized as rear end collision types (55.55%). Rear end collisions are typical of congested road segments. Weather conditions are considered a potential contributing factor for 36.36% of the reported collisions. No fatal collisions were noted.

Table 6: Britannia Road btwn Fourth Line and James Snow Parkway Collision Summary

		Number	**%**
Total Collisions		**11**	**100%**
Light	Daylight	6	54.55%
	Dawn – artificial	1	9.09%
	Dusk	1	9.09%
	Dark	3	27.27%
Initial Impact Type	Approaching	1	9.09%
	Rear end	6	54.55%
	Sideswipe	1	9.09%
	SMV Other	3	27.27%
Environment	Clear	7	63.64%
	Rain	4	36.36%

The road segment of Britannia Road between Fifth Line and James Snow Parkway experienced ten collisions between 2016-2020. All the collisions occurred in daylight with most collisions categorized as rear end collision types (50.00%). Rear end collisions are typical of congested road segments. Weather conditions are considered a potential contributing factor for 40.00% of the reported collisions. No fatal collisions were noted.

Table 7: Britannia Road btwn Fifth Line and James Snow Parkway Collision Summary

		Number	%
Total Collisions		**10**	**100%**
Light	Daylight	10	100.00%
Initial Impact Type	Approaching	3	30.00%
	Rear end	5	50.00%
	SMV Other	1	10.00%
	Other	1	10.00%
Environment	Clear	6	60.00%
	Rain	1	10.00%
	Snow	2	20.00%
	Drifting Snow	1	10.00%

The collision analysis above does not require any changes to the surrounding road network as they are relatively low and intersection configuration changes to Britannia Road at Fourth Line, and Britannia Road at James Snow Parkway will be made in the future analysis horizons and will improve intersection operations and congestion.

2.6 Existing Peak Hour Travel Demand

2.6.1 2021 Existing Traffic Volumes

To understand the existing AM and PM peak hour traffic volumes, turning movement counts (TMC) for the existing Study Area intersections have been requested from the Region of Halton. Table 8 summarizes the date and source of the most recent turning movement count at each Study Area intersection.

Table 8: Turning Movement Count Data Dates

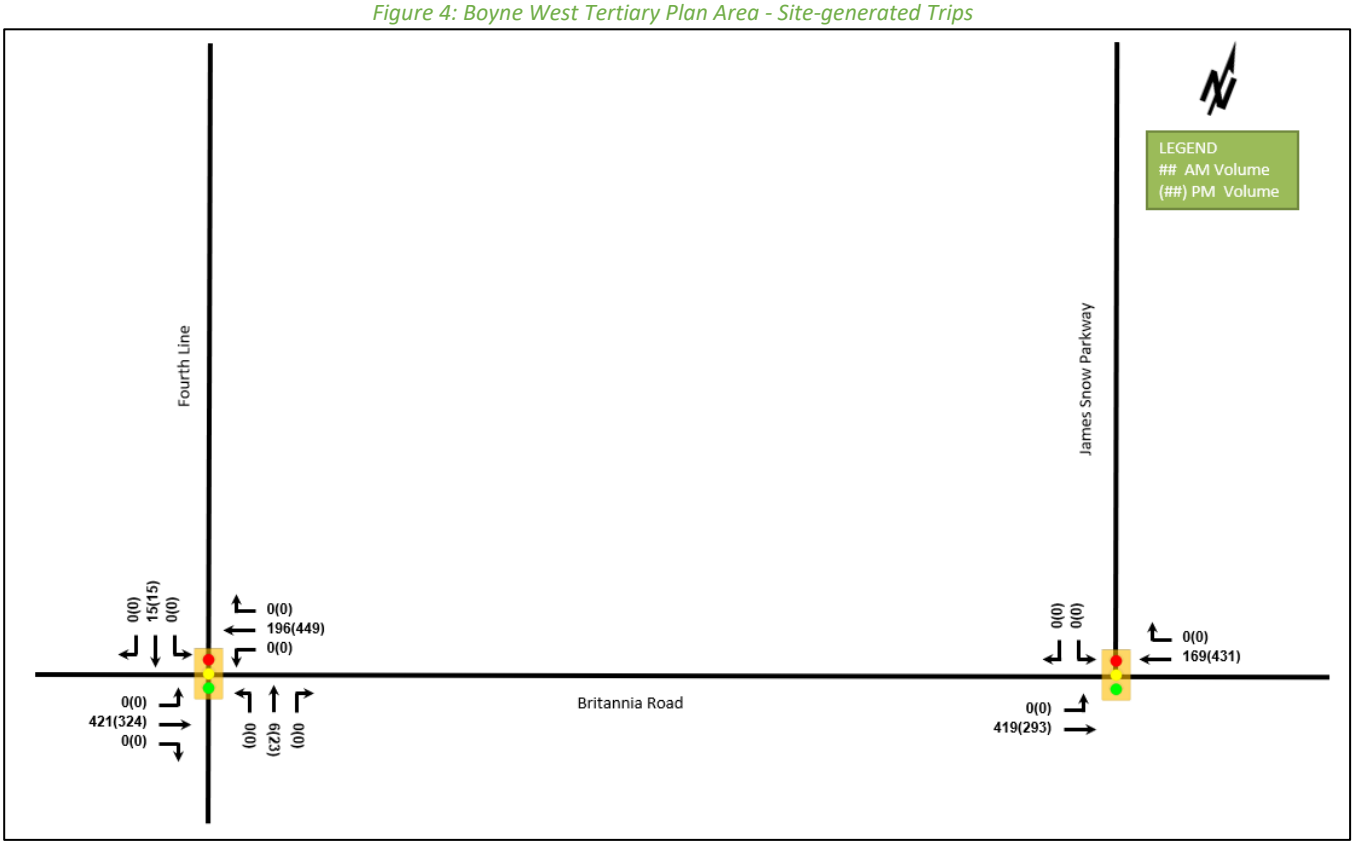
Intersection	Count Date	Data Source
Britannia Road at James Snow Parkway	November 7, 2019	Region of Halton
Britannia Road at Fourth Line	November 7, 2019	Region of Halton

As can be seen above, the available TMC counts received have been collected prior to the existing analysis horizon, and as such have been grown to the existing analysis horizon of 2021. A compound annual growth rate of 2% has been applied to James Snow Parkway, Fourth Line, and Britannia Road. The 2% growth rate is based on Halton Region and Town of Milton staff comments on the previous TIS submission as shown in Appendix A. Given the nature of the intersections considered, these growth rates were applied to all turning movements at each Study Area intersection.

The need for volume balancing between the Study Area intersections was then evaluated for the 2021 existing volumes and as no unjustified volume imbalances greater than 10% were identified, no volume balancing was performed.

It has been assumed that the Boyne West Tertiary Plan area has been fully built out and the resulting site traffic can be added to the 2021 existing conditions volumes at the proposed Study Area intersections. As the Boyne Secondary Plan Road Network Assessment only provides the site generated volumes at the Study Area intersections based on generation from both the East and West Tertiary Plan areas, assumptions to isolate the traffic generated by the West Tertiary Plan area have been made. As the Boyne West Tertiary Plan area generates approximately 55% of the total trips generated by the East and West Tertiary Plan areas, the total site generated traffic for all through movements at the two Study Area intersection have been reduced by 45%. Additionally, it is unlikely that the turning movements at the Study Area intersections are a result of any site generated traffic from the Boyne West Tertiary Plan area and have been removed. The raw Boyne RNA site trips can be found in Appendix C, and the assumed Boyne West Tertiary Plan site generated trips can be seen in Figure 4 below. The calculated West and East Tertiary Plan area percentages are shown in Appendix D.

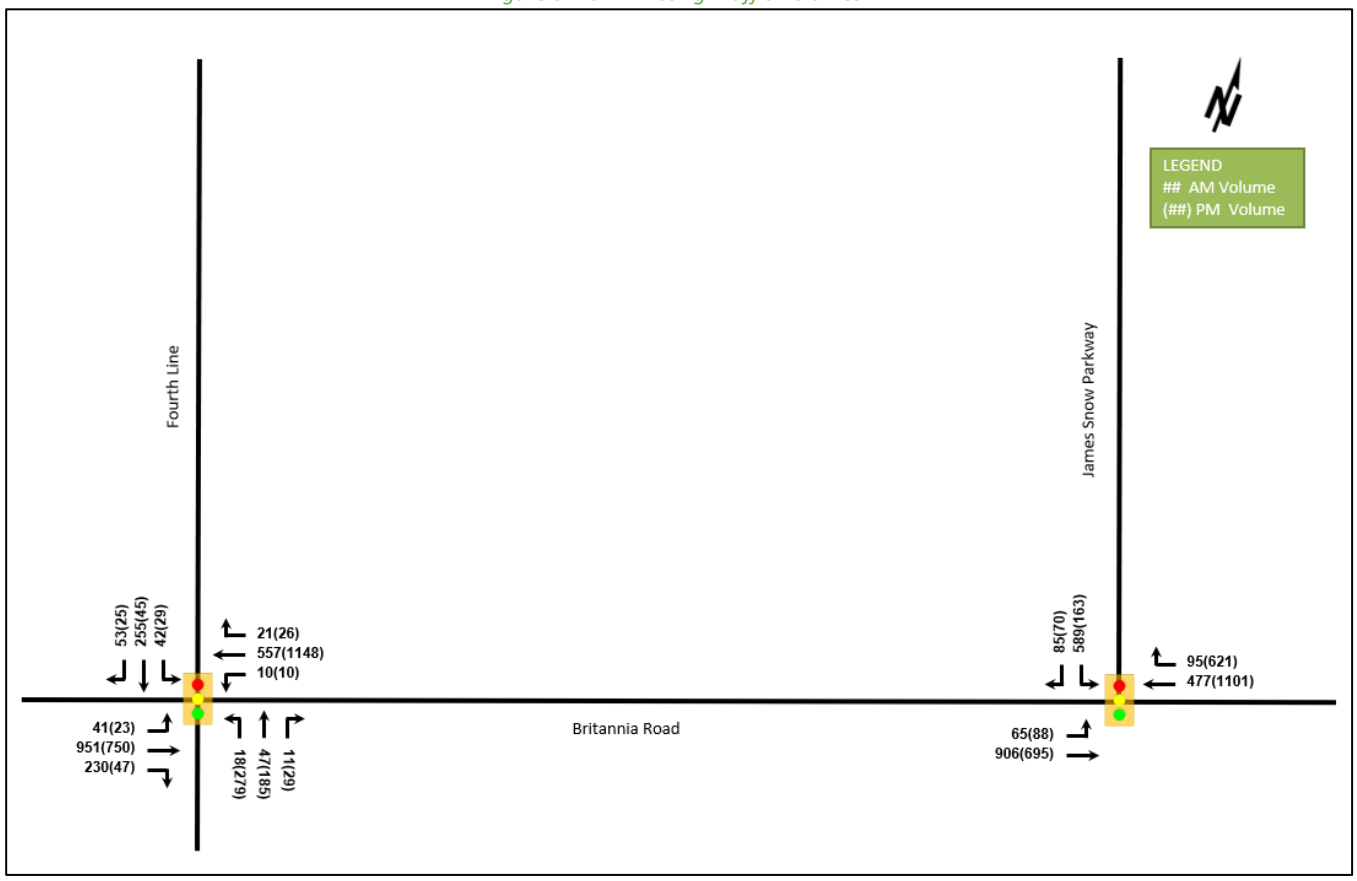
Figure 4: Boyne West Tertiary Plan Area - Site-generated Trips



The applied growth rates are considered conservative in nature as not many developments beyond those in the Boyne West Tertiary Plan, which is explicitly considered in the surrounding area, have been completed between 2019 and 2021.

The resulting 2021 existing traffic volumes are illustrated in Figure 5. Turning movement count data is included in Appendix E.

Figure 5: 2021 Existing Traffic Volumes

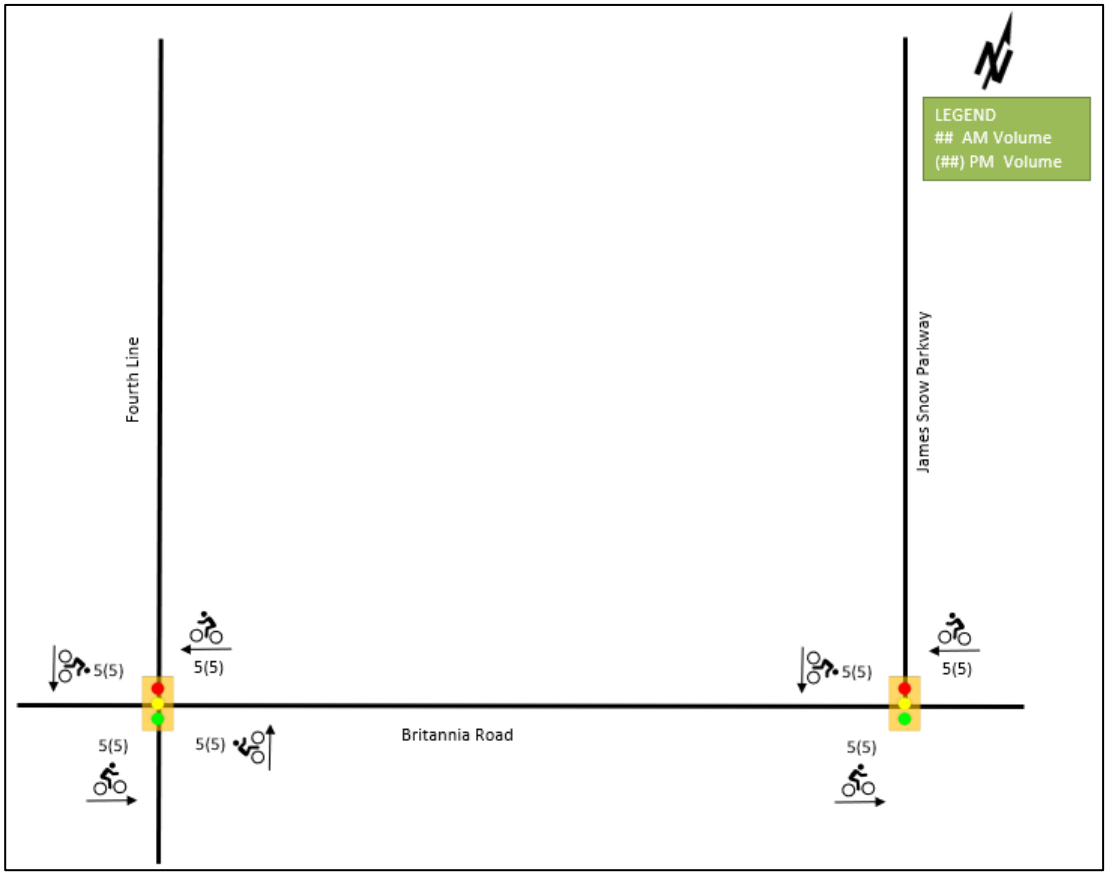


2.6.2 2021 Existing Active Transportation Volumes

As discussed in Section 2.3, limited existing active transportation facilities are present within the Study Area. Pedestrian volumes were provided for those intersections with turning movement count information and do not indicate any pedestrian volumes within the Study Area. As no cycling information was provided for any intersection, a conservative assumption of 5 cyclists/h was used for each intersection leg. Based on these assumptions, 2021 existing pedestrian and cycling volume figures have been developed and are shown in Figure 6 and, Figure 7, respectively.

Figure 6: 2021 Existing Pedestrian Volumes

Figure 7: 2021 Existing Cycling Volumes



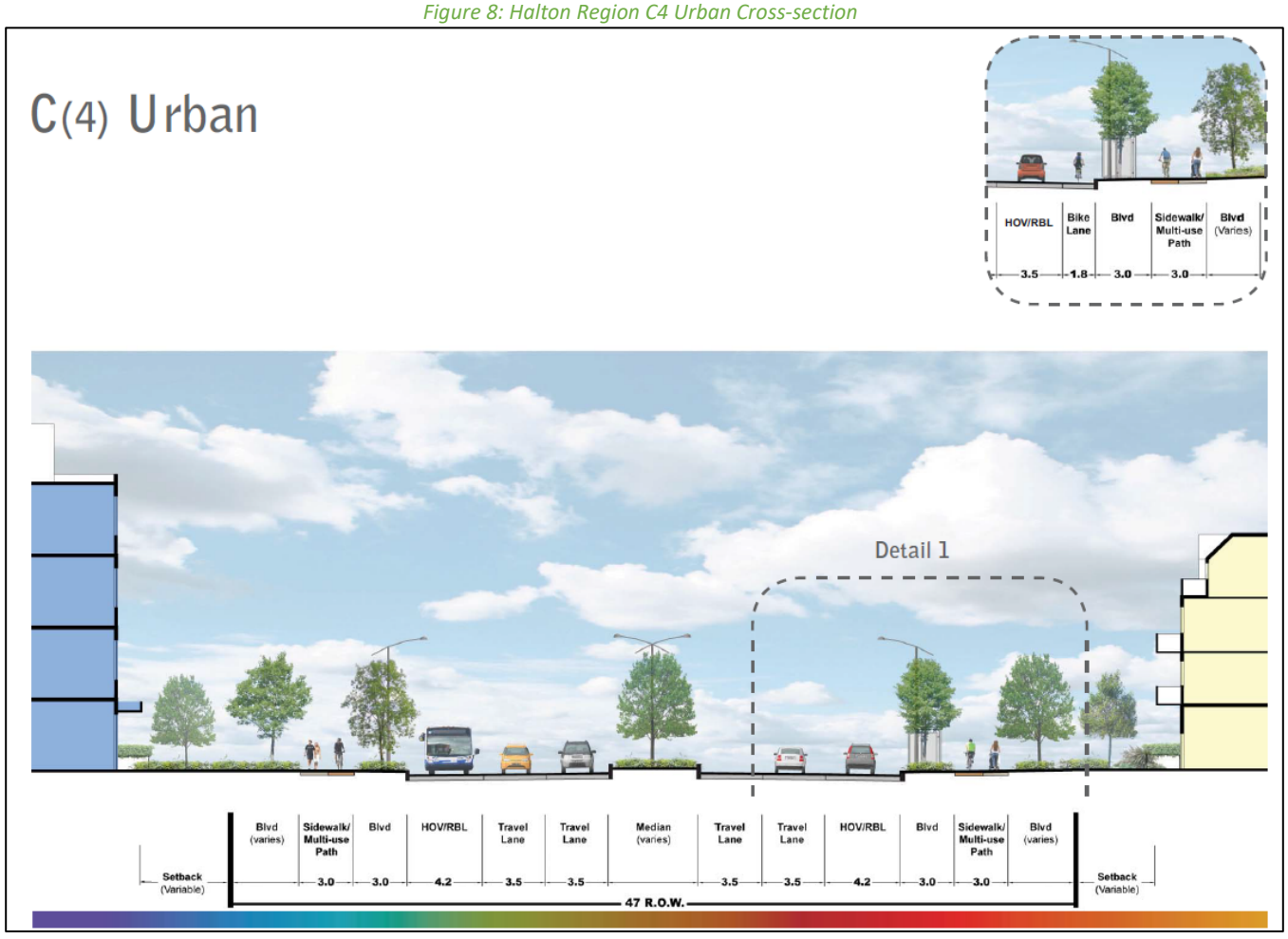
3 Future Background Conditions

3.1 Planned Conditions

3.1.1 James Snow Parkway Widening

James Snow Parkway (Regional Road 4) is a north-south major arterial Regional Road within the Study Area. Halton Region's 2021 Budget and Business Plan Capital Report indicates that James Snow Parkway will be widened to six lanes with construction starting in 2023. It is, however, noted that Halton Region staff have indicated that this is an unlikely timeline as both the Municipal Class Environmental Assessment and the Detailed Design Project have not yet been completed. As James Snow Parkway is shown to have a reserved 47-metre right-of-way and is subject to a C4 urban cross-section, the two outer through lanes have been assumed to operate as HOV lanes based on the lack of substantial future transit indicated on James Snow Parkway. As such, the planned improvements will be considered in the 2026 future analysis horizon. As no further information is available, it is assumed that active mode facilities will be provided on both sides of James Snow Parkway within the Study Area. It is assumed that the posted speed limit will remain at 70 km/h. An excerpt from Halton Region's 2021 Budget and Business Plan Capital Report can be found in Appendix F, and the Halton Region C4 urban cross-section is shown below in Figure 8.

Figure 8: Halton Region C4 Urban Cross-section



3.1.2 Britannia Road Widening and Realignment

Britannia Road (Regional Road 6) is an east-west major arterial Regional Road within the Study Area. An Environmental Assessment to examine the widening of Britannia Road between Regional Road 25 and Highway 407 from two-lanes to six-lanes has been completed by the Region of Halton. The widening of Britannia Road has

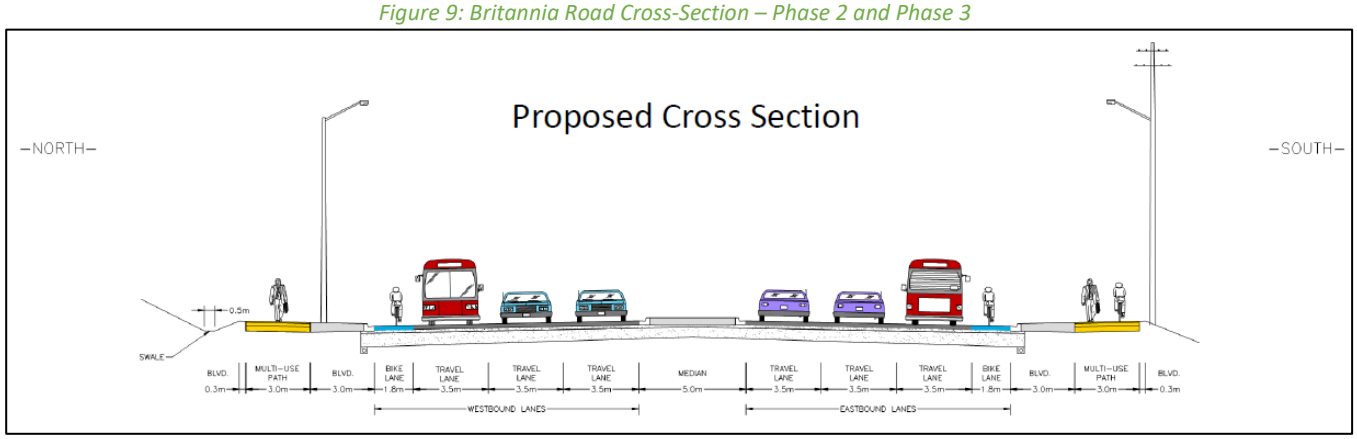
been broken into three phases, with Phase 2 and Phase 3 including segments of Britannia Road considered within the Study Area. Both Phase 2 and Phase 3 are anticipated to be complete in December of 2024. As such, the planned improvements will be considered in the 2026 future analysis horizon.

A posted speed limit of 70 km/h has been identified.

The proposed cross-section provided in both the Phase 2 and Phase 3 Public Information Centre presentations is illustrated in Figure 9, and includes the following elements (from left to right):

- A ditch or swale
- 0.3 metre boulevard
- 3.0 metre multi-use path
- 3.0 metre boulevard
- 1.8 metre bike lane
- One 3.5 metre HOV lane
- Two 3.5 metre drive lanes
- 5.0 metre median
- Two 3.5 metre drive lanes
- One 3.5 metre HOV lane
- 1.8 metre bike lane
- 3.0 metre boulevard
- 3.0 metre multi-use path
- 0.3 metre boulevard
- A ditch or swale

Figure 9: Britannia Road Cross-Section – Phase 2 and Phase 3



Additionally, the Issued for Tender Drawings document provided as part of the Britannia Road widening Environmental Study for the portion of Britannia Road east of Regional Road 25 to west of James Snow Parkway will be used to determine further details of the lane and intersection configurations on Britannia Road for the future analysis horizon and can be seen in Appendix G.

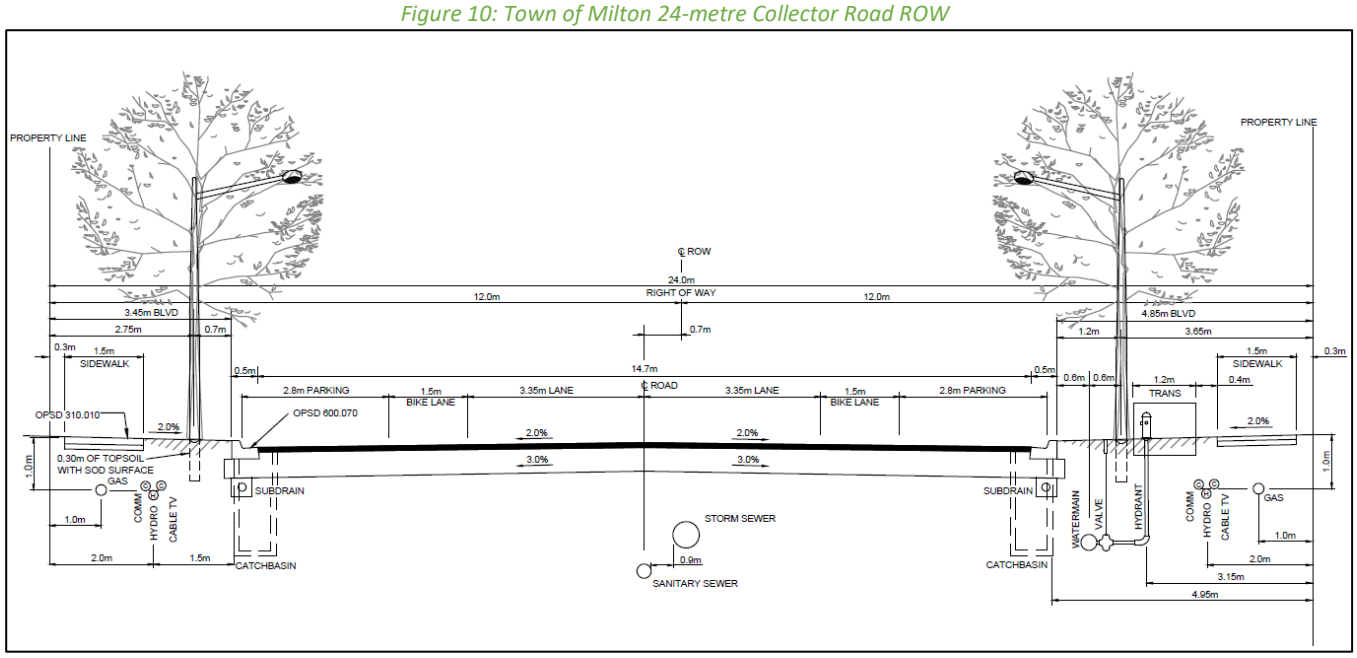
3.1.3 Trudeau Drive Extension

Trudeau Drive is a north-south Town of Milton collector road, currently north of the Study Area at the time of this report. The planned extension of Trudeau Drive into the Study Area, as shown in the Town of Milton's TMP, will provide the proposed development with an additional connection to the north through the adjacent future land parcels. A 24-metre right-of-way is proposed for Trudeau Drive within the proposed development lands. The Town

of Milton engineering standard drawing for a 24-metre collector road has been assumed and is shown in Figure 10, and includes the following elements (from left to right):

- 1.5 metre sidewalk within a 3.45 metre boulevard
- 0.5 metre curb and gutter
- 2.5 metre parking lane
- 1.5 metre bike lane
- Two 3.35 metre drive lanes
- 1.5 metre bike lane
- 2.5 metre parking lane
- 0.5 metre curb and gutter
- 1.5 metre sidewalk within a 4.85 metre boulevard

Figure 10: Town of Milton 24-metre Collector Road ROW



An unposted speed limit of 50 km/h has been assumed. The extension of Trudeau Drive will be considered in the 2026 future total analysis horizon.

3.1.4 East-west Collector (Street 1)

The proposed east-west collector within the subject development is assumed to have the same cross-section as Trudeau Drive. As is the case with Trudeau Drive, an unposted speed limit of 50 km/h has been assumed. Street 1 will be considered in the 2026 future total analysis horizon.

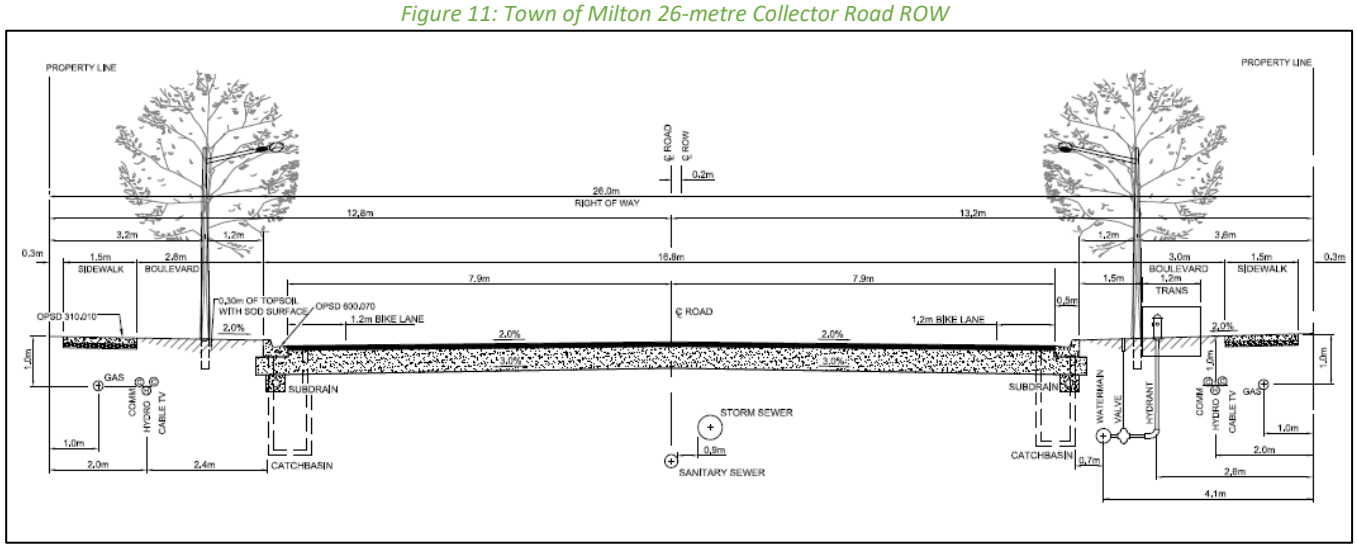
3.1.5 Whitlock Avenue Extension

Whitlock Avenue is an east-west Town of Milton collector road that is currently west of the Study Area between Bronte Street South and Thompson Road South. The planned extension of Whitlock Avenue to James Snow Parkway, as shown in the Town of Milton's TMP, will intersect the adjacent Mattamy lands to the north. A 26-metre right-of-way is proposed for Whitlock Avenue within the adjacent Mattamy lands. The Town of Milton engineering standard drawing for a 26-metre collector road has been assumed to apply and is shown in Figure 11, and includes the following elements (from left to right):

- 1.5 metre sidewalk within a 2.6 metre boulevard
- 0.5 metre curb and gutter

- 1.2 metre bike lane
- Two 6.7 metre drive lanes
- 1.2 metre bike lane
- 0.5 metre curb and gutter
- 1.5 metre sidewalk within a 3.0 metre boulevard

Figure 11: Town of Milton 26-metre Collector Road ROW

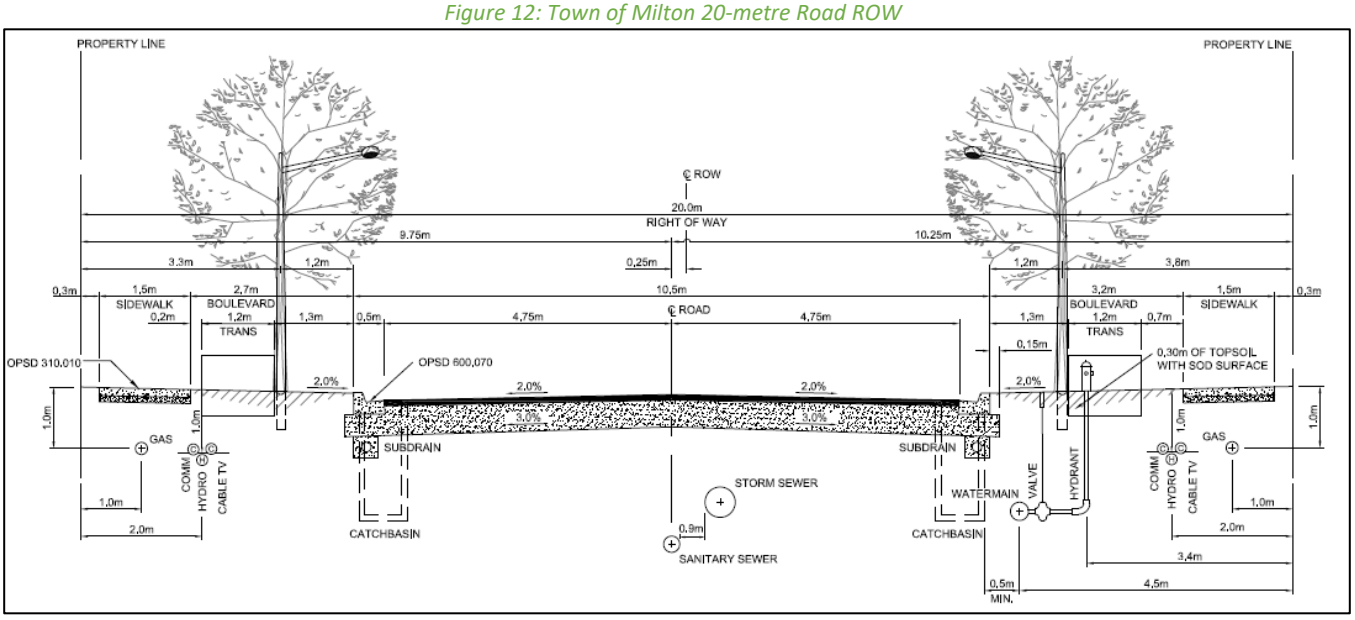


The future intersection of Whitlock Avenue and James Snow Parkway formed as a result of the extension of Whitlock Avenue will be considered in the 2026 future background and future total analysis horizons. The intersection configuration will be based on the proposed intersection configuration shown in the *Bayview Lexis Residential Subdivision Revised TIS (2020)*, prepared by TMIG.

3.1.6 Fourth Line Urbanization

Fourth Line is a north-south Town of Milton collector road with a rural cross-section. Town of Milton staff have indicated that the urbanization of Fourth Line along the frontage of the subject site, in accordance with the Town of Milton 20-metre road cross-section standard, will be required. As such, it is anticipated that upon full-build-out of the development, Fourth Line will be urbanized in accordance with the Town of Milton 20-metre road cross-section shown in Figure 12 below.

Figure 12: Town of Milton 20-metre Road ROW



3.1.7 Active Transportation

The *Halton Region Active Transportation Master Plan* (2015) includes the proposed regional cycling and walking networks. The following active transportation improvements have been proposed within the Study Area and are assumed to be implemented by the 2026 future horizon:

- Bike lanes on James Snow Parkway and Britannia Road
- Boulevard multi-use trails on James Snow Parkway and Britannia Road

The *Town of Milton Transportation Master Plan* (2018) includes the proposed cycling and walking networks within the Study Area. The planned improvements on the Regional Road network as listed above are confirmed within this TMP and are also listed below for consistency. The following active transportation improvements proposed within the Study Area, along with their estimated implementation dates are shown below:

- In-boulevard multi-use trail on both sides of Britannia Road and James Snow Parkway (Short Term: 2018-2021)
- Bike lanes on Trudeau Drive (north-south future collector road) (Medium Term: 2021-2031)
- Bike lanes on Whitlock Avenue (east-west future collector road) (Medium Term: 2021-2031)
- On-road signed bike route on Fourth Line south of Britannia Road (Medium Term: 2021-2031)
- Bike lanes on Fourth Line north of Britannia Road (Medium Term: 2021-2031) (potential)

As none of the listed active transportation improvements have been built at the time of this study, they will only be considered for the 2026 future analysis horizon. No plans to construct the proposed bike lanes on Fourth Line have been indicated at this time and as such, they are noted as a potential improvement only.

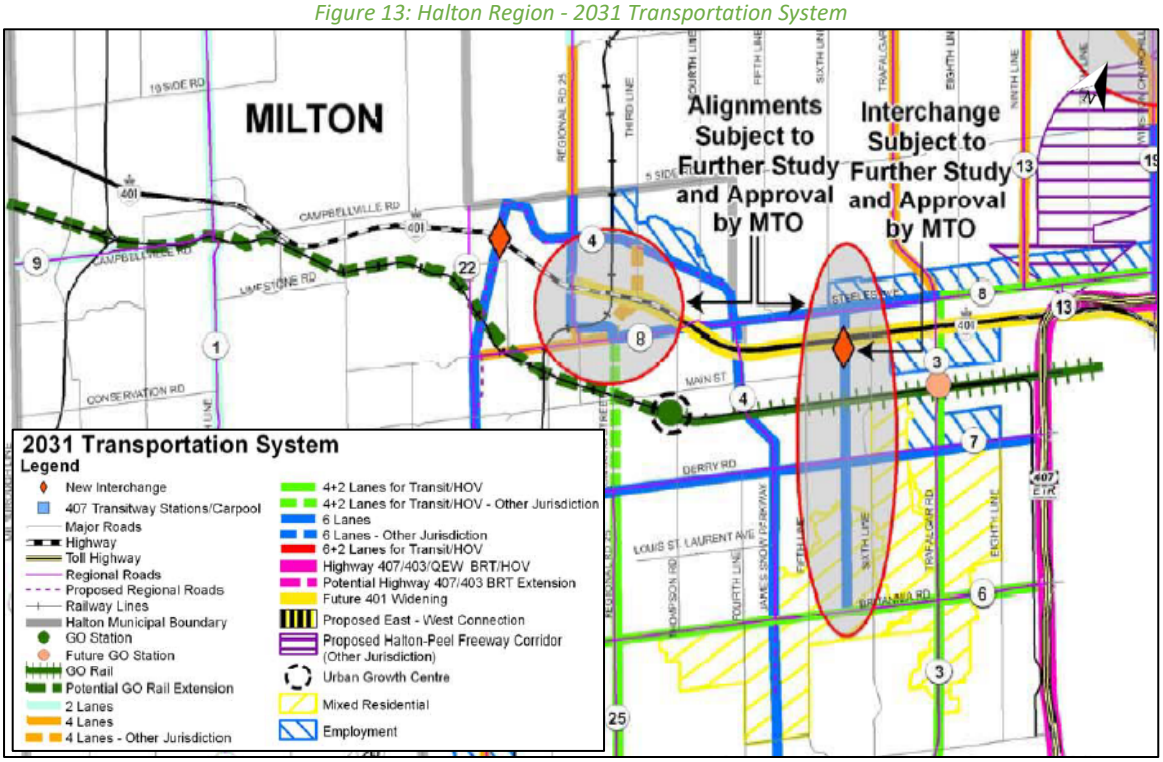
Additionally, sidewalks and bike lanes are assumed on both sides of Whitlock Avenue, Trudeau Drive and the east-west collector road within the Study Area.

3.1.8 Transit

3.1.8.1 Halton Region Transportation Master Plan

Halton Region's Transportation Master Plan identifies Britannia Road as having the potential for a transit route, as it indicates two lanes are reserved for Transit/HOV uses as shown below in Figure 13.

Figure 13: Halton Region - 2031 Transportation System



3.1.8.2 Town of Milton Transportation Master Plan

The Town of Milton's Transit Service Review and Master Plan Update (June 2019) identifies potential options for future transit route re-alignment based on the proposed road network. In the proposed "medium-term" (defined as 2022-2025) transit network, as well as the "long-term" (beyond 2025) the potential for Route 3 (Trudeau) to be extended along Trudeau Drive into the proposed development, as well as on the east-west collector road, to the west of Trudeau Drive is shown.

Figure 14 and Figure 15 show the medium-term and long-term transit routes, respectively, proposed by the Town of Milton. Excerpts from the Town of Milton's Transit Service Review and Master Plan Update (June 2019), can be seen in Appendix H.

Figure 14: Town of Milton Proposed Transit Routes – Medium-term

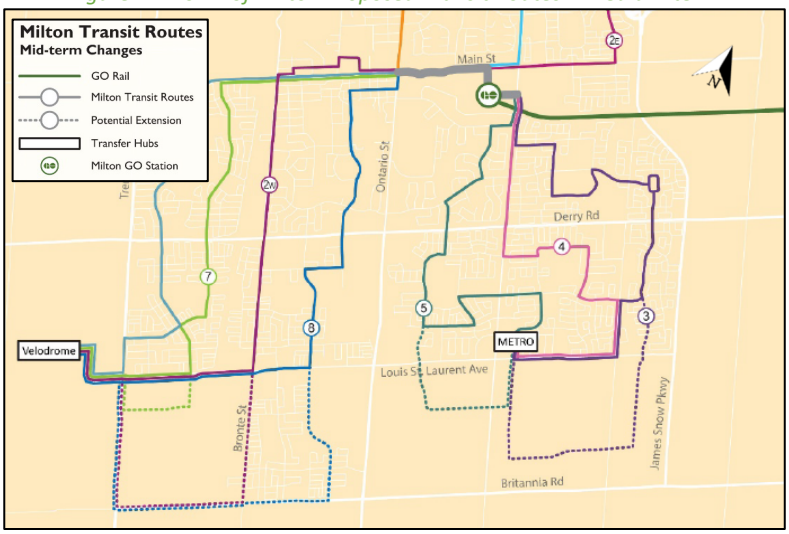
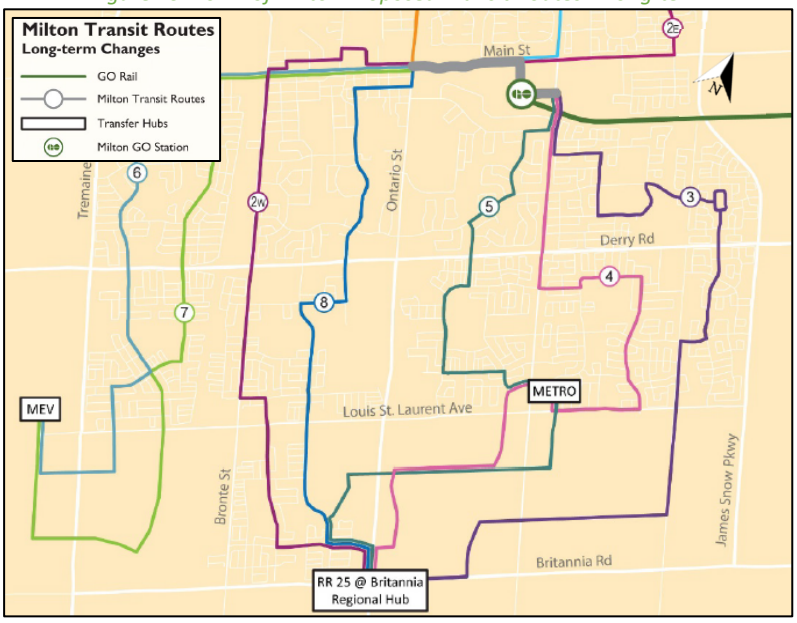


Figure 15: Town of Milton Proposed Transit Routes – Long-term



3.1.9 Other Study Area Developments

The development roadways are assumed to be available prior to build-out completion and have been considered as part of the future background network. This assumption has been made for analysis purposes only and the actual timing and construction of the roadways will proceed according to the requirements of site construction. As such, all Study Area intersections and Site Accesses have been shown in the below figures.

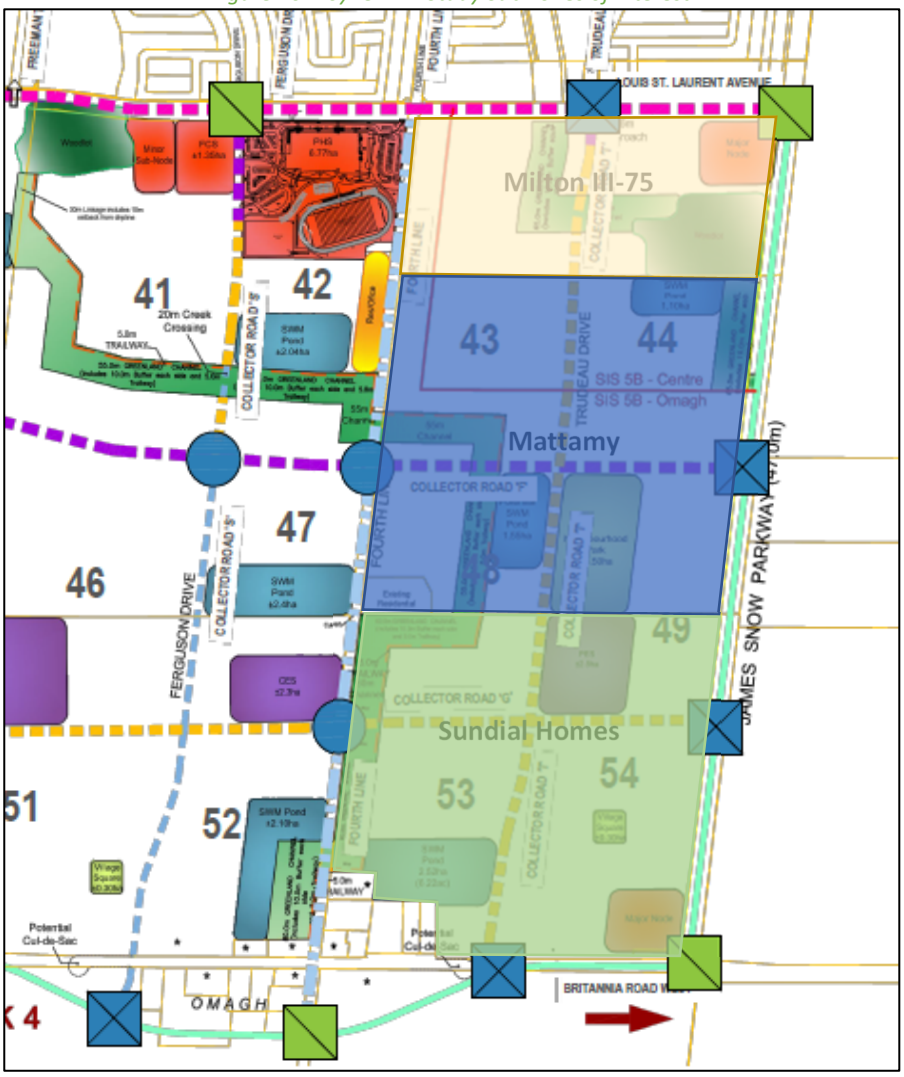
3.1.9.1 Boyne Secondary Plan Area – East and West Tertiary Plan Areas

The surrounding proposed developments within close proximity to the subject development are primarily within the Boyne Secondary Plan Survey Area. It is assumed that both the Boyne Survey East Tertiary Plan area and the Boyne Survey West Tertiary Plan area will be fully built-out and occupied by the 2026 future analysis horizon. In accordance with direction from Region of Halton and Town of Milton staff given to the adjacent development to the north (*Bayview Lexis Residential Subdivision Revised TIS (2020*), the site trip contributions for the subject development, the Mattamy development directly to the north, and the Milton III-75 development to the north as determined in the Boyne RNA, will be estimated and removed from the site-generated trips taken from the Boyne RNA as more recent site statistics at these three developments are available. Using these updated development statistics, the site-generated volumes for both the Mattamy development directly to the north and the Milton III-75 development to the north will be added to the reduced Boyne RNA site-generated volumes to determine the contribution of the background developments within the Boyne Secondary Plan area.

3.1.9.1.1 Boyne Secondary Plan Area – East and West Blocks – Volume Removal

The subject development, the Mattamy lands, and the Milton III-75 lands make up the Boyne traffic sub-zones 43, 44, 48, 49, 53, and 54, as defined the Boyne RNA study. Figure 16 below, shows the sub-zones of interest.

Figure 16: Boyne RNA Study Sub-zones of Interest



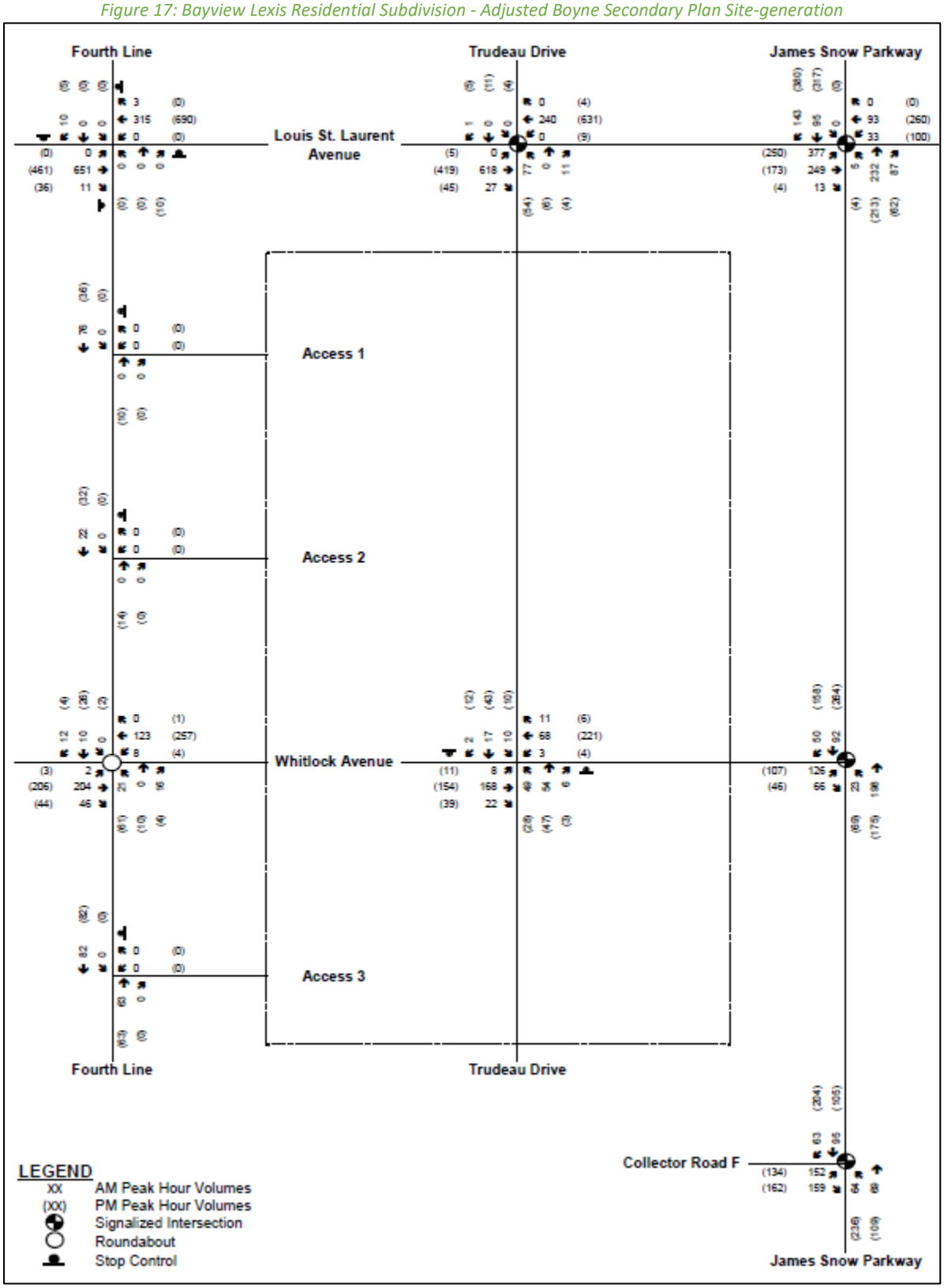
The Boyne RNA study determines site generated trips for the low and medium density residential units based on existing trip rates taken from the Bristol Survey neighbourhood north of Louis St. Laurent Avenue. For the high-density residential units, the commercial land uses, and the Elementary Schools, ITE Trip Generation Manual 8th Edition was used. For high density residential units, the Land Use Code "230 Residential Condominium /Townhouse" was used, for the commercial land uses, the Land Use Code "820 Shopping Centre" was used, and for the Elementary Schools, the Land Use Code "520 Elementary School" was used. A pass-by rate of 43% was applied to the commercial land use trip generation in the PM peak period, and a 75% internal capture rate was applied to the elementary school land use trip generation in both the AM and PM peak periods. Table 9 below summarizes the land use and resulting trip generation of the sub-zones of interest, following the methodology used in the Boyne RNA report.

Table 9: Boyne RNA Sub-zones of Interest - Trip Generation

Sub-zone	Land Use	Units / GFA	Weekday AM Peak Hour Trip Generation			Weekday PM Peak Hour Trip Generation		
			In	Out	Total	In	Out	Total
43	Low & Medium Density	257	43	99	142	111	77	188
44	Low & Medium Density	302	50	116	166	130	90	220
	High Density	160	11	53	64	51	26	77
	Commercial	21,130 ft^2	11	7	18	19	21	40
48	Low & Medium Density	246	41	94	135	106	72	178
49	Low & Medium Density	401	66	154	220	172	120	292
	Elementary School	1 school	50	21	71	11	13	24
53	Low & Medium Density	135	23	52	75	58	41	99
54	Low & Medium Density	337	56	129	185	145	101	246
	High Density	115	8	38	46	37	19	56
	Commercial	15,479 ft^2	8	5	13	14	15	29
Total			**367**	**768**	**1135**	**854**	**595**	**1449**
Milton III-75 & Mattamy ***(Sub-zone 43, 44, 48 (50%), 49 (60% of residential))***			*175*	*414*	*589*	*467*	*322*	*789*
Sundial Homes **(Sub-zone 48 (50%), 49 (40% of residential + school), 53, 54)**			*192*	*354*	*546*	*387*	*273*	*660*

The TIS completed for the adjacent development to the north (*Bayview Lexis Residential Subdivision Revised TIS (2020)*) has determined the adjusted Boyne Secondary Plan site-generated trips inclusive of volume reductions for the removal of the Mattamy and Milton III-75 developments. These volumes are shown in Figure 17 below.

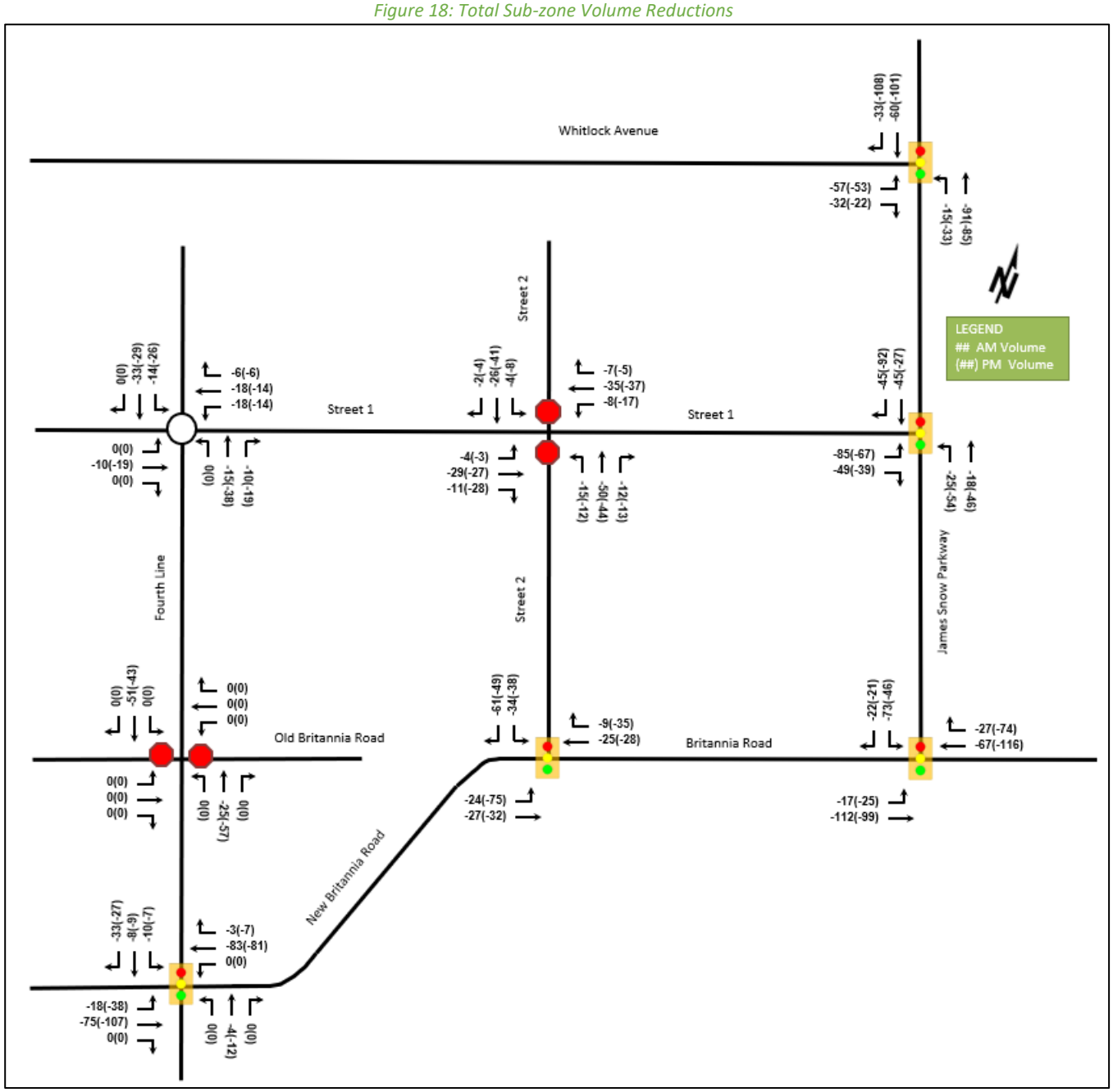
Figure 17: Bayview Lexis Residential Subdivision - Adjusted Boyne Secondary Plan Site-generation



The resulting reductions to the Boyne Secondary Plan RNA site-generated traffic as a result of the removal of the Mattamy and Milton III-75 developments have been assigned to the Study Area intersections using the Boyne Secondary Plan RNA site-generated traffic turning movement splits, access to major transportation infrastructure, and general knowledge of the area.

Additionally, the Sundial Homes site-generated traffic contribution to the Boyne Secondary Plan site traffic has been calculated using the sub-zones as discussed above. This traffic has been assigned to the Study Area intersections using the distribution and assignment discussed below in Section 4 with consideration given to the applied assignment in the Boyne RNA report. The total sub-zone volume reductions applied to the Boyne RNA site-generated traffic as a result of the subject development, the Mattamy development and the Milton development is shown in Figure 18.

Figure 18: Total Sub-zone Volume Reductions



3.1.9.1.2 Boyne Secondary Plan Area – East and West Blocks – Volume Addition

The two proposed developments (Mattamy Lands and Milton III-75 lands) within close proximity to the Sundial Homes development are expected to directly impact the Study Area intersections and road network. As discussed above, as more recent site statistics are available for these two developments within the east block of the Boyne

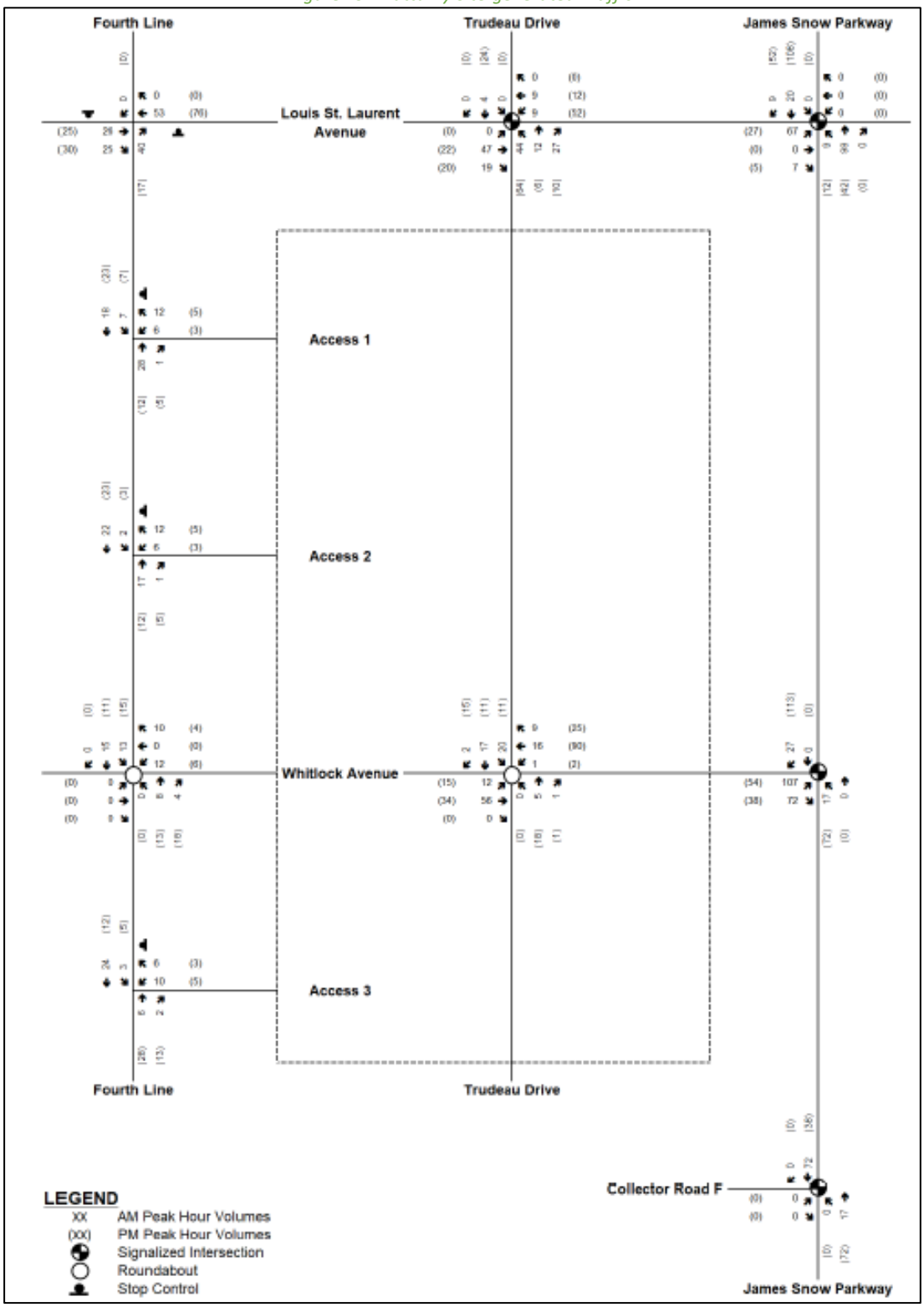
Secondary Area, updated site trip generation will be used to correct the assumptions and resulting trip generation used in the Boyne RNA study for the two developments.

Both background developments, and the traffic associated with it, has been summarized below:

Mattamy Lands:

The Mattamy lands are within the Boyne Secondary Area and is located directly north of the proposed development. Approximately 392 detached units, 409 townhouse units, and 8.82 acres of park area are proposed. Access to this development will be via roads through adjacent developments to Louis St. Laurent Avenue and Britannia Road with direct access to James Snow Parkway and Fourth Line. The Mattamy lands are assumed to be built-out and occupied by the 2026 future background analysis horizon. The traffic generated by the Mattamy development is summarized in Figure 19 and has been taken from the *Bayview Lexis Residential Subdivision Revised TIS (2020)*, prepared by TMIG.

Figure 19: Mattamy Site-generated Traffic

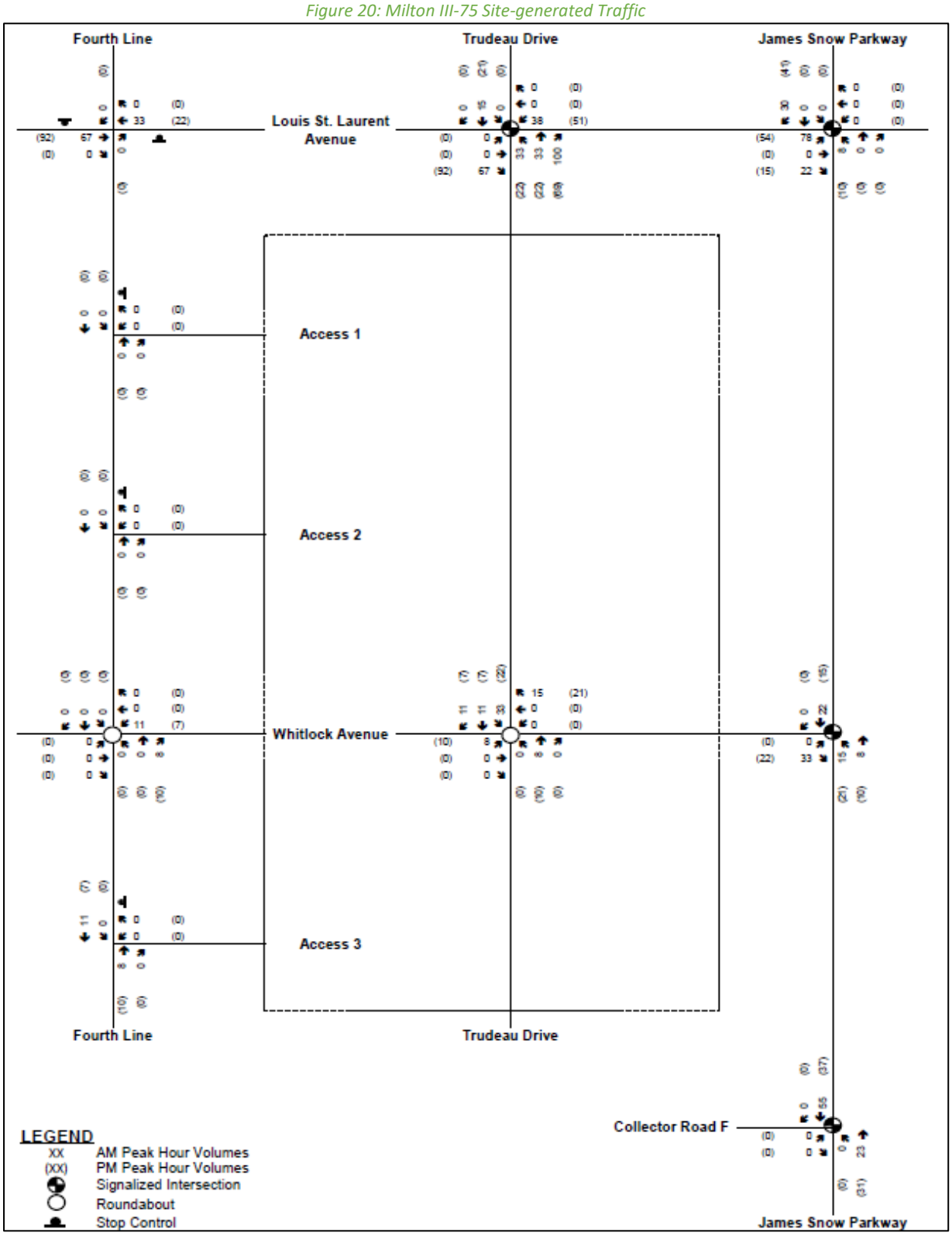


Milton III-75 Lands:

The Milton III-75 lands are within the Boyne Secondary Area and is located north of the proposed development. Approximately 114 detached units, 141 townhouse units, 160 high rise units, and 20,850 ft^2 of commercial uses are proposed. Access to this development will be via roads through adjacent developments to Britannia Road with direct access to Louis St. Laurent Avenue, James Snow Parkway and Fourth Line. The Milton III-75 lands are

assumed to be built-out and occupied by the 2026 future background analysis horizon. The traffic generated by the Milton III-75 development is summarized in Figure 20 and has been taken from the *Bayview Lexis Residential Subdivision Revised TIS (2020)*, prepared by TMIG as it was indicated by Region and Town staff in the Bayview Lexis TOR that the currently available TIS for the Milton III-75 lands should not be used.

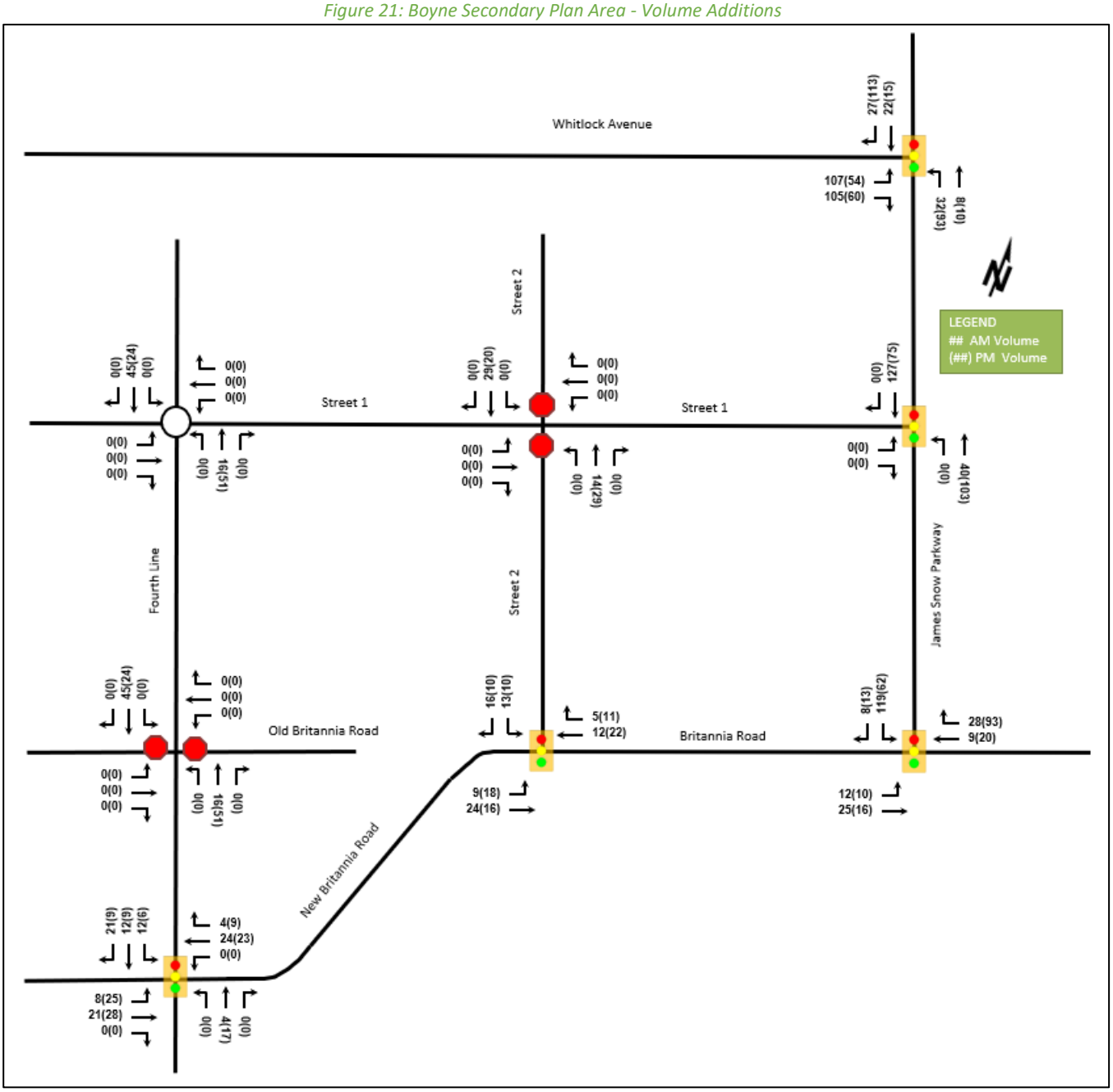
Figure 20: Milton III-75 Site-generated Traffic



The estimated site-generated vehicle trips for both the Mattamy lands and the Milton III-75 lands have been taken from the *Bayview Lexis Residential Subdivision Revised TIS (2020)* and have been applied to the Study Area intersections using the Boyne Secondary Plan site-generated traffic turning movement splits, access to major transportation infrastructure, and general knowledge of the area.

Figure 21 summarizes the volume additions to the Boyne Secondary Plan Area to account for the most recent site statistics at the Mattamy lands directly to the north, and the Milton 111-75 lands to the north.

Figure 21: Boyne Secondary Plan Area - Volume Additions



3.1.9.2 Derry Green Business Park

The Derry Green Business Park is a 2,000 acre area zoned for industrial businesses located northeast of the subject development. The Derry Green Business Park is located in the Milton Urban Expansion Area and is bordered by James Snow Parkway to the west, Highway 401 and Sixteen Mile Creek to the north, Sixth Line to the east, and the Sixteen Mile Creek to the south.

As discussed in the Boyne RNA study, approximately 503 two-way vehicle trips during the AM peak hour, and 726 two-way vehicle trips during the PM peak hour are expected to be generated by the Boyne Survey Area at full build-out and occupancy. Approximately 350 two-way vehicle trips during both the AM and PM peak hours were expected to be generated by areas outside of the Boyne Survey Area and were assigned to the westbound right and southbound left-turn movements at the intersection of James Snow Parkway and Louis St. Laurent Avenue. As such, the Derry Green Business Park will not be explicitly accounted for in the background traffic and has instead been accounted for in the conservative growth rates applied.

3.1.10 Background Growth

As per Halton Region staff comments, compound annual growth rates have been applied to Study Area intersections in two stages to determine the future background 2026 future horizon volumes. The first stage will apply growth rates to the 2021 existing traffic volumes to determine Study Area intersection volumes at an intermediate horizon of 2023. The second stage will apply growth rates to the 2023 future background volume horizon to determine Study Area intersection volumes at the 2026 future background analysis horizon.

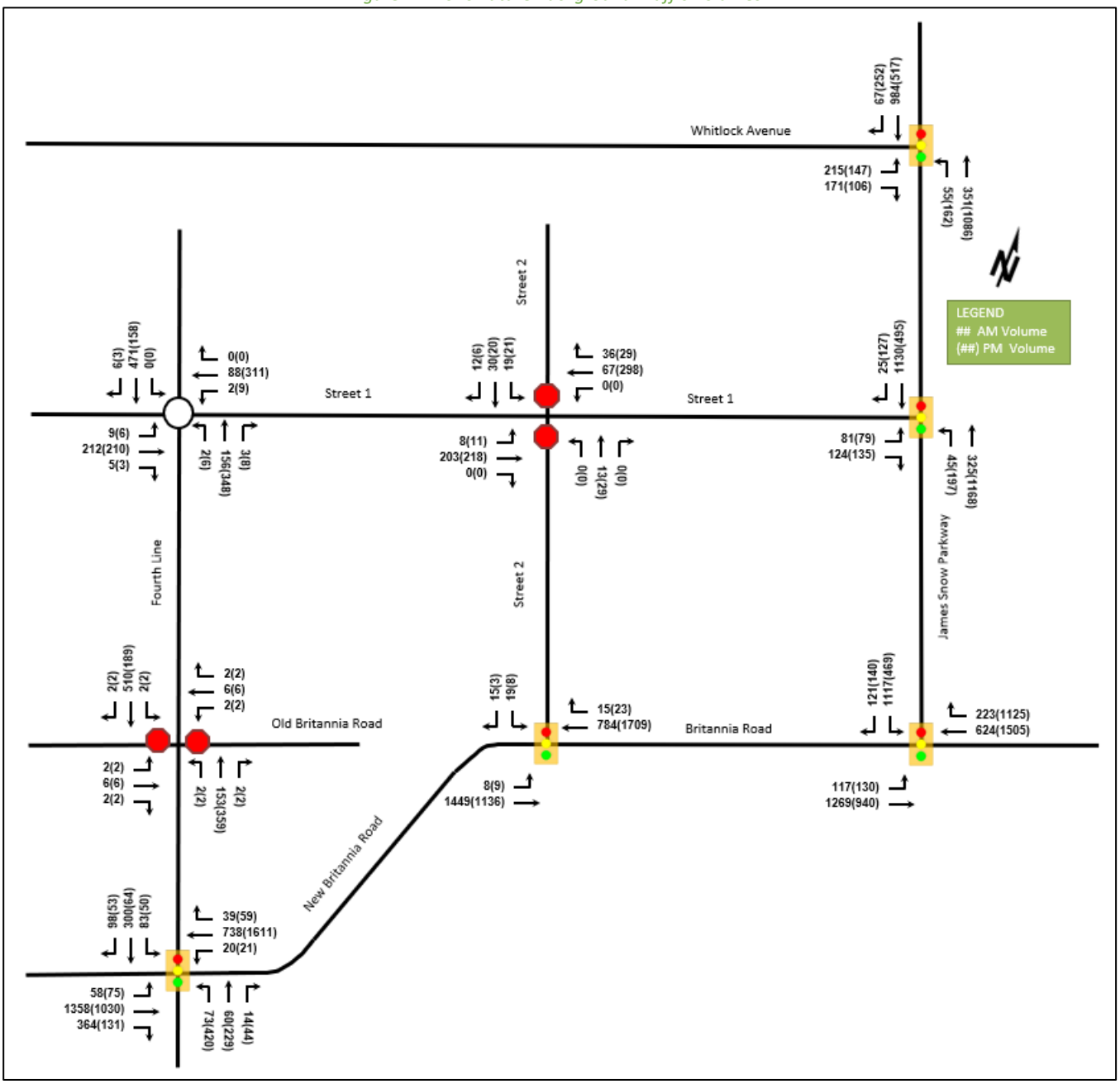
As indicated by Region and Town staff, a 2% compound annual growth rate will be applied to the existing 2021 traffic volumes at all Study Area intersection movements to determine the 2023 future background volumes.

A compound annual growth rate of 9% will then be applied to James Snow Parkway, 2% will be applied to Fourth Line and all Town of Milton roads, and 5.5% will be applied to Britannia Road. These growth rates will be applied to the 2023 future background horizon volumes to determine the 2026 future background analysis horizon volumes. The 9% growth rate will only be applied to the northbound and southbound through movements on James Snow Parkway at collector road intersections and will be applied to the southbound left-turn and southbound right-turn movements at the intersection of Britannia Road. The 5.5% growth rate will only be applied to the eastbound and westbound through movements on Britannia Road at all Study Area intersections along Britannia Road. Additionally, the 5.5% growth rate will be applied to the eastbound left-turn movement and the westbound right-turn movement at the intersection of James Snow Parkway and Britannia Road. All other intersection movements within the Study Area will have a 2% compound annual growth rate applied to them to determine the 2026 future background analysis horizon volumes.

