Revised Final Report

Transportation Impact Study - 772 Winston Churchill Boulevard

Prepared for 772 Winston Churchill GP Inc., as General Partner for 772 Winston Churchill Limited Partnership
by Arcadis
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1 Introduction

772 Winston Churchill Boulevard (the ‘development site’) is located on the west side of Winston Churchill Boulevard, approximately 600 metres south of the intersection of Winston Churchill Boulevard and Royal Windsor Drive in the Town of Oakville, Ontario. The development site is currently vacant.

Previously, IBI Group (now Arcadis) prepared the report *Transportation Impact Study – 772 Winston Churchill Boulevard* for a proposed commercial development at the development site, dated December 9, 2015 (the “2015 report”). As the proposed commercial development from the 2015 report was ultimately not constructed, 772 Winston Churchill GP Inc., as General Partner for 772 Winston Churchill Limited Partnership now proposes to construct two industrial buildings totalling 60,112.28 m^2 for warehouse uses (the “proposed development”).

The purpose of this report is to analyze the impact that the proposed development will have on the traffic for the surrounding road network. This report takes into consideration future road improvements, background growth, other developments in the area, and examines the location of the proposed site accesses. This report also provides a high-level review of site plan features and examines functional circulation for vehicular traffic.

This report is outlined with the following sections:

- **Section 2** through **Section 4** discuss the transportation impact study (TIS);
- **Section 5** discusses the location and configuration of the proposed site accesses;
- **Section 6** discusses the Winston Churchill Boulevard corridor review;
- **Section 7** discusses the vehicle swept path analysis; and
- **Section 8** discusses conclusions made and the study recommendations based on the preceding sections.

This report adheres to the scope of investigation developed by Arcadis and discussed with The Regional Municipality of Peel (the applicable road authority under the Regional Municipality of Peel / Regional Municipality of Halton boundary road agreement) on September 24, 2020, and circulated to the Regional Municipality of Halton (collectively, the “Review Agencies”). This correspondence is presented in **Appendix A**.

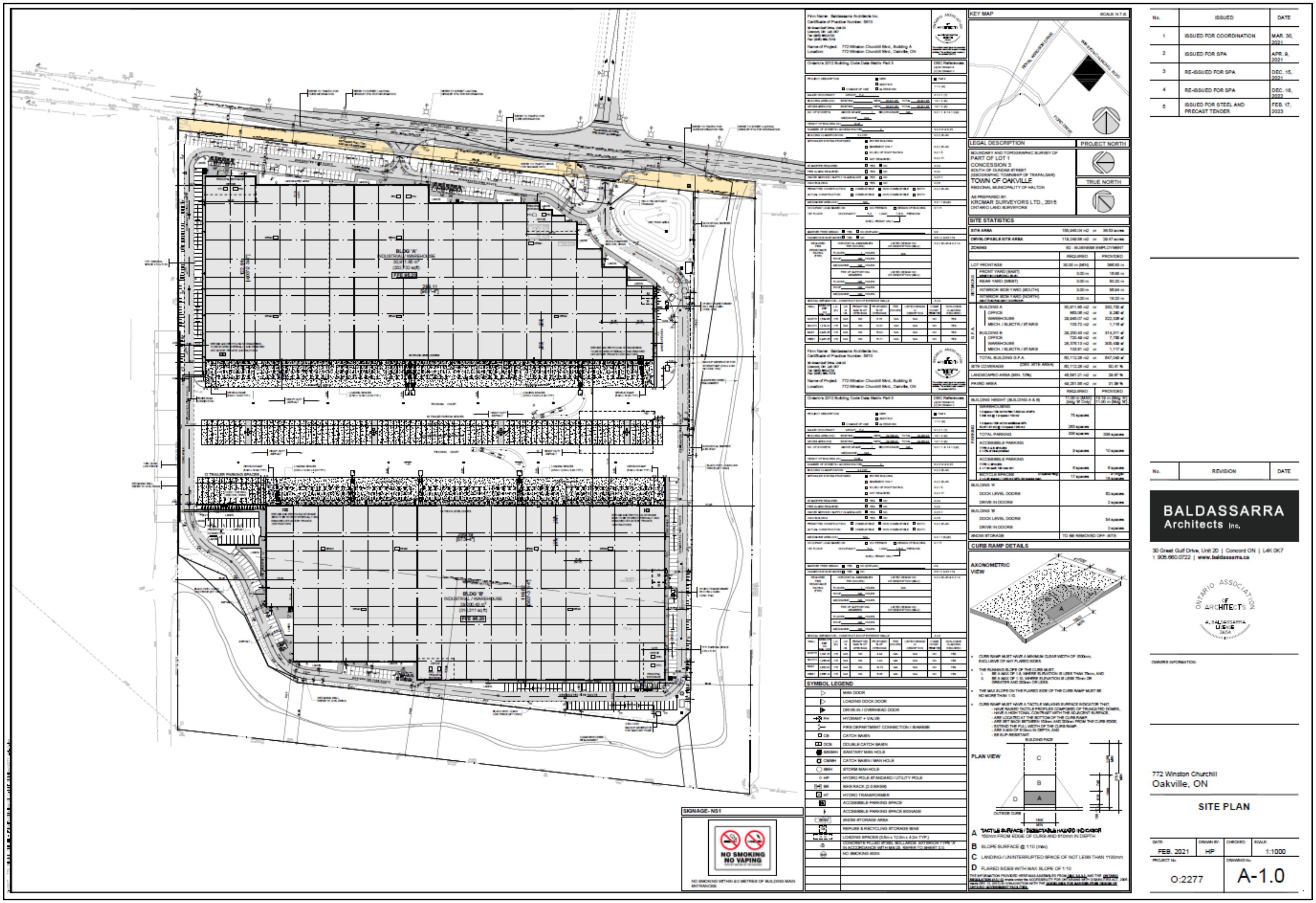
1.1 Project Understanding

1.1.1 Site Description

772 Winston Churchill Boulevard is located at the boundary between the Town of Oakville (Halton Region) and the City of Mississauga (Peel Region), and is currently unoccupied. The proponent is proposing to develop two industrial buildings, occupying a total of 60,112.28 m^2 of gross floor area (GFA) for warehousing uses including ancillary site management office space. Parking is proposed to consist of 338 at-grade parking spaces (322 conventional spaces, plus 16 barrier-free spaces), accessible via one of two proposed accesses onto Winston Churchill Boulevard. Full build-out is expected in a single phase, with the specific tenant to be determined.

The proposed site plan is presented in **Exhibit 1-1**. It should be noted that small changes in building sizes may occur as this development moves through the approval process. However, the assumptions in this report are conservative, and differences in traffic operations from these changes are expected to be negligible.

Exhibit 1-1: Proposed Site Plan



1.1.2 Study Area

Based on the location of the proposed development and confirmation with the Review Agencies, it was agreed that the study area would consist of the following intersections, as shown in **Exhibit 1-2**:

1. Winston Churchill Boulevard and Royal Windsor Drive (signalized);
2. Winston Churchill Boulevard and Beryl Road (signalized);
3. Winston Churchill Boulevard and Lakeshore Road (signalized);
4. Winston Churchill Boulevard and Proposed North Site Access (unsignalized); and
5. Winston Churchill Boulevard and Proposed South Site Access / Future Road (signalized).

Exhibit 1-2: Development Study Area

Base Map Source: Conservation Halton. October 6, 2020,
http://camaps.maps.arcgis.com/apps/webappviewer/index.html?id=a2928bf280194294a4027111f8ff284a

2 Existing Traffic Conditions

This section documents the transportation network in the study area in 2020, including existing roadways, traffic control measures, intersection performance, walking and cycling facilities, and transit operations.

2.1 Existing Road Network

2.1.1 Winston Churchill Boulevard

Winston Churchill Boulevard is a north-south arterial road under the jurisdiction of Peel Region. The speed limit along Winston Churchill Boulevard in the study is 60 km/hr. This road has one lane in each direction for the majority of study area. The road becomes a four-lane road with exclusive right-turn and left-turn lanes, as it intersects Royal Windsor Drive. This road also acts as the boundary between the Town of Oakville (Halton Region) to the west and the City of Mississauga (Peel Region) to the east.

2.1.2 Royal Windsor Drive

Royal Windsor Drive is a four-lane east-west arterial road under the jurisdictions of the Town of Oakville (west of Winston Churchill Boulevard), and the City of Mississauga (east of Winston Churchill Boulevard). This road has a speed limit of 60 km/hr.

2.1.3 Beryl Road

Beryl Road is a two-lane east-west local roadway under the jurisdiction of the Town of Oakville. This road intersects Winston Churchill Boulevard from the west and forms a T-intersection. The road has a speed limit of 60 km/hr.

2.1.4 Lakeshore Road West / Lakeshore Road East

Lakeshore Road is a two-lane east-west road. To the west of Winston Churchill Boulevard, this road is referred to as Lakeshore Road East, which is under the jurisdiction of the Town of Oakville, and has a speed limit of 50 km/hr. To the east of Winston Churchill Boulevard, the road is referred to as Lakeshore Road West, which is under the jurisdiction of the City of Mississauga and has a speed limit of 60 km/hr.

2.1.5 Site Accesses

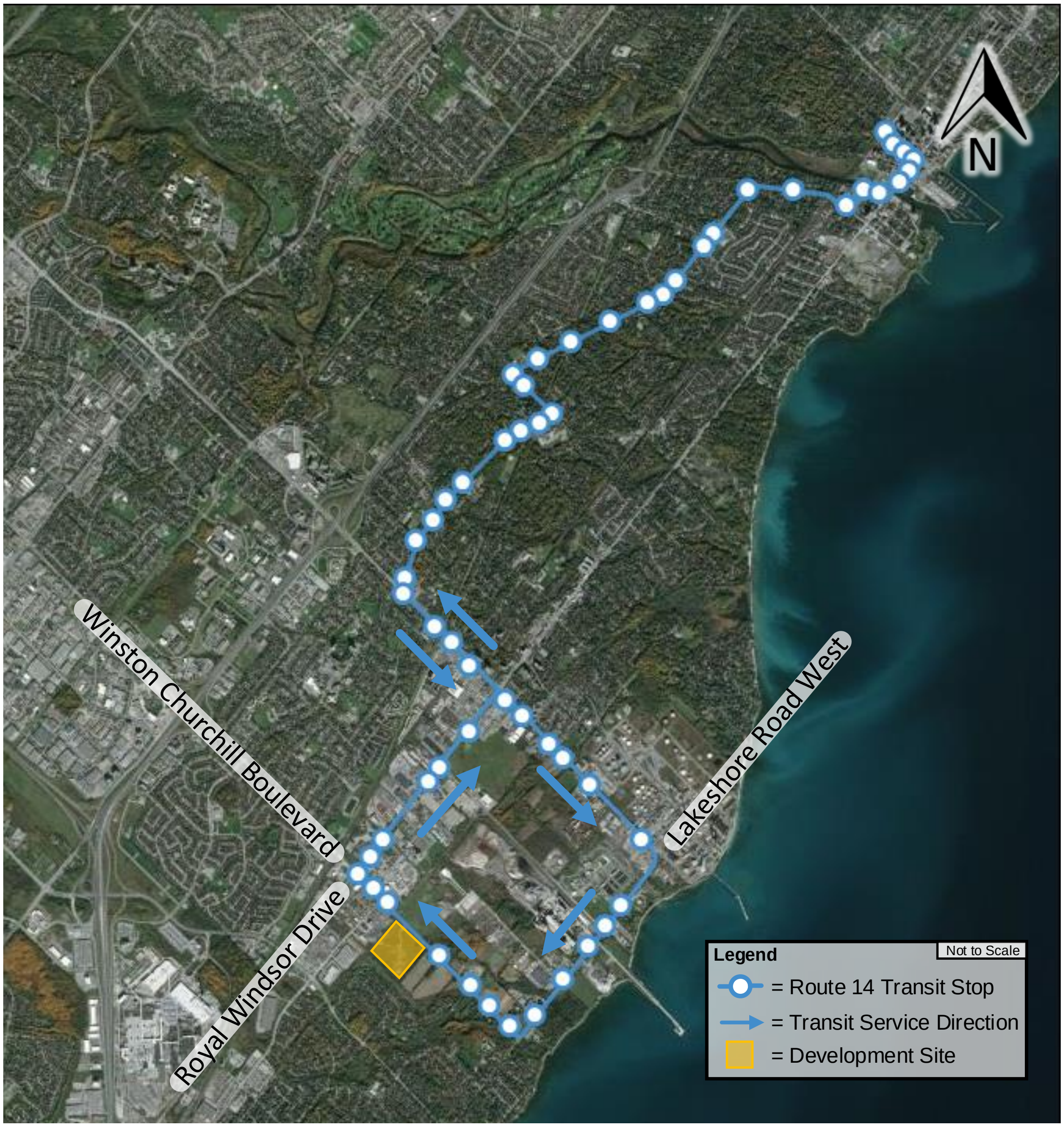
The Proposed North Site Access is to intersect Winston Churchill Boulevard at approximately 180 metres south from the north property line. This unsignalized access is proposed to be restricted to right-in, right-out movements only, and would consist of one lane per direction.

The Proposed South Site Access is to intersect Winston Churchill Boulevard at approximately 56 metres north from the south property line and is approximately 180 metres south of the Proposed North Site Access. The intersection of Winston Churchill Boulevard and the Proposed South Site Access is proposed to be signalized and located opposite of Orr Road, located east of the development site, as described in further detail in **Section 3.1.4**.

2.2 Public Transit Accessibility

Transit Route 14 – Lorne Park, operated by MiWay, provides transit service during the Weekday AM and PM Peak Periods at frequencies of approximately every 30 minutes, and does not operate on weekends or holidays. Transit Route 14 runs between Winston Churchill Boulevard and Port Credit GO Station, with Clarkson GO Station as an intermediate stop. Transit Route 14 is illustrated in **Exhibit 2-1**.

Exhibit 2-1: Existing Transit Network



Base Map Source: MiWay. October 6, 2020, https://www.mississauga.ca/miway-transit/schedules-and-maps/schedules/

2.3 Pedestrian and Cyclist Facilities

Existing cycling infrastructure facilities within the study area include multi-use trail connections along Beryl Road, dedicated bicycle lanes along Royal Windsor Drive between Winston Churchill Drive and Ford Drive, and the Waterfront Trail that runs along Lakeshore Road. A map of the existing cycling infrastructure facilities is presented in **Exhibit 2-2**.

Exhibit 2-2: Study Area Bicycle Route Map

Base Map Source: City of Mississauga. October 7, 2020, https://www.mississaugabikes.ca/wp-content/uploads/2018/07/Mississauga-Cycling-Map-2018-web-with-panels.pdf

The existing pedestrian infrastructure includes the above-noted shared multi-use trail along Beryl Road, as well as the Waterfront Trail along Lakeshore Road. In addition, crosswalks are present at all legs of the study area intersections. All existing crosswalks are equipped with pedestrian signals and all side-street crosswalks are equipped with pedestrian pushbuttons. In lieu of any sidewalks along Winston Churchill Boulevard, south of Beryl Road, there are paved shoulders on either side of Winston Churchill Boulevard that provide a smooth walking surface for pedestrians.

2.4 Signal Timings

The current signal timing plans for all existing signalized intersections were provided by Peel Region staff, which has jurisdiction over the signalized intersections along Winston Churchill Boulevard. The signal timing plans for the signalized study area intersections are provided in **Appendix B**.

It should be noted that, at the intersection of Winston Churchill Boulevard and Royal Windsor, if a pedestrian call is received for the east crosswalk then the maximum extension of the southbound left-turn protected phase is limited so that conflicting pedestrian walk and flashing don't walk can be provided. If no call is received, then the southbound left-turn phase can be extended to the maximum specified by the timing card. This operation was verified in the field, but a minimum phase length error is returned if modelled as per the timing card.

2.5 Turning Movement Counts

The turning movement counts for all existing intersections in the study area were acquired from Spectrum Traffic. The date of completion for each count is presented in **Exhibit 2-3**.

Exhibit 2-3: Traffic Data Information

Intersection	Data Source	Date	Peak Hour	
			AM	PM
Winston Churchill Boulevard and Royal Windsor Drive	Spectrum Traffic	Tuesday, January 31, 2017	8:00 a.m. - 9:00 a.m.	5:00 p.m. - 6:00 p.m.
Winston Churchill Boulevard and Beryl Road	Spectrum Traffic	Tuesday, January 31, 2017	8:00 a.m. - 9:00 a.m.	4:00 p.m. - 5:00 p.m.
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	Spectrum Traffic	Tuesday, January 31, 2017	8:00 a.m. - 9:00 a.m.	4:00 p.m. - 5:00 p.m.

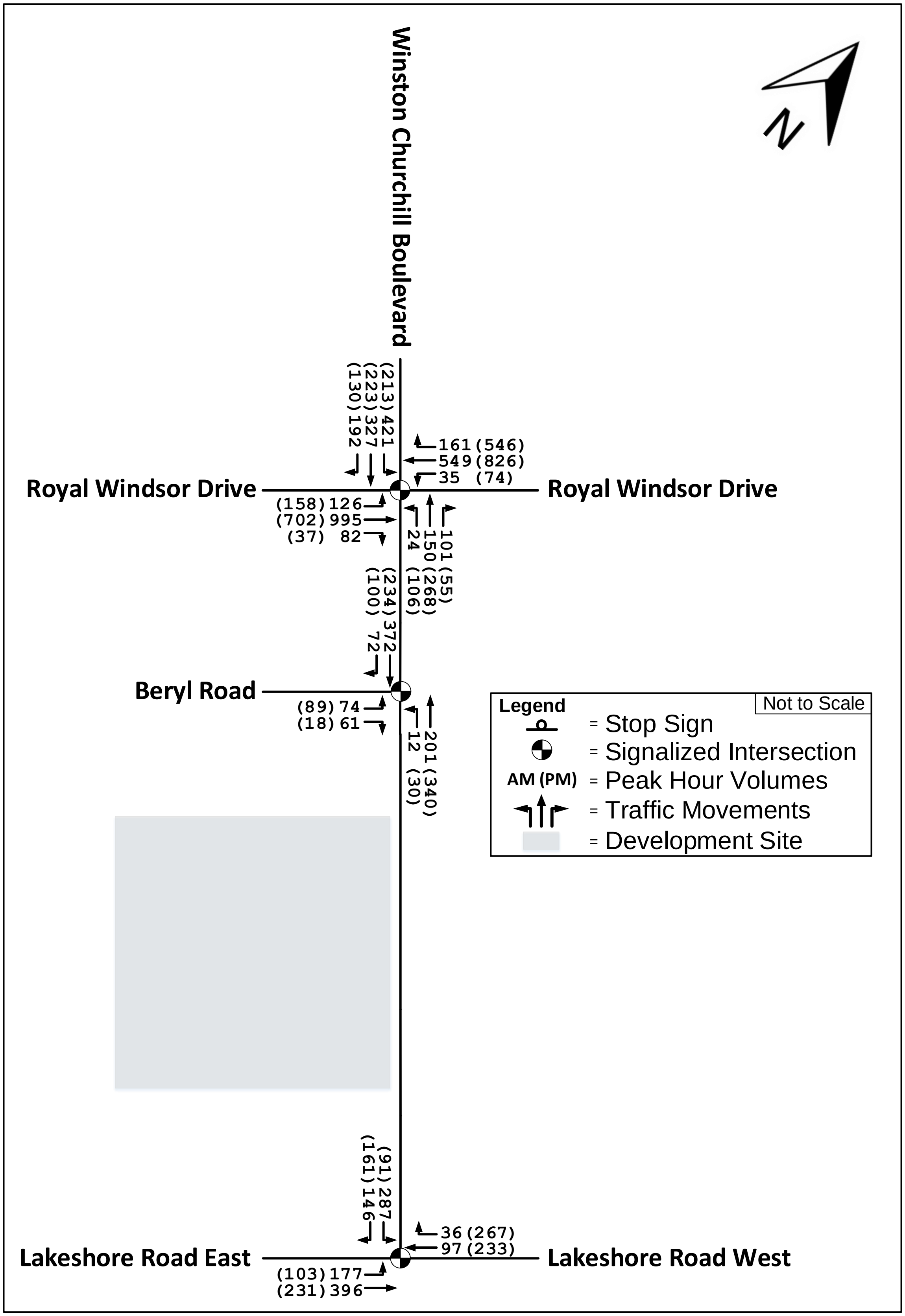
As the counts were completed in 2017, supplemental turning movement counts at the intersection of Winston Churchill Boulevard and Royal Windsor Drive from March 2019 were acquired to determine annual directional traffic growth rates, which are presented in **Exhibit 2-4**. Refer to **Appendix C** for full turning movement count sheets.