3.1.11 Future Background Traffic Volumes

Using the background growth rate established above, the balanced 2021 turning movement volumes were grown to reflect the 2026 future background traffic volumes. The Boyne RNA site-generated traffic volumes, reduced by the volume contributions from the subject development, Mattamy development, and Milton III-75 development, have been directly considered in the background conditions. The updated Mattamy, and Milton III-75 site-generated volumes have also been directly considered in the background conditions. At the intersection of Old Britannia Road and Fourth Line, 20 AM and 20 PM peak periods trips have been conservatively assumed as a result of the existing residential properties that front onto to Old Britannia Road, east of Fourth Line, and west of Fourth Line, and have been assigned to the intersection accordingly. The resulting 2026 future background traffic is illustrated in Figure 22.

Figure 22: 2026 Future Background Traffic Volumes



It is noted that Halton Region staff originally requested an additional future background analysis horizon year of 2023. As the anticipated build-out of the subject development is well beyond the requested 2023 future analysis horizon, Halton Region staff have agreed that a 2023 future analysis horizon is not required. To understand the potential implications on the proposed collector roadway intersection at James Snow Parkway, in the unlikely event James Snow Parkway is not fully widened in the 2026 future analysis horizon, an additional analysis scenario has been requested. This scenario will look at the collector road intersection and James Snow Parkway only in the 2026 future analysis horizon, assuming James Snow Parkway has not yet been widened. Halton Region staff have indicated that in this scenario, a 2% growth rate can be applied to James Snow Parkway from the 2021 existing conditions to the 2026 future conditions. Figure 23 below shows the additional scenario 2026 future background horizon volumes at the intersection of Street 1 and James Snow Parkway.

Figure 23: 2026 Future Background Additional Horizon Volumes

4 Forecasting

4.1 Development-Generated Travel Demand

4.1.1 Trip Generation and Mode Shares

The ITE Trip Generation Manual 10th Edition has been reviewed to determine the appropriate trip generation rate equations for the proposed residential land uses. The rate equations were used to determine appropriate vehicle trip generation rates. The Multifamily Housing (Low-Rise) is used to estimate trips for the street, rear access, and back-to-back townhouses, and the Multifamily Housing (Mid-Rise) is used to estimate trips from the high-density apartment units.

Table 10 summarizes the vehicle trip rates for the proposed residential land uses.

Table 10: Trip Generation Vehicle Trip Rates

Land Use	Land Use Code	Peak Hour	Vehicle Trip Rate
Single Family Detached	210	AM	0.73
		PM	0.98
Multifamily Housing (Low-Rise)	220	AM	0.44
		PM	0.49
Multifamily Housing (Mid-Rise)	221	AM	0.36
		PM	0.44

Trip generation from the elementary school has been evaluated using a first principles approach. Elementary schools are likely to have a short duration peak of 15 minutes prior to the start and end of classes and these peaks are individual to every elementary school. It was previously assumed that all teachers and support staff will travel outside of the peak hours and therefore no net new vehicle peak hour trips as a result of the school were

anticipated. Based on comments received from both Town and Region staff, trip generation for the elementary school has been considered. Halton District School Board staff have provided a rough estimate of 106 staff at peak school operation. Following a comparison of start and end times of surrounding elementary schools in the area, to the peak periods of the collected Study Area intersection Turning Movement Counts (TMC), it is estimated that 80% of teachers and staff will arrive at the school in the AM peak analysis period, and 10% of teachers and staff will leave the school in the PM peak analysis period. This methodology has been approved by Town and Region staff. Documentation of correspondence with Halton District School Board staff as well as Town and Region staff can be found in Appendix I. Table 11 below indicates the start and end time of surrounding elementary schools, and Table 12 below indicates the AM and PM peak periods of the collected TMCs for comparison purposes.

Table 11: Elementary School Peak Periods

School	Start Time	End Time
Boyne Public School	8:40	15:30
Chris Hadfield Public School	8:25	15:25
Guardian Angels Catholic Elementary School	8:30	15:00

Table 12: Collected Turning Movement Count Peak Periods

Turning Movement Count (TMC)	AM Peak	PM Peak
Britannia Road & James Snow Parkway	7:15-8:15	17:00-18:00
Britannia Road & Fourth Line	7:15-8:15	16:45-17:45

It is noted that any drop-off or pick-up trips performed using cars are considered pass-by trips which cannot be shown as the school accesses are not considered. Additionally, the elementary school is assumed to generate non-staff trips within the proposed development only, with the majority being active mode trips. As such only teacher and staff trip generation has been considered for the elementary school.

Trip generation from the village square land use has not been considered. The village square land use (park) is assumed to only generate trips within the proposed development as this small park will only draw residents from a small catchment area and will primarily be accessed via active mode.

Using the above Vehicle Trip rates, the total vehicle trip generation has been estimated. Table 13 below illustrates the total trip generation by dwelling type.

Table 13: Total Vehicle Trip Generation

Land Use	Units / peak staff	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single Family Detached	253 units	46	139	185	156	92	248
Multifamily Housing (Low-rise)	546 units	55	185	240	169	99	268
Multifamily Housing (Mid-rise)	295 units	25	72	97	76	48	124
Elementary School	106 staff	85	0	85	0	11	11
Total Vehicle Trips		**211**	**396**	**607**	**401**	**250**	**651**

As shown above, 607 AM, and 651 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

4.1.1.1 Boyne Survey RNA-Trip Generation Comparison

The Boyne Survey RNA study trip generation for the Sundial Homes development have been calculated and discussed above in Section 3.1.9. A comparison of the volume contributions considered in the Boyne Secondary Plan RNA study and the total vehicle trip generation based on updated site statistics, as shown in Table 13 above, can be seen in Table 14 below.

Table 14: Total Vehicle Trip Generation Comparison

Scenario	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Boyne RNA	192	354	546	387	273	660
Updated Statistics	211	396	607	401	250	651
Difference	+19	+42	+61	+14	-23	-9

As shown above, 61 AM additional peak hour two-way vehicle trips are projected as a result of the proposed development, and nine fewer peak hour two-way vehicle trips are projected as a result of the proposed development in comparison to the vehicle trips generated within the Boyne RNA study.

4.1.2 Trip Distribution

To understand the travel patterns of the subject development, the 2016 Transportation Tomorrow Survey (TTS) has been reviewed to determine the future travel patterns for the traffic zone containing the proposed development (traffic zone 4109). As the existing travel patterns for traffic zone 4109 are not representative of future expected travel patterns, the adjacent traffic zone (4110) has been analyzed as a proxy zone given its existing land uses are similar to the proposed land uses of traffic zone 4109.

This information was then used to develop an overall trip distribution for proxy traffic zone 4110. The resulting trip distribution for traffic zone 4110 is illustrated in Table 15 and has been applied to the proposed development. The origin-destination data generated from the 2016 Transportation Tomorrow Survey is shown in Appendix J.

Table 15: Traffic Zone 4110 Trip Distribution

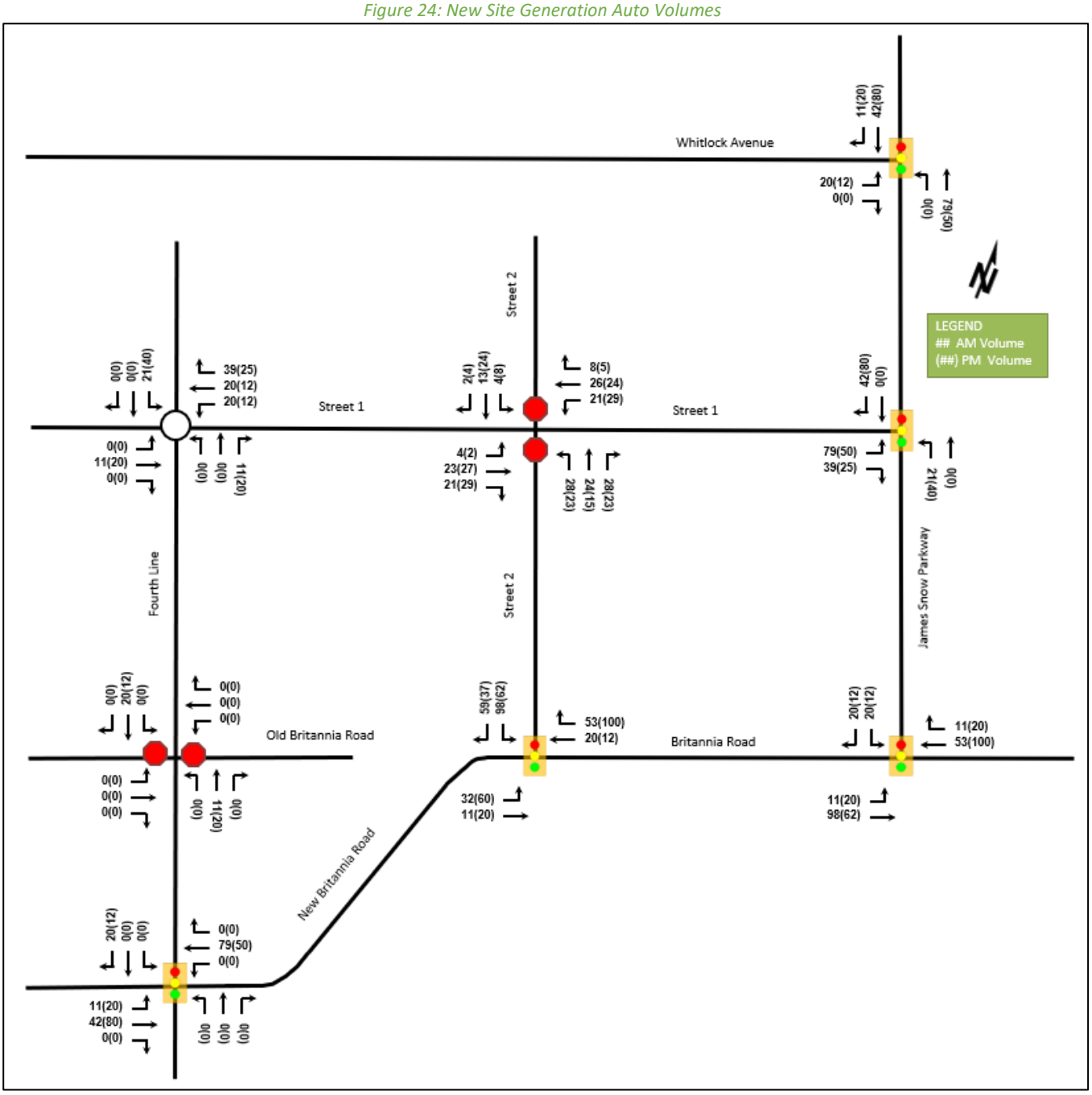
To/From	Percent of Trips
North	30%
South	10%
East	35%
West	25%
Total	100%

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.

Figure 24 illustrates the 2026 new site traffic generated volumes.

Figure 24: New Site Generation Auto Volumes



4.1.4 Future Total Travel Demands

The site generated traffic has been combined with the 2026 future background traffic volumes to estimate the future total traffic volumes. The 2026 future total traffic volumes are illustrated in Figure 25.

Figure 25: 2026 Future Total Traffic

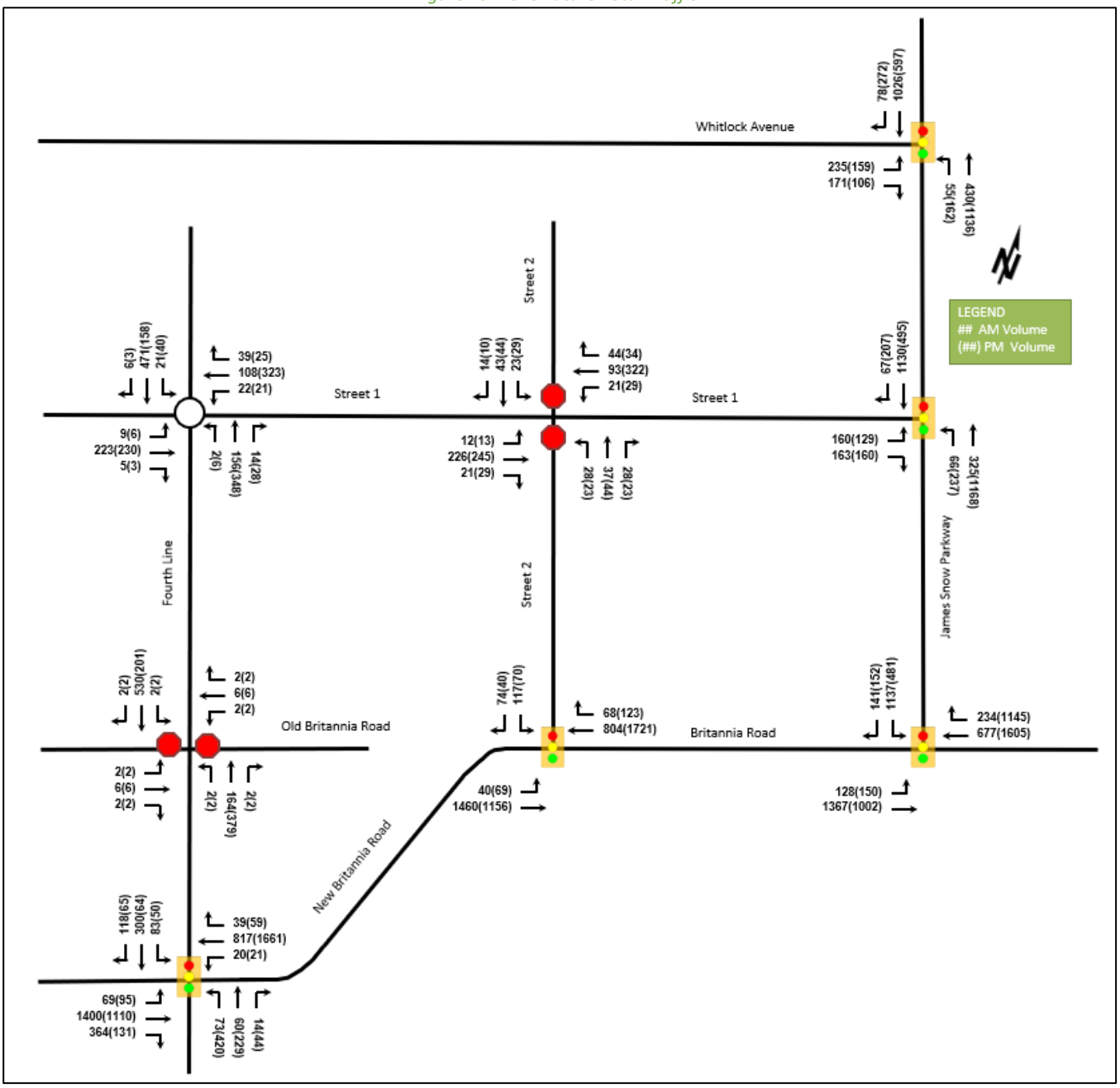
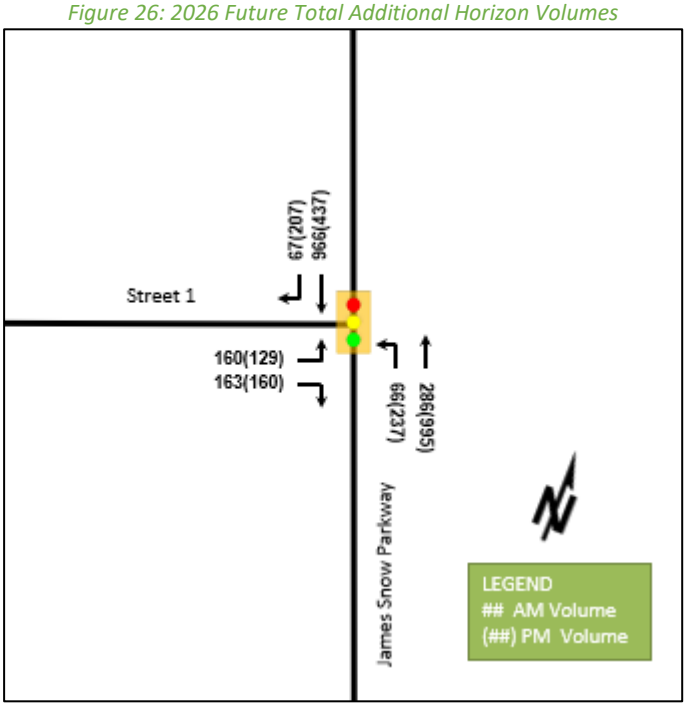


Figure 26 below shows the additional scenario 2026 future background horizon volumes at the intersection of Street 1 and James Snow Parkway.

Figure 26: 2026 Future Total Additional Horizon Volumes



5 Site Circulation

5.1 Development Roadway Cross-sections

Roadway cross-sections provided by the Town of Milton have been considered for the proposed development's internal road network. The provided cross-sections for 24-metre minor collector roadways, and 16-metre local roadways have been used.

Sidewalks are proposed on both sides of the 24-metre minor collector roadways. As noted on the 16-metre double loaded local roadway cross-section, sidewalks on one side of the road are accepted when justified. Within the subject development, single-sided sidewalks are appropriate considering the following points:

- The north-south and east-west minor collector roadways provide sidewalks on both sides of the road and allow for sufficient pedestrian connections to the local road network;
- Single-sided sidewalks on the local roads will contribute to a "greener" community feel;
- Sidewalks can be strategically placed on the side of the local road which will limit the number of pedestrian crossings and subsequently promote pedestrian safety and comfort within the subject development; and
- Reduce the amount of yearly winter maintenance, as well as long-term maintenance and repair.

As such, the only local road within the subject development proposed to have sidewalks on both sides is Street 8 to ensure adequate pedestrian connection between the existing houses to remain on Britannia Road on the northeast corner of Old Britannia Road and Fourth Line, and the subject development. All other local roads will have single-sided sidewalks.

Bike lanes and parking lanes are proposed on both sides of the 24-metre minor collector roadways. The exact location of the parking lanes will be determined by driveway and fire hydrant locations.

Within the proposed development, a 24-metre minor collector roadway (Street 2) runs in the north-south direction with a connection to Britannia Road on the south end and a connection to the adjacent lands to the north. A 24-metre minor collector roadway (Street 1) runs in the east-west direction with a connection to James

Snow Parkway on the east end and Fourth Line on the west end. The surrounding local roadway network within the development is made up of 16-metre local roads with a few 16-metre window streets.

While outside of the development roadway network, it is noted that Whitlock Avenue has been considered a major collector roadway with a 26-metre right-of-way.

Further details on the various roadway cross-sections can be found in Appendix K.

5.2 Site Circulation

Given the proposed development's context within the Boyne Survey Secondary Plan area, negligible cut-through traffic / infiltration is expected to occur within the road network. As the development is bordered by James Snow Parkway, Britannia Road, and Fourth Line, drivers are more likely to travel along these roads with higher posted speed limits and fewer intersections than contribute to cut-through traffic or infiltration within the proposed development.

6 Access Analysis and Site Circulation

6.1 Access Configuration

All accesses have been considered as full-movement accesses and consider the appropriate cross-sections found in Appendix K. Further intersection geometric configuration details are provided within Section 8 below.

6.2 Access Spacing

The access spacing has been reviewed using Halton Region's *Access Management Guideline* (January 2015). For the full-movement accesses on James Snow Parkway and Britannia Road, the minimum access spacing required is 300 metres measured stop bar to stop bar. No minimum access spacing is outlined for Fourth Line as it is not a Regional Road.

Along James Snow Parkway, Street 1 is located approximately 400 metres north of Britannia Road, and 390 metres south of the adjacent development's access to the north. All measurements are from stop bar to stop bar.

Along Britannia Road, Street 2 is located approximately 330 metres east of Fourth Line and 285 metres west of James Snow Parkway, measured stop bar to stop bar. A technical memo supporting the proposed intersection location of Street 2 At Britannia Road dated February 2, 2022 was prepared and justifies the intersection location using the projected 2026 future total 95th percentile queue lengths at both the intersection of James Snow Parkway at Britannia Road, and Street 2 at Britannia Road. This memo was approved by Halton Region and Town of Milton staff. Both the memo and subsequent approvals can be seen in Appendix L. It is noted that queues at these two intersections shown in this report differ slightly due to changes to the site generated traffic and background growth rates used to develop the 2026 future total volumes. As these changes are minimal and have reduced the queues on most intersection movements at these two intersections, the memo is still considered appropriate.

6.3 Access Sight Distance

No significant vertical or horizontal curvatures are present on the boundary road network are anticipated to impose limitations on the site lines at the proposed accesses.

7 Transportation Demand Management

7.1 Planned Active Transportation

Within the Sundial Homes lands, pedestrian desire lines have been developed in order to determine the optimal placement of sidewalks within the development to best serve the flow of pedestrians. The primary destinations

for pedestrians within the subject development are the proposed public elementary school in the northeast corner of the intersection of Street 1 and Street 2. The primary destinations for pedestrians outside of the subject development are to the adjacent developments to the north and to the west as they have both schools and park areas, which are significant pedestrian trip origin and destination points. The pedestrian desire lines for the proposed development can be seen in Figure 27.

The placement of sidewalks within the proposed development has been informed by the developed pedestrian desire lines and implemented based on the Town of Milton proposed cross-sections. As such, sidewalks will be provided on both sides of the minor collector roads. Sidewalks will be provided on one side of the local roads within the subdivision. To enhance cyclist connectivity and travel experience, bike lanes will be provided along both sides of Street 1 and Street 2. Further details regarding these planned facilities can be seen in their proposed cross-section drawings in Appendix K.

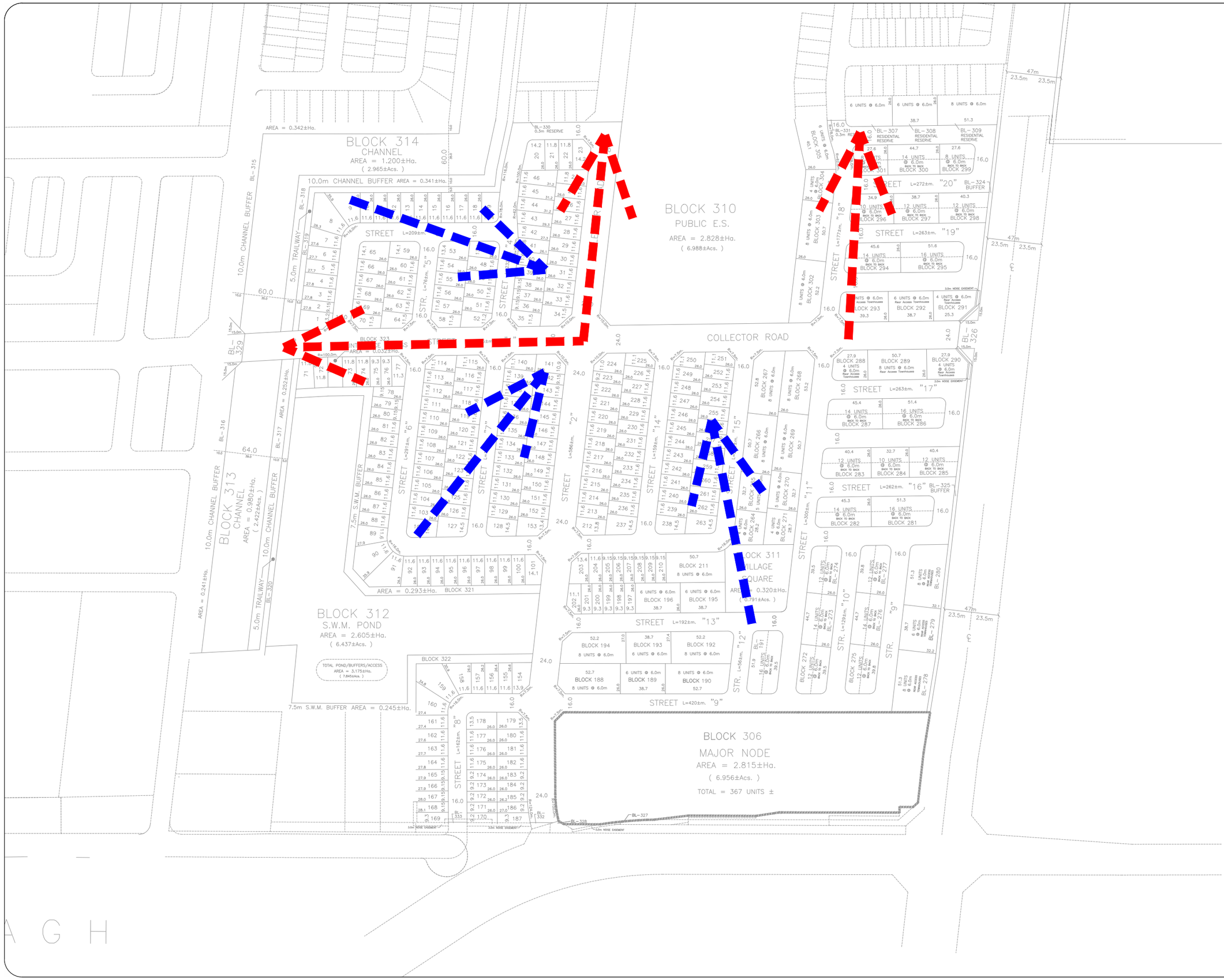
Additionally, a trail is proposed on the west side of the subject development lands between the adjacent development to the north, Fourth Line, and Britannia Road.

Outside of the subdivision, the pedestrian and cyclist facilities will connect to a broader and improved active transportation network provided by the Town and the Region as part of the Britannia Road widening project, James Snow Parkway widening project, and the urbanization of Fourth Line, which were previously discussed in Section 3.1. By the 2026 horizon, the active transportation infrastructure will include:

- Bike lanes and boulevard multi-use trails on both sides of James Snow Parkway
- Bike lanes and boulevard multi-use trails on both sides of Britannia Road
- Bike lanes (potentially) and sidewalks on both sides of Fourth Line
- Sidewalks on one side of Street 8 as it connects to Old Britannia Road
- Cycling and pedestrian facilities within adjacent proposed subdivisions

The corresponding 2026 Pedestrian and Cycling Concept Plans can be seen in Figure 28 and Figure 29, respectively.

Figure 27: Pedestrian Desire Lines



Notes:

LEGEND:

- Internal Desire Line
- External Desire Line

Internal Desire Lines Include:

- Public Elementary School

External Desire Lines Include:

- Catholic Elementary School
- Catholic High School
- Public High School
- Parks

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	AN	2023-04-20
01	Issued for Review	AN	2023-03-01

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Sundial Homes (4th Line) Limited

ARCHITECT:

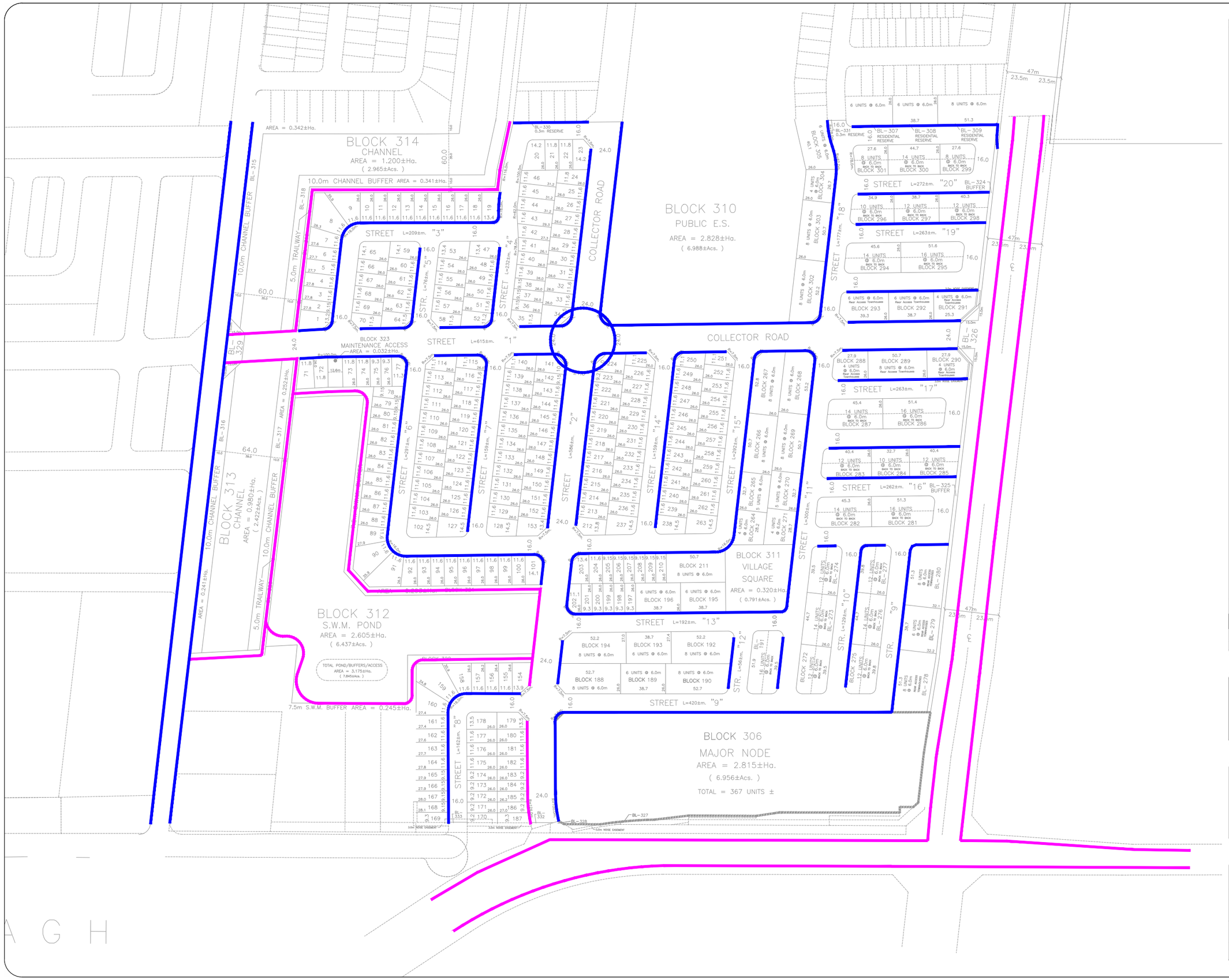
SITE: Sundial Homes (4th Line)

TITLE: Pedestrian Desire Lines Concept Plan

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2023-04-20	AN	MC

PROJECT NO:	DRAWING NO:	REVISION:
2021-014	003	02

Figure 28: 2026 Pedestrian Concept Plan



Notes:

LEGEND:

- Sidewalk
- Pedestrian Crossing
- Multi-use Pathway

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	AN	2023-04-20
01	Issued for Review	AN	2023-03-01

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Sundial Homes (4th Line) Limited

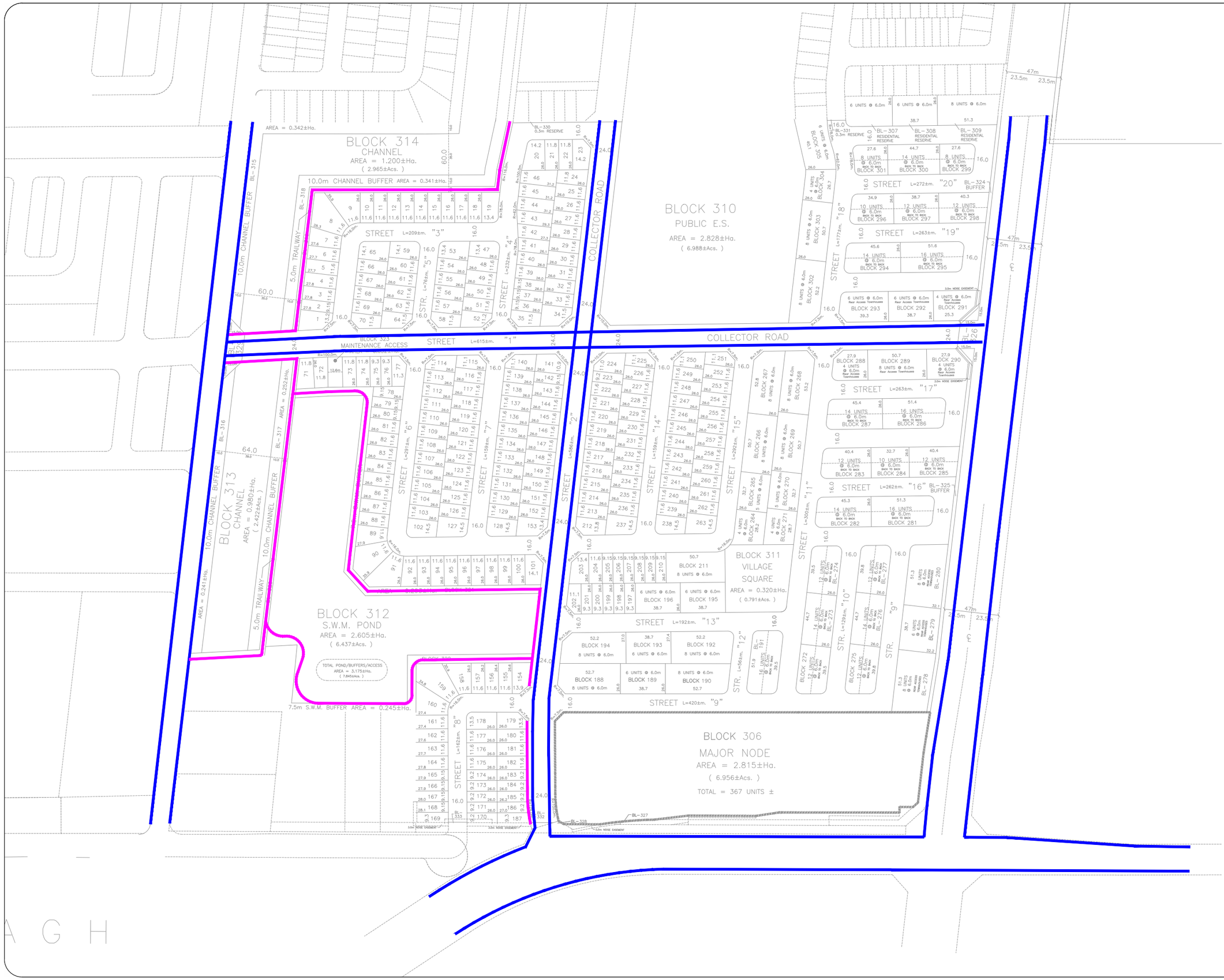
ARCHITECT:

SITE: Sundial Homes (4th Line)

TITLE: Pedestrian Facilities Concept Plan

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2023-04-20	AN	MC
PROJECT NO:	DRAWING NO:		REVISION:
2021-014	001		02

Figure 29: 2026 Cycling Concept Plan



Notes:

LEGEND:

- Cycle Lanes
- Multi-use Pathway

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	AN	2023-04-20
01	Issued for Review	AN	2023-03-01

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Sundial Homes (4th Line) Limited

ARCHITECT:

SITE: Sundial Homes (4th Line)

TITLE: Cycling Facilities Concept Plan

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2023-04-20	AN	MC
PROJECT NO:	DRAWING NO:		REVISION:
2021-014	002		02

7.2 TDM Measures

The Sundial Homes development supports active transportation, and access to public transportation.

As shown in Figure 28 and Figure 29 above, pedestrian and cycling facilities are proposed within the development and allow for connections to active transportation facilities on James Snow Parkway, Britannia Road, and Fourth Line. These proposed active mode facilities also provide connections for cyclists and pedestrians to existing and proposed public transportation routes surrounding and within the development, and in turn reduces reliance on single-occupancy vehicle trips.

Additionally, as Transportation Demand Management measures are typically more applicable to mid-rise blocks, they will be further examined as part of site applications for those individual sites as further details are developed.

8 Operational Analysis

Synchro (Version 10) and Sidra (Version 8.0) were used to model the Study Area intersections. Peak Hour Factors (PHF) have been calculated for the intersections of James Snow Parkway at Britannia Road, and Fourth Line at Britannia Road based on the existing turning movement counts and will be applied to both existing and future analysis horizons. At future intersections that include at least one Regional Road and where no 15-minute count data is available, the calculated Peak Hour Factors from adjacent intersections have been used. As per Town staff direction, a Peak Hour Factor of 1.00 has been used for all future intersections that include only Town roadways and where no 15-minute count data is available. Peak Hour Factor Calculations can be found in Appendix M. The Peak Hour Factors applied at each intersection are summarized in Table 16 below.

Table 16: Peak Hour Factors

Intersection	Horizon	Peak Hour Factor	
		AM	PM
James Snow Parkway & Britannia Road	Existing/Future	0.96	0.97
Fourth Line & Britannia Road	Existing/Future	0.94	0.97
Street 1 & James Snow Parkway	Future	0.96	0.97
Street 2 & Britannia Road	Future	0.96	0.97
Old Britannia Road & Fourth Line	Future	1.00	1.00
Street 1 & Fourth Line	Future	1.00	1.00
Street 1 & Street 2	Future	1.00	1.00
Whitlock Avenue & James Snow Parkway	Future	0.96	0.97

Heavy Vehicle percentages (HV%) have been calculated for each movement based on the existing turning movement counts for the Study Area intersections. Any HV% calculated to be less than 2% was entered as 2% in Synchro to ensure a conservative analysis. At intersections where no Heavy Vehicle percentage is available, 2% has been used. Heavy Vehicle percentage calculations can be found in Appendix N.

Pedestrian volumes were provided for those intersections with turning movement count information. As no pedestrians were recorded at the Study Area intersections given the general area context and lack of pedestrian infrastructure, a conservative assumption of 10 pedestrians/h has been used for each intersection leg and have been applied to the existing conditions analysis. As no cycling information was provided for any intersection, a conservative assumption of 5 cyclists/h has been used for each intersection leg in the existing conditions analysis. Pedestrian volumes of 10 pedestrians/h and cycling volumes of 5 cyclists/h have been used at all intersections in the future analysis horizons where applicable.

The LOS has been defined using the HCM 2000 definition for LOS at signalized intersections (Table 17) and unsignalized intersections (Table 18) for those intersections modelled in Synchro.

Table 17: 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 18: Level of Service Criteria for Unsignalized Intersections

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

The vehicle LOS for roundabouts 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 Halton Region Transportation Impact Study Guidelines (January 2015). Critical movements and critical intersections at signalized intersections have been defined as those with volume to capacity ratios of 0.85 or greater for the overall intersection, through movements, or shared through / turning movements, exclusive movements with V/C ratios of 0.95 or greater, and individual movements with queues projected to exceed available turning lane storage. These criteria have been applied to roundabouts as well.

Critical movements and critical intersections at unsignalized intersections have been defined as individual movements with LOS E or worse, and individual movements with queues projected to exceed available turning lane storage.

8.1 2021 Existing Conditions Operational Analysis

Table 19 summarizes the operational analysis for the 2021 existing conditions in both the AM and PM peak periods. Critical movements, as defined above, have been identified. Table 20 summarizes the 95th percentile queue of each movement for the 2021 existing conditions. Existing 2021 Synchro worksheets are included in Appendix O.

The Study Area intersections have been designed based on aerial photos and turning lane storage lengths have been rounded to the closest five-metre. All other parameters have been coded using accepted best practices and default parameters where applicable. The Synchro model has been coded using the existing traffic signal timing, provided by Halton Region which can be found in Appendix E.

Table 19: 2021 Existing Conditions Operational Analysis

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	B	0.18	13	C	0.51	24
	EBT	**D**	**0.96**	**44**	B	0.58	10
	WBT	C	0.64	26	**E**	**1.06**	**65**
	WBR	B	0.07	16	B	0.49	14
	SBL	**F**	**1.07**	**91**	D	0.53	38
	SBR	C	0.07	23	C	0.05	32
	Overall	***D***	***1.04***	***50***	***D***	***0.91***	***36***
Mitigation Measure – Signal Cycle Length and Signal Timing Split Optimization							
James Snow Parkway & Britannia Road (*Signalized*)	EBL	*B*	*0.19*	*16*	*C*	*0.57*	*31*
	EBT	***D***	***0.97***	***51***	*A*	*0.53*	*8*
	WBT	*C*	*0.63*	*29*	***C***	***0.94***	***34***
	WBR	*B*	*0.07*	*19*	*B*	*0.45*	*12*
	SBL	***E***	***0.99***	***71***	*E*	*0.67*	*57*
	SBR	*C*	*0.08*	*26*	*D*	*0.05*	*44*
	Overall	***D***	***1.01***	***48***	***C***	***0.87***	***24***
Fourth Line & Britannia Road (*Signalized*)	EBL/T/R	**F**	**1.25**	**142**	B	0.75	16
	WBL/T/R	B	0.64	16	**D**	**1.01**	**46**
	NBL/T/R	C	0.18	27	**F**	**1.85**	**435**
	SBL/T/R	D	0.81	43	C	0.32	35
	Overall	***F***	***1.17***	***89***	***F***	***1.26***	***110***
Mitigation Measure – Signal Cycle Length and Signal Timing Split Optimization							
Fourth Line & Britannia Road (*Signalized*)	EBL/T/R	***F***	***1.17***	***110***	*B*	*0.75*	*18*
	WBL/T/R	*B*	*0.60*	*16*	***D***	***1.01***	***49***
	NBL/T/R	*C*	*0.20*	*34*	***F***	***1.66***	***357***
	SBL/T/R	*E*	*0.84*	*55*	*D*	*0.28*	*40*
	Overall	***E***	***1.12***	***74***	***F***	***1.22***	***98***

Table 20: 2021 Existing Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	75	11	16
	EBT	N/A	#257	108
	WBT	N/A	110	#332
	WBR	80	9	41
	SBL	160	**#196**	47
	SBR	N/A	11	11
Mitigation Measure – Signal Cycle Length and Signal Timing Split Optimization				
James Snow Parkway & Britannia Road (Signalized)	*EBL*	*75*	*14*	*22*
	EBT	*N/A*	*#302*	*90*
	WBT	*N/A*	*127*	*#341*
	WBR	*80*	*10*	*21*
	SBL	*160*	*#215*	*61*
	SBR	*N/A*	*13*	*13*
Fourth Line & Britannia Road (*Signalized*)	EBL/T/R	N/A	#390	144
	WBL/T/R	N/A	114	#318
	NBL/T/R	N/A	21	#206
	SBL/T/R	N/A	#93	29
Mitigation Measure – Signal Cycle Length and Signal Timing Split Optimization				
Fourth Line & Britannia Road (Signalized)	*EBL/T/R*	*N/A*	*#457*	*176*
	WBL/T/R	*N/A*	*125*	*#383*
	NBL/T/R	*N/A*	*26*	*#241*
	SBL/T/R	*N/A*	*#115*	*34*
Notes:	*# 95th percentile queue exceeds capacity*			

As shown above, the existing Study Area intersections operate with multiple critical movement in both the AM and PM peak periods. Additionally, both intersections are considered to be critical based on their overall

operation. The 95th percentile queues at the Study Area intersections are not shown to exceed the available turning lane storage length identified for each auxiliary turn lane with the exception of the southbound left-turn lane at the intersection of James Snow Parkway and Britannia Road in the AM peak period.

As the 2021 existing volumes analyzed above are not raw volumes and are instead hypothetical volumes that have been grown using growth rates and the inclusion of Boyne West Tertiary Plan Area volumes. Therefore, no calibration has been performed.

Additionally, as per the request of Halton Region staff, signal timing optimization has been performed at the existing Study Area intersections by adjusting both cycle lengths and timing splits. While some improvements are noted as a result of these mitigation measures, multiple critical movement in both the AM and PM peak periods are still noted and both intersections are considered to be critical based on their overall operation. This operational analysis supports the need for the planned future roadway widenings and improvements in the Study Area.

8.2 Future Background Conditions

8.2.1 Future Background Intersection Control

The method of control for the Study Area intersections in the 2026 future background horizon has been assumed to be consistent with the recommendations and assumptions in the Boyne Survey RNA Report. As such, the intersections of James Snow Parkway at Whitlock Avenue, James Snow Parkway at Street 1, Street 2 at Britannia Road, Britannia Road at James Snow Parkway, and New Britannia Road at Fourth Line will be analyzed as signalized intersections. The intersection of Street 1 and Fourth Line will be analyzed as a roundabout, and the intersections of Fourth Line at Old Britannia Road, and Street 1 at Street 2 will be analyzed as unsignalized intersections with stop-control.

An all-way stop control was evaluated at the internal site intersection of Street 1 and Street 2 using the Ontario Traffic Manual Book 5. At the intersection of Street 1 and Street 2, the total vehicle volume on all intersection approaches does exceed 350 for the highest hour recorded however, the volume split also exceeds the 65/35 volume split, even with a 5% “handicap” in the 2026 future background conditions. As such, all-way stop control is not warranted at the internal site intersection for the 2026 future background condition. Therefore, the intersection will be analyzed as an unsignalized intersection with stop-control on the north and south legs for the 2026 future background horizon. Analyzing this intersection as a two-way stop-control is consistent with the Boyne RNA study. The all-way stop-control warrant can be seen in Appendix P.

8.2.2 Future Background Intersection Design

As noted above, the development roadways are assumed to be available prior to build-out completion for simplicity.

8.2.2.1 Britannia Road and James Snow Parkway

The signalized intersection of Britannia Road and James Snow Parkway has been designed with consideration given to the widening of both James Snow Parkway and Britannia Road to six lanes. A partial intersection design is available as part of the Issued for Tender Drawings document provided for the Britannia Road widening Environmental Study which provides information for the west leg of the intersection only. The remainder of the intersection configuration has been assumed based on the forecasted 2026 future volumes. The north leg will have an auxiliary left-turn lane, a left-turn lane, and two right-turn lanes. The east leg will have three through lanes and an auxiliary right-turn lane. The west leg will consist of an auxiliary left-turn lane and three through lanes. The westbound right, and southbound left auxiliary turn lanes have been designed for operational purposes

only using the 95th percentile queues generated in the operational analysis. The two outer through lanes on Britannia Road and James Snow Parkway have been designated as HOV lanes.

8.2.2.2 New Britannia Road and Fourth Line

The signalized intersection of New Britannia Road and Fourth Line has been designed using the Issued for Tender Drawings document provided as part of the Britannia Road widening Environmental Study for the portion of Britannia Road east of Regional Road 25 to west of James Snow Parkway and can be found in Appendix G. The intersection configuration consists of an auxiliary left-turn, three through lanes, and an auxiliary right-turn lane on the east and west legs. The south leg has an auxiliary left-turn lane and a shared through / right-turn lane. The north leg consists of an auxiliary left-turn lane, a through lane, and an auxiliary right-turn lane. The two outer through lanes on Britannia Road have been designated as HOV lanes.

8.2.2.3 Street 1 and James Snow Parkway

The intersection of Street 1 and James Snow Parkway has been designed as a signalized intersection. The south leg consists of an auxiliary left-turn lane, and three through lanes, the north leg consists of three through lanes, and an auxiliary right-turn lane, and the west leg has an auxiliary left-turn lane, and a right-turn lane. Both auxiliary left-turn lanes have been designed for operational purposes only using the 95th percentile queues generated in the operational analysis. The two outer lanes on James Snow Parkway have been assumed to have been designated as HOV lanes.

8.2.2.4 Street 2 and Britannia Road

The signalized intersection of Street 2 (also referred to as Trudeau Drive) and Britannia Road has been designed using the intersection configuration shown in the Issued for Tender Drawings document provided as part of the Britannia Road widening Environmental Study for the portion of Britannia Road east of Regional Road 25 to west of James Snow Parkway and can be found in Appendix G. The intersection configuration consists of an auxiliary left-turn lane and three through lanes on the west leg, and three through lanes, and an auxiliary right-turn lane on the east leg. The north leg consists of an auxiliary left-turn lane and a right-turn lane. The two outer through lanes on Britannia Road have been designated as HOV lanes.

8.2.2.5 Old Britannia Road and Fourth Line

The unsignalized intersection of Fourth Line and Old Britannia Road has been designed using the Issued for Tender Drawings document provided as part of the Britannia Road widening Environmental Study for the portion of Britannia Road east of Regional Road 25 to west of James Snow Parkway and can be found in Appendix G. The intersection configuration consists of a shared left-turn/through/right-turn lane on all four legs. Stop-control is provided on the east and west legs of the intersection.

8.2.2.6 Street 1 and Fourth Line

The roundabout intersection of Street 1 and Fourth Line has been designed as a one-lane, four-legged roundabout with yield-control on each approach based on Town of Milton right-of-way standard drawings, and the existing configuration of Fourth Line. Circulating lanes within the roundabout have been assumed to be five metres in width, the inner radius has been assumed to be 15 metres, and the circulating speed limit has been assumed to be 30 km/h.

8.2.2.7 Street 1 and Street 2

As discussed in Section 8.2.1 above, the intersection of Street 1 and Street 2 has been designed as an unsignalized intersection with stop-control on the north and south legs.

8.2.2.8 Whitlock Avenue and James Snow Parkway

The intersection of Whitlock Avenue and James Snow Parkway has been designed as a signalized intersection. The intersection configuration used in the 2026 future background analysis shown in the *Bayview Lexis Residential*

Subdivision Revised TIS (2020), prepared by TMIG. As such, the south leg consists of an auxiliary left-turn lane, and three through lanes, the north leg consists of two through lanes, and a shared through/right-turn lane, and the west leg has an auxiliary left-turn lane, and a right-turn lane. The eastbound left-turn lane has a storage length of 30 metres, and the northbound storage lane has a storage length of 100 metres. The two outer lanes on James Snow Parkway have been assumed to have been designated as HOV lanes.

8.2.3 2026 Future Background Operational Analysis

The 2026 future background intersection volumes and other development traffic have been analyzed to allow for a comparison between the future volumes with and without the proposed development.

The signal timing splits and cycle lengths of all signalized intersections was optimized and Amber Clearance, All Red Clearance, Walk, and Flash Don't Walk times were calculated using the methodology provided in OTM Book 12-Traffic Signals. A walk time of 7 seconds was assumed, and a pedestrian walking speed of 1.2 m/s was used. The minimum initial values for the Study Area intersections were taken from OTM Book 12. Additionally, for Britannia Road and James Snow Parkway, a lane utilization factor of 0.80 has been applied in accordance with the Halton Region Transportation Impact Study Guidelines to account for the capacity reduction on these roads as a result of the implementation of the outer HOV lanes.

Table 21 summarizes the operational analysis for the 2026 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 configurations in Section 8.2.1 and Section 8.2.2, respectively. The 95th percentile queue of each movement for the 2026 future background conditions is shown in Table 22.

2026 Future Background Synchro and Sidra worksheets are included in Appendix Q.

Table 21: 2026 Future Background Conditions Operational Analysis

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	B	0.31	16	C	0.60	22
	EBT	C	0.62	23	B	0.40	15
	WBT	C	0.42	27	C	0.78	29
	WBR	C	0.16	24	B	0.89	17
	SBL	C	0.74	27	C	0.36	24
	SBR	B	0.05	18	C	0.05	22
	Overall	***C***	***0.67***	***25***	***C***	***0.84***	***22***
Fourth Line & New Britannia Road (*Signalized*)	EBL	A	0.16	7	B	0.38	18
	EBT	B	0.71	18	C	0.52	20
	EBR	B	0.32	13	B	0.09	16
	WBL	B	0.11	11	B	0.09	13
	WBT	B	0.42	15	C	0.83	30
	WBR	B	0.03	12	B	0.04	17
	NBL	C	0.32	20	D	0.90	53
	NBT/R	B	0.12	18	C	0.42	26
	SBL	B	0.22	19	C	0.16	23
	SBT	C	0.55	23	C	0.10	22
	SBR	B	0.07	18	C	0.04	22
	Overall	***B***	***0.62***	***17***	***C***	***0.82***	***28***
James Snow Parkway & Street 1 (*Signalized*)	EBL	C	0.23	23	C	0.20	21
	EBR	C	0.09	24	C	0.09	22
	NBL	A	0.15	4	A	0.29	4
	NBT	A	0.12	4	A	0.40	5
	SBT	A	0.50	10	A	0.23	10
	SBR	A	0.02	7	A	0.09	9
	Overall	***B***	***0.38***	***10***	***A***	***0.35***	***8***

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
Britannia Road & Street 2 (*Signalized*)	EBL	A	0.02	1	A	0.04	1
	EBT	A	0.41	2	A	0.30	1
	WBT	A	0.25	3	A	0.49	3
	WBR	A	0.01	2	A	0.02	2
	SBL	C	0.14	30	D	0.09	37
	SBR	C	0.01	32	D	0.00	40
	Overall	***A***	***0.39***	***3***	***A***	***0.45***	***2***
Old Britannia Road & Fourth Line (*Unsignalized*)	EBL/T/R	B	0.03	15	B	0.02	13
	WBL/T/R	B	0.03	14	B	0.02	13
	NBL/T/R	A	0.00	<1	A	0.00	<1
	SBL/T/R	A	0.00	0	A	0.00	<1
	Overall	***A***	-	***1***	***A***	-	***1***
Fourth Line & Street 1 (*Roundabout*)	EBL/T/R	A	0.34	3	A	0.24	1
	WBL/T/R	A	0.10	1	A	0.43	3
	NBL/T/R	A	0.19	1	A	0.41	2
	SBL/T/R	A	0.47	1	A	0.21	2
	Overall	***A***	***0.47***	***1***	***A***	***0.43***	***2***
Street 1 & Street 2 (*Unsignalized*)	EBL/T/R	*A*	*0.01*	*<1*	A	0.01	1
	WBL/T/R	*A*	*0.00*	*0*	A	0.00	0
	NBL/T/R	*B*	*0.02*	*12*	B	0.07	14
	SBL/T/R	*B*	*0.10*	*11*	B	0.11	15
	Overall	***A***	-	***2***	***A***	-	***2***
James Snow Parkway & Whitlock Avenue (*Signalized*)	EBL	C	0.46	21	C	0.35	22
	EBR	C	0.37	23	C	0.07	23
	NBL	A	0.25	8	A	0.46	10
	NBT	A	0.13	5	A	0.38	6
	SBT/R	A	0.39	7	A	0.26	5
	Overall	***A***	***0.40***	***10***	***A***	***0.42***	***8***

Table 22: 2026 Future Background Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	125	27	#39
	EBT	N/A	118	72
	WBT	N/A	64	160
	WBR	150	17	110
	SBL	140	128	50
	SBR	N/A	6	6
Fourth Line & New Britannia Road (*Signalized*)	EBL	50	11	14
	EBT	N/A	#138	88
	EBR	50	34	12
	WBL	50	5	6
	WBT	N/A	59	161
	WBR	45	1	6
	NBL	115	18	**#139**
	NBT/R	N/A	15	63
	SBL	60	18	16
	SBT	N/A	57	18
	SBR	30	9	5
James Snow Parkway & Street 1 (*Signalized*)	EBL	30	17	16
	EBR	N/A	10	10
	NBL	30	10	30
	NBT	N/A	20	75
	SBT	N/A	100	39
	SBR	30	7	12
Britannia Road & Street 2 (*Signalized*)	EBL	50	1	1
	EBT	N/A	28	18
	WBT	N/A	27	67
	WBR	40	2	3
	SBL	30	7	5
	SBR	N/A	4	3
Old Britannia Road & Fourth Line (*Unsignalized*)	EBL/T/R	N/A	1	1
	WBL/T/R	N/A	1	1
	NBL/T/R	N/A	0	0
	SBL/T/R	N/A	0	0
Fourth Line & Street 1 (*Roundabout*)	EBL/T/R	N/A	11	8
	WBL/T/R	N/A	3	16
	NBL/T/R	N/A	6	15
	SBL/T/R	N/A	21	7
Street 1 & Street 2 (*Unsignalized*)	EBL/T/R	N/A	<1	<1
	WBL/T/R	N/A	0	0
	NBL/T/R	N/A	1	2
	SBL/T/R	N/A	2	3
James Snow Parkway & Whitlock Avenue (*Signalized*)	EBL	30	**39**	27
	EBR	N/A	26	9
	NBL	100	16	#51
	NBT	N/A	21	68
	SBT/R	N/A	66	36
Notes:	*# 95th percentile queue exceeds capacity* ** Synchro does not allow a storage length of greater than 300 metres to be entered. A storage length of 475 metres is recommended.*			

With the addition of background growth to reflect the 2026 horizon as well as the adjusted traffic generated from the Boyne Secondary Plan area, the Study Area intersections operate well with minimal critical movements.

It is noted that at the intersection of Fourth Line and New Britannia Road, the northbound left-turn lane has a 95th percentile queue shown to exceed the available storage distance in the PM peak period, and at the intersection of Whitlock Avenue and James Snow Parkway, the eastbound left-turn lane has a 95th percentile queue shown to

exceed the available storage distance in the AM peak period. As such, a storage length of 155 metres is recommended for the northbound left-turn lane at the intersection of Fourth Line and New Britannia Road, and a storage length of 55 metres is recommended for the eastbound left-turn at the intersection of James Snow Parkway and Whitlock Avenue. It is noted that the recommended extension of the eastbound left-turn lane at the intersection of Whitlock Avenue and James Snow Parkway to 55 metres is consistent with the final recommended intersection configuration of this intersection discussed in the *Bayview Lexis Residential Subdivision Revised TIS (2020)*, prepared by TMIG. These extended storage lanes will be analyzed in the 2026 future total analysis scenario.

8.2.4 2026 Future Background – Additional Analysis Scenario

As previously discussed, Halton Region staff have requested the intersection of Street 1 and James Snow Parkway be analyzed under the assumption that the planned widening of James Snow Parkway is not complete by 2026.

As such, using Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants, the intersection of Street 1 and James Snow Parkway has been evaluated using the volumes shown in Figure 23 above. Signalization is not warranted, and the intersection of Street 1 and James Snow Parkway has therefore been analyzed as an unsignalized intersection with stop-control on the west leg. Traffic control warrant sheets have been included in Appendix R.

The Ministry of Transportation Ontario (MTO) Geometric Design Standards for Ontario Highways (GDSOH) has been reviewed to determine the need for a northbound left-turn lane at the two-lane highway unsignalized intersection of Street 1 and James Snow Parkway for the 2026 future background additional analysis horizon. Using the GDSOH methodology and a 90 km/h design speed, it was found that a northbound left-turn lane will be warranted. Left turn lane warrant analysis sheets have been included in Appendix S.

Additionally, an auxiliary southbound right-turn is also expected to be warranted at this intersection as the southbound right-turn volume in the PM peak period is greater than 20% of the total southbound approaching volume in the PM peak period. As such, the decelerating southbound right-turning vehicles are expected to cause undue hazard to southbound through vehicles in the PM peak period. This is consistent with the recommendation from Halton Region staff that an auxiliary southbound right-turn lane be considered at this intersection.

The resulting intersection configuration will consist of an auxiliary eastbound left-turn lane, an eastbound right-turn lane, an auxiliary northbound left-turn lane, a northbound through lane, a southbound through lane, and an auxiliary southbound right-turn lane. Auxiliary turn lanes have been determined for operational analysis purposes only using the projected 95th percentile queues. Further functional design of the intersection will be conducted at future submission stages should this be required.

Table 23 summarizes the operational analysis for the 2026 future background additional analysis scenario, and Table 24 summarizes the 95th percentile queue of each movement for the 2026 future background. 2026 Future Background Additional Analysis Synchro worksheets are included in Appendix T.

Table 23: 2026 Future Background Additional Analysis Conditions Operational Analysis

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
James Snow Parkway & Street 1 (*Unsignalized*)	EBL	**F**	**0.61**	**66**	**F**	**1.38**	**364**
	EBR	D	0.46	29	B	0.24	13
	NBL	B	0.07	11	A	0.21	10
	NBT	A	0.18	0	A	0.60	0
	SBT	A	0.59	0	A	0.27	0
	SBR	A	0.02	0	A	0.08	0
	Overall	***C***	-	***6***	***C***	-	***16***

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
Mitigation Measure: Signalization, Signal Timing Optimization							
James Snow Parkway & Street 1 (Signalized)	*EBL*	*D*	*0.30*	*37*	*C*	*0.26*	*32*
	EBR	*D*	*0.14*	*39*	*C*	*0.09*	*33*
	NBL	*A*	*0.16*	*4*	*A*	*0.30*	*5*
	NBT	*A*	*0.21*	*3*	*A*	*0.74*	*9*
	SBT	*A*	*0.70*	*8*	*A*	*0.32*	*4*
	SBR	*A*	*0.02*	*3*	*A*	*0.09*	*4*
	Overall	***B***	***0.63***	***11***	***A***	***0.64***	***10***

Table 24: 2026 Future Background Additional Analysis Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Street 1 (*Unsignalized*)	EBL	60	24	54
	EBR	N/A	17	7
	NBL	30	11	6
	NBT	N/A	0	0
	SBT	N/A	0	0
	SBR	30	0	0
Mitigation Measure: Signalization, Signal Timing Optimization				
James Snow Parkway & Street 1 (Signalized)	*EBL*	30	26	22
	EBR	N/A	16	13
	NBL	40	9	32
	NBT	N/A	36	#258
	SBT	N/A	219	60
	SBR	30	4	7
Notes:	*# 95th percentile queue exceeds capacity*			

With the addition of background growth to reflect the 2026 horizon in the event that James Snow Parkway is not widened at that time, as well as the adjusted traffic generated from the Boyne Secondary Plan area, the intersection of James Snow Parkway and Street 1 operates with critical movements. As shown above, in both the AM and PM peak period, the eastbound left-turn lane is shown to have a LOS E or worse and in the PM peak period, a very high v/c ratio and delay are noted.

As shown above, in order to improve the operation of this intersection and eliminate any critical movements, signalization has been considered as a mitigation measure. The signal timing splits and cycle lengths have been optimized and Amber Clearance, All Red Clearance, Walk, and Flash Don't Walk times were calculated using the methodology provided in OTM Book 12-Traffic Signals. A walk time of 7 seconds was assumed, and a pedestrian walking speed of 1.2 m/s was used. The minimum initial values for the Study Area intersections were taken from OTM Book 12.

As noted above, auxiliary turn lanes have been determined for operational analysis purposes only using the projected 95th percentile queues and should it be required, any functional design of the intersection will be conducted at future submission stages.

8.3 Future Total Conditions

8.3.1 Future Total Intersection Control

Similar to the future background conditions, the method of control for the Study Area intersections in the 2026 future total horizon has been assumed to be consistent with the recommendations and assumptions in the Boyne Survey RNA Report. As such, the intersections of James Snow Parkway at Street 1, Street 2 at Britannia Road, Britannia Road at James Snow Parkway, and New Britannia Road at Fourth Line will be analyzed as signalized intersections. The intersection of Street 1 and Fourth Line will be analyzed as a roundabout, and the intersections

of Fourth Line at Old Britannia Road, and Street 1 at Street 2 will be analyzed as unsignalized intersections with stop-control.

Additionally, an all-way stop control was evaluated at the internal site intersection of Street 1 and Street 2 using the Ontario Traffic Manual Book 5. At the intersection of Street 1 and Street 2, the total vehicle volume on all intersection approaches does exceed 350 for the highest hour recorded however, the volume split did exceed the 65/35 volume split, even with a 5% "handicap" in the 2026 future total conditions. As such, all-way stop control is not warranted at the internal site intersection for the 2026 future total condition. Therefore, the intersection will be analyzed as an unsignalized intersection with stop-control on the north and south legs for the 2026 future total horizon. Analyzing this intersection as a two-way stop-control is consistent with the Boyne RNA study. The all-way stop-control warrant can be seen in Appendix P.

8.3.2 Future Total Intersection and Access Design

All Study Area intersections in the 2026 future total horizon have been analyzed with same intersection configuration as was examined in the 2026 future background horizon. The exceptions to this is the northbound left-turn storage lane at the intersection of Fourth Line and New Britannia Road which has been increased to 155 metres, and the eastbound left-turn lane storage lane at the intersection of Whitlock Avenue and James Snow Parkway, which has been increased to 55 metres.

8.3.3 2026 Future Total Operational Analysis

The proposed development's trip generation has been added to the 2026 future background traffic volumes to project the impact of the new traffic on the future road network.

The signal timing splits and cycle lengths of all signalized intersections was optimized and Amber Clearance, All Red Clearance, Walk, and Flash Don't Walk times were calculated using the methodology provided in OTM Book 12-Traffic Signals. A walk time of 7 seconds was assumed, and a pedestrian walking speed of 1.2 m/s was used. The minimum initial values for the Study Area intersections were taken from OTM Book 12. Additionally, for Britannia Road and James Snow Parkway, a lane utilization factor of 0.80 has been applied in accordance with the Halton Region Transportation Impact Study Guidelines to account for the capacity reduction on these roads as a result of the implementation of the outer HOV lanes.

Table 25 summarizes the operational analysis for the 2026 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 configurations in Section 8.3.1 and Section 8.3.2, respectively. Additionally, the recommended mitigation measure analyzed and identified in the 2026 future background analysis in Section 8.2.3 above has been applied. The 95th percentile queue of each movement for the 2026 future background conditions is shown in Table 26.

2026 Future Total Synchro and Sidra worksheets are included in Appendix U.

Table 25: 2026 Future Total Conditions Operational Analysis

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	B	0.36	17	E	0.72	34
	EBT	C	0.67	24	B	0.43	16
	WBT	C	0.46	28	D	0.84	32
	WBR	C	0.17	25	E	0.91	19
	SBL	C	0.75	27	C	0.36	24
	SBR	B	0.06	18	C	0.06	23
	Overall	***C***	***0.70***	***25***	***C***	***0.87***	***24***

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
Fourth Line & New Britannia Road (*Signalized*)	EBL	A	0.19	7	C	0.47	22
	EBT	B	0.71	18	C	0.55	23
	EBR	B	0.32	13	B	0.10	17
	WBL	B	0.11	11	B	0.09	14
	WBT	B	0.47	16	C	0.84	33
	WBR	B	0.03	12	B	0.04	18
	NBL	C	0.34	22	E	0.91	58
	NBT/R	B	0.13	19	C	0.42	29
	SBL	B	0.23	20	C	0.17	26
	SBT	C	0.57	24	C	0.10	25
	SBR	B	0.08	19	C	0.04	25
	Overall	***B***	***0.63***	***17***	***C***	***0.83***	***31***
James Snow Parkway & Street 1 (*Signalized*)	EBL	C	0.39	22	C	0.30	21
	EBR	C	0.12	22	C	0.11	22
	NBL	A	0.21	5	A	0.36	4
	NBT	A	0.13	5	A	0.41	6
	SBT	B	0.55	13	B	0.25	11
	SBR	A	0.07	9	B	0.14	11
	Overall	***B***	***0.44***	***12***	***A***	***0.38***	***9***
Britannia Road & Street 2 (*Signalized*)	EBL	A	0.09	2	A	0.23	4
	EBT	A	0.47	4	A	0.35	3
	WBT	A	0.30	6	A	0.62	9
	WBR	A	0.05	5	A	0.11	5
	SBL	C	0.41	26	C	0.30	29
	SBR	C	0.05	26	C	0.03	30
	Overall	***A***	***0.45***	***6***	***A***	***0.52***	***7***
Old Britannia Road & Fourth Line (*Unsignalized*)	EBL/T/R	C	0.03	15	B	0.02	13
	WBL/T/R	B	0.03	15	B	0.02	13
	NBL/T/R	A	0.00	<1	A	0.00	<1
	SBL/T/R	A	0.00	0	A	0.00	<1
	Overall	***A***	***-***	***1***	***A***	***-***	***1***
Fourth Line & Street 1 (*Roundabout*)	EBL/T/R	A	0.38	4	A	0.27	1
	WBL/T/R	A	0.18	1	A	0.50	3
	NBL/T/R	A	0.21	1	A	0.46	2
	SBL/T/R	A	0.52	1	A	0.27	2
	Overall	***A***	***0.52***	***2***	***A***	***0.50***	***2***
Street 1 & Street 2 (*Unsignalized*)	EBL/T/R	A	0.01	<1	A	0.01	1
	WBL/T/R	A	0.02	1	A	0.02	1
	NBL/T/R	B	0.18	13	C	0.24	18
	SBL/T/R	B	0.16	14	C	0.25	20
	Overall	***A***	***-***	***4***	***A***	***-***	***4***
James Snow Parkway & Whitlock Avenue (*Signalized*)	EBL	C	0.48	21	C	0.37	22
	EBR	C	0.37	23	C	0.07	22
	NBL	A	0.28	9	B	0.52	12
	NBT	A	0.16	6	A	0.40	6
	SBT/R	A	0.42	7	A	0.31	6
	Overall	***A***	***0.43***	***10***	***A***	***0.48***	***8***

Table 26: 2026 Future Total Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Britannia Road (*Signalized*)	EBL	125	29	#52
	EBT	N/A	131	76
	WBT	N/A	70	174
	WBR	150	17	#145
	SBL	140	131	51
	SBR	N/A	6	7
Fourth Line & New Britannia Road (*Signalized*)	EBL	50	13	24
	EBT	N/A	#145	100
	EBR	50	36	14
	WBL	50	5	6
	WBT	N/A	67	175
	WBR	45	1	7
	NBL	155	18	#151
	NBT/R	N/A	15	70
	SBL	60	18	17
	SBT	N/A	57	19
	SBR	30	9	9
James Snow Parkway & Street 1 (*Signalized*)	EBL	50	31	24
	EBR	N/A	11	11
	NBL	50	13	36
	NBT	N/A	20	75
	SBT	N/A	100	40
	SBR	30	12	15
Britannia Road & Street 2 (*Signalized*)	EBL	50	3	4
	EBT	N/A	43	27
	WBT	N/A	34	83
	WBR	40	5	10
	SBL	30	24	19
	SBR	N/A	9	8
Old Britannia Road & Fourth Line (*Unsignalized*)	EBL/T/R	N/A	1	1
	WBL/T/R	N/A	1	1
	NBL/T/R	N/A	0	0
	SBL/T/R	N/A	0	0
Fourth Line & Street 1 (*Roundabout*)	EBL/T/R	N/A	12	9
	WBL/T/R	N/A	6	21
	NBL/T/R	N/A	6	18
	SBL/T/R	N/A	24	9
Street 1 & Street 2 (*Unsignalized*)	EBL/T/R	N/A	<1	<1
	WBL/T/R	N/A	<1	1
	NBL/T/R	N/A	5	7
	SBL/T/R	N/A	4	8
James Snow Parkway & Whitlock Avenue (*Signalized*)	EBL	55	42	29
	EBR	N/A	27	9
	NBL	100	17	#56
	NBT	N/A	25	72
	SBT/R	N/A	70	45
Notes:	*# 95th percentile queue exceeds capacity*			

With the addition of the site generated traffic to the 2026 future background traffic, the Study Area intersections operate similarly to the 2026 future background conditions with minimal critical movements.

At the intersection of James Snow Parkway and Britannia Road, the overall intersection operates with a v/c ratio equal to or greater than 0.85 in the PM peak period. As no volume reduction has been applied at this intersection to account for the use of the HOV lane, the volumes used for this analysis are likely higher than what will be realized in the 2026 future horizon. As the signal timing for this intersection has already been optimized, the

westbound right-turn phase has been set to 'permissive + overlap', and the cycle length extended to 120 seconds in the PM peak period, no mitigation measures are recommended as the v/c ratios equal to or greater than 0.85 cannot be further reduced. Additionally, these critical movements are considered a temporary condition as the planned extension of James Snow Parkway south of Britannia Road in 2031 is anticipated to reduce volume on the southbound left-turn and westbound right-turn as volume is re-routed to the southbound through and northbound through movements.

8.3.4 2026 Future Total – Additional Analysis Scenario

The proposed development's trip generation has been added to the 2026 future background additional analysis scenario traffic volumes to project the impact of the new traffic on the future road network for the hypothetical scenario where James Snow Parkway is not widened by 2026.

The signal timing splits and cycle lengths of all signalized intersections was optimized and Amber Clearance, All Red Clearance, Walk, and Flash Don't Walk times were calculated using the methodology provided in OTM Book 12-Traffic Signals. A walk time of 7 seconds was assumed, and a pedestrian walking speed of 1.2 m/s was used. The minimum initial values for the Study Area intersections were taken from OTM Book 12.

Table 27 summarizes the operational analysis for the 2026 future total additional analysis scenario conditions in both the AM and PM peak periods. Critical movements, as defined above, have been identified. The intersection has been analyzed based on the identified signal control and intersection configuration discussed in Section 8.2.4 above as a result of the recommended mitigation measures. The 95th percentile queue of each movement for the 2026 future background conditions is shown in Table 28.

2026 Future Total Additional Analysis Synchro worksheets are included in Appendix V.

Table 27: 2026 Future Total Additional Analysis Conditions Operational Analysis

Intersection	Mvmnt	AM Peak Hour			PM Peak Hour		
		LOS	V/C	Del (s)	LOS	V/C	Del. (s)
James Snow Parkway & Street 1 (Signalized)	*EBL*	*D*	*0.49*	*37*	*C*	*0.39*	*32*
	EBR	*D*	*0.30*	*37*	*C*	*0.11*	*32*
	NBL	*A*	*0.26*	*6*	*A*	*0.38*	*6*
	NBT	*A*	*0.22*	*4*	*B*	*0.76*	*11*
	SBT	*B*	*0.73*	*11*	*A*	*0.33*	*5*
	SBR	*A*	*0.06*	*4*	*A*	*0.14*	*5*
	Overall	***B***	***0.67***	***14***	***A***	***0.67***	***11***

Table 28: 2026 Future Total Additional Analysis Conditions Queue Lengths

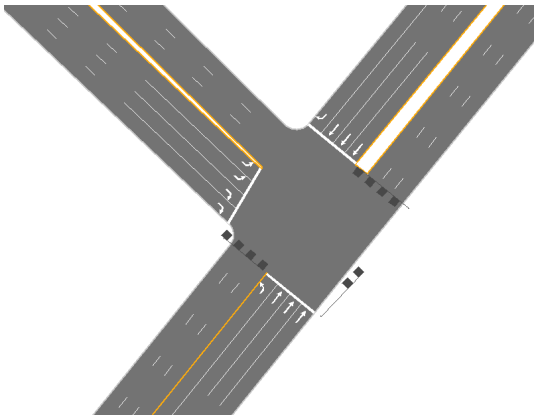
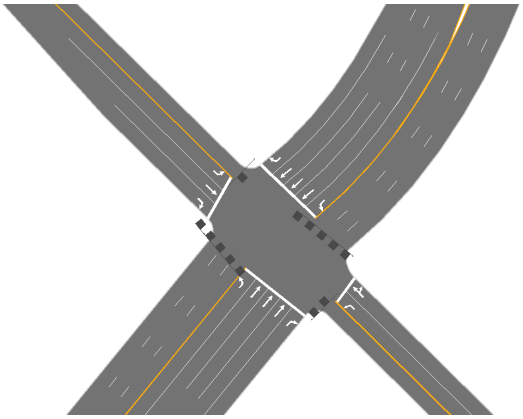
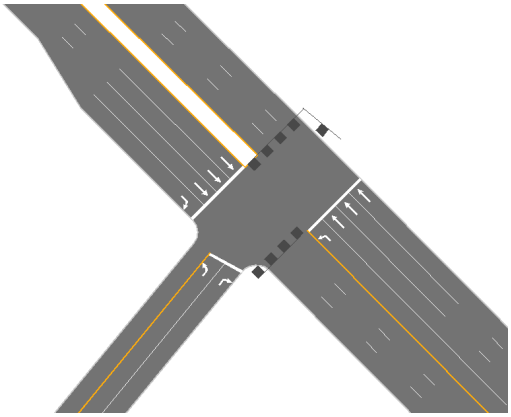
Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Street 1 (Signalized)	*EBL*	30	**47**	**33**
	EBR	N/A	27	14
	NBL	40	14	**41**
	NBT	N/A	36	#258
	SBT	N/A	219	60
	SBR	30	9	9
Notes:	*# 95th percentile queue exceeds capacity*			

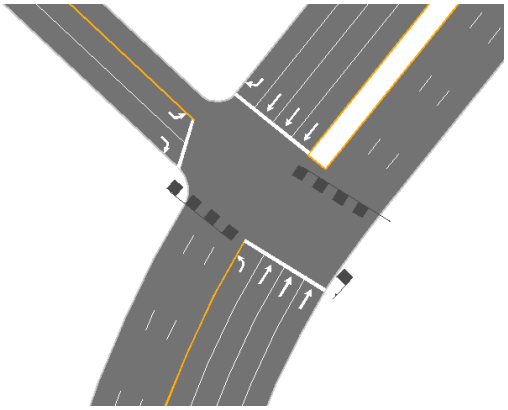
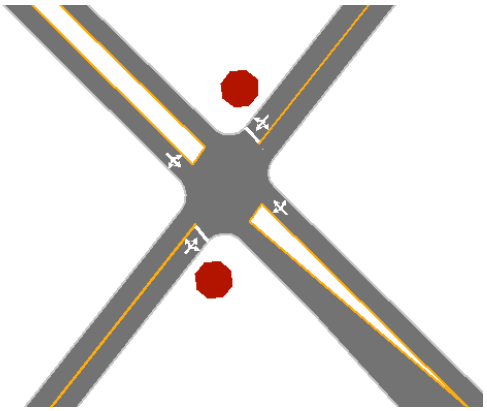
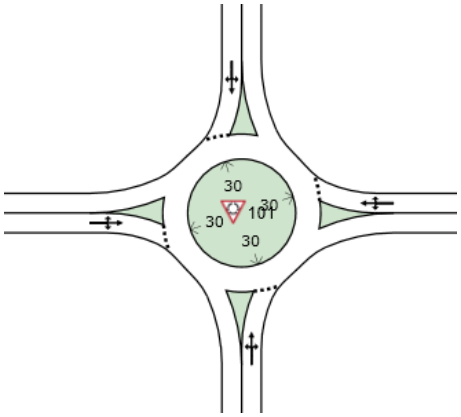
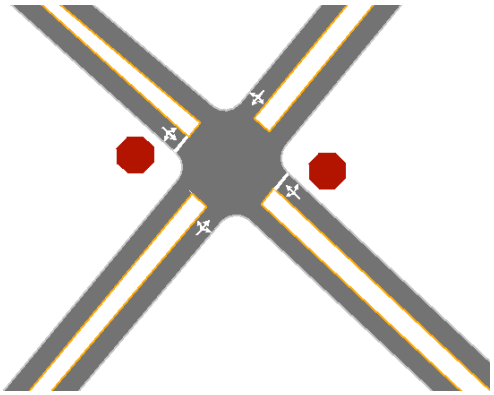
With the addition of the site generated traffic to the 2026 future background additional analysis scenario traffic, the Study Area intersections operate similarly to the 2026 future background additional analysis scenario conditions. The eastbound left-turn lane 95th percentile queue is noted to extend beyond the storage distance in both the AM and PM peak periods, and the northbound left-turn lane 95th percentile queue is noted to extend beyond the storage distance in the PM peak period. As such, an eastbound left-turn lane storage length of 50 meters, and a northbound left-turn lane storage length of 45 metres is recommended.