Exhibit 2-4: Compounded Annual Traffic Growth Rates

Direction	Compounded Annual Growth Rate	
	AM Peak Hour	PM Peak Hour
Northbound	4.8%	8.8%
Eastbound	13.1%	7.6%
Southbound	11.0%	8.8%
Westbound	5.4%	5.4%

The compounded annualized growth rates, as shown in **Exhibit 2-4**, were applied to the appropriate through movements at the intersection of Winston Churchill Boulevard and Royal Windsor Drive, as well as the eastbound through and westbound through movements at the intersection of Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West. All turning movement counts were subsequently balanced to determine 2020 Existing Conditions volumes, as illustrated in **Exhibit 2-5**. It should be noted that the annual traffic growth rates presented above are solely intended to estimate 2020 Existing Conditions volumes. Separate annual traffic growth rates to determine future traffic volumes post-2020 are discussed in **Section 3.1.1**.

Exhibit 2-5: 2020 Existing Conditions Traffic Volumes



2.6 2020 Existing Conditions Analysis

The intersections were analyzed using the Synchro 11.0 analysis software and the Highway Capacity Manual methodology. As described in Peel Region's **Traffic Impact Study Guidelines** document, the following criteria were used to identify critical movements for signalized intersections:

- Volume to capacity (v/c) ratios for overall intersection operations, through movements, or shared through / turning movements increased to 0.90 or above;
- v/c ratios for exclusive turning movements increased to 1.00 or above; or
- Queues that exceed the provided storage capacity.

A summary of the critical movements for the 2020 Existing Conditions traffic operations analysis can be found in **Exhibit 2-6**, while full Synchro reports are provided in **Appendix D**.

Exhibit 2-6: 2020 Existing Conditions Traffic Operations – Signalized Intersections

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	D	42.7	0.58	EBL	D	46.5	0.56	51	130
				EBTR	D	53.7	0.90	181	-
				WBL	F	94.4	0.69	29	105
				WBT	D	36.5	0.46	79	-
				WBR	C	31.2	0.11	15	230
				NBL	C	31.1	0.09	12	125
				NBT	C	31.1	0.12	24	-
				NBR	C	30.5	0.07	13	65
				SBL	E	61.8	0.76	73	115
				SBT	B	16.1	0.18	31	-
				SBR	B	16.0	0.15	19	95
Winston Churchill Boulevard and Beryl Road	A	8.1	0.37	EBL	C	25.4	0.36	17	80
				EBR	C	23.5	0.04	8	-
				NBL	A	3.4	0.03	2	115
				NBT	A	3.9	0.17	16	-
				SBTR	A	5.2	0.37	36	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	B	19.4	0.45	EBL	A	7.4	0.21	24	75
				EBT	A	8.2	0.33	50	-
				WBT	A	6.4	0.08	13	-
				WBR	A	6.1	0.04	4	90
				SBL	D	44.1	0.79	71	125
				SBR	C	27.6	0.09	13	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
PM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	D	35.5	0.52	EBL	C	29.9	0.60	39	130
				EBTR	C	28.0	0.48	91	-
				WBL	D	36.2	0.31	29	105
				WBT	D	40.9	0.66	124	-
				WBR	D	35.2	0.35	26	230
				NBL	D	38.9	0.31	41	125
				NBT	D	36.3	0.24	42	-
				NBR	C	33.6	0.04	2	65
				SBL	E	63.9	0.62	42	115
				SBT	C	22.9	0.14	27	-
				SBR	C	22.4	0.08	12	95
Winston Churchill Boulevard and Beryl Road	A	7.3	0.30	EBL	C	25.4	0.41	19	80
				EBR	C	22.9	0.01	4	-
				NBL	A	3.6	0.05	4	115
				NBT	A	4.7	0.28	28	-
				SBTR	A	4.7	0.28	25	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	B	11.4	0.23	EBL	A	3.7	0.12	11	75
				EBT	A	3.8	0.16	20	-
				WBT	A	3.8	0.16	20	-
				WBR	A	3.9	0.18	6	90
				SBL	D	38.7	0.50	28	125
				SBR	C	35.0	0.10	16	-

Note: Red font represents a critical movement.

As shown in **Exhibit 2-6**, overall operations for the signalized study area intersections were found to be operating below capacity thresholds during the Weekday AM and Weekday PM Peak Hours. With respect to individual movements, the shared eastbound through / right-turn movement at the intersection of Winston Churchill Boulevard and Royal Windsor Drive was found to be operating above critical capacity thresholds during the Weekday AM Peak Hour, with a v/c ratio of 0.90. All remaining movement during the Weekday AM and Weekday PM Peak Hours were found to operate below critical thresholds.

3 Future Traffic Conditions

3.1 2028 Future Background Conditions

This section discusses the proposed development horizon year, background traffic growth rates, anticipated future road network improvement, and other development-related traffic in the study area under the 2028 horizon year.

3.1.1 Horizon Year

As per the Peel Region **Traffic Impact Study Guidelines**, described in **Section 2.6**, and as confirmed with the Review Agencies (see **Appendix A**), a horizon year of 2028 (5 years from the anticipated full build-out date of the proposed development) would be used for the traffic analysis under Future Background and Future Total conditions.

3.1.2 Growth Rate

Consistent with Review Agency comments from the 2015 report, a 2.0% annual traffic growth rate was applied to through movements along major roads within the study area (i.e., Winston Churchill Boulevard, Royal Windsor Drive, and Lakeshore Road East / Lakeshore Road West). This results in an absolute increase in traffic volumes of approximately 17.2% between 2020 and 2028.

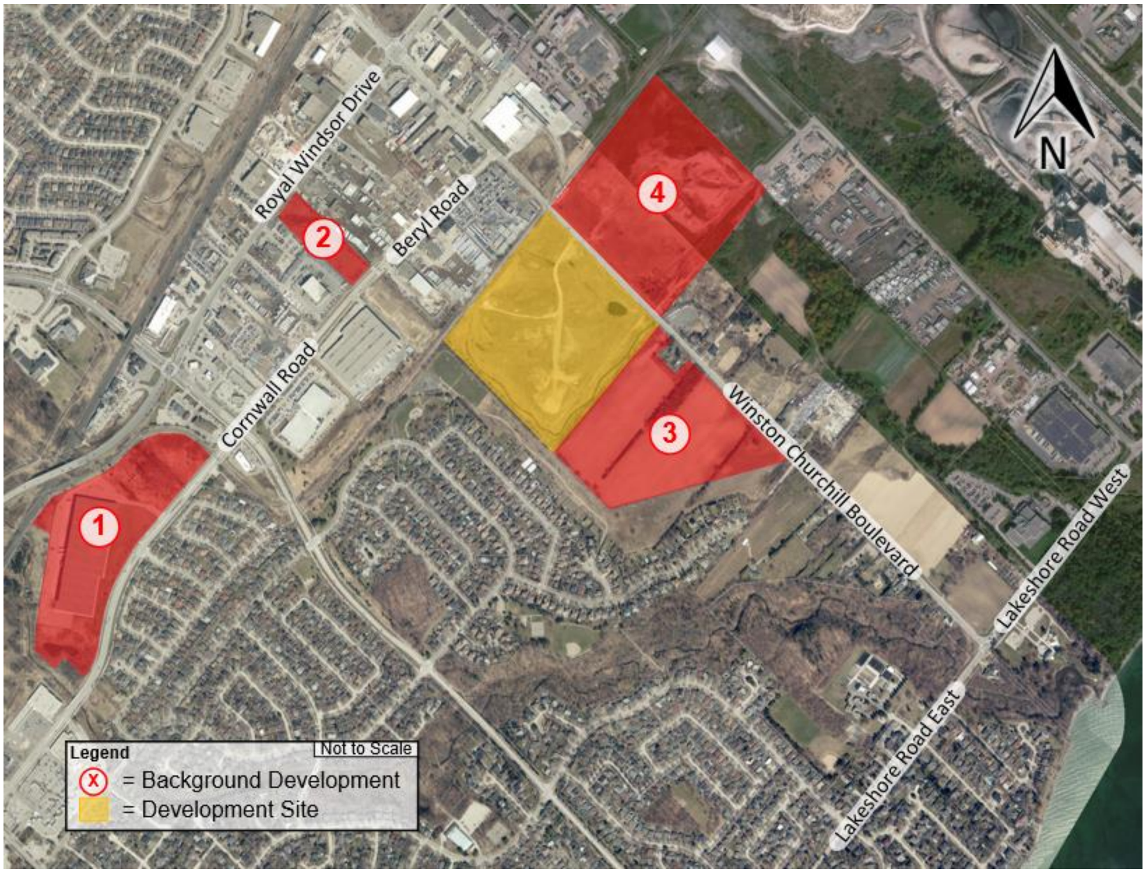
3.1.3 Background Developments

Based on correspondence with the Review Agencies (see **Appendix A**), four background developments which are expected to generate traffic volumes affecting the study area intersections have been identified in the vicinity of the development site. Details regarding these background development are presented in **Exhibit 3-1** and are illustrated geographically in **Exhibit 3-2**.

Exhibit 3-1: Background Development Summary

ID	Address / Location	Size and Nature of Background Development
1	2175 Cornwall Road	1 warehouse building consisting of approximately 28,900 m^2 GFA.
2	2395 Cornwall Road	1 industrial building consisting of 5,094 m^2 GFA.
3	560 Winston Churchill Boulevard	2 warehouse buildings, totalling 58,655 m^2 GFA in size.
4	759 Winston Churchill Boulevard	3 new industrial buildings with a combined 69,710 m^2 GFA

Exhibit 3-2: Background Developments



The development generated traffic and trip assignments for the 759 Winston Churchill Boulevard were retrieved from excepts of an April 2022 transportation impact study prepared by and provided by LEA Consulting Ltd. In lieu of any identified transportation impact studies published for the proposed 560 Winston Churchill Boulevard and 2395 Cornwall Road developments, background development site trips were estimated using average rate and fitted curve data (where applicable) from the publication **Trip Generation Manual, 10th Edition** (Institute of Transportation Engineers, September 2017). The estimated net vehicle trips for the proposed background developments at 560 Winston Churchill Boulevard and 2395 Cornwall Road are presented in **Exhibit 3-3**. Trip generation source data is presented in **Appendix E**.

Exhibit 3-3: Background Development Trip Generation

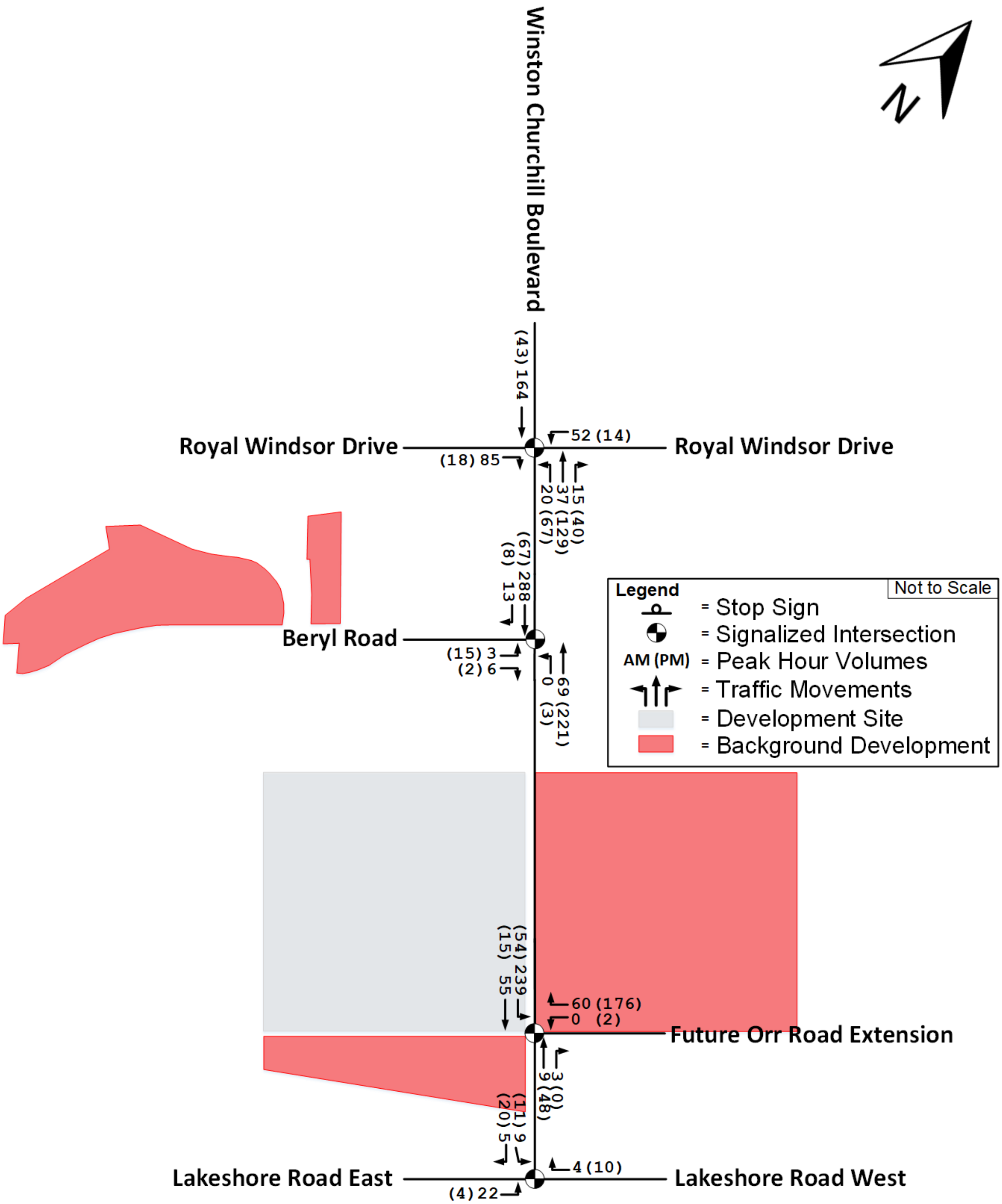
560 Winston Churchill Boulevard, Oakville					
LUC 150: Warehousing – 631,357.17 ft^2 (58,655 m^2)					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Trip Generation Equation	vehicle trips / 1000 ft^2	T = 0.12(X) + 25.32		T = 0.12(X) + 27.82	
Total Trips	vehicles / hour	**101**		**104**	
New Inbound Trips	vehicles / hour	78	77%	28	27%
New Outbound Trips	vehicles / hour	23	23%	76	73%
2395 Cornwall Road, Oakville					
LUC 110: General Light Industrial – 54,831 ft^2 (5,094 m^2)					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Trip Generation Equation	vehicle trips / 1000 ft^2	-		-	
Total Trips	vehicles / hour	**38**		**35**	
New Inbound Trips	vehicles / hour	33	88%	5	13%
New Outbound Trips	vehicles / hour	5	12%	30	87%

Trips associated with the 2175 Cornwall Road background development were assigned to the study area according to the trip distribution scheme and other supporting information presented in the following documents:

- **2175 Cornwall Road Traffic Impact Study Update, Oakville, ON** (McIntosh Perry Consulting Engineers Ltd., November 2020); and
- **Response to Paradigm Transportation Solution Limited Technical Review Comments for the 2175 Cornwall Road, Traffic Impact Study Update, Oakville** (McIntosh Perry Consulting Engineers Ltd., March 2021).

With respect to the 2395 Cornwall Road and 560 Winston Churchill Boulevard background developments, trips were assigned to the study area intersections based on data from the 2016 Transportation Tomorrow Survey (TTS). Background development trip assignments are illustrated in **Exhibit 3-4**.

Exhibit 3-4: Background Development Site Trips



3.1.4 Planned Road Improvements

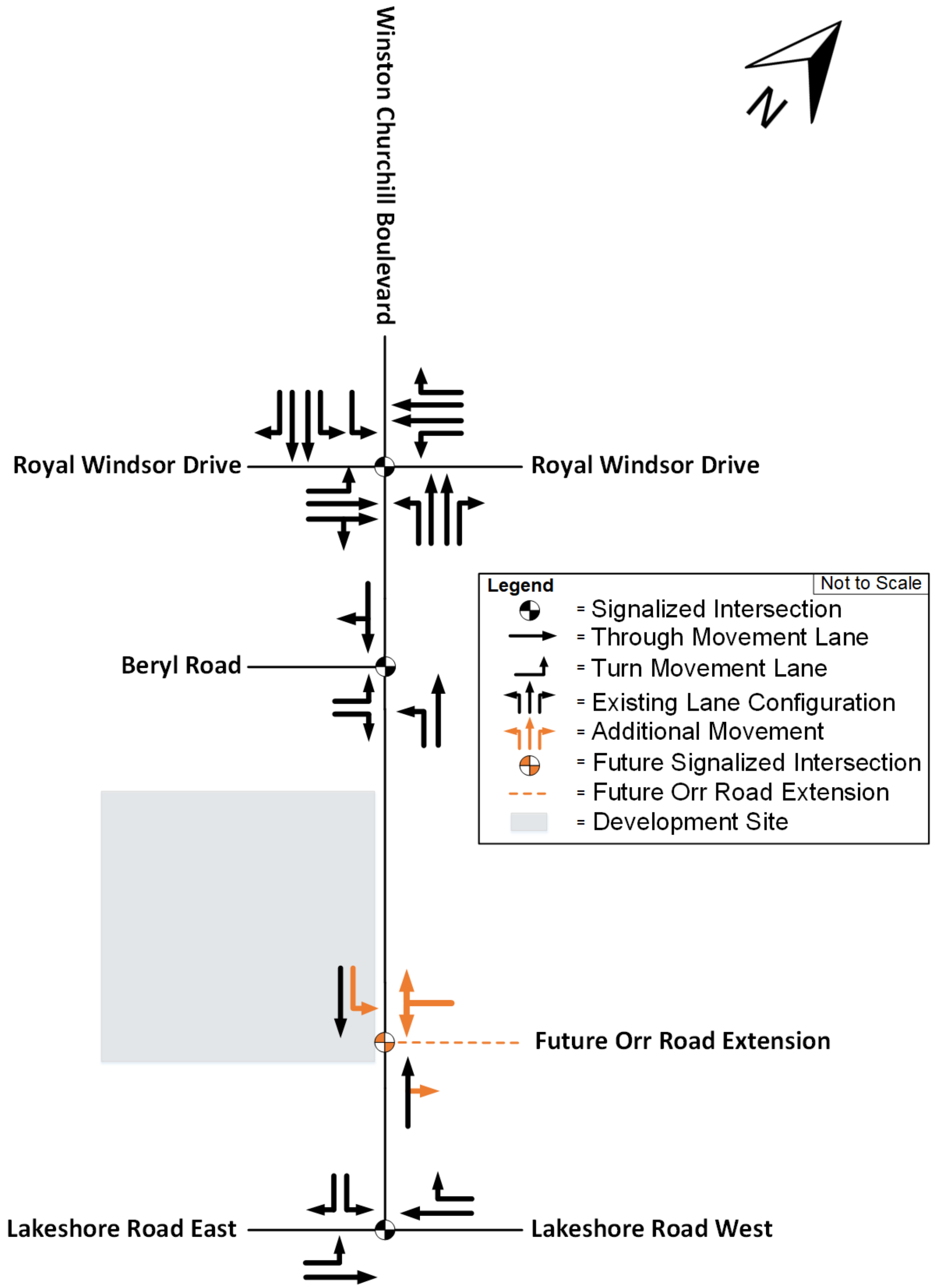
As mentioned in **Section 1**, a previous transportation impact study for the development site had been issued on December 9, 2015. Comments received from Peel Region, Halton Region, and the Town of Oakville with regards to the 2015 report include the consideration of a westward extension of Orr Road (located east of the development site) to form a signalized intersection with Winston Churchill Boulevard. This future signalized intersection would align with the Proposed South Site Access and would be equipped with an exclusive northbound left-turn lane[1] and an exclusive southbound left-turn lane[2]. A future dedicated southbound left-turn lane[3], opposite the northbound left-turn lane was assumed for the purposes of analysis. These future roadway changes are illustrated in **Exhibit 3-5** and **Exhibit 3-6**. It should also be noted that the lane configurations for the Future Orr Road Extension are conceptual at this time and are subject to change during detailed design stages.