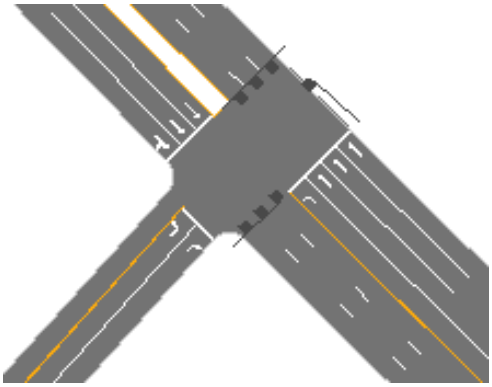
9 Recommendations and Mitigation Measures

The recommended configuration for each of the Study Area intersections considered in the 2026 future horizon are illustrated in Table 29.

Table 29: Study Area Intersection Configurations

Intersection	Lane Configuration – Ultimate Proposed
James Snow Parkway & Britannia Road	
New Britannia Road & Fourth Line	
James Snow Parkway & Street 1	

Britannia Road & Street 2	
Old Britannia Road & Fourth Line	
Fourth Line & Street 1	
Street 1 & Street 2	

Whitlock Avenue & James Snow Parkway	

The following intersection configuration descriptions are based on the intersection control and design discussed in Sections 8.2.1, 8.2.2, 8.3.1, and 8.3.2

As shown above, the signalized intersection of James Snow Parkway and Britannia Road has been designed based on the planned road widening at both James Snow Parkway and Britannia Road. The eastbound approach has been designed based on the Britannia Road Design Drawings, and the southbound left-turn lane and westbound right-turn lane have been designed based on the 95th percentile queuing results. A storage length of 150 metres is proposed for the auxiliary westbound right-turn lane, and a storage length of 140 metres has been proposed for the auxiliary southbound left-turn lane.

The signalized intersection of Fourth Line and New Britannia Road has been designed based on the planned road widening and realignment of Britannia Road, using the Britannia Road Design Drawings. Increasing the northbound left-turn lane to a storage length of 155 metres is proposed as a mitigation measure.

The signalized intersection of James Snow Parkway and Street 1 has been designed based on the planned road widening of James Snow Parkway as well as the 24-metre Town of Milton right-of-way cross-section for Street 1. The northbound left-turn lane, the southbound right-turn lane, and the eastbound left-turn lane have been designed based on the 95th percentile queuing results. A storage length of 50 metres has been proposed for both the auxiliary eastbound left-turn lane and northbound left-turn lane. A storage length of 30 metres has been proposed for the auxiliary southbound right-turn lane.

The signalized intersection of Britannia Road and Street 2 as been designed based on the based on the planned road widening and realignment of Britannia Road, using the Britannia Road Design Drawings, as well as the 24-metre Town of Milton right-of-way cross-section for Street 2. The southbound left-turn lane has been designed based on the 95th percentile queuing results. A storage length of 30 metres has been proposed for the auxiliary southbound left-turn lane.

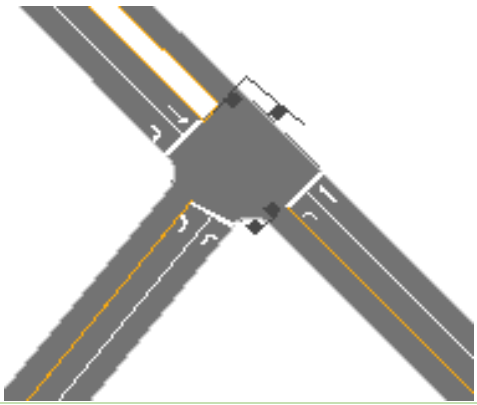
The unsignalized intersection of Old Britannia Road and Fourth Line has been designed based on the planned road widening and realignment of Britannia Road, using the Britannia Road Design Drawings.

Both the intersection of Fourth Line at Street 1 and the intersection of Street 1 and Street 2 have been designed using the appropriate Town of Milton right-of-way cross-section drawings.

Additionally, the signal timing of all signalized intersections has been optimized and is included in the relevant Synchro Worksheet Appendix.

The proposed intersection configuration for the signalized intersection of James Snow Parkway and Street 1 as a result of the requested additional analysis scenario by Halton Region staff can be seen in Figure 30 below.

Figure 30: James Snow Parkway & Street 1 Additional Analysis Intersection Configuration

Intersection	Lane Configuration – Proposed
James Snow Parkway & Street 1	

As shown above, the signalized intersection of James Snow Parkway and Street 1 has been designed based on the existing configuration of James Snow Parkway as well as the 24-metre Town of Milton right-of-way cross-section for Street 1. The intersection consists of an auxiliary northbound left-turn lane, a northbound through lane, a southbound through lane, an auxiliary southbound right-turn lane, and auxiliary eastbound left-turn lane and an eastbound right-turn lane which have been designed based on the 95th percentile queuing results. An eastbound left-turn lane storage length of 50 meters, a southbound right-turn storage length of 30 metres, and a northbound left-turn lane storage length of 45 metres is recommended.

10 Conclusions

This Transportation Impact Study has examined the trip generation, access requirements, and Study Area road network impact of the proposed Sundial Homes development. The TIS has shown the following:

a) The proposed development is within the Boyne Survey Secondary Plan area.
b) The Boyne Secondary Plan Survey Road Network Assessment report prepared by GHD in 2017, the TOR, and the comments received from Region and Town staff will help inform the examination of the transportation impact on Sundial Homes' proposed development.
c) The proposed development consists of a mix of residential land uses with the following breakdown: 253 detached homes, 546 townhomes, and 295 high density apartment units. Additionally, an elementary school, and village square area have been proposed.
d) Three site accesses are proposed to serve the development with one access on James Snow parkway, Britannia Road, and Fourth Line. All accesses are proposed as full-movement intersections with no turn-restrictions. Additionally, one internal intersection within the proposed development has been analyzed as a full movement intersection with no turn restrictions.
e) A compound annual growth rate of 2% was applied to all intersection turning movements to determine the 2021 existing traffic volumes. The West Boyne Tertiary area site-generated traffic was also considered as part of the 2021 existing conditions.
f) A compound annual growth rate of a 2% compound annual growth rate will be applied to the existing 2021 traffic volumes at all Study Area intersection movements to determine the 2023 future background volumes, then a compound annual growth rate of 9% was applied to James Snow Parkway, 2% was applied to Fourth Line, and 5.5% was applied to Britannia Road in order to determine the background growth between the 2023 existing horizon and the 2026 future analysis horizon.
g) Adjusted trip-generation from the Boyne Secondary Plan Survey Road Network Assessment report was also considered at the 2026 future horizon.

h) The Britannia Road and James Snow Parkway widening projects were considered in 2026 future horizon.
i) The subject development is anticipated to generate 607 AM, and 651 PM net new peak hour two-way vehicle trips.
j) Using the existing traffic volumes projected to 2021, an operational analysis of existing conditions was undertaken. No mitigation measures were recommended.
k) The operational analysis of both the 2026 future background and 2026 future total scenarios were similar and in both horizons, minimal critical movements were identified.
l) Mitigation measures identified as a result of the 2026 future background and 2026 future total operational analysis are summarized in Section 9.
m) An additional 2026 analysis horizon scenario was requested by Halton Region staff to determine the operation and preliminary intersection configuration and control of James Snow Parkway and Street 1 in the unlikely event that James Snow parkway is not widened by 2026. Mitigation measures identified as a result of the 2026 future background and 2026 future total operational analysis are summarized in Section 9.

The impact of the proposed development can be accommodated by the Study Area road network with the planned infrastructure changes and recommended mitigation measures. The proposed accesses and internal site intersections will operate well. The proposed development will provide a good pedestrian and cycling network along with good access to transit throughout the development. It is recommended that, from a transportation perspective, the proposed development application proceed.

Prepared By:

Robin Marinac, P. Eng.
437-242-5183
Robin.Marinac@CGHTransportation.com

Reviewed By:

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

Appendix A

Scope Confirmation – Terms of References

Technical Memorandum

To:	Robert Clackett – Halton Region Patrick Monaghan – Halton Region Heide Schlegl – Town of Milton	Date:	2021-04-20
Cc:	Mark Crockford – CGH Transportation		
From:	Robin Marinac	Project Number:	2021-014

Re: Sundial Homes 4th Line Transportation Impact Study – Terms of Reference

The following Transportation Impact Study Terms of Reference has been prepared in support of the Zoning By-law Amendment and draft plan of subdivision for the Sundial Homes 4th Line property. The proposed development is located on 4th Line, abutting Britannia Road and James Snow Parkway in the City of Milton. Approximately 271 detached homes, 532 townhomes, and 256 high density apartment units are proposed. One access point on 4th Line, one access point on Britannia Road, one access point on James Snow Parkway, and two access points north to the adjacent property are proposed. The preliminary draft plan of subdivision is shown Attachment 1.

As the proposed development property is within the Boyne Survey Secondary Plan area, it is subject to the Urban Design Guidelines and studies associated with the Secondary Plan.

We have prepared the following TIS scope of work for Halton Region's and the City of Milton's review and endorsement. Additionally, Region and Town staff provided comments on December 1, 2020, in response to the pre-submission consultation. These comments have been considered in the development of this scope of work and are included in Attachment 2. Please let us know if you have any comments or additions.

Transportation Impact Study:

The study will be in accordance with Halton Region's *Transportation Impact Study Guidelines (2015)*.

Study Area:

- An overview of the transportation system existing conditions will be documented (including transit, cycling, pedestrian and automobile modes).
- A summary of existing transportation planning policies within the Study Area will be identified.
- An overview of the Study Area road network will be provided including the road classification and descriptions of:
    - Britannia Road
    - James Snow Parkway
    - Fourth Line
- The following intersections will be included in the Transportation Impact Study:
    - Britannia Road at James Snow Parkway (existing)
    - Fourth Line at Britannia Road (existing & future configuration)
    - Fourth Line at the east-west collector road (future)
    - Trudeau Drive (north-south collector road) at Britannia Road (future)
    - Trudeau Drive (north-south collector road) at the east-west collector road (future)

Existing Study Area Multimodal Conditions:

- Existing Turning Movement Count Summary Reports for Britannia Road at James Snow Park, and Britannia Road at Fourth Line have been requested from Halton Region and the Town of Milton staff, as applicable, and will be used to produce the existing conditions auto, cyclist, and pedestrian volumes within the Study Area.
- As the Boyne Secondary Plan Survey RNA assumes a full-build out of 2021, the resulting developed site traffic for the West Block will be added to the existing turning movement counts. Re-routing of traffic may be required as not all connections assumed in the Boyne Survey RNA are currently in place.
- Signal Timing Plans will be requested for the intersections of Britannia Road at James Snow Park, and Britannia Road at Fourth Line from Halton Region and the Town of Milton staff, as applicable.
- Existing collision data have been requested from Halton Region in order to produce a traffic collision analysis.
- A compound annual growth rate of 9% will be applied to James Snow Parkway, 2% will be applied to Fourth Line, and 2.25% will be applied to Britannia Road based on the Boyne Survey Road Network assessment (RNA) as well as Region and Town direction on the adjacent development to the north (*Bayview Lexis Residential Subdivision TIS (2019)*). These growth rates will be applied to the turning movement counts, as applicable, to establish the existing 2021 horizon.

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.
- Transportation Demand Management (TDM) supportive elements of the proposed development.

Study Horizon & Peak Periods:

- Base year 2021, followed by an assumed full build-out of 2026 to remain consistent with the horizons considered in the Boyne Survey RNA.
- AM and PM peak hours will be considered.

Planned Transportation Improvements:

- Britannia Road widening from two to six lanes and realignment within the Study Area
    - Phase 3 of the Halton Region Britannia Road Corridor Improvements Project (Regional Road 25 to James Snow Parkway)
    - Indicated completion in 2024.
- James Snow Parkway widening from four to six lanes.
    - Assumed completion in 2023 based on Region and Town direction on the adjacent development to the north (*Bayview Lexis Residential Subdivision TIS (2019)*).

Background Growth:

- A compound annual growth rate of 9% will be applied to James Snow Parkway, 2% will be applied to Fourth Line, and 2.25% will be applied to Britannia Road based on the Boyne Survey Road Network assessment (RNA) as well as Region and Town direction on the adjacent development to the north (*Bayview Lexis Residential Subdivision TIS (2019)*). These growth rates will be applied to the turning movement counts, as applicable, to establish the future 2026 horizon.
- The site traffic developed in the Boyne RNA for the West and East Block will be added to the 2026 future background horizon.
    - The site generated traffic of the Mattamy development directly to the north as well as the proposed development, will be removed and the site traffic for the Mattamy development will be added based on the *Bayview Lexis Residential Subdivision TIS (2019),* which considers updated site statistics.

- Site generated traffic from the Derry Green Corporate Business Park development area is assumed to be accounted for within the conservative annual growth rates proposed for the Study Area road network.

Development Site Multimodal Trip Distribution and Assignment:

- Trip generation: ITE Trip Generation Manual 10th Edition
    - Trip generation for the elementary school and village square land uses will not be considered.
- Modal Split: No transit modal split will be considered.
- Trip distribution and assignment: Transportation Tomorrow Survey (TTS), existing traffic routing patterns and surrounding area characteristics based on an existing proxy zone of similar characteristics to the proposed development zone.
- Trip reductions as required (i.e. Pass-by, Synergy, etc.) as per ITE Trip Generation Handbook 3rd Edition.
- Site generated traffic as assumed in the Boyne RNA will be removed to reflect the updated site statistics.

Automobile Mode Performance and Analysis:

- Traffic analysis to be performed using Synchro 10 and Sidra on Study Area network intersections to determine the LOS, delay, V / C ratio and the 95th percentile queues using Highway Capacity Manual (HCM) methodology
    - Heavy Vehicle %, Peak Hour Factors, pedestrian volumes, and cyclist volumes will be taken from the collected TMC data. Where information is not available, a Heavy Vehicle % of 2%, and the Peak Hour Factor of an adjacent intersection will be applied.
    - Other Synchro inputs will be based on site observations, Halton Region's Transportation Impact Study Guidelines, as well as Synchro default parameters.
    - Critical movements and intersections will be identified as defined in Halton Region's Transportation Impact Study Guidelines.
- Qualitative transit, cycling, and pedestrian analysis
- Safety analysis to be performed if required.
- Access location analysis, site parking, loading and circulation to be considered where necessary.

Recommendations:

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

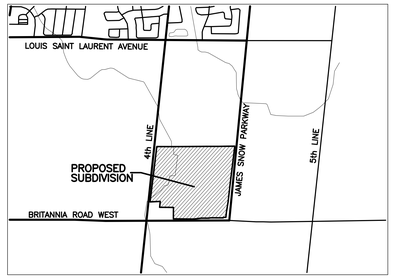
Attachment 1

Proposed Concept Plan

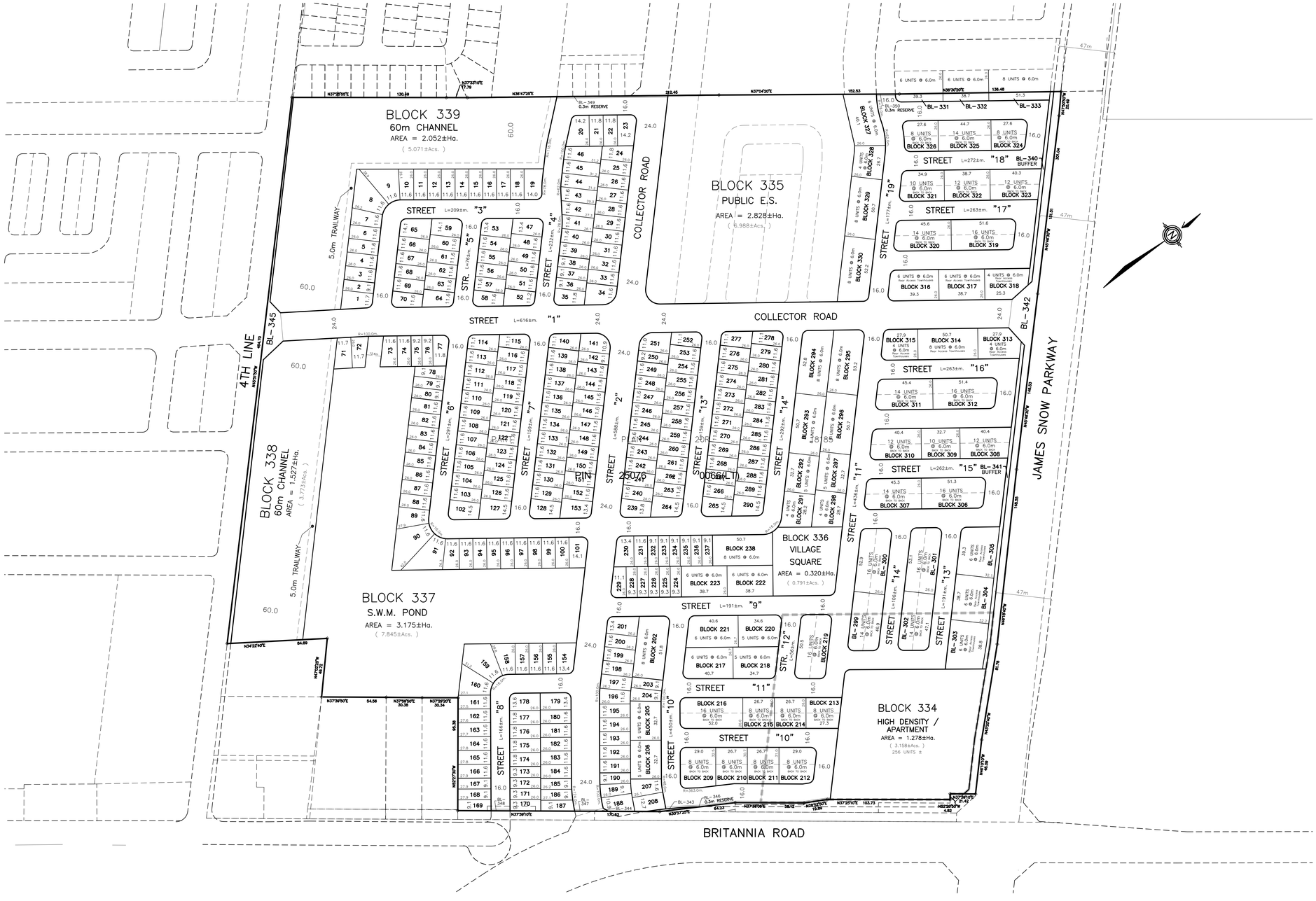
DRAFT PLAN OF SUBDIVISION
PART OF LOT 6, CONCESSION 5, NEW SURVEY
(GEOGRAPHIC TOWNSHIP OF TRAFALGAR)
TOWN OF MILTON
REGIONAL MUNICIPALITY OF HALTON

SCALE 1:1250

DRAFT PLAN T–



KEY PLAN N.T.S.



SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE ----------, 2021

THOMAS J. SALB
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF MILTON FOR APPROVAL.

OWNER

SUNDIAL HOMES (4th LINE) LIMITED

4576 YONGE STREET
SUITE 500
TORONTO, ONTARIO
M2N 6N4

ROBERT YANOWSKI
PRESIDENT

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED = 36.670±Ha. (90.614±Acs)

	BLOCKS	LOTS	UNITS	±Ha.	±Acs.
DETACHED DWELLINGS					
LOTS 3–33. 39–51, 53–57, 59–63, 65–69, 71–74, 81–113, 116–139, 143–166, 174–184, 191–201, 207–208, 230–231, 239–249, 253–276 and 279–290 MIN. LOT FRONTAGE=11.6m. MIN LOT AREA=301.60sq.m.		217	217	7.101	17.547
LOTS 1–2, 34–38, 52, 58, 64, 70, 75–80, 114–115, 140–142, 167–173, 185–190, 203–204, 224–229, 232–237, 250–252, and 277–278 MIN. LOT FRONTAGE=9.15m. MIN LOT AREA=237.90sq.m.		54	54	1.492	3.687
STREET TOWNHOUSES					
BLOCKS 202, 205–206, 217–218, 220–223, 238, 291–298 and 327–333 MIN. UNIT FRONTAGE=6.0m.	25		146	2.480	6.128
REAR ACCESS TOWNHOUSESE					
BLOCKS 303–305 and 313–318 MIN. UNIT FRONTAGE=6.0m.	9		50	0.983	2.429
BACK TO BACK TOWNHOUSES					
BLOCKS 209–216, 219, 299–302, 306–312 and 319–326 MIN. UNIT FRONTAGE=6.0m.	28		336	3.035	7.500
HIGH DENSITY / APARTMENT RESIDENTIAL					
BLOCK 334 – ESTIMATED DENSITY 200 UNITS/HECTARE	1		256 ∗	1.278	3.158
SUBTOTAL	63	271	1,059 ∗	16.369	40.449
BLOCK 335 – PUBLIC ELEMENTARY SCHOOL	1			2.828	6.988
BLOCK 336 – VILLAGE SQUARE	1			0.320	0.791
BLOCK 337 – STORMWATER MANAGEMENT POND	1			3.175	7.845
BLOCKS 338–339 – 60m CHANNEL	2			3.579	8.844
BLOCKS 340–341 – BUFFER	2			0.133	0.329
BLOCKS 342–345 – ROAD WIDENING	4			0.567	1.401
BLOCKS 346–350 – 0.3m RESERVE	5			0.008	0.020
STREETS				9.691	23.947
24.0m. WIDE TOTAL LENGTH=1,204±m. AREA= 2.889±Ha.					
16.0m. WIDE TOTAL LENGTH=4,251±m. AREA= 6.802±Ha.					
TOTAL LENGTH=5,455±m. AREA= 9.691±Ha.					
TOTAL	79	271	1,059 ∗	36.670	90.614

NOTE – CANADIAN GEODETIC DATUM ELEVATIONS RELATED TO

MAJOR NODE AREA

NOTE – ∗ SUBJECT TO FINAL CALCULATION

PROJECT No. P-2181

SCALE 1:1250 MAR 17, 2021

(2181DES22 - 4TH LINE) - (2181MAS2 & 2181TOPO)

DWG. No. - 21:2

KLM PLANNING PARTNERS INC.
64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
TEL: (905)669-4055 FAX: (905)669-0097 design@klmplanning.com

Planning ● Design ● Development

Attachment 2

Pre-submission Comments

Town of Milton
150 Mary Street
Milton, ON L9T 6Z5

T 905-878-7252
www.milton.ca

DEVELOPMENT ENGINEERING

MEMORANDUM

To: **Stirling Todd**, Senior Planner, Development Review

From: **Jonathan Sylvester**, Development Engineering Technologist

Date: 2020 / Dec / 01

Subject: **Pre-Application Comments**
Sundial (Fourth Line)

Development Engineering provides the following **preliminary** comments with regards to this proposal:

1. The Owner is advised that a **Site Alteration Permit** will be required should preliminary grading proceed. Please refer to the Town of Milton Site Alteration By-Law 33-2004 (as amended by By-Law 104-2007) for Site Alteration Permit Application and permit requirements.

2. Development Engineering will require the following **Engineering Studies**, signed and sealed by a qualified Professional Engineer, for review in support of Draft Plan Approval:

   a) **Environmental Site Assessment** to identify areas of potential environmental concern.

   b) **Archaeological Assessment Report** (or Ministry of Tourism, Culture, and Sport clearance letter) identifying and evaluating the presence of archaeological resources and outlining measures to mitigate the impact of development on such resources.

   c) **Traffic Impact Study** as per the Terms of Reference as provided by the Traffic Section.

   d) **Noise Impact Assessment** determining the impact of noise generated by the proposed development on the surrounding environment, the impact of noise from the surrounding environment on the proposed development (including but not limited to vehicular and stationary noise), and the impact of noise from the proposed development on itself, as well as mitigation measures to reduce any negative impacts.

   e) **Functional Servicing Report** verifying the adequacy of water, wastewater, and stormwater capacities to service the subject lands.

   f) **Stormwater Management Report** providing recommendations and descriptions of the proposed stormwater management system for the site.

   g) **Geotechnical Report** revealing the subsurface conditions and to determining the relevant soil properties for the design and construction of pavement and stormwater management infrastructures.

   h) **Tree Inventory and Preservation Plan**

   i) **Topographical Survey Plan** showing all areas of all land parcels relevant to the development proposal.

j) **Pedestrian Routing Plan** showing all sidewalks, trails, and bike lanes within the subject development.

3. The Owner is advised that all design documents/information shall adhere to the current versions of the **Town of Milton Engineering and Parks Standards Manual**, the **Town of Milton Site Plan Application Guideline**, and the **Town of Milton Right-of-Way Construction Standards** and are a **preliminary** list of requirements that is subject to change during Draft Plan review.

4. Development Engineering would like to advise the applicant that the following items are to be addressed through their submissions for Draft Plan of Subdivision:

   a) There is a small jog in the rear lots of the houses backing onto the south portion of the Stormwater Management Pond Block. This is to be 'smoothed' out.

   b) The northeast-most portion of the greenland channel has an odd 'cut-out' as is interfaces with the local road to its east. An effort should be made to smooth the right-of-way as much as possible.

   c) The south portion of the greenland channel illustrates the trail on its west side. We request that the trail be flipped to the east side in order to allow for the ability to combine this trail with the pond access road in an effort to reduce maintenance costs and provide better active transportation connectivity.

   d) Effort is to be made to reduce/eliminate the requirement for noise attenuation walls if at all possible.

5. Preliminary grading information is to be provided where sidewalk connections are being made through window streets to adjacent roads. Retaining walls are to be avoided.

Should there be any questions or concerns please contact the undersigned.

Jonathan Sylvester, C.E.T.
Development Engineering Technologist | Town of Milton
150 Mary Street, Milton, ON L9T 6Z5
www.milton.ca | jonathan.sylvester@milton.ca | Ph: 905-878-7252 Ext: 2230

RECORD OF PRE-SUBMISSION CONSULTATION

Town of Milton
Engineering Services, 2nd Floor
150 Mary Street
Milton, Ontario L9T 6Z5
FAX: 905-876-5029

Transportation Planning Comments – Sundial Homes 4th Line Subdivision

Comments Provided By: Michael Curco (□0□-□7□-72□2 ext. 2□□□)

Likely Conditions for Approval

1. A Transportation Impact Study (TIS) is required. The scope of work is to be circulated to the undersigned for approval prior to commencing the study. PDF's as well as hard copies are to be provided. Please note that the findings of the TIS may trigger additional required changes to the plan.

2. Please be advised that the following intersection is to operate under roundabout control:
   a. Fourth Line at east/west collector road (Collector Rd 'G' per Boyne RNA)

3. The intersection of Trudeau Drive & the east/west collector road (Collector Rd '□' per Boyne RNA) may be required to operate under roundabout control, subject to review of the TIS and at the discretion of the Town. Please note that this would have an impact on lot layouts, daylighting requirements, etc. and that holding provisions would be placed on the lots adjacent to the roundabout to ensure that the roundabout is designed to Town of Milton specifications.

4. All driveways must be clear of the roundabout splitter islands. All units/blocks adjacent to roundabouts will have a holding provision enacted until such time that the Town is satisfied with the design of the roundabouts. Roundabouts are to be designed as per the Town of Milton's Engineering and Parks Standards Manual Update (201□).

5. Daylighting requirements are to be as per the Town of Milton's Engineering and Parks Standards Manual 201□ Update. Daylighting provisions in excess of what is noted in the Town of Milton's Engineering and Parks Standards Manual is required at roundabouts, which is to be confirmed through detailed design to the satisfaction of the Town. All daylighting provisions need to be properly indicated on the plan.

6. The Owner will be responsible for the urbanization/reconstruction of Fourth Line along the frontage of the subject site, in conformance to Town of Milton Engineering Standard No. □-□A.

7. Please co-ordinate with adjacent landowners to ensure that driveways/roadways align accordingly.

□□ □t is t□e □o□n's preference t□at t□e proposed elementary sc□ool □as fronta□e on bot□ □rudeau □ri□e and t□e east□□est collector road□ay□□ocatin□ sc□ools on a corner □it□ fronta□e on at least t□o public streets□ensures safe and con□enient access for bus loops□automobile par□in□□c□ildcare drop off□ □ood connecti□ity for acti□e modes of transportation□and access to public transportation □□ere a□ailable□ □t also allo□s for traffic to be spread o□er multiple road□ays□instead of all of it bein□ consolidated to one road□ay□□□ic□ □elps alle□iate traffic con□estion□

□□ □□e second □□esterly□road□ay connection to Britannia □oad is □enerally not supportable from a transportation en□ineerin□ □plannin□ perspecti□e□□o□e□er□Britannia □oad is under t□e □urisdiction of □alton □e□ion and t□e decision □□et□er to permit t□is connection □ill ultimately be at t□eir discretion□

10□Si□nificant consideration must be □i□en to pedestrian circulation□□edestrian desire lines must be considered and safe□ con□enient connections must be pro□ided to □ from t□e future□existin□ side□al□□multi-use pat□ net□or□□recreational trail system□sc□ools □par□s□boundary road□ays□etc□ Minimum □□0m □ide □al□□ay bloc□s must be pro□ided□□□ere applicable□

11□As per the Town of Milton's Engineering & Parks Standards Manual, all plans of subdivision are to □a□e a minimum of t□o points of access durin□ construction and upon completion□

12□□urnaround facilities need to be pro□ided at streets t□at dead-end□□□ere applicable

S□ould you □a□e any □uestions□please do not □esitate to contact me□

Mic□ael □urco□□ □□□□M□□□
□ransportation □lannin□ □ec□nolo□ist

DEVELOPMENT APPLICATION
PRE-CONSULTATION FORM
Subdivision/Condominium/Official Plan Amendment/Zoning By-law Amendment

The following form is to be completed with Staff from the Town of Milton Planning and Development, Regional Municipality of Halton Legislative Planning Services and Conservation Authority staff with the applicant/owner at a Pre-consultation Meeting **prior** to the application being submitted to the Town of Milton.

DATE OF MEETING:	December 1, 2020
PROPOSAL:	□□e proposed de□elopment consists of a mix of sin□le detac□ed d□ellin□s□ to□n□ouses □e□□□street□bac□-to-bac□ and rear access□and a bloc□ of medium density apartments □0□□□□ □ectares□on t□e sub□ect lands□□□e plan also consists of a □reenland c□annel □□□S□□it□ a trail□ay system□ storm□ater mana□ement pond □□□111 □ectares□□□illa□e s□uare □0□□□□ □ectares□and a public elementary sc□ool □2□□□2 □ectares□□□□e □lan of Subdi□ision □ill be bisected by t□o collector roads□□it□ a series of local roads t□rou□□out to ser□ice t□e de□elopment□Situated □it□in t□e sout□eastern portion of t□e sub□ect lands is a future de□elopment bloc□ approximately 1□22□ □ectares □□a□in size □□ic□ is to be de□eloped at a later date□ □□ere appeared to be a □erita□e buildin□ on t□e property t□at □as been demolis□ed □it□out permission□ □□is □ill need to be assessed□
APPLICANT:	Sundial Homes - Chris Matson - □□M □lannin□ □artners □nc□
SITE LOCATION:	1□01 □ourt□ □ine - □ort□-□est corner of □ames Sno□ □ar□□ay and Britannia □oad and bet□een □ourt□ □ine and □ames Sno□ □ar□□ay □□□□□ □a □□□ acres□□□
ATTENDEES:	Stirling Todd, Chris Lupis, Roberta Sager, □onat□an Syl□ester□, Michael Turco, Dee Dee Fitzpatrick, Heather Dearlove, Robert Clackett

APPLICATION TYPE: *(Please Check)*

- ☒ **Plan of Subdivision**
- ☐ **Plan of Condominium**
- ☐ **Official Plan Amendment**
- ☒ **Zoning By-law Amendment**
- ☐ **Site Plan Approval Required?** YES ☐ N/A ☐
- ☒ **SIS Approved?** YES ☐ NO ☒

LAND USE:

Conformity with Regional Official Plan Land Use Designation:	YES ☒ NO ☐ TBD ☐
If "No", an application has been made to amend the Regional Official Plan:	YES ☐ NO ☐ TBD ☐
Existing Town of Milton Official Plan Designation:	**Milton Official Plan (OPA 31)** *Schedule 1* – □rban Area and □□S Area *Schedule B* – □esidential Area□□□S Area and □ar□□ay Belt □ est *Schedule M* – □□S – □ey □eatures **Boyne Secondary Plan** *Schedule C.10.B* – □□S□Bo□es □ast □ei□□bour□ood□□ma□□ Study Area□S□ M □ond and □illa□e S□uare *Schedule C.10.B* – □n□anced Streetscape alon□ Britannia □oad□□□S□□ma□□ Study Area□Ma□or Arterial □oads □Britannia and □S□□and a □ollector □oad is s□o□n *Schedule C.10.C* –□ma□□ Study Area□ □ate□ay□Ma□or □ode□□esidential Area□□□S□ and □esidential □ffice Area *Schedule C.10. D* – □□ase □B □□□ to proceed□
Conformity with Local Official Plan Land Use Designation:	YES ☐ NO ☐ TBD ☒
If "NO", the nature of the amendment need:	Maybe issues with the Major Node configuration and sizing and heritage building demolition
Existing Zoning:	Future Development (FD) and Natural Heritage System (NHS)
Conformity with the Town's Zoning By-law	YES ☐ NO ☒ TBD ☐
If "NO", the proposed zoning is:	Site Specific Zones to accommodate a plan of subdivision and uses in accordance with Boyne Secondary Plan permissions.

Submission Requirements*			
Plans and Drawings	**Required**	**Paper Copies**	**Notes**
Completed Application Form	☒	1 copy	With original signatures
Survey / Legal Plan	☒	15 copies	
Draft Official Plan Amendment	☐	5 copies	PDF and Word file digital
Draft Zoning By-law	☒	5 copies	PDF and Word file digital
Concept Plan	☒	15 copies	PDF & AutoCad (georeferenced)
2D/3D Concept Plan (Colour) with street labels	☒	15 copies	PDF digital
Draft Plan of Subdivision and/or Condominium	☒	15 copies	PDF & AutoCad (georeferenced)
Public Engagement Strategy	☒	1 copy	PDF and Word file digital
Planning Justification Report	☒	10 copies	PDF and Word file digital
Archaeological Assessment	☒	10 copies	PDF and Word file digital
Heritage Impact Assessment	☒	5 copies	PDF and Word file digital
Environmental Site Assessment (i.e. Phase 1)	☒	10 copies	PDF and Word file digital
Environmental Impact Statement/Study	☐	10 copies	
Tree Inventory & Preservation Study	☒	10 copies	PDF and Word file digital
Opportunities & Constraint Mapping	☐	10 copies	
Topographical Survey	☐	10 copies	PDF & AutoCad (georeferenced)
Soils/Geotechnical Report	☒	10 copies	PDF and Word file digital
Hydrogeological Report	☒	10 copies	PDF and Word file digital
Functional Servicing Report	☒	10 copies	PDF and Word file digital
Storm Water Management Report	☒	10 copies	PDF and Word file digital
Traffic/Transportation Impact Analysis	☒	10 copies	PDF and Word file digital
Parking justification Report	☐	10 copies	
Noise & Vibration	☒	10 copies	PDF and Word file digital
Urban Design Guidelines	☒	5 copies	PDF and Word file digital
Architectural Control Guidelines	☒	5 copies	PDF and Word file digital
Shadow Analysis	☐	10 copies	
Agricultural Impact Assessment	☐	10 copies	
Market Impact Study	☐	10 copies	
Financial Impact Study	☐	10 copies	
Park Concept Plan (Village Square Block).	☒	10 copies	PDF & AutoCad (georeferenced)
Context Concept Plan – Proposed Elementary School Block/Neighbourhood Park (External to Plan)	☒	5 copies	PDF & AutoCad (georeferenced)
Pedestrian Circulation Plan	☒	10 copies	PDF & AutoCad (georeferenced)
Phasing Plan	☒	10 copies	PDF & AutoCad (georeferenced)
Site Servicing and Grading Plan	☒	10 copies	PDF & AutoCad (georeferenced)
Allocation Transfer Request	☒		To Halton Region prior to application submission to the satisfaction of the Town and Region

**In compliance with the Accessibility for Ontarians with Disabilities Act, 2005, all documents provided shall be developed and/or designed using software that enables the author to create an accessible format.*

***Note: All reports, documents and drawings (including two sets of reduced copies of all plans (11" x 17") must be submitted in paper and electronic (i.e. PDF or JPG) form and on three (3) compact discs or USB.**

Application Fees:

Agency:	Fees:
Town of Milton	https://www.milton.ca/en/business-and-development/resources/2020-Development-Application-Fee-Schedule.pdf **Advertising Fee: Actual Cost of Ad + $480.58**
Region of Halton	See Town link above for list of consolidated fees, including the Region of Halton.
Conservation Halton	https://www.conservationhalton.ca/plan-review-fees

***Rates in affect at the time of application apply.**
***Separate cheques are required for each fee at the time of submission.**

Notes:

a) The purpose of a pre-consultation form is to identify the information required to prepare a complete application as set out in the *Planning Act*. Pre-consultation does not imply or suggest any decision whatsoever on the part of Town staff or the Corporation to either support or refuse the application. Comments provided at a pre-consultation meeting are preliminary and based on the information submitted for review at that time.

b) When a formal application is made, the cheque for the application fee will be processed immediately; however, this does not constitute the application being deemed complete for *Planning Act* purposes.

c) For all applications for an Official Plan Amendment, Zoning By-law Amendment, Plan of Subdivision and Plan of Condominium, the applicant hereby acknowledges that the Town is not responsible for the construction or installation of a sign and the applicant agrees to submit a digital photograph of the sign on the property.

d) An application submitted without the requisite information and number of copies identified in this Pre-consultation Form, will not be considered a complete application.

e) Digital mapping software standards: The Town's standard GIS program is ArcGIS Version 10.[illegible] The Town's standard CAD program is AutoCAD 201[illegible] Compatibility with either software package is required. The Town's standard projection for all digital submissions is Universal Transverse Mercator, Zone 17 North, North American Datum 1[illegible] Data not conforming to this standard will be sent back to the consultant at the consultant's expense. Data should be submitted as either ArcGIS Shapefile format or AutoCAD [illegible] A CAD seedfile or Shapefile in the appropriate coordinate system can be provided to the consultant. Consultants providing AutoCAD submissions must include legible layer naming conventions and include layers: GIS_Prop_Block, GIS_Prop_Building, GIS_Prop_Driveway, GIS_Prop_Lot, GIS_Prop_Road, GIS_Prop_Common_Lot_Lines if applicable and only include relevant layer information in the following format: GIS_prop or ext_Other_Feature. Any reference maps attached or layer names not understandable will be sent back to the consultant at the consultant's expense. Consultants providing AutoCAD submission should not use special fonts, reference files or colour tables. Digital information supplied to the consultant by the Town is not to be altered, distributed, manipulated or misrepresented in any form.

f) Additional studies may be required during the processing of the application, depending on the issues identified and information required, as the application proceeds through the planning review process.

g) The applicant acknowledges that the Town considers the application form and all supporting materials, including studies and drawings, filed with any application to be public information and to form part of the public record. By filing an application, the applicant consents to the Town photocopying, posting on the Internet and/or releasing the application and any supporting materials either for its own use in processing the application or at the request of a third party, without further notification to or permission from the applicant. All plans and documents are to be *Accessibility for Ontarians with Disabilities Act, 2005* (AODA) compliant. The applicant also hereby states that it has authority to bind its consultants to the terms of this acknowledgement.

h) This Pre-Consultation Form expires four (4) months from the date of signing or at the discretion of the Commissioner of Planning and Development or his/her designate. In the event that this Pre-Consultation Form expires prior to the application being accepted, and/or new policy and/or new by-laws apply, another form will be required.

i) Development Planning Comments:

General Comments

I. There are significant concerns surrounding the unauthorized demolition of the listed heritage building located on the subject lands. An investigation into how this building was demolished is commencing. The Town is very disappointed that this was allowed to happen on these lands. Aside from possible fines and a police investigation, staff will consider the need to construct an exact replica of the lost building down to all available details on the property to the satisfaction of the Town. Further documentation from the Town on this matter will be forthcoming.

II. Parkway Belt West Plan (PBWP): Until such time as Halton Region and the Province has resolved the PBWP delineation on the subject lands, the requirements of this designation apply. Has Sundial thought about seeking an MZO to deal with that issue?

III. We need a detail unit, density and housing mix stats based on the BSP requirements, a details Regional Servicing Allocation Table on the draft Plan and the draft plan to clearly articulate the boundaries of the Major Node as shown on Schedule C.10.C in the BSP (See Urban Design and Policy comments on the size).

IV. Confirmation that the Region is comfortable with two close accesses onto Britannia Road is required. The Town prefers one access and consideration of a road connection between this plan and the old Britannia Road stub from a connectively and a functional perspective if it is achievable.

V. There is a tremendous amount of debris and garbage deposited on the property in the areas near the demolished heritage building. Proof that this has been cleaned up is required prior to application submission and should be done ASAP.

Policy Assessment

VI. **Residential (C.10.5)**

1. All lots currently located adjacent to a collector road should be realigned such that it fronts onto the collector road whenever possible and in accordance with the Boyne Secondary Plan.
2. Roads and lots need to be oriented such that the need for noise attenuation fences/ barriers are not required. This is especially the case along Britannia Road and JSP to the satisfaction of Halton Region and the Town. The Town and Region will not assume any current or future liability or responsibility for these features and the burden will not be permitted to be borne by future home owners.
3. C.10.2.1e: overall UPNH should be 40 UPNH for this development and 70 residents and jobs per gross hectares. Compliance to this policy requirement needs to be documented on the Draft Plan in the statistics section.
4. C.10.4.4: Housing Mix: LD48%/ MD34%/HD17%. This needs to be documented on the Draft Plan statistics section in terms of what is being proposed and the policy requirement.
5. C.10.5.1.1a: Medium Density 1 Res.: 31-45 UPNH (Singles, Semis, Street Towns Tri and Quads).
6. C.10.5.1.1b: Medium Density II Res.: 46-100 UPNH (Stacked Towns and Apt's).
7. C.10.5.1.1c: High density Res.: 100-200 UPNH (B2b and Apartments).

VII. **NHS (C.10.5.8)**

1. 60 metre Greenland Channel (NHS) is proposed with a trail in the outer limits and shown as 5 M wide.
2. What happens at the southern end of the Greenland channel as it end at an existing residential lot?
3. The draft plan needs to be in accordance with the SIS for Boyne Area 5B.

VIII. **Gateway (C.10.2.2.f)**

1. Hard to tell if Sundial is achieving the Gateway objectives in the BSP Major Node/ Gateway policies.

IX. **Omagh Study Area (OSA) (C.10.5.12)**

1. The OSA was intended to assess the heritage attributes of the Omagh area.
2. The boundary just slightly touches the Sundial property.
3. I am of the opinion unless advised otherwise by Planning Policy staff that it does not apply to the Sundial lands. It appear to me that the way the circle was stretched over the area on the schedule that these

policies were not intended to apply to the Sundial lands as it was intended to capture the historic settlement area. The historic building noted in the Secondary Plan to be located on the Sundial property is significantly outside of the settlement area and would have been historically a farm homestead and not part of the settlement area. It will be assessed separately for its heritage attributes and connections to the settlement area and further comments will be provided by the Heritage Planner regarding the noted unauthorized demolition.

4. Connectivity to the future Old Britannia Road stub (once Britannia Road is realigned by Halton Region) is recommended.

X. **Major Node (C.10.5.6)**

1. The Major Node (MN) area does not seem to be accurately depicted on the draft plan and the mix of uses proposed does not seem to be the highest and best use of these lands.
2. The limits of the MN as depicted on Schedule C.10.C shall be shown on the draft plan for reference purposes by a dashed line.
3. It needs to be proven that the medium density uses shown within the MN designation and the apartment, and future development block/ B2B and single detached uses located within this designation meets the policy intent. It appears the policy objectives are not being achieved and the area being treated to be within the designation are much smaller that on Schedule C. 10.C.
4. High density uses within the MN shall be developed at a FSI between 1-3 and from a minimum of 3 storeys to a maximum of 15 storeys (C.10.5.6.3c). They should form part of a mixed use development that has a strong street presence at Britannia Road and JSP as noted in the Gateway Policies.

XI. **Village Square**

1. Community Services will provide direction on the location and composition of the Village Square in accordance with Policy C.10.5.11.

XII. **Elementary School**

1. It appears that the HDSB wants to school site and further direction on the location should be sought from them.
2. The proposed school block is located adjacent to the park located in the Bayview Lexus (Mattamy) 24T-20001/M development which is good.

XIII. **Residential/ Office Designation (C.10.5.2)**

1. This designation has been identified on Schedule C.10.C (Land Use Plan) and this was further refined on the Tertiary Plan Appendix C.10.D. In the Tertiary Plan it is no longer shown along the 4th Line as a result of the realignment of the creek (NHS).
2. This area and designation no longer apply to the Sundial property

j) Urban Design/ Policy Planning Comments:

I. **Architectural Control Guidelines**

1. The Owner shall provide to the satisfaction of Town Administration, Architectural Control Guidelines in conformity with the Boyne Survey Secondary Plan and Implementation Strategy, prepared by a qualified consultant prior to the passing of the implementing Zoning By-law, to address but not be limited to, streetscape, architectural form and façade, setbacks, heritage buildings, utility equipment structures and other design issues unique to the proposed development and to identify priority lots.
2. Prior to the submission of individual building permit applications, the Owner shall submit building drawings to the Town's Urban Design Section for review of lots that have been identified as priority lots in the Architectural Control Guidelines. Not all priority lots may be subject to review. Urban Design staff will confirm which specific lots require the Town's review when a more detailed plan and Architectural Control Guidelines are submitted.

II. **Omagh Character Area**

1. In 2019, Town staff prepared the Omagh Village Heritage and Character Value Assessment Background Report (PD-50-19). The report along with the staff's recommendation to designate Omagh a "Character Area" were endorsed by Council on December 16, 2019. The next step is the establishment of a Character Area boundary and the completion of a Character Area Plan by the Urban Design Section. Urban design staff does not consider the property at 1501 Fourth Line (Sundial Homes - KLM Planning Partners lands) to be part of the future character area, therefore will not be subject to any resulting zoning regulations to be planned for the character area.
2. It is important that the subdivision design addresses the character area. There is an opportunity to provide adequate and enhanced pedestrian connections between the proposed new subdivision and the Character Area.

III. **Lot Configuration**

1. Plans should include the complete lot layout. Use a different colour for street townhouses. Comments will be provided when a more detailed plan is submitted.
2. The owner should pay attention to the blocks along the collector road, at James Snow Parkway. Back to back townhouses should be avoided at this gateway location. Urban design staff would prefer that rear access townhouses be proposed on both sides of the collector road. This approach would enhance the pedestrian experience and contribute to create built form that reinforces the gateway character of the streetscape.
3. Subject to the conclusions and recommendations of a Heritage Impact Assessment, the Subdivision Plan shall indicate the lot where the listed heritage house is to be relocated.
4. Access to Britannia Road from local roads and the design of back to back townhouses with frontage onto Britannia Road are discouraged.

IV. **Major Node Designation**

1. The Local Official Plan designates the block at the intersection of Britannia Rd. and James Snow Parkway Major Node Area. The purpose of the Major Node Area designation on Schedule "C.10.C" identifies

integrated concentrations of mixed uses and higher residential densities at key intersection locations. These areas are intended to be the focus of urban activity for surrounding residential neighbourhoods, be pedestrian-oriented and maximize the use of public transit. The proposed configuration of the node, with medium density apartments and a future street-oriented housing development does not reflect the intent of the Official Plan. Urban design staff recommends a mixed use development that incorporate retail and service commercial use in this area.

2. The Major Node Area depicted on the Boyne Survey Tertiary Plan Schedule C.10.D is approx. 2.76ha in size. The proposed medium density apartment and future development blocks have a combined area of 0.95ha, which is significantly smaller than the direction provided by the Official Plan. This should be reviewed.
3. Staff would like to review a preliminary comprehensive development plan for the Major Node as part of the subdivision review.

k) Infrastructure Engineering Comments:

I. Applicant is to confirm that any Municipal EA requirements for the two collector roads will be addressed, including how these will be addressed. This will include confirming if a Municipal Class EA is required, if not, why not, and if so, how the requirement will be addressed (i.e. integrated approach with the Planning application, or other). Currently the Municpal Class EA process states: *Ontario Regulation 345/93, made under the EA Act, designates private sector developers as subject to the requirements of the EA Act if a private sector developer is proposing an undertaking of a type listed in Schedule C and the undertaking involves the provision of roads, water or wastewater facilities for the residents of a municipality.* If the developer indicates the collector roads identified are not considered Schedule C projects at this time, we need some justification from the applicant supporting this, to be submitted to the Town (Engineering) in writing.

II. Regarding the urbanization of 4th Line, it is Infrastructure's expectation that 4th Line will be urbanized along the frontage of this development, by the Developer (similar to what has been communicated to both developments north of Sundial's property).

III. It is noted that the concept plan identifies the east cul-de-sac on "Old Britannia" that will be ultimately constructed by the Region – suggest early discussion and coordination with the Region re: limits of their work and associated timing etc.

IV. Consideration of the potential (or not) of connecting the future proposed cul-de-sac on Old Britannia from the Sundial lands and any Planning Policy work that is ongoing for the Omagh area needs to be assessed and represented in any future plans on the Sundial property.

V. It appears as though Sundial is proposing 2 connections out to Britannia (Trudeau and then another road immediately to the west). The Region will be involved, but the Town highly doubts this would be supported from their end – ultimately up to the Region.

l) Community Services Comments:

I. **Required Submittals, Zoning Amendment and Plan of Subdivision:**

1. Park Concept Plan (Village Square Block).
2. Context Concept Plan – Proposed Elementary School Block/Neighbourhood Park (External to Plan).
3. Phasing Plan.

II. **Parkland Dedication - Village Square Block**

1. As a contribution toward parkland dedication, this block is subject to the terms of the Boyne Financial Agreement, providing Village Square uses to one of the sub-neighbourhoods within Bowes Neighbourhood. Specific policy references include Schedule C.10.D (Boyne Survey Tertiary Plan) and the Boyne Secondary Plan, and Part VII of the Boyne Financial Agreement.
2. Proposed parkland is to be conveyed free of any encumbrances including but not limited to physical structures, restrictions to the development of site amenities and recreational facilities on Town land, easements, and servicing infrastructure required for adjacent lands etc.
3. The Village Square as located and configured is in general conformity with the Boyne East Tertiary Plan discussions, and creates an attractive pedestrian route through the street fabric. The Village Square Block (0.44 hectares) as proposed is larger in size than the approximate acreage of 0.32 ha as discussed during the Tertiary Plan discussions. Please note credits will not be provided for parkland contributed in excess of the total 105 acres identified within the limit of the Boyne Secondary Plan. Any reduction in size should retain the positive characteristics of the current block configuration.
4. A **Phasing Plan** with proposed number of building permits per phase is required to confirm the timing for conveyance of the Village Square in relation to the terms of the Boyne Financial Agreement. As outlined in Part VII item 21c, the trigger for the conveyance of the Village Square is 25% of the building permits issued for this Bowes sub-neighbourhood. Parks are typically conveyed in the first phase of a subdivision development. Community Services staff will provide more information regarding the parkland development timing during the application process. All base condition works are to be completed and to the Town's satisfaction to meet the Town's schedule for capital construction.
5. The submission of a **Park Concept Plan** (also called Park/Open Space Plan, or POSC Plan) is required to demonstrate that the proposed configuration of the Village Square will accommodate the uses expected. Typically, a Village Square site programme includes: junior play structure/equipment & swings for young children, site furniture such as benches/trash receptacles, lit asphalt pathways of 3.0 m width, tree planting for shade, planting for screening of private residences, open sodded play areas, and a shade shelter. Where the park has frontage on roadways, the park feature areas should be set back accordingly for safety and security of young children. Sight lines should be maintained through the park. Should the landscape architectural consultant enquire about existing village squares, there are many village squares throughout Milton that have been constructed. Examples of existing parks in the range of 0.30-0.35 hectares include: Bronson Park or Raspberry Park (within the Boyne East plan area), Holloway Park and Hutchinson Park. Village squares such as Speyer, McDougall, McCready, Leiterman and Gastle Parks, although each of their acreage is larger (in the range of 0.80ha), demonstrate the amenity spaces that are considered for village squares. The Applicant or their landscape architectural consultant is invited to contact Community Services to discuss any aspect of the park programme. The Applicant should review the parkland requirements under Section 1.4 of the Engineering and Parks Standards Manual (EPSM) for the requirements related to the POSC.
6. The Village Square is part of the overall network of connected open space areas included in the subdivision. Therefore, the POSC Plan and the Active Transportation Plan are to be coordinated to

demonstrate connectivity of the park to/from the sidewalks and cycling facilities proposed in the overall subdivision. Further, visibility to the park and connectivity from the active transportation network on James Snow Parkway should be provided.

7. Future submissions for permits/approvals (e.g. Site Alteration, Pre-Servicing, Subdivision) must be in accordance with the Town's standards for parkland conveyance as included in the Town's Engineering and Parks Standards Manual.
8. Town land, including parkland, is not to be used for stockpiling or storage during any site works, including site alteration.
9. Through the Town's Park Development Methods Policy, the Applicant can request to design and construct village squares on behalf of the Town. This can be discussed further with Community Services staff through the application process.

III. **Parkland(External)/School Block Coordination**

1. The proposed elementary School block abuts a proposed neighbourhood park block on the adjacent property (24T-20001 Mattamy Bayview Lexis). The park concept plan for the neighbourhood park is currently under review, and it will be shared with the Applicant when completed. A **Context Concept Plan** showing the conceptual site concepts of the proposed school and the adjacent neighbourhood park block is required to confirm that opportunities for AODA compliant pathway connections will exist and that there are no conflicts between the layouts. This Plan must demonstrate how the proposed School Block meets the site programme from Halton District School Board, and specifically, all the standard requirements of site plan approval, including vehicular circulation, setbacks etc. within the limits of the proposed school block. Further, the detailed subdivision design must ensure that the concepts are feasible.

IV. **Park Base Condition**

The following preliminary comments are provided to aid the preparation of the technical reports prepared in support of the Draft Plan submission and/or the preparation of the engineering/landscape drawing submission:

1. Please refer to the Town's Engineering and Parks Standards Manual (March 2019) for complete information regarding Drawing and Base Condition Requirements associated with Park Blocks. Base condition works for the Village Square include temporary and permanent fencing, water service, stormwater service and grading, electrical service, signage, and sodding. Key information regarding Town parkland can be found in sections 1.4, 2.1.14 and 2.1.19.3.
2. Once approved by Community Services, the Park/Open Space Concept Plan (POSC) is to be used for the detailed design of the developer's base condition works. All base condition works are to be included in the engineering/landscape drawing submissions prepared by the Applicant's consulting team. The Applicant should review the parkland requirements under Section 1.4 of the Engineering and Parks Standards Manual (EPSM) for the requirements related to base condition, the "Park/Open Space Concept Plan (POSC)" and the "Park/Open Space Interim (Base Condition) Grading Plan."
3. A Cost Estimate for the Park Base Condition works is to accompany each engineering/landscape submission.

m) Finance Comments:

I. Regional development charges and educational development charges are applicable in accordance with the appropriate agency's policies and by-laws. Town development charges and other charges are applicable on any future development in accordance with Town policies and by-laws and other applicable legislation. All development charge inquiries should be directed to Cathie Boyle, Development Administrator at 905-878-7252, extension 2402.

II. The standard development fees, as outlined in the Town's annual user fee report and by-law, are applicable.

III. A letter from the Trustees (contact information noted below) is required for each development application confirming that the landowner is in good standing with the applicable Landowners' Group.

Helen Mihailidi
MP3 Cost Sharing Trustee Inc.
c/o Bratty and Partners, LLP
7501 Keele Street, Suite 200
Vaughan, ON L4K 1Y2
905-760-2700
hmihailidi@bratty.com

AND

Nathan Tracey
Milton Phase 3 Landowners Group Inc.
c/o Delta Urban Inc.
8800 Dufferin Street, Suite 104
Vaughan, ON L4K 0C5
905-660-7667
nathant@deltaurban.com

n) Transportation Planning comments dated December 1, 2020 are attached.

o) Development Engineering comments dated December 1, 2020 are attached.

p) Heritage Services comments will be provided at a later date given the ongoing investigation surrounding the unauthorized demolition of the listed Heritage Building on the subject property located at 1501 Fourth Line, Milton.

q) Conservation Halton comments:

I. SIS Areas 5A, 5B, and 6 Boyne Survey Lands, Town of Milton (revised September 2018) has been finalized:

1. Interim Omagh Tributary SIS Addendum - will need to be substantially completed prior to Draft Plan Approval (Town of Milton, Region of Halton and Conservation Halton approval).
2. Comments pertaining to the creek realignment and SWM approach to be discussed as part of the SIS review.

II. Ensure coordination with adjacent subdivision (SWM design (Pond S5b-2), creek realignment (SE-3-B)) to the north.

III. Ensure coordination with Region of Halton and the Town of Milton (i.e. adjacent roadworks etc.).

IV. Please contact CH at the time of submission for the Subdivision Fee. Please note depending on timing 2021 fee schedule may apply.

r) Halton Region Comments dated December 16, 2020 have been attached.

Signed,

Town Planning Staff (Print)	Signature	Date
Robert Clackett		12/16/2020
Regional Planning Staff (Print)	Signature	Date
Conservation Authority Staff (Print)	Signature	Date

By signing this Pre-Consultation Form, I/we acknowledge that, subject to any appeals, the drawings, reports and other requirements indicated above must be submitted along with a completed application form, any information or materials prescribed by statute in both paper and electric form and the required planning application fees to be considered complete. In addition, I/we have read, understood and agreed to the Notes listed above.

Agent (Print) (I have the authority to bind the Owner)	Signature	Date
Owner (Print)	Signature	Date

Michael Dowdall

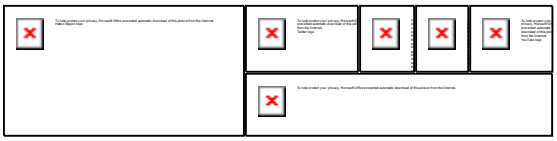
From: Monaghan, Patrick <Patrick.Monaghan@halton.ca>
Sent: Thursday, August 15, 2019 3:54 PM
To: Michael Dowdall
Cc: Michael.Turco@milton.ca; Larkin, Ann; McNeish, Amanda; Hudson, Brian; Dalrymple, Melissa; McGregor, David
Subject: FW: TIS TOR Review - Mattamy - Bayview Lexis Subdivision

Hi Michael

Please see below comments on the scope of work in red. Let me know if you have any questions.

Kind Regards,
Patrick

Patrick Monaghan
Transportation Planning Coordinator
Infrastructure Planning & Policy
Public Works
Halton Region
905-825-6000, ext. 7213 | 1-866-442-5866



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From: Michael Dowdall
Sent: Monday, July 29, 2019 10:06 AM
To: Michael.Turco@milton.ca; 'Monaghan, Patrick' <Patrick.Monaghan@halton.ca>
Subject: Mattamy - Bayview Lexis Subdivision Study Terms of Reference, Town of Milton
Importance: High

Hi Michael and Patrick,

The Municipal Infrastructure Group Ltd. (TMIG) has been retained to prepare a Transportation Impact Study for a proposed Bayview Lexis residential subdivision consisting of approximately 800 dwelling units (see attached concept).

Based on a review of the Concept Plan, the site contains a mix of single and townhouse dwelling units. Vehicular access to the development is proposed via a full moves connection to James Snow Parkway, four connections to Fourth Line, plus connections through future development at the south and north end of the subject parcel. Trudeau Drive and

Whitlock Crossing are planned to bisect the subject parcel in the north-south and east-west directions respectively. A roundabout is proposed at the future intersection of Whitlock Crossing at Fourth Line.

In order to properly scope this project we ask that the Town & Region provide comments on the following terms of reference and confirm if there are any additional items required as part of the study.

Terms of Reference

- We will conduct a study area road inventory review to confirm lane assignments, traffic controls, speed limits, and surrounding land uses and general study area characteristics of the study area.

- The proposed study intersections will consist of:
    - Whitlock Crossing at James Snow Parkway (Regional Road 4)
    - Whitlock Crossing at Fourth Line (roundabout)
    - Three access points to Fourth Line
    - Louis St Laurent at James Snow Parkway (Regional Road 4)
    - Collector Road "F" (Collector Road just north of Britannia Road) at James Snow Parkway

- Develop future background traffic estimates for the development along Fourth Line and James Snow Parkway. Background traffic volumes at build out will be developed that include both corridor growth and planned developments within the planning horizon consistent with the Boyne RNA study.

  Please consider a 9% compounded annually growth rate on James Snow Parkway. In addition please add the Boyne Secondary Plan Site Traffic.

- The estimated site traffic volumes assumed in the Boyne RNA will be removed and replaced per the updated subdivision statistics. As such, the estimated site generated traffic will be built upon the forecasted background traffic volumes provided by the Boyne RNA study, which in turn will become our future traffic base model.

  Agreed, please document these assumption in the report. To be clear the analysis is required to consider the traffic generated by the other subdivisions in the background / total scenario (as noted below).

- The proposed 2021 and 2026 horizon years have been selected to remain consistent with the Boyne RNA.

  In the 2021 scenario please assume the Subdivision to the north (24T-18001 & Z-05 18 - Milton III-75 Land Ltd) is constructed and James Snow Parkway remains 1 lane in each direction. Please complete a sensitivity analysis to confirm that intersection design at James Snow Parkway is not impacted by the implementation of the Trudeau Drive extension through the Subdivision to the north (24T-18001 & Z-05 18 - Milton III-75 Land Ltd).

  In the 2026 scenario please assume all of the Boyne Secondary Plan lands are constructed and James Snow Parkway is 3 lanes in each directions.

- Background traffic growth rates, and future background development, within the study area to be extracted from the Boyne RNA as part of this study.

  Please consider a 9% compounded annually growth rate on James Snow Parkway. In addition please add the Boyne Secondary Plan Traffic as noted above.

- Please provide any potential/committed future road / intersection / other transportation infrastructure improvements within the study area, beyond those proposed in the Boyne RNA, that could affect local traffic

distribution or assignments. Their effects on traffic patterns will be accounted for in the appropriate planning horizon as specified by Town/Regional staff.

James Snow Parkway from Britannia Road to Regional Road 25 is planned to be widened to Six Lanes in 2023. Please assume both Whitlock Avenue and Collector Road F intersections will be signalized through this Capital Improvement. The Transportation Impact Study will be required to recommend an acceptable interim (2021) and ultimate (2026) access solution to James Snow Parkway.

- Trip generation estimates will be prepared for the weekday am and pm peak hours for the proposed development. ITE 10th Edition trip generation data will be reviewed and the appropriate rates used in the analysis.

  Agreed.

- Intersection capacity analyses for the resultant post-build out future traffic condition (the combination of future background traffic plus estimated site trip generation) during selected peak hours will then be conducted at all study intersections using Synchro v.10. Input parameters to the Synchro software will be consistent with the recommended municipal practices and guidelines.

  Agreed.

- Transit mode split and non-auto trip rates methodologies, as per the Boyne RNA study, will be clearly documented in the report.

  Do not apply any transit mode split.

- The directional distribution of traffic approaching and departing the site will be determined based upon a review of existing traffic patterns, Boyne RNA, and Toronto Tomorrow Survey 2011 (TTS) data. The site traffic will be assigned to the study area roadway network in accordance with our interpretation of these various patterns.

  Please use the 2011 Transportation Tomorrow Survey, however since this is a green field development please consider the results of neighboring zones that have established travel patterns.

- Conduct left-turn and right-turn lane warrants at the site accesses, and determine the required storage lane lengths.

  As noted above the Transportation Impact Study will be required to recommend an acceptable interim (2021) and ultimate (2026) access solution to James Snow Parkway. In addition to left and right turn lane warrants please consider a traffic signal warrant for a potential temporary traffic signal and confirm sightlines conform to TAC Requirements.

  Please provide a preliminary design for the interim (2021) and ultimate (2026) designs for the intersection with James Snow Parkway.

Thank you in advance for your attention to this matter. We look forward to your comments on the preceding scope of work.

Michael Dowdall, C.E.T., MITE
Project Manager, Transportation Services

TMIG | The Municipal Infrastructure Group Ltd.
8800 Dufferin Street, Suite 200 | Vaughan, Ontario L4K 0C5
p: 905.738.5700 x361 | c: 437.993.2662 | f: 905.738.0065 | mdowdall@tmig.ca | tmig.ca

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Michael Dowdall

From: Michael.Turco@milton.ca
Sent: Friday, August 16, 2019 8:58 AM
To: Michael Dowdall
Cc: 'Monaghan, Patrick'
Subject: RE: Mattamy - Bayview Lexis Subdivision Study Terms of Reference, Town of Milton

Hi Michael,

Please see the Town's comments below in green:

Should you have any questions, please feel free to contact me.

Thank you,

Michael Turco, C.E.T., MITE
Transportation Planning Technologist
150 Mary Street, Milton ON,
905-878-7252 x2363
www.milton.ca

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From: Michael Dowdall <mdowdall@tmig.ca>
Sent: Monday, July 29, 2019 10:06 AM
To: Michael Turco <Michael.Turco@milton.ca>; 'Monaghan, Patrick' <Patrick.Monaghan@halton.ca>
Subject: Mattamy - Bayview Lexis Subdivision Study Terms of Reference, Town of Milton
Importance: High

Hi Michael and Patrick,

The Municipal Infrastructure Group Ltd. (TMIG) has been retained to prepare a Transportation Impact Study for a proposed Bayview Lexis residential subdivision consisting of approximately 800 dwelling units (see attached concept).

Based on a review of the Concept Plan, the site contains a mix of single and townhouse dwelling units. Vehicular access to the development is proposed via a full moves connection to James Snow Parkway, four connections to Fourth Line, plus connections through future development at the south and north end of the subject parcel. Trudeau Drive and Whitlock Crossing are planned to bisect the subject parcel in the north-south and east-west directions respectively. A roundabout is proposed at the future intersection of Whitlock Crossing at Fourth Line.

In order to properly scope this project we ask that the Town & Region provide comments on the following terms of reference and confirm if there are any additional items required as part of the study.

Terms of Reference

- We will conduct a study area road inventory review to confirm lane assignments, traffic controls, speed limits, and surrounding land uses and general study area characteristics of the study area.

- The proposed study intersections will consist of:
    - Whitlock ~~Crossing~~ Avenue at James Snow Parkway (Regional Road 4)
    - Whitlock ~~Crossing~~ Avenue at Fourth Line (roundabout)
    - Whitlock Avenue at Trudeau Drive
    - Three access points to Fourth Line
    - Louis St. Laurent Avenue at Trudeau Drive

- Develop future background traffic estimates for the development along Fourth Line and James Snow Parkway. Background traffic volumes at build out will be developed that include both corridor growth and planned developments within the planning horizon consistent with the Boyne RNA study. Please utilize a growth rate of 2% compounded per annum for Fourth Line. Boyne RNA traffic is to be included as well.

- The estimated site traffic volumes assumed in the Boyne RNA will be removed and replaced per the updated subdivision statistics. As such, the estimated site generated traffic will be built upon the forecasted background traffic volumes provided by the Boyne RNA study, which in turn will become our future traffic base model. Please ensure that the methodology is very clearly documented in the report including supporting diagrams, excerpts, and detailed text with justification.

- The proposed 2021 and 2026 horizon years have been selected to remain consistent with the Boyne RNA. Refer to Halton Region comments. 24T-18001 & Z-05 18 - Milton III-75 Land Ltd is currently in-stream and so a Final TIS is not available for review. The draft TIS had numerous omissions and errors and therefore should not be referenced. You will need to calculate the trip gen and distribute the traffic accordingly for this subdivision (ensure that detailed info and turning movement diagrams are provided).

- Background traffic growth rates, and future background development, within the study area to be extracted from the Boyne RNA as part of this study.

- Please provide any potential/committed future road / intersection / other transportation infrastructure improvements within the study area, beyond those proposed in the Boyne RNA, that could affect local traffic distribution or assignments. Their effects on traffic patterns will be accounted for in the appropriate planning horizon as specified by Town/Regional staff. Fourth Line & LSL is currently proposed to be signalized prior to 2021 and then converted to a RIRO with PXO configuration by 2026. Refer to Boyne RNA and Town of Milton Capital Construction Forecast for more information.

- Trip generation estimates will be prepared for the weekday am and pm peak hours for the proposed development. ITE 10th Edition trip generation data will be reviewed and the appropriate rates used in the analysis. All land uses within the subdivision must be accounted for. Trip generation must be conducted for all of the land uses including residential, schools, parks, mixed-use nodes, etc.

- Intersection capacity analyses for the resultant post-build out future traffic condition (the combination of future background traffic plus estimated site trip generation) during selected peak hours will then be conducted at all study intersections using Synchro v.10. Input parameters to the Synchro software will be consistent with the recommended municipal practices and guidelines. Arcady is to be used for roundabout analysis utilizing a 15% and 0% y-intercept adjustment.

- Transit mode split and non-auto trip rates methodologies, as per the Boyne RNA study, will be clearly documented in the report. No modal split is to be applied to the trip generation as it is already accounted for within the sites surveyed in the ITE Trip Generation Manual

- The directional distribution of traffic approaching and departing the site will be determined based upon a review of existing traffic patterns, Boyne RNA, and Toronto Tomorrow Survey ~~2011~~ (TTS) data. The site traffic will be assigned to the study area roadway network in accordance with our interpretation of these various patterns. Please utilize 2016 TTS Data

- Conduct left-turn and right-turn lane warrants at the site accesses, and determine the required storage lane lengths.

- Please run an all-way stop warrant for the intersection of Whitlock Avenue and Trudeau Drive. Please utilize a 5% "handicap" for the directional split warrant to account for a reasonable margin of error. If an all-way stop is warranted, the Town will require that this intersection be designed as a single lane roundabout.

- Review queueing at each intersection, highlighting where 95th percentile queues are anticipated to exceed available storage space, and determine mitigation measures.

- Include a thorough review of the internal road network. Ensure that all TAC standards are adhered to including, but not limited to, sightlines, intersection spacing, corner clearances, road alignments, etc.. Review and comment on traffic infiltration/cut-through traffic and on-street parking supply.

- A comparison of trip generation assumptions provided in the Boyne Secondary Plan Road Network Traffic Analysis (September 2017) and the currently proposed site plan is to be provided.

- Detailed recommendations must be included in the report.

Thank you in advance for your attention to this matter. We look forward to your comments on the preceding scope of work.

Michael Dowdall, C.E.T., MITE
Project Manager, Transportation Services

TMIG | The Municipal Infrastructure Group Ltd.
8800 Dufferin Street, Suite 200 | Vaughan, Ontario L4K 0C5
p: 905.738.5700 x361 | c: 437.993.2662 | f: 905.738.0065 | mdowdall@tmig.ca | tmig.ca

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Robin Marinac

From: heide.schlegl@milton.ca
Sent: May 7, 2021 1:13 PM
To: Robin Marinac
Subject: RE: Sundial Homes 4th Line - Terms of Reference

Hi Robin:

From the Town's perspective, I am fine with your terms of reference.

Please ensure that once you receive comments from Halton Region that they are incorporated into the TIS.

Thanks

Heide

Heide Schlegl, C.E.T., MITE, Dipl. M.M.
Manager, Traffic
150 Mary Street, Milton ON, L9T 6Z5
905-878-7252 x2506
www.milton.ca

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From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Tuesday, April 20, 2021 4:06 PM
To: Heide Schlegl <heide.schlegl@milton.ca>; Amanda.McNeish@halton.ca; Patrick.Monaghan@halton.ca
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: Sundial Homes 4th Line - Terms of Reference

Hi Amanda, Patrick, and Heide,

CGH Transportation as been retained to prepare a Transportation Impact Study for the proposed Sundial Homes development within the Boyne Secondary Plan area. Based on the proposed concept plan, as well as pre-application feedback from staff, we have developed a Terms of Reference memo (attached) for your review.

Please let us know if you have any comments or questions.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.

P: 437-242-5183
E: robin.marinac@cghtransportation.com

Robin Marinac

From: Loro, Darren <Darren.Loro@halton.ca>
Sent: May 4, 2021 3:17 PM
To: Robin Marinac; Mark Crockford
Cc: Krusto, Matt; Monaghan, Patrick
Subject: RE: Sundial Homes 4th Line - Terms of Reference

Hi Robin & Mark,

Transportation Planning has reviewed the proposed terms of reference for the Transportation Impact Study (TIS) and offers the following comments:

Land Dedication

The "James Snow Parkway Right-of-way" requirements and "Britannia Road Right-of-way" requirements as outlined in the Region's pre-consultation comments (provided on December 1, 2020) must be acknowledged and accounted for. Right-of-way dedication including daylighting triangles should be dimensioned on the Draft Plan and reflect the Region's right-of-way requirements.

Additionally, setbacks from the property line must conform to the minimum setback requirements outlined in the Town of Milton Comprehensive Zoning By-Law 016-2014.

Study Area

Please include the following intersections in the study area:

- James Snow Parkway and future east-west collector road (as part of the proposed development); and
- James Snow Parkway and Whitlock Avenue (future intersection as part of the Bayview Lexis residential subdivision to the north).

Existing Conditions

The terms of reference acknowledges that the latest turning movement count data for the existing study intersections has been requested from Halton Region's Traffic Operations and Safety department. The use of this traffic data to establish base traffic volumes is acceptable. However, if the existing traffic data for the intersection of James Snow Parkway and Britannia Road is older than 2019, then please use the existing traffic data for the aforementioned intersection (traffic data collected in March 2019) from the "Transportation Impact Study Derry Green Corporate Business Park" update prepared by Crozier Consulting Engineers in January 2021.

A growth rate of 2% compounded annually should be applied to the base traffic volumes on James Snow Parkway and Britannia Road to estimate 2021 "existing" traffic volumes on the road network.

Interim Scenario Analysis – Collector Roadway Connections

Per the Region's pre-consultation comments, an important component of the TIS will be to evaluate and recommend an interim configuration and design (e.g. traffic control, auxiliary turn lanes) for the future east-west collector roadway connection to James Snow Parkway prior to the widening of James Snow Parkway to six lanes (discussed later in these comments). Additionally, the TIS will also be required to evaluate and recommend an interim configuration and design

(e.g. traffic control, auxiliary turn lanes) for the future north-south roadway connection to Britannia Road prior to the widening of Britannia to six lanes (discussed later in these comments).

Horizon Years

The future background roadway improvements detailed below will likely be completed by the proposed full build-out year of 2026. To evaluate interim conditions for both the James Snow Parkway and Britannia Road collector road intersections, the 2023 horizon year should also be added to the analysis. Full build-out of the proposed development should be assumed for the 2023 horizon to provide a conservative analysis of the interim scenario for the James Snow Parkway and Britannia Road collector road intersections.

Background Roadway Improvements

The Region's Transportation Master Plan (TMP) identified the need to widen James Snow Parkway to six lanes from Highway 401 to Britannia Road. Currently, a Municipal Class Environmental Assessment or Detail Design project has not been completed. However, this improvement is currently scheduled to start construction in 2023 per the Region's Capital Project Forecast Listing 2021. This improvement should be accounted for under the 2026 horizon year.

The Region's TMP identified the need to widen Britannia Road to six lanes from Tremaine Road to Highway 407. The segment of Britannia Road from James Snow Parkway to Highway 407 (Phase 2) is currently scheduled to start construction in 2021. The segment of Britannia Road from Regional Road 25 to James Snow Parkway (Phase 3) is currently scheduled to start construction in Spring 2021. The Britannia Road improvements should be accounted for under the 2026 horizon year.

Background Traffic Volume Forecasting

A growth rate of 2% compounded annually should be applied to the 2021 existing traffic volumes on James Snow Parkway and Britannia Road to estimate 2023 future background traffic volumes on the road network.

For consistency with the Bayview Lexis TIS Update prepared by TMIG, a growth rate of 9% compounded annually should be applied to the 2023 future background through traffic volumes on James Snow Parkway to forecast 2026 future background traffic volumes. A growth rate of 2% compounded annually can be maintained for forecasting 2026 future background traffic volumes for the turning movements entering and exiting Whitlock Avenue and the future east-west collector road as part of the subject property.

As documented in the Derry Green TIS Update prepared by Crozier, the Region provided a growth rate of 5.5% compounded annually on Britannia Road. This growth rate accounts for the planned roadway improvements. Therefore, a growth rate of 5.5% compounded annually should be applied to the 2023 future background through traffic volumes on Britannia Road to forecast 2026 future background traffic volumes. A growth rate of 2% compounded annually can be maintained for forecasting 2026 future background traffic volumes for the turning movements entering and exiting the future north-south collector road as part of the subject property.

In addition, the following background developments should be accounted for:

- Boyne Survey West and East Blocks from the Boyne Survey Road Network Assessment (RNA) prepared by GHD Group (subtracting the Boyne Survey RNA traffic associated with the subject property and with the Bayview Lexis residential subdivision to the north); and
- The Bayview Lexis residential subdivision to the north, referencing the latest "Revised Traffic Impact Study Bayview Lexis Residential Subdivision" prepared by The Municipal Infrastructure Group (TMIG).

Growth rates along Fourth Line and the internal subdivision roadways should be confirmed with the Town.

Britannia Road Analysis - 2026

Another important component of the TIS will be to confirm that the future intersection designs along Britannia Road post-widening can accommodate site traffic generated by the proposed development.

Trip Generation & Distribution

The terms of reference proposes not considering trip generation for the elementary school and village square land uses. Consideration should be given to the potential for external trip catchment (e.g. teachers working at the elementary school and employees working in the village square). Any assumptions regarding reductions to the elementary school and village square trip generation will have to be justified and clearly documented within the TIS.