[1] 20 metres of vehicle storage assumed for the purposes of analysis.
[2] 90 metres of vehicle storage assumed for the purposes of analysis.
[3] 20 metres of vehicle storage assumed for the purposes of analysis.

Exhibit 3-5: Future Road Extension of Orr Road to Winston Churchill Boulevard

Base Map Source: Conservation Halton. October 6, 2020,
http://camaps.maps.arcgis.com/apps/webappviewer/index.html?id=a2928bf280194294a4027111f8ff284a

Exhibit 3-6: Future Signalized Intersection Lane Configurations



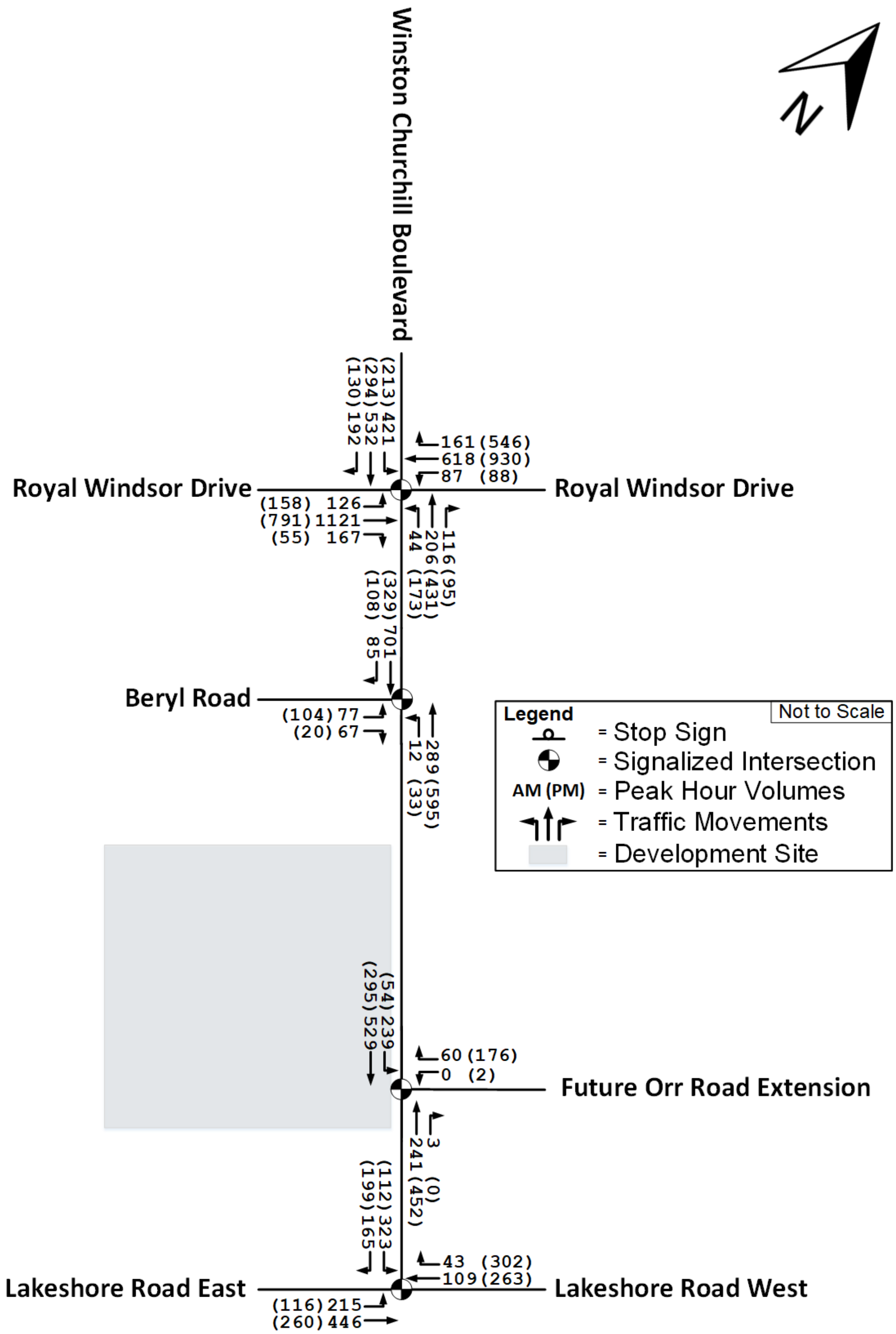
This future roadway extension and signalized intersection with Winston Churchill Boulevard has been accounted for in 2028 Future Background and 2028 Future Total Conditions.

Based on Review Agency comments, no other road improvements are planned by 2028 that will significantly affect traffic operations in the study area. It is our understanding that an urbanization of Winston Churchill Boulevard may occur beyond 2028, and this urbanization may include the provision for dedicated cycling facilities and / or a multi-use path.

3.1.5 2028 Future Background Conditions Analysis

New trips resulting from background traffic growth were added to the 2020 Existing Conditions scenario, producing the 2028 Future Background Conditions traffic volumes illustrated in **Exhibit 3-7**.

Exhibit 3-7: 2028 Future Background Conditions Traffic Volumes



The 2028 Future Background traffic analysis results are presented in **Exhibit 3-8**. Full Synchro reports are provided in **Appendix F**.

Exhibit 3-8: 2028 Future Background Conditions Traffic Operations – Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	E	70.4	0.95	EBL	E	57.2	0.68	60	130
				EBTR	F	111.3	1.12	266	-
				WBL	F	433.1	1.71	57	105
				WBT	D	38.2	0.54	94	-
				WBR	C	31.2	0.11	15	230
				NBL	C	33.7	0.19	20	125
				NBT	C	31.8	0.18	33	-
				NBR	C	31.0	0.10	18	65
				SBL	E	61.8	0.76	73	115
				SBT	B	17.5	0.30	53	-
				SBR	B	16.3	0.18	26	95
Winston Churchill Boulevard and Beryl Road	A	9.6	0.63	EBL	C	25.4	0.37	17	80
				EBR	C	23.4	0.05	8	-
				NBL	A	3.8	0.05	2	115
				NBT	A	4.4	0.25	23	-
				SBTR	A	9.0	0.67	94	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	C	20.7	0.52	EBL	A	8.8	0.28	30	75
				EBT	A	9.7	0.39	60	-
				WBT	A	7.2	0.10	15	-
				WBR	A	6.9	0.04	4	90
				SBL	D	47.5	0.85	91	125
				SBR	C	26.4	0.11	14	-
Winston Churchill Boulevard and Future Orr Road Extension	A	8	0.37	WBT	C	25.6	0.04	-	-
				NBT	A	3.2	0.19	16	-
				SBL	A	7.5	0.29	36	20
				SBT	A	8.5	0.41	88	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
PM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	D	38.1	0.66	EBL	D	39.3	0.72	44	130
				EBTR	C	30.1	0.57	113	-
				WBL	D	43.7	0.48	37	105
				WBT	D	45.1	0.77	152	-
				WBR	D	36.9	0.42	47	230
				NBL	D	46.3	0.54	67	125
				NBT	D	38.8	0.39	69	-
				NBR	C	34.0	0.06	13	65
				SBL	E	63.9	0.62	42	115
				SBT	C	23.6	0.19	36	-
				SBR	C	22.4	0.08	12	95
Winston Churchill Boulevard and Beryl Road	A	7.8	0.49	EBL	C	25.4	0.45	21	80
				EBR	C	22.6	0.01	5	-
				NBL	A	2.8	0.06	2	115
				NBT	A	6.2	0.50	78	-
				SBTR	A	5.6	0.39	38	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	B	12.2	0.27	EBL	A	4.3	0.15	13	75
				EBT	A	4.3	0.20	26	-
				WBT	A	4.3	0.20	26	-
				WBR	A	4.5	0.21	8	90
				SBL	D	39.7	0.57	33	125
				SBR	C	34.0	0.13	17	-
Winston Churchill Boulevard and Future Orr Road Extension	A	7.6	0.33	WBT	C	22.6	0.12	14	-
				NBT	A	5.8	0.38	37	-
				SBL	A	2.3	0.09	2	20
				SBT	A	2.7	0.25	9	-

Note: Red font represents a critical movement.

As shown in the above analysis, the shared eastbound through / right turn and westbound left turn movements at the intersection of Winston Churchill Boulevard and Royal Windsor Drive during the Weekday AM Peak Hour is anticipated to operate above capacity (v/c ratio of 1.12 and 1.71, respectively). These results indicate that the addition of background traffic is expected to exacerbate the operational constraint previously noted under 2020 Existing Conditions.

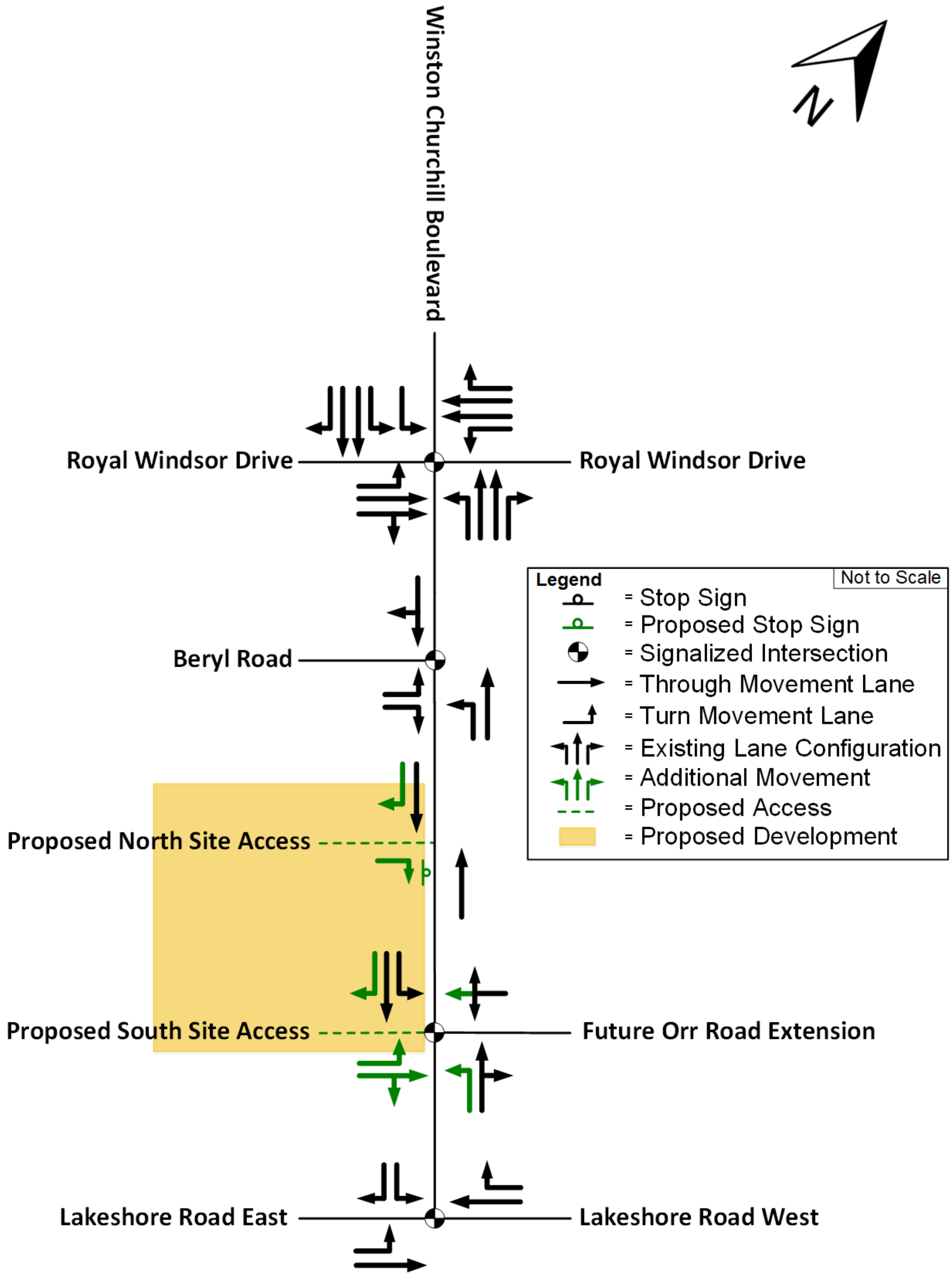
3.2 2028 Future Total Traffic Conditions

The 2028 Future Total traffic conditions analyzes a scenario in which the anticipated site traffic volumes are added to the 2028 Future Background traffic volumes.

3.2.1 Proposed Site Accesses

As discussed in **Section 2.1.5**, vehicular traffic will access the proposed development via either the Proposed North Site Access (right-in movements only) or the Proposed South Site Access. The proposed full build-out lane configurations are illustrated in **Exhibit 3-9**.

Exhibit 3-9: Future Total Lane Configurations



3.2.2 Trip Generation

Trip Generation Manual, 10th Edition (Institute of Transportation Engineers, September 2017), as mentioned in **Section 3.1.3**, was used to determine the associated number of trips to be generated by the proposed development. It should be noted that the trip generation estimates and subsequent traffic analysis are based on an earlier development concept which consisted of 63,265.68 m^2 of GFA for warehousing uses (i.e., a 3,153.40 m^2 GFA larger development). Given that the proposed development is smaller in size when compared to the previous development concept, the anticipated numbers of site trips are expected to be less than those presented below, resulting in a conservative analysis. As a result, traffic operations are likely to be better than presented in this report.

Based on a review of existing transit network, pedestrian facility, cyclist facility, and observed non-motorized movement counts, it is anticipated that most trips generated by the proposed development will be by vehicle. As a result, no reduction is applied for non-auto trips. This is anticipated to be a conservative estimate, as there may be carpooling and a number of transit riders accessing the site.

Based on the nature of the proposed development, its location context, and the data quality, fitted curve data for vehicle trips, Land Use Code 150: Warehousing – General Urban/Suburban was used. The estimated net new trips generated by the proposed development are illustrated in **Exhibit 3-10**.

Exhibit 3-10: Proposed Development Trip Generation

772 Winston Churchill Boulevard, Oakville					
LUC 150: Warehousing – 734,805.66 ft^2 (63,265.68 m^2)					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Trip Generation Equation	vehicle trips / 1000 ft^2	$T = 0.12(X) + 25.32$		$T = 0.12(X) + 27.82$	
Total Trips	vehicles / hour	**113**		**116**	
New Inbound Trips	vehicles / hour	87	77%	31	27%
New Outbound Trips	vehicles / hour	26	23%	85	73%

As shown in **Exhibit 3-10**, the proposed development is expected to generate up to 113 net new vehicle trips during the Weekday AM Peak Hour (87 inbound trips and 26 outbound trips) and up to 116 net new vehicle trips during the Weekday PM Peak Hour (31 inbound trips and 85 outbound trips). Trip generation source data is presented in **Appendix E**.

3.2.3 Trip Distribution and Assignment

The trip distribution for site trips was determined based on data from the 2016 Transportation Tomorrow Survey (TTS), and is presented in **Exhibit 3-11**.

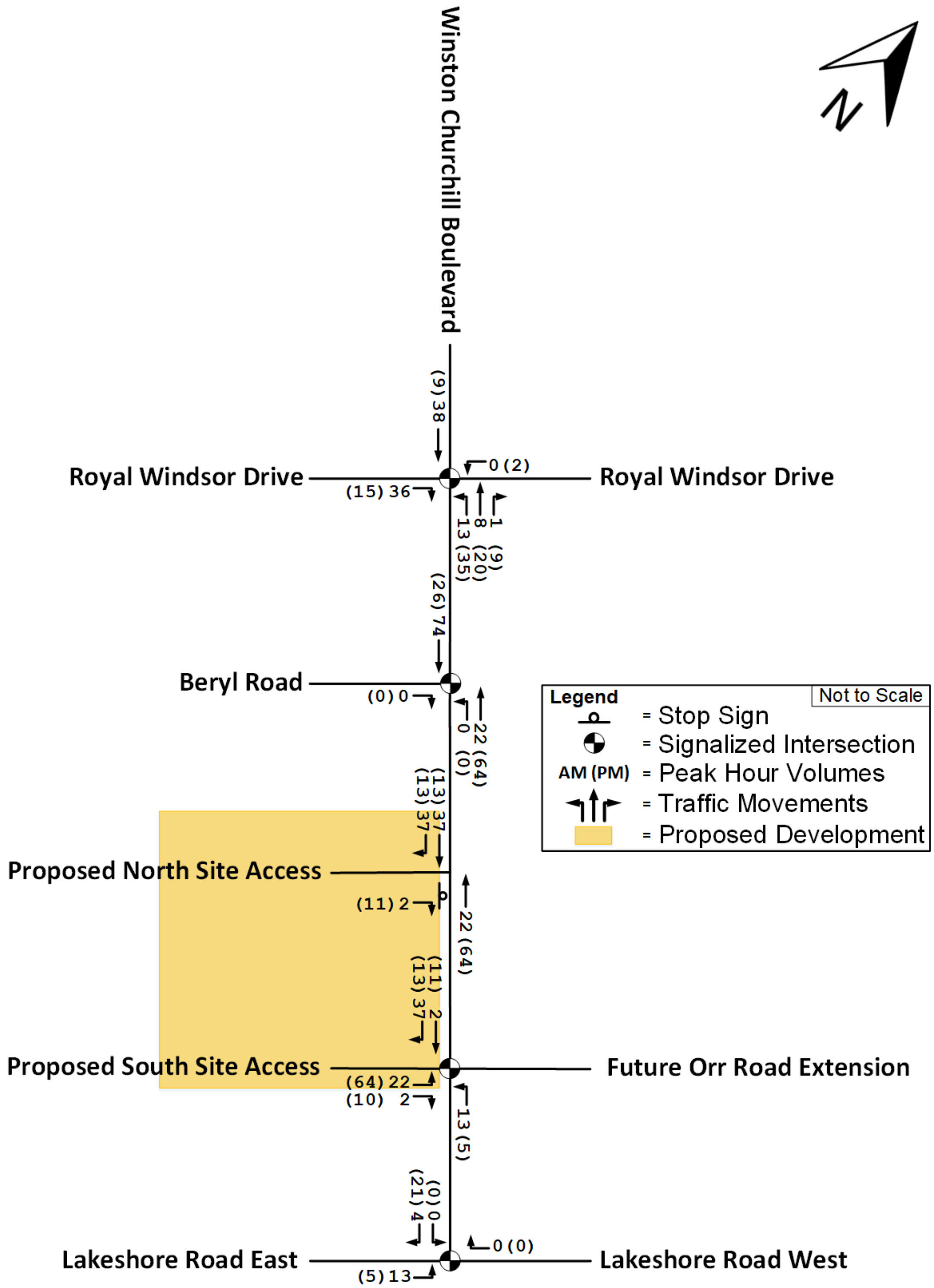
Exhibit 3-11: Site Trip Distribution

To / From	Inbound Trips		Outbound Trips	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
North (along Winston Churchill Boulevard)	44%	30%	47%	23%
East (along Royal Windsor Drive)	0%	3%	7%	11%
East (along Lakeshore Road West)	0%	0%	0%	0%
West (along Royal Windsor Drive)	41%	50%	24%	41%
West (along Beryl Road)	0%	0%	0%	0%
West (along Lakeshore Road East)	15%	17%	22%	25%
Total	**100%**	**100%**	**100%**	**100%**

Site trips[4] were assigned to the study area roadways based on logical travel patterns, as illustrated in **Exhibit 3-12**.