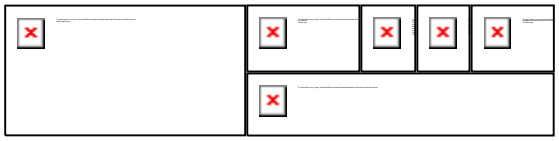
Please provide a comparison within the report of the proposed development trip generation compared to the trip generation forecasts from the Boyne Survey RNA for the subject property. If the proposed development is expected to generate more traffic than previously considered in the Boyne Survey RNA, please provide a site traffic figure to show how the additional trips will be allocated to the network.

The trip distribution that was applied to site generated auto traffic in the Bayview Lexis TIS Update prepared by TMIG should be applied to site generated traffic in this TIS for consistency.

If you have any questions or wish to discuss further, please feel free to reach out to us.

Cheers,
Darren

Darren Loro, C.E.T.
Project Manager I – Transportation Planning Coordination
Infrastructure Planning & Policy
Public Works
Halton Region
905-825-6000, ext. 2694 | 1-866-442-5866



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From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Tuesday, April 20, 2021 4:06 PM
To: heide.schlegl@milton.ca; McNeish, Amanda <Amanda.McNeish@halton.ca>; Monaghan, Patrick <Patrick.Monaghan@halton.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: Sundial Homes 4th Line - Terms of Reference

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Hi Amanda, Patrick, and Heide,

CGH Transportation as been retained to prepare a Transportation Impact Study for the proposed Sundial Homes development within the Boyne Secondary Plan area. Based on the proposed concept plan, as well as pre-application feedback from staff, we have developed a Terms of Reference memo (attached) for your review.

Please let us know if you have any comments or questions.

Kind regards,
Robin Marinac

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

Town of Milton

Memo

To: Angela Janzen, Senior Planner, Development Review

From: Kavleen Sachdeva, Transportation Planning Technologist

Date: 3/10/2022

Subject: Sundial Homes-Fourth Line (Z-20-21/24T-21006/M)

Further to the Transportation Impact Study prepared by CGH Transportation dated May 2021 and associated site plans, please be advised that the Traffic section has the following comments:

Transportation Impact Study

- Please note that the report should follow the agreed upon scope of work in the Terms of Reference.

- Section 2.6.1; the growth rate used to reflect the existing horizon year volumes are not in accordance with the agreed upon ToR. These should be revised.

- Section 3.1; please consider the Region's comments in regards to the expected completion years for road widening. The report must include the most up-to- date information.

- Section 3.1.6.2; it is unclear which version of the Master Plan has been referred to for the transit network improvements. Please clarify and append the relevant pages to the report.

- Section 4.1.1; the TIS states that trips generated from the elementary school are estimated to occur out of the peak hours. While the town is in agreement with the rationalization, a portion of the trips should still be included in the analysis to account for teachers and admin/support staff that may commute during peak periods. The Town is in agreement with the rationalization provided for the exclusion of trips generated from the Village Square.

- Section 8; The Town typically asks for a peak hour factor of 1.00 for future scenarios background and future total scenarios to simulate a flat hourly peak. Please confirm with Region staff if this approach is acceptable for regional roads.

- Section 8.1; Several movements are operating with a v/c ratio of 1.00 or above, since this is theoretically not possible, it is recommended that the modelling for the existing conditions be calibrated accordingly to ensure that existing movements operate with v/c ratios under 1.00.

- A figure showing the location of sidewalks and pedestrian crossings should be prepared and submitted.

- A Traffic Control Plan should be submitted. The plan should show all roadways, property lines (including designation of schools and parks), driveways, fire hydrants, sidewalks, bike paths, street lighting, traffic signage (including all regulatory, warning and information signs), street trees, tactile surfaces and pavement markings

  The following notes to be added to the traffic control plans to reduce conflicts

  a) All traffic signage to be installed as per the Ontario Traffic Manual.

  b) Traffic signage to be installed on streetlight posts where possible.

  c) Parking prohibitions may be required in the areas of intersections, curbs, park pathways and vehicular park entrance locations, on a site-by site-basis. Areas to be confirmed by Town Engineering staff prior to installation of signage.

  d) Owner is responsible for installing the approved line painting prior to assumption of the subdivision.

  e) All “No Parking” and “No Stopping” signs are to be placed in front of street trees upon traffic approach in the boulevard. Signs placed in locations where they are blocked by trees will be relocated at the contractor’s expense.

  f) Street tree plantings to be limbed up and/or regulatory sign locations to be adjusted as directed by the Town, prior to commencement of the Maintenance Period.

- An AutoTURN swept path analysis must be submitted showing the appropriate design vehicle completing each type of manoeuver (left turn, through, and right turn) from all approaches.

- Daylighting triangles, as outlined in Table 1.2 of the Town's Engineering and Parks Standards Manual, should be shown on the plans

- All roundabout analysis should be conducted using Arcady.

Please submit a revised study with the aforementioned changes in PDF format.

Should you have any further questions, please feel free to contact me at Kavleen.sachdeva@milton.ca

Kavleen Sachdeva, P. Eng.
Transportation Planning Technologist

□e□islati□e and □lannin□ Ser□ices
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RE: Zoning By-law Amendment, and Draft Plan of Subdivision Z-20/21, and 24T-21006 – 1st Submission Sundial Homes (4th Line) Limited Part of Lot 6, Concession 5 NS (Trafalgar)

□e□ional staff □a□e re□ie□ed t□e materials related to t□e abo□e noted applications for a □onin□ By-la□ Amendment □□BA□and □raft □lan of Subdi□ision □□ □S□□Attac□ed are t□e Region's current comments on the applications□

□□e □raft □lan of Subdi□ision□identified as 2□□-2100□ and dated Marc□ 1□□2021□is for t□e de□elopment of□

- 217 detac□ed d□ellin□ units□
- 1□□ street to□n□ouse units□
- □0 rear access to□n□ouse units□
- □□□ bac□-to-bac□ units□and□
- a □i□□ density bloc□ □approximately 2□□ residential units□□

□□e subdi□ision also consists of a □reenland c□annel □it□ a trail□ay system □2□0 □a□□a storm□ater mana□ement pond □□17□ □a□□a □illa□e s□uare □0□2 □a□and a public elementary sc□ool □2□2□ □a□□

□□e purpose of t□e zonin□ by-la□ amendment is to implement t□e Boyne Sur□ey Secondary □lan□t□ □ill rezone t□e sub□ect lands from □uture □e□elopment □□□ into t□e appropriate zones□includin□□□esidential Medium □ensity □□esidential Medium □ensity □□□ □i□□ □ensity □esidential□ □atural □erita□e System□ □pen Space – Storm□ater mana□ement□and □nstitutional Minor□□it□ site specific exceptions to permit t□e proposed de□elopment□

Preliminary Comments

The Provincial Policy Statement (PPS), A Place to Grow: Growth Plan for the Greater Golden Horseshoe (P2G) and Halton Region Official Plan (ROP) provide policy direction that focuses growth and development towards settlement areas, and protects and preserves employment lands for their planned function. Regional Staff have considered the development proposal and the available supporting studies / materials as it relates to this policy direction and are generally satisfied that the PPS, P2G and ROP policy direction in this regard will be addressed, subject to satisfying the comments and required updates and/or revisions requested below.

The lands are outside of the built boundary and are within a 'Greenfield' area. The Urban Area designation under Section 76 permits use in accordance with the Local Official Plan and Zoning By-law and all development shall be subject to the policies of this Plan.

It should be noted that the site is located in Sub-watershed Impact Study (SIS) Area 5B (Omagh). The Region has been working with the Town and CH on the completion of the SIS Addendum. While the proposal is consistent with the Omagh SIS, the SIS is still outstanding, and will need to be deemed complete (by the Town) prior to registration of the subdivision.

Section 147(17) of the Regional Official Plan (ROP) requires the applicant of a development proposal to determine whether there is any potential contamination on the site they wish to develop, and if there is, to undertake the steps necessary to bring the site to a condition suitable for its intended use. The applicant is required to follow the processes outlined in O.REG 153/04 in the preparation of all Environmental Site Assessment (ESA) reports and supporting documentation. As such, ESA reports must be no older than 18 months old and comply with all requirements set in Schedule D and E of the regulation. Circulated with the subject application was a Phase I ESA report from Soil-Con Limited (#0404-S103, April 2004). Staff note that the ESA report is older than 18 months and done to ESA Standard Z768-01. A new Phase I ESA in full compliance with Schedule D of O.REG 153/04 is required. Further requirements will be determined based on report findings.

Servicing Allocation

The ROP requires that the development industry absorb their share of the cost of the provision for infrastructure and that any financial impact of new development or redevelopment on existing residents be based on a financing plan communicated to the taxpayers and subsequently approved by Council, per Sections 77(15), 89(8), and 210(6) of the Region's Official Plan. To this end, the Region has implemented a Water and Wastewater Allocation Program that requires proponents of residential development applications to purchase servicing allocation from the Region through an Allocation

Agreement. The subject lands are located within the ‘Greenfield Area’ and as a result, t□ose units are sub□ect to t□e Allocation □ro□ram.

□□ere is currently a transfer of allocation pendin□ bet□een Sundial □omes (3rd □ine) and Sundial □omes (4t□ □ine) for t□e 400 SDE re□uired for t□is proposed de□elopment. □□is de□elopment cannot proceed until t□is transfer is complete. As part of t□e next submission □e□ional staff □ill re□uire documentation s□o□in□ t□at t□is transfer is complete.

Archaeology

The sub□ect lands are identified as located □it□in an area of arc□aeolo□ical potential. Section 167(6) of t□e ROP re□uires t□at prior to de□elopment occurrin□ in or near areas of arc□aeolo□ical potential, an assessment and miti□ation acti□ities must be carried out in accordance □it□ □ro□incial re□uirements and t□e □e□ional Arc□eolo□ical Mana□ement □lan. Sta□e 1-3 and 4 Arc□aeolo□ical Assessments □ere completed for t□e sub□ect lands. □□ese reports are to be filed and re□istered □it□ t□e Ministry of □erita□e, Sport, □ourism and □ulture □ndustries (MHSTC). □lease pro□ide t□e □e□ion □it□ t□e re□istration letters.

The proponent is cautioned t□at durin□ de□elopment acti□ities, s□ould arc□aeolo□ical materials be found on t□e property, t□e □ntario Ministry of □erita□e, Sport, □ourism and □ulture □ndustries s□ould be notified immediately. □n t□e e□ent t□at □uman remains are encountered durin□ construction, t□e proponent s□ould immediately contact t□e appropriate aut□orities (police or coroner) and all soil disturbance must stop to allo□ t□e aut□orities to in□esti□ate and t□e □e□istrar of □emeteries to be consulted.

Other Matters of Regional Interest (Technical Comments)

□e□ional staff offer t□e follo□in□ tec□nical comments □it□ respect to t□e materials and reports submitted in support of t□e de□elopment proposal.

Municipal Infrastructure:

Section 58(□.□) of t□e ROP permits development provided that: “adequate supply of □ater and treatment of □aste□ater for t□e proposed use □as been secured to t□e satisfaction of the Region”. Further, Section 89(3) of the ROP requires that all new de□elopment □it□in t□e □rban Area be on t□e basis of connection to Halton’s municipal □ater and □aste□ater system.

Servicing Comments:

□ ater

The site is located □it□in t□e □ater pressure area □one 4 and □ill rece□e its □ater feed from t□e nort□. □urt□ermore, a 300mm diameter local main on future Street ‘2’ (Trudeau

□ri□e□and anot□er on future Street ‘19’□to be completed by Mattamy to t□e nort□ of t□e sub□ect lands□

□□e sub□ect lands □ill connect to t□e existin□ 1200 diameter □ater trun□ on Britannia □oad□at t□e intersection of future □rudeau □ri□e (Street ‘2’) and Britannia □oad□

□□e □□ner □ill be re□uired to extend a 200mm diameter local main on Britannia □oad from future □rudeau □ri□e (Street ‘2’) to □t□ □ine and turn nort□□ardly on □t□ □ine to future Logan Drive (St ‘1’) to complete the loop by connecting with the proposed 300mm □atermain on future Street ‘1’. This □ill complete t□e □ater system loop in t□e area and pro□ide future □ater ser□ice a□ailability for lands frontin□ on □t□ □ine and Britannia □oad□

□□e □e□ion is currently under□oin□ a pro□ram to reali□n t□e □ater pressure zones in t□e □e□ion□As part of t□is pro□ram an interim zone condition and an ultimate zone condition □ill be implemented within the Region’s water distribution system. □□e timin□ of implementin□ t□e ne□ pressure zone boundaries may ta□e se□eral years□ □t is possible t□at t□e proposed de□elopment may be impacted by t□e c□an□es to t□e pressure zones in bot□ t□e interim and ultimate conditions dependin□ on t□e timin□ of t□e implementation of t□ese c□an□es□

□lease note t□at minimum ser□ice le□els for bot□ □ater pressure and flo□ □ill be maintained t□rou□□out t□e □e□ion durin□ t□is process□ □esidents may notice c□an□es to t□eir □ater pressure □□en t□e zones are c□an□ed o□er from t□e existin□ zone to t□e interim zone and also □□en t□e interim zone is c□an□ed to t□e ultimate zone□

<u>□ aste□ater</u>

□□e se□a□e from t□e site is to be collected internally and drained sout□ to a proposed man□ole at t□e intersection of future □rudeau □ri□e □Street ‘2’□and Britannia □oad□□rom t□is man□ole a □7□mm diameter sanitary se□er on Britannia □oad □as been proposed to pic□ up t□e se□a□e and disc□ar□e into t□e existin□ Man□ole □ at t□e intersection of □t□ □ine and Britannia □oad□

<u>Storm□ater</u>

□□e □□ner s□all a□ree t□at post de□elopment storm□ater flo□s are controlled so t□at t□ey do not exceed pre de□elopment flo□s□□urt□er draina□e from storm e□ents □up to a 100 year e□ent□□ill need to be captured□detained □it□in t□e site and not directed to□ards □ames Sno□ □ar□□ay or Britannia □oad□

□unctional Ser□icin□ □eport □□S□□

□□e □e□ion □as no ob□ection to t□e ser□icin□ sc□eme as proposed□stated in t□e submitted □S□□but □a□e pro□ided some comments for t□e en□ineerin□ consultant□S□S□to address□ □□ere may also be additional comments from □ublic □ or□s□A re□ised □S□ □ill be re□uired prior to detailed en□ineerin□ submission and □ill be included as a condition of draft plan appro□al□

Waste Management

□rom a □ aste Mana□ement perspecti□e□t□e □e□ion pro□ides confirmation respectin□t□e ability to pro□ide on-site refuse and recyclin□ collection□

□o do so□a detailed □aste mana□ement plan is re□uired for Bloc□ □□□ □□i□□ density apartment□for the Region's review and appro□al□t is recommended t□at t□e o□ner design the site in accordance with the Region's Development Design Guidelines for Source Separation for Solid □ aste to ensure t□e de□elopment □ill be eli□ible for □e□ional collection ser□ice□

□e□ional □aste mana□ement ser□ices □ill ser□ice all sin□le family residential units for full curbside □aste collection ser□ices□

Transportation

□ransportation □lannin□ □as re□ie□ed t□e 2□□-2100□□M □raft □lan of Subdi□ision application for t□e Sundial □t□ □ine property and □as pro□ided comments in Attac□ment 'A' to t□is letter□

Finance

□□e □□ner □ill be re□uired to pay all ot□er applicable □e□ional de□elopment c□ar□es and front-endin□ reco□ery payments prior to t□e issuance of any buildin□ permits□unless a subdi□ision □or ot□er form of de□elopment□a□reement is re□uired in □□ic□ case t□e road portion and front-endin□ reco□ery payment of t□e □e□ional de□elopment c□ar□es are payable upon execution of t□e a□reement□□lease □isit our □ebsite at □□□□□alton□ca to obtain t□e most current de□elopment c□ar□e and front endin□ reco□ery payment information□□□ic□ is sub□ect to c□an□e□

Disclaimer: It is the Owner's responsibility to ensure that all applicable payments and de□elopment c□ar□es for t□e sin□le detac□ed e□ui□alent units □S□□s□bein□ re□uested are paid for as re□uired by t□e terms and conditions of t□e applicable allocation pro□ram a□reement□

Conclusion

□alton □e□ion is pleased to pro□ide preliminary tec□nical comments to □elp facilitate t□e ad□ancement of t□e sub□ect applications□ A resubmission □ill be re□uired to address t□e tec□nical matters outlined abo□e□ □ □ile □e□ional staff are not currently in a position to pro□ide final recommendation comments or conditions□□e □ould be pleased to continue coordinatin□ and □or□in□ □it□ t□e applicant to satisfy tec□nical matters□

□trust t□at t□ese comments are of assistance□S□ould you □a□e any □uestions in t□is re□ard□ please do not □esitate to contact me at □□0□□ □□□-1□70□ or □ia email at □obert□□lac□ett□ □alton□ca□

Sincerely□

□obert □lac□ett□M□□□ □□□
Senior □lanner

Attac□□

Attachment 'A': Transportation Planning Comments

□ransportation □lannin□ □as re□ie□ed t□e 2□□-2100□□M □raft □lan of Subdi□ision application for t□e Sundial □t□ □ine property and offers t□e follo□in□ comments□

James Snow Parkway Right-of-way Requirement:

□□e Region's Transportation Master Plan (TMP) ultimate right-of-□ay re□uirement of □7m for □ames Sno□ □ar□□ay is s□o□n on t□e □raft □lan of Subdi□ision but t□e reference line □t□e centerline of t□e ori□inal ri□□t-of-□ay□is not s□o□n□nor is t□e 2□□□m offset from t□e reference line to identify t□e re□uired land dedication□□□e 2□□□m offset from t□e centerline of t□e ori□inal ri□□t-of-□ay of □ames Sno□ □ar□□ay s□ould be dimensioned on t□e □raft □lan of Subdi□ision and all sur□ey plans□

A dayli□□t trian□le measurin□ 1□m alon□ t□e proposed □ollector □oad and 1□m alon□ □ames Sno□ □ar□□ay s□all be dedicated to t□e □e□ional Municipality of □alton for t□e purpose of road ri□□t-of-□ay □idenin□ and future road impro□ements□ □□is dayli□□t trian□le s□ould be properly s□o□n and dimensioned on t□e □raft □lan of Subdi□ision and all sur□ey plans□

Reminders:

- *Any additional lands that are part of the subject property and have been identified as required for the future widening of James Snow Parkway, as identified in the Municipal Class Environmental Assessment / Environmental Study Report, shall be dedicated to the Regional Municipality of Halton for the purpose of road right-of-way widening and future road improvements.*
- *Any additional lands that are part of the subject property and have been identified as required for the future widening of James Snow Parkway, as identified in the Detail Design Study, shall be dedicated to the Regional Municipality of Halton for the purpose of road right-of-way widening and future road improvements.*
- *All lands to be dedicated to Halton Region shall be dedicated with clear title (free and clear of encumbrances) and a Certificate of title shall be provided, in a form satisfactory to the Director of Legal Services or his/her designate.*
- *Setbacks from the property line must conform to the minimum setback requirements outlined in the Town of Milton Comprehensive Zoning By-Law 016-2014.*

Britannia Road Capital Project – Coordination:

□i□en t□e acti□e construction on Britannia □oad for t□e □apital □ro□ect bet□een □e□ional □oad 2□ and □ames Sno□ □ar□□ay□property re□uirements and all de□elopment □or□s □it□in or near t□e Britannia □oad □e□ional ri□□t-of-□ay □□radin□□under□round ser□icin□□ and t□e intersection of Britannia □oad and Sa□oline Boule□ard□need to be co-ordinated

□it□ □n□ineerin□ & □onstruction□and specifically t□e Britannia □oad □apital □ro□ect team□ □on □ eiss is t□e □ro□ect Mana□er for t□is □apital □ro□ect□

Transportation Impact Study (TIS) Requirement:

□ransportation □lannin□ □as reviewed the "Sundial Homes (4t□ □ine□□imited□□ourt□ □ine Milton Transportation Impact Study" prepared by CGH Transportation (dated May 2021) and re□uires an update to t□e □ransportation □mpact Study □□S□to address t□e follo□in□ comments□□□ese comments □a□e been pro□ided □it□ t□e primary intent of promotin□ consistency bet□een t□is □S and t□e □S prepared for t□e ad□acent Bay□ie□ □exis subdi□ision t□e Bay□ie□ □exis □S□□□□e □e□ion may □a□e additional comments on t□is Sundial □S dependin□ on if t□e results of t□e □S si□nificantly c□an□e after addressin□ the Region's comments.

1. **2021 "Existing" Traffic Volumes Estimates**

   □er t□e establis□ed □erms of □eference for t□e □S□a □ro□t□ rate of 2□ compounded annually is to be applied to □istorical traffic □olumes to estimate 2021 "existing" traffic volumes. However, the TIS states that a growth rate of 3% compounded annually □as applied to □istorical traffic □olumes on □ames Sno□ □ar□□ay and a □ro□t□ rate of 2□2□□ compounded annually on Britannia □oad to estimate 2021 "existing" traffic volumes. The 2% growth rate should be applied on both roadways to estimate 2021 "existing" traffic volumes.

2. **Study Scope**

   □er t□e establis□ed □erms of □eference for t□e □S□t□e study scope of analysis is to include t□e future □ □itloc□ A□enue intersection at □ames Sno□ □ar□□ay □t□e future east-□est collector road□ay t□rou□□ t□e ad□acent Bay□ie□ □exis subdi□ision□□□o□e□er□t□is intersection □as not included in t□e study scope□As t□e Bay□ie□ □exis □S analyzed t□e proposed east-□est collector road connection to □ames Sno□ □ar□□ay for t□e Sundial subdi□ision□t□is □S □ill need to analyze t□e intersection of □ames Sno□ □ar□□ay and □ □itloc□A□enue□

3. **Background Roadway Improvements Source**

   The TIS sources the Region's Transportation Development and Non-□e□elopment □apital □mplementation □lan □201□-20□1□□ia text and □i□ure □for t□e timin□ of t□e □ames Sno□ □ar□□ay □idenin□currently sc□eduled to be□in construction in 202□□ The TIS should source the Region's Capital Project Forecast Listing 2021 as the latest source for t□is construction timin□ □part of t□e 2021 Bud□et and Business □lan□□□ic□ can be accessed online at□ □ttps□□□□□□alton□ca□□epository□2021-Bud□et-and-Business-□lan-□apital-□eport□

□ransportation □lannin□ notes t□at t□e anticipated construction start of 202□ is unli□ely □i□en t□at a Municipal □lass □n□ironmental Assessment nor □etail □esi□n □ro□ect not been completed yet for t□e □ames Sno□ □ar□□ay □idenin□□□o□e□er□ t□is □ill not impact any assumptions in t□e □□S□

□urt□er□t□e □□S states t□at □□ase 2 and □ of t□e Britannia □oad impro□ements are expected to be completed by t□e summer of 2022□ □□e current anticipated completion date is December 2024 for Phase 2 and 3 per the Region's Construction Projects page on the Region's website. The TIS should source the current anticipated completion date□

4. Horizon Years

□er t□e establis□ed □erms of □eference for t□e □□S□t□e 202□ and 202□ □orizon years are to be analyzed for future bac□□round and total analysis□□o□e□er□t□e □□S only analyzes t□e 202□ □orizon year under future bac□□round and total analysis□rationalizin□ t□at the development isn't expected to be fully built-out until 202□□□□e purpose of t□e 202□ □orizon year analysis is to analyze traffic operations on t□e road net□or□pre-□idenin□ in t□e scenario t□at t□e de□elopment is fully built-out before t□e bac□□round road□ay impro□ements are complete□

Per the Region's pre-consultation comments and □erms of □eference comments□ an important component of t□e □□S □ill be to e□aluate and recommend an interim confi□uration and desi□n □e□□□traffic control□auxiliary turn lanes□for t□e future east-□est collector road□ay connection to □ames Sno□ □ar□□ay prior to t□e □idenin□ of □ames Sno□ □ar□□ay to six lanes□and for t□e future nort□-sout□ road□ay connection to Britannia □oad prior to t□e □idenin□ of Britannia to six lanes□□□is interim analysis □as re□uired for t□e Bay□ie□ □exis □□S and also needs to be included in t□is □□S□

5. James Snow Parkway Southbound Right-Turn Lane

A sout□bound ri□□t-turn turn lane or taper □ill be re□uired on □ames Sno□ □ar□□ay at t□e future east-□est collector road□ay intersection in t□e interim scenario□□□e turn lane or taper □ill be needed to increase traffic safety because of t□e forecasted sout□bound ri□□t-turn traffic □olumes at t□e intersection□ t□e sin□le-lane sout□bound t□rou□□ lane on □ames Sno□ □ar□□ay and t□e operatin□ speeds of traffic on □ames Sno□ □ar□□ay associated □it□ t□e □i□□ posted speed limit□□□e □□S recommends a sout□bound ri□□t-turn lane on □ames Sno□ □ar□□ay at t□e future east-□est collector road□ay intersection under t□e ultimate □post-□idenin□□ scenario□

6. Future Background Traffic Volumes Forecasts

□er t□e establis□ed □erms of □eference for t□e □S□ t□e follo□in□ □ro□t□ rates are to be applied□

- A □ro□t□ rate of 2□ compounded annually s□ould be applied to t□e 2021 existin□ traffic □olumes on □ames Sno□ □ar□□ay and Britannia □oad to estimate 202□ future bac□□round traffic □olumes on t□e road net□or□□
- □or consistency □it□ t□e Bay□ie□ □exis □S □pdate prepared by □M□□a □ro□t□ rate of □□ compounded annually s□ould be applied to t□e 202□ future bac□□round t□rou□□ traffic □olumes on □ames Sno□ □ar□□ay to forecast 202□ future bac□□round traffic □olumes□A □ro□t□ rate of 2□ compounded annually can be maintained for forecastin□ 202□ future bac□□round traffic □olumes for t□e turnin□ mo□ements enterin□ and exitin□ □ □itloc□ A□enue and t□e future east-□est collector road as part of t□e sub□ect property□
- As documented in t□e □erry □reen □S □pdate prepared by □rozier□t□e □e□ion pro□ided a □ro□t□ rate of □□□□ compounded annually on Britannia □oad□□□is □ro□t□ rate accounts for t□e planned road□ay impro□ements□ □□erefore□a □ro□t□ rate of □□□□ compounded annually s□ould be applied to t□e 202□ future bac□□round t□rou□□ traffic □olumes on Britannia □oad to forecast 202□ future bac□□round traffic □olumes□A □ro□t□ rate of 2□ compounded annually can be maintained for forecastin□ 202□ future bac□□round traffic □olumes for t□e turnin□ mo□ements enterin□ and exitin□ t□e future nort□-sout□ collector road as part of t□e sub□ect property□

□□e □S s□ould follo□ t□e □ro□t□ rate met□odolo□y outlined abo□e from t□e establis□ed □erms of □eference for consistency □it□ t□e Bay□ie□ □exis □S and ot□er recent studies in t□e area□

Since t□e preparation of t□is □S□t□e Bay□ie□ □exis □S □as been updated□ □□erefore□any references to t□e Bay□ie□ □exis □S s□ould be c□ec□ed to ma□e sure t□at t□ey reflect t□e latest □ersion of t□e □S□

7. Trip Generation

□□e □S does not consider trip □eneration for t□e elementary sc□ool by rationalizin□ t□e follo□in□□

- elementary sc□ools are li□ely to □a□e a s□ort duration pea□ period of 1□ minutes before and after sc□ool□
- t□ese pea□s □ould occur outside of t□e typical □ee□day a□m□and p□m□ commuter pea□ □ours□

- teac□ers and staff □ould tra□el outside of t□e commuter pea□ □ours□
- ne□ trips □enerated by t□e elementary sc□ool □ould be to and from t□e proposed subdi□ision only□and
- t□e ma□ority of t□ese ne□ trips □ould be made by acti□e modes of transportation□

□ransportation □lannin□ a□rees t□at t□e catc□ment area for t□e proposed elementary sc□ool □ould be primarily □it□in t□e proposed subdi□ision□particularly for students□□o□e□er□it is reasonable to assume t□at some teac□ers□admin staff and support staff may not be from t□e immediate subdi□ision area and t□us □ould tra□el on t□e external □e□ional road net□or□□and durin□ □ee□day a□m□and p□m□ commuter pea□ periods □e□□□teac□ers commutin□ to sc□ool before classes and lea□in□ t□e sc□ool late-afternoon or early e□enin□□after classes finis□□□□□e □□S s□ould consider t□is assumption in t□e trip □eneration forecasts re□ardin□a portion of t□ese teac□er□admin staff and support staff ori□inatin□from external areas□

□□e □□S also does not consider trip □eneration for t□e □illa□e s□uare by rationalizin□ t□at t□e ne□ trips □enerated by t□e □illa□e s□uare □ould be to and from t□e proposed subdi□ision only□and t□at t□e ma□ority of t□ese ne□ trips □ould be made by acti□e modes of acti□e transportation□Based on t□e understandin□ t□at t□e □illa□e s□uare is primarily meant to be a par□ □it□ potentially some minor ancillary businesses□□ransportation □lannin□ accepts t□e omission of t□e □illa□e s□uare in t□e trip □eneration forecasts□

8. 2021 “Existing” Traffic Operations

□□e □□S identifies multiple critical movements under 2021 “existing” conditions durin□ t□e □ee□day a□m□and p□m□pea□ periods□□ □ile t□e □□S rationalizes t□at t□ese operations support t□e need for t□e planned future bac□□round road□ay impro□ements□ t□e □e□ion □ould be interested in seein□ if si□nal timin□ optimizations under existin□ conditions could address t□e existin□ traffic issues until t□e future bac□□round road□ay impro□ements are implemented□

9. Future Background Traffic Modelling

□□e Sync□ro output reports under future bac□□round and total conditions indicate t□at no lost time ad□ustments □ere applied to t□e Sync□ro modellin□□□□□e analysis conducted for t□e ad□acent Bay□ie□ □exis subdi□ision applied lost time ad□ustment factors under future bac□□round and total conditions to impro□e traffic operations□ justifying lost time adjustment factors to bring the “total” lost time for protected mo□ements to 1□0 second □e□□□a lost time ad□ustment of -2□0 seconds for a □□0 second inter□reen time) and the “total” lost time for permissive movements to 5.0 seconds □e□□□a lost time ad□ustment of -1□0 seconds for a □□0 second inter□reen time□□ □□ese lost time ad□ustments could be applied to t□is □□S under future

bac□□round and total conditions for consistency □it□ t□e Bay□ie□ □exis □□S and to impro□e future traffic operations□

□□e □□S notes t□at a cycle len□t□ of 1□0 seconds □as assumed for t□e intersection of □ames Sno□ □ar□□ay and Britannia □oad under future bac□□round and total conditions□□□e Region's ideal maximum cycle length is 120 seconds, which is also consistent □it□ t□e cycle len□t□ t□at □as assumed on □ames Sno□ □ar□□ay under future conditions in ot□er recent studies in t□e surroundin□ area□□□erefore□t□e cycle len□t□ for t□e intersection s□ould not exceed 120 seconds if possible□

Noise Feasibility Study (NFS) Requirement:

Transportation Planning has reviewed the "Noise Control Feasibility Study, Proposed □esidential Subdi□ision□Sundial □omes □□t□ Line) Limited, Town of Milton" prepared by SS□ ilson Associates □onsultin□ □n□ineers □dated □uly 1□□2021□and re□uires an update to t□e □oise □easibility Study □□□S□to address t□e follo□in□ comments□It is noted t□at a □erms of □eference for t□is □□S □as not establis□ed □it□ □ransportation □lannin□ staff prior to t□e preparation of t□is study□

1. **Dwelling Types and Outdoor Living Areas**

□□e □□S lists t□e different types of future □utdoor □i□in□ Areas □□□As□for t□e different types of proposed residential d□ellin□ units□□□e study s□ould identify t□e specific types of d□ellin□ units □and specifically types of □□As□t□at are anticipated □it□in t□e Bloc□s frontin□ □ames Sno□ □ar□□ay and Britannia □oad□□□is may pro□ide clarity as to □□y specific Bloc□s □arrant an acoustic barrier □e□□□units in Bloc□s □1□ and □1□□compared to ot□ers t□at do not□

2. **Transportation Inputs**

□□e □□S assumes t□at □ames Sno□ □ar□□ay and Britannia □oad currently consist of four lanes□□o□e□er□t□ese road□ays currently consist of t□o lanes□□□us□t□e □□S s□ould be updated to accurately reflect existin□ conditions□

□□e □□S assumes a day□ni□□t split of □2□ □□□ □respecti□ely□for t□e Annual A□era□e □aily □raffic □AA□□□estimates□□or consistency □it□ t□e □□S t□at □as submitted for t□e ad□acent Bay□ie□ □exis subdi□ision and as commonly accepted by t□e □e□ion□a day□ni□□t split of □0□ □10□ □respecti□ely□s□ould be applied□

3. **Physical Mitigation**

Per the Region's pre-consultation comments□land use layouts and unit types □it□in t□e de□elopment s□ould be planned so t□at □□As do not re□uire p□ysical miti□ation measures □acoustic barrier□□□□e follo□in□□□S comments re□ardin□t□e acoustic barrier □a□e been pro□ided in t□e scenario t□at acoustic barriers are

absolutely necessary and that other alternatives have been explored and are not considered feasible. However, every effort should be made where possible in planning the development layout so that NAs do not require physical mitigation measures.

4. Acoustic Barrier Height

The ENCS recommends various acoustic barrier heights for the recommended acoustic barriers fronting Britannia Road and James Snow Parkway with the overall intent of providing the shortest barrier height possible to reach the upper limit of the 50-60 dBA excess threshold. While the Region prefers that the acoustic barriers target a noise level reduction closer to 5 dBA this would result in greater heights for the acoustic barriers. Therefore the Region recommends that the heights for the recommended acoustic barriers fronting Britannia Road and James Snow Parkway be selected as to achieve a noise level reduction to 7 dBA so long as the acoustic barrier height does not exceed 5m.

5. Easement for Acoustic Barrier

The Region will require an easement adjacent to any proposed acoustic barriers along Britannia Road and James Snow Parkway for the purpose of allowing Regional staff to access the barriers for maintenance. The Region will require a 1m easement on the inside of the acoustic barriers within the residential lots and a 2m easement on the outside of the acoustic barrier within any private or Town-owned blocks.

6. Warning Clauses

The ENCS recommends warning clauses for specific units for the proposed development based on the results of the noise analysis. Table 1 of the report should list the different types of warning clauses recommended for the various units and present a list of the warning clauses below. Table 1 this would further list all report recommendations in one section.

The Region recommends the following to the warning clauses presented in the ENCS.

Add Warning Clause applicable to all units: *"Purchasers/tenants are advised that this development and associated blocks/units are directly adjacent/in close proximity to a Regional road. Halton Regional roads are classified as major arterial roadways and as such: Serve mainly inter-regional and regional travel demands; May serve an Intensification Corridor; Accommodate all truck traffic; Accommodate higher order transit services and high occupancy vehicle lanes; Connect Urban Areas in different municipalities; Carry high volumes of traffic; Distribute traffic to and from Provincial Freeways and Highways; Accommodate active transportation.*

Truck traffic is permitted on all Regional roads, and is one of the functions of the Regional road network. Therefore, despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic will interfere with some activities of the dwelling occupants, including any raised patio and/or balcony, as sound levels exceed the sound level limits of the Municipality and the Ministry of Environment, Conservation and Parks."

Reword Warning Clause applicable to all units which have been designed with provisions for adding central air, Section 2.2.3 of the NFS: *"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

Add Warning Clause applicable to all units adjacent to an Acoustic Barrier that is to be owned by the Region: *"**A noise barrier(s) has been constructed adjacent to this lot. The noise barrier(s) will need to be maintained in good condition (pre-existing barrier height and material) by the property owner (Builder) until such time as the subdivision has been assumed by the local municipality. Once assumed, the ownership and future maintenance will become the responsibility of the Regional Municipally of Halton. Halton Region will require, from time to time access to this lot/block in order to maintain this noise barrier(s). An easement has been placed on this lot/block to permit maintenance access to the noise barrier."*

Robin Marinac

From: Loro, Darren <Darren.Loro@halton.ca>
Sent: April 20, 2022 3:37 PM
To: Robin Marinac; Mark Crockford
Cc: Kavleen.Sachdeva@milton.ca; Clackett, Robert
Subject: RE: Fourth Line TIS - Updates

Hi Robin & Mark,

Just following up on our discussion with summary notes below in red.

As always, let me know if you have any questions or wish to discuss further!

Cheers,
Darren

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Tuesday, April 19, 2022 9:04 AM
To: Loro, Darren <Darren.Loro@halton.ca>; Kavleen.Sachdeva@milton.ca
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: Fourth Line TIS - Updates

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Hi Darren and Kavleen,

I hope you both had a nice long weekend. In advance of our meeting tomorrow, there a couple additional items we would like to discuss. As such, I've put together a bit of an agenda below to keep us on track.

1. **Elimination of the requested 2023 future analysis horizon.** As discussed by Mark below, given the anticipated build-out of Sundial's property being well beyond next year, we would like to discuss omitting this horizon from our analysis as it will not be reflective of a possible scenario. The 2023 horizon year can be omitted from the analysis. However, we require analysis of an interim (pre-widening) scenario for the intersection of James Snow Parkway and the proposed collector roadway under the 2026 horizon in case the planned James Snow Parkway widening is not complete by 2026. The purpose of this interim scenario is to evaluate and recommend an interim configuration and design (e.g. traffic control, auxiliary turn lanes) for the future east-west collector roadway connection to James Snow Parkway prior to the widening of James Snow Parkway to six lanes. For this 2026 interim scenario, a growth rate of 2% compounded annually can be maintained for James Snow Parkway from 2021 "existing" conditions to 2026 future conditions.

2. **Trip generation for the elementary school.** In order to address both Town and Region comments, we previously discussed a nominal volume of 10 vehicles entering the site in the AM peak period and 10 vehicles exiting the site in the PM peak period. Since this email was sent proposing this to you Darren, we have received a rough estimate from our contact at the Halton District School Board of 106 staff at peak school operation. After comparing the start and end times of surrounding elementary schools in the area, to the peak periods of our collected intersection counts, we propose that an estimated 80% (85 staff) of teachers and staff will arrive at the school in the AM peak analysis period, and 10% (11 staff) of staff will leave the school in the PM peak analysis period. The comparison of school start and end times to the AM and PM peak periods of our Study Area intersections can be seen below.

School	Start	End
Boyne Public School	8:40	15:30
Chris Hadfield Public School	8:25	15:25
Guardian Angels Catholic Elementary School	8:30	15:00

TMC	AM Peak
Britannia Road @ James Snow Parkway	7:15-8:15
Britannia Road @ Fourth Line	7:15-8:15

This approach is acceptable as long as it is clearly documented in the TIS Update.

3. **Peak Hour Factor for future analysis horizons.** We received the following comment from the Town: *"Section 8; The Town typically asks for a peak hour factor of 1.00 for future scenarios background and future total scenarios to simulate a flat hourly peak. Please confirm with Region staff if this approach is acceptable for regional roads."* As such, we would like to confirm the preferred approach to determining the peak hour factor on regional roads. Within our report, we have used calculated Peak Hour Factors where available and where this is not possible, we have used Peak Hour Factors from adjacent intersections. Please continue to use the "intersection" Peak Hour Factors as calculated for all intersections along Britannia Road and James Snow Parkway. As mentioned in the 1st submission comments, lost time adjustments could be considered to improve future intersection operations and for consistency with the Bayview Lexis TIS.

4. **Future background traffic volume forecasts.** In the Halton Region comments, growth rates are identified on James Snow Parkway and Britannia Road for use in determining the future background volumes. Further guidance on the growth rates to be applied on the turning movements at the intersections of Britannia Road and Fourth Line, and Britannia Road and James Snow Parkway is requested. At the Britannia Road intersections with Fourth Line and the future collector roadway, please apply the 5.5% growth rate for Britannia Road to the through movements only (e.g. EBT and WBT) from 2023 to 2026. A 2% growth rate compounded annually can be maintained for turning movements to the local road (e.g. EBL, EBR, WBL and WBR). At the James Snow Parkway intersection with the future collector roadway, please apply the 9% growth rate for James Snow Parkway to the through movements only (e.g. NBT and SBT) from 2023 to 2026. A 2% growth rate compounded annually can be maintained for turning movements to the local road (e.g. NBL, SBR). At the intersection of Britannia Road and James Snow Parkway, please apply the respective "through" corridor growth rates from 2023 to 2026 for all movements (e.g. 5.5% for the EBL, EBT, WBT and WBR movements, and 9% for the SBL and SBR movements).

5. **Request for the updated Bayview Lexis TIS.** Halton Region comments indicate an updated version of this TIS has been prepared since submission of our report. We would like to request this report so that we can update our work accordingly. The Town has circulated the TIS Update.

Thank you again for taking the time to discuss our questions. Looking forward to our call tomorrow!

Kind regards,
Robin Marinac

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

From: Loro, Darren <Darren.Loro@halton.ca>
Sent: April 14, 2022 2:15 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; Kavleen.Sachdeva@milton.ca
Subject: RE: Fourth Line TIS - Updates

Hi Mark,

I'll schedule a discussion for Wednesday at 2:30 p.m.

Have a great long weekend!

Cheers,
Darren

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: Thursday, April 14, 2022 10:39 AM
To: Loro, Darren <Darren.Loro@halton.ca>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; Kavleen.Sachdeva@milton.ca
Subject: RE: Fourth Line TIS - Updates

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Thanks Darren, and great point.

I'm available Tuesday morning, Wednesday after 2, and Thursday morning.

Mark

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

From: Loro, Darren <Darren.Loro@halton.ca>
Sent: April 13, 2022 5:42 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; Kavleen.Sachdeva@milton.ca
Subject: RE: Fourth Line TIS - Updates

Hi Mark,

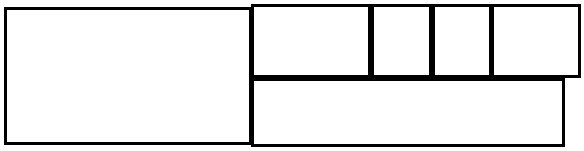
Thanks for inquiring about this before finalizing the study. I think this one is best resolved over a Zoom discussion between us and Kavleen at the Town since she will also have to be ok with any changes to the study scope.

What's everyone's availability next week to discuss over Zoom? (tomorrow's not going to work and I'm also off on Monday). I'll set up a half-hour discussion based on everyone's earliest availability.

Cheers,
Darren

Darren Loro, C.E.T.
Project Manager I – Transportation Planning Coordination
Infrastructure Planning & Policy
Public Works

Halton Region
905-825-6000, ext. 2694 | 1-866-442-5866



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From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: Tuesday, April 12, 2022 10:23 AM
To: Loro, Darren <Darren.Loro@halton.ca>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>
Subject: Fourth Line TIS - Updates

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Hi Darren,

We are working through the updates to the TIS for Sundial's Fourth Line property. One of the comments requests that a 2023 full build-out analysis be undertaken. The subject development includes almost 1000 units (in a mix of densities), full constructing and occupying all of these units by next year would be impossible. The study assumes a 2026 build-out horizon, but after speaking with our client even this seems like an aggressive timeline. Therefore, the analysis scenario you have requested would be hypothetical and would not occur. We would suggest that this scenario should not be required for this development, given the anticipated build-out and occupancy horizons.

If you would like to discuss please let us know and I'm happy to give you a quick call.

Thanks,
Mark

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

Halton Region - Transportation Planning Comments		
Number	Comment	Response
James Snow Parkway Right-of-way Requirement:		
1	The Region's Transportation Master Plan (TMP) ultimate right-of-way requirement of 47m for James Snow Parkway is shown on the Draft Plan of Subdivision but the reference line (the centerline of the original right-of-way) is not shown, nor is the 23.5m offset from the reference line to identify the required land dedication. The 23.5m offset from the centerline of the original right-of-way of James Snow Parkway should be dimensioned on the Draft Plan of Subdivision and all survey plans.	Noted. This this will be shown on the plans.
2	A daylight triangle measuring 15m along the proposed Collector Road and 15m along James Snow Parkway shall be dedicated to the Regional Municipality of Halton for the purpose of road right-of-way widening and future road improvements. This daylight triangle should be properly shown and dimensioned on the Draft Plan of Subdivision and all survey plans.	Noted. This this will be shown on the plans.
3	Reminders: - Any additional lands that are part of the subject property and have been identified as required for the future widening of James Snow Parkway, as identified in the Municipal Class Environmental Assessment / Environmental Study Report, shall be dedicated to the Regional Municipality of Halton for the purpose of road right-of-way widening and future road improvements. - Any additional lands that are part of the subject property and have been identified as required for the future widening of James Snow Parkway, as identified in the Detail Design Study, shall be dedicated to the Regional Municipality of Halton for the purpose of road right-of-way widening and future road improvements. - All lands to be dedicated to Halton Region shall be dedicated with clear title (free and clear of encumbrances) and a Certificate of title shall be provided, in a form satisfactory to the Director of Legal Services or his/her designate. - Setbacks from the property line must conform to the minimum setback requirements outlined in the Town of Milton Comprehensive Zoning By-Law 016-2014.	Noted. This has been passed on to the project team.
Britannia Road Capital Project - Coordination:		
4	Given the active construction on Britannia Road for the Capital Project between Regional Road 25 and James Snow Parkway, property requirements and all development works within or near the Britannia Road Regional right-of-way (grading, underground servicing, and the intersection of Britannia Road and Savoline Boulevard) need to be co-ordinated with Engineering & Construction, and specifically the Britannia Road Capital Project team. Ron Weiss is the Project Manager for this Capital Project.	Noted. This has been undertaken and passed on to the project team.
Transportation Impact Study (TIS) Requirement		
5	Transportation Planning has reviewed the "Sundial Homes (4th Line) Limited, Fourth Line Milton Transportation Impact Study" prepared by CGH Transportation (dated May 2021) and requires an update to the Transportation Impact Study (TIS) to address the following comments. These comments have been provided with the primary intent of promoting consistency between this TIS and the TIS prepared for the adjacent Bayview Lexis subdivision (the Bayview Lexis TIS). The Region may have additional comments on this Sundial TIS depending on if the results of the TIS significantly change after addressing the Region's comments.	Noted. Updates to the TIS have been made as applicable.
6	1. 2021 "Existing" Traffic Volumes Estimates Per the established Terms of Reference for the TIS, a growth rate of 2% compounded annually is to be applied to historical traffic volumes to estimate 2021 "existing" traffic volumes. However, the TIS states that a growth rate of 3% compounded annually was applied to historical traffic volumes on James Snow Parkway and a growth rate of 2.25% compounded annually on Britannia Road to estimate 2021 "existing" traffic volumes. The 2% growth rate should be applied on both roadways to estimate 2021 "existing" traffic volumes.	Noted. A 2% growth rate will be applied to both roadways to estimate 2021 existing traffic volumes.

7	2. Study Scope Per the established Terms of Reference for the TIS, the study scope of analysis is to include the future Whitlock Avenue intersection at James Snow Parkway (the future east-west collector roadway through the adjacent Bayview Lexis subdivision). However, this intersection was not included in the study scope. As the Bayview Lexis TIS analyzed the proposed east-west collector road connection to James Snow Parkway for the Sundial subdivision, this TIS will need to analyze the intersection of James Snow Parkway and Whitlock Avenue.	Noted. This intersection has been analyzed in the updated TIS.
8	3. Background Roadway Improvements Source The TIS sources the Region's Transportation Development and Non-Development Capital Implementation Plan (2018-2031) via text and Figure 8 for the timing of the James Snow Parkway widening currently scheduled to begin construction in 2023. The TIS should source the Region's Capital Project Forecast Listing 2021 as the latest source for this construction timing (part of the 2021 Budget and Business Plan, which can be accessed online at: https://www.halton.ca/Repository/2021-Budget-and-Business-Plan-Capital-Report) Transportation Planning notes that the anticipated construction start of 2023 is unlikely given that a Municipal Class Environmental Assessment nor Detail Design Project not been completed yet for the James Snow Parkway widening. However, this will not impact any assumptions in the TIS. Further, the TIS states that Phase 2 and 3 of the Britannia Road improvements are expected to be completed by the summer of 2022. The current anticipated completion date is December 2024 for Phase 2 and 3 per the Region's Construction Projects page on the Region's website. The TIS should source the current anticipated completion date.	Noted. This has been adjusted in the updated TIS.
9	4. Horizon Years Per the established Terms of Reference for the TIS, the 2023 and 2026 horizon years are to be analyzed for future background and total analysis. However, the TIS only analyzes the 2026 horizon year under future background and total analysis, rationalizing that the development isn't expected to be fully built-out until 2026. The purpose of the 2023 horizon year analysis is to analyze traffic operations on the road network pre-widening in the scenario that the development is fully built-out before the background roadway improvements are complete. Per the Region's pre-consultation comments and Terms of Reference comments, an important component of the TIS will be to evaluate and recommend an interim configuration and design (e.g. traffic control, auxiliary turn lanes) for the future east-west collector roadway connection to James Snow Parkway prior to the widening of James Snow Parkway to six lanes, and for the future north-south roadway connection to Britannia Road prior to the widening of Britannia to six lanes. This interim analysis was required for the Bayview Lexis TIS and also needs to be included in this TIS.	As the anticipated build-out of the subject development is well beyond the requested 2023 future analysis horizon, Halton Region staff have agreed that a 2023 future analysis horizon is not required. In order to still understand the potential implications on the proposed collector roadway intersection at James Snow Parkway in the unlikely event James Snow Parkway is not fully widened in the 2026 future analysis horizon, an additional analysis scenario has been requested. This scenario will look at the collector road intersection and James Snow Parkway only in the 2026 future analysis horizon in the event James Snow Parkway has not yet been widened.
10	5. James Snow Parkway Southbound Right-Turn Lane A southbound right-turn turn lane or taper will be required on James Snow Parkway at the future east-west collector roadway intersection in the interim scenario. The turn lane or taper will be needed to increase traffic safety because of the forecasted southbound right-turn traffic volumes at the intersection, the single-lane southbound through lane on James Snow Parkway and the operating speeds of traffic on James Snow Parkway associated with the high posted speed limit. The TIS recommends a southbound right-turn lane on James Snow Parkway at the future east-west collector roadway intersection under the ultimate (post-widening) scenario.	Noted. A southbound right-turn lane has been considered at the intersection of Street 1 and James Snow Parkway in the additional analysis scenario.

11	6. Future Background Traffic Volumes Forecasts Per the established Terms of Reference for the TIS, the following growth rates are to be applied: o A growth rate of 2% compounded annually should be applied to the 2021 existing traffic volumes on James Snow Parkway and Britannia Road to estimate 2023 future background traffic volumes on the road network. o For consistency with the Bayview Lexis TIS Update prepared by TMIG, a growth rate of 9% compounded annually should be applied to the 2023 future background through traffic volumes on James Snow Parkway to forecast 2026 future background traffic volumes. A growth rate of 2% compounded annually can be maintained for forecasting 2026 future background traffic volumes for the turning movements entering and exiting Whitlock Avenue and the future east-west collector road as part of the subject property. o As documented in the Derry Green TIS Update prepared by Crozier, the Region provided a growth rate of 5.5% compounded annually on Britannia Road. This growth rate accounts for the planned roadway improvements. Therefore, a growth rate of 5.5% compounded annually should be applied to the 2023 future background through traffic volumes on Britannia Road to forecast 2026 future background traffic volumes. A growth rate of 2% compounded annually can be maintained for forecasting 2026 future background traffic volumes for the turning movements entering and exiting the future north-south collector road as part of the subject property. The TIS should follow the growth rate methodology outlined above from the established Terms of Reference for consistency with the Bayview Lexis TIS and other recent studies in the area. Since the preparation of this TIS, the Bayview Lexis TIS has been updated. Therefore, any references to the Bayview Lexis TIS should be checked to make sure that they reflect the latest version of the TIS.	Noted. These growth rates have been used in the updated TIS.
12	7. Trip Generation The TIS does not consider trip generation for the elementary school by rationalizing the following: o elementary schools are likely to have a short duration peak period of 15 minutes before and after school; o these peaks would occur outside of the typical weekday a.m. and p.m. commuter peak hours; o teachers and staff would travel outside of the commuter peak hours; o new trips generated by the elementary school would be to and from the proposed subdivision only; and o the majority of these new trips would be made by active modes of transportation. Transportation Planning agrees that the catchment area for the proposed elementary school would be primarily within the proposed subdivision, particularly for students. However, it is reasonable to assume that some teachers, admin staff and support staff may not be from the immediate subdivision area and thus would travel on the external Regional road network, and during weekday a.m. and p.m. commuter peak periods (e.g. teachers commuting to school before classes and leaving the school late-afternoon or early evening, after classes finish). The TIS should consider this assumption in the trip generation forecasts regarding a portion of these teacher, admin staff and support staff originating from external areas. The TIS also does not consider trip generation for the village square by rationalizing that the new trips generated by the village square would be to and from the proposed subdivision only, and that the majority of these new trips would be made by active modes of active transportation. Based on the understanding that the village square is primarily meant to be a park with potentially some minor ancillary businesses, Transportation Planning accepts the omission of the village square in the trip generation forecasts.	Noted. As discussed with both Halton Region and Town of Milton staff, Halton District School Board staff have provided a rough estimate of 106 staff at peak school operation. Following a comparison of start and end times of surrounding elementary schools in the area, to the peak periods of the collected Study Area intersection Turning Movement Counts (TMC), it is estimated that 80% of teachers and staff will arrive at the school in the AM peak analysis period, and 10% of teachers and staff will leave the school in the PM peak analysis period. This means that 85 inbound AM trips and 11 outbound PM trips will be added to the site generated traffic to account for the portion of teachers, admin staff, and support staff that may not be from the immediate subdivision area and will travel during the AM and PM peak periods.

13	8. 2021 “Existing” Traffic Operations The TIS identifies multiple critical movements under 2021 “existing” conditions during the weekday a.m. and p.m. peak periods. While the TIS rationalizes that these operations support the need for the planned future background roadway improvements, the Region would be interested in seeing if signal timing optimizations under existing conditions could address the existing traffic issues until the future background roadway improvements are implemented.	Noted. Signal timing optimizations under existing conditions have been performed in the updated TIS. As a result, some improvements were shown however multiple critical movements in both the AM and PM peak periods were noted.
14	9. Future Background Traffic Modelling The Synchro output reports under future background and total conditions indicate that no lost time adjustments were applied to the Synchro modelling. The analysis conducted for the adjacent Bayview Lexis subdivision applied lost time adjustment factors under future background and total conditions to improve traffic operations, justifying lost time adjustment factors to bring the “total” lost time for protected movements to 1.0 second (e.g. a lost time adjustment of -2.0 seconds for a 3.0 second intergreen time) and the “total” lost time for permissive movements to 5.0 seconds (e.g. a lost time adjustment of -1.0 seconds for a 6.0 second intergreen time). These lost time adjustments could be applied to this TIS under future background and total conditions for consistency with the Bayview Lexis TIS and to improve future traffic operations. The TIS notes that a cycle length of 130 seconds was assumed for the intersection of James Snow Parkway and Britannia Road under future background and total conditions. The Region’s ideal maximum cycle length is 120 seconds, which is also consistent with the cycle length that was assumed on James Snow Parkway under future conditions in other recent studies in the surrounding area. Therefore, the cycle length for the intersection should not exceed 120 seconds if possible.	Noted. Lost time adjustments have been made to the updated TIS. A cycle length of 120 seconds has been used.

Town of Milton - Transportation Impact Study Comments		
Number	Comment	Response
1	Please note that the report should follow the agreed upon scope of work in the Terms of Reference.	Noted.
2	Section 2.6.1; the growth rate used to reflect the existing horizon year volumes are not in accordance with the agreed upon ToR. These should be revised.	Noted. As per Halton Region comments on the TIS, the growth rate used to determine the 2021 existing horizon volume should be 2% for both Britannia Road and James Snow Parkway. The growth rate applied to Fourth Line will be 2% which is consistent with the TOR and TIS.
3	Section 3.1; please consider the Region's comments in regards to the expected completion years for road widening. The report must include the most up-to- date information.	Noted. These have been considered in the updated TIS.
4	Section 3.1.6.2; it is unclear which version of the Master Plan has been referred to for the transit network improvements. Please clarify and append the relevant pages to the report.	Noted. This will be addressed in the updated TIS.
5	Section 4.1.1; the TIS states that trips generated from the elementary school are estimated to occur out of the peak hours. While the town is in agreement with the rationalization, a portion of the trips should still be included in the analysis to account for teachers and admin/support staff that may commute during peak periods. The Town is in agreement with the rationalization provided for the exclusion of trips generated from the Village Square.	Noted. As discussed with both Halton Region and Town of Milton staff, Halton District School Board staff have provided a rough estimate of 106 staff at peak school operation. Following a comparison of start and end times of surrounding elementary schools in the area, to the peak periods of the collected Study Area intersection Turning Movement Counts (TMC), it is estimated that 80% of teachers and staff will arrive at the school in the AM peak analysis period, and 10% of teachers and staff will leave the school in the PM peak analysis period. This means that 85 inbound AM trips and 11 outbound PM trips will be added to the site generated traffic to account for the portion of teachers, admin staff, and support staff that may not be from the immediate subdivision area and will travel during the AM and PM peak periods.
6	Section 8; The Town typically asks for a peak hour factor of 1.00 for future scenarios background and future total scenarios to simulate a flat hourly peak. Please confirm with Region staff if this approach is acceptable for regional roads.	Noted. As discussed with both Region and Town staff, a peak hour factor of 1.00 has been applied for future background and future total scenarios at intersections where both roads are Town roads.
7	Section 8.1; Several movements are operating with a v/c ratio of 1.00 or above, since this is theoretically not possible, it is recommended that the modelling for the existing conditions be calibrated accordingly to ensure that existing movements operate with v/c ratios under 1.00.	Noted. As the 2021 existing volumes are not raw volumes and are insteas hypothetical volumes that have been grown using growth rates and the inclusion of Boyne West Tertiary Plan Area volumes, calibration is necessary and has not been performed.
8	A figure showing the location of sidewalks and pedestrian crossings should be prepared and submitted.	Noted. A schematic figure with pedestrian facilities was previously included in the TIS.
9	A Traffic Control Plan should be submitted. The plan should show all roadways, property lines (including designation of schools and parks), driveways, fire hydrants, sidewalks, bike paths, street lighting, traffic signage (including all regulatory, warning and information signs), street trees, tactile surfaces and pavement markings The following notes to be added to the traffic control plans to reduce conflicts a) All traffic signage to be installed as per the Ontario Traffic Manual. b) Traffic signage to be installed on streetlight posts where possible. c) Parking prohibitions may be required in the areas of intersections, curbs, park pathways and vehicular park entrance locations, on a site-by site-basis. Areas to be confirmed by Town Engineering staff prior to installation of signage. d) Owner is responsible for installing the approved line painting prior to assumption of the subdivision. e) All "No Parking" and "No Stopping" signs are to be placed in front of street trees upon traffic approach in the boulevard. Signs placed in locations where they are blocked by trees will be relocated at the contractor's expense. f) Street tree plantings to be limbed up and/or regulatory sign locations to be adjusted as directed by the Town, prior to commencement of the Maintenance Period.	Noted. This will be addressed at a later stage once more details (i.e. hydrant locations, light pole locations, etc.) are available.
10	An AutoTURN swept path analysis must be submitted showing the appropriate design vehicle completing each type of manoeuver (left turn, through, and right turn) from all approaches.	Noted. It has been indicated during further discussion with Town staff that this comment only applies to non-standard locationsand will be completed as part of the Traffic Control Plan.
11	Daylighting triangles, as outlined in Table 1.2 of the Town's Engineering and Parks Standards Manual, should be shown on the plans	Noted. This this will be shown on the plans.

12	All roundabout analysis should be conducted using Arcady.	The Terms of Reference (TOR) submitted on April 20, 2021 indicated Sidra would be used. This Terms of Reference document was approved by Town staff. As a result of this, as well as further discussion with Town staff on this topic, Sidra will continue to be used for roundabout analysis.

Town of Milton - Development Engineering - Draft Plan of Subdivision		
Number	Comment	Response
1 (d)	Be advised that, should a round-about be warranted at the intersection of Street '1' & Street '2', there will be additional right-of-way requirements. Additionally, a 'Hold' will be placed on adjacent lots.	Noted. As the all-way-stop control warrant was not met for this intersection, it is not considered a candidate for a roundabout. Additionally, this is consitent with the Boyne RNA study.
Parks and Facility Planning, Design & Construction		
7	7. 5.2 – good connectivity is provided to the park on all frontages; as required please update the active transportation routing with any changes made to the Draft Plan and maintain these park connections. As an observation, some coordination is needed between this figure and Dwg No 026 by CGH Transportation in the TIS.	Noted. The pedestrian facilities figure has been updated accordingly.
-	As an observation, some coordination is needed between Drawing 026 Pedestrian Facilities Concept Plan and Figure 5.2 in the FSR; please revise as per comments received from Town Traffic and Development Engineering Divisions.	Noted. The pedestrian facilities figure has been updated accordingly.

Appendix B

Collision Data

Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light	Traffic Control	Traffic Control Condit	Road Jurisdiction	Classification Of Accident	Initial Impact Type
2016-01-10	2016	11:29	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	02 - Non-fatal injury	02 - Angle
2017-02-06	2017	18:25	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	01 - Clear		07 - Dark	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-03-10	2017	17:15	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	02 - Angle
2017-06-04	2017	17:30	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	02 - Rain		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-06-15	2017	16:08	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2017-06-25	2017	13:30	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	03 - Rear end
2017-08-06	2017	13:21	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	03 - Rear end
2017-08-13	2017	10:58	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	02 - Non-fatal injury	02 - Angle
2017-08-30	2017	15:30	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	03 - Rear end
2017-11-02	2017	16:15	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	02 - Rain		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-05-13	2018	18:00	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-05-28	2018	17:30	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	02 - Angle
2018-06-27	2018	20:34	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	01 - Within intersection	0	02 - Rain		05 - Dusk	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	05 - Turning movement
2018-10-20	2018	13:40	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	10 - No control			04 - Non-reportable	03 - Rear end
2019-02-08	2019	18:45	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	1	01 - Clear		07 - Dark	10 - No control		05 - Regional municipality	03 - P.D. only	03 - Rear end
2019-02-24	2019	23:56	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	11 - Not on roadway - right side	0	03 - Snow		07 - Dark	10 - No control		01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2019-07-01	2019	09:08	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	02 - Angle
2019-07-09	2019	17:50	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal		05 - Regional municipality	03 - P.D. only	03 - Rear end
2019-07-12	2019	18:59	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	03 - Rear end
2019-07-21	2019	16:41	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	02 - Non-fatal injury	03 - Rear end
2019-10-11	2019	14:49	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	02 - Angle
2019-12-01	2019	03:55	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2019-12-05	2019	08:55	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	1	03 - Snow		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2019-12-15	2019	09:59	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	02 - Angle
2020-02-11	2020	16:30	BRITANNIA ROAD @ FOURTH LINE (10018601)	03 - At intersection	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	04 - Non-reportable	03 - Rear end
2020-02-27	2020	17:10	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	0	03 - Snow		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	02 - Non-fatal injury	03 - Rear end
2021-01-13	2021	15:56	BRITANNIA ROAD @ FOURTH LINE (10018601)	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight		01 - Functioning	05 - Regional municipality	02 - Non-fatal injury	03 - Rear end

Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light	Traffic Control	Traffic Control Condit	Road Jurisdiction	Classification Of Accident	Initial Impact Type
2020-01-26	2020	18:51	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	12 - Off highway	0	02 - Rain		08 - Dark, artificial	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	02 - Non-fatal injury	07 - SMV other
2019-12-26	2019	18:50	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	02 - Rain		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2019-08-10	2019	08:15	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2019-06-06	2019	08:49	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2019-06-06	2019	07:50	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2019-04-27	2019	16:25	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	02 - Non-fatal injury	03 - Rear end
2019-01-21	2019	08:38	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	12 - Off highway	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2018-12-20	2018	21:56	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	2	02 - Rain		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2018-12-20	2018	17:00	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	04 - Right turn lane	0	01 - Clear		07 - Dark	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-11-06	2018	07:50	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	02 - Rain		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-11-04	2018	17:57	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	02 - Thru lane	0	02 - Rain		07 - Dark	09 - Traffic controller	01 - Functioning	05 - Regional municipality	03 - P.D. only	05 - Turning movement
2018-11-01	2018	18:57	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	01 - Within intersection	0	02 - Rain		07 - Dark	09 - Traffic controller		05 - Regional municipality	03 - P.D. only	05 - Turning movement
2018-08-14	2018	18:35	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-08-02	2018	05:46	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	12 - Off highway	0	01 - Clear		03 - Dawn	01 - Traffic signal	01 - Functioning	02 - Provincial Highway	03 - P.D. only	07 - SMV other
2018-07-02	2018	19:18	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	02 - Non-fatal injury	02 - Angle
2018-02-11	2018	05:50	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	01 - Within intersection	0	03 - Snow		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2018-02-09	2018	15:00	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	04 - Right turn lane	0	03 - Snow		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2018-02-07	2018	07:52	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	12 - Off highway	0	03 - Snow		01 - Daylight	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2018-01-19	2018	07:13	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	04 - Right turn lane	0	01 - Clear		03 - Dawn	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	04 - Sideswipe
2017-12-25	2017	13:00	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	03 - Snow		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	04 - Sideswipe
2017-12-02	2017	10:40	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-10-15	2017	02:15	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	12 - Off highway	0	02 - Rain		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2017-07-12	2017	08:07	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	03 - Left turn lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	04 - Sideswipe
2017-06-22	2017	08:30	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	01 - Within intersection	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-06-12	2017	08:35	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-06-10	2017	09:15	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2017-04-30	2017	03:51	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	01 - Within intersection	0	01 - Clear		08 - Dark, artificial	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2017-03-24	2017	08:40	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	11 - Not on roadway - right side	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	07 - SMV other
2017-03-15	2017	17:06	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	01 - Within intersection	0	01 - Clear		01 - Daylight			05 - Regional municipality	03 - P.D. only	02 - Angle
2017-02-24	2017	06:46	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	01 - Clear		07 - Dark	01 - Traffic signal		05 - Regional municipality	03 - P.D. only	07 - SMV other
2016-10-30	2016	19:38	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	03 - Left turn lane	0	01 - Clear		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	03 - Rear end
2016-05-30	2016	08:15	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	02 - Thru lane	0	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning		04 - Non-reportable	03 - Rear end
2016-02-20	2016	05:55	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	02 - Intersection related	12 - Off highway	0	02 - Rain		07 - Dark	01 - Traffic signal	01 - Functioning	01 - Municipal (excl. Twp. Rd.)	03 - P.D. only	07 - SMV other
2016-02-18	2016	12:45	BRITANNIA ROAD @ JAMES SNOW PARKWAY SOUT	03 - At intersection	02 - Thru lane	1	01 - Clear		01 - Daylight	01 - Traffic signal	01 - Functioning	05 - Regional municipality	03 - P.D. only	03 - Rear end

Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light				Classification Of Accident	Initial Impact Type
2017-04-21	2017	13:00	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				01 - Clear		01 - Daylight				02 - Non-fatal injury	03 - Rear end
2020-07-31	2020	16:15	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				01 - Clear		01 - Daylight				03 - P.D. only	07 - SMV other
2020-06-20	2020	22:46	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				01 - Clear		07 - Dark				03 - P.D. only	03 - Rear end
2016-11-02	2016	09:30	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				02 - Rain		01 - Daylight				04 - Non-reportable	03 - Rear end
2020-08-19	2020	03:17	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				01 - Clear		08 - Dark, artificial				03 - P.D. only	05 - Turning movement
2016-12-06	2016	07:45	JAMES SNOW PARKWAY SOUTH btwn BRITANNIA ROAD & LOUIS ST LAURENT AVENUE (1068770)				04 - Freezing Rain		03 - Dawn				03 - P.D. only	03 - Rear end

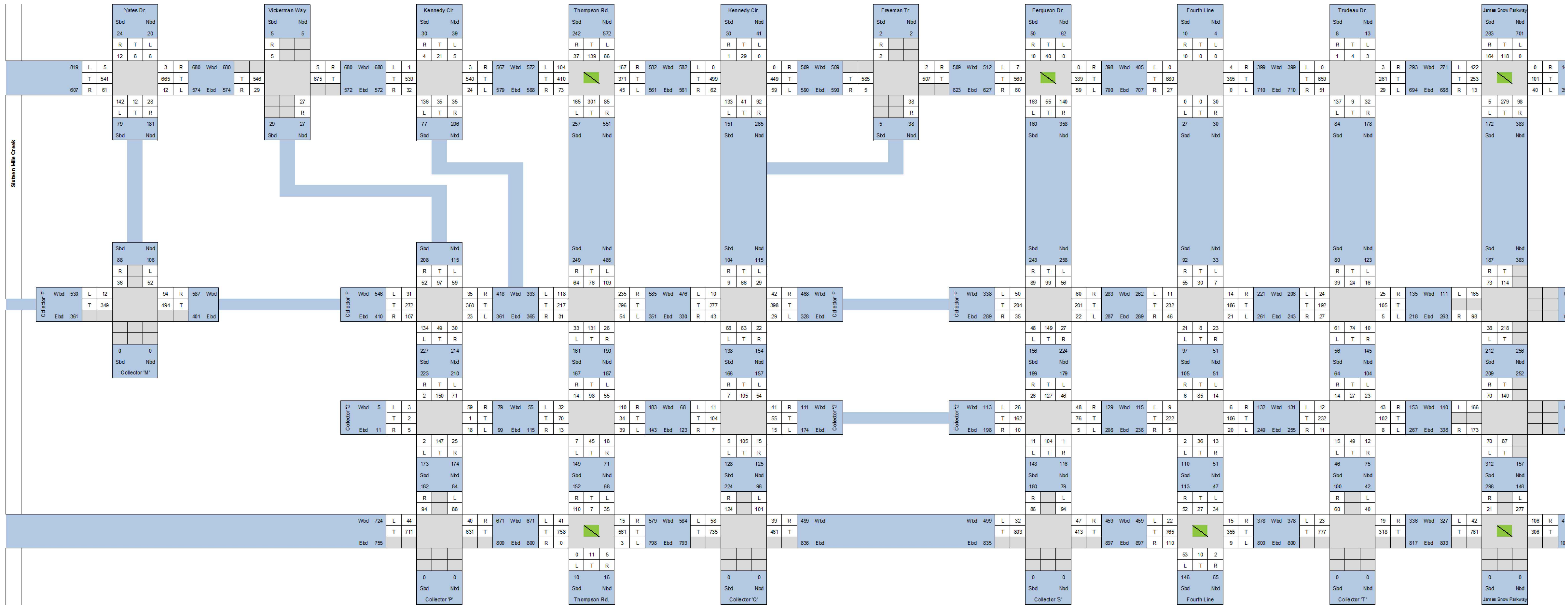
Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light				Classification Of Accident	Initial Impact Type
2019-07-13	2019	17:13	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2017-10-10	2017	16:18	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				02 - Non-fatal injury	03 - Rear end
2019-10-18	2019	17:48	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2016-02-10	2016	15:30	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				03 - Snow		01 - Daylight				03 - P.D. only	03 - Rear end
2017-02-02	2017	21:15	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		07 - Dark				03 - P.D. only	07 - SMV other
2018-07-04	2018	12:51	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	07 - SMV other
2016-11-29	2016	07:20	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				04 - Non-reportable	03 - Rear end
2019-06-01	2019	04:20	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		07 - Dark				03 - P.D. only	01 - Approaching
2018-06-04	2018	20:15	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	05 - Turning movement
2018-07-05	2018	09:30	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				04 - Non-reportable	07 - SMV other
2019-04-12	2019	16:45	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				02 - Rain		01 - Daylight				03 - P.D. only	03 - Rear end
2019-10-26	2019	08:25	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				02 - Rain		01 - Daylight				03 - P.D. only	05 - Turning movement
2018-02-07	2018	11:00	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				03 - Snow		01 - Daylight				04 - Non-reportable	07 - SMV other
2020-03-12	2020	17:35	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2018-09-29	2018	15:15	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				04 - Non-reportable	03 - Rear end
2019-03-12	2019	11:12	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2019-09-06	2019	03:33	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				02 - Rain		07 - Dark				03 - P.D. only	03 - Rear end
2020-03-06	2020	08:15	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2017-11-30	2017	18:27	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		08 - Dark, artificial				03 - P.D. only	02 - Angle
2016-03-05	2016	13:35	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2017-07-05	2017	16:45	BRITANNIA ROAD btwn FOURTH LINE & THOMPSON ROAD SOUTH (1140510)				01 - Clear		01 - Daylight				03 - P.D. only	02 - Angle

Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light				Classification Of Accident	Initial Impact Type
2019-01-30	2019	20:02	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		07 - Dark				03 - P.D. only	03 - Rear end
2019-04-20	2019	02:35	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				02 - Rain		07 - Dark				03 - P.D. only	07 - SMV other
2016-09-27	2016	17:30	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		01 - Daylight				04 - Non-reportable	04 - Sideswipe
2018-11-03	2018	16:40	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		05 - Dusk				03 - P.D. only	01 - Approaching
2019-09-11	2019	06:50	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		04 - Dawn, artificial				02 - Non-fatal injury	03 - Rear end
2020-01-18	2020	20:31	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				02 - Rain		07 - Dark				03 - P.D. only	07 - SMV other
2019-03-26	2019	08:30	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2016-07-15	2016	09:00	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		01 - Daylight				03 - P.D. only	07 - SMV other
2019-05-01	2019	17:00	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				02 - Rain		01 - Daylight				03 - P.D. only	03 - Rear end
2018-10-17	2018	09:00	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				02 - Rain		01 - Daylight				04 - Non-reportable	03 - Rear end
2016-06-11	2016	14:50	BRITANNIA ROAD btwn FOURTH LINE & JAMES SNOW PARKWAY (1140550)				01 - Clear		01 - Daylight				02 - Non-fatal injury	03 - Rear end

Accident Date	Accident Year	Accident Time	Location	Accident Location	Impact Location	Thru Lane	Environment	Environme	Light				Classification Of Accident	Initial Impact Type
2017-03-15	2017	16:35	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				05 - Drifting Snow		01 - Daylight				02 - Non-fatal injury	01 - Approaching
2019-09-23	2019	09:05	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				03 - P.D. only	03 - Rear end
2017-09-21	2017	18:00	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				04 - Non-reportable	03 - Rear end
2020-01-18	2020	12:25	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				03 - Snow		01 - Daylight				03 - P.D. only	07 - SMV other
2017-05-29	2017	15:33	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				02 - Non-fatal injury	99 - Other
2016-10-13	2016	16:45	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				04 - Non-reportable	03 - Rear end
2018-07-30	2018	17:10	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				04 - Non-reportable	03 - Rear end
2020-08-12	2020	15:11	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				01 - Clear		01 - Daylight				02 - Non-fatal injury	01 - Approaching
2019-02-27	2019	09:00	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				03 - Snow		01 - Daylight				02 - Non-fatal injury	01 - Approaching
2016-03-31	2016	09:00	BRITANNIA ROAD btwn FIFTH LINE & JAMES SNOW PARKWAY (1140560)				02 - Rain		01 - Daylight					03 - Rear end

Appendix C

Raw Boyne RNA Site-generated Trips



Legend

- Existing Traffic Signal
- 2015 Roundabout

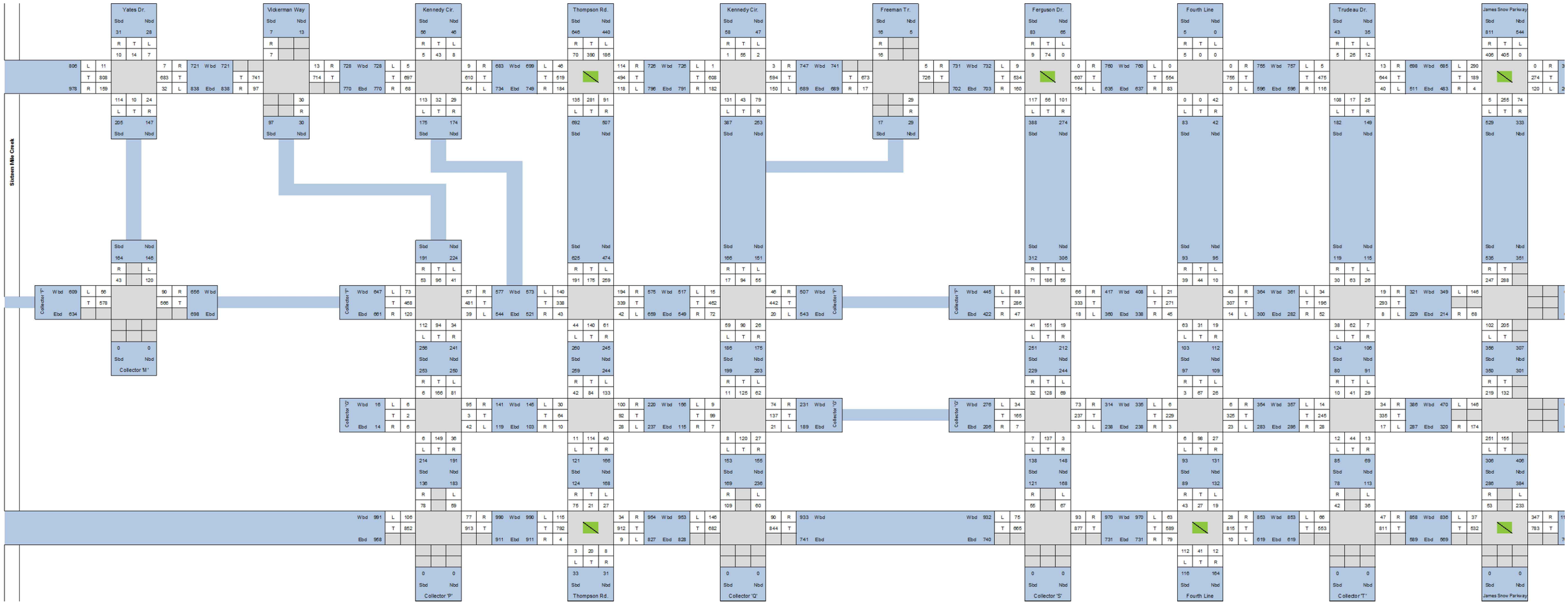
Milton Phase 3 Landowners Group
Boyne Survey
Road Network Assessment
AM Peak Hour
Estimated Site Traffic East Block

Job Number 28-21522
Revision C
Date Sept 2017

Figure 7B

6705 Millcreek Drive, Unit 1, Mississauga Ontario L5N 5M4 T 1 416 213 7121 F 1 416 890 8499 W www.ghd.com

Plot Date: 23 November 2016 - 3:55 PM Plotted by: Adam Mildenberger Cad File No: G:\Legacy\Service\Traffic\Projects\2013\13221 BOYNE RD NEEDS ASSESSMENT\OCTOBER 2015 UPDATE - USE\13221 Boyne Figures (2016).dwg



Le□e□d

E□□t□□ Tra□c S□□al

2015 Ro□da□o□t

M□lto□ P□a□e 3 La□do□□er□ Gro□□
Bo□□e S□r□e□
Road Net□or□ A□□e□me□t
PM Pea□ Ho□r
E□t□mated S□te Tr□□□ Ea□t Bloc□

□o□ N□m□er 28-21522
Re□□□o□ C
Date Sept 2017

F□□□re 8B

6705 M□llcree□ Dr□e, U□t 1, M□□□□a□□a O□tar□o L5N 5M4 **T** 1 416 213 7121 **F** 1 416 890 8499 **E** □□o□ □□dca□ada.com **W** □□□.□□d.com

Plot Date: 23 No□em□er 2016 - 3:55 PM Plotted □□: Adam M□lde□□er□er Cad F□le No: G:□Le□ac□Ser□a Tra□□Tec□Pro□ect□2013□13221 BOYNE RD NEEDS ASSESSMENT□OCTOBER 2015 UPDATE - USE □□□□□□□13221 Bo□□e F□□re□(□□□2016).d□□

Appendix D

East and West Boyne RNA Block Percentage Calculations

	AM Peak Hour		PM Peak Hour		Average
	In	Out	In	Out	
West Block	2406	4151	4690	3411	
East Block	1884	3497	3914	2782	
West %	0.56	0.54	0.55	0.55	0.55
East %	0.44	0.46	0.45	0.45	0.45

Appendix E

Traffic Data

Britannia Rd @ James Snow Pkwy

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Halton Region
Site #: 0000003246
Intersection: Britannia Rd & James Snow Pkwy
TFR File #: 3
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E

North Leg Total: 801
North Entering: 648
North Peds: 0
Peds Cross: ⋈

Heavys	3	9	12
Trucks	1	0	1
Cars	78	557	635
Totals	82	566	

Heavys	7
Trucks	1
Cars	145
Totals	153

East Leg Total: 1421
East Entering: 387
East Peds: 0
Peds Cross: ⧖

James Snow Pkwy

Heavys	Trucks	Cars	Totals
25	2	351	378

Britannia Rd

Heavys	Trucks	Cars	Totals
1	0	61	62
1	7	460	468
2	7	521	

N
W E
S

Cars	Trucks	Heavys	Totals
84	1	6	91
273	1	22	296
357	2	28	

Britannia Rd

Cars	Trucks	Heavys	Totals
1017	7	10	1034

Peds Cross: ⧖
West Peds: 0
West Entering: 530
West Leg Total: 908

Comments

Britannia Rd @ James Snow Pkwy

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 13:00:00
To: 14:00:00

Municipality: Halton Region
Site #: 0000003246
Intersection: Britannia Rd & James Snow Pkwy
TFR File #: 3
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

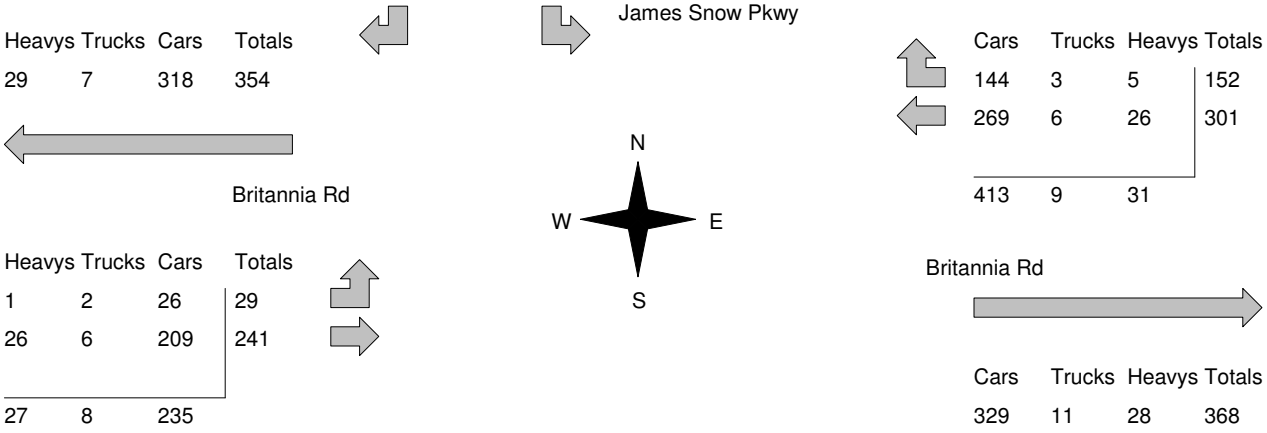
Major Road: Britannia Rd runs W/E

North Leg Total: 361
North Entering: 180
North Peds: 0
Peds Cross: ⋈

Heavys	3	2	5
Trucks	1	5	6
Cars	49	120	169
Totals	53	127	

Heavys	6
Trucks	5
Cars	170
Totals	181

East Leg Total: 821
East Entering: 453
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 270
West Leg Total: 624

Comments

Britannia Rd @ James Snow Pkwy

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 17:00:00
To: 18:00:00

Municipality: Halton Region
Site #: 0000003246
Intersection: Britannia Rd & James Snow Pkwy
TFR File #: 3
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E

North Leg Total: 906
North Entering: 224
North Peds: 0
Peds Cross: ⋈

Heavys	1	1	2
Trucks	1	1	2
Cars	65	155	220
Totals	67	157	

Heavys	5
Trucks	1
Cars	676
Totals	682

East Leg Total: 1784
East Entering: 1241
East Peds: 0
Peds Cross: ⧖

James Snow Pkwy

Heavys	Trucks	Cars	Totals
5	3	703	711

Britannia Rd

Heavys	Trucks	Cars	Totals
3	0	82	85
11	1	374	386
14	1	456	

Cars	Trucks	Heavys	Totals
594	1	2	597
638	2	4	644
1232	3	6	

Britannia Rd

Cars	Trucks	Heavys	Totals
529	2	12	543

N
W E
S

Peds Cross: ⧖
West Peds: 0
West Entering: 471
West Leg Total: 1182

Comments

Britannia Rd @ James Snow Pkwy

Total Count Diagram

Municipality: Halton Region
Site #: 0000003246
Intersection: Britannia Rd & James Snow Pkwy
TFR File #: 3
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E

North Leg Total:	4900
North Entering:	2407
North Peds:	0
Peds Cross:	⋈

Heavys	26	41	67
Trucks	11	15	26
Cars	429	1885	2314
Totals	466	1941	

Heavys	46
Trucks	17
Cars	2430
Totals	2493

East Leg Total:	10165
East Entering:	5341
East Peds:	0
Peds Cross:	⧖

James Snow Pkwy

Heavys	Trucks	Cars	Totals
204	50	3447	3701

Britannia Rd

Heavys	Trucks	Cars	Totals
15	3	369	387
138	35	2710	2883
153	38	3079	

Cars	Trucks	Heavys	Totals
2061	14	31	2106
3018	39	178	3235
5079	53	209	

Britannia Rd

Cars	Trucks	Heavys	Totals
4595	50	179	4824

N
W E
S

Peds Cross:	⧖
West Peds:	0
West Entering:	3270
West Leg Total:	6971

Comments

Date: 8-Nov-2017
Intersection: James Snow Pkwy & Britannia Rd

8 Phase Basic Timing Sheet												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**2 Ped**	**4 Ped**	**6 Ped**	**8 Ped**
Phases in use		X		X	X	X				x	x	
Direction		EBT		SBL	EBL	WBT						
Min Green		25		15	7	25						
Veh Ext.		5.0		5.0	2.5	5.0						
Yellow		4		5	3	4						
Red		3		2	0	3						
Walk		-		7	-	7						
Don't Walk		-		8	-	21						
Max 1		50		40	7	50						
Max 2		60		30	7	60						
Max 3		50		20	7	50						
Veh Recall		x				x						
Ped Recall												

Notes:
Sync Reference 3:15
Max 1 6:30-9:30
Max 2 15:00-19:00
Max 3 9:30- 15:00

Britannia Rd @ Fourth Line

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

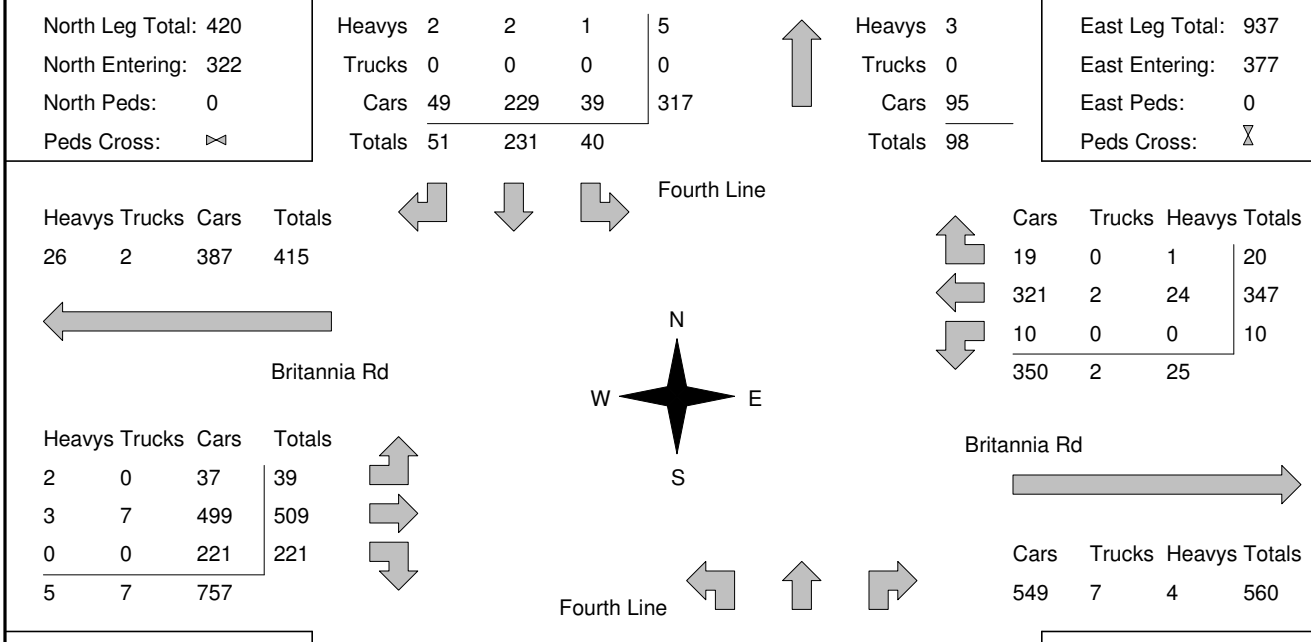
Municipality: Halton Region
Site #: 0000003245
Intersection: Britannia Rd & Fourth Line
TFR File #: 2
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E



Comments

Britannia Rd @ Fourth Line

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 13:00:00
To: 14:00:00

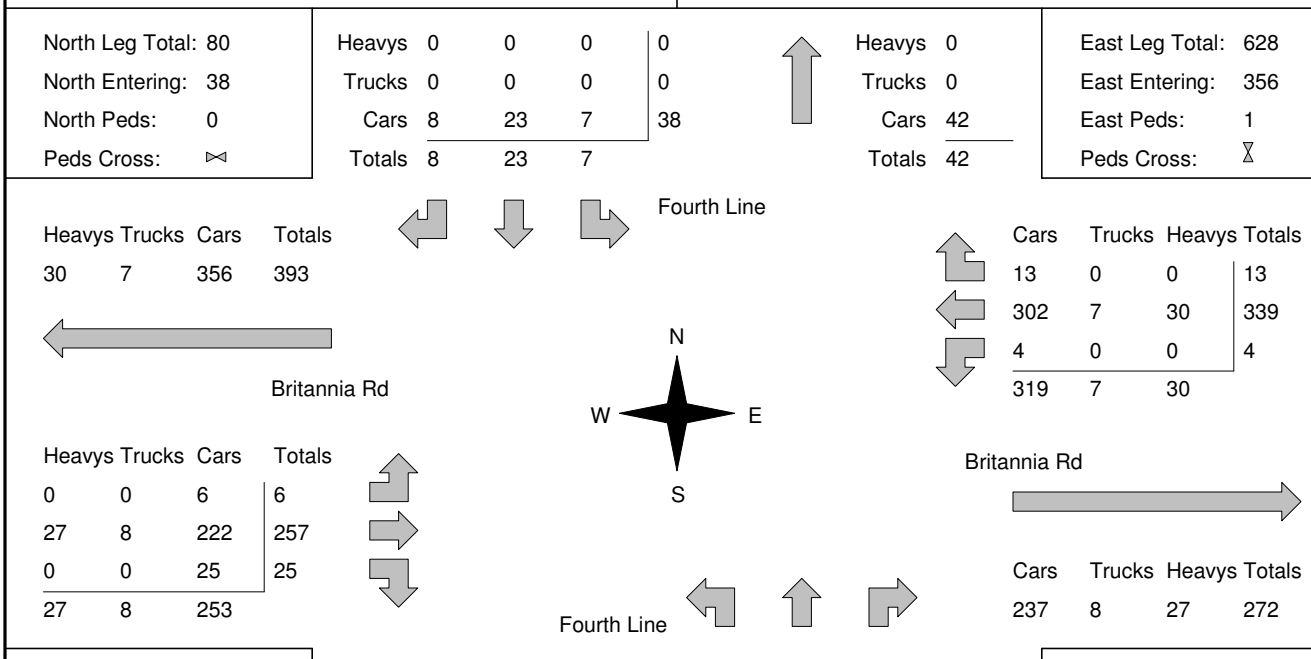
Municipality: Halton Region
Site #: 0000003245
Intersection: Britannia Rd & Fourth Line
TFR File #: 2
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E



Comments

Britannia Rd @ Fourth Line

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

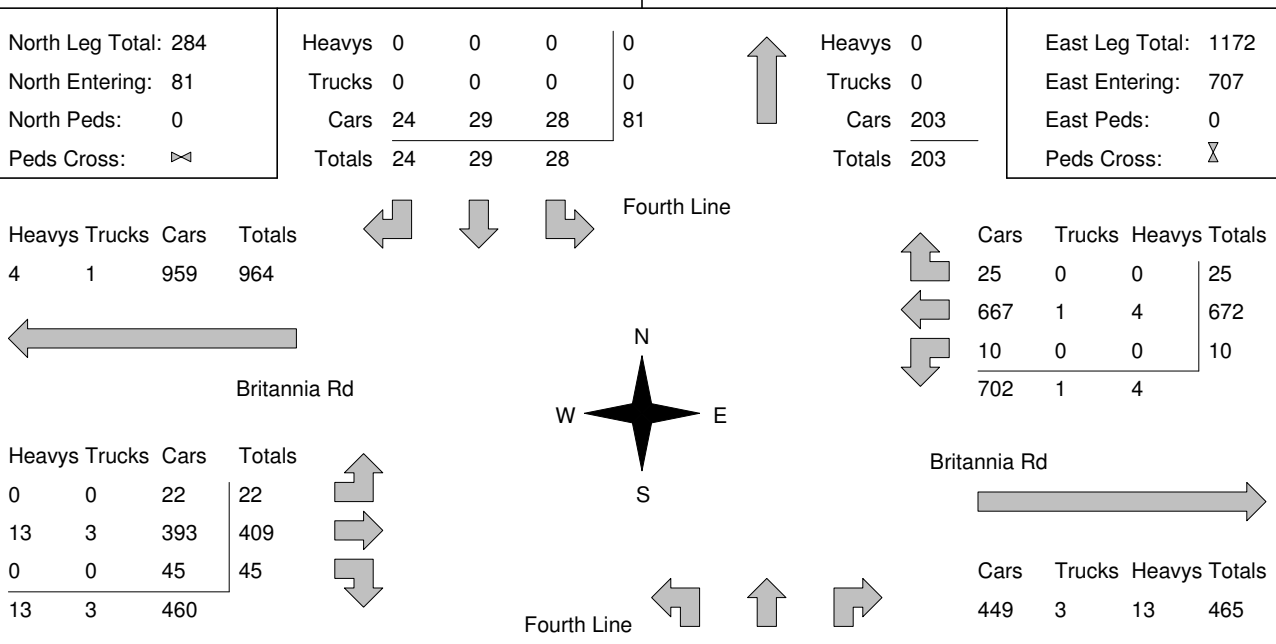
Municipality: Halton Region
Site #: 0000003245
Intersection: Britannia Rd & Fourth Line
TFR File #: 2
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E



Comments

Britannia Rd @ Fourth Line

Total Count Diagram

Municipality: Halton Region
Site #: 0000003245
Intersection: Britannia Rd & Fourth Line
TFR File #: 2
Count date: 7-Nov-2019

Weather conditions:
Overcast/Wet

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Britannia Rd runs W/E

North Leg Total:	1629			
North Entering:	884			
North Peds:	0			
Peds Cross:	⋈			
Heavys	5	3	2	10
Trucks	4	1	1	6
Cars	178	535	155	868
Totals	187	539	158	
Heavys	9			
Trucks	2			
Cars	734			
Totals	745			
East Leg Total:	6965			
East Entering:	3696			
East Peds:	1			
Peds Cross:	⧖			

Fourth Line

Heavys	Trucks	Cars	Totals
202	52	4209	4463

Cars	Trucks	Heavys	Totals
120	0	6	126
3257	48	197	3502
66	1	1	68
3443	49	204	

Britannia Rd

N
W E
S

Heavys	Trucks	Cars	Totals
3	1	128	132
145	39	2816	3000
1	1	587	589
149	41	3531	

Britannia Rd

Cars	Trucks	Heavys	Totals
3080	42	147	3269

Fourth Line

Peds Cross:	⧖			
West Peds:	0			
West Entering:	3721			
West Leg Total:	8184			
Cars	1188			
Trucks	3			
Heavys	5			
Totals	1196			
Cars	774	486	109	1369
Trucks	0	1	2	3
Heavys	0	0	0	0
Totals	774	487	111	
Peds Cross:	⋈			
South Peds:	0			
South Entering:	1372			
South Leg Total:	2568			

Comments

Date: 14-May-2008
Intersection: Britannia Road & Fourth Line

8 Phase Basic Timing Sheet

	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use	X	X		X	X	X	X	X				
Direction	WBLT	EB		SB	EBLT	WB	SBLT	NB				
Min Green	7	25		10	7	25		10				
Veh Ext.	2.5	5.0		5.0	2.5	5.0		5.0				
Yellow	3	5		5	3	5		5				
Red	1	2.5		1.6	1	2.5		1.6				
Walk	-	-		-	-	-		-				
Don't Walk	-	-		-	-	-		-				
Max 1	-	50		35	10	50		35				
Max 2	10	60		25	-	60		25				
Max 3	-	40		20	-	40		20				
Max 4	-	30		20	-	30		20				
Veh Recall												
Ped Recall												

Notes: Revised September 15, 2008

Use Max I from 6:30am-9:30am *Display EBLT*
Use Max II from 3:00pm-7:00pm *Display WBLT*
Use Max III from 9:30am-3:00pm
Use Max IV from 7:00pm-6:30am

Appendix F

2021 Budget and Business Plan Capital Report

2021-2030 TRANSPORTATION FORECAST

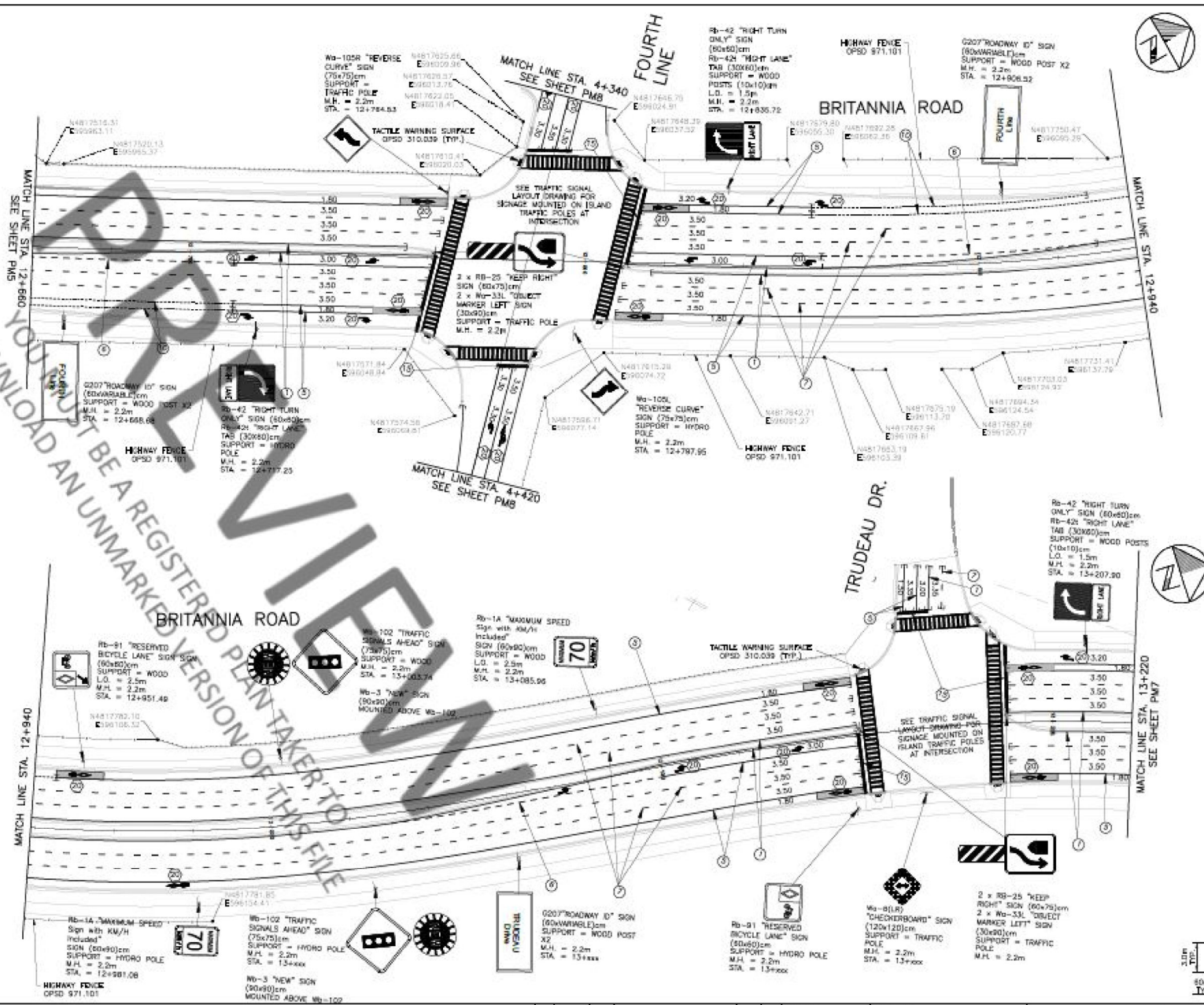
PROJECT FORECAST LISTING 2021 (000 DOLLARS)

PR NO	UNIQ ID#	PROJECT DESCRIPTION	Gross Cost	GROSS EXPENDITURE BY YEAR									
				2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
PR-2961B	7565	Trafalgar Road - Widening from 2 to 4 lanes from Steeles Avenue to 10 Side Road (HHS) (Regional Road 3)	40,400	40,400	-	-	-	-	-	-	-	-	-
		EA	-	-	-	-	-	-	-	-	-	-	-
		Study	-	-	-	-	-	-	-	-	-	-	-
		Design	500	500	-	-	-	-	-	-	-	-	-
		Property	17,900	17,900	-	-	-	-	-	-	-	-	-
		Utility Relocate	-	-	-	-	-	-	-	-	-	-	-
		Construction	22,000	22,000	-	-	-	-	-	-	-	-	-
PR-2960B	7756	Trafalgar Road Widening from 2 to 4 Lanes from 10 Side Road to Hwy 7 (HHS) (Regional Road 3)	49,121	-	-	-	49,121	-	-	-	-	-	-
		EA	-	-	-	-	-	-	-	-	-	-	-
		Study	-	-	-	-	-	-	-	-	-	-	-
		Design	-	-	-	-	-	-	-	-	-	-	-
		Property	-	-	-	-	-	-	-	-	-	-	-
		Utility Relocate	-	-	-	-	-	-	-	-	-	-	-
		Construction	49,121	-	-	-	49,121	-	-	-	-	-	-
	5839	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	33,368	3,604	887	28,877	-	-	-	-	-	-	-
		EA	-	-	-	-	-	-	-	-	-	-	-
		Study	-	-	-	-	-	-	-	-	-	-	-
		Design	-	-	-	-	-	-	-	-	-	-	-
		Property	3,604	3,604	-	-	-	-	-	-	-	-	-
		Utility Relocate	887	-	887	-	-	-	-	-	-	-	-
		Construction	28,877	-	-	28,877	-	-	-	-	-	-	-
	6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	21,067	-	-	-	1,100	-	-	3,538	15,719	710	-
		EA	1,100	-	-	-	1,100	-	-	-	-	-	-
		Study	-	-	-	-	-	-	-	-	-	-	-
		Design	3,538	-	-	-	-	-	-	3,538	-	-	-
		Property	15,719	-	-	-	-	-	-	-	15,719	-	-
		Utility Relocate	710	-	-	-	-	-	-	-	-	710	-
		Construction	-	-	-	-	-	-	-	-	-	-	-

Note: Schedule may not add due to rounding.

Appendix G

Britannia Road Widening Issued for Tender Drawings



KEY PLAN
N.T.S.

GENERAL NOTES:

1. TAPERS AND STORAGE TO BE 70m AND 50m RESPECTIVELY FOR BOTH LEFT AND RIGHT HAND TURNS UNLESS OTHERWISE DENOTED.
2. ALL PAVEMENT MARKINGS TO BE PERMANENT AS SPECIFIED IN CONTRACT

PAVEMENT MARKING LEGEND:

1	SOLID YELLOW, 10cm
2	SOLID DOUBLE YELLOW, 10cm
3	1–6–3 BROKEN YELLOW, 10cm
4	SOLID YELLOW, 20cm
5	SOLID WHITE, 10cm
6	3–3–3 BROKEN WHITE, 10cm
7	3–6–3 BROKEN WHITE, 10cm
9	SOLID WHITE, 20cm
10	1–1–1 BROKEN WHITE, 10cm
11	3–3–3 BROKEN WHITE, 20cm
13	3–3–3 BROKEN WHITE, 30cm
14	SOLID WHITE, 30cm
15	SOLID WHITE, 60cm
16	1–1–1 BROKEN WHITE, 45cm
17	SOLID WHITE, 15cm
18	SOLID WHITE, 45cm
19	1–1–1 BROKEN YELLOW, 10cm
20	SOLID WHITE SYMBOLS/ARROWS
21	1–2–1 BROKEN WHITE, 10cm
22	1.8–1.8–1.8 BROKEN WHITE, 15cm
23	WHITE DOT 10cm@ @ 1.8m SPACING
	LIMITS OF MARKINGS

NOTES:
1. 333, 363, 393, Pavement Marking Spacing (ie., 3m line, 3m gap, 3m line)
2. ① for PAVEMENT MARKING
3. □ for PAVEMENT MARKING, TEMPORARY
4. △ for PAVEMENT MARKING, TEMPORARY and REMOVABLE
5. ○ for PAVEMENT MARKING, DURABLE

12m LONG THERMOPLASTIC OR COLD PLASTIC COLOUR SHALL BE GREEN

ADVANCED STREET NAME NOTES:

ALL ADVANCED STREET NAME SIGNS SHALL BE MOUNTED TO THE SAME SUPPORT OF THE WARNING SIGN (INTERSECTION AHEAD OR SIGNAL AHEAD) UPSTREAM OF THE INTERSECTION.

MOUNTING HEIGHT TO THE BOTTOM OF THE LOWEST SIGN SHALL BE 2.1m MINIMUM MEASURED TO THE EDGE OF PAVEMENT.

MINIMUM DISTANCE BETWEEN THE EDGE OF SIGNS TO THE EDGE OF THE SHOULDER OR FACE OF THE CURB SHALL BE 0.6m

MOUNT SIGNS TO AVAILABLE STREET–LIGHT STANDARD OR HYDRO POST.

USE A 6"x6" WOODEN POST SIGN SUPPORT BURIED DEPTH SHALL BE MINIMUM OF 1.0m

PRE–DRILL TWO 51mm DIAMETER HOLES AT THE DISTANCE OF 350mm ABOVE FINISH GRADE AND A SEPARATION OF 380mm BETWEEN HOLES. THE POST SHALL BE PLANTED WITH THE PRE–DRILLED HOLES NORMAL TO THE EDGE OF PAVEMENT.

FOR TENDER ONLY
NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISIONS	MANU	QAD
0	04/11/20	VM	ISSUED FOR TENDER		

DESIGN	VM	CH'KD	DAR	DATE	
DRAWN	OML	CH'KD	VM		
SCALE 1:500				REFERENCES	

FIELD NOTES

V.V. MANALASTAS 100072970 2020-11-20 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

REGIONAL

SEE COVER SHEET FOR REGIONAL ACCEPTANCE

JACOBS

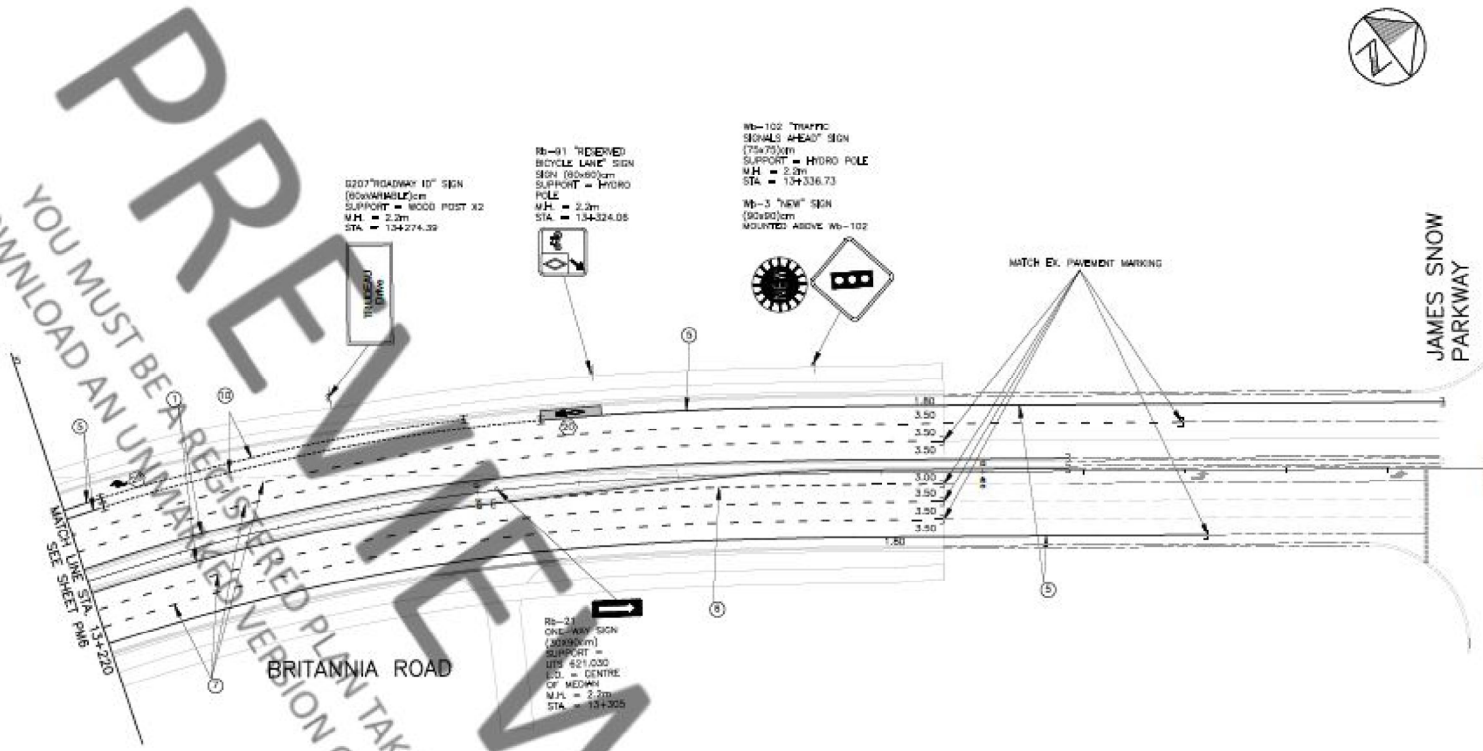
Halton REGION

PAVEMENT MARKINGS AND SIGNS
ROAD RECONSTRUCTION
BRITANNIA ROAD (REGIONAL RD 6)
0km FROM 4TH LN TO .2km WEST OF JS Pkwy
FROM STA. 12+660 TO STA. 13+220
IN THE TOWN OF MILTON

CONSULTANT FILE NO.	REGIONAL DRAWING NO.
689368	
CONTRACT NO.	DRAWING NO.
R-3309A-20	SHEET PM6 OF PM9

R-3309A-20 078 OF 269

PREVIEW
YOU MUST BE A REGISTERED PLAN TAKER TO DOWNLOAD AN UNWATERMARKED VERSION OF THIS FILE



KEY PLAN
N.T.S.

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PAVEMENT MARKING LEGEND:

1	SOLID YELLOW, 10cm
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4	SOLID YELLOW, 30cm
5	SOLID WHITE, 10cm
6	3–3–3 BROKEN WHITE, 10cm
7	3–6–3 BROKEN WHITE, 10cm
9	SOLID WHITE, 20cm
10	1–1–1 BROKEN WHITE, 10cm
11	3–3–3 BROKEN WHITE, 20cm
13	3–3–3 BROKEN WHITE, 30cm
14	SOLID WHITE, 30cm
15	SOLID WHITE, 60cm
16	1–1–1 BROKEN WHITE, 45cm
17	SOLID WHITE, 15cm
18	SOLID WHITE, 45cm
19	1–1–1 BROKEN YELLOW, 10cm
20	SOLID WHITE SYMBOLS/ARROWS
21	1–2–1 BROKEN WHITE, 10cm
22	1.8–1.8–1.8 BROKEN WHITE, 15cm
23	WHITE DOT 10cm⌀ @ 1.8m SPACING
⊢⊣	LIMITS OF MARKINGS

NOTES:
1. 333, 363, 393, Pavement Marking Spacing (ie., 3m line, 3m gap, 3m line)
2. Ⓟ for PAVEMENT MARKING
3. ☐ for PAVEMENT MARKING, TEMPORARY
4. △ for PAVEMENT MARKING, TEMPORARY and REMOVABLE
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FOR TENDER ONLY
NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISIONS	MANU	CAD
0	24/11/20	VM	ISSUED FOR TENDER		X

DESIGN	VM	CH'KD	DAR	DATE
DRAWN	CNL	CH'KD	VM	

SCALE 1:500
REFERENCES

FIELD NOTES

LICENSED PROFESSIONAL ENGINEER — V.M. MANALASTAS — 100072979 — PROVINCE OF ONTARIO

REGIONAL

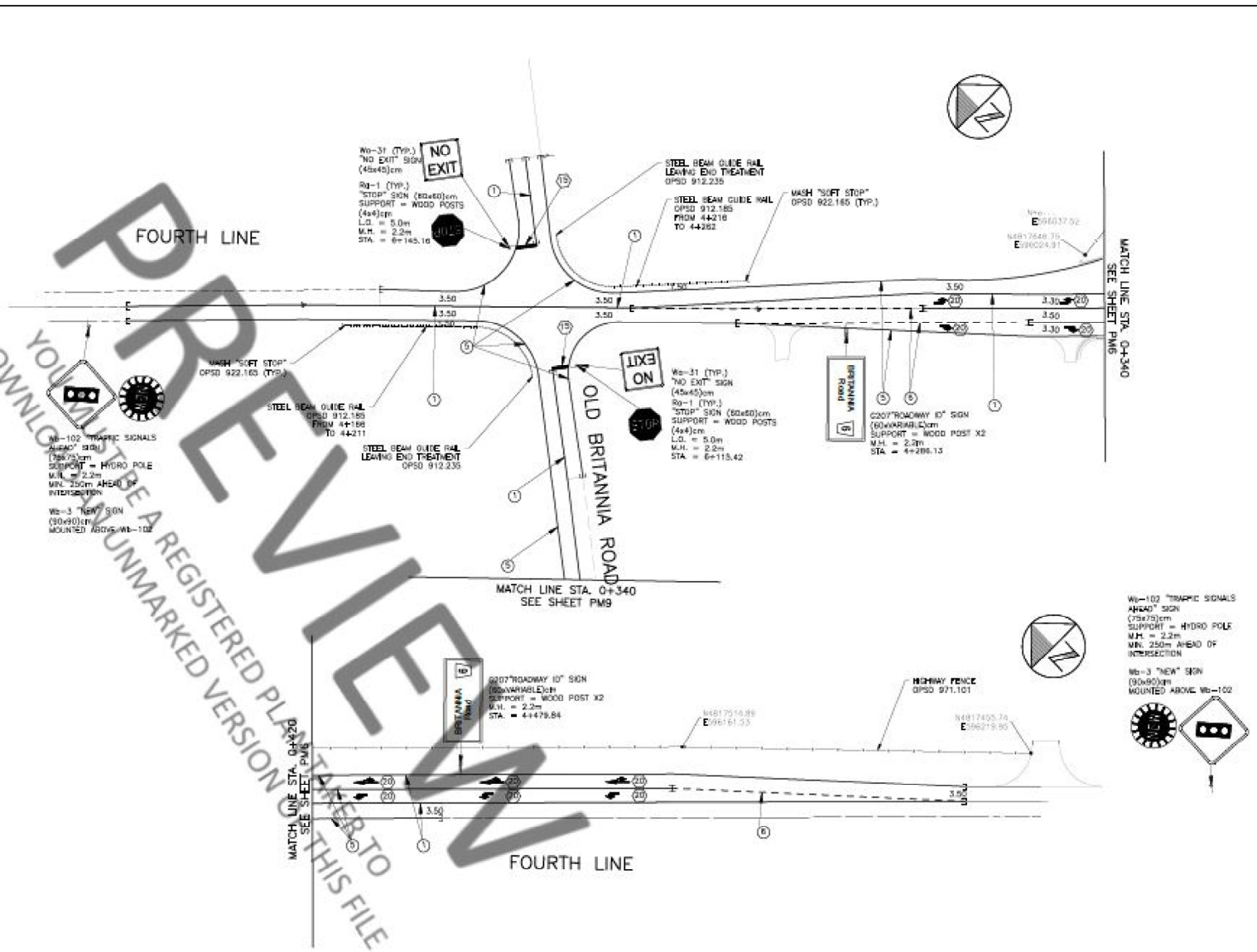
SEE COVER SHEET FOR REGIONAL ACCEPTANCE

JACOBS
Halton RINKOR

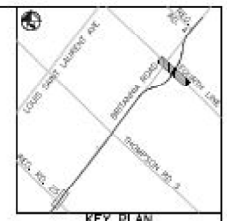
PAVEMENT MARKINGS AND SIGNS
ROAD RECONSTRUCTION
BRITANNIA ROAD (REGIONAL RD 6)
.2km WEST OF JS Pkwy TO 0km FROM JS Pkwy
FROM STA. 134+220 TO STA. 134+520
IN THE TOWN OF MILTON

CONSULTANT FILE NO.	REGIONAL DRAWING NO.
689368	
CONTRACT NO.	DRAWING NO.
R-3309A-20	SHEET PM7 OF PM9

R-3309A-20 079 OF 269



PREVIEW
YOU MUST BE A REGISTERED PLAN TAKER TO DOWNLOAD AN UNMARKED VERSION OF THIS FILE



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N.T.S.

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23	WHITE DOT 10cm⌀ @ 1.8m SPACING
	LIMITS OF MARKINGS

NOTES:
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2. Ⓣ for PAVEMENT MARKING
3. Ⓣ for PAVEMENT MARKING, TEMPORARY
4. △ for PAVEMENT MARKING, TEMPORARY and REMOVABLE
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FOR TENDER ONLY
NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISIONS	MANU	CAD
0	24/11/20	VM	ISSUED FOR TENDER		X

DESIGN	VM	CH'KD	DAR	DATE
DRAWN	CML	CH'KD	VM	

SCALE 1:500

REFERENCES

FIELD NOTES

REGIONAL

SEE COVER SHEET FOR REGIONAL ACCEPTANCE

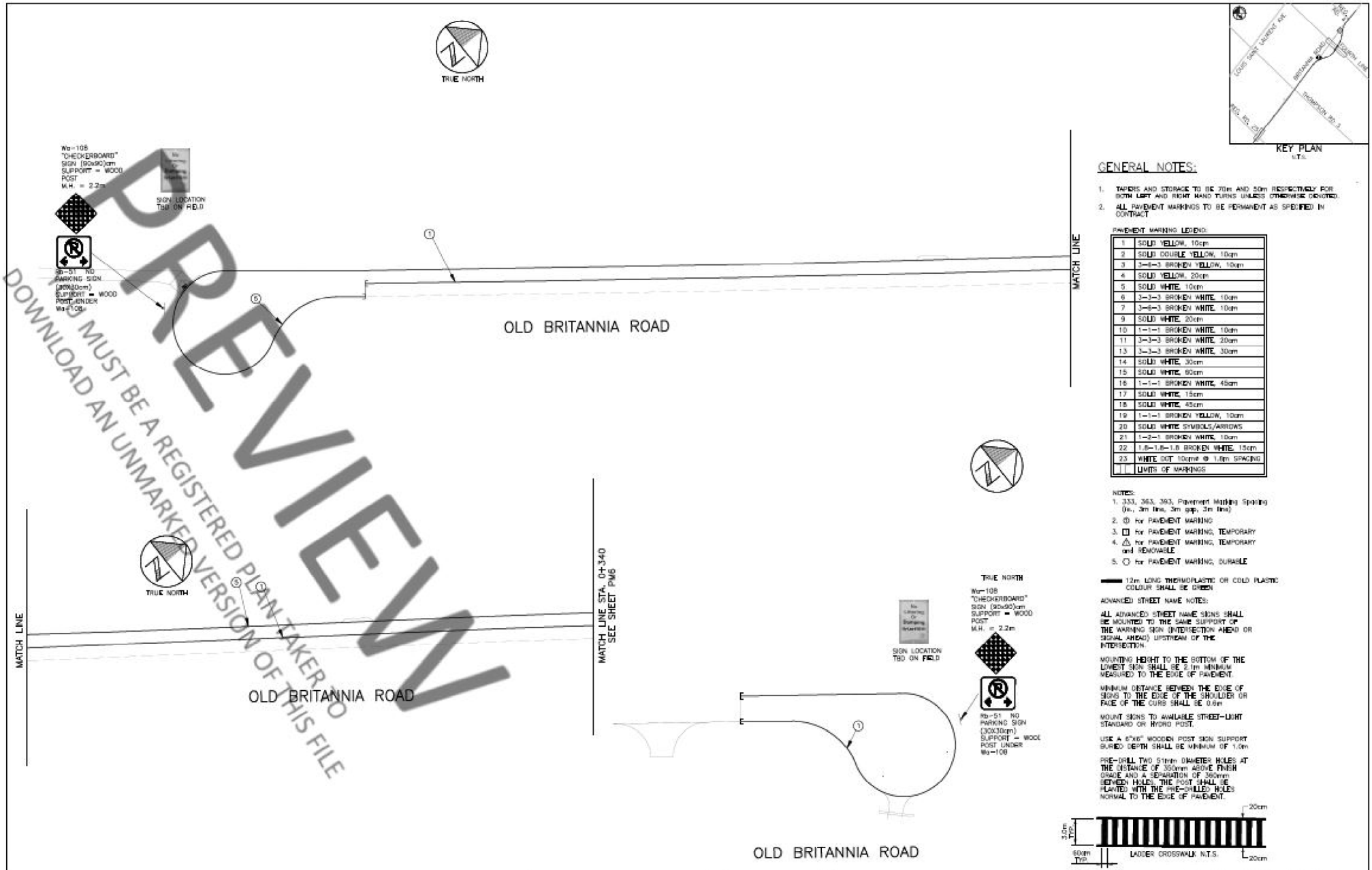
JACOBS

Halton REGION

PAVEMENT MARKINGS AND SIGNS
ROAD RECONSTRUCTION
BRITANNIA ROAD (REGIONAL RD 6)
FROM 1km NORTH TO 4km SOUTH OF BRITANNIA
FROM STA. 0+120 TO STA. 0+600
IN THE TOWN OF MILTON

CONSULTANT FILE NO.	REGIONAL DRAWING NO.
689368	
CONTRACT NO.	DRAWING NO.
R-3309A-20	SHEET PM8 OF PM9

R-3309A-20 080 OF 269



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N.T.S.

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7	3-6-3 BROKEN WHITE, 10cm
9	SOLID WHITE, 20cm
10	1-1-1 BROKEN WHITE, 10cm
11	3-3-3 BROKEN WHITE, 20cm
13	3-3-3 BROKEN WHITE, 30cm
14	SOLID WHITE, 30cm
15	SOLID WHITE, 60cm
16	1-1-1 BROKEN WHITE, 45cm
17	SOLID WHITE, 15cm
18	SOLID WHITE, 45cm
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23	WHITE DOT, 10cm⌀ @ 1.8m SPACING
	LIMITS OF MARKINGS

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LADDER CROSSWALK N.T.S.

PREVIEW
YOU MUST BE A REGISTERED PLAN TAKER TO DOWNLOAD AN UNMARKED VERSION OF THIS FILE

FOR TENDER ONLY
NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISIONS	MANU	CAD
0	24/11/20	VM	ISSUED FOR TENDER		X

DESIGN	VM	CH'KD	DAR	DATE
DRAWN	CML	CH'KD	VM	

SCALE 1:500

REFERENCES

FIELD NOTES

V.V. MANALASTAS 100072870 PROVINCE OF ONTARIO

REGIONAL

SEE COVER SHEET FOR REGIONAL ACCEPTANCE

JACOBS

Halton REGION

PAVEMENT MARKINGS AND SIGNS
ROAD RECONSTRUCTION
BRITANNIA ROAD (REGIONAL RD 6)
FROM .5km EAST OF 4 LN TO .3km WEST OF 4 LN
FROM STA. 54-600 TO STA. 64-440
IN THE TOWN OF MILTON

CONSULTANT FILE NO.	REGIONAL DRAWING NO.
689368	
CONTRACT NO.	DRAWING NO.
R-3309A-20	SHEET PM9 OF PM9

R-3309A-20 081 OF 269

Appendix H

Town of Milton Transit Service Review

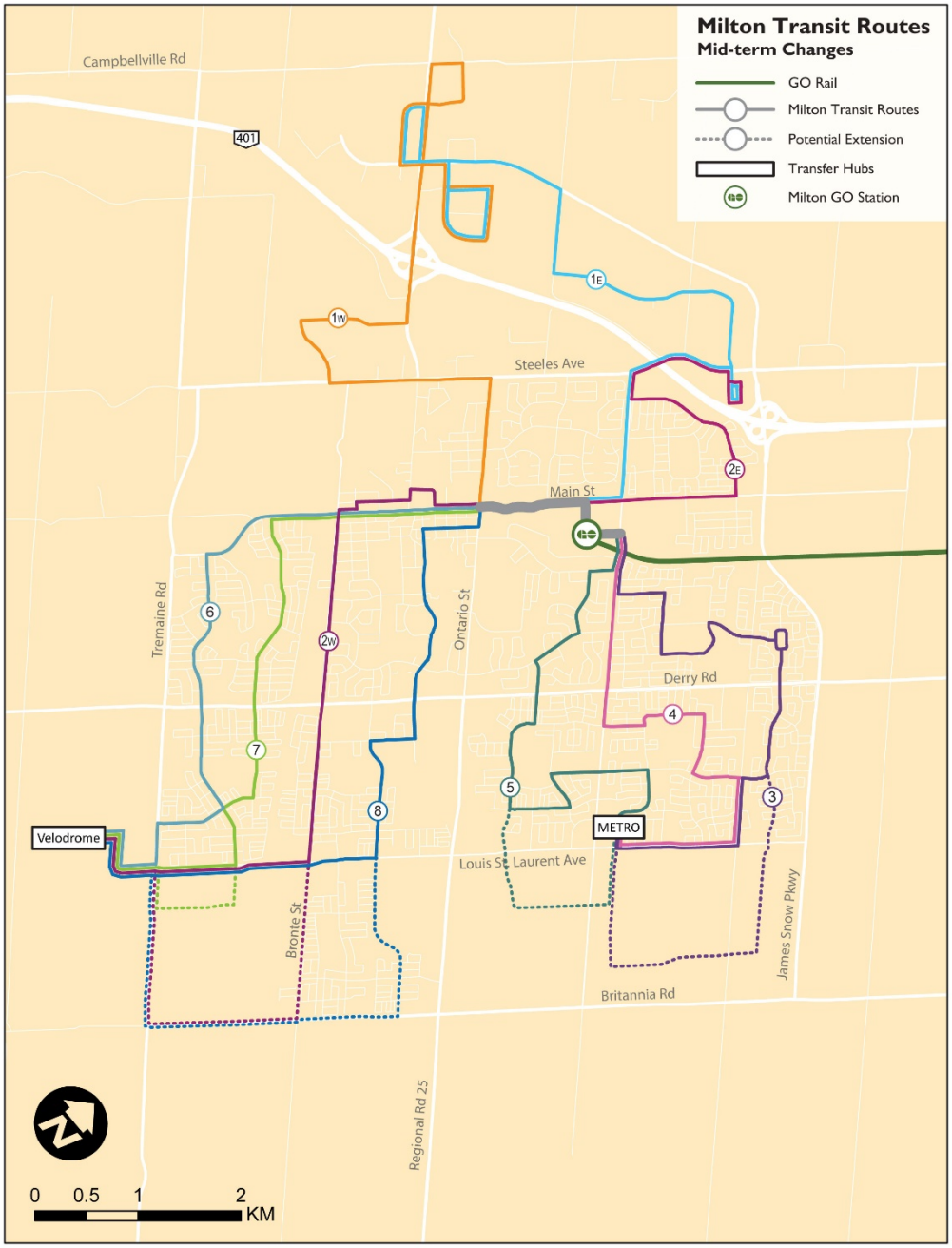

Figure 126 I Mid-term Route Realignment

Connecting the routes to these hubs would increase the route length and running time of most of the routes. With many of the existing routes experiencing crowding and late running during the afternoon period, the extensions would require additional service hours and buses, which would increase operating cost, even in cases where the increase in route length appears slight. These realignments, if fully extended into Boyne

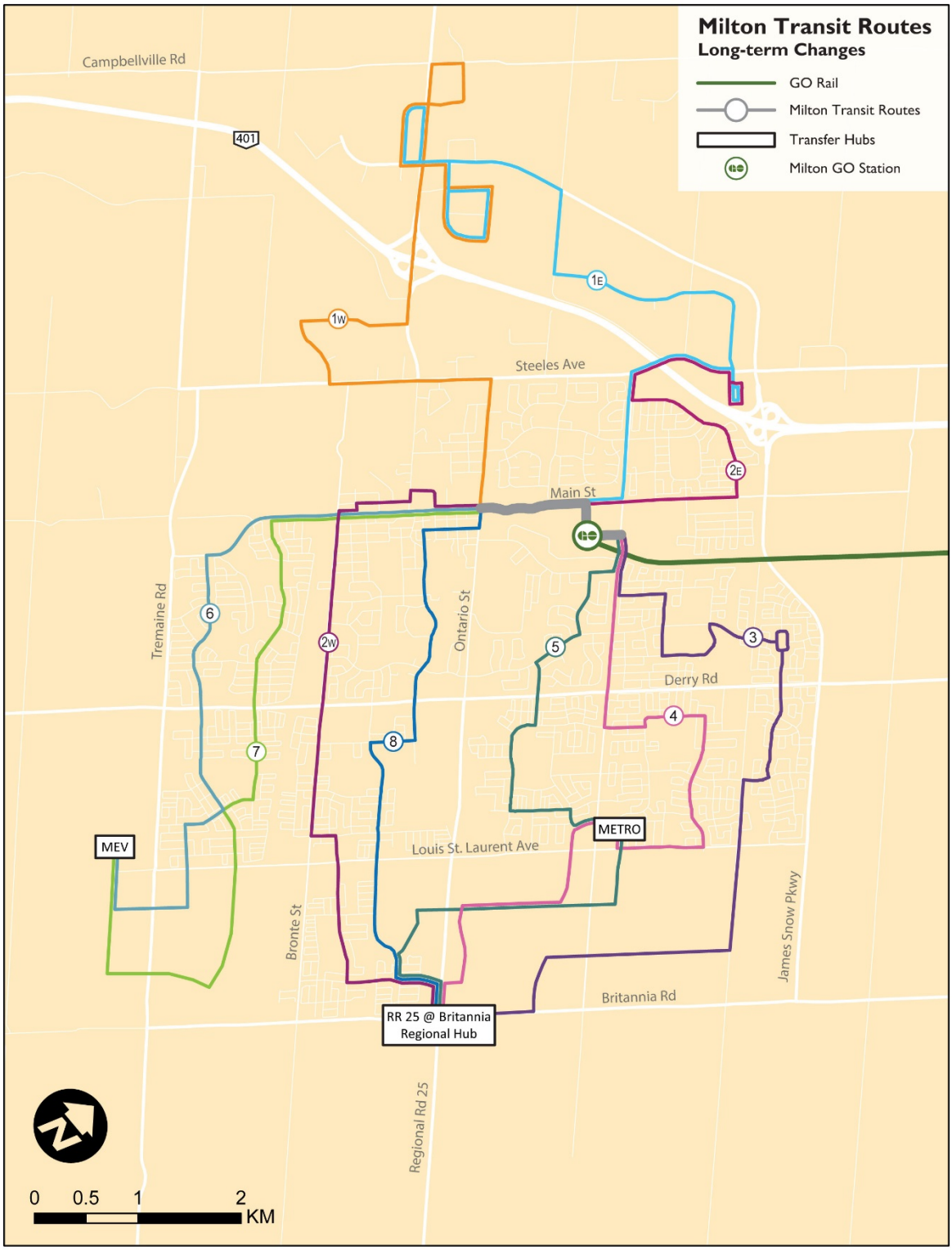

Figure 130 I Extending existing routes to serve new development areas and new transfer hubs

Appendix I

Halton District School Board Emails

Robin Marinac

From: thibeaultf@hdsb.ca
Sent: April 13, 2022 11:42 AM
To: Mark Crockford
Cc: Robin Marinac; 'Mitchell Gundy [Staff]'; 'Michelle D'Aguiar [Staff]'
Subject: RE: Elementary School - Estimated Staff numbers

35 permanent classrooms + 18 portables @ 2 staff per classrooms. Total 106 staff at peak.

Frederick Thibeault, MPl, BES
General Manager of Planning | HDSB
Email: thibeaultf@hdsb.ca
Office: (905) 335-3665 ext. 3375
Cell: (905) 691-7076

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: April 13, 2022 11:38 AM
To: thibeaultf@hdsb.ca
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; 'Michelle D'Aguiar [Staff]' <daguiarm@hdsb.ca>
Subject: Re: Elementary School - Estimated Staff numbers

Hi Fred,

I'm fine with even an average staffing for Milton elementary schools. We just need a really rough number in order to estimate how many staff vehicle trips there will be. Simplify as much as possible. A rough estimate is more than enough.

Mark

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

From: thibeaultf@hdsb.ca <thibeaultf@hdsb.ca>
Sent: Wednesday, April 13, 2022 11:13:58 AM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; 'Michelle D'Aguiar [Staff]' <daguiarm@hdsb.ca>
Subject: RE: Elementary School - Estimated Staff numbers

Hey Mark, working through the staffing numbers right now, and just confirming the amounts. Seems like something is off. Can we stick the standard approach to accepting the 2:1 ratio for now?

Frederick Thibeault, MPl, BES
General Manager of Planning | HDSB
Email: thibeaultf@hdsb.ca
Office: (905) 335-3665 ext. 3375
Cell: (905) 691-7076

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: April 11, 2022 4:16 PM
To: thibeaultf@hdsb.ca
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; 'Michelle D'Aguiar [Staff]' <daguiarm@hdsb.ca>
Subject: RE: Elementary School - Estimated Staff numbers

Hi Fred,

Just following up on this item, we are getting our analysis underway this week so we would like to get an idea of staff numbers as soon as you can.

Thanks,
Mark

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

From: thibeaultf@hdsb.ca <thibeaultf@hdsb.ca>
Sent: March 23, 2022 12:20 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; 'Michelle D'Aguiar [Staff]' <daguiarm@hdsb.ca>
Subject: RE: Elementary School - Estimated Staff numbers

Sounds good. I'll get you something next week then when Michelle is back.

Cheers,
Fred T.

Frederick Thibeault, MPl, BES
General Manager of Planning | HDSB
Email: thibeaultf@hdsb.ca
Office: (905) 335-3665 ext. 3375
Cell: (905) 691-7076

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: March 23, 2022 11:57 AM
To: thibeaultf@hdsb.ca
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; Michelle D'Aguiar [Staff] <daguiarm@hdsb.ca>
Subject: RE: Elementary School - Estimated Staff numbers

Hi Fred,

I think it likely will be your school.

We are working on our resubmission in the coming weeks so if we could get an answer in the next week or two? It's not urgent, but it will feed into other pieces of our analysis so I'm trying to get ahead of it.

Thanks as always for your help!
Mark

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

From: thibeaultf@hdsb.ca <thibeaultf@hdsb.ca>
Sent: March 23, 2022 11:53 AM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>; 'Mitchell Gundy [Staff]' <gundym@hdsb.ca>; Michelle D'Aguiar [Staff] <daguiarm@hdsb.ca>
Subject: RE: Elementary School - Estimated Staff numbers

Understood, that is more than likely our school if its with Sundial.

I'll work in getting you some stats on number of staff for similarly sized schools.

What's the timing on this?

Frederick Thibeault, MPl, BES
General Manager of Planning | HDSB
Email: thibeaultf@hdsb.ca
Office: (905) 335-3665 ext. 3375
Cell: (905) 691-7076

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: March 21, 2022 5:04 PM
To: thibeaultf@hdsb.ca
Cc: Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: Elementary School - Estimated Staff numbers

Hi Fred,

Thanks for your reply. Yes this is in the Boyne Secondary Plan, in the Southeast corner (just north of the intersection of James Snow Parkway and Britannia Road). I think it's east of Thompson, but there may be another one in the area. Looking at the info we have from our client it looks like the site is likely an HDSB site. Again we don't need anything firm or official, just looking to make sure the number that we put in our report is at least in the right ball park, and a future traffic study for the school will look closer at the details, this is just to support the overall subdivision and make sure we aren't missing anything.

Thanks,
Mark

Mark Crockford, P.Eng.
CGH Transportation Inc.

P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: thibeaultf@hdsb.ca <thibeaultf@hdsb.ca>
Sent: March 21, 2022 12:29 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: Elementary School - Estimated Staff numbers

Hey Mark,

The Board may have a bearing, as the HDSB has a number of special education programs that sometimes have more staff. This a Boyne Site? East of Thompson?

Frederick Thibeault, MPI, BES
General Manager of Planning | HDSB
Email: thibeaultf@hdsb.ca
Office: (905) 335-3665 ext. 3375
Cell: (905) 691-7076

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: March 21, 2022 11:48 AM
To: Fred Thibeault <thibeaultf@hdsb.ca>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>
Subject: Elementary School - Estimated Staff numbers

Hi Fred,

I hope you are doing well.

I have a quick question about Elementary School Staffing numbers in Halton Region. We are looking at a residential subdivision in Milton, where a parcel of land is reserved for a future hypothetical elementary school (I'm not sure which school board, but I don't think it would change the answer much). As part of our traffic study we've been asked to estimate the amount of traffic based on the number of staff. Do you have an average number of staff per elementary school that I can reference in order to make this estimate. This can be a rough number or an average of existing schools, just something quick is fine to give us a starting point.

Thanks,
Mark

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

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Appendix J

Trip Distribution TTS 2016 Data

Mon Apr 26 2021 19:39:49 GMT-0400 (Eastern Daylight Time) - Run Time: 2509ms

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 4110
and
Primary travel mode of trip - mode_prime In D,
and
Start time of trip - start_time In 600-900)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
4110	36	11
4110	37	22
4110	69	31
4110	88	44
4110	156	8
4110	226	12
4110	266	19
4110	285	27
4110	294	22
4110	323	35
4110	327	13
4110	355	17
4110	357	6
4110	358	57
4110	367	43
4110	378	32
4110	392	19
4110	394	17
4110	420	7
4110	421	10
4110	444	59
4110	473	11
4110	589	44
4110	2005	17
4110	2042	47
4110	2065	14
4110	2073	29
4110	2082	25
4110	2090	16
4110	2128	18
4110	2254	8
4110	2271	17
4110	2373	31
4110	2387	31
4110	2393	14
4110	3191	69
4110	3323	13
4110	3325	110
4110	3330	13
4110	3332	13
4110	3338	17
4110	3351	22
4110	3357	31
4110	3365	30
4110	3375	22
4110	3419	7
4110	3462	6
4110	3480	114
4110	3485	9
4110	3495	8
4110	3511	46
4110	3601	9
4110	3604	10
4110	3605	23
4110	3608	30
4110	3612	9
4110	3613	33
4110	3614	18
4110	3615	13
4110	3616	9
4110	3618	109
4110	3619	14
4110	3620	15
4110	3621	47
4110	3628	19
4110	3633	74
4110	3638	10
4110	3639	19
4110	3645	38
4110	3651	40
4110	3655	27
4110	3660	6
4110	3671	15
4110	3680	11

4110	3686	15
4110	3692	95
4110	3693	61
4110	3694	14
4110	3696	23
4110	3699	43
4110	3703	17
4110	3704	49
4110	3705	48
4110	3706	55
4110	3709	9
4110	3714	17
4110	3717	34
4110	3720	24
4110	3721	61
4110	3809	25
4110	3812	21
4110	3816	7
4110	3820	15
4110	3821	25
4110	3822	13
4110	3823	115
4110	3828	21
4110	3831	10
4110	3836	21
4110	3841	28
4110	3848	24
4110	3849	26
4110	3850	4
4110	3851	41
4110	3854	72
4110	3864	60
4110	3867	41
4110	3868	23
4110	3870	10
4110	4002	15
4110	4003	9
4110	4005	19
4110	4008	64
4110	4014	33
4110	4015	32
4110	4016	14
4110	4019	40
4110	4023	14
4110	4024	75
4110	4026	23
4110	4027	17
4110	4028	16
4110	4029	13
4110	4030	33
4110	4041	62
4110	4059	30
4110	4065	7
4110	4068	30
4110	4077	40
4110	4085	11
4110	4100	9
4110	4103	11
4110	4104	19
4110	4105	34
4110	4108	63
4110	4109	88
4110	4110	784
4110	4119	46
4110	4120	47
4110	4123	83
4110	4124	60
4110	4125	207
4110	4126	18
4110	4130	13
4110	4138	30
4110	4144	19
4110	4145	20
4110	4148	132
4110	4149	3
4110	4150	30
4110	4152	21
4110	4158	11
4110	4190	24
4110	4192	42
4110	5020	47
4110	5032	3
4110	5175	19
4110	5229	22
4110	6212	17
4110	7345	49
4110	7349	19
4110	7353	24
4110	7547	30
4110	8057	9
4110	8090	9
4110	8190	26
4110	8376	10
4110	9066	6

Mon Apr 26 2021 19:43:50 GMT-0400 (Eastern Daylight Time) - Run Time: 2558ms

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 4110
and
Primary travel mode of trip - mode_prime In D,
and
Start time of trip - start_time In 600-900)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
362	4110	14
2060	4110	7
3607	4110	12
3619	4110	14
3637	4110	26
3645	4110	38
3718	4110	22
3809	4110	63
3820	4110	40
3851	4110	69
4030	4110	12
4045	4110	12
4062	4110	32
4076	4110	20
4079	4110	29
4091	4110	21
4103	4110	41
4104	4110	19
4105	4110	62
4108	4110	105
4109	4110	109
4110	4110	784
4118	4110	74
4119	4110	33
4120	4110	90
4124	4110	44
4125	4110	97
4127	4110	59
4148	4110	4
4150	4110	30
4159	4110	12
4185	4110	16
4186	4110	12
4190	4110	22
4192	4110	16
5014	4110	32

Mon Apr 26 2021 19:41:30 GMT-0400 (Eastern Daylight Time) - Run Time: 2963ms

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 4110
and
Primary travel mode of trip - mode_prime In D,
and
Start time of trip - start_time In 1600-1900)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
4110	128	19
4110	300	4
4110	356	11
4110	421	15
4110	2060	7
4110	3615	15
4110	3617	23
4110	3618	9
4110	3634	14
4110	3637	26
4110	3658	9
4110	3671	12
4110	3684	3
4110	3691	22
4110	3809	63
4110	3820	40
4110	3836	19
4110	3851	69
4110	3876	13
4110	4001	34
4110	4022	6
4110	4030	34
4110	4036	35
4110	4037	14
4110	4045	12
4110	4062	32
4110	4076	20
4110	4077	28
4110	4078	36
4110	4101	9
4110	4103	41
4110	4104	11
4110	4105	180
4110	4108	41
4110	4110	247
4110	4114	12
4110	4117	39
4110	4118	39
4110	4119	218
4110	4120	78
4110	4123	47
4110	4124	135
4110	4125	102
4110	4126	6
4110	4127	37
4110	4133	23
4110	4139	20
4110	4144	22
4110	4148	38
4110	4159	12
4110	4164	5
4110	4185	16
4110	4190	22
4110	5014	32
4110	5150	11
4110	7051	15
4110	8404	19
4110	8706	12

Mon Apr 26 2021 19:42:26 GMT-0400 (Eastern Daylight Time) - Run Time: 2556ms

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 4110
and
Primary travel mode of trip - mode_prime In D,
and
Start time of trip - start_time In 1600-1900)

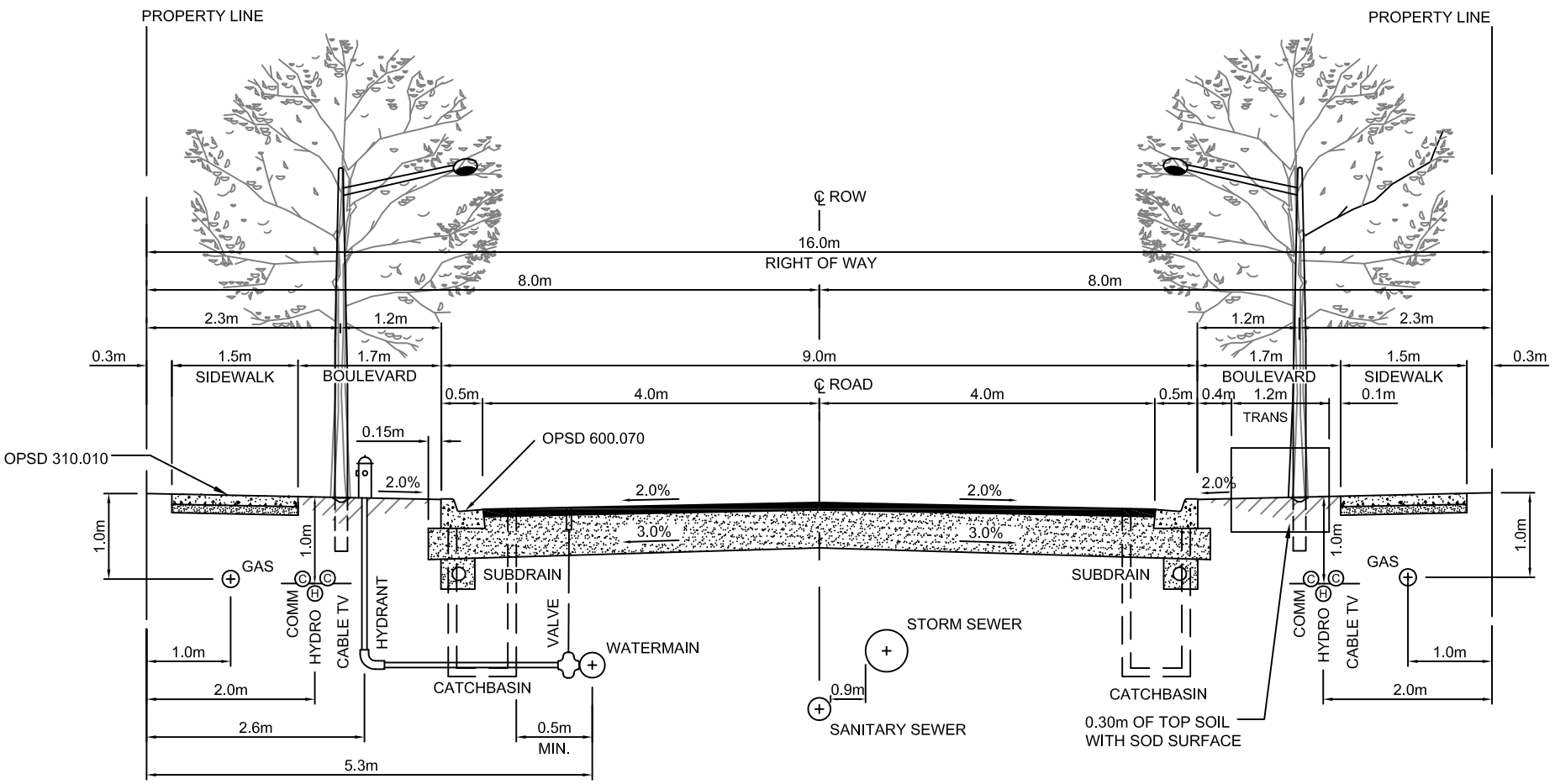
Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
36	4110	11
52	4110	19
57	4110	35
69	4110	31
77	4110	6
86	4110	6
88	4110	44
89	4110	13
147	4110	18
189	4110	12
231	4110	15
285	4110	22
294	4110	22
323	4110	35
327	4110	13
355	4110	17
356	4110	11
357	4110	6
358	4110	57
392	4110	19
394	4110	15
421	4110	10
444	4110	59
589	4110	44
2005	4110	17
2042	4110	47
2065	4110	14
2073	4110	29
2082	4110	25
2090	4110	16
2137	4110	9
2254	4110	8
2271	4110	6
2373	4110	31
2387	4110	31
2393	4110	14
3191	4110	69
3325	4110	75
3330	4110	13
3338	4110	17
3351	4110	22
3357	4110	31
3365	4110	16
3367	4110	13
3375	4110	22
3381	4110	7
3462	4110	6
3480	4110	114
3482	4110	31
3495	4110	8
3601	4110	49
3605	4110	17
3606	4110	11
3608	4110	30
3613	4110	9
3616	4110	19
3618	4110	109
3620	4110	6
3621	4110	28
3633	4110	74
3639	4110	19
3645	4110	51
3654	4110	29
3660	4110	6
3661	4110	3
3668	4110	11
3671	4110	15
3686	4110	15
3693	4110	69
3699	4110	43
3703	4110	17
3704	4110	10
3705	4110	21
3706	4110	55

3709	4110	20
3714	4110	17
3721	4110	49
3809	4110	10
3812	4110	21
3816	4110	7
3819	4110	24
3821	4110	25
3822	4110	6
3823	4110	115
3828	4110	21
3831	4110	10
3836	4110	13
3838	4110	19
3841	4110	15
3848	4110	24
3849	4110	26
3854	4110	55
3864	4110	33
3868	4110	23
4008	4110	38
4012	4110	23
4014	4110	18
4016	4110	14
4019	4110	27
4023	4110	29
4024	4110	82
4026	4110	9
4027	4110	17
4029	4110	13
4030	4110	11
4037	4110	14
4041	4110	31
4047	4110	19
4059	4110	30
4065	4110	7
4077	4110	30
4078	4110	41
4084	4110	4
4087	4110	19
4101	4110	9
4104	4110	11
4105	4110	132
4108	4110	46
4110	4110	247
4117	4110	43
4119	4110	260
4120	4110	50
4122	4110	22
4123	4110	92
4124	4110	199
4125	4110	89
4126	4110	22
4127	4110	34
4133	4110	32
4139	4110	16
4144	4110	68
4145	4110	20
4148	4110	179
4149	4110	3
4152	4110	29
4158	4110	11
4160	4110	24
4163	4110	24
4190	4110	24
4192	4110	30
5020	4110	47
5061	4110	11
5175	4110	19
6212	4110	17
7041	4110	9
7345	4110	49
7349	4110	19
8090	4110	9
8190	4110	26
8376	4110	10
9066	4110	6

Appendix K

Proposed Development Roadway Cross-sections



MINIMUM ROAD STRUCTURE	
SURFACE COARSE	40mm HL3
BINDER COARSE	50mm HL8
BASE	150mm 19mm LIMESTONE
SUB BASE	300mm GRANULAR 'B', TYPE II

NOTE:

1. CABLE AND BELL PEDESTALS TO BE ALIGNED WITH LIGHT STANDARDS
2. SIDEWALKS ARE TO BE PLACED ON BOTH SIDES OF THE R.O.W., UNLESS JUSTIFIED BY THE PEDESTRIAN ROUTING PLAN
3. SINGLE AND DOUBLE LOADED REFERS TO BUILDINGS FRONTING THE R.O.W ON ONE OR BOTH SIDES, NOT TO SIDEWALK LOCATIONS.

TOWN OF MILTON

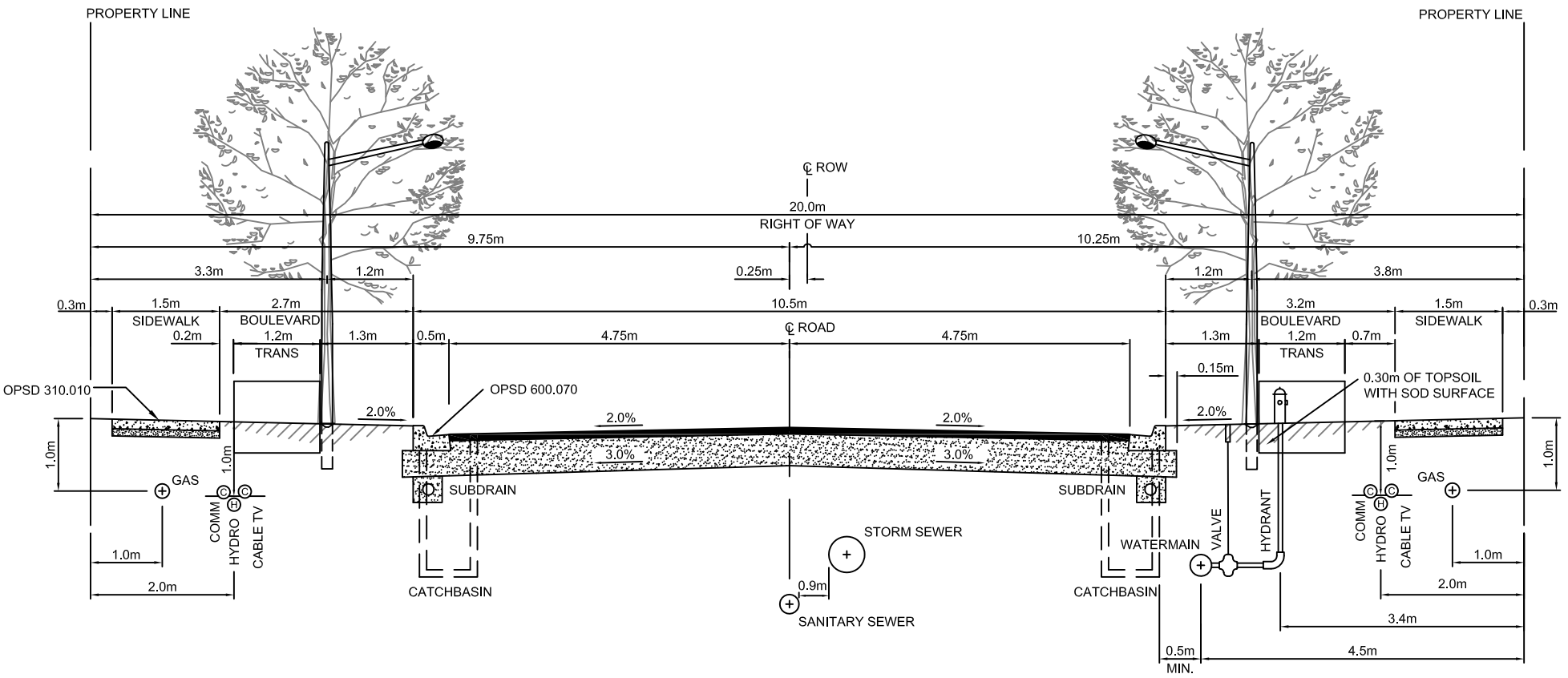
16m ROAD ALLOWANCE - MINOR LOCAL - DOUBLE LOADED

SCALE: N.T.S.

DATE: MARCH 2017

STD. NO. E - 2

MILTON



MINIMUM ROAD STRUCTURE	
SURFACE COARSE	40mm HL3
BINDER COARSE	80mm HL8
BASE	150mm 19mm LIMESTONE
SUB BASE	375mm GRANULAR 'B', TYPE II

NOTE:

1. CABLE AND BELL PEDESTALS TO BE ALIGNED WITH LIGHT STANDARDS
2. SIDEWALKS ARE TO BE PLACED ON BOTH SIDES OF THE R.O.W., UNLESS JUSTIFIED BY THE PEDESTRIAN ROUTING PLAN
3. SINGLE AND DOUBLE LOADED REFERS TO BUILDINGS FRONTING THE R.O.W ON ONE OR BOTH SIDES, NOT TO SIDEWALK LOCATIONS.