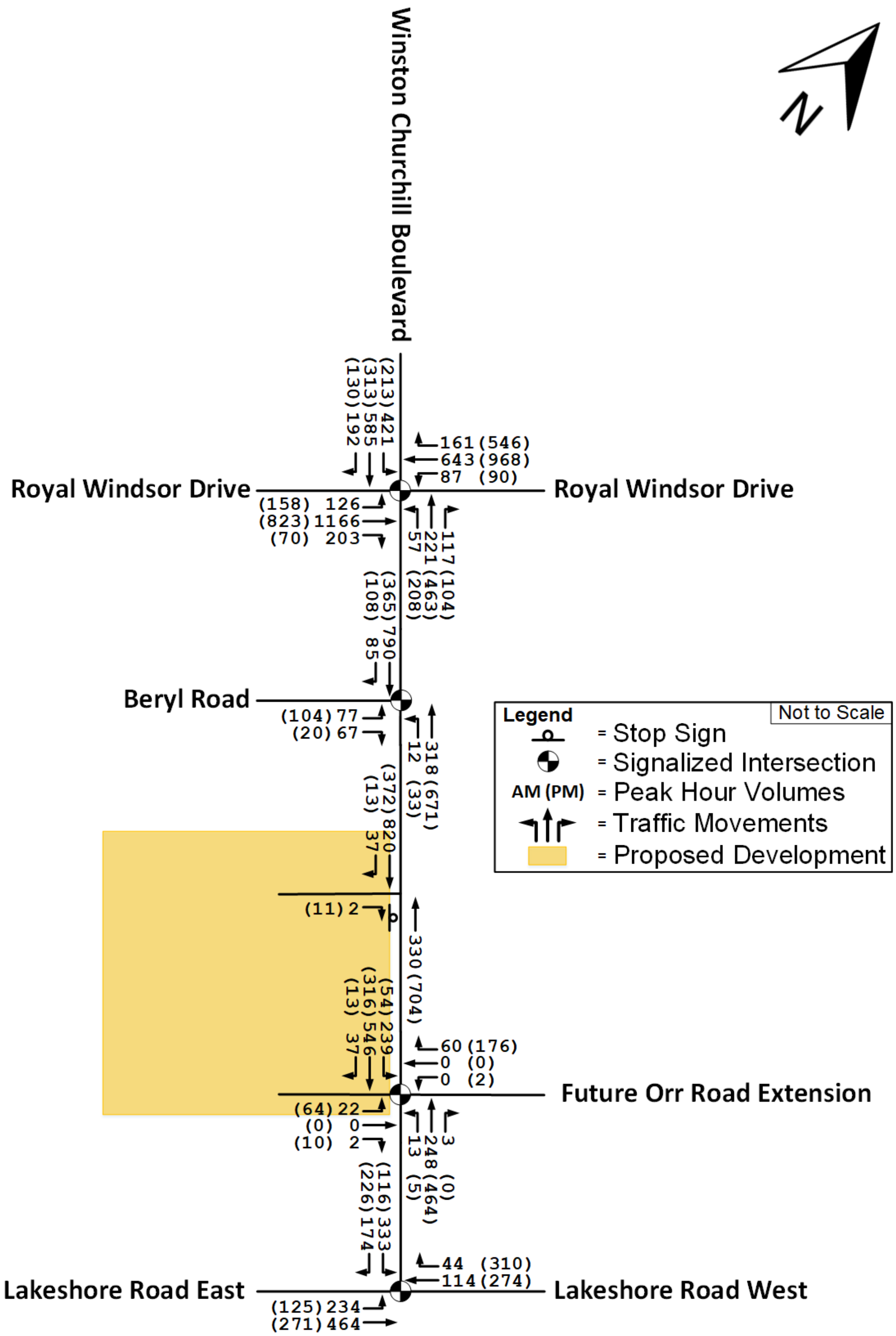
[4] The ITE Trip Generation Manual provides trip generation estimates for vehicle, of which ITE indicates qualitatively that 70% are expected to be automobile and 30% are expected to be trucks during the AM Peak Hour and PM Peak Hour. While it is noted that trucks are prohibited on Lakeshore Road East within the Town of Oakville, trip generation, distribution, and assignment was based on “vehicles” as per ITE.

Exhibit 3-12: Net New Site Traffic Volumes



New trips resulting from the construction of the proposed development were added to the 2028 Future Background conditions scenario, producing the 2028 Future Total traffic volumes illustrated in **Exhibit 3-13**.

Exhibit 3-13: 2028 Future Total Conditions Traffic Volumes



3.2.4 2028 Future Total Conditions Analysis

Using these 2028 Future Total Conditions traffic volumes, traffic operations analysis was conducted to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. Full Highway Capacity Manual analysis for the 2028 Future Total Conditions scenario is presented in **Appendix G**.

As initially discussed in **Section 3.2.2**, it should be noted that the trip generation estimates used for the 2028 Future Total analysis is based on an earlier development concept which had consisted of approximately 3,153.40 m^2 GFA of additional space for warehouse uses. As the proposed development is smaller in size when compared to the previous development concept, the traffic operations presented in this section are likely to be better than reported.

3.2.4.1 Signalized Intersections

The 2028 Future Total analysis results for the study area signalized intersections are presented in **Exhibit 3-14**.

Exhibit 3-14: 2028 Future Total Conditions Traffic Operations – Signalized Intersections

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	E	74.8	0.96	EBL	E	57.2	0.68	60	130
				EBTR	F	124.9	1.15	277	-
				WBL	F	433.1	1.71	57	105
				WBT	D	38.2	0.54	94	-
				WBR	C	31.2	0.11	15	230
				NBL	D	35.5	0.26	25	125
				NBT	C	31.9	0.18	34	-
				NBR	C	31.1	0.10	19	65
				SBL	E	61.8	0.76	73	115
				SBT	B	17.8	0.32	57	-
				SBR	B	16.3	0.18	26	95
Winston Churchill Boulevard and Beryl Road	B	10.4	0.68	EBL	C	25.4	0.37	17	80
				EBR	C	23.4	0.05	8	-
				NBL	A	3.7	0.06	2	115
				NBT	A	4.2	0.27	23	-
				SBTR	B	10.5	0.74	139	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	C	20.6	0.52	EBL	A	9.0	0.29	32	75
				EBT	A	9.7	0.39	60	-
				WBT	A	7.2	0.10	15	-
				WBR	A	6.9	0.04	4	90
				SBL	D	47.5	0.85	91	125
				SBR	C	26.4	0.11	14	-
Winston Churchill Boulevard and Proposed South Site Access / Future Orr Road Extension	A	8.3	0.38	EBL	C	26.3	0.18	8	-
				EBTR	C	25.3	0.00	-	-
				WBLTR	C	25.5	0.04	-	-
				NBL	A	2.6	0.02	2	20
				NBTR	A	3.2	0.19	16	-
				SBL	A	7.4	0.30	32	20
				SBT	A	8.4	0.41	89	-
				SBR	A	9.5	0.02	1	20

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
PM Peak Hour									
Winston Churchill Boulevard and Royal Windsor Drive	D	38.6	0.71	EBL	D	39.3	0.72	44	130
				EBTR	C	30.4	0.58	116	-
				WBL	D	45.4	0.50	39	105
				WBT	D	45.1	0.77	152	-
				WBR	D	37.0	0.43	49	230
				NBL	D	51.8	0.66	86	125
				NBT	D	39.1	0.41	72	-
				NBR	C	34.1	0.07	14	65
				SBL	E	63.9	0.62	42	115
				SBT	C	23.7	0.20	37	-
				SBR	C	22.4	0.08	12	95
Winston Churchill Boulevard and Beryl Road	A	8.9	0.54	EBL	C	25.4	0.45	21	80
				EBR	C	22.6	0.01	5	-
				NBL	A	3.8	0.07	3	115
				NBT	A	8.3	0.56	94	-
				SBTR	A	5.8	0.41	42	-
Winston Churchill Boulevard and Lakeshore Road East / Lakeshore Road West	B	12.6	0.27	EBL	A	4.3	0.16	14	75
				EBT	A	4.3	0.20	26	-
				WBT	A	4.3	0.20	26	-
				WBR	A	4.5	0.21	8	90
				SBL	D	39.7	0.57	33	125
				SBR	C	34.1	0.14	18	-
Winston Churchill Boulevard and Proposed South Site Access / Future Orr Road Extension	A	8.7	0.38	EBL	C	24.0	0.35	15	-
				EBTR	C	21.6	0.01	-	-
				WBLTR	C	22.2	0.12	13	-
				NBL	A	3.9	0.01	1	20
				NBTR	A	6.0	0.38	39	-
				SBL	A	2.4	0.09	3	20
				SBT	A	2.8	0.26	9	-
				SBR	A	3.9	0.01	-	20

Note: Red font represents a critical movement.