TOWN OF MILTON

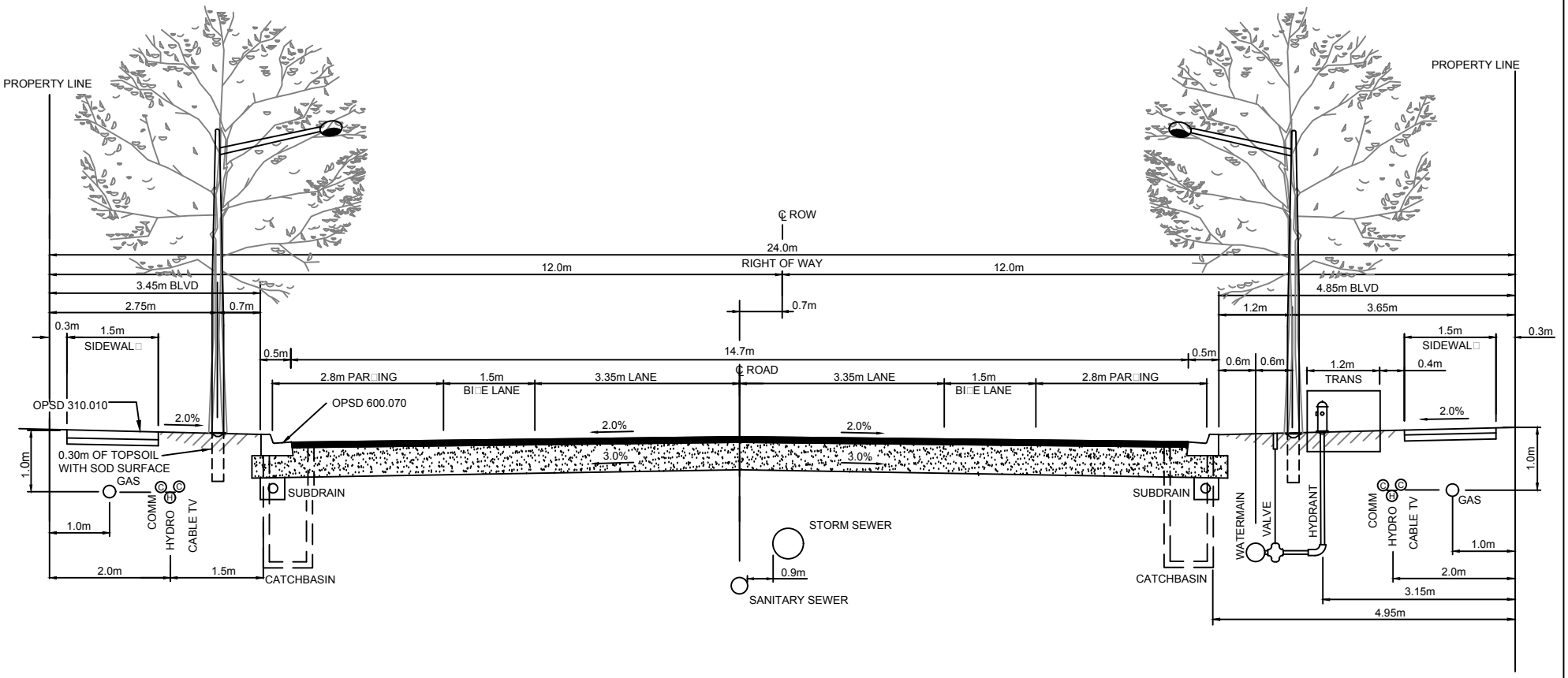
20m ROAD ALLOWANCE - LOCAL - DOUBLE LOADED - SIDEWALK BOTH SIDES

SCALE: N.T.S.

DATE: MARCH 2017

STD. NO. E - 3

MILTON



MINIMUM ROAD STRUCTURE	
SURFACE COARSE	40mm HL3 H□□ Sta□lit□
BINDER COARSE	100mm HL8
BASE	150mm 19mm LIMESTONE
SUB BASE	375mm GRANULAR 'B', TYPE II

NOTE:

1. SINGLE AND DOUBLE LOADED REFERS TO BUILDINGS FRONTING THE R.O.W ON ONE OR BOTH SIDES, NOT TO SIDEWAL□ LOCATIONS.

TOWN OF MILTON

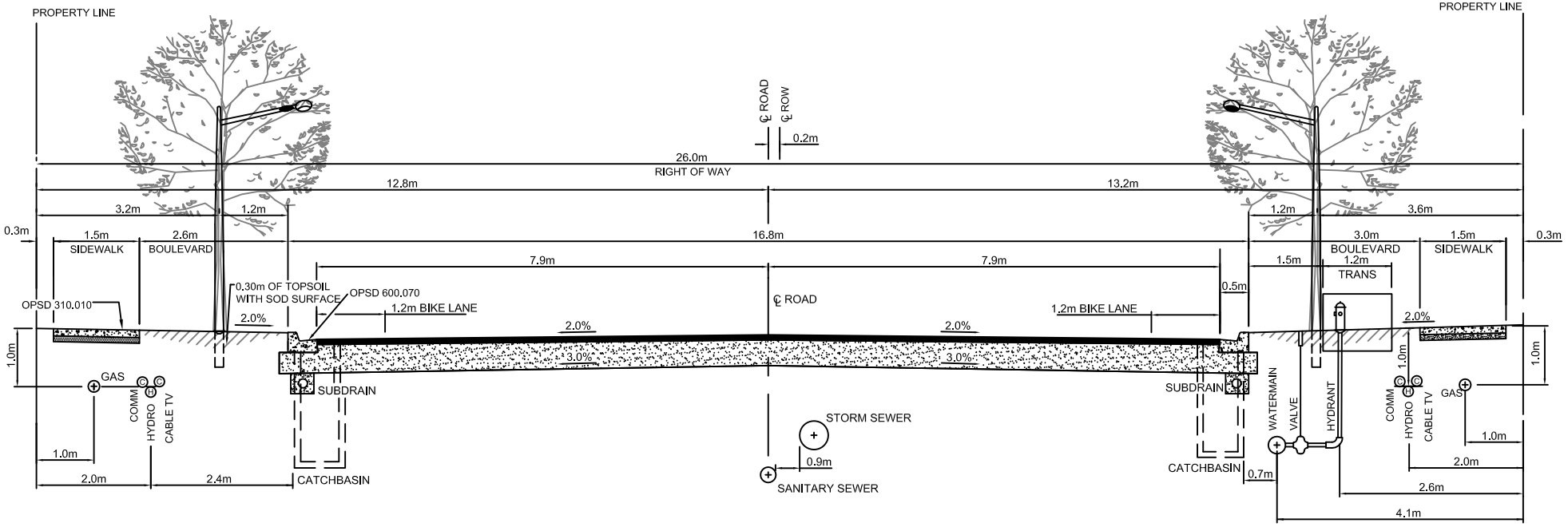
24m ROAD ALLOWANCE - MINOR COLLECTOR - SINGLE OR DOUBLE LOADED

SCALE: N.T.S.

DATE: MARCH 2017

STD. NO. E - 4

MILTON



MINIMUM ROAD STRUCTURE	
SURFACE COARSE	40mm HL3 HIGH STABILITY
BINDER COARSE	100mm HL8
BASE	150mm 19mm LIMESTONE
SUB BASE	375mm GRANULAR 'B', TYPE II

NOTE:

1. CABLE AND BELL PEDESTALS TO BE ALIGNED WITH LIGHT STANDARDS
2. SIDEWALKS ARE TO BE PLACED ON BOTH SIDES OF THE R.O.W., UNLESS JUSTIFIED BY THE PEDESTRIAN ROUTING PLAN
3. CURB AND GUTTER PER OPSD 600.070
4. SINGLE AND DOUBLE LOADED REFERS TO BUILDINGS FRONTING THE R.O.W ON ONE OR BOTH SIDES, NOT TO SIDEWALK LOCATIONS.

TOWN OF MILTON

26m ROAD ALLOWANCE - MAJOR COLLECTOR - SINGLE OR DOUBLE LOADED

SCALE: N.T.S.

DATE: MARCH 2017

STD. NO. E - 5

MILTON

Appendix L

Access Memo

Technical Memorandum

To:	Darren Loro Kevin Barrett	Date:	2022-02-11
Cc:	Chris Matson Daniel Yanowski		
From:	Robin Marinac – CGH Transportation Mark Crockford – CGH Transportation	Project Number:	2021-014

Re: Street 2 / Trudeau Drive at Britannia Road Access Intersection Spacing Memo

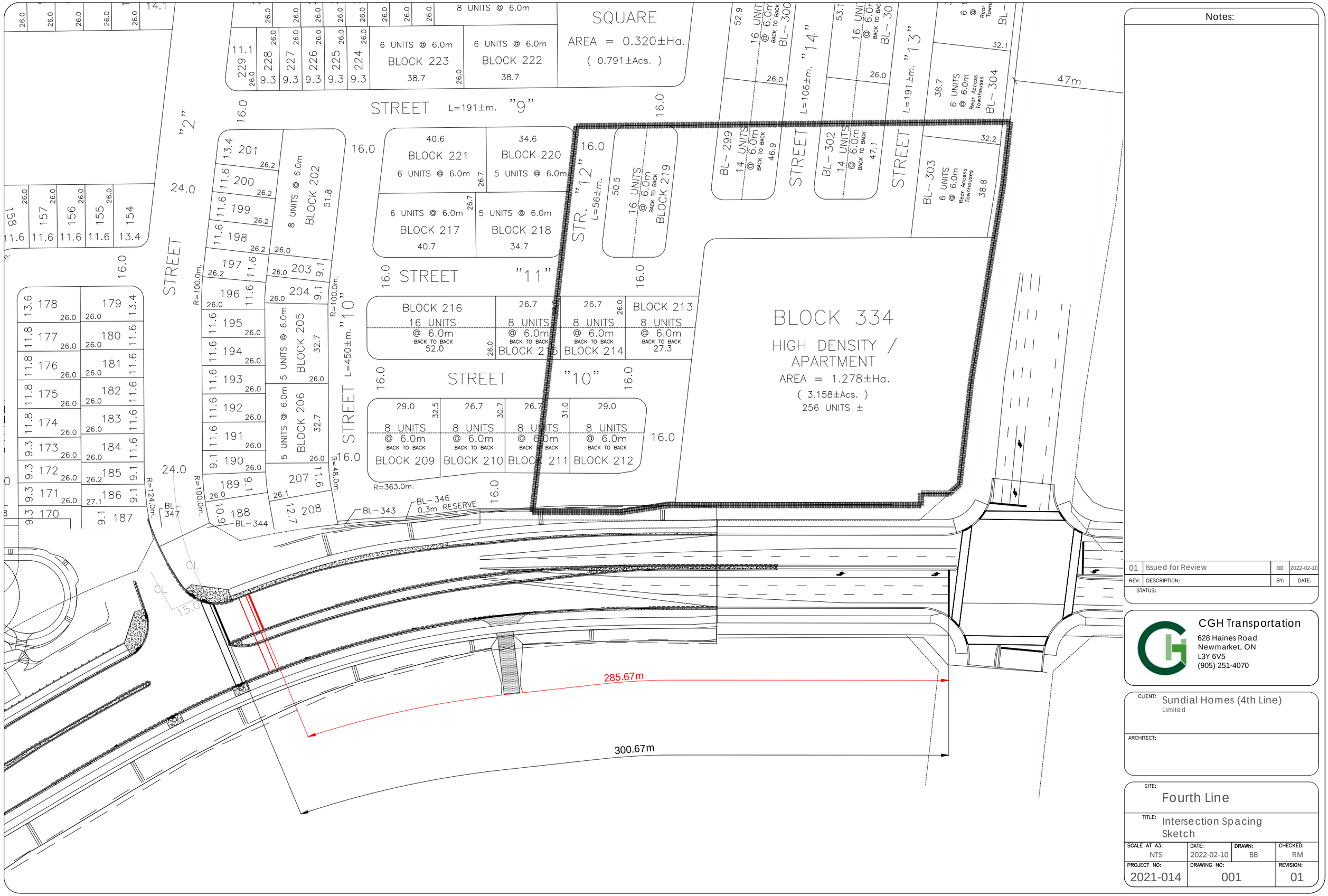
This memo has been prepared to support the proposed location of the intersection of Street 2 / Trudeau Drive at Britannia Road as part of the proposed Sundial Homes (4th Line) Limited ("Sundial Homes") development in the Boyne Secondary Plan area in Milton. The subject development is bounded by Britannia Road to the south, Fourth Line to the west, and James Snow Parkway to the east, and is located at the southeastern corner of the lands considered within the Boyne Secondary Plan area. The proposed development consists of a mix of detached homes, townhomes, and high-density apartment units. An elementary school and village square (park area) have also been proposed. Three site access intersections have been proposed: one on James Snow Parkway, one on Britannia Road, and one on Fourth Line.

The *Sundial Homes Fourth Line Transportation Impact Study (May 2021)* was submitted in support of the proposed development. Comments were received from Halton Region staff on February 2, 2022 and are currently being considered and addressed.

As noted in the Transportation Impact Study and the Halton Region comments, Britannia Road is subject to widening and realignment within the Study Area and is considered a Capital Project. As indicated by Halton Region staff, these changes to Britannia Road within the Study Area are anticipated to be completed by December of 2024.

The future plans for Britannia Road provided by the Britannia Road Capital Project team, show the location of the Street 2 / Trudeau Drive Extension intersection with Britannia Road (referred to as Site Access #2 in the Transportation Impact Study) to be 300.67 metres west of the intersection of Britannia Road and James Snow Parkway. The subject development proposes a location that is 285.67 metres west of the intersection of Britannia Road and James Snow Parkway. These distances have been measured from stop bar to stop bar as per the *Halton Region Access Management Guideline (2015)*. Additionally, it is noted that these guidelines indicate the minimum access spacing required to be 300 metres. Figure 1 illustrates the two intersection locations and their measured spacing from James Snow Parkway as discussed above.

Figure 1: Trudeau Drive / Access #2 Intersection Spacing



Notes:

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2022-02-10

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Sundial Homes (4th Line) Limited

ARCHITECT:

SITE: Fourth Line

TITLE: Intersection Spacing Sketch

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-02-10	BB	RM
PROJECT NO:	DRAWING NO:		REVISION:
2021-014	001		01

As shown in the Transportation Impact Study, in the 2026 future total horizon the projected eastbound left-turn lane queue is 35 metres in the AM peak period and 75 metres for the PM peak period, and the projected eastbound through queue is 131 metres in the AM peak period and 77 metres for the PM peak period at the intersection of James Snow Parkway and Britannia Road. In the 2026 future total horizon the projected westbound through lane queue is 35 metres in the AM peak period and 85 metres in the PM peak period, and the projected westbound right-turn lane queue is 4 metres in the AM peak period and 10 metres in the PM peak period at the intersection of Street 2 / Trudeau Drive at Britannia Road (Site Access #2). An excerpt from the Transportation Impact Study is shown in Table 1 below.

Table 1: 2026 Future Total Transportation Impact Study Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
James Snow Parkway & Britannia Road (*Signalized*)	**EBL**	**125**	**35**	**#75**
	EBT	**N/A**	**131**	**77**
	WBT	N/A	67	178
	WBR	300*	19	#471
	SBL	165	162	66
	SBR	N/A	7	8
Britannia Road & Street 2 (*Signalized*)	EBL	50	3	6
	EBT	N/A	45	29
	WBT	**N/A**	**35**	**85**
	WBR	**40**	**4**	**10**
	SBL	30	25	20
	SBR	N/A	9	8
Notes:	*# 95th percentile queue exceeds capacity* ** Synchro does not allow a storage length of greater than 300 metres to be entered. A storage length of 475 metres is recommended.*			

Despite future changes to the 2026 future total volumes anticipated as a result of the Halton Region comments, these changes are expected to have a minimal impact and may even decrease the volumes at these intersections, therefore decreasing the projected queues. As shown above, the eastbound left-turn lane queues at the intersection of James Snow Parkway do not exceed the provided storage length of 125 metres and the westbound right-turn lane queues at the intersection of Britannia Road and Street 2 / Trudeau Drive do not exceed the provided storage length of 40 metres. It is noted that the maximum eastbound through queue at the intersection of James Snow Parkway and Britannia Road occurs in the AM peak period and in the event that the adjustments to the intersection volumes do increase, the eastbound left-turn and eastbound through queues at the intersection of Britannia Road and James Snow Parkway and the westbound through and westbound right-turn queues at the intersection of Street 2 / Trudeau Drive at Britannia Road (Site Access #2), an adequate buffer distance is available between the two intersections to accommodate any increase in queues. Therefore, the proposed intersection location at 285.67 metres west of James Snow Parkway is considered to be adequate and is supportable from a transportation perspective.

Darren and Kevin, please call or email if you have any questions.

Yours truly,

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

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

Robin Marinac

From: Chris Matson <cmatson@mmland.ca>
Sent: March 25, 2022 3:04 PM
To: Yanowski Daniel; Kurtz Sarah; Pereira Aidan; Campbell Sean; Robin Marinac; Mark Crockford
Subject: Fwd: Sundial intersection on Britannia

Team
FYI below.

Begin forwarded message:

> **From:** Chris Matson <cmatson@mmland.ca>
> **Date:** March 25, 2022 at 3:01:43 PM EDT
> **To:** "Goh, Seam" <Seam.Goh@halton.ca>
> **Cc:** "Barrett, Kevin" <Kevin.Barrett@halton.ca>, "Loro, Darren" <Darren.Loro@halton.ca>, "Clackett, Robert" <Robert.Clackett@halton.ca>, "Najak, Zahir" <Zahir.Najak@halton.ca>, Tom.Court@milton.ca
> **Subject: Re: Sundial intersection on Britannia**
>
> I'm just resending as I'm not sure my original email reached everyone
> Chris
>
> > On Mar 25, 2022, at 2:58 PM, Chris Matson <cmatson@mmland.ca> wrote:
> >
> > Seam
> > Given the timing constraints, I can advise on behalf of Sundial that we want to continue with the revised location that reflects our draft plan that has always been shown on our draft plan. This is the location we settled on with you and your consultant about a week or so ago.
> > We understand there may be some remote risk, but we have not received any comments thus far related to the location of the intersection we have on our draft plan, so we are comfortable taking on that responsibility.
> >
> > Chris
> >
> > > On Mar 25, 2022, at 2:11 PM, Goh, Seam <Seam.Goh@halton.ca> wrote:
> > >
> > > Great!
> > > I gathered the Town's position is 'no objection' (but not approval) to either location but would not bear any responsibility on future changes. This would be the Region's position as well, that's why we'll need something from you to waive us off that.

We'll need that today to get back to the contractor!

Thanks
Seam

From: Chris Matson <cmatson@mmland.ca>
Sent: Friday, March 25, 2022 2:03 PM
To: Goh, Seam <Seam.Goh@halton.ca>
Cc: Barrett, Kevin <Kevin.Barrett@halton.ca>; Loro, Darren <Darren.Loro@halton.ca>; Clackett, Robert <Robert.Clackett@halton.ca>; Najak, Zahir <Zahir.Najak@halton.ca>; Tom.Court@milton.ca
Subject: RE: Sundial intersection on Britannia

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Seam,
I will set up a mtg with the Town to discuss.
chris

From: Goh, Seam <Seam.Goh@halton.ca>
Sent: March 25, 2022 12:43 PM
To: 'Chris Matson' <cmatson@mmland.ca>
Cc: Barrett, Kevin <Kevin.Barrett@halton.ca>; Loro, Darren <Darren.Loro@halton.ca>; Clackett, Robert <Robert.Clackett@halton.ca>; Najak, Zahir <Zahir.Najak@halton.ca>; 'Tom.Court@milton.ca' <Tom.Court@milton.ca>
Subject: Sundial intersection on Britannia

Hi Chris
Please see Town's position on the email below which is typical (same with the Region) when a draft plan has not been approved.

We'll need you to touch base with the Town again (asap!) to reassure that this revised intersection location would be the one that our Regional Britannia Road design will be incorporating.

And we await your confirmation of the above b'fore instructing the road contractor to go ahead.

Please have this done asap as there's already a big delay in the road contract and the Region can't afford to face any delay penalty!

Also in your response, to waive the Town and the Region off any cost/responsibility should there be any changes to future Trudeau Drive within the Plan that may end up not aligning to this revised intersection on Britannia Road.

Thanks
Seam

From: Tom.Court@milton.ca <Tom.Court@milton.ca>
Sent: Thursday, March 24, 2022 5:44 PM
To: 'Manalastas, Vlad' <Vlad.Manalastas@jacobs.com>; Barrett, Kevin <Kevin.Barrett@halton.ca>; Raby, Douglas/OTT <Douglas.Raby@jacobs.com>; Barrett, Kevin <Kevin.Barrett@halton.ca>
Cc: diana.jiona@milton.ca; heide.schlegl@milton.ca; Anita.Sparre@milton.ca; angela.janzen@milton.ca; Kavleen.Sachdeva@milton.ca
Subject: RE: R-3309A-20 Britannia Road Phase 3 - Development Coordination

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Good afternoon Vlad,

After reviewing the proposal, the Town offers the following;

- Per the Town's previous comments (item 2e), it was the expectation that, when the development proceeds to the north, the developer would be responsible to tie into Britannia.
- The Town has received a draft plan submission for the Sundial lands to the north, however, there are substantial outstanding concerns that need to be resolved.
- The Town cannot confirm how this proposal will affect the development to the north.
- It will be the responsibility of the developer to ensure that Trudeau Drive can be built to the Town's satisfaction in accordance with the applicable standards and requirements. Confirmation will be completed through the review of the subdivision's draft plan and engineering drawings. If there are changes required to accommodate the development, the Town will not be responsible.
- In the event that there adjustments or alterations are required to any of the works completed, the Town will not be held responsible.

Per our meeting earlier this week, it is my understanding that the alterations proposed were requested by the developer. The Town will not be held responsible for changes to the approved plans. It is the Region's responsibility to confirm

that any alterations do not adversely affect the surrounding lands in any way.

The Region may proceed at their own risk.

Please let me know if you'd like to discuss further.

Thank you.

Tom Court
Manager, Development Engineering
150 Mary Street, Milton ON, L9T 6Z5
905-878-7252 ext. 2509
www.milton.ca

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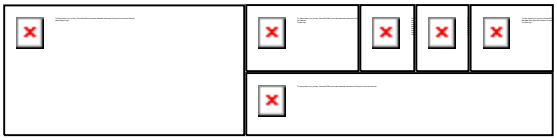
Seam Goh, P.Eng.
Development Project Manager
Planning Services
Legislative & Planning Services
Halton Region
905-825-6000, ext. 7718 | 1-866-442-5866



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Robin Marinac

From: Goh, Seam <Seam.Goh@halton.ca>
Sent: February 28, 2022 3:34 PM
To: Chris Matson; 'Sean Campbell'; Salil, Shweta
Cc: 'Daniel Yanowski'; 'Aidan Pereira'; Clackett, Robert; Loro, Darren; Sardena, Cindy; Huang, Alex; Barrett, Kevin; Mark Crockford; Robin Marinac; Najak, Zahir
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request
Attachments: 2181DES22 - 4th Line - Britannia Road Overlay - JAN 17, 2022.pdf

Good news Chris!
The Region's Britannia Road Project team is able to revise the intersection location to match with your draft plan, please re-confirm that the proposed street alignment within the Plan (attached) is going to remain unchanged b'fore Kevin Barret, our project manager proceeds to instruct his designer/contractor to do so.
Thanks
Seam

From: Chris Matson <cmatson@mmland.ca>
Sent: Monday, January 17, 2022 2:06 PM
To: 'Sean Campbell' <SCampbell@KLMPlanning.com>; Salil, Shweta <Shweta.Salil@halton.ca>
Cc: 'Daniel Yanowski' <dyanowski@sundialhomes.com>; 'Aidan Pereira' <APereira@klmplanning.com>; Clackett, Robert <Robert.Clackett@halton.ca>; Loro, Darren <Darren.Loro@halton.ca>; Sardena, Cindy <Cindy.Sardena@halton.ca>; Huang, Alex <Alex.Huang@halton.ca>; Goh, Seam <Seam.Goh@halton.ca>; Barrett, Kevin <Kevin.Barrett@halton.ca>; 'Mark Crockford' <mark.crockford@cghtransportation.com>; 'Robin Marinac' <robin.marinac@cghtransportation.com>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

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I am just resending to add Mark and Robin from CGH on this email. I had invited them separately on the zoom, so Sean didn't have their contact info when he sent this out.

chris

Chris Matson
Matson Planning and Development Inc.
20 Shore Breeze Dr., Suite 1609
Toronto, ON M8V 0C7
cell: 416-371-5352
e-mail: cmatson@mmland.ca

From: Sean Campbell <SCampbell@KLMPlanning.com>
Sent: January 17, 2022 11:00 AM
To: Chris Matson <cmatson@mmland.ca>; 'Salil, Shweta' <Shweta.Salil@halton.ca>
Cc: 'Daniel Yanowski' <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; 'Clackett, Robert' <Robert.Clackett@halton.ca>; 'Loro, Darren' <Darren.Loro@halton.ca>; 'Sardena, Cindy' <Cindy.Sardena@halton.ca>; 'Huang, Alex' <Alex.Huang@halton.ca>; 'Goh, Seam' <Seam.Goh@halton.ca>; 'Barrett, Kevin' <Kevin.Barrett@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Hello all,

Attached for your review is the overlay and AutoCAD file as discussed.

Sean

From: Chris Matson [mailto:cmatson@mmland.ca]
Sent: Wednesday, January 12, 2022 3:56 PM
To: 'Salil, Shweta' <Shweta.Salil@halton.ca>
Cc: Sean Campbell <SCampbell@KLMPlanning.com>; 'Daniel Yanowski' <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; 'Clackett, Robert' <Robert.Clackett@halton.ca>; 'Loro, Darren' <Darren.Loro@halton.ca>; 'Sardena, Cindy' <Cindy.Sardena@halton.ca>; 'Huang, Alex' <Alex.Huang@halton.ca>; 'Goh, Seam' <Seam.Goh@halton.ca>; 'Barrett, Kevin' <Kevin.Barrett@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Thank you all.
Meeting invite has been sent, and I hope I captured everybody.

chris

Chris Matson
Matson Planning and Development Inc.
20 Shore Breeze Dr., Suite 1609
Toronto, ON M8V 0C7
cell: 416-371-5352
e-mail: cmatson@mmland.ca

From: Salil, Shweta <Shweta.Salil@halton.ca>
Sent: January 12, 2022 2:59 PM
To: 'Chris Matson' <cmatson@mmland.ca>
Cc: 'Sean Campbell' <SCampbell@KLMPlanning.com>; 'Daniel Yanowski' <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; Clackett, Robert <Robert.Clackett@halton.ca>; Loro, Darren <Darren.Loro@halton.ca>; Sardena, Cindy <Cindy.Sardena@halton.ca>; Huang, Alex <Alex.Huang@halton.ca>; Goh, Seam <Seam.Goh@halton.ca>; Barrett, Kevin <Kevin.Barrett@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Hi Chris,

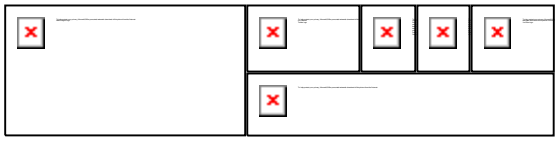
In addition to Seam and the others noted below (Darren, Cindy and Alex), please also invite Kevin and myself.

I believe Monday (17th), any time before 2:30 is open in everyone's calendars if that works for you and your team as well.

Thanks,
Shweta

Shweta Salil
EIT Intern
Engineering & Construction
Public Works

Halton Region
905-825-6000, ext. 3158 | 1-866-442-5866



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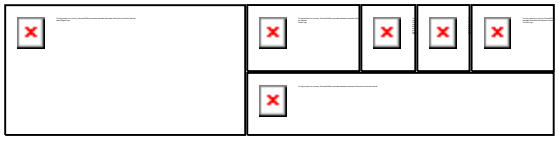
From: Goh, Seam <Seam.Goh@halton.ca>
Sent: Wednesday, January 12, 2022 10:35 AM
To: 'Chris Matson' <cmatson@mmland.ca>; Salil, Shweta <Shweta.Salil@halton.ca>; Barrett, Kevin <Kevin.Barrett@halton.ca>
Cc: 'Sean Campbell' <SCampbell@KLMPlanning.com>; 'Daniel Yanowski' <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; Clackett, Robert <Robert.Clackett@halton.ca>; Loro, Darren <Darren.Loro@halton.ca>; Sardena, Cindy <Cindy.Sardena@halton.ca>; Huang, Alex <Alex.Huang@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Thanks Chris
Please add Darren , Cindy and Alex to the mtg…

Seam Goh, P.Eng.
Development Project Manager
Planning Services
Legislative & Planning Services
Halton Region
905-825-6000, ext. 7718 | 1-866-442-5866



From: Chris Matson <cmatson@mmland.ca>
Sent: Tuesday, January 11, 2022 5:05 PM
To: Salil, Shweta <Shweta.Salil@halton.ca>; Barrett, Kevin <Kevin.Barrett@halton.ca>
Cc: 'Sean Campbell' <SCampbell@KLMPlanning.com>; 'Daniel Yanowski' <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; Clackett, Robert <Robert.Clackett@halton.ca>; Goh, Seam <Seam.Goh@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

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I'm resending this email with Seam's correct email address this time.
chris

From: Chris Matson
Sent: January 11, 2022 5:00 PM
To: Shweta.Salil@halton.ca; Kevin.Barrett@halton.ca
Cc: Sean Campbell (SCampbell@KLMPlanning.com) <SCampbell@KLMPlanning.com>; Daniel Yanowski (dyanowski@sundialhomes.com) <dyanowski@sundialhomes.com>; Aidan Pereira <APereira@klmplanning.com>; Seam Goh (gohs@region.halton.on.ca) <gohs@region.halton.on.ca>; Clackett, Robert <Robert.Clackett@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Hi Shweta,

I don't think we have met in the past, but I am helping Sundial Homes with their land development management for their 4th Line site in Milton. Thank you for sending the Britannia Road information to Aidan before the holidays.

For our pending draft plan on the north side of Britannia at James Snow, we have one concern not with the Britannia alignment, but rather, with the assumed location of an intersecting road from our subdivision. I wasn't sure who at the Region would be the best person to review this with, but we need to set up a zoom call as soon as possible to show you our issue – which would involve a slight shift of the intersecting road location.

Can you please advise if you and Kevin are who we should meet with. Then I can send out a meeting invite.

Looking forward to hearing from you,
Thanks
Chris

Chris Matson
Matson Planning and Development Inc.
20 Shore Breeze Dr., Suite 1609
Toronto, ON M8V 0C7
cell: 416-371-5352
e-mail: cmatson@mmland.ca

From: Salil, Shweta <Shweta.Salil@halton.ca>
Sent: December 14, 2021 2:13 PM
To: Aidan Pereira <APereira@klmplanning.com>
Cc: Barrett, Kevin <Kevin.Barrett@halton.ca>
Subject: RE: Britannia Road Transportation Corridor Improvements CAD File Request

Hi Aidan,

Signed DLA is attached. The CAD files can be accessed at the following link:
http://2big4email.halton.ca/en/downloadfiles.aspx?param=2rj7vmyqPneQK6N77j4vPlUsgeQuAleQuAl

Please let me know if you have any issues downloading the files.

Thanks,
Shweta

Appendix M

Peak Hour Factor Calculations

Britannia Rd @ James Snow Pkwy

Municipality: Halton Region
Major Road: Britannia Rd
Minor Road: James Snow Pkwy

Date: Nov 7, 2019

Major Road Runs: East/West
Weather Conditions: Overcast/Wet
Person No. 1 Cam
Person No. 2

Period Ending	North Approach							East Approach							South Approach							West Approach							Veh. Summary		
	Cars			Trucks			Ped.	Cars			Trucks			Ped.	Cars			Trucks			Ped.	Cars			Trucks			Ped.			
	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	15	60	PHF
7:15	101	0	18	1	0	1	0	0	44	15	0	1	3	0	0	0	0	0	0	0	0	14	169	0	0	2	0	0	369		
7:30	139	0	15	1	0	0	0	0	51	16	0	2	2	0	0	0	0	0	0	0	0	17	141	0	0	3	0	0	387		
7:45	149	0	24	4	0	1	0	0	65	24	0	8	2	0	0	0	0	0	0	0	0	19	109	0	1	2	0	0	408		
8:00	141	0	20	1	0	1	0	0	81	22	0	8	2	0	0	0	0	0	0	0	0	13	104	0	0	1	0	0	394	1558	
8:15	128	0	19	3	0	2	0	0	76	22	0	5	1	0	0	0	0	0	0	0	0	12	106	0	0	2	0	0	376	1565	0.96
8:30	120	0	16	1	0	2	0	0	72	22	0	8	1	0	0	0	0	0	0	0	0	6	115	0	0	7	0	0	370	1548	
8:45	114	0	17	7	0	3	0	0	75	35	0	4	1	0	0	0	0	0	0	0	0	11	132	0	2	5	0	0	406	1546	
9:00	80	0	13	9	0	2	0	0	70	27	0	5	2	0	0	0	0	0	0	0	0	8	126	0	0	8	0	0	350	1502	
11:15	39	0	14	2	0	1	0	0	42	15	0	3	0	0	0	0	0	0	0	0	0	7	64	0	0	7	0	0	194		
11:30	42	0	11	0	0	3	0	0	37	24	0	9	0	0	0	0	0	0	0	0	0	7	68	0	1	3	0	0	205		
11:45	43	0	5	0	0	2	0	0	53	21	0	10	2	0	0	0	0	0	0	0	0	4	74	0	2	3	0	0	219		
12:00	47	0	8	1	0	1	0	0	47	22	0	15	0	0	0	0	0	0	0	0	0	6	48	0	0	8	0	0	203	821	
12:15	48	0	6	1	0	0	0	0	50	34	0	9	1	0	0	0	0	0	0	0	0	6	74	0	0	9	0	0	238	865	
12:30	37	0	15	2	0	1	0	0	43	27	0	7	2	0	0	0	0	0	0	0	0	4	74	0	0	7	0	0	219	879	
12:45	29	0	10	2	0	1	0	0	53	36	0	12	1	0	0	0	0	0	0	0	0	5	65	0	1	4	0	0	219	879	
13:00	46	0	6	2	0	0	0	0	59	34	0	9	1	0	0	0	0	0	0	0	0	12	46	0	0	8	0	0	223	899	
13:15	33	0	8	1	0	0	0	0	55	36	0	9	1	0	0	0	0	0	0	0	0	7	56	0	1	5	0	0	212	873	
13:30	26	0	11	1	0	1	0	0	72	30	0	7	2	0	0	0	0	0	0	0	0	6	53	0	0	11	0	0	220	874	
13:45	28	0	16	2	0	1	0	0	63	36	0	6	3	0	0	0	0	0	0	0	0	8	50	0	2	6	0	0	221	876	
14:00	33	0	14	3	0	2	0	0	79	42	0	10	2	0	0	0	0	0	0	0	0	5	50	0	0	10	0	0	250	903	
15:15	34	0	12	1	0	1	0	0	114	60	0	9	4	0	0	0	0	0	0	0	0	14	64	0	1	17	0	0	331		
15:30	34	0	15	1	0	1	0	0	146	105	0	11	2	0	0	0	0	0	0	0	0	10	74	0	1	8	0	0	408		
15:45	30	0	6	0	0	2	0	0	142	118	0	8	0	0	0	0	0	0	0	0	0	10	62	0	1	8	0	0	387		
16:00	31	0	10	2	0	1	0	0	159	114	0	10	2	0	0	0	0	0	0	0	0	10	88	0	1	7	0	0	435	1561	
16:15	49	0	12	0	0	2	0	0	141	127	0	12	2	0	0	0	0	0	0	0	0	15	85	0	0	4	0	0	449	1679	
16:30	39	0	12	3	0	1	0	0	156	138	0	8	1	0	0	0	0	0	0	0	0	21	77	0	1	3	0	0	460	1731	
16:45	37	0	15	0	0	1	0	0	167	140	0	5	2	0	0	0	0	0	0	0	0	15	81	0	0	2	0	0	465	1809	
17:00	53	0	16	3	0	1	0	0	168	125	0	1	0	0	0	0	0	0	0	0	0	15	81	0	0	1	0	0	464	1838	
17:15	39	0	11	1	0	0	0	0	152	151	0	0	1	0	0	0	0	0	0	0	0	21	94	0	3	4	0	0	477	1866	
17:30	39	0	12	1	0	0	0	0	188	135	0	1	1	0	0	0	0	0	0	0	0	20	97	0	0	5	0	0	499	1905	
17:45	50	0	20	0	0	0	0	0	129	154	0	2	1	0	0	0	0	0	0	0	0	21	102	0	0	1	0	0	480	1920	
18:00	27	0	22	0	0	2	0	0	169	154	0	3	0	0	0	0	0	0	0	0	0	20	81	0	0	2	0	0	480	1936	0.97

Britannia Rd @ Fourth Line

Municipality: Halton Region
Major Road: Britannia Rd
Minor Road: Fourth Line

Date: Nov 7, 2019

Major Road Runs: East/West
Weather Conditions: Overcast/Wet
Person No. 1 Cam
Person No. 2

Period	North Approach							East Approach							South Approach							West Approach							Veh. Summary		
	Cars			Trucks			Ped.	Cars			Trucks			Ped.	Cars			Trucks			Ped.	Cars			Trucks			Ped.			
Ending	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	Left	Thru	Right	Left	Thru	Right	Cross.	15	60	PHF
7:15	6	37	5	0	1	0	0	0	67	3	0	2	0	0	0	1	1	0	0	0	0	0	184	38	0	2	0	0	347		
7:30	8	70	8	0	1	0	0	2	58	2	0	2	0	0	5	5	4	0	0	0	0	5	140	53	1	3	0	0	367		
7:45	11	71	9	0	1	0	0	3	81	5	0	8	1	0	1	11	3	0	0	0	0	8	143	46	1	4	0	0	407		
8:00	14	53	10	0	0	0	0	2	94	6	0	9	0	0	8	17	3	0	0	0	0	18	101	62	0	1	0	0	398	1519	
8:15	6	35	22	1	0	2	0	3	88	6	0	7	0	0	3	6	1	0	0	0	0	6	115	60	0	2	0	0	363	1535	0.94
8:30	8	49	16	0	0	0	0	4	80	0	0	8	1	0	8	5	4	0	0	0	0	4	108	46	0	7	1	0	349	1517	
8:45	4	41	8	0	0	0	0	4	95	1	0	8	0	0	7	8	1	0	0	1	0	8	117	52	0	4	0	0	359	1469	
9:00	10	25	11	0	1	1	0	5	74	2	0	6	1	0	8	4	2	0	0	0	0	0	100	32	0	10	0	0	292	1363	
11:15	2	6	1	0	0	0	0	1	52	1	0	4	0	0	4	5	2	0	0	0	0	1	68	6	1	8	0	0	162		
11:30	4	3	4	0	0	2	0	1	45	3	0	12	0	0	4	0	4	0	0	0	0	0	80	10	0	5	1	0	178		
11:45	6	6	4	0	0	0	0	0	57	0	0	12	0	0	5	1	1	0	0	0	0	3	56	5	0	3	0	0	159		
12:00	3	2	2	0	0	0	0	1	50	3	0	18	0	0	8	3	2	0	0	0	0	3	56	4	0	10	0	0	165	664	
12:15	3	11	3	0	0	0	0	0	54	2	0	8	0	0	11	7	1	0	0	0	0	4	70	5	0	6	0	0	185	687	
12:30	4	5	1	1	0	0	0	3	59	1	0	10	0	0	8	0	0	0	0	0	0	2	84	8	0	8	0	0	194	703	
12:45	4	6	2	0	0	0	0	1	58	2	1	10	0	0	10	5	0	0	0	0	0	5	58	7	0	3	0	0	172	716	
13:00	1	3	4	0	0	1	0	2	59	2	0	9	0	0	10	7	4	0	0	0	0	3	56	7	1	8	0	0	177	728	
13:15	2	8	2	0	0	0	0	0	60	0	0	9	0	0	7	2	3	0	0	0	0	5	54	8	0	7	0	0	167	710	
13:30	0	7	3	0	0	0	0	1	77	5	0	8	0	0	14	7	1	0	0	0	0	0	60	10	0	12	0	0	205	721	
13:45	2	4	1	0	0	0	0	1	75	2	0	7	0	0	14	8	2	0	0	0	0	0	50	5	0	7	0	0	178	727	
14:00	3	4	2	0	0	0	0	2	90	6	0	13	0	1	11	6	2	0	0	0	0	1	58	2	0	9	0	0	209	759	
15:15	8	10	4	0	0	1	0	2	116	3	0	9	0	0	27	25	2	0	0	0	0	3	66	6	0	12	0	0	294		
15:30	3	9	6	1	0	1	0	2	162	6	0	12	1	0	30	13	3	0	0	0	0	2	77	10	0	10	0	0	348		
15:45	3	5	6	0	0	0	0	4	133	8	0	10	0	0	41	26	2	0	0	0	0	2	73	7	0	9	0	0	329		
16:00	1	4	2	0	0	1	0	3	158	6	0	9	0	0	50	31	1	0	1	0	0	6	98	9	0	6	0	0	386	1357	
16:15	4	5	7	0	0	0	0	4	152	6	0	14	1	0	49	23	7	0	0	1	0	3	91	12	0	4	0	0	383	1446	
16:30	5	12	4	0	0	0	0	0	144	8	0	7	1	0	42	38	10	0	0	0	0	4	82	13	0	3	0	0	373	1471	
16:45	0	9	5	0	0	0	0	4	179	2	0	6	0	0	60	28	6	0	0	0	0	5	83	14	0	2	0	0	403	1545	
17:00	4	3	7	0	0	0	0	3	164	11	0	2	0	0	67	50	6	0	0	0	0	8	97	16	0	1	0	0	439	1598	
17:15	7	6	5	0	0	0	0	0	170	6	0	0	0	0	69	34	10	0	0	0	0	5	100	4	0	7	0	0	423	1638	
17:30	8	11	7	0	0	0	0	6	178	3	0	1	0	0	68	39	3	0	0	0	0	3	99	11	0	6	0	0	443	1708	
17:45	9	9	5	0	0	0	0	1	155	5	0	2	0	0	64	33	9	0	0	0	0	6	97	14	0	2	0	0	411	1716	0.97
18:00	2	6	2	0	0	0	0	1	173	4	1	3	0	0	61	38	9	0	0	0	0	5	95	5	0	3	0	0	408	1685	

Appendix N

Heavy Vehicle Percentage Calculations

Britannia Road/James Snow Parkway

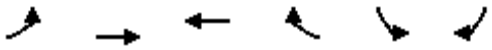
	NBL	NBT	NBR	WBL	WBT	WBR	SBL	SBT	SBR	EBL	EBT	EBR
AM					23	7	9		4	1	8	
PM					6	3	2		2	3	12	
SAT												
	2%(2%)	2%(2%)	2%(2%)	2%(2%)	8%(2%)	8%(2%)	2%(2%)	2%(2%)	5%(3%)	2%(4%)	2%(3%)	2%(2%)

Britannia Road/Fourth Line

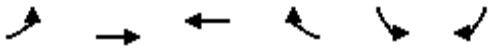
	NBL	NBT	NBR	WBL	WBT	WBR	SBL	SBT	SBR	EBL	EBT	EBR
AM	0	0	0	0	26	1	1	2	2	2	10	0
PM	0	0	0	0	5	0	0	0	0	0	16	0
SAT												
	2%(2%)	2%(2%)	2%(2%)	2%(2%)	7%(2%)	5%(2%)	3%(2%)	2%(2%)	4%(2%)	5%(2%)	2%(4%)	2%(2%)

Appendix O

2021 Existing Conditions Synchro Worksheets



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	906	477	95	589	85
Future Volume (vph)	65	906	477	95	589	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	75.0			80.0	160.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	100.0				100.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			0.97	0.97	0.94
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	1842	1740	1479	1750	1521
Flt Permitted	0.309				0.950	
Satd. Flow (perm)	567	1842	1740	1442	1692	1433
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				99		86
Link Speed (k/h)		60	60		70	
Link Distance (m)		669.3	512.5		271.5	
Travel Time (s)		40.2	30.8		14.0	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Adj. Flow (vph)	68	944	497	99	614	89
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	944	497	99	614	89
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	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)	25			15	25	15
Number of Detectors	2	0	0	0	1	1
Detector Template						
Leading Detector (m)	20.0	0.0	0.0	0.0	7.0	7.0
Trailing Detector (m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Position(m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Size(m)	8.0	0.6	0.6	2.0	8.0	8.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(m)	17.0					
Detector 2 Size(m)	3.0					
Detector 2 Type	Cl+Ex					
Detector 2 Channel						



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Extend (s)	0.0					
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	15.0	15.0
Minimum Split (s)	10.0	32.0	35.0	35.0	25.0	25.0
Total Split (s)	10.0	60.0	50.0	50.0	40.0	40.0
Total Split (%)	10.0%	60.0%	50.0%	50.0%	40.0%	40.0%
Maximum Green (s)	7.0	53.0	43.0	43.0	33.0	33.0
Yellow Time (s)	3.0	4.0	4.0	4.0	5.0	5.0
All-Red Time (s)	0.0	3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			21.0	21.0	8.0	8.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	57.0	53.0	45.0	45.0	33.0	33.0
Actuated g/C Ratio	0.57	0.53	0.45	0.45	0.33	0.33
v/c Ratio	0.17	0.97	0.63	0.14	1.06	0.17
Control Delay	10.7	45.9	26.5	4.1	89.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	45.9	26.5	4.1	89.5	6.6
LOS	B	D	C	A	F	A
Approach Delay		43.5	22.8		79.0	
Approach LOS		D	C		E	
Queue Length 50th (m)	5.6	167.9	74.9	0.0	~131.9	0.4
Queue Length 95th (m)	11.3	#257.1	110.4	8.9	#196.4	10.6
Internal Link Dist (m)		645.3	488.5		247.5	
Turn Bay Length (m)	75.0			80.0	160.0	
Base Capacity (vph)	406	976	783	703	577	530
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.97	0.63	0.14	1.06	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 49.0		Intersection LOS: D	

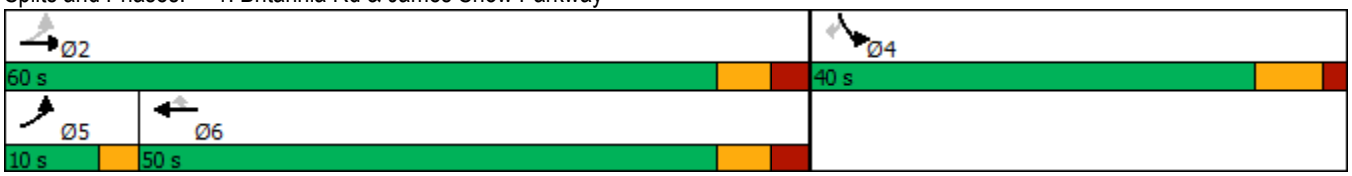
Intersection Capacity Utilization 92.0% ICU Level of Service F

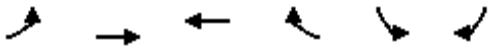
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

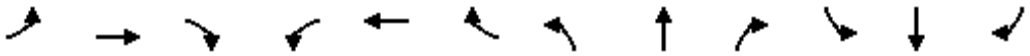
Splits and Phases: 1: Britannia Rd & James Snow Parkway





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	906	477	95	589	85
Future Volume (vph)	65	906	477	95	589	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1748	1842	1740	1442	1750	1432
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	568	1842	1740	1442	1750	1432
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	68	944	497	99	614	89
RTOR Reduction (vph)	0	0	0	55	0	58
Lane Group Flow (vph)	68	944	497	44	614	31
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	53.6	53.6	45.0	45.0	33.0	33.0
Effective Green, g (s)	53.6	53.6	45.0	45.0	33.0	33.0
Actuated g/C Ratio	0.53	0.53	0.45	0.45	0.33	0.33
Clearance Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	368	981	778	645	574	469
v/s Ratio Prot	0.01	c0.51	0.29		c0.35	
v/s Ratio Perm	0.09			0.03		0.02
v/c Ratio	0.18	0.96	0.64	0.07	1.07	0.07
Uniform Delay, d1	13.0	22.5	21.5	15.9	33.8	23.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	21.0	4.0	0.2	57.6	0.1
Delay (s)	13.2	43.5	25.5	16.1	91.4	23.3
Level of Service	B	D	C	B	F	C
Approach Delay (s)		41.4	23.9		82.8	
Approach LOS		D	C		F	

Intersection Summary			
HCM 2000 Control Delay	49.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
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)	41	951	230	10	557	21	18	47	11	42	255	53
Future Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.99			0.99	
Frt		0.975			0.995			0.980			0.980	
Flt Protected		0.998			0.999			0.988			0.994	
Satd. Flow (prot)	0	1780	0	0	1746	0	0	1772	0	0	1775	0
Flt Permitted		0.000			0.970			0.853			0.950	
Satd. Flow (perm)	0	0	0	0	1695	0	0	1527	0	0	1694	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			2			9			9	
Link Speed (k/h)		60			60			70			60	
Link Distance (m)		432.7			669.3			331.2			1116.3	
Travel Time (s)		26.0			40.2			17.0			67.0	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Adj. Flow (vph)	44	1012	245	11	593	22	19	50	12	45	271	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1301	0	0	626	0	0	81	0	0	372	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-2.0		0.0	-2.0	
Detector 1 Position(m)	0.0	2.0		0.0	2.0		0.0	-2.0		0.0	-2.0	
Detector 1 Size(m)	2.0	12.0		2.0	12.0		2.0	12.0		2.0	12.0	
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	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2	5		6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	32.5		32.5	32.5		24.6	24.6		24.6	24.6	

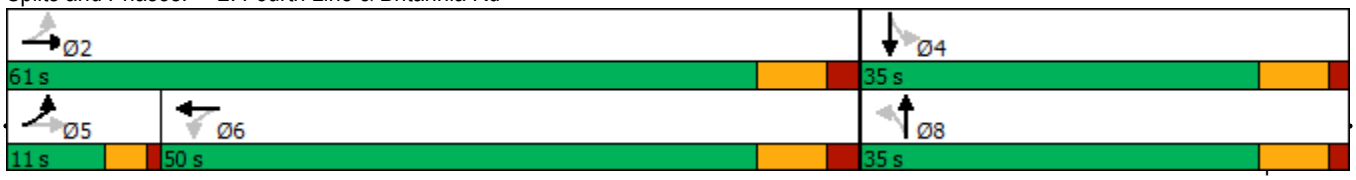
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	61.0		50.0	50.0		35.0	35.0		35.0	35.0	
Total Split (%)	11.5%	63.5%		52.1%	52.1%		36.5%	36.5%		36.5%	36.5%	
Maximum Green (s)	7.0	53.5		42.5	42.5		28.4	28.4		28.4	28.4	
Yellow Time (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		7.5			7.5			6.6			6.6	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.5	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	None	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.6			53.6			24.8			24.8	
Actuated g/C Ratio		0.58			0.58			0.27			0.27	
v/c Ratio		1.25			0.64			0.19			0.81	
Control Delay		143.6			17.4			24.2			45.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		143.6			17.4			24.2			45.5	
LOS		F			B			C			D	
Approach Delay		143.6			17.4			24.2			45.5	
Approach LOS		F			B			C			D	
Queue Length 50th (m)		~304.3			73.2			9.8			60.3	
Queue Length 95th (m)		#390.1			113.8			21.0			#93.3	
Internal Link Dist (m)		408.7			645.3			307.2			1092.3	
Turn Bay Length (m)												
Base Capacity (vph)		1039			982			475			527	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.25			0.64			0.17			0.71	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 92.5			
Natural Cycle: 140			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 91.0		Intersection LOS: F	
Intersection Capacity Utilization 120.5%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

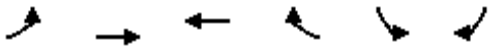
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Fourth Line & Britannia Rd

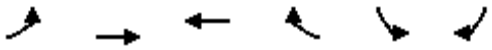


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Future Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5			6.6			6.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		1780			1747			1769			1771	
Flt Permitted		0.00			0.97			0.85			0.95	
Satd. Flow (perm)		0			1696			1527			1692	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	1012	245	11	593	22	19	50	12	45	271	56
RTOR Reduction (vph)	0	8	0	0	1	0	0	7	0	0	7	0
Lane Group Flow (vph)	0	1293	0	0	625	0	0	74	0	0	365	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2	5		6			8			4		
Actuated Green, G (s)		53.6			53.6			24.8			24.8	
Effective Green, g (s)		53.6			53.6			24.8			24.8	
Actuated g/C Ratio		0.58			0.58			0.27			0.27	
Clearance Time (s)		7.5			7.5			6.6			6.6	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1031			982			409			453	
v/s Ratio Prot		c0.73										
v/s Ratio Perm					0.37			0.05			c0.22	
v/c Ratio		1.25			0.64			0.18			0.81	
Uniform Delay, d1		19.4			13.0			26.0			31.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		122.2			3.2			0.4			11.4	
Delay (s)		141.7			16.1			26.5			43.0	
Level of Service		F			B			C			D	
Approach Delay (s)		141.7			16.1			26.5			43.0	
Approach LOS		F			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	89.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	18.1
Intersection Capacity Utilization	120.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	695	1101	621	163	70
Future Volume (vph)	88	695	1101	621	163	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	75.0			80.0	160.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	100.0				100.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.98	0.97	0.94
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1716	1824	1842	1566	1750	1551
Flt Permitted	0.069				0.950	
Satd. Flow (perm)	125	1824	1842	1527	1692	1457
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				498		72
Link Speed (k/h)		60	60		70	
Link Distance (m)		669.3	512.5		271.5	
Travel Time (s)		40.2	30.8		14.0	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Adj. Flow (vph)	91	716	1135	640	168	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	91	716	1135	640	168	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	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)	25			15	25	15
Number of Detectors	2	0	0	0	1	1
Detector Template						
Leading Detector (m)	20.0	0.0	0.0	0.0	7.0	7.0
Trailing Detector (m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Position(m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Size(m)	8.0	0.6	0.6	2.0	8.0	8.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(m)	17.0					
Detector 2 Size(m)	3.0					
Detector 2 Type	Cl+Ex					
Detector 2 Channel						



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Extend (s)	0.0					
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	15.0	15.0
Minimum Split (s)	10.0	32.0	35.0	35.0	25.0	25.0
Total Split (s)	10.0	70.0	60.0	60.0	30.0	30.0
Total Split (%)	10.0%	70.0%	60.0%	60.0%	30.0%	30.0%
Maximum Green (s)	7.0	63.0	53.0	53.0	23.0	23.0
Yellow Time (s)	3.0	4.0	4.0	4.0	5.0	5.0
All-Red Time (s)	0.0	3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			21.0	21.0	8.0	8.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	67.1	63.1	55.1	55.1	17.1	17.1
Actuated g/C Ratio	0.71	0.67	0.58	0.58	0.18	0.18
v/c Ratio	0.44	0.59	1.05	0.58	0.53	0.22
Control Delay	14.8	11.3	65.3	5.4	41.3	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	11.3	65.3	5.4	41.3	9.8
LOS	B	B	E	A	D	A
Approach Delay		11.7	43.7		31.9	
Approach LOS		B	D		C	
Queue Length 50th (m)	4.1	59.6	~228.9	11.2	27.9	0.0
Queue Length 95th (m)	16.0	108.0	#332.0	40.8	47.2	10.7
Internal Link Dist (m)		645.3	488.5		247.5	
Turn Bay Length (m)	75.0			80.0	160.0	
Base Capacity (vph)	207	1221	1077	1099	427	410
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.59	1.05	0.58	0.39	0.18

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 94.2	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 33.5	Intersection LOS: C

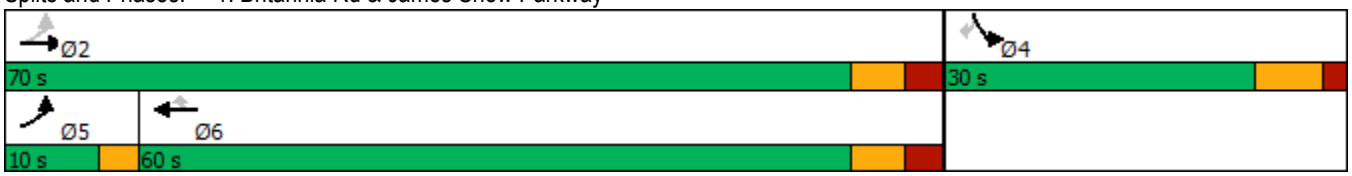
Intersection Capacity Utilization 91.3% ICU Level of Service F

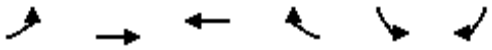
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

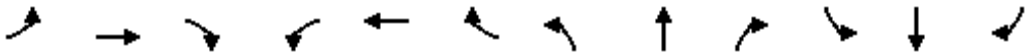
Splits and Phases: 1: Britannia Rd & James Snow Parkway





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	695	1101	621	163	70
Future Volume (vph)	88	695	1101	621	163	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1716	1824	1842	1528	1750	1456
Flt Permitted	0.07	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	124	1824	1842	1528	1750	1456
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	716	1135	640	168	72
RTOR Reduction (vph)	0	0	0	209	0	59
Lane Group Flow (vph)	91	716	1135	431	168	13
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	63.7	63.7	55.1	55.1	17.1	17.1
Effective Green, g (s)	63.7	63.7	55.1	55.1	17.1	17.1
Actuated g/C Ratio	0.67	0.67	0.58	0.58	0.18	0.18
Clearance Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	177	1225	1070	888	315	262
v/s Ratio Prot	0.03	c0.39	c0.62		c0.10	
v/s Ratio Perm	0.31			0.28		0.01
v/c Ratio	0.51	0.58	1.06	0.49	0.53	0.05
Uniform Delay, d1	21.6	8.4	19.8	11.6	35.2	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	2.0	45.1	1.9	3.2	0.2
Delay (s)	23.5	10.4	65.0	13.5	38.4	32.3
Level of Service	C	B	E	B	D	C
Approach Delay (s)		11.9	46.4		36.6	
Approach LOS		B	D		D	

Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	94.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
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)	23	750	47	10	1148	26	279	185	29	29	45	25
Future Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.98			0.98	
Frt		0.992			0.997			0.992			0.966	
Flt Protected		0.999						0.972			0.986	
Satd. Flow (prot)	0	1790	0	0	1835	0	0	1770	0	0	1730	0
Flt Permitted		0.945			0.992			0.795			0.837	
Satd. Flow (perm)	0	1693	0	0	1821	0	0	1430	0	0	1466	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			3			3			16	
Link Speed (k/h)		60			60			70			60	
Link Distance (m)		432.7			669.3			331.2			1116.3	
Travel Time (s)		26.0			40.2			17.0			67.0	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	24	773	48	10	1184	27	288	191	30	30	46	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	845	0	0	1221	0	0	509	0	0	102	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-0.2		0.0	-2.0	
Detector 1 Position(m)	0.0	2.0		0.0	2.0		0.0	-0.2		0.0	-2.0	
Detector 1 Size(m)	2.0	12.0		2.0	12.0		2.0	10.2		2.0	12.0	
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	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.5	32.5		11.0	32.5		24.6	24.6		24.6	24.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	60.0	60.0		11.0	71.0		25.0	25.0		25.0	25.0	
Total Split (%)	62.5%	62.5%		11.5%	74.0%		26.0%	26.0%		26.0%	26.0%	
Maximum Green (s)	52.5	52.5		7.0	63.5		18.4	18.4		18.4	18.4	
Yellow Time (s)	5.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.5	2.5		1.0	2.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		7.5			7.5			6.6			6.6	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	5.0	5.0		2.5	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Act Effct Green (s)		63.5			63.5			18.4			18.4	
Actuated g/C Ratio		0.66			0.66			0.19			0.19	
v/c Ratio		0.75			1.01			1.84			0.35	
Control Delay		16.4			47.2			419.8			32.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		16.4			47.2			419.8			32.1	
LOS		B			D			F			C	
Approach Delay		16.4			47.2			419.8			32.1	
Approach LOS		B			D			F			C	
Queue Length 50th (m)		93.8			~216.5			~145.5			13.8	
Queue Length 95th (m)		144.4			#317.6			#206.3			28.8	
Internal Link Dist (m)		408.7			645.3			307.2			1092.3	
Turn Bay Length (m)												
Base Capacity (vph)		1121			1205			276			293	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.75			1.01			1.84			0.35	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 96			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.84			
Intersection Signal Delay: 107.7		Intersection LOS: F	
Intersection Capacity Utilization 111.8%		ICU Level of Service H	
Analysis Period (min) 15			

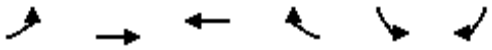
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

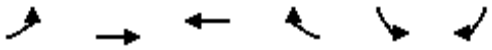
Splits and Phases: 2: Fourth Line & Britannia Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Future Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5			6.6			6.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			0.99			1.00	
Frt		0.99			1.00			0.99			0.97	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1790			1835			1750			1725	
Flt Permitted		0.94			0.99			0.80			0.84	
Satd. Flow (perm)		1693			1821			1431			1466	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	24	773	48	10	1184	27	288	191	30	30	46	26
RTOR Reduction (vph)	0	2	0	0	1	0	0	2	0	0	13	0
Lane Group Flow (vph)	0	843	0	0	1220	0	0	507	0	0	89	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		63.5			63.5			18.4			18.4	
Effective Green, g (s)		63.5			63.5			18.4			18.4	
Actuated g/C Ratio		0.66			0.66			0.19			0.19	
Clearance Time (s)		7.5			7.5			6.6			6.6	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1119			1204			274			280	
v/s Ratio Prot												
v/s Ratio Perm		0.50			c0.67			c0.35			0.06	
v/c Ratio		0.75			1.01			1.85			0.32	
Uniform Delay, d1		11.0			16.2			38.8			33.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.7			29.3			395.8			1.4	
Delay (s)		15.7			45.5			434.6			34.8	
Level of Service		B			D			F			C	
Approach Delay (s)		15.7			45.5			434.6			34.8	
Approach LOS		B			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	109.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	906	477	95	589	85
Future Volume (vph)	65	906	477	95	589	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	75.0			80.0	160.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	100.0				100.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			0.97	0.96	0.94
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	1842	1740	1479	1750	1521
Flt Permitted	0.307				0.950	
Satd. Flow (perm)	563	1842	1740	1439	1680	1423
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				99		75
Link Speed (k/h)		60	60		70	
Link Distance (m)		669.3	512.5		271.5	
Travel Time (s)		40.2	30.8		14.0	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Adj. Flow (vph)	68	944	497	99	614	89
Shared Lane Traffic (%)						
Lane Group Flow (vph)	68	944	497	99	614	89
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	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)	25			15	25	15
Number of Detectors	2	0	0	0	1	1
Detector Template						
Leading Detector (m)	20.0	0.0	0.0	0.0	7.0	7.0
Trailing Detector (m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Position(m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Size(m)	8.0	0.6	0.6	2.0	8.0	8.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(m)	17.0					
Detector 2 Size(m)	3.0					
Detector 2 Type	Cl+Ex					
Detector 2 Channel						



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Extend (s)	0.0					
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	15.0	15.0
Minimum Split (s)	10.0	32.0	35.0	35.0	25.0	25.0
Total Split (s)	10.0	70.0	60.0	60.0	50.0	50.0
Total Split (%)	8.3%	58.3%	50.0%	50.0%	41.7%	41.7%
Maximum Green (s)	7.0	63.0	53.0	53.0	43.0	43.0
Yellow Time (s)	3.0	4.0	4.0	4.0	5.0	5.0
All-Red Time (s)	0.0	3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			21.0	21.0	8.0	8.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	67.0	63.0	55.0	55.0	43.0	43.0
Actuated g/C Ratio	0.56	0.52	0.46	0.46	0.36	0.36
v/c Ratio	0.18	0.98	0.62	0.14	0.98	0.16
Control Delay	13.4	52.3	29.6	4.3	69.9	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	52.3	29.6	4.3	69.9	8.5
LOS	B	D	C	A	E	A
Approach Delay		49.7	25.4		62.1	
Approach LOS		D	C		E	
Queue Length 50th (m)	7.0	208.8	89.6	0.0	141.9	2.1
Queue Length 95th (m)	13.7	#301.6	126.5	9.6	#215.3	13.1
Internal Link Dist (m)		645.3	488.5		247.5	
Turn Bay Length (m)	75.0			80.0	160.0	
Base Capacity (vph)	383	967	797	712	627	558
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.98	0.62	0.14	0.98	0.16

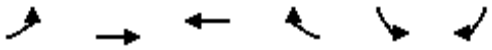
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 47.2		Intersection LOS: D	

Intersection Capacity Utilization 92.0% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 1: Britannia Rd & James Snow Parkway



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	906	477	95	589	85
Future Volume (vph)	65	906	477	95	589	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.94
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1748	1842	1740	1439	1750	1423
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	565	1842	1740	1439	1750	1423
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	68	944	497	99	614	89
RTOR Reduction (vph)	0	0	0	54	0	48
Lane Group Flow (vph)	68	944	497	45	614	41
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	63.6	63.6	55.0	55.0	43.0	43.0
Effective Green, g (s)	63.6	63.6	55.0	55.0	43.0	43.0
Actuated g/C Ratio	0.53	0.53	0.46	0.46	0.36	0.36
Clearance Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	352	971	793	656	623	507
v/s Ratio Prot	0.01	c0.51	0.29		c0.35	
v/s Ratio Perm	0.09			0.03		0.03
v/c Ratio	0.19	0.97	0.63	0.07	0.99	0.08
Uniform Delay, d1	16.0	27.6	25.0	18.4	38.5	25.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	22.9	3.7	0.2	32.3	0.1
Delay (s)	16.2	50.5	28.7	18.6	70.8	25.8
Level of Service	B	D	C	B	E	C
Approach Delay (s)		48.2	27.0		65.1	
Approach LOS		D	C		E	

Intersection Summary			
HCM 2000 Control Delay	47.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
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)	41	951	230	10	557	21	18	47	11	42	255	53
Future Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.99			0.99	
Frt		0.975			0.995			0.980			0.980	
Flt Protected		0.998			0.999			0.988			0.994	
Satd. Flow (prot)	0	1780	0	0	1746	0	0	1772	0	0	1775	0
Flt Permitted		0.000			0.970			0.825			0.950	
Satd. Flow (perm)	0	0	0	0	1695	0	0	1477	0	0	1694	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			2			7			7	
Link Speed (k/h)		60			60			70			60	
Link Distance (m)		432.7			669.3			331.2			1116.3	
Travel Time (s)		26.0			40.2			17.0			67.0	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Adj. Flow (vph)	44	1012	245	11	593	22	19	50	12	45	271	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1301	0	0	626	0	0	81	0	0	372	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-2.0		0.0	-2.0	
Detector 1 Position(m)	0.0	2.0		0.0	2.0		0.0	-2.0		0.0	-2.0	
Detector 1 Size(m)	2.0	12.0		2.0	12.0		2.0	12.0		2.0	12.0	
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	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2	5		6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	25.0		25.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	32.5		32.5	32.5		24.6	24.6		24.6	24.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	11.0	79.0		68.0	68.0		41.0	41.0		41.0	41.0	
Total Split (%)	9.2%	65.8%		56.7%	56.7%		34.2%	34.2%		34.2%	34.2%	
Maximum Green (s)	7.0	71.5		60.5	60.5		34.4	34.4		34.4	34.4	
Yellow Time (s)	3.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	1.0	2.5		2.5	2.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		7.5			7.5			6.6			6.6	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	2.5	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	None	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		71.6			71.6			29.9			29.9	
Actuated g/C Ratio		0.62			0.62			0.26			0.26	
v/c Ratio		1.17			0.60			0.21			0.84	
Control Delay		111.7			17.0			31.5			57.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		111.7			17.0			31.5			57.2	
LOS		F			B			C			E	
Approach Delay		111.7			17.0			31.5			57.2	
Approach LOS		F			B			C			E	
Queue Length 50th (m)		~364.3			84.2			13.1			78.5	
Queue Length 95th (m)		#456.9			125.0			25.9			#114.7	
Internal Link Dist (m)		408.7			645.3			307.2			1092.3	
Turn Bay Length (m)												
Base Capacity (vph)		1108			1050			444			509	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.17			0.60			0.18			0.73	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 115.7			
Natural Cycle: 140			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 75.5		Intersection LOS: E	
Intersection Capacity Utilization 120.5%		ICU Level of Service H	
Analysis Period (min) 15			

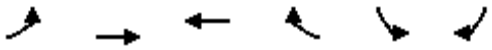
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

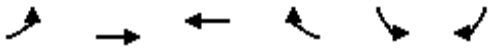
Splits and Phases: 2: Fourth Line & Britannia Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Future Volume (vph)	41	951	230	10	557	21	18	47	11	42	255	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5			6.6			6.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.98			0.98	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		1780			1747			1769			1770	
Flt Permitted		0.00			0.97			0.83			0.95	
Satd. Flow (perm)		0			1695			1477			1692	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	1012	245	11	593	22	19	50	12	45	271	56
RTOR Reduction (vph)	0	6	0	0	1	0	0	5	0	0	5	0
Lane Group Flow (vph)	0	1295	0	0	625	0	0	76	0	0	367	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2	5		6			8			4		
Actuated Green, G (s)		71.6			71.6			29.9			29.9	
Effective Green, g (s)		71.6			71.6			29.9			29.9	
Actuated g/C Ratio		0.62			0.62			0.26			0.26	
Clearance Time (s)		7.5			7.5			6.6			6.6	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1102			1049			382			437	
v/s Ratio Prot		c0.73										
v/s Ratio Perm					0.37			0.05			c0.22	
v/c Ratio		1.17			0.60			0.20			0.84	
Uniform Delay, d1		22.0			13.3			33.5			40.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		88.4			2.5			0.5			14.6	
Delay (s)		110.4			15.8			34.0			55.2	
Level of Service		F			B			C			E	
Approach Delay (s)		110.4			15.8			34.0			55.2	
Approach LOS		F			B			C			E	

Intersection Summary			
HCM 2000 Control Delay	74.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	115.6	Sum of lost time (s)	18.1
Intersection Capacity Utilization	120.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	695	1101	621	163	70
Future Volume (vph)	88	695	1101	621	163	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	75.0			80.0	160.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	100.0				100.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.97	0.96	0.93
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1716	1824	1842	1566	1750	1551
Flt Permitted	0.049				0.950	
Satd. Flow (perm)	89	1824	1842	1525	1680	1440
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				557		72
Link Speed (k/h)		60	60		70	
Link Distance (m)		669.3	512.5		271.5	
Travel Time (s)		40.2	30.8		14.0	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Adj. Flow (vph)	91	716	1135	640	168	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	91	716	1135	640	168	72
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	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)	25			15	25	15
Number of Detectors	2	0	0	0	1	1
Detector Template						
Leading Detector (m)	20.0	0.0	0.0	0.0	7.0	7.0
Trailing Detector (m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Position(m)	2.0	0.0	0.0	0.0	-1.0	-1.0
Detector 1 Size(m)	8.0	0.6	0.6	2.0	8.0	8.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(m)	17.0					
Detector 2 Size(m)	3.0					
Detector 2 Type	Cl+Ex					
Detector 2 Channel						



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Extend (s)	0.0					
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	25.0	25.0	25.0	15.0	15.0
Minimum Split (s)	10.0	32.0	35.0	35.0	25.0	25.0
Total Split (s)	10.0	95.0	85.0	85.0	25.0	25.0
Total Split (%)	8.3%	79.2%	70.8%	70.8%	20.8%	20.8%
Maximum Green (s)	7.0	88.0	78.0	78.0	18.0	18.0
Yellow Time (s)	3.0	4.0	4.0	4.0	5.0	5.0
All-Red Time (s)	0.0	3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			21.0	21.0	8.0	8.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	92.0	88.0	78.0	78.0	17.0	17.0
Actuated g/C Ratio	0.77	0.74	0.66	0.66	0.14	0.14
v/c Ratio	0.55	0.53	0.94	0.54	0.67	0.27
Control Delay	27.8	8.5	34.7	3.2	62.6	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	8.5	34.7	3.2	62.6	13.0
LOS	C	A	C	A	E	B
Approach Delay		10.7	23.4		47.7	
Approach LOS		B	C		D	
Queue Length 50th (m)	4.9	64.8	224.9	6.7	37.7	0.0
Queue Length 95th (m)	22.0	89.7	#341.2	20.6	61.1	12.9
Internal Link Dist (m)		645.3	488.5		247.5	
Turn Bay Length (m)	75.0			80.0	160.0	
Base Capacity (vph)	164	1349	1207	1191	264	279
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.53	0.94	0.54	0.64	0.26

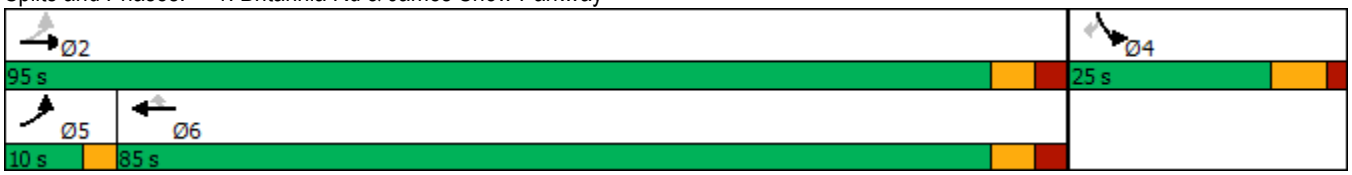
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 119			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 21.8		Intersection LOS: C	

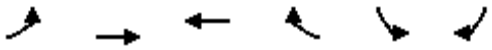
Intersection Capacity Utilization 91.3% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 1: Britannia Rd & James Snow Parkway





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	695	1101	621	163	70
Future Volume (vph)	88	695	1101	621	163	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.93
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1716	1824	1842	1525	1750	1440
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	89	1824	1842	1525	1750	1440
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	716	1135	640	168	72
RTOR Reduction (vph)	0	0	0	192	0	62
Lane Group Flow (vph)	91	716	1135	448	168	10
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	88.0	88.0	78.0	78.0	17.0	17.0
Effective Green, g (s)	88.0	88.0	78.0	78.0	17.0	17.0
Actuated g/C Ratio	0.74	0.74	0.66	0.66	0.14	0.14
Clearance Time (s)	3.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	161	1348	1207	999	250	205
v/s Ratio Prot	0.03	c0.39	c0.62		c0.10	
v/s Ratio Perm	0.38			0.29		0.01
v/c Ratio	0.57	0.53	0.94	0.45	0.67	0.05
Uniform Delay, d1	27.3	6.6	18.4	10.0	48.4	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	1.5	15.1	1.5	9.0	0.2
Delay (s)	30.9	8.2	33.5	11.5	57.3	44.2
Level of Service	C	A	C	B	E	D
Approach Delay (s)		10.7	25.5		53.4	
Approach LOS		B	C		D	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	119.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
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)	23	750	47	10	1148	26	279	185	29	29	45	25
Future Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.99			0.99	
Frt		0.992			0.997			0.992			0.966	
Flt Protected		0.999						0.972			0.986	
Satd. Flow (prot)	0	1790	0	0	1835	0	0	1771	0	0	1732	0
Flt Permitted		0.942			0.992			0.774			0.847	
Satd. Flow (perm)	0	1688	0	0	1821	0	0	1395	0	0	1485	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			2			2			13	
Link Speed (k/h)		60			60			70			60	
Link Distance (m)		432.7			669.3			331.2			1116.3	
Travel Time (s)		26.0			40.2			17.0			67.0	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	24	773	48	10	1184	27	288	191	30	30	46	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	845	0	0	1221	0	0	509	0	0	102	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left			Left			Left			Left		
Leading Detector (m)	2.0	0.0		2.0	0.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	-0.2		0.0	-2.0	
Detector 1 Position(m)	0.0	2.0		0.0	2.0		0.0	-0.2		0.0	-2.0	
Detector 1 Size(m)	2.0	12.0		2.0	12.0		2.0	10.2		2.0	12.0	
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	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	25.0	25.0		7.0	25.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	32.5	32.5		11.0	32.5		24.6	24.6		24.6	24.6	

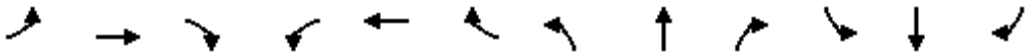
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	76.0	76.0		11.0	87.0		33.0	33.0		33.0	33.0	
Total Split (%)	63.3%	63.3%		9.2%	72.5%		27.5%	27.5%		27.5%	27.5%	
Maximum Green (s)	68.5	68.5		7.0	79.5		26.4	26.4		26.4	26.4	
Yellow Time (s)	5.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.5	2.5		1.0	2.5		1.6	1.6		1.6	1.6	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		7.5			7.5			6.6			6.6	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	5.0	5.0		2.5	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Act Effct Green (s)		79.5			79.5			26.4			26.4	
Actuated g/C Ratio		0.66			0.66			0.22			0.22	
v/c Ratio		0.76			1.01			1.65			0.30	
Control Delay		19.1			49.9			339.1			36.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		19.1			49.9			339.1			36.9	
LOS		B			D			F			D	
Approach Delay		19.1			49.9			339.1			36.9	
Approach LOS		B			D			F			D	
Queue Length 50th (m)		122.7			~280.6			~175.1			17.5	
Queue Length 95th (m)		176.4			#382.7			#240.9			33.5	
Internal Link Dist (m)		408.7			645.3			307.2			1092.3	
Turn Bay Length (m)												
Base Capacity (vph)		1119			1207			308			336	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.76			1.01			1.65			0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.65			
Intersection Signal Delay: 94.7		Intersection LOS: F	
Intersection Capacity Utilization 111.8%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 2: Fourth Line & Britannia Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Future Volume (vph)	23	750	47	10	1148	26	279	185	29	29	45	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5			6.6			6.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			0.99			1.00	
Frt		0.99			1.00			0.99			0.97	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		1790			1835			1753			1727	
Flt Permitted		0.94			0.99			0.77			0.85	
Satd. Flow (perm)		1689			1821			1395			1485	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	24	773	48	10	1184	27	288	191	30	30	46	26
RTOR Reduction (vph)	0	1	0	0	1	0	0	2	0	0	10	0
Lane Group Flow (vph)	0	844	0	0	1220	0	0	507	0	0	92	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		79.5			79.5			26.4			26.4	
Effective Green, g (s)		79.5			79.5			26.4			26.4	
Actuated g/C Ratio		0.66			0.66			0.22			0.22	
Clearance Time (s)		7.5			7.5			6.6			6.6	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1118			1206			306			326	
v/s Ratio Prot												
v/s Ratio Perm		0.50			c0.67			c0.36			0.06	
v/c Ratio		0.75			1.01			1.66			0.28	
Uniform Delay, d1		13.7			20.2			46.8			38.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.7			28.9			310.4			1.0	
Delay (s)		18.4			49.1			357.2			39.9	
Level of Service		B			D			F			D	
Approach Delay (s)		18.4			49.1			357.2			39.9	
Approach LOS		B			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	97.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix P

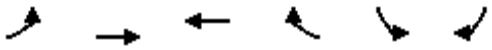
All-way Stop-control Warrants

2026 FB	NBL	NBT	NBR	WBL	WBT	WBR	SBL	SBT	SBR	EBL	EBT	EBR
AM	0	13	0	0	67	36	19	30	12	8	203	0
AM Sum		13			103			61			211	
PM	0	29	0	0	298	29	21	20	6	11	218	0
PM Sum		29			327			47			229	
EB/WB AM	314	81%	NB/SB AM	74	19%							
EB/WB PM	556	96%	NB/SB PM	21	4%							

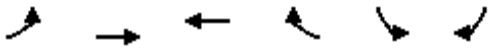
2026 FT	NBL	NBT	NBR	WBL	WBT	WBR	SBL	SBT	SBR	EBL	EBT	EBR
AM	28	37	28	21	93	44	23	43	14	12	226	21
AM Sum		93			158			80			259	
PM	23	44	23	29	322	34	29	44	10	13	245	29
PM Sum		90			385			83			287	
EB/WB AM	417	71%	NB/SB AM	173	29%							
EB/WB PM	672	93%	NB/SB PM	52	7%							

Appendix Q

2026 Future Background Synchro and Sidra Worksheets



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	117	1269	624	223	1117	121
Future Volume (vph)	117	1269	624	223	1117	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	125.0			150.0	0.0	0.0
Storage Lanes	1			1	2	2
Taper Length (m)	30.0				100.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Ped Bike Factor	1.00			0.98	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4175	1479	3395	2677
Flt Permitted	0.290				0.950	
Satd. Flow (perm)	532	4421	4175	1442	3363	2614
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				232		126
Link Speed (k/h)		70	70		70	
Link Distance (m)		334.0	512.5		143.0	
Travel Time (s)		17.2	26.4		7.4	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Adj. Flow (vph)	122	1322	650	232	1164	126
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	1322	650	232	1164	126
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		7.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-0.2
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-0.2
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	10.2
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

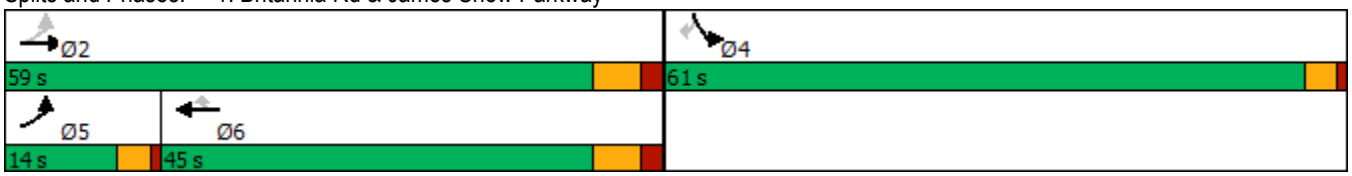


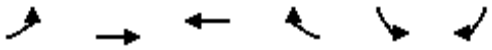
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	32.0	44.5	44.5	42.0	42.0
Total Split (s)	14.0	59.0	45.0	45.0	61.0	61.0
Total Split (%)	11.7%	49.2%	37.5%	37.5%	50.8%	50.8%
Maximum Green (s)	10.0	52.5	38.5	38.5	57.0	57.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.3	2.3	2.3	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.5	-1.5	-1.5	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	58.3	54.2	41.5	41.5	51.9	48.9
Actuated g/C Ratio	0.52	0.48	0.37	0.37	0.46	0.44
v/c Ratio	0.30	0.62	0.42	0.34	0.74	0.10
Control Delay	17.7	24.0	28.8	5.2	27.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	24.0	28.8	5.2	27.7	3.2
LOS	B	C	C	A	C	A
Approach Delay		23.4	22.6		25.3	
Approach LOS		C	C		C	
Queue Length 50th (m)	13.8	89.1	45.3	0.0	104.1	0.0
Queue Length 95th (m)	26.7	118.0	63.6	16.8	127.5	5.5
Internal Link Dist (m)		310.0	488.5		119.0	
Turn Bay Length (m)	125.0			150.0		
Base Capacity (vph)	418	2137	1543	679	1823	1395
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.62	0.42	0.34	0.64	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 112.2			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 23.9		Intersection LOS: C	
Intersection Capacity Utilization 80.8%		ICU Level of Service D	
Analysis Period (min) 15			

* User Entered Value

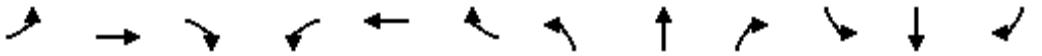
Splits and Phases: 1: Britannia Rd & James Snow Parkway



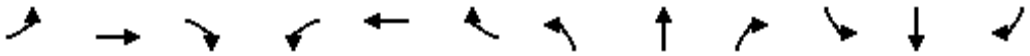


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	117	1269	624	223	1117	121
Future Volume (vph)	117	1269	624	223	1117	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1749	4421	4175	1444	3395	2615
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	534	4421	4175	1444	3395	2615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	122	1322	650	232	1164	126
RTOR Reduction (vph)	0	0	0	146	0	71
Lane Group Flow (vph)	122	1322	650	86	1164	55
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	52.8	52.8	40.1	40.1	48.9	48.9
Effective Green, g (s)	55.8	54.3	41.6	41.6	51.9	48.9
Actuated g/C Ratio	0.50	0.48	0.37	0.37	0.46	0.44
Clearance Time (s)	4.0	6.5	6.5	6.5	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	392	2139	1547	535	1570	1139
v/s Ratio Prot	0.03	c0.30	0.16		c0.34	
v/s Ratio Perm	0.12			0.06		0.02
v/c Ratio	0.31	0.62	0.42	0.16	0.74	0.05
Uniform Delay, d1	15.6	21.3	26.3	23.6	24.7	18.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.4	0.8	0.6	2.3	0.0
Delay (s)	16.0	22.7	27.2	24.3	27.0	18.3
Level of Service	B	C	C	C	C	B
Approach Delay (s)		22.1	26.4		26.1	
Approach LOS		C	C		C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	112.2	Sum of lost time (s)	7.0
Intersection Capacity Utilization	80.8%	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)	58	1358	364	20	738	39	73	60	14	83	300	98
Future Volume (vph)	58	1358	364	20	738	39	73	60	14	83	300	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		45.0	115.0		0.0	60.0		30.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	50.0			60.0			60.0			60.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	1.00		0.96	1.00	1.00		0.99		0.98
Frt			0.850			0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1700	4421	1566	1750	4214	1521	1750	1783	0	1733	1842	1536
Flt Permitted	0.262			0.126			0.426			0.706		
Satd. Flow (perm)	467	4421	1500	232	4214	1456	781	1783	0	1279	1842	1502
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			300			91		15				104
Link Speed (k/h)		70			70			70			60	
Link Distance (m)		432.7			376.8			331.2			134.2	
Travel Time (s)		22.3			19.4			17.0			8.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Adj. Flow (vph)	62	1445	387	21	785	41	78	64	15	88	319	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	1445	387	21	785	41	78	79	0	88	319	104
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		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	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Detector 1 Type	Cl+Ex	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	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	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	0.0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4



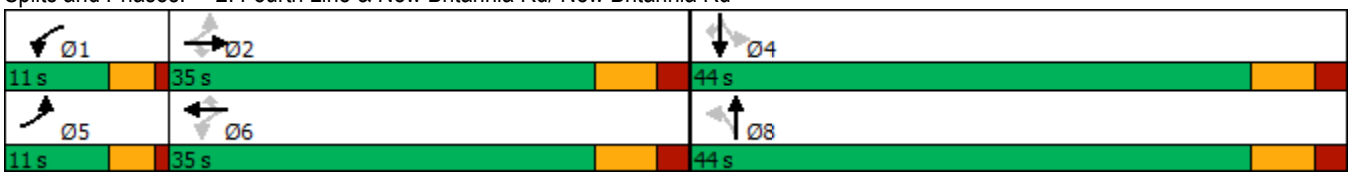
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.0	32.5	32.5	11.0	32.5	32.5	43.5	43.5		43.5	43.5	43.5
Total Split (s)	11.0	35.0	35.0	11.0	35.0	35.0	44.0	44.0		44.0	44.0	44.0
Total Split (%)	12.2%	38.9%	38.9%	12.2%	38.9%	38.9%	48.9%	48.9%		48.9%	48.9%	48.9%
Maximum Green (s)	7.0	28.5	28.5	7.0	28.5	28.5	37.5	37.5		37.5	37.5	37.5
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	-3.0	-1.5	-3.0	-1.5	-1.5	-1.5	-1.5	-1.5		-1.5	-1.5	-1.5
Total Lost Time (s)	1.0	5.0	3.5	2.5	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Recall Mode	None	Max	Max	None	Max	Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		19.0	19.0		19.0	19.0	30.0	30.0		30.0	30.0	30.0
Pedestrian Calls (#/hr)		10	10		10	10	10	10		10	10	10
Act Effct Green (s)	40.7	33.2	34.7	38.2	31.0	31.0	22.7	22.7		22.7	22.7	22.7
Actuated g/C Ratio	0.58	0.47	0.50	0.55	0.44	0.44	0.32	0.32		0.32	0.32	0.32
v/c Ratio	0.14	0.69	0.43	0.07	0.42	0.06	0.31	0.13		0.21	0.53	0.19
Control Delay	9.1	20.0	6.2	9.8	16.9	0.4	21.7	14.7		18.7	22.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	9.1	20.0	6.2	9.8	16.9	0.4	21.7	14.7		18.7	22.9	4.6
LOS	A	C	A	A	B	A	C	B		B	C	A
Approach Delay		16.9			16.0			18.1			18.5	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	2.9	48.3	4.7	1.0	31.1	0.0	8.2	6.3		9.0	36.7	0.0
Queue Length 95th (m)	11.4	#138.0	33.8	5.4	59.2	0.7	18.1	14.5		18.3	57.4	8.6
Internal Link Dist (m)		408.7			352.8			307.2			110.2	
Turn Bay Length (m)	50.0		50.0	50.0		45.0	115.0			60.0		30.0
Base Capacity (vph)	453	2094	895	317	1868	696	450	1034		737	1062	910
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.14	0.69	0.43	0.07	0.42	0.06	0.17	0.08		0.12	0.30	0.11

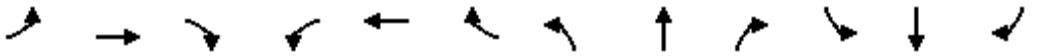
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 70			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 16.9		Intersection LOS: B	
Intersection Capacity Utilization 76.3%		ICU Level of Service D	
Analysis Period (min) 15			

* User Entered Value

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

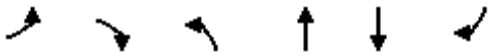
Splits and Phases: 2: Fourth Line & New Britannia Rd/ New Britannia Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	1358	364	20	738	39	73	60	14	83	300	98
Future Volume (vph)	58	1358	364	20	738	39	73	60	14	83	300	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	3.5	2.5	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	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		0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1698	4421	1507	1750	4214	1464	1744	1782		1724	1842	1503
Flt Permitted	0.26	1.00	1.00	0.13	1.00	1.00	0.43	1.00		0.71	1.00	1.00
Satd. Flow (perm)	469	4421	1507	232	4214	1464	781	1782		1280	1842	1503
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	62	1445	387	21	785	41	78	64	15	88	319	104
RTOR Reduction (vph)	0	0	156	0	0	23	0	10	0	0	0	71
Lane Group Flow (vph)	62	1445	231	21	785	18	78	69	0	88	319	33
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	35.3	31.6	31.6	32.7	30.3	30.3	21.2	21.2		21.2	21.2	21.2
Effective Green, g (s)	41.0	33.1	34.6	35.7	31.8	31.8	22.7	22.7		22.7	22.7	22.7
Actuated g/C Ratio	0.57	0.46	0.48	0.49	0.44	0.44	0.31	0.31		0.31	0.31	0.31
Clearance Time (s)	4.0	6.5	6.5	4.0	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	380	2026	722	196	1856	644	245	560		402	579	472
v/s Ratio Prot	c0.02	c0.33		0.01	0.19			0.04			c0.17	
v/s Ratio Perm	0.08		0.15	0.05		0.01	0.10			0.07		0.02
v/c Ratio	0.16	0.71	0.32	0.11	0.42	0.03	0.32	0.12		0.22	0.55	0.07
Uniform Delay, d1	7.2	15.7	11.6	10.6	13.9	11.4	18.9	17.6		18.2	20.5	17.3
Progression Factor	1.00	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	2.2	1.2	0.2	0.7	0.1	1.6	0.2		0.6	1.9	0.1
Delay (s)	7.3	17.9	12.7	10.9	14.6	11.5	20.4	17.9		18.8	22.5	17.5
Level of Service	A	B	B	B	B	B	C	B		B	C	B
Approach Delay (s)		16.5			14.4			19.1			20.8	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	72.2	Sum of lost time (s)	12.5
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

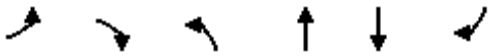


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	81	124	45	325	1130	25
Future Volume (vph)	81	124	45	325	1130	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	30.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Ped Bike Factor	0.99	0.98	1.00			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4421	1566
Flt Permitted	0.950		0.141			
Satd. Flow (perm)	1738	1532	259	4421	4421	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		138				16
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			279.9	448.4	
Travel Time (s)	25.2			14.4	23.1	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	90	138	50	361	1256	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	138	50	361	1256	28
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	10.2	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	7.0	7.0	10.0	10.0
Minimum Split (s)	42.0	42.0	11.0	31.4	31.4	31.4
Total Split (s)	42.0	42.0	11.0	48.0	37.0	37.0
Total Split (%)	46.7%	46.7%	12.2%	53.3%	41.1%	41.1%
Maximum Green (s)	38.0	38.0	7.0	41.6	30.6	30.6
Yellow Time (s)	3.0	3.0	3.0	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-3.0	-1.4	-1.4	-1.4
Total Lost Time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	31.0	31.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10		10	10	10
Act Effct Green (s)	16.1	13.1	51.4	47.3	40.6	40.6
Actuated g/C Ratio	0.23	0.19	0.74	0.68	0.58	0.58
v/c Ratio	0.22	0.35	0.12	0.12	0.49	0.03
Control Delay	20.0	6.2	6.1	6.0	12.8	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	6.2	6.1	6.0	12.8	9.0
LOS	C	A	A	A	B	A
Approach Delay	11.7			6.0	12.7	
Approach LOS	B			A	B	
Queue Length 50th (m)	8.6	0.0	0.8	4.0	34.9	0.6
Queue Length 95th (m)	17.1	9.9	9.4	20.4	100.0	6.8
Internal Link Dist (m)	325.5			255.9	424.4	
Turn Bay Length (m)	30.0		30.0			30.0
Base Capacity (vph)	1054	916	410	3006	2579	881
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.15	0.12	0.12	0.49	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 69.6			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 11.2		Intersection LOS: B	
Intersection Capacity Utilization 51.7%		ICU Level of Service A	
Analysis Period (min) 15			
* User Entered Value			

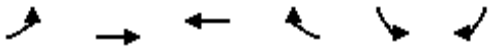
Splits and Phases: 3: James Snow Parkway & Street 1



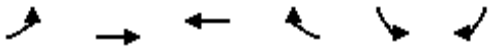
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	81	124	45	325	1130	25
Future Volume (vph)	81	124	45	325	1130	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1529	1750	4421	4421	1508
Flt Permitted	0.95	1.00	0.14	1.00	1.00	1.00
Satd. Flow (perm)	1750	1529	259	4421	4421	1508
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	90	138	50	361	1256	28
RTOR Reduction (vph)	0	113	0	0	0	7
Lane Group Flow (vph)	90	25	50	361	1256	21
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	13.1	13.1	47.5	47.5	39.2	39.2
Effective Green, g (s)	16.1	13.1	50.5	48.9	40.6	40.6
Actuated g/C Ratio	0.23	0.18	0.71	0.69	0.57	0.57
Clearance Time (s)	4.0	4.0	4.0	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	396	282	337	3044	2528	862
v/s Ratio Prot	c0.05		c0.02	0.08	c0.28	
v/s Ratio Perm		0.02	0.09			0.01
v/c Ratio	0.23	0.09	0.15	0.12	0.50	0.02
Uniform Delay, d1	22.4	24.0	3.6	3.7	9.1	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.2	0.1	0.7	0.1
Delay (s)	22.7	24.1	3.8	3.8	9.8	6.7
Level of Service	C	C	A	A	A	A
Approach Delay (s)	23.6			3.8	9.7	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	1449	784	15	19	15
Future Volume (vph)	8	1449	784	15	19	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.4	3.4
Storage Length (m)	50.0			40.0	30.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	60.0				15.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Ped Bike Factor	1.00			0.96	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4421	1566	1730	1548
Flt Permitted	0.290				0.950	
Satd. Flow (perm)	532	4421	4421	1499	1718	1515
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				16		16
Link Speed (k/h)		70	70		50	
Link Distance (m)		376.8	334.0		424.9	
Travel Time (s)		19.4	17.2		30.6	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1509	817	16	20	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	1509	817	16	20	16
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.4	
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	1.03	1.03
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-0.2	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-0.2	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	10.2	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

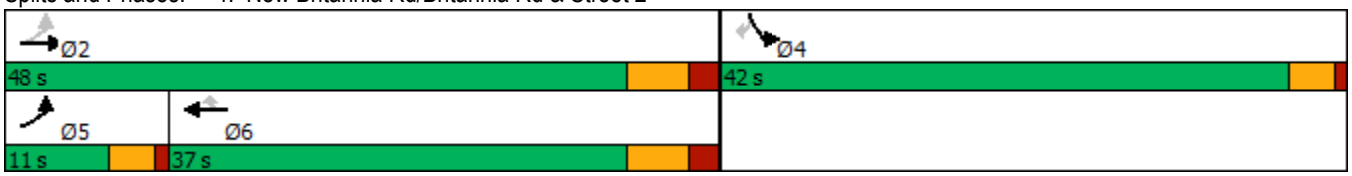


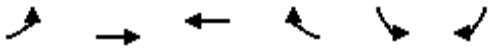
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	31.4	31.4	31.4	42.0	42.0
Total Split (s)	11.0	48.0	37.0	37.0	42.0	42.0
Total Split (%)	12.2%	53.3%	41.1%	41.1%	46.7%	46.7%
Maximum Green (s)	7.0	41.6	30.6	30.6	38.0	38.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.2	2.2	2.2	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.4	-1.4	-1.4	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		18.0	18.0	18.0	31.0	31.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	59.1	58.1	55.7	55.7	10.2	7.2
Actuated g/C Ratio	0.92	0.90	0.86	0.86	0.16	0.11
v/c Ratio	0.01	0.38	0.21	0.01	0.07	0.09
Control Delay	1.1	1.9	2.9	2.8	23.9	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.1	1.9	2.9	2.8	23.9	14.5
LOS	A	A	A	A	C	B
Approach Delay		1.9	2.9		19.7	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.0	0.0	0.0	0.0	2.0	0.0
Queue Length 95th (m)	0.6	28.2	26.5	2.1	6.5	4.4
Internal Link Dist (m)		352.8	310.0		400.9	
Turn Bay Length (m)	50.0			40.0	30.0	
Base Capacity (vph)	676	3984	3820	1297	1105	903
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.38	0.21	0.01	0.02	0.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 64.5			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 2.5		Intersection LOS: A	
Intersection Capacity Utilization 48.7%		ICU Level of Service A	
Analysis Period (min) 15			

* User Entered Value

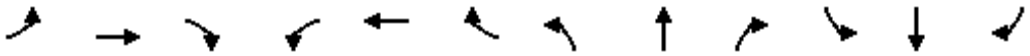
Splits and Phases: 4: New Britannia Rd/Britannia Rd & Street 2





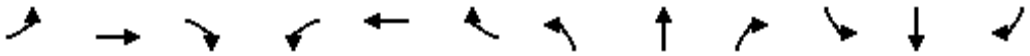
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	1449	784	15	19	15
Future Volume (vph)	8	1449	784	15	19	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.4	3.4
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Frpb, ped/bikes	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
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1748	4421	4421	1509	1730	1480
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	533	4421	4421	1509	1730	1480
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1509	817	16	20	16
RTOR Reduction (vph)	0	0	0	4	0	15
Lane Group Flow (vph)	8	1509	817	12	20	1
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	56.8	56.8	51.3	51.3	2.9	2.9
Effective Green, g (s)	59.8	58.2	52.7	52.7	5.9	2.9
Actuated g/C Ratio	0.85	0.83	0.75	0.75	0.08	0.04
Clearance Time (s)	4.0	6.4	6.4	6.4	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	532	3670	3323	1134	145	61
v/s Ratio Prot	0.00	c0.34	0.18		c0.01	
v/s Ratio Perm	0.01			0.01		0.00
v/c Ratio	0.02	0.41	0.25	0.01	0.14	0.01
Uniform Delay, d1	0.8	1.5	2.6	2.2	29.7	32.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3	0.2	0.0	0.4	0.1
Delay (s)	0.8	1.9	2.8	2.2	30.2	32.3
Level of Service	A	A	A	A	C	C
Approach Delay (s)		1.9	2.8		31.1	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	70.1	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
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)	2	6	2	2	6	2	2	153	2	2	510	2
Future Volume (vph)	2	6	2	2	6	2	2	153	2	2	510	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.973			0.998			0.999	
Flt Protected		0.990			0.990			0.999				
Satd. Flow (prot)	0	1774	0	0	1774	0	0	1837	0	0	1840	0
Flt Permitted		0.990			0.990			0.999				
Satd. Flow (perm)	0	1774	0	0	1774	0	0	1837	0	0	1840	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		226.2			228.8			134.2			437.6	
Travel Time (s)		16.3			16.5			8.1			26.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	2	6	2	2	6	2	2	153	2	2	510	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	10	0	0	157	0	0	514	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

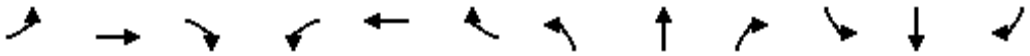
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	6	2	2	6	2	2	153	2	2	510	2
Future Volume (Veh/h)	2	6	2	2	6	2	2	153	2	2	510	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	6	2	2	6	2	2	153	2	2	510	2
Pedestrians		10			10			10			10	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134				
pX, platoon unblocked												
vC, conflicting volume	698	694	531	698	694	174	522			165		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698	694	531	698	694	174	522			165		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	100	99	98	100	100			100		
cM capacity (veh/h)	337	358	538	336	358	853	1034			1400		

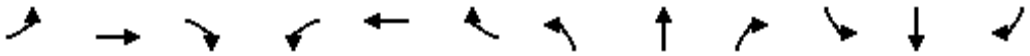
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	10	157	514
Volume Left	2	2	2	2
Volume Right	2	2	2	2
cSH	379	399	1034	1400
Volume to Capacity	0.03	0.03	0.00	0.00
Queue Length 95th (m)	0.6	0.6	0.0	0.0
Control Delay (s)	14.8	14.2	0.1	0.0
Lane LOS	B	B	A	A
Approach Delay (s)	14.8	14.2	0.1	0.0
Approach LOS	B	B		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A	
Analysis Period (min)	15			



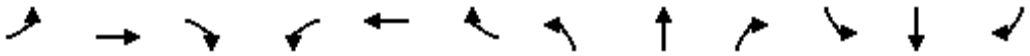
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	212	5	2	88	0	2	156	3	0	471	6
Future Volume (vph)	9	212	5	2	88	0	2	156	3	0	471	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997						0.997			0.998	
Flt Protected		0.998			0.999			0.999				
Satd. Flow (prot)	0	1812	0	0	1820	0	0	1835	0	0	1838	0
Flt Permitted		0.998			0.999			0.999				
Satd. Flow (perm)	0	1812	0	0	1820	0	0	1835	0	0	1838	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		90.1			324.1			437.6			702.9	
Travel Time (s)		6.5			23.3			26.3			42.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	9	212	5	2	88	0	2	156	3	0	471	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	226	0	0	90	0	0	161	0	0	477	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.03	1.03	1.03	1.03	1.03	1.03	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		



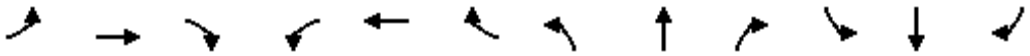
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	9	212	5	2	88	0	2	156	3	0	471	6
Future Volume (veh/h)	9	212	5	2	88	0	2	156	3	0	471	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	212	5	2	88	0	2	156	3	0	471	6
Approach Volume (veh/h)		226			90			161			477	
Crossing Volume (veh/h)		473			167			221			92	
High Capacity (veh/h)		954			1215			1165			1289	
High v/c (veh/h)		0.24			0.07			0.14			0.37	
Low Capacity (veh/h)		773			1007			962			1074	
Low v/c (veh/h)		0.29			0.09			0.17			0.44	

Intersection Summary				
Maximum v/c High	0.37			
Maximum v/c Low	0.44			
Intersection Capacity Utilization	47.8%	ICU Level of Service		A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	203	0	0	67	36	0	13	0	19	30	12
Future Volume (vph)	8	203	0	0	67	36	0	13	0	19	30	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.953						0.973	
Flt Protected		0.998									0.985	
Satd. Flow (prot)	0	1818	0	0	1736	0	0	1821	0	0	1746	0
Flt Permitted		0.998									0.985	
Satd. Flow (perm)	0	1818	0	0	1736	0	0	1821	0	0	1746	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		324.1			349.5			424.9			102.3	
Travel Time (s)		23.3			25.2			30.6			7.4	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	8	203	0	0	67	36	0	13	0	19	30	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	211	0	0	103	0	0	13	0	0	61	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.4			3.4	
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	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

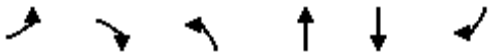
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	203	0	0	67	36	0	13	0	19	30	12
Future Volume (Veh/h)	8	203	0	0	67	36	0	13	0	19	30	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	203	0	0	67	36	0	13	0	19	30	12
Pedestrians		10			10			10			10	
Lane Width (m)		3.4			3.4			3.4			3.4	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					350							
pX, platoon unblocked												
vC, conflicting volume	113			213			351	342	223	330	324	105
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	113			213			351	342	223	330	324	105
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	98	100	97	95	99
cM capacity (veh/h)	1462			1344			551	566	801	589	579	932

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	211	103	13	61
Volume Left	8	0	0	19
Volume Right	0	36	0	12
cSH	1462	1344	566	630
Volume to Capacity	0.01	0.00	0.02	0.10
Queue Length 95th (m)	0.1	0.0	0.5	2.4
Control Delay (s)	0.3	0.0	11.5	11.3
Lane LOS	A		B	B
Approach Delay (s)	0.3	0.0	11.5	11.3
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	34.9%	ICU Level of Service	A	
Analysis Period (min)	15			

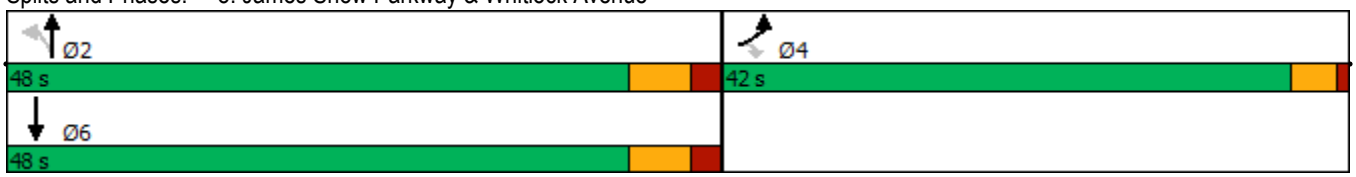


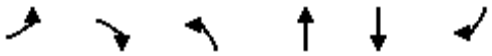
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	215	171	55	351	984	67
Future Volume (vph)	215	171	55	351	984	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	0.91
Ped Bike Factor	0.99	0.98	1.00		1.00	
Frt		0.850			0.990	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4365	0
Flt Permitted	0.950		0.194			
Satd. Flow (perm)	1738	1532	356	4421	4365	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		58			14	
Link Speed (k/h)	50			70	70	
Link Distance (m)	376.4			448.4	176.5	
Travel Time (s)	27.1			23.1	9.1	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	224	178	57	366	1025	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	224	178	57	366	1095	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)	25	15	25			15
Number of Detectors	1	1	1	1	1	
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	
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	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	
Total Split (s)	42.0	42.0	48.0	48.0	48.0	
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	
Maximum Green (s)	38.0	38.0	41.6	41.6	41.6	
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	31.0	31.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	10	10	10	10	10	
Act Effct Green (s)	19.8	16.7	44.3	44.3	44.3	
Actuated g/C Ratio	0.28	0.24	0.63	0.63	0.63	
v/c Ratio	0.45	0.44	0.25	0.13	0.40	
Control Delay	22.7	17.3	13.3	7.1	8.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.7	17.3	13.3	7.1	8.5	
LOS	C	B	B	A	A	
Approach Delay	20.3			7.9	8.5	
Approach LOS	C			A	A	
Queue Length 50th (m)	23.3	12.7	2.4	5.8	21.1	
Queue Length 95th (m)	38.7	26.2	16.1	20.7	65.6	
Internal Link Dist (m)	352.4			424.4	152.5	
Turn Bay Length (m)	30.0		100.0			
Base Capacity (vph)	1039	869	224	2790	2760	
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	0.20	0.25	0.13	0.40	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 70.2			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 10.8		Intersection LOS: B	
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 8: James Snow Parkway & Whitlock Avenue

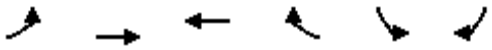




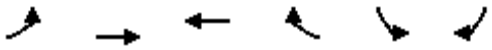
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	215	171	55	351	984	67
Future Volume (vph)	215	171	55	351	984	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1750	1531	1745	4421	4368	
Flt Permitted	0.95	1.00	0.19	1.00	1.00	
Satd. Flow (perm)	1750	1531	357	4421	4368	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	224	178	57	366	1025	70
RTOR Reduction (vph)	0	44	0	0	5	0
Lane Group Flow (vph)	224	134	57	366	1090	0
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	16.7	16.7	42.9	42.9	42.9	
Effective Green, g (s)	19.7	16.7	44.3	44.3	44.3	
Actuated g/C Ratio	0.28	0.24	0.63	0.63	0.63	
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	492	365	225	2797	2764	
v/s Ratio Prot	c0.13			0.08	c0.25	
v/s Ratio Perm		0.09	0.16			
v/c Ratio	0.46	0.37	0.25	0.13	0.39	
Uniform Delay, d1	20.7	22.2	5.6	5.1	6.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.6	2.7	0.1	0.4	
Delay (s)	21.4	22.9	8.3	5.2	6.7	
Level of Service	C	C	A	A	A	
Approach Delay (s)	22.0			5.7	6.7	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	130	940	1505	1125	469	140
Future Volume (vph)	130	940	1505	1125	469	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	125.0			150.0	0.0	0.0
Storage Lanes	1			1	2	2
Taper Length (m)	30.0				100.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Ped Bike Factor	1.00			0.98	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1716	4378	4421	1566	3395	2729
Flt Permitted	0.077				0.950	
Satd. Flow (perm)	139	4378	4421	1530	3363	2664
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				253		144
Link Speed (k/h)		70	70		70	
Link Distance (m)		334.0	512.5		143.0	
Travel Time (s)		17.2	26.4		7.4	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Adj. Flow (vph)	134	969	1552	1160	484	144
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	969	1552	1160	484	144
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		7.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	4	4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	4	4	4



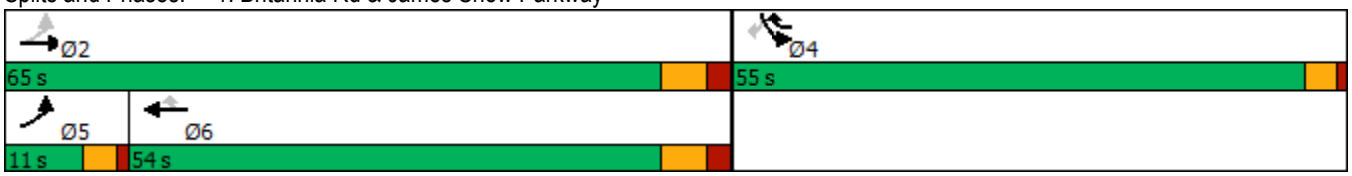
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	7.0	7.0	7.0
Minimum Split (s)	11.0	32.0	44.5	42.0	42.0	42.0
Total Split (s)	11.0	65.0	54.0	55.0	55.0	55.0
Total Split (%)	9.2%	54.2%	45.0%	45.8%	45.8%	45.8%
Maximum Green (s)	7.0	58.5	47.5	51.0	51.0	51.0
Yellow Time (s)	3.0	4.2	4.2	3.0	3.0	3.0
All-Red Time (s)	1.0	2.3	2.3	1.0	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.5	-1.5	0.0	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	4.0	1.0	4.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	None	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	64.6	60.5	49.4	90.9	43.5	40.5
Actuated g/C Ratio	0.59	0.55	0.45	0.83	0.40	0.37
v/c Ratio	0.60	0.40	0.78	0.88	0.36	0.13
Control Delay	30.0	16.3	30.8	12.7	23.6	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	16.3	30.8	12.7	23.6	3.7
LOS	C	B	C	B	C	A
Approach Delay		18.0	23.1		19.1	
Approach LOS		B	C		B	
Queue Length 50th (m)	13.1	51.0	121.2	54.6	36.8	0.0
Queue Length 95th (m)	#38.7	71.8	160.3	109.7	48.9	6.4
Internal Link Dist (m)		310.0	488.5		119.0	
Turn Bay Length (m)	125.0			150.0		
Base Capacity (vph)	225	2406	1984	1419	1679	1321
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.40	0.78	0.82	0.29	0.11

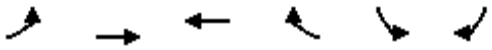
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 110.1			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 21.3		Intersection LOS: C	
Intersection Capacity Utilization 84.6%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

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

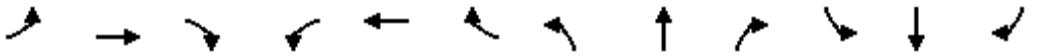
Splits and Phases: 1: Britannia Rd & James Snow Parkway



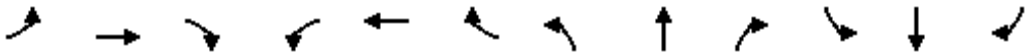


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	130	940	1505	1125	469	140
Future Volume (vph)	130	940	1505	1125	469	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	4.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Frpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1716	4378	4421	1547	3395	2665
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	139	4378	4421	1547	3395	2665
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	134	969	1552	1160	484	144
RTOR Reduction (vph)	0	0	0	50	0	91
Lane Group Flow (vph)	134	969	1552	1110	484	53
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	4	4	
Permitted Phases	2			6		4
Actuated Green, G (s)	59.0	59.0	47.9	88.4	40.5	40.5
Effective Green, g (s)	62.0	60.5	49.4	88.4	43.5	40.5
Actuated g/C Ratio	0.56	0.55	0.45	0.80	0.40	0.37
Clearance Time (s)	4.0	6.5	6.5	4.0	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	223	2407	1985	1243	1342	981
v/s Ratio Prot	c0.06	0.22	0.35	c0.33	0.14	
v/s Ratio Perm	0.28			0.39		0.02
v/c Ratio	0.60	0.40	0.78	0.89	0.36	0.05
Uniform Delay, d1	18.2	14.3	25.7	7.5	23.4	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.5	3.1	9.1	0.3	0.0
Delay (s)	22.1	14.8	28.9	16.6	23.8	22.4
Level of Service	C	B	C	B	C	C
Approach Delay (s)		15.7	23.6		23.5	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.6%	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)	75	1030	131	21	1611	59	420	229	44	50	64	53
Future Volume (vph)	75	1030	131	21	1611	59	420	229	44	50	64	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		45.0	115.0		0.0	60.0		30.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	50.0			60.0			60.0			60.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.95	1.00		0.95	0.99	1.00		0.99		0.98
Frt			0.850			0.850		0.976				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	4336	1566	1750	4421	1566	1750	1791	0	1750	1842	1566
Flt Permitted	0.079			0.173			0.714			0.476		
Satd. Flow (perm)	146	4336	1495	318	4421	1495	1305	1791	0	872	1842	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130			74		10				74
Link Speed (k/h)		70			70			70			60	
Link Distance (m)		432.7			376.8			331.2			134.2	
Travel Time (s)		22.3			19.4			17.0			8.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	77	1062	135	22	1661	61	433	236	45	52	66	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	1062	135	22	1661	61	433	281	0	52	66	55
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		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	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Detector 1 Type	Cl+Ex	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	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	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	0.0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4



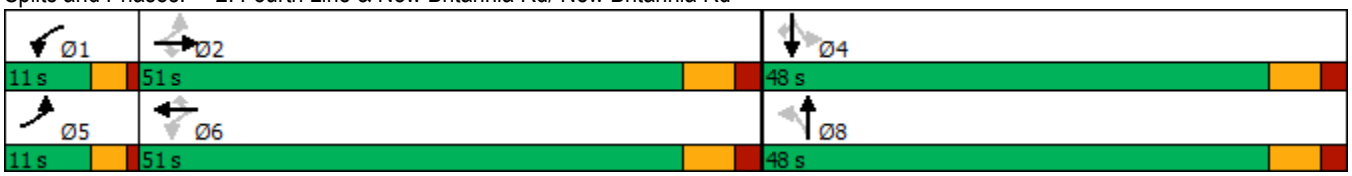
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.0	32.5	32.5	11.0	32.5	32.5	43.5	43.5		43.5	43.5	43.5
Total Split (s)	11.0	51.0	51.0	11.0	51.0	51.0	48.0	48.0		48.0	48.0	48.0
Total Split (%)	10.0%	46.4%	46.4%	10.0%	46.4%	46.4%	43.6%	43.6%		43.6%	43.6%	43.6%
Maximum Green (s)	7.0	44.5	44.5	7.0	44.5	44.5	41.5	41.5		41.5	41.5	41.5
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	-3.0	-1.5	-1.5	-3.0	-1.5	-1.5	-1.5	-1.5		-1.5	-1.5	-1.5
Total Lost Time (s)	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Recall Mode	None	Max	Max	None	Max	Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		19.0	19.0		19.0	19.0	30.0	30.0		30.0	30.0	30.0
Pedestrian Calls (#/hr)		10	10		10	10	10	10		10	10	10
Act Effct Green (s)	58.6	50.7	50.7	58.2	46.5	46.5	39.4	39.4		39.4	39.4	39.4
Actuated g/C Ratio	0.56	0.49	0.49	0.56	0.45	0.45	0.38	0.38		0.38	0.38	0.38
v/c Ratio	0.32	0.50	0.17	0.07	0.84	0.09	0.88	0.41		0.16	0.09	0.09
Control Delay	15.2	20.8	4.4	11.6	32.4	3.7	51.4	25.4		23.5	21.8	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	15.2	20.8	4.4	11.6	32.4	3.7	51.4	25.4		23.5	21.8	3.2
LOS	B	C	A	B	C	A	D	C		C	C	A
Approach Delay		18.7			31.1			41.1			16.4	
Approach LOS		B			C			D			B	
Queue Length 50th (m)	7.3	58.1	0.5	2.0	135.7	0.0	83.5	41.3		7.1	8.8	0.0
Queue Length 95th (m)	14.4	87.8	11.7	5.6	161.0	6.0	#139.2	63.4		15.9	17.7	5.2
Internal Link Dist (m)		408.7			352.8			307.2			110.2	
Turn Bay Length (m)	50.0		50.0	50.0		45.0	115.0			60.0		30.0
Base Capacity (vph)	237	2106	793	315	1970	707	543	752		363	767	680
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.32	0.50	0.17	0.07	0.84	0.09	0.80	0.37		0.14	0.09	0.08

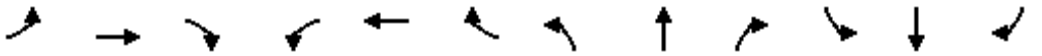
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 104.4			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 28.3		Intersection LOS: C	
Intersection Capacity Utilization 90.2%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

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

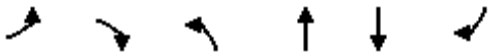
Splits and Phases: 2: Fourth Line & New Britannia Rd/ New Britannia Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	1030	131	21	1611	59	420	229	44	50	64	53
Future Volume (vph)	75	1030	131	21	1611	59	420	229	44	50	64	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	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	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1750	4336	1497	1749	4421	1497	1736	1791		1741	1842	1529
Flt Permitted	0.08	1.00	1.00	0.17	1.00	1.00	0.71	1.00		0.48	1.00	1.00
Satd. Flow (perm)	146	4336	1497	319	4421	1497	1305	1791		872	1842	1529
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	77	1062	135	22	1661	61	433	236	45	52	66	55
RTOR Reduction (vph)	0	0	68	0	0	34	0	6	0	0	0	35
Lane Group Flow (vph)	77	1062	67	22	1661	27	433	275	0	52	66	20
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	54.5	49.2	49.2	49.3	46.6	46.6	37.9	37.9		37.9	37.9	37.9
Effective Green, g (s)	58.9	50.7	50.7	55.3	48.1	48.1	39.4	39.4		39.4	39.4	39.4
Actuated g/C Ratio	0.55	0.47	0.47	0.52	0.45	0.45	0.37	0.37		0.37	0.37	0.37
Clearance Time (s)	4.0	6.5	6.5	4.0	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	205	2058	710	241	1991	674	481	660		321	679	564
v/s Ratio Prot	c0.03	0.24		0.00	c0.38			0.15			0.04	
v/s Ratio Perm	0.18		0.04	0.04		0.02	c0.33			0.06		0.01
v/c Ratio	0.38	0.52	0.09	0.09	0.83	0.04	0.90	0.42		0.16	0.10	0.04
Uniform Delay, d1	17.4	19.5	15.4	13.1	25.8	16.4	31.8	25.1		22.6	22.1	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.9	0.3	0.2	4.3	0.1	20.8	0.9		0.5	0.1	0.1
Delay (s)	18.2	20.4	15.7	13.3	30.1	16.5	52.6	26.0		23.1	22.2	21.6
Level of Service	B	C	B	B	C	B	D	C		C	C	C
Approach Delay (s)		19.8			29.5			42.1			22.3	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	106.8	Sum of lost time (s)	11.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

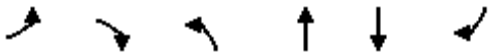


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	135	197	1168	495	127
Future Volume (vph)	79	135	197	1168	495	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	30.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Ped Bike Factor	0.99	0.98	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4421	1566
Flt Permitted	0.950		0.411			
Satd. Flow (perm)	1738	1532	751	4421	4421	1498
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		139				131
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			279.9	448.4	
Travel Time (s)	25.2			14.4	23.1	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	139	203	1204	510	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	139	203	1204	510	131
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	7.0	10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	11.0	31.4	31.4	31.4
Total Split (s)	42.0	42.0	15.0	48.0	33.0	33.0
Total Split (%)	46.7%	46.7%	16.7%	53.3%	36.7%	36.7%
Maximum Green (s)	38.0	38.0	11.0	41.6	26.6	26.6
Yellow Time (s)	3.0	3.0	3.0	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-3.0	-1.4	-1.4	-1.4
Total Lost Time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	31.0	31.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10		10	10	10
Act Effct Green (s)	15.7	12.6	48.7	44.6	32.4	32.4
Actuated g/C Ratio	0.24	0.19	0.73	0.67	0.49	0.49
v/c Ratio	0.20	0.34	0.28	0.41	0.24	0.16
Control Delay	19.5	6.2	6.2	7.5	12.7	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	6.2	6.2	7.5	12.7	4.4
LOS	B	A	A	A	B	A
Approach Delay	11.1			7.3	11.0	
Approach LOS	B			A	B	
Queue Length 50th (m)	7.7	0.0	3.6	16.4	11.4	0.0
Queue Length 95th (m)	15.8	10.0	30.1	74.5	38.9	11.9
Internal Link Dist (m)	325.5			255.9	424.4	
Turn Bay Length (m)	30.0		30.0			30.0
Base Capacity (vph)	1107	956	766	2967	2160	798
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.15	0.27	0.41	0.24	0.16

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 66.4			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.41			
Intersection Signal Delay: 8.7		Intersection LOS: A	
Intersection Capacity Utilization 55.7%		ICU Level of Service B	
Analysis Period (min) 15			
* User Entered Value			

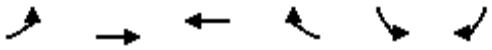
Splits and Phases: 3: James Snow Parkway & Street 1



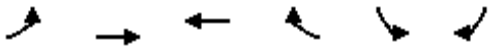
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	135	197	1168	495	127
Future Volume (vph)	79	135	197	1168	495	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1530	1746	4421	4421	1508
Flt Permitted	0.95	1.00	0.41	1.00	1.00	1.00
Satd. Flow (perm)	1750	1530	755	4421	4421	1508
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	139	203	1204	510	131
RTOR Reduction (vph)	0	113	0	0	0	66
Lane Group Flow (vph)	81	26	203	1204	510	65
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	12.6	12.6	43.2	43.2	31.2	31.2
Effective Green, g (s)	15.6	12.6	46.2	44.6	32.6	32.6
Actuated g/C Ratio	0.24	0.19	0.70	0.67	0.49	0.49
Clearance Time (s)	4.0	4.0	4.0	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	291	691	2978	2177	742
v/s Ratio Prot	c0.05		0.05	c0.27	0.12	
v/s Ratio Perm		0.02	0.16			0.04
v/c Ratio	0.20	0.09	0.29	0.40	0.23	0.09
Uniform Delay, d1	20.3	22.1	3.4	4.8	9.6	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	0.2	0.4	0.3	0.2
Delay (s)	20.5	22.2	3.7	5.3	9.9	9.1
Level of Service	C	C	A	A	A	A
Approach Delay (s)	21.6			5.0	9.7	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	1136	1709	23	8	3
Future Volume (vph)	9	1136	1709	23	8	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.4	3.4
Storage Length (m)	50.0			40.0	30.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	60.0				15.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Ped Bike Factor				0.96	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4421	1566	1730	1548
Flt Permitted	0.085				0.950	
Satd. Flow (perm)	157	4421	4421	1497	1717	1513
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				13		3
Link Speed (k/h)		70	70		50	
Link Distance (m)		376.8	334.0		424.9	
Travel Time (s)		19.4	17.2		30.6	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	1171	1762	24	8	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	1171	1762	24	8	3
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.4	
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	1.03	1.03
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

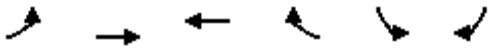


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	31.4	31.4	31.4	42.0	42.0
Total Split (s)	11.0	58.0	47.0	47.0	42.0	42.0
Total Split (%)	11.0%	58.0%	47.0%	47.0%	42.0%	42.0%
Maximum Green (s)	7.0	51.6	40.6	40.6	38.0	38.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.2	2.2	2.2	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.4	-1.4	-1.4	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		18.0	18.0	18.0	31.0	31.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	71.9	72.0	70.0	70.0	10.0	7.0
Actuated g/C Ratio	0.96	0.96	0.93	0.93	0.13	0.09
v/c Ratio	0.02	0.28	0.43	0.02	0.03	0.02
Control Delay	0.6	0.7	2.4	1.7	30.5	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.6	0.7	2.4	1.7	30.5	23.7
LOS	A	A	A	A	C	C
Approach Delay		0.7	2.4		28.6	
Approach LOS		A	A		C	
Queue Length 50th (m)	0.0	0.0	0.0	0.0	1.0	0.0
Queue Length 95th (m)	0.5	17.8	67.3	2.6	5.0	2.5
Internal Link Dist (m)		352.8	310.0		400.9	
Turn Bay Length (m)	50.0			40.0	30.0	
Base Capacity (vph)	364	4250	4132	1400	948	770
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.28	0.43	0.02	0.01	0.00

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 74.9			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.43			
Intersection Signal Delay: 1.8		Intersection LOS: A	
Intersection Capacity Utilization 53.7%		ICU Level of Service A	
Analysis Period (min) 15			

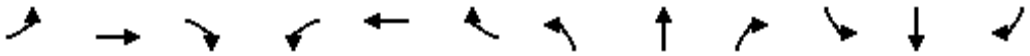
* User Entered Value

Splits and Phases: 4: New Britannia Rd/Britannia Rd & Street 2



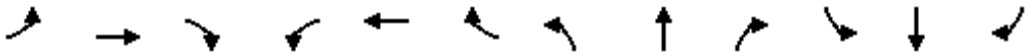
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	1136	1709	23	8	3
Future Volume (vph)	9	1136	1709	23	8	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.4	3.4
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.91
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1750	4421	4421	1506	1730	1413
Flt Permitted	0.09	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	157	4421	4421	1506	1730	1413
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	9	1171	1762	24	8	3
RTOR Reduction (vph)	0	0	0	2	0	3
Lane Group Flow (vph)	9	1171	1762	22	8	0
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	69.8	69.8	64.5	64.5	1.3	1.3
Effective Green, g (s)	72.8	71.2	65.9	65.9	4.3	1.3
Actuated g/C Ratio	0.89	0.87	0.81	0.81	0.05	0.02
Clearance Time (s)	4.0	6.4	6.4	6.4	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	224	3862	3574	1217	91	22
v/s Ratio Prot	0.00	c0.26	c0.40		c0.00	
v/s Ratio Perm	0.03			0.01		0.00
v/c Ratio	0.04	0.30	0.49	0.02	0.09	0.00
Uniform Delay, d1	0.8	0.9	2.5	1.5	36.7	39.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.2	0.5	0.0	0.4	0.0
Delay (s)	0.8	1.1	3.0	1.5	37.2	39.5
Level of Service	A	A	A	A	D	D
Approach Delay (s)		1.1	3.0		37.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	2.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	81.5	Sum of lost time (s)	7.0
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
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)	2	6	2	2	6	2	2	359	2	2	189	2
Future Volume (vph)	2	6	2	2	6	2	2	359	2	2	189	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.973			0.999			0.999	
Flt Protected		0.990			0.990						0.999	
Satd. Flow (prot)	0	1774	0	0	1774	0	0	1840	0	0	1838	0
Flt Permitted		0.990			0.990						0.999	
Satd. Flow (perm)	0	1774	0	0	1774	0	0	1840	0	0	1838	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		226.2			228.8			134.2			437.6	
Travel Time (s)		16.3			16.5			8.1			26.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	2	6	2	2	6	2	2	359	2	2	189	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	10	0	0	363	0	0	193	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

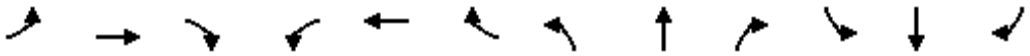
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	6	2	2	6	2	2	359	2	2	189	2
Future Volume (Veh/h)	2	6	2	2	6	2	2	359	2	2	189	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	6	2	2	6	2	2	359	2	2	189	2
Pedestrians		10			10			10			10	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134				
pX, platoon unblocked	0.90	0.90		0.90	0.90	0.90				0.90		
vC, conflicting volume	583	579	210	583	579	380	201			371		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	481	477	210	481	477	256	201			246		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	100	99	100	100			100		
cM capacity (veh/h)	424	429	814	424	429	691	1358			1177		

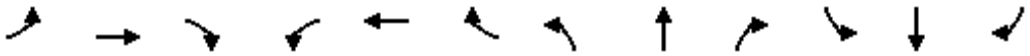
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	10	363	193
Volume Left	2	2	2	2
Volume Right	2	2	2	2
cSH	472	463	1358	1177
Volume to Capacity	0.02	0.02	0.00	0.00
Queue Length 95th (m)	0.5	0.5	0.0	0.0
Control Delay (s)	12.8	13.0	0.1	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	12.8	13.0	0.1	0.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	33.1%	ICU Level of Service	A	
Analysis Period (min)	15			



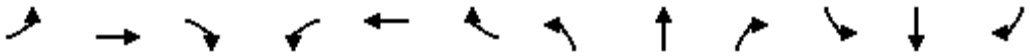
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	210	3	9	311	0	6	348	8	0	158	3
Future Volume (vph)	6	210	3	9	311	0	6	348	8	0	158	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998						0.997			0.997	
Flt Protected		0.999			0.999			0.999				
Satd. Flow (prot)	0	1816	0	0	1820	0	0	1835	0	0	1837	0
Flt Permitted		0.999			0.999			0.999				
Satd. Flow (perm)	0	1816	0	0	1820	0	0	1835	0	0	1837	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		90.1			324.1			437.6			702.9	
Travel Time (s)		6.5			23.3			26.3			42.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	6	210	3	9	311	0	6	348	8	0	158	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	219	0	0	320	0	0	362	0	0	161	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.03	1.03	1.03	1.03	1.03	1.03	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 50.7%		ICU Level of Service A	
Analysis Period (min) 15			



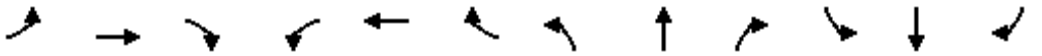
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	6	210	3	9	311	0	6	348	8	0	158	3
Future Volume (veh/h)	6	210	3	9	311	0	6	348	8	0	158	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	210	3	9	311	0	6	348	8	0	158	3
Approach Volume (veh/h)		219			320			362			161	
Crossing Volume (veh/h)		167			360			216			326	
High Capacity (veh/h)		1215			1044			1169			1072	
High v/c (veh/h)		0.18			0.31			0.31			0.15	
Low Capacity (veh/h)		1007			853			966			878	
Low v/c (veh/h)		0.22			0.38			0.37			0.18	

Intersection Summary				
Maximum v/c High	0.31			
Maximum v/c Low	0.38			
Intersection Capacity Utilization	50.7%	ICU Level of Service	A	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	218	0	0	298	29	0	29	0	21	20	6
Future Volume (vph)	11	218	0	0	298	29	0	29	0	21	20	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.988						0.983	
Flt Protected		0.998									0.978	
Satd. Flow (prot)	0	1818	0	0	1799	0	0	1821	0	0	1751	0
Flt Permitted		0.998									0.978	
Satd. Flow (perm)	0	1818	0	0	1799	0	0	1821	0	0	1751	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		324.1			349.5			424.9			102.3	
Travel Time (s)		23.3			25.2			30.6			7.4	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	11	218	0	0	298	29	0	29	0	21	20	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	229	0	0	327	0	0	29	0	0	47	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.4			3.4	
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	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

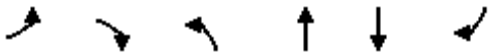
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.6%		ICU Level of Service A	
Analysis Period (min) 15			



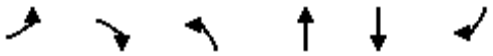
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	218	0	0	298	29	0	29	0	21	20	6
Future Volume (Veh/h)	11	218	0	0	298	29	0	29	0	21	20	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	218	0	0	298	29	0	29	0	21	20	6
Pedestrians		10			10			10			10	
Lane Width (m)		3.4			3.4			3.4			3.4	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					350							
pX, platoon unblocked												
vC, conflicting volume	337			228			588	587	238	587	572	332
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	337			228			588	587	238	587	572	332
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	93	100	95	95	99
cM capacity (veh/h)	1211			1328			386	410	786	383	418	696

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	229	327	29	47
Volume Left	11	0	0	21
Volume Right	0	29	0	6
cSH	1211	1328	410	422
Volume to Capacity	0.01	0.00	0.07	0.11
Queue Length 95th (m)	0.2	0.0	1.7	2.8
Control Delay (s)	0.5	0.0	14.4	14.6
Lane LOS	A		B	B
Approach Delay (s)	0.5	0.0	14.4	14.6
Approach LOS			B	B

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	37.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	147	106	162	1086	517	252
Future Volume (vph)	147	106	162	1086	517	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	0.91
Ped Bike Factor	0.99	0.98	0.99		0.99	
Frt		0.850			0.951	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4147	0
Flt Permitted	0.950		0.301			
Satd. Flow (perm)	1738	1532	552	4421	4147	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		109			188	
Link Speed (k/h)	50			70	70	
Link Distance (m)	357.2			448.4	152.3	
Travel Time (s)	25.7			23.1	7.8	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	152	109	167	1120	533	260
Shared Lane Traffic (%)						
Lane Group Flow (vph)	152	109	167	1120	793	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)	25	15	25			15
Number of Detectors	1	1	1	1	1	
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	
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	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						



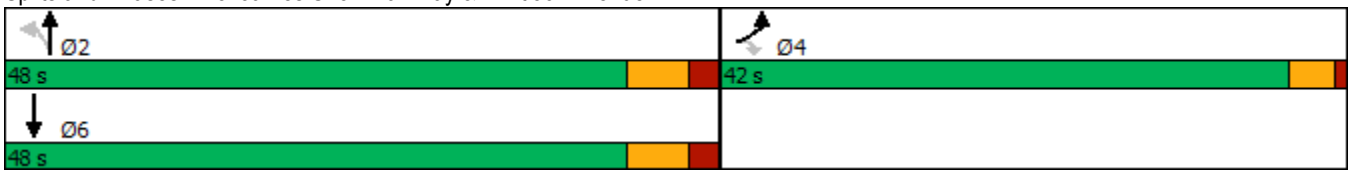
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	
Total Split (s)	42.0	42.0	48.0	48.0	48.0	
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	
Maximum Green (s)	38.0	38.0	41.6	41.6	41.6	
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	31.0	31.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	10	10	10	10	10	
Act Effct Green (s)	17.8	14.8	47.0	47.0	47.0	
Actuated g/C Ratio	0.25	0.21	0.66	0.66	0.66	
v/c Ratio	0.35	0.27	0.46	0.38	0.28	
Control Delay	21.8	5.8	15.3	7.8	5.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.8	5.8	15.3	7.8	5.5	
LOS	C	A	B	A	A	
Approach Delay	15.1			8.7	5.5	
Approach LOS	B			A	A	
Queue Length 50th (m)	15.1	0.0	7.0	18.2	8.5	
Queue Length 95th (m)	26.7	9.0	#50.6	68.0	35.9	
Internal Link Dist (m)	333.2			424.4	128.3	
Turn Bay Length (m)	30.0		100.0			
Base Capacity (vph)	1029	884	365	2929	2811	
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	0.15	0.12	0.46	0.38	0.28	

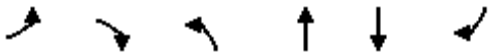
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 8.3		Intersection LOS: A	
Intersection Capacity Utilization 56.3%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

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

Splits and Phases: 8: James Snow Parkway & Whitlock Avenue





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	147	106	162	1086	517	252
Future Volume (vph)	147	106	162	1086	517	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1750	1530	1742	4421	4153	
Flt Permitted	0.95	1.00	0.30	1.00	1.00	
Satd. Flow (perm)	1750	1530	553	4421	4153	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	152	109	167	1120	533	260
RTOR Reduction (vph)	0	86	0	0	63	0
Lane Group Flow (vph)	152	23	167	1120	730	0
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	14.8	14.8	45.6	45.6	45.6	
Effective Green, g (s)	17.8	14.8	47.0	47.0	47.0	
Actuated g/C Ratio	0.25	0.21	0.66	0.66	0.66	
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	439	319	367	2934	2756	
v/s Ratio Prot	c0.09			0.25	0.18	
v/s Ratio Perm		0.01	c0.30			
v/c Ratio	0.35	0.07	0.46	0.38	0.26	
Uniform Delay, d1	21.7	22.5	5.7	5.4	4.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.1	4.0	0.4	0.2	
Delay (s)	22.2	22.6	9.8	5.7	5.1	
Level of Service	C	C	A	A	A	
Approach Delay (s)	22.4			6.3	5.1	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	6.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: 101 [Fourth Line & Street 1 2026 FB AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fourth Line												
1	L2	2	2.0	0.186	1.2	LOS A	0.8	5.8	0.41	0.27	0.41	53.0
2	T1	156	2.0	0.186	1.2	LOS A	0.8	5.8	0.41	0.27	0.41	56.2
3	R2	3	2.0	0.186	1.2	LOS A	0.8	5.8	0.41	0.27	0.41	50.8
Approach		161	2.0	0.186	1.2	LOS A	0.8	5.8	0.41	0.27	0.41	56.1
East: Street 1												
4	L2	2	2.0	0.098	0.8	LOS A	0.4	2.7	0.32	0.17	0.32	52.8
5	T1	88	2.0	0.098	0.8	LOS A	0.4	2.7	0.32	0.17	0.32	49.2
6	R2	1	2.0	0.098	0.8	LOS A	0.4	2.7	0.32	0.17	0.32	51.2
Approach		91	2.0	0.098	0.8	LOS A	0.4	2.7	0.32	0.17	0.32	49.3
North: Fourth Line												
7	L2	1	2.0	0.473	0.7	LOS A	3.0	21.1	0.36	0.20	0.36	53.2
8	T1	471	2.0	0.473	0.7	LOS A	3.0	21.1	0.36	0.20	0.36	56.5
9	R2	6	2.0	0.473	0.7	LOS A	3.0	21.1	0.36	0.20	0.36	51.1
Approach		478	2.0	0.473	0.7	LOS A	3.0	21.1	0.36	0.20	0.36	56.4
West: Street 1												
10	L2	9	2.0	0.340	3.0	LOS A	1.5	10.5	0.61	0.53	0.61	51.5
11	T1	212	2.0	0.340	3.0	LOS A	1.5	10.5	0.61	0.53	0.61	48.0
12	R2	5	2.0	0.340	3.0	LOS A	1.5	10.5	0.61	0.53	0.61	49.9
Approach		226	2.0	0.340	3.0	LOS A	1.5	10.5	0.61	0.53	0.61	48.2
All Vehicles		956	2.0	0.473	1.3	LOS A	3.0	21.1	0.42	0.29	0.42	53.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Fourth Line & Street 1 2026 FB PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fourth Line												
1	L2	6	2.0	0.411	1.5	LOS A	2.2	15.4	0.49	0.33	0.49	52.6
2	T1	348	2.0	0.411	1.5	LOS A	2.2	15.4	0.49	0.33	0.49	55.8
3	R2	8	2.0	0.411	1.5	LOS A	2.2	15.4	0.49	0.33	0.49	50.5
Approach		362	2.0	0.411	1.5	LOS A	2.2	15.4	0.49	0.33	0.49	55.6
East: Street 1												
4	L2	9	2.0	0.430	2.7	LOS A	2.2	15.9	0.61	0.49	0.64	51.5
5	T1	311	2.0	0.430	2.7	LOS A	2.2	15.9	0.61	0.49	0.64	48.0
6	R2	1	2.0	0.430	2.7	LOS A	2.2	15.9	0.61	0.49	0.64	50.0
Approach		321	2.0	0.430	2.7	LOS A	2.2	15.9	0.61	0.49	0.64	48.1
North: Fourth Line												
7	L2	1	2.0	0.211	1.8	LOS A	0.9	6.5	0.50	0.37	0.50	52.6
8	T1	158	2.0	0.211	1.8	LOS A	0.9	6.5	0.50	0.37	0.50	55.8
9	R2	3	2.0	0.211	1.8	LOS A	0.9	6.5	0.50	0.37	0.50	50.5
Approach		162	2.0	0.211	1.8	LOS A	0.9	6.5	0.50	0.37	0.50	55.7
West: Street 1												
10	L2	6	2.0	0.237	0.9	LOS A	1.1	7.7	0.37	0.20	0.37	52.6
11	T1	210	2.0	0.237	0.9	LOS A	1.1	7.7	0.37	0.20	0.37	49.0
12	R2	3	2.0	0.237	0.9	LOS A	1.1	7.7	0.37	0.20	0.37	51.0
Approach		219	2.0	0.237	0.9	LOS A	1.1	7.7	0.37	0.20	0.37	49.1
All Vehicles		1064	2.0	0.430	1.8	LOS A	2.2	15.9	0.50	0.36	0.51	51.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix R

Signal Warrants

James Snow Parkway & Street 1
2026 FB Additional Scenario

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	874	121%	92%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	157	92%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	770	107%	53%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	40	53%		

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

James Snow Parkway & Street 1
2026 FT Additional Scenario

Justification #7

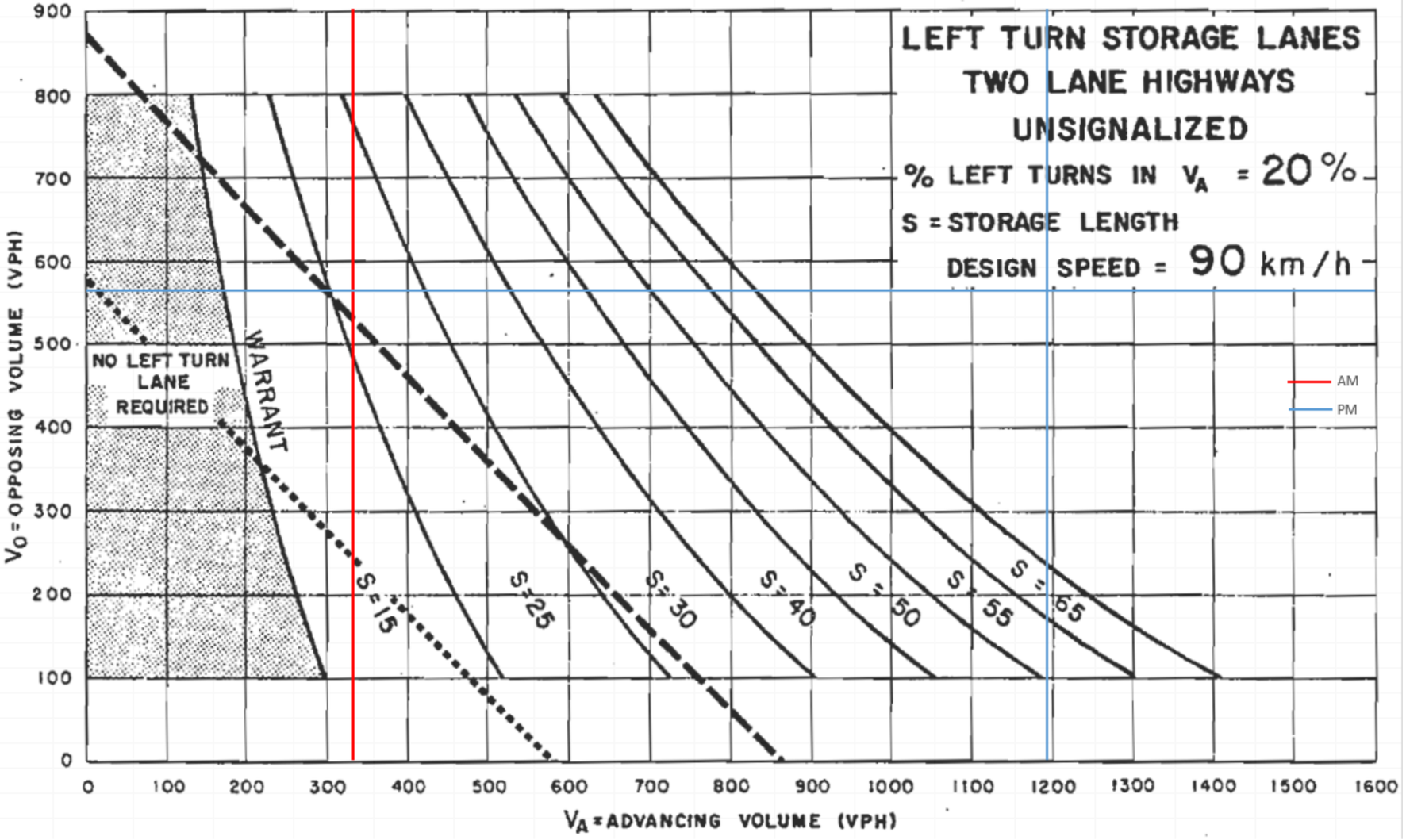
Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	968	134%	134%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	230	135%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	815	113%	96%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	72	96%		

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

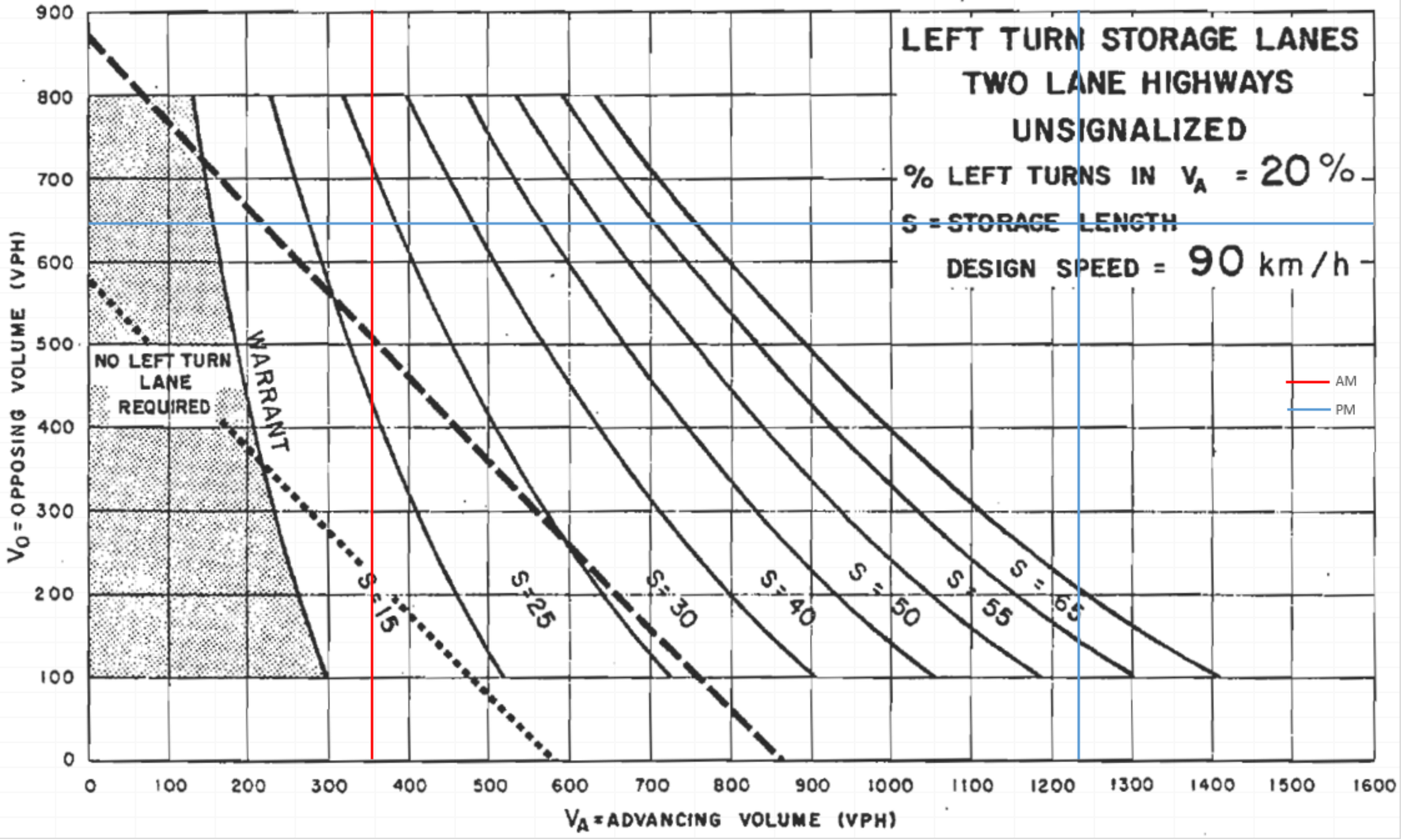
Appendix S

Left-turn Lane Warrants

Design Speed	Northbound Left	2026 FB						Yes									
90 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
	AM	81	0	124	0	0	0	45	286	0	0	966	25	13.6%	331	991	
	PM	79	0	135	0	0	0	197	995	0	0	437	127	16.5%	1192	564	

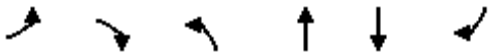

LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 20 %
S = STORAGE LENGTH
DESIGN SPEED = 90 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Design Speed	Northbound Left	2026 FT						Yes									
90 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing	
	AM	160	0	163	0	0	0	66	286	0	0	966	67	18.8%	352	1033	
	PM	129	0	160	0	0	0	237	995	0	0	437	207	19.2%	1232	644	


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 20 %
S = STORAGE LENGTH
DESIGN SPEED = 90 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S=15
S=25
S=30
S=40
S=50
S=55
S=65
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
900
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Appendix T

2026 Future Background Additional Analysis Synchro Worksheet



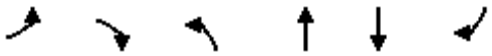
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	81	124	45	286	966	25
Future Volume (vph)	81	124	45	286	966	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0	0.0	30.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1750	1566	1750	1842	1842	1566
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	84	129	47	298	1006	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	129	47	298	1006	26
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)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.5%		ICU Level of Service C	
Analysis Period (min) 15			
* User Entered Value			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	81	124	45	286	966	25
Future Volume (Veh/h)	81	124	45	286	966	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	84	129	47	298	1006	26
Pedestrians	10			10	10	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1418	1026	1042			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1418	1026	1042			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	39	54	93			
cM capacity (veh/h)	137	279	661			

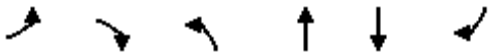
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	84	129	47	298	1006	26
Volume Left	84	0	47	0	0	0
Volume Right	0	129	0	0	0	26
cSH	137	279	661	1700	1700	1700
Volume to Capacity	0.61	0.46	0.07	0.18	0.59	0.02
Queue Length 95th (m)	24.3	17.4	1.7	0.0	0.0	0.0
Control Delay (s)	65.6	28.5	10.9	0.0	0.0	0.0
Lane LOS	F	D	B			
Approach Delay (s)	43.1		1.5		0.0	
Approach LOS	E					

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	135	197	995	437	127
Future Volume (vph)	79	135	197	995	437	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0	0.0	30.0			30.0
Storage Lanes	1	1	1			1
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		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1750	1566	1750	1842	1842	1566
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	139	203	1026	451	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	139	203	1026	451	131
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)	25	15	25			15
Sign Control	Stop			Free	Free	

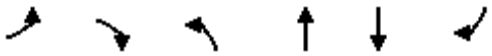
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.0%		ICU Level of Service C	
Analysis Period (min) 15			
* User Entered Value			



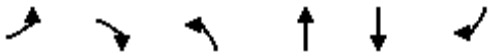
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	79	135	197	995	437	127
Future Volume (Veh/h)	79	135	197	995	437	127
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	81	139	203	1026	451	131
Pedestrians	10			10	10	
Lane Width (m)	3.5			3.5	3.5	
Walking Speed (m/s)	1.0			1.0	1.0	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1903	471	592			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1903	471	592			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	76	79			
cM capacity (veh/h)	59	581	974			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	81	139	203	1026	451	131
Volume Left	81	0	203	0	0	0
Volume Right	0	139	0	0	0	131
cSH	59	581	974	1700	1700	1700
Volume to Capacity	1.38	0.24	0.21	0.60	0.27	0.08
Queue Length 95th (m)	53.8	7.0	6.0	0.0	0.0	0.0
Control Delay (s)	364.1	13.1	9.7	0.0	0.0	0.0
Lane LOS	F	B	A			
Approach Delay (s)	142.3		1.6		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	16.4		
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		



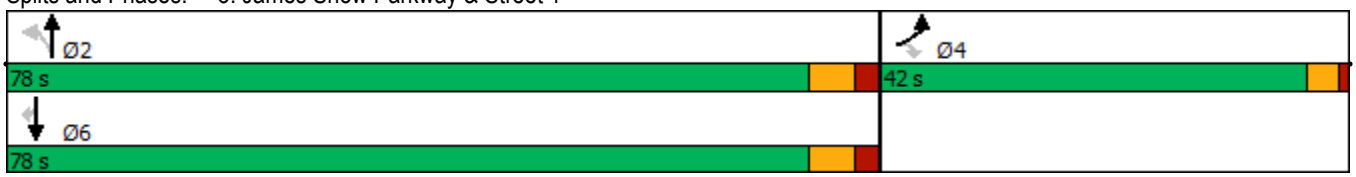
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	81	124	45	286	966	25
Future Volume (vph)	81	124	45	286	966	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	40.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Ped Bike Factor	0.98	0.95				0.95
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.211			
Satd. Flow (perm)	1714	1494	389	1842	1842	1493
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		117				9
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	84	129	47	298	1006	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	129	47	298	1006	26
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	10.2	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						

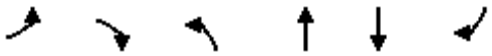


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	31.4
Total Split (s)	42.0	42.0	78.0	78.0	78.0	78.0
Total Split (%)	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%
Maximum Green (s)	38.0	38.0	71.6	71.6	71.6	71.6
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	1.4
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	22.0	22.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10	10	10	10	10
Act Effct Green (s)	15.9	12.9	77.2	77.2	77.2	74.4
Actuated g/C Ratio	0.16	0.13	0.78	0.78	0.78	0.75
v/c Ratio	0.30	0.44	0.16	0.21	0.70	0.02
Control Delay	37.2	13.0	6.0	4.3	10.8	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	13.0	6.0	4.3	10.8	4.0
LOS	D	B	A	A	B	A
Approach Delay	22.5			4.5	10.6	
Approach LOS	C			A	B	
Queue Length 50th (m)	13.6	2.0	1.5	9.7	60.4	0.6
Queue Length 95th (m)	25.8	16.3	9.1	36.2	218.6	4.4
Internal Link Dist (m)	325.5			219.5	200.2	
Turn Bay Length (m)	30.0		40.0			30.0
Base Capacity (vph)	728	648	302	1434	1434	1122
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.20	0.16	0.21	0.70	0.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 99.1			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 71.4%		ICU Level of Service C	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 3: James Snow Parkway & Street 1

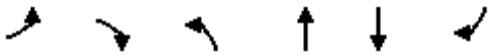




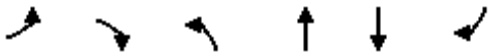
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	81	124	45	286	966	25
Future Volume (vph)	81	124	45	286	966	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1486	1745	1842	1842	1500
Flt Permitted	0.95	1.00	0.21	1.00	1.00	1.00
Satd. Flow (perm)	1750	1486	388	1842	1842	1500
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	84	129	47	298	1006	26
RTOR Reduction (vph)	0	102	0	0	0	2
Lane Group Flow (vph)	84	27	47	298	1006	24
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	12.9	12.9	75.7	75.7	75.7	75.7
Effective Green, g (s)	15.9	12.9	77.1	77.1	77.1	74.3
Actuated g/C Ratio	0.16	0.13	0.78	0.78	0.78	0.75
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	193	302	1434	1434	1125
v/s Ratio Prot	c0.05			0.16	c0.55	
v/s Ratio Perm		0.02	0.12			0.02
v/c Ratio	0.30	0.14	0.16	0.21	0.70	0.02
Uniform Delay, d1	36.6	38.1	2.8	2.9	5.3	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.3	1.1	0.3	2.9	0.0
Delay (s)	37.2	38.5	3.9	3.2	8.2	3.2
Level of Service	D	D	A	A	A	A
Approach Delay (s)	38.0			3.3	8.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	71.4%	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)	79	135	197	995	437	127
Future Volume (vph)	79	135	197	995	437	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0	0.0	40.0			30.0
Storage Lanes	1	1	1			1
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	0.98	0.96	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.486			
Satd. Flow (perm)	1720	1498	887	1842	1842	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		139				127
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	139	203	1026	451	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	139	203	1026	451	131
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-0.2	-2.0	-2.0	-0.2
Detector 1 Position(m)	-2.0	-2.0	-0.2	-2.0	-2.0	-0.2
Detector 1 Size(m)	12.0	12.0	10.2	12.0	12.0	10.2
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						



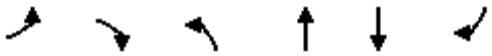
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.0	33.0	31.4	31.4	31.4	31.4
Total Split (s)	33.0	33.0	67.0	67.0	67.0	67.0
Total Split (%)	33.0%	33.0%	67.0%	67.0%	67.0%	67.0%
Maximum Green (s)	29.0	29.0	60.6	60.6	60.6	60.6
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	1.4
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	22.0	22.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10	10	10	10	10
Act Effct Green (s)	15.4	12.4	66.2	66.2	66.2	63.3
Actuated g/C Ratio	0.18	0.14	0.76	0.76	0.76	0.72
v/c Ratio	0.26	0.42	0.30	0.74	0.32	0.12
Control Delay	30.9	9.3	6.4	12.6	5.5	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	9.3	6.4	12.6	5.5	1.7
LOS	C	A	A	B	A	A
Approach Delay	17.3			11.5	4.6	
Approach LOS	B			B	A	
Queue Length 50th (m)	11.1	0.0	6.8	59.9	15.5	0.2
Queue Length 95th (m)	22.0	13.3	32.2	#258.3	59.5	7.3
Internal Link Dist (m)	325.5			219.5	200.2	
Turn Bay Length (m)	60.0		40.0			30.0
Base Capacity (vph)	644	592	669	1391	1391	1119
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.23	0.30	0.74	0.32	0.12

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 87.6			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 70.9%		ICU Level of Service C	
Analysis Period (min) 15			

* User Entered Value

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

Splits and Phases: 3: James Snow Parkway & Street 1



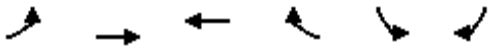
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	79	135	197	995	437	127
Future Volume (vph)	79	135	197	995	437	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1491	1734	1842	1842	1504
Flt Permitted	0.95	1.00	0.49	1.00	1.00	1.00
Satd. Flow (perm)	1750	1491	887	1842	1842	1504
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	139	203	1026	451	131
RTOR Reduction (vph)	0	119	0	0	0	35
Lane Group Flow (vph)	81	20	203	1026	451	96
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	12.4	12.4	64.8	64.8	64.8	64.8
Effective Green, g (s)	15.4	12.4	66.2	66.2	66.2	63.4
Actuated g/C Ratio	0.18	0.14	0.76	0.76	0.76	0.72
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	307	211	670	1392	1392	1088
v/s Ratio Prot	c0.05			c0.56	0.24	
v/s Ratio Perm		0.01	0.23			0.06
v/c Ratio	0.26	0.09	0.30	0.74	0.32	0.09
Uniform Delay, d1	31.2	32.7	3.4	5.9	3.5	3.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	1.2	3.5	0.6	0.2
Delay (s)	31.7	32.9	4.6	9.4	4.1	3.7
Level of Service	C	C	A	A	A	A
Approach Delay (s)	32.4			8.6	4.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	87.6	Sum of lost time (s)	6.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

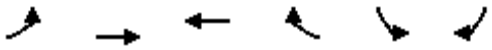
c Critical Lane Group

Appendix U

2026 Future Total Synchro and Sidra Worksheets



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	128	1367	677	234	1137	141
Future Volume (vph)	128	1367	677	234	1137	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	125.0			150.0	0.0	0.0
Storage Lanes	1			1	2	2
Taper Length (m)	30.0				100.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Ped Bike Factor	1.00			0.98	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4175	1479	3395	2677
Flt Permitted	0.260				0.950	
Satd. Flow (perm)	477	4421	4175	1442	3363	2614
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				244		147
Link Speed (k/h)		70	70		70	
Link Distance (m)		334.0	512.5		143.0	
Travel Time (s)		17.2	26.4		7.4	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Adj. Flow (vph)	133	1424	705	244	1184	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	1424	705	244	1184	147
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		7.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-0.2	-0.2
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-0.2	-0.2
Detector 1 Size(m)	12.0	12.0	12.0	12.0	10.2	10.2
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

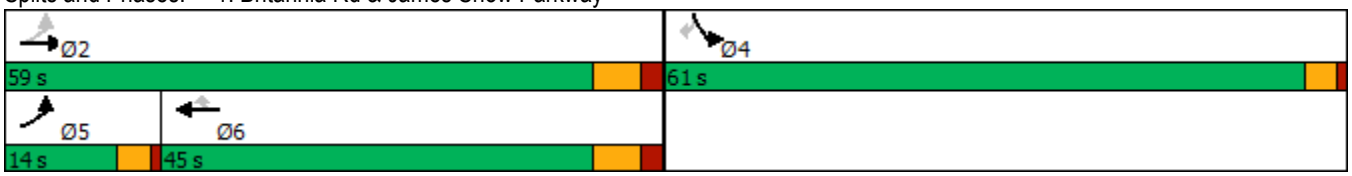


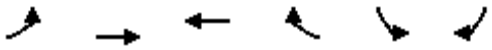
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	32.0	44.5	44.5	42.0	42.0
Total Split (s)	14.0	59.0	45.0	45.0	61.0	61.0
Total Split (%)	11.7%	49.2%	37.5%	37.5%	50.8%	50.8%
Maximum Green (s)	10.0	52.5	38.5	38.5	57.0	57.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.3	2.3	2.3	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.5	-1.5	-1.5	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	58.3	54.3	41.3	41.3	52.8	49.8
Actuated g/C Ratio	0.52	0.48	0.37	0.37	0.47	0.44
v/c Ratio	0.35	0.67	0.46	0.36	0.75	0.12
Control Delay	18.6	25.5	29.9	5.2	27.8	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	25.5	29.9	5.2	27.8	3.0
LOS	B	C	C	A	C	A
Approach Delay		25.0	23.6		25.1	
Approach LOS		C	C		C	
Queue Length 50th (m)	15.7	102.6	51.7	0.0	106.8	0.0
Queue Length 95th (m)	28.7	130.8	69.5	17.4	130.9	5.8
Internal Link Dist (m)		310.0	488.5		119.0	
Turn Bay Length (m)	125.0			150.0		
Base Capacity (vph)	392	2121	1523	681	1809	1396
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.67	0.46	0.36	0.65	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 113.1			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 24.7		Intersection LOS: C	
Intersection Capacity Utilization 82.0%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

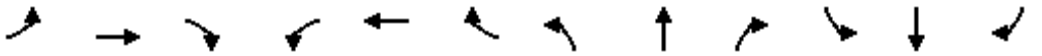
Splits and Phases: 1: Britannia Rd & James Snow Parkway



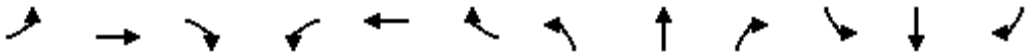


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	128	1367	677	234	1137	141
Future Volume (vph)	128	1367	677	234	1137	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1749	4421	4175	1444	3395	2615
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	478	4421	4175	1444	3395	2615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	133	1424	705	244	1184	147
RTOR Reduction (vph)	0	0	0	155	0	82
Lane Group Flow (vph)	133	1424	705	89	1184	65
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	2%	2%	8%	8%	2%	5%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	52.8	52.8	39.8	39.8	49.8	49.8
Effective Green, g (s)	55.8	54.3	41.3	41.3	52.8	49.8
Actuated g/C Ratio	0.49	0.48	0.37	0.37	0.47	0.44
Clearance Time (s)	4.0	6.5	6.5	6.5	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	370	2122	1524	527	1584	1151
v/s Ratio Prot	0.04	c0.32	0.17		c0.35	
v/s Ratio Perm	0.14			0.06		0.02
v/c Ratio	0.36	0.67	0.46	0.17	0.75	0.06
Uniform Delay, d1	16.3	22.6	27.4	24.3	24.7	18.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.7	1.0	0.7	2.4	0.0
Delay (s)	16.7	24.3	28.4	25.0	27.1	18.2
Level of Service	B	C	C	C	C	B
Approach Delay (s)		23.6	27.5		26.1	
Approach LOS		C	C		C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	113.1	Sum of lost time (s)	7.0
Intersection Capacity Utilization	82.0%	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)	69	1400	364	20	817	39	73	60	14	83	300	118
Future Volume (vph)	69	1400	364	20	817	39	73	60	14	83	300	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		45.0	155.0		0.0	60.0		30.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	50.0			60.0			60.0			60.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96			0.96	1.00	1.00		0.99		0.98
Frt			0.850			0.850		0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1700	4421	1566	1750	4214	1521	1750	1783	0	1733	1842	1536
Flt Permitted	0.225			0.123			0.413			0.706		
Satd. Flow (perm)	401	4421	1500	227	4214	1456	757	1783	0	1279	1842	1502
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			291			91		15				126
Link Speed (k/h)		70			70			70			60	
Link Distance (m)		432.7			376.8			331.2			134.2	
Travel Time (s)		22.3			19.4			17.0			8.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Adj. Flow (vph)	73	1489	387	21	869	41	78	64	15	88	319	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	1489	387	21	869	41	78	79	0	88	319	126
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		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	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Detector 1 Type	Cl+Ex	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	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	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	0.0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4



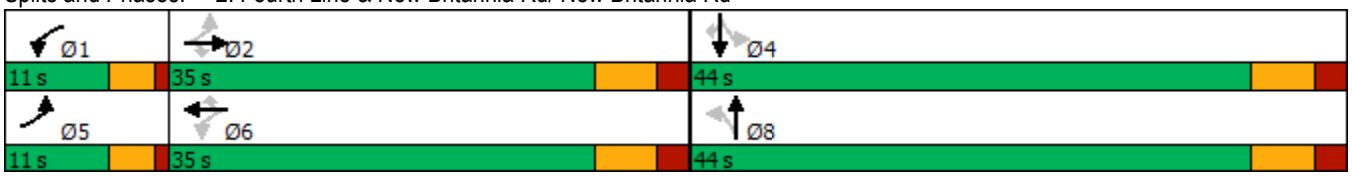
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.0	32.5	32.5	11.0	32.5	32.5	43.5	43.5		43.5	43.5	43.5
Total Split (s)	11.0	35.0	35.0	11.0	35.0	35.0	44.0	44.0		44.0	44.0	44.0
Total Split (%)	12.2%	38.9%	38.9%	12.2%	38.9%	38.9%	48.9%	48.9%		48.9%	48.9%	48.9%
Maximum Green (s)	7.0	28.5	28.5	7.0	28.5	28.5	37.5	37.5		37.5	37.5	37.5
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	-3.0	-1.5	-3.0	-1.5	-1.5	-1.5	-1.5	-1.5		-1.5	-1.5	-1.5
Total Lost Time (s)	1.0	5.0	3.5	2.5	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Recall Mode	None	Max	Max	None	Max	Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		19.0	19.0		19.0	19.0	30.0	30.0		30.0	30.0	30.0
Pedestrian Calls (#/hr)		10	10		10	10	10	10		10	10	10
Act Effct Green (s)	42.9	35.3	36.9	39.9	30.8	30.8	22.7	22.7		22.7	22.7	22.7
Actuated g/C Ratio	0.59	0.49	0.51	0.55	0.43	0.43	0.31	0.31		0.31	0.31	0.31
v/c Ratio	0.17	0.69	0.43	0.07	0.48	0.06	0.33	0.14		0.22	0.55	0.23
Control Delay	9.2	20.0	6.5	9.8	18.4	0.4	22.9	15.1		19.4	24.2	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	9.2	20.0	6.5	9.8	18.4	0.4	22.9	15.1		19.4	24.2	4.5
LOS	A	B	A	A	B	A	C	B		B	C	A
Approach Delay		16.9			17.5			19.0			18.7	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	3.5	50.6	5.2	1.0	35.2	0.0	8.3	6.3		9.0	36.7	0.0
Queue Length 95th (m)	13.0	#144.7	35.6	5.4	66.5	0.7	18.3	14.5		18.3	57.4	9.4
Internal Link Dist (m)		408.7			352.8			307.2			110.2	
Turn Bay Length (m)	50.0		50.0	50.0		45.0	155.0			60.0		30.0
Base Capacity (vph)	423	2162	908	309	1799	673	420	996		710	1022	890
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.17	0.69	0.43	0.07	0.48	0.06	0.19	0.08		0.12	0.31	0.14

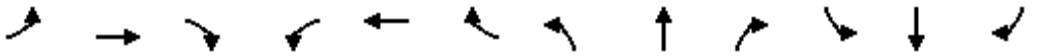
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 72.2			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 77.1%		ICU Level of Service D	
Analysis Period (min) 15			

* User Entered Value

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

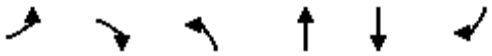
Splits and Phases: 2: Fourth Line & New Britannia Rd/ New Britannia Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	1400	364	20	817	39	73	60	14	83	300	118
Future Volume (vph)	69	1400	364	20	817	39	73	60	14	83	300	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	3.5	2.5	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	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		0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1699	4421	1507	1750	4214	1463	1744	1782		1724	1842	1503
Flt Permitted	0.23	1.00	1.00	0.12	1.00	1.00	0.41	1.00		0.71	1.00	1.00
Satd. Flow (perm)	403	4421	1507	227	4214	1463	759	1782		1280	1842	1503
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	73	1489	387	21	869	41	78	64	15	88	319	126
RTOR Reduction (vph)	0	0	147	0	0	23	0	10	0	0	0	88
Lane Group Flow (vph)	73	1489	240	21	869	18	78	69	0	88	319	38
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	5%	2%	2%	2%	7%	5%	2%	2%	2%	3%	2%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	39.1	33.8	33.8	33.5	31.0	31.0	21.2	21.2		21.2	21.2	21.2
Effective Green, g (s)	43.3	35.3	36.8	36.5	32.5	32.5	22.7	22.7		22.7	22.7	22.7
Actuated g/C Ratio	0.58	0.47	0.49	0.49	0.44	0.44	0.30	0.30		0.30	0.30	0.30
Clearance Time (s)	4.0	6.5	6.5	4.0	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	378	2094	744	192	1838	638	231	542		390	561	457
v/s Ratio Prot	c0.02	c0.34		0.01	0.21			0.04			c0.17	
v/s Ratio Perm	0.09		0.16	0.05		0.01	0.10			0.07		0.03
v/c Ratio	0.19	0.71	0.32	0.11	0.47	0.03	0.34	0.13		0.23	0.57	0.08
Uniform Delay, d1	7.2	15.6	11.3	11.0	14.9	12.0	20.1	18.7		19.3	21.8	18.5
Progression Factor	1.00	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	2.1	1.1	0.3	0.9	0.1	1.8	0.2		0.6	2.2	0.2
Delay (s)	7.3	17.6	12.5	11.2	15.8	12.1	21.9	19.0		20.0	24.0	18.6
Level of Service	A	B	B	B	B	B	C	B		B	C	B
Approach Delay (s)		16.2			15.5			20.4			22.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	12.5
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

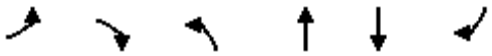


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	160	163	66	325	1130	67
Future Volume (vph)	160	163	66	325	1130	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0	50.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Ped Bike Factor	0.99	0.98	1.00			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4421	1566
Flt Permitted	0.950		0.130			
Satd. Flow (perm)	1738	1532	239	4421	4421	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		181				43
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			279.9	448.4	
Travel Time (s)	25.2			14.4	23.1	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	178	181	73	361	1256	74
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	181	73	361	1256	74
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	10.2	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	7.0	7.0	10.0	10.0
Minimum Split (s)	42.0	42.0	11.0	31.4	31.4	31.4
Total Split (s)	42.0	42.0	11.0	48.0	37.0	37.0
Total Split (%)	46.7%	46.7%	12.2%	53.3%	41.1%	41.1%
Maximum Green (s)	38.0	38.0	7.0	41.6	30.6	30.6
Yellow Time (s)	3.0	3.0	3.0	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-3.0	-1.4	-1.4	-1.4
Total Lost Time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	31.0	31.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10		10	10	10
Act Effct Green (s)	18.4	15.3	49.0	44.9	36.1	36.1
Actuated g/C Ratio	0.27	0.22	0.71	0.65	0.52	0.52
v/c Ratio	0.39	0.38	0.19	0.13	0.55	0.09
Control Delay	21.9	5.5	7.0	6.7	15.3	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	5.5	7.0	6.7	15.3	8.0
LOS	C	A	A	A	B	A
Approach Delay	13.6			6.7	14.9	
Approach LOS	B			A	B	
Queue Length 50th (m)	18.0	0.0	1.8	5.1	39.9	1.7
Queue Length 95th (m)	31.0	11.3	12.5	20.4	100.0	12.3
Internal Link Dist (m)	325.5			255.9	424.4	
Turn Bay Length (m)	50.0		50.0			30.0
Base Capacity (vph)	1052	934	390	2862	2297	799
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.19	0.19	0.13	0.55	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 69.4			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 53.8%		ICU Level of Service A	
Analysis Period (min) 15			
* User Entered Value			

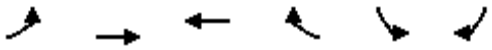
Splits and Phases: 3: James Snow Parkway & Street 1



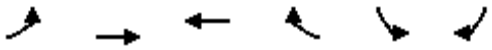
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	160	163	66	325	1130	67
Future Volume (vph)	160	163	66	325	1130	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1531	1750	4421	4421	1507
Flt Permitted	0.95	1.00	0.13	1.00	1.00	1.00
Satd. Flow (perm)	1750	1531	240	4421	4421	1507
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	178	181	73	361	1256	74
RTOR Reduction (vph)	0	141	0	0	0	21
Lane Group Flow (vph)	178	40	73	361	1256	53
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	15.3	15.3	44.2	44.2	34.6	34.6
Effective Green, g (s)	18.3	15.3	47.2	45.6	36.0	36.0
Actuated g/C Ratio	0.26	0.22	0.68	0.65	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	458	335	347	2884	2276	776
v/s Ratio Prot	c0.10		c0.03	0.08	c0.28	
v/s Ratio Perm		0.03	0.12			0.04
v/c Ratio	0.39	0.12	0.21	0.13	0.55	0.07
Uniform Delay, d1	21.2	21.9	4.8	4.6	11.5	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.3	0.1	1.0	0.2
Delay (s)	21.8	22.0	5.1	4.7	12.5	8.7
Level of Service	C	C	A	A	B	A
Approach Delay (s)	21.9			4.8	12.2	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	7.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	1460	804	68	117	74
Future Volume (vph)	40	1460	804	68	117	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.4	3.4
Storage Length (m)	50.0			40.0	30.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	60.0				15.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Ped Bike Factor	1.00			0.96	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4421	1566	1730	1548
Flt Permitted	0.276				0.950	
Satd. Flow (perm)	506	4421	4421	1499	1718	1515
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				71		77
Link Speed (k/h)		70	70		50	
Link Distance (m)		376.8	334.0		424.9	
Travel Time (s)		19.4	17.2		30.6	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	42	1521	838	71	122	77
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	1521	838	71	122	77
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.4	
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	1.03	1.03
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-0.2	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-0.2	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	10.2	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

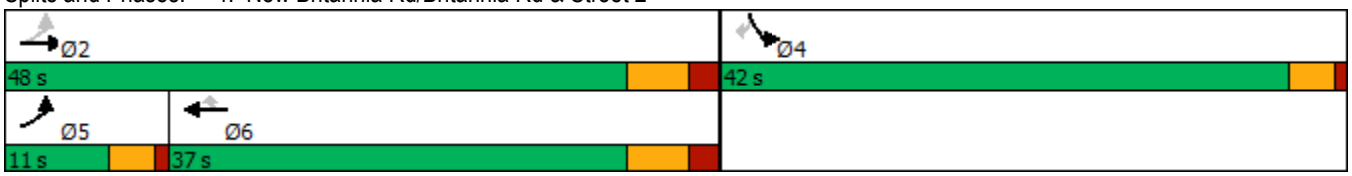


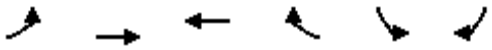
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	31.4	31.4	31.4	42.0	42.0
Total Split (s)	11.0	48.0	37.0	37.0	42.0	42.0
Total Split (%)	12.2%	53.3%	41.1%	41.1%	46.7%	46.7%
Maximum Green (s)	7.0	41.6	30.6	30.6	38.0	38.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.2	2.2	2.2	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.4	-1.4	-1.4	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		18.0	18.0	18.0	31.0	31.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	51.0	48.0	43.7	43.7	13.0	10.0
Actuated g/C Ratio	0.80	0.75	0.68	0.68	0.20	0.16
v/c Ratio	0.07	0.46	0.28	0.07	0.35	0.25
Control Delay	2.5	4.7	6.7	2.8	24.1	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.5	4.7	6.7	2.8	24.1	8.7
LOS	A	A	A	A	C	A
Approach Delay		4.7	6.4		18.1	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.8	26.1	11.6	0.0	11.9	0.0
Queue Length 95th (m)	3.0	43.4	34.0	5.3	24.2	9.2
Internal Link Dist (m)		352.8	310.0		400.9	
Turn Bay Length (m)	50.0			40.0	30.0	
Base Capacity (vph)	599	3329	3026	1048	1112	933
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.46	0.28	0.07	0.11	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 63.8			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 6.3		Intersection LOS: A	
Intersection Capacity Utilization 51.1%		ICU Level of Service A	
Analysis Period (min) 15			

* User Entered Value

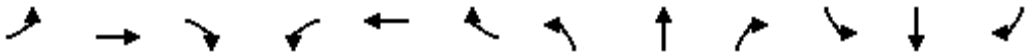
Splits and Phases: 4: New Britannia Rd/Britannia Rd & Street 2





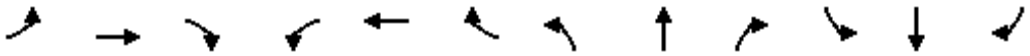
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	1460	804	68	117	74
Future Volume (vph)	40	1460	804	68	117	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.4	3.4
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1748	4421	4421	1509	1730	1508
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	508	4421	4421	1509	1730	1508
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	42	1521	838	71	122	77
RTOR Reduction (vph)	0	0	0	26	0	67
Lane Group Flow (vph)	42	1521	838	45	122	10
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	48.1	48.1	41.3	41.3	8.6	8.6
Effective Green, g (s)	51.1	49.5	42.7	42.7	11.6	8.6
Actuated g/C Ratio	0.76	0.74	0.64	0.64	0.17	0.13
Clearance Time (s)	4.0	6.4	6.4	6.4	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	494	3261	2813	960	299	193
v/s Ratio Prot	0.01	c0.34	0.19		c0.07	
v/s Ratio Perm	0.06			0.03		0.01
v/c Ratio	0.09	0.47	0.30	0.05	0.41	0.05
Uniform Delay, d1	2.0	3.5	5.5	4.6	24.7	25.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.5	0.3	0.1	0.9	0.1
Delay (s)	2.1	4.0	5.7	4.7	25.6	25.8
Level of Service	A	A	A	A	C	C
Approach Delay (s)		3.9	5.7		25.7	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	7.0
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
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)	2	6	2	2	6	2	2	164	2	2	530	2
Future Volume (vph)	2	6	2	2	6	2	2	164	2	2	530	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.973			0.998			0.999	
Flt Protected		0.990			0.990			0.999				
Satd. Flow (prot)	0	1774	0	0	1774	0	0	1837	0	0	1840	0
Flt Permitted		0.990			0.990			0.999				
Satd. Flow (perm)	0	1774	0	0	1774	0	0	1837	0	0	1840	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		226.2			228.8			134.2			437.6	
Travel Time (s)		16.3			16.5			8.1			26.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	2	6	2	2	6	2	2	164	2	2	530	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	10	0	0	168	0	0	534	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

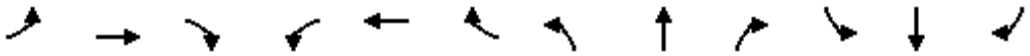
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	6	2	2	6	2	2	164	2	2	530	2
Future Volume (Veh/h)	2	6	2	2	6	2	2	164	2	2	530	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	6	2	2	6	2	2	164	2	2	530	2
Pedestrians		10			10			10			10	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134				
pX, platoon unblocked												
vC, conflicting volume	729	725	551	729	725	185	542			176		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	729	725	551	729	725	185	542			176		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	100	99	98	100	100			100		
cM capacity (veh/h)	321	344	524	321	344	841	1017			1387		

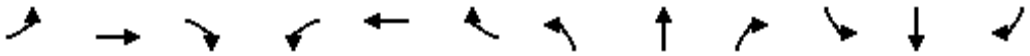
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	10	168	534
Volume Left	2	2	2	2
Volume Right	2	2	2	2
cSH	363	383	1017	1387
Volume to Capacity	0.03	0.03	0.00	0.00
Queue Length 95th (m)	0.6	0.6	0.0	0.0
Control Delay (s)	15.2	14.6	0.1	0.0
Lane LOS	C	B	A	A
Approach Delay (s)	15.2	14.6	0.1	0.0
Approach LOS	C	B		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A	
Analysis Period (min)	15			



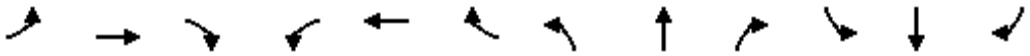
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	223	5	22	108	39	2	156	14	21	471	6
Future Volume (vph)	9	223	5	22	108	39	2	156	14	21	471	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997			0.969			0.989			0.998	
Flt Protected		0.998			0.994			0.999			0.998	
Satd. Flow (prot)	0	1812	0	0	1754	0	0	1820	0	0	1835	0
Flt Permitted		0.998			0.994			0.999			0.998	
Satd. Flow (perm)	0	1812	0	0	1754	0	0	1820	0	0	1835	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		90.1			324.1			437.6			702.9	
Travel Time (s)		6.5			23.3			26.3			42.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	9	223	5	22	108	39	2	156	14	21	471	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	237	0	0	169	0	0	172	0	0	498	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.03	1.03	1.03	1.03	1.03	1.03	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 62.5%		ICU Level of Service B	
Analysis Period (min) 15			



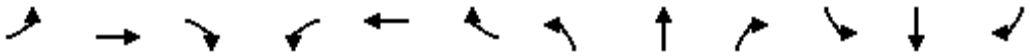
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	9	223	5	22	108	39	2	156	14	21	471	6
Future Volume (veh/h)	9	223	5	22	108	39	2	156	14	21	471	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	223	5	22	108	39	2	156	14	21	471	6
Approach Volume (veh/h)		237			169			172			498	
Crossing Volume (veh/h)		514			167			253			132	
High Capacity (veh/h)		923			1215			1136			1249	
High v/c (veh/h)		0.26			0.14			0.15			0.40	
Low Capacity (veh/h)		745			1007			935			1038	
Low v/c (veh/h)		0.32			0.17			0.18			0.48	

Intersection Summary				
Maximum v/c High	0.40			
Maximum v/c Low	0.48			
Intersection Capacity Utilization	62.5%	ICU Level of Service	B	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	226	21	21	93	44	28	37	28	23	43	14
Future Volume (vph)	12	226	21	21	93	44	28	37	28	23	43	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.989			0.962			0.959			0.976	
Flt Protected		0.998			0.993			0.985			0.986	
Satd. Flow (prot)	0	1798	0	0	1740	0	0	1720	0	0	1753	0
Flt Permitted		0.998			0.993			0.985			0.986	
Satd. Flow (perm)	0	1798	0	0	1740	0	0	1720	0	0	1753	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		324.1			349.5			424.9			102.3	
Travel Time (s)		23.3			25.2			30.6			7.4	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	12	226	21	21	93	44	28	37	28	23	43	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	259	0	0	158	0	0	93	0	0	80	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.4			3.4	
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	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

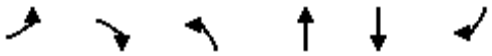
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	226	21	21	93	44	28	37	28	23	43	14
Future Volume (Veh/h)	12	226	21	21	93	44	28	37	28	23	43	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	226	21	21	93	44	28	37	28	23	43	14
Pedestrians		10			10			10			10	
Lane Width (m)		3.4			3.4			3.4			3.4	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					350							
pX, platoon unblocked												
vC, conflicting volume	147			257			473	460	256	484	448	135
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	147			257			473	460	256	484	448	135
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			94	92	96	95	91	98
cM capacity (veh/h)	1421			1295			437	477	767	424	484	897

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	259	158	93	80
Volume Left	12	21	28	23
Volume Right	21	44	28	14
cSH	1421	1295	522	504
Volume to Capacity	0.01	0.02	0.18	0.16
Queue Length 95th (m)	0.2	0.4	4.9	4.3
Control Delay (s)	0.4	1.2	13.4	13.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	1.2	13.4	13.5
Approach LOS			B	B

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	31.9%	ICU Level of Service	A	
Analysis Period (min)	15			

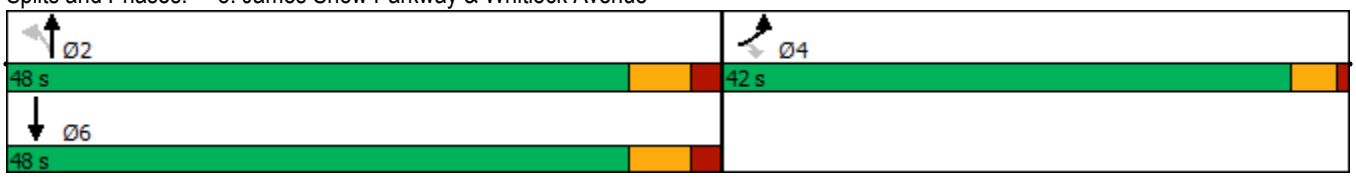


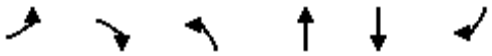
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	235	171	55	430	1026	78
Future Volume (vph)	235	171	55	430	1026	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	55.0	0.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	0.91
Ped Bike Factor	0.99	0.98	1.00		1.00	
Frt		0.850			0.989	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4360	0
Flt Permitted	0.950		0.178			
Satd. Flow (perm)	1738	1532	327	4421	4360	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		51			16	
Link Speed (k/h)	50			70	70	
Link Distance (m)	320.7			448.4	86.1	
Travel Time (s)	23.1			23.1	4.4	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	245	178	57	448	1069	81
Shared Lane Traffic (%)						
Lane Group Flow (vph)	245	178	57	448	1150	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)	25	15	25			15
Number of Detectors	1	1	1	1	1	
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	
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	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	
Total Split (s)	42.0	42.0	48.0	48.0	48.0	
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	
Maximum Green (s)	38.0	38.0	41.6	41.6	41.6	
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	31.0	31.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	10	10	10	10	10	
Act Effct Green (s)	20.4	17.4	44.1	44.1	44.1	
Actuated g/C Ratio	0.29	0.25	0.62	0.62	0.62	
v/c Ratio	0.48	0.43	0.28	0.16	0.42	
Control Delay	23.1	17.8	14.6	7.3	8.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.1	17.8	14.6	7.3	8.9	
LOS	C	B	B	A	A	
Approach Delay	20.8			8.2	8.9	
Approach LOS	C			A	A	
Queue Length 50th (m)	25.8	13.5	2.6	7.6	23.7	
Queue Length 95th (m)	42.2	27.2	16.9	25.0	69.7	
Internal Link Dist (m)	296.7			424.4	62.1	
Turn Bay Length (m)	55.0		100.0			
Base Capacity (vph)	1033	861	204	2759	2727	
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	0.24	0.21	0.28	0.16	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 70.6			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 11.1		Intersection LOS: B	
Intersection Capacity Utilization 59.9%		ICU Level of Service B	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 8: James Snow Parkway & Whitlock Avenue

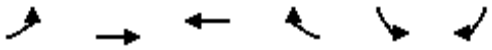




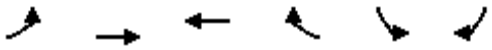
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	235	171	55	430	1026	78
Future Volume (vph)	235	171	55	430	1026	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1750	1531	1745	4421	4363	
Flt Permitted	0.95	1.00	0.18	1.00	1.00	
Satd. Flow (perm)	1750	1531	327	4421	4363	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	245	178	57	448	1069	81
RTOR Reduction (vph)	0	38	0	0	6	0
Lane Group Flow (vph)	245	140	57	448	1144	0
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	17.4	17.4	42.6	42.6	42.6	
Effective Green, g (s)	20.4	17.4	44.0	44.0	44.0	
Actuated g/C Ratio	0.29	0.25	0.62	0.62	0.62	
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	507	378	204	2763	2726	
v/s Ratio Prot	c0.14			0.10	c0.26	
v/s Ratio Perm		0.09	0.17			
v/c Ratio	0.48	0.37	0.28	0.16	0.42	
Uniform Delay, d1	20.6	22.0	6.0	5.5	6.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.6	3.4	0.1	0.5	
Delay (s)	21.4	22.6	9.4	5.6	7.2	
Level of Service	C	C	A	A	A	
Approach Delay (s)	21.9			6.1	7.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	70.4	Sum of lost time (s)	6.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	150	1002	1605	1145	481	152
Future Volume (vph)	150	1002	1605	1145	481	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	125.0			150.0	0.0	0.0
Storage Lanes	1			1	2	2
Taper Length (m)	30.0				100.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Ped Bike Factor				0.98	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1716	4378	4421	1566	3395	2729
Flt Permitted	0.076				0.950	
Satd. Flow (perm)	137	4378	4421	1530	3363	2664
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				200		157
Link Speed (k/h)		70	70		70	
Link Distance (m)		334.0	512.5		143.0	
Travel Time (s)		17.2	26.4		7.4	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Adj. Flow (vph)	155	1033	1655	1180	496	157
Shared Lane Traffic (%)						
Lane Group Flow (vph)	155	1033	1655	1180	496	157
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		7.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		3.0	3.0		3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	4	4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	4	4	4



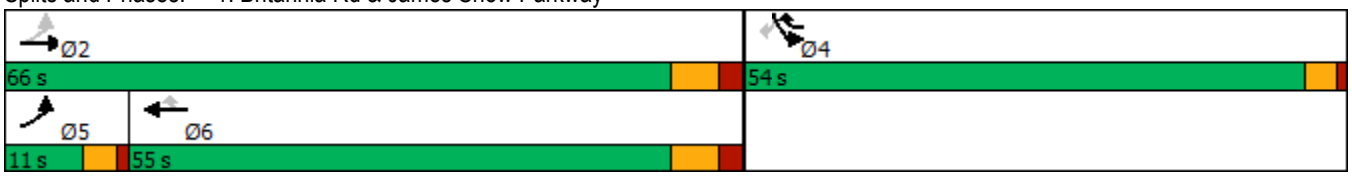
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	7.0	7.0	7.0
Minimum Split (s)	11.0	32.0	44.5	42.0	42.0	42.0
Total Split (s)	11.0	66.0	55.0	54.0	54.0	54.0
Total Split (%)	9.2%	55.0%	45.8%	45.0%	45.0%	45.0%
Maximum Green (s)	7.0	59.5	48.5	50.0	50.0	50.0
Yellow Time (s)	3.0	4.2	4.2	3.0	3.0	3.0
All-Red Time (s)	1.0	2.3	2.3	1.0	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.5	-1.5	0.0	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	4.0	1.0	4.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Recall Mode	None	Max	Max	None	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)			10	10	10	10
Act Effct Green (s)	65.4	61.4	50.3	93.9	45.6	42.5
Actuated g/C Ratio	0.58	0.54	0.45	0.83	0.40	0.38
v/c Ratio	0.71	0.43	0.84	0.90	0.36	0.14
Control Delay	40.0	17.3	34.0	14.6	23.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	17.3	34.0	14.6	23.9	3.6
LOS	D	B	C	B	C	A
Approach Delay		20.2	25.9		19.0	
Approach LOS		C	C		B	
Queue Length 50th (m)	19.8	62.4	147.7	65.8	38.5	0.0
Queue Length 95th (m)	#51.6	76.3	174.0	#146.7	51.0	6.8
Internal Link Dist (m)		310.0	488.5		119.0	
Turn Bay Length (m)	125.0			150.0		
Base Capacity (vph)	219	2379	1969	1392	1602	1273
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.43	0.84	0.85	0.31	0.12

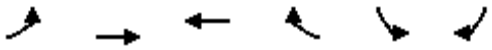
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 113			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 23.5		Intersection LOS: C	
Intersection Capacity Utilization 86.9%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

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

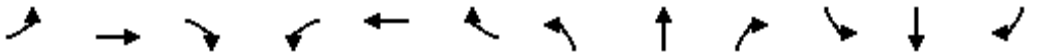
Splits and Phases: 1: Britannia Rd & James Snow Parkway



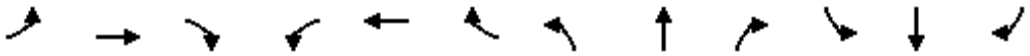


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	150	1002	1605	1145	481	152
Future Volume (vph)	150	1002	1605	1145	481	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	4.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	0.97	0.88
Frpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1716	4378	4421	1547	3395	2664
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	137	4378	4421	1547	3395	2664
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	155	1033	1655	1180	496	157
RTOR Reduction (vph)	0	0	0	38	0	98
Lane Group Flow (vph)	155	1033	1655	1142	496	59
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	4	4	
Permitted Phases	2			6		4
Actuated Green, G (s)	59.9	59.9	48.9	91.4	42.5	42.5
Effective Green, g (s)	62.9	61.4	50.4	91.4	45.5	42.5
Actuated g/C Ratio	0.56	0.54	0.45	0.81	0.40	0.38
Clearance Time (s)	4.0	6.5	6.5	4.0	4.0	4.0
Vehicle Extension (s)	2.5	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	216	2380	1973	1252	1368	1002
v/s Ratio Prot	c0.06	0.24	0.37	c0.34	0.15	
v/s Ratio Perm	0.34			0.39		0.02
v/c Ratio	0.72	0.43	0.84	0.91	0.36	0.06
Uniform Delay, d1	23.9	15.4	27.7	7.8	23.6	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.1	0.6	4.5	10.7	0.3	0.1
Delay (s)	34.0	16.0	32.1	18.5	23.9	22.5
Level of Service	C	B	C	B	C	C
Approach Delay (s)		18.3	26.5		23.6	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	112.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	86.9%	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)	95	1110	131	21	1661	59	420	229	44	50	64	65
Future Volume (vph)	95	1110	131	21	1661	59	420	229	44	50	64	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		50.0	50.0		45.0	155.0		0.0	60.0		30.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	50.0			60.0			60.0			60.0		
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.95	1.00		0.95	0.99	1.00		0.99		0.98
Frt			0.850			0.850		0.976				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	4336	1566	1750	4421	1566	1750	1791	0	1750	1842	1566
Flt Permitted	0.070			0.149			0.714			0.466		
Satd. Flow (perm)	129	4336	1493	274	4421	1493	1304	1791	0	853	1842	1528
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			115			68		9				68
Link Speed (k/h)		70			70			70			60	
Link Distance (m)		432.7			376.8			331.2			134.2	
Travel Time (s)		22.3			19.4			17.0			8.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	98	1144	135	22	1712	61	433	236	45	52	66	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	1144	135	22	1712	61	433	281	0	52	66	67
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		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	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1	1	1	1	1	1	1		1	1	1
Detector Template												
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
Detector 1 Type	Cl+Ex	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	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	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	0.0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4



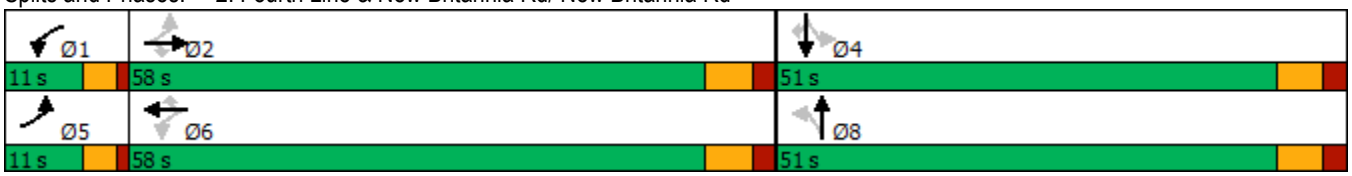
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.0	32.5	32.5	11.0	32.5	32.5	43.5	43.5		43.5	43.5	43.5
Total Split (s)	11.0	58.0	58.0	11.0	58.0	58.0	51.0	51.0		51.0	51.0	51.0
Total Split (%)	9.2%	48.3%	48.3%	9.2%	48.3%	48.3%	42.5%	42.5%		42.5%	42.5%	42.5%
Maximum Green (s)	7.0	51.5	51.5	7.0	51.5	51.5	44.5	44.5		44.5	44.5	44.5
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	1.0	2.3	2.3	1.0	2.3	2.3	2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	-3.0	-1.5	-1.5	-3.0	-1.5	-1.5	-1.5	-1.5		-1.5	-1.5	-1.5
Total Lost Time (s)	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Recall Mode	None	Max	Max	None	Max	Max	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		19.0	19.0		19.0	19.0	30.0	30.0		30.0	30.0	30.0
Pedestrian Calls (#/hr)		10	10		10	10	10	10		10	10	10
Act Effct Green (s)	67.5	57.6	57.6	67.1	53.1	53.1	43.6	43.6		43.6	43.6	43.6
Actuated g/C Ratio	0.57	0.49	0.49	0.57	0.45	0.45	0.37	0.37		0.37	0.37	0.37
v/c Ratio	0.46	0.54	0.17	0.08	0.86	0.09	0.90	0.42		0.17	0.10	0.11
Control Delay	22.7	23.4	5.6	12.0	34.9	4.3	57.8	28.8		26.2	24.3	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	22.7	23.4	5.6	12.0	34.9	4.3	57.8	28.8		26.2	24.3	6.0
LOS	C	C	A	B	C	A	E	C		C	C	A
Approach Delay		21.6			33.6			46.4			18.2	
Approach LOS		C			C			D			B	
Queue Length 50th (m)	10.1	83.5	2.6	2.2	149.9	0.0	93.1	46.2		8.0	9.8	0.0
Queue Length 95th (m)	23.7	100.2	14.0	5.8	175.0	6.7	#151.0	69.6		17.2	19.3	8.8
Internal Link Dist (m)		408.7			352.8			307.2			110.2	
Turn Bay Length (m)	50.0		50.0	50.0		45.0	155.0			60.0		30.0
Base Capacity (vph)	212	2122	789	281	1993	710	510	706		333	721	639
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.46	0.54	0.17	0.08	0.86	0.09	0.85	0.40		0.16	0.09	0.10

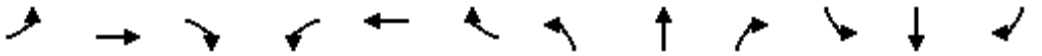
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 117.7			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 31.1		Intersection LOS: C	
Intersection Capacity Utilization 91.1%		ICU Level of Service F	
Analysis Period (min) 15			

* User Entered Value

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

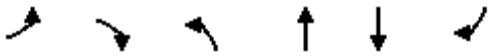
Splits and Phases: 2: Fourth Line & New Britannia Rd/ New Britannia Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1110	131	21	1661	59	420	229	44	50	64	65
Future Volume (vph)	95	1110	131	21	1661	59	420	229	44	50	64	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	*0.80	1.00	1.00	*0.80	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	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	0.99	1.00		0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1750	4336	1493	1749	4421	1493	1735	1791		1740	1842	1527
Flt Permitted	0.07	1.00	1.00	0.15	1.00	1.00	0.71	1.00		0.47	1.00	1.00
Satd. Flow (perm)	129	4336	1493	275	4421	1493	1304	1791		853	1842	1527
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	98	1144	135	22	1712	61	433	236	45	52	66	67
RTOR Reduction (vph)	0	0	59	0	0	33	0	6	0	0	0	43
Lane Group Flow (vph)	98	1144	76	22	1712	28	433	275	0	52	66	24
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	63.1	56.1	56.1	57.3	53.2	53.2	42.1	42.1		42.1	42.1	42.1
Effective Green, g (s)	67.2	57.6	57.6	63.3	54.7	54.7	43.6	43.6		43.6	43.6	43.6
Actuated g/C Ratio	0.56	0.48	0.48	0.53	0.46	0.46	0.37	0.37		0.37	0.37	0.37
Clearance Time (s)	4.0	6.5	6.5	4.0	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	208	2093	720	233	2027	684	476	654		311	673	558
v/s Ratio Prot	c0.04	0.26		0.01	c0.39			0.15			0.04	
v/s Ratio Perm	0.23		0.05	0.04		0.02	c0.33			0.06		0.02
v/c Ratio	0.47	0.55	0.10	0.09	0.84	0.04	0.91	0.42		0.17	0.10	0.04
Uniform Delay, d1	20.3	21.7	16.8	14.2	28.5	17.8	36.0	28.4		25.6	24.9	24.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	1.0	0.3	0.2	4.5	0.1	22.2	0.9		0.5	0.1	0.1
Delay (s)	21.5	22.7	17.1	14.4	33.1	17.9	58.2	29.3		26.1	25.0	24.5
Level of Service	C	C	B	B	C	B	E	C		C	C	C
Approach Delay (s)		22.1			32.3			46.8			25.1	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	119.3	Sum of lost time (s)	11.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

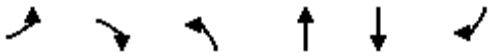


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	129	160	237	1168	495	207
Future Volume (vph)	129	160	237	1168	495	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0	50.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Ped Bike Factor	0.99	0.98	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4421	1566
Flt Permitted	0.950		0.410			
Satd. Flow (perm)	1738	1532	749	4421	4421	1497
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		165				213
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			279.9	448.4	
Travel Time (s)	25.2			14.4	23.1	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	133	165	244	1204	510	213
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	165	244	1204	510	213
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	7.0	7.0	10.0	10.0
Minimum Split (s)	42.0	42.0	11.0	31.4	31.4	31.4
Total Split (s)	42.0	42.0	16.0	48.0	32.0	32.0
Total Split (%)	46.7%	46.7%	17.8%	53.3%	35.6%	35.6%
Maximum Green (s)	38.0	38.0	12.0	41.6	25.6	25.6
Yellow Time (s)	3.0	3.0	3.0	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-3.0	-1.4	-1.4	-1.4
Total Lost Time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	31.0	31.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10		10	10	10
Act Effct Green (s)	16.9	13.8	48.1	44.0	31.4	31.4
Actuated g/C Ratio	0.25	0.21	0.72	0.66	0.47	0.47
v/c Ratio	0.30	0.37	0.34	0.41	0.25	0.26
Control Delay	20.7	5.9	6.8	7.9	13.8	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	5.9	6.8	7.9	13.8	4.1
LOS	C	A	A	A	B	A
Approach Delay	12.5			7.8	10.9	
Approach LOS	B			A	B	
Queue Length 50th (m)	13.1	0.0	5.5	19.1	12.7	0.0
Queue Length 95th (m)	23.8	10.8	36.1	74.5	39.6	15.2
Internal Link Dist (m)	325.5			255.9	424.4	
Turn Bay Length (m)	50.0		50.0			30.0
Base Capacity (vph)	1095	958	766	2902	2065	812
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.17	0.32	0.41	0.25	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 67.1			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.41			
Intersection Signal Delay: 9.2		Intersection LOS: A	
Intersection Capacity Utilization 58.9%		ICU Level of Service B	
Analysis Period (min) 15			
* User Entered Value			

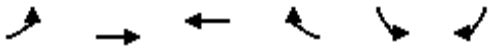
Splits and Phases: 3: James Snow Parkway & Street 1



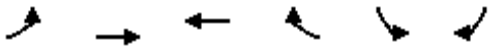
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	129	160	237	1168	495	207
Future Volume (vph)	129	160	237	1168	495	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	1.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1531	1746	4421	4421	1508
Flt Permitted	0.95	1.00	0.41	1.00	1.00	1.00
Satd. Flow (perm)	1750	1531	754	4421	4421	1508
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	133	165	244	1204	510	213
RTOR Reduction (vph)	0	131	0	0	0	113
Lane Group Flow (vph)	133	34	244	1204	510	100
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	13.8	13.8	42.6	42.6	30.0	30.0
Effective Green, g (s)	16.8	13.8	45.6	44.0	31.4	31.4
Actuated g/C Ratio	0.25	0.21	0.68	0.66	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	440	316	686	2912	2078	708
v/s Ratio Prot	c0.08		0.06	c0.27	0.12	
v/s Ratio Perm		0.02	0.18			0.07
v/c Ratio	0.30	0.11	0.36	0.41	0.25	0.14
Uniform Delay, d1	20.3	21.5	3.9	5.3	10.6	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2	0.3	0.4	0.3	0.4
Delay (s)	20.6	21.7	4.2	5.8	10.9	10.5
Level of Service	C	C	A	A	B	B
Approach Delay (s)	21.2			5.5	10.8	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	1156	1721	123	70	40
Future Volume (vph)	69	1156	1721	123	70	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.4	3.4
Storage Length (m)	50.0			40.0	30.0	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	60.0				15.0	
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Ped Bike Factor				0.96	0.99	0.98
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1750	4421	4421	1566	1730	1548
Flt Permitted	0.079				0.950	
Satd. Flow (perm)	146	4421	4421	1497	1717	1513
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				67		41
Link Speed (k/h)		70	70		50	
Link Distance (m)		376.8	334.0		424.9	
Travel Time (s)		19.4	17.2		30.6	
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	71	1192	1774	127	72	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	1192	1774	127	72	41
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.5	3.5		3.4	
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	1.03	1.03
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4

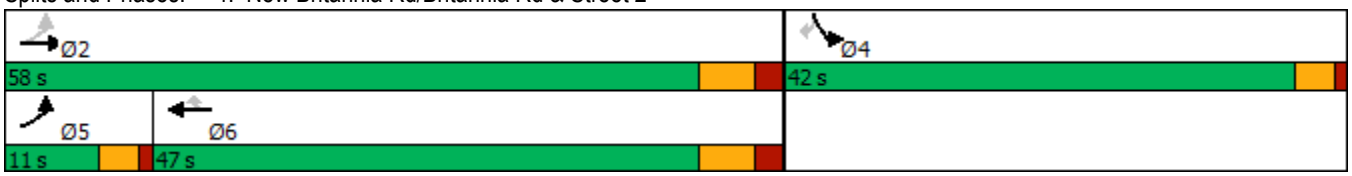


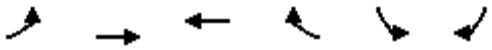
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	7.0	7.0
Minimum Split (s)	11.0	31.4	31.4	31.4	42.0	42.0
Total Split (s)	11.0	58.0	47.0	47.0	42.0	42.0
Total Split (%)	11.0%	58.0%	47.0%	47.0%	42.0%	42.0%
Maximum Green (s)	7.0	51.6	40.6	40.6	38.0	38.0
Yellow Time (s)	3.0	4.2	4.2	4.2	3.0	3.0
All-Red Time (s)	1.0	2.2	2.2	2.2	1.0	1.0
Lost Time Adjust (s)	-3.0	-1.4	-1.4	-1.4	-3.0	0.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		18.0	18.0	18.0	31.0	31.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	60.8	57.8	49.0	49.0	11.8	8.8
Actuated g/C Ratio	0.84	0.80	0.68	0.68	0.16	0.12
v/c Ratio	0.21	0.34	0.59	0.12	0.26	0.19
Control Delay	3.1	3.1	9.8	3.9	28.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	3.1	9.8	3.9	28.3	11.9
LOS	A	A	A	A	C	B
Approach Delay		3.1	9.4		22.4	
Approach LOS		A	A		C	
Queue Length 50th (m)	1.2	16.5	58.7	3.0	8.4	0.0
Queue Length 95th (m)	4.1	26.5	83.4	9.8	18.8	7.8
Internal Link Dist (m)		352.8	310.0		400.9	
Turn Bay Length (m)	50.0			40.0	30.0	
Base Capacity (vph)	344	3530	2991	1034	979	813
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.34	0.59	0.12	0.07	0.05

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 72.4			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 7.4		Intersection LOS: A	
Intersection Capacity Utilization 63.1%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

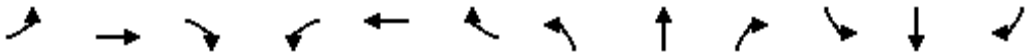
Splits and Phases: 4: New Britannia Rd/Britannia Rd & Street 2





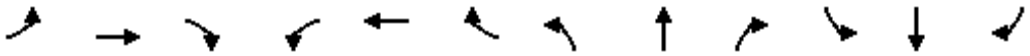
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	1156	1721	123	70	40
Future Volume (vph)	69	1156	1721	123	70	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.4	3.4
Total Lost time (s)	1.0	5.0	5.0	5.0	1.0	4.0
Lane Util. Factor	1.00	*0.80	*0.80	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1750	4421	4421	1507	1730	1504
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	146	4421	4421	1507	1730	1504
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	71	1192	1774	127	72	41
RTOR Reduction (vph)	0	0	0	24	0	37
Lane Group Flow (vph)	71	1192	1774	103	72	4
Confl. Peds. (#/hr)	10			10	10	10
Confl. Bikes (#/hr)				5		5
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	56.2	56.2	46.6	46.6	7.4	7.4
Effective Green, g (s)	59.2	57.6	48.0	48.0	10.4	7.4
Actuated g/C Ratio	0.80	0.78	0.65	0.65	0.14	0.10
Clearance Time (s)	4.0	6.4	6.4	6.4	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	3441	2867	977	243	150
v/s Ratio Prot	0.03	c0.27	c0.40		c0.04	
v/s Ratio Perm	0.16			0.07		0.00
v/c Ratio	0.23	0.35	0.62	0.11	0.30	0.03
Uniform Delay, d1	3.6	2.5	7.6	4.9	28.5	30.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3	1.0	0.2	0.7	0.1
Delay (s)	4.0	2.8	8.6	5.1	29.2	30.1
Level of Service	A	A	A	A	C	C
Approach Delay (s)		2.8	8.4		29.5	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	74.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	63.1%	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)	2	6	2	2	6	2	2	379	2	2	201	2
Future Volume (vph)	2	6	2	2	6	2	2	379	2	2	201	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.973			0.999			0.999	
Flt Protected		0.990			0.990							
Satd. Flow (prot)	0	1774	0	0	1774	0	0	1840	0	0	1840	0
Flt Permitted		0.990			0.990							
Satd. Flow (perm)	0	1774	0	0	1774	0	0	1840	0	0	1840	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		226.2			228.8			134.2			437.6	
Travel Time (s)		16.3			16.5			8.1			26.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	2	6	2	2	6	2	2	379	2	2	201	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	10	0	0	383	0	0	205	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

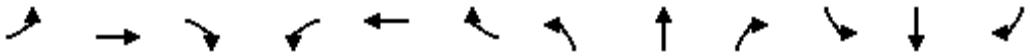
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	6	2	2	6	2	2	379	2	2	201	2
Future Volume (Veh/h)	2	6	2	2	6	2	2	379	2	2	201	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	6	2	2	6	2	2	379	2	2	201	2
Pedestrians		10			10			10			10	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134				
pX, platoon unblocked	0.88	0.88		0.88	0.88	0.88				0.88		
vC, conflicting volume	615	611	222	615	611	400	213			391		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	499	494	222	499	494	255	213			245		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	100	99	100	100			100		
cM capacity (veh/h)	405	412	802	405	412	679	1344			1156		

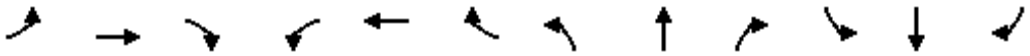
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	10	383	205
Volume Left	2	2	2	2
Volume Right	2	2	2	2
cSH	454	445	1344	1156
Volume to Capacity	0.02	0.02	0.00	0.00
Queue Length 95th (m)	0.5	0.5	0.0	0.0
Control Delay (s)	13.1	13.3	0.1	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	13.1	13.3	0.1	0.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	34.1%	ICU Level of Service	A	
Analysis Period (min)	15			



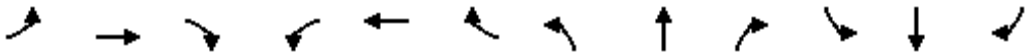
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	230	3	21	323	25	6	348	28	40	158	3
Future Volume (vph)	6	230	3	21	323	25	6	348	28	40	158	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.990			0.998	
Flt Protected		0.999			0.997			0.999			0.990	
Satd. Flow (prot)	0	1816	0	0	1800	0	0	1822	0	0	1820	0
Flt Permitted		0.999			0.997			0.999			0.990	
Satd. Flow (perm)	0	1816	0	0	1800	0	0	1822	0	0	1820	0
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		90.1			324.1			437.6			702.9	
Travel Time (s)		6.5			23.3			26.3			42.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	6	230	3	21	323	25	6	348	28	40	158	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	239	0	0	369	0	0	382	0	0	201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.03	1.03	1.03	1.03	1.03	1.03	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 68.8%		ICU Level of Service C	
Analysis Period (min) 15			



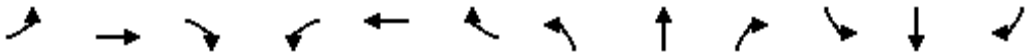
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Right Turn Channelized												
Traffic Volume (veh/h)	6	230	3	21	323	25	6	348	28	40	158	3
Future Volume (veh/h)	6	230	3	21	323	25	6	348	28	40	158	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	230	3	21	323	25	6	348	28	40	158	3
Approach Volume (veh/h)		239			369			382			201	
Crossing Volume (veh/h)		219			360			276			350	
High Capacity (veh/h)		1167			1044			1115			1052	
High v/c (veh/h)		0.20			0.35			0.34			0.19	
Low Capacity (veh/h)		963			853			917			860	
Low v/c (veh/h)		0.25			0.43			0.42			0.23	

Intersection Summary				
Maximum v/c High	0.35			
Maximum v/c Low	0.43			
Intersection Capacity Utilization	68.8%	ICU Level of Service	C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	245	29	29	322	34	23	44	23	29	44	10
Future Volume (vph)	13	245	29	29	322	34	23	44	23	29	44	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.986			0.988			0.965			0.984	
Flt Protected		0.998			0.996			0.987			0.983	
Satd. Flow (prot)	0	1792	0	0	1792	0	0	1735	0	0	1762	0
Flt Permitted		0.998			0.996			0.987			0.983	
Satd. Flow (perm)	0	1792	0	0	1792	0	0	1735	0	0	1762	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		324.1			349.5			424.9			102.3	
Travel Time (s)		23.3			25.2			30.6			7.4	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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
Adj. Flow (vph)	13	245	29	29	322	34	23	44	23	29	44	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	287	0	0	385	0	0	90	0	0	83	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.4			3.4	
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	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

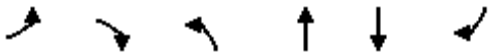
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		



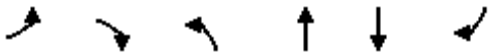
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	245	29	29	322	34	23	44	23	29	44	10
Future Volume (Veh/h)	13	245	29	29	322	34	23	44	23	29	44	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	245	29	29	322	34	23	44	23	29	44	10
Pedestrians		10			10			10			10	
Lane Width (m)		3.4			3.4			3.4			3.4	
Walking Speed (m/s)		1.0			1.0			1.0			1.0	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					350							
pX, platoon unblocked												
vC, conflicting volume	366			284			734	720	280	748	717	359
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	366			284			734	720	280	748	717	359
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			92	87	97	89	87	99
cM capacity (veh/h)	1181			1266			281	336	745	270	337	672

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	287	385	90	83
Volume Left	13	29	23	29
Volume Right	29	34	23	10
cSH	1181	1266	369	328
Volume to Capacity	0.01	0.02	0.24	0.25
Queue Length 95th (m)	0.3	0.5	7.2	7.5
Control Delay (s)	0.5	0.8	17.9	19.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.5	0.8	17.9	19.6
Approach LOS			C	C

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	45.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	159	106	162	1136	597	272
Future Volume (vph)	159	106	162	1136	597	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	55.0	0.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	0.91
Ped Bike Factor	0.99	0.98	1.00		0.99	
Frt		0.850			0.953	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	4421	4158	0
Flt Permitted	0.950		0.268			
Satd. Flow (perm)	1738	1532	491	4421	4158	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		109			169	
Link Speed (k/h)	50			70	70	
Link Distance (m)	327.7			448.4	164.3	
Travel Time (s)	23.6			23.1	8.4	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	164	109	167	1171	615	280
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	109	167	1171	895	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)	25	15	25			15
Number of Detectors	1	1	1	1	1	
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	
Trailing Detector (m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Position(m)	-2.0	-2.0	-2.0	-2.0	-2.0	
Detector 1 Size(m)	12.0	12.0	12.0	12.0	12.0	
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	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						



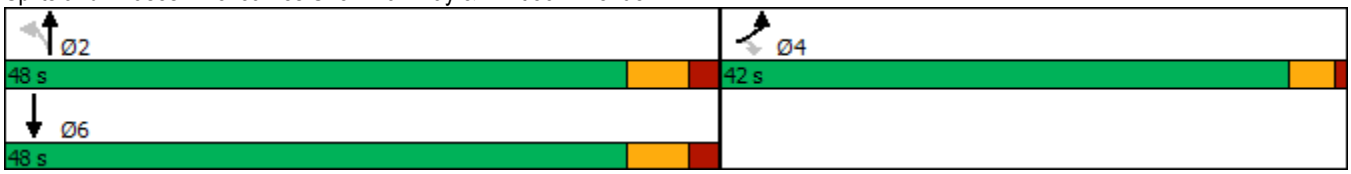
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	
Total Split (s)	42.0	42.0	48.0	48.0	48.0	
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	
Maximum Green (s)	38.0	38.0	41.6	41.6	41.6	
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	0.0	
Total Lost Time (s)	1.0	4.0	5.0	5.0	6.4	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	31.0	31.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	10	10	10	10	10	
Act Effct Green (s)	18.2	15.2	46.9	46.9	45.4	
Actuated g/C Ratio	0.26	0.21	0.66	0.66	0.64	
v/c Ratio	0.37	0.26	0.52	0.40	0.33	
Control Delay	22.0	5.7	18.6	8.0	6.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.0	5.7	18.6	8.0	6.6	
LOS	C	A	B	A	A	
Approach Delay	15.5			9.4	6.6	
Approach LOS	B			A	A	
Queue Length 50th (m)	16.4	0.0	7.7	20.1	12.1	
Queue Length 95th (m)	28.6	9.0	#55.9	71.8	45.0	
Internal Link Dist (m)	303.7			424.4	140.3	
Turn Bay Length (m)	55.0		100.0			
Base Capacity (vph)	1026	882	323	2910	2714	
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	0.16	0.12	0.52	0.40	0.33	

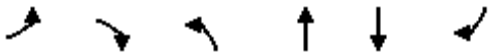
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.2			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 9.0		Intersection LOS: A	
Intersection Capacity Utilization 57.9%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

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

Splits and Phases: 8: James Snow Parkway & Whitlock Avenue





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	159	106	162	1136	597	272
Future Volume (vph)	159	106	162	1136	597	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	6.4	
Lane Util. Factor	1.00	1.00	1.00	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1750	1530	1743	4421	4165	
Flt Permitted	0.95	1.00	0.27	1.00	1.00	
Satd. Flow (perm)	1750	1530	491	4421	4165	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	164	109	167	1171	615	280
RTOR Reduction (vph)	0	86	0	0	61	0
Lane Group Flow (vph)	164	23	167	1171	834	0
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	15.2	15.2	45.5	45.5	45.5	
Effective Green, g (s)	18.2	15.2	46.9	46.9	45.5	
Actuated g/C Ratio	0.26	0.21	0.66	0.66	0.64	
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	447	327	323	2916	2665	
v/s Ratio Prot	c0.09			0.26	0.20	
v/s Ratio Perm		0.02	c0.34			
v/c Ratio	0.37	0.07	0.52	0.40	0.31	
Uniform Delay, d1	21.7	22.3	6.2	5.6	5.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.1	5.8	0.4	0.3	
Delay (s)	22.2	22.4	12.1	6.0	6.1	
Level of Service	C	C	B	A	A	
Approach Delay (s)	22.3			6.8	6.1	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	7.4
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: 101 [Fourth Line & Street 1 2026 FT AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fourth Line												
1	L2	2	2.0	0.206	1.4	LOS A	0.9	6.4	0.44	0.30	0.44	52.8
2	T1	156	2.0	0.206	1.4	LOS A	0.9	6.4	0.44	0.30	0.44	56.1
3	R2	14	2.0	0.206	1.4	LOS A	0.9	6.4	0.44	0.30	0.44	50.7
Approach		172	2.0	0.206	1.4	LOS A	0.9	6.4	0.44	0.30	0.44	55.6
East: Street 1												
4	L2	22	2.0	0.182	0.9	LOS A	0.8	5.6	0.35	0.20	0.35	52.4
5	T1	108	2.0	0.182	0.9	LOS A	0.8	5.6	0.35	0.20	0.35	48.8
6	R2	39	2.0	0.182	0.9	LOS A	0.8	5.6	0.35	0.20	0.35	50.8
Approach		169	2.0	0.182	0.9	LOS A	0.8	5.6	0.35	0.20	0.35	49.7
North: Fourth Line												
7	L2	21	2.0	0.515	1.1	LOS A	3.3	23.7	0.46	0.27	0.46	52.7
8	T1	471	2.0	0.515	1.1	LOS A	3.3	23.7	0.46	0.27	0.46	55.9
9	R2	6	2.0	0.515	1.1	LOS A	3.3	23.7	0.46	0.27	0.46	50.5
Approach		498	2.0	0.515	1.1	LOS A	3.3	23.7	0.46	0.27	0.46	55.7
West: Street 1												
10	L2	9	2.0	0.377	3.6	LOS A	1.7	12.4	0.65	0.63	0.69	51.3
11	T1	223	2.0	0.377	3.6	LOS A	1.7	12.4	0.65	0.63	0.69	47.9
12	R2	5	2.0	0.377	3.6	LOS A	1.7	12.4	0.65	0.63	0.69	49.8
Approach		237	2.0	0.377	3.6	LOS A	1.7	12.4	0.65	0.63	0.69	48.0
All Vehicles		1076	2.0	0.515	1.7	LOS A	3.3	23.7	0.48	0.34	0.49	52.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Fourth Line & Street 1 2026 FT PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fourth Line												
1	L2	6	2.0	0.462	2.1	LOS A	2.5	17.9	0.57	0.43	0.58	52.3
2	T1	348	2.0	0.462	2.1	LOS A	2.5	17.9	0.57	0.43	0.58	55.5
3	R2	28	2.0	0.462	2.1	LOS A	2.5	17.9	0.57	0.43	0.58	50.2
Approach		382	2.0	0.462	2.1	LOS A	2.5	17.9	0.57	0.43	0.58	55.0
East: Street 1												
4	L2	21	2.0	0.497	3.2	LOS A	2.9	20.9	0.66	0.59	0.72	51.2
5	T1	323	2.0	0.497	3.2	LOS A	2.9	20.9	0.66	0.59	0.72	47.8
6	R2	25	2.0	0.497	3.2	LOS A	2.9	20.9	0.66	0.59	0.72	49.7
Approach		369	2.0	0.497	3.2	LOS A	2.9	20.9	0.66	0.59	0.72	48.1
North: Fourth Line												
7	L2	40	2.0	0.270	2.1	LOS A	1.2	8.7	0.54	0.42	0.54	51.8
8	T1	158	2.0	0.270	2.1	LOS A	1.2	8.7	0.54	0.42	0.54	54.9
9	R2	3	2.0	0.270	2.1	LOS A	1.2	8.7	0.54	0.42	0.54	49.7
Approach		201	2.0	0.270	2.1	LOS A	1.2	8.7	0.54	0.42	0.54	54.1
West: Street 1												
10	L2	6	2.0	0.273	1.3	LOS A	1.3	9.1	0.44	0.26	0.44	52.3
11	T1	230	2.0	0.273	1.3	LOS A	1.3	9.1	0.44	0.26	0.44	48.7
12	R2	3	2.0	0.273	1.3	LOS A	1.3	9.1	0.44	0.26	0.44	50.7
Approach		239	2.0	0.273	1.3	LOS A	1.3	9.1	0.44	0.26	0.44	48.8
All Vehicles		1191	2.0	0.497	2.2	LOS A	2.9	20.9	0.57	0.44	0.59	51.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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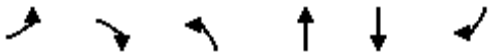
Appendix V

2026 Future Total Additional Analysis Synchro Worksheets

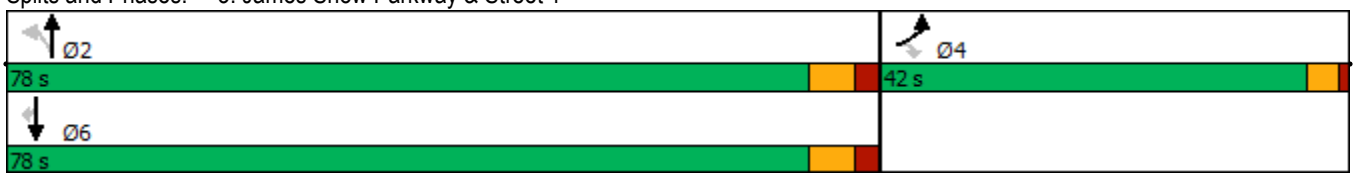


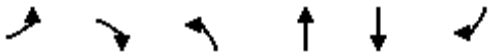
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	160	163	66	286	966	67
Future Volume (vph)	160	163	66	286	966	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0	0.0	40.0			30.0
Storage Lanes	1	1	1			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Ped Bike Factor	0.98	0.95				0.95
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.191			
Satd. Flow (perm)	1714	1494	352	1842	1842	1493
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		117				25
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	167	170	69	298	1006	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	167	170	69	298	1006	70
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Position(m)	-0.2	-2.0	-2.0	-2.0	-2.0	-2.0
Detector 1 Size(m)	10.2	12.0	12.0	12.0	12.0	12.0
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	31.4	31.4	31.4	31.4
Total Split (s)	42.0	42.0	78.0	78.0	78.0	78.0
Total Split (%)	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%
Maximum Green (s)	38.0	38.0	71.6	71.6	71.6	71.6
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	1.4
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	22.0	22.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10	10	10	10	10
Act Effct Green (s)	19.2	16.2	74.2	74.2	74.2	71.4
Actuated g/C Ratio	0.19	0.16	0.75	0.75	0.75	0.72
v/c Ratio	0.49	0.50	0.26	0.22	0.73	0.06
Control Delay	40.1	17.9	8.7	5.1	12.9	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.1	17.9	8.7	5.1	12.9	4.1
LOS	D	B	A	A	B	A
Approach Delay	28.9			5.8	12.3	
Approach LOS	C			A	B	
Queue Length 50th (m)	28.5	8.8	3.2	13.2	82.3	2.0
Queue Length 95th (m)	46.9	26.6	14.3	36.2	218.6	8.6
Internal Link Dist (m)	325.5			219.5	200.2	
Turn Bay Length (m)	30.0		40.0			30.0
Base Capacity (vph)	724	645	262	1374	1374	1078
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.26	0.26	0.22	0.73	0.06

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 99.4			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 14.1		Intersection LOS: B	
Intersection Capacity Utilization 75.5%		ICU Level of Service D	
Analysis Period (min) 15			
* User Entered Value			

Splits and Phases: 3: James Snow Parkway & Street 1

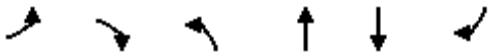




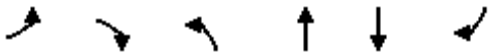
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	160	163	66	286	966	67
Future Volume (vph)	160	163	66	286	966	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1491	1750	1842	1842	1500
Flt Permitted	0.95	1.00	0.19	1.00	1.00	1.00
Satd. Flow (perm)	1750	1491	351	1842	1842	1500
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	167	170	69	298	1006	70
RTOR Reduction (vph)	0	98	0	0	0	7
Lane Group Flow (vph)	167	72	69	298	1006	63
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	16.2	16.2	72.8	72.8	72.8	72.8
Effective Green, g (s)	19.2	16.2	74.2	74.2	74.2	71.4
Actuated g/C Ratio	0.19	0.16	0.75	0.75	0.75	0.72
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	243	262	1375	1375	1077
v/s Ratio Prot	c0.10			0.16	c0.55	
v/s Ratio Perm		0.05	0.20			0.04
v/c Ratio	0.49	0.30	0.26	0.22	0.73	0.06
Uniform Delay, d1	35.8	36.6	4.0	3.8	7.0	4.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.7	2.4	0.4	3.5	0.1
Delay (s)	36.9	37.3	6.4	4.2	10.5	4.2
Level of Service	D	D	A	A	B	A
Approach Delay (s)	37.1			4.6	10.1	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	99.4	Sum of lost time (s)	6.0
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)	129	160	237	995	437	207
Future Volume (vph)	129	160	237	995	437	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0	0.0	40.0			30.0
Storage Lanes	1	1	1			1
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	0.98	0.96	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1750	1566	1750	1842	1842	1566
Flt Permitted	0.950		0.481			
Satd. Flow (perm)	1720	1498	878	1842	1842	1499
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		165				206
Link Speed (k/h)	50			70	70	
Link Distance (m)	349.5			243.5	224.2	
Travel Time (s)	25.2			12.5	11.5	
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	133	165	244	1026	451	213
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	165	244	1026	451	213
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)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	10.0	10.0	10.0	10.0	10.0	10.0
Trailing Detector (m)	-2.0	-2.0	-0.2	-2.0	-2.0	-0.2
Detector 1 Position(m)	-2.0	-2.0	-0.2	-2.0	-2.0	-0.2
Detector 1 Size(m)	12.0	12.0	10.2	12.0	12.0	10.2
Detector 1 Type	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
Detector 1 Queue (s)	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
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						



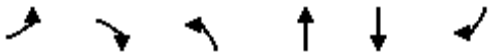
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	7.0	7.0	10.0	10.0	10.0	10.0
Minimum Split (s)	33.0	33.0	31.4	31.4	31.4	31.4
Total Split (s)	33.0	33.0	67.0	67.0	67.0	67.0
Total Split (%)	33.0%	33.0%	67.0%	67.0%	67.0%	67.0%
Maximum Green (s)	29.0	29.0	60.6	60.6	60.6	60.6
Yellow Time (s)	3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	1.0	1.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-3.0	0.0	-1.4	-1.4	-1.4	1.4
Total Lost Time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	22.0	22.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	10	10	10	10	10	10
Act Effct Green (s)	17.1	14.0	64.5	64.5	64.5	61.7
Actuated g/C Ratio	0.20	0.16	0.74	0.74	0.74	0.70
v/c Ratio	0.39	0.44	0.38	0.76	0.33	0.19
Control Delay	32.6	8.6	7.8	13.9	6.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.6	8.6	7.8	13.9	6.0	1.6
LOS	C	A	A	B	A	A
Approach Delay	19.3			12.7	4.6	
Approach LOS	B			B	A	
Queue Length 50th (m)	18.8	0.0	10.5	72.3	18.6	0.3
Queue Length 95th (m)	33.3	14.4	40.9	#258.3	59.5	9.1
Internal Link Dist (m)	325.5			219.5	200.2	
Turn Bay Length (m)	60.0		40.0			30.0
Base Capacity (vph)	643	609	646	1356	1356	1116
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.27	0.38	0.76	0.33	0.19

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 87.6			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 11.2		Intersection LOS: B	
Intersection Capacity Utilization 71.8%		ICU Level of Service C	
Analysis Period (min) 15			

* User Entered Value

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

Splits and Phases: 3: James Snow Parkway & Street 1



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	129	160	237	995	437	207
Future Volume (vph)	129	160	237	995	437	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	5.0	5.0	5.0	7.8
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1493	1734	1842	1842	1504
Flt Permitted	0.95	1.00	0.48	1.00	1.00	1.00
Satd. Flow (perm)	1750	1493	879	1842	1842	1504
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	133	165	244	1026	451	213
RTOR Reduction (vph)	0	139	0	0	0	61
Lane Group Flow (vph)	133	26	244	1026	451	152
Confl. Peds. (#/hr)	10	10	10			10
Confl. Bikes (#/hr)		5				5
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	14.0	14.0	63.1	63.1	63.1	63.1
Effective Green, g (s)	17.0	14.0	64.5	64.5	64.5	61.7
Actuated g/C Ratio	0.19	0.16	0.74	0.74	0.74	0.71
Clearance Time (s)	4.0	4.0	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	340	238	647	1357	1357	1060
v/s Ratio Prot	c0.08			c0.56	0.24	
v/s Ratio Perm		0.02	0.28			0.10
v/c Ratio	0.39	0.11	0.38	0.76	0.33	0.14
Uniform Delay, d1	30.7	31.4	4.2	6.8	4.0	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	1.7	4.0	0.7	0.3
Delay (s)	31.5	31.6	5.9	10.8	4.7	4.5
Level of Service	C	C	A	B	A	A
Approach Delay (s)	31.6			9.8	4.6	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	87.5	Sum of lost time (s)	6.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group