Based on the analysis presented in **Exhibit 3-14**, overall operations at the study area signalized intersections are anticipated to remain below critical capacity thresholds during the Weekday AM and PM Peak Hours. With respect to individual movements, the shared eastbound through / right-turn and westbound left turn movements at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour is expected to continue operating above capacity (v/c ratio of 1.15 and 1.71, respectively). However, it should be noted that the difference in the v/c ratio is marginal when compared to the 2028 Future Background Conditions scenario (v/c ratio of 1.12 and 1.71, respectively). All remaining movements are anticipated to operate below critical thresholds. Measures to mitigate this identified capacity constraint are discussed further in **Section 3.2.5**.

3.2.4.2 Unsignalized Intersections

The 2028 Future Total analysis results for the study area unsignalized intersection are presented in **Exhibit 3-15**.

Exhibit 3-15: 2028 Future Total Conditions Traffic Operations – Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Hour							
Winston Churchill Boulevard and Proposed North Site Access	0.0	EBR	B	14.3	0.01	0	-
PM Peak Hour							
Winston Churchill Boulevard and Proposed North Site Access	0.1	EBR	B	10.4	0.02	0	-

As shown in **Exhibit 3-15**, no capacity or queuing concerns are anticipated at the Proposed North Site Access during the Weekday AM and PM Peak Hours.

3.2.5 Traffic Operations Mitigation Measures

In order to improve traffic operations for the shared eastbound through / right-turn movement for the intersection of Winston Churchill Boulevard and Royal Windsor Drive to within capacity, the re-allocation of 7 seconds from the southbound left-turn / southbound through signal phases to the eastbound / westbound phases is recommended. No changes to the existing cycle length are proposed.

Comparisons of Unmitigated and Mitigated 2028 Future Background and 2028 Future Total traffic operations at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour resulting from these signal timing adjustments are presented in **Exhibit 3-16** and **Exhibit 3-17**, respectively. Full Highway Capacity Manual analysis for the Mitigated 2028 Future Background and 2028 Future Total Conditions analysis is presented in **Appendix H**.

Exhibit 3-16: 2028 Future Background Conditions Traffic Operations, Unmitigated and Mitigated, Signal Timing Plan Adjustment – Intersection of Winston Churchill Boulevard and Royal Windsor Drive

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak Hour (2028 Unmitigated Future Background Conditions)									
Winston Churchill Boulevard and Royal Windsor Drive	E	70.4	0.95	EBL	E	57.2	0.68	60	130
				EBTR	F	111.3	1.12	266	-
				WBL	F	433.1	1.71	57	105
				WBT	D	38.2	0.54	94	-
				WBR	C	31.2	0.11	15	230
				NBL	C	33.7	0.19	20	125
				NBT	C	31.8	0.18	33	-
				NBR	C	31.0	0.10	18	65
				SBL	E	61.8	0.76	73	115
				SBT	B	17.5	0.30	53	-
				SBR	B	16.3	0.18	26	95
AM Peak Hour (2028 Mitigated Future Background Conditions)									
Winston Churchill Boulevard and Royal Windsor Drive	D	36.1	0.78	EBL	C	22.8	0.37	37	130
				EBTR	C	29.4	0.75	175	-
				WBL	F	91.4	0.88	57	105
				WBT	C	20.3	0.36	67	-
				WBR	B	17.3	0.11	11	230
				NBL	D	54.8	0.34	23	125
				NBT	D	48.7	0.31	39	-
				NBR	D	47.9	0.19	28	65
				SBL	E	76.2	0.88	85	115
				SBT	C	33.5	0.43	75	-
				SBR	C	29.0	0.12	15	95

Note: Red font represents a critical movement.

Exhibit 3-17: 2028 Future Total Conditions Traffic Operations, Unmitigated and Mitigated, Signal Timing Plan Adjustments – Intersection of Winston Churchill Boulevard and Royal Windsor Drive

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak Hour (2028 Unmitigated Future Total Conditions)									
Winston Churchill Boulevard and Royal Windsor Drive	E	74.8	0.96	EBL	E	57.2	0.68	60	130
				EBTR	F	124.9	1.15	277	-
				WBL	F	433.1	1.71	57	105
				WBT	D	38.2	0.54	94	-
				WBR	C	31.2	0.11	15	230
				NBL	D	35.5	0.26	25	125
				NBT	C	31.9	0.18	34	-
				NBR	C	31.1	0.10	19	65
				SBL	E	61.8	0.76	73	115
				SBT	B	17.8	0.32	57	-
				SBR	B	16.3	0.18	26	95
AM Peak Hour (2028 Mitigated Future Total Conditions)									
Winston Churchill Boulevard and Royal Windsor Drive	D	37.2	0.84	EBL	C	22.8	0.37	37	130
				EBTR	C	30.3	0.78	183	-
				WBL	F	118.4	0.97	60	105
				WBT	C	20.3	0.36	67	-
				WBR	B	17.3	0.11	11	230
				NBL	E	60.7	0.46	29	125
				NBT	D	48.9	0.32	40	-
				NBR	D	47.9	0.20	29	65
				SBL	E	76.2	0.88	85	115
				SBT	C	34.1	0.46	81	-
				SBR	C	29.0	0.12	15	95

Note: Red font represents a critical movement.

Based on the above, when compared to Unmitigated traffic operations, the v/c ratio for the shared eastbound through / right-turn and westbound left turn movements at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour is anticipated to decrease from 1.12 and 1.71 (Unmitigated) to 0.75 and 0.88 for 2028 Future Background Conditions, and from 1.15 and 1.71 (Unmitigated) to 0.78 and 0.97 for 2028 Future Total Conditions. The resulting changes are anticipated to improve operations for the shared eastbound through / right-turn movement to below critical capacity thresholds without adversely affecting overall intersection operations or any other individual movements during the Weekday AM Peak Hour.

4 Traffic Study Recommendations/Conclusions

Based on the completed analysis, the following conclusions can be made:

- Trip generation estimates and the corresponding future total traffic analysis are based on an earlier development concept, which consisted of approximately 3,153.40 m^2 GFA of additional space for warehouse uses over the proposed development. Based on the larger previous development concept, a total of 113 and 116 two-way trips are anticipated to be produced during the Weekday AM and PM peak hours, respectively. This takes into account no trip reduction due to non-auto trips such as transit and carpooling.
- The shared eastbound through / right-turn movement at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour was found to be operating above critical capacity thresholds under 2020 Existing Conditions. All remaining movements during the Weekday AM and PM Peak Hours were found to operate below critical capacity thresholds.
- The study area intersections are anticipated to operate with sufficient reserve capacity under the 2028 Future Background and 2028 Future Total Conditions during the Weekday AM and PM Peak Hours, with the exception of the shared eastbound through / right-turn and westbound left turn movements at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour, as identified under 2020 Existing Conditions. The identified capacity constraint may be mitigated through signal timing adjustments.
- Overall, the traffic generated by the proposed development is anticipated to not have a significant impact on traffic operations within the study area. No new capacity or queuing concerns are anticipated as a result of the addition of site traffic, and increases to delays are minimal.

5 Access Location Analysis

The Transportation Association of Canada's (TAC) **Geometric Design Guide for Canadian Roads** (June 2017) was used to determine if the minimum stopping sight distance and the minimum departure sight distances are present at the location of the proposed site accesses. A design speed of 70 km/h was used (the posted speed limit of 60 km/h for Winston Churchill Boulevard, plus 10 km/h to account for driver speed variances under suburban conditions) in this analysis.

5.1 North Site Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the Proposed North Site Access. It should be noted that while proposed to be a right-in, right-out only access, the analysis reflects an earlier iteration which accommodated left-in and left-out movements.

5.1.1 Stopping Sight Distance

Stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the site access. For vehicles approaching the site, this distance is given by Equation 2.5.2 in TAC:

$$SSD = 0.278Vt + 0.039\frac{V^2}{a}$$

Where:

SSD = Stopping sight distance (m)
t = Brake reaction time (2.5 s)
V = Design speed (70 km/h)
a = Deceleration rate (3.4 m/s^2)

The resulting stopping sight distance requirements for the Proposed North Site Access onto Winston Churchill Boulevard are illustrated in **Exhibit 5-1**.

Exhibit 5-1: North Site Access – Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance	Maximum Distance Observed on Site
Approaching intersection from the north	105 m	✔	>650 m
Approaching intersection from the south	105 m	✔	>400 m

As shown in **Exhibit 5-1**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 5-2** and **Exhibit 5-3**.

Exhibit 5-2: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the Site Access)

Red arrow indicates the location of the proposed site access.

Exhibit 5-3: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the Site Access)

Red arrow indicates the location of the proposed site access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the site access. As shown in both **Exhibit 5-2** and **Exhibit 5-3**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound site traffic.

5.1.2 Departure Sight Distance

Departure sight distance (also known as Intersection Sight Distance) refers to the sight distance necessary for a driver to depart from a driveway and merge into traffic without causing a vehicle travelling along Winston Churchill Boulevard to have to decrease their speed by more than 30%. The specified departure sight distance for vehicles is given by Equation 9.9.1 in TAC:

$$ISD = 0.278\ (V_{major} \times t_g)$$

where:

ISD	=	Intersection sight distance (m)
V_{major}	=	Design speed (70 km/h)
t_g	=	Time gap for turning movement from stop (11.5 s for left-turns by trucks, 10.5 s for right-turns by trucks)

The departure sight distance requirements for the Proposed North Site Access onto Winston Churchill Boulevard are illustrated in **Exhibit 5-4**.

Exhibit 5-4: North Site Access – Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance	Maximum Distance Observed on Site
Left-turn from intersection – looking north	225 m	✔	>650 m
Left-turn from intersection – looking south	225 m	✔	>400 m
Right-turn from intersection – looking north	205 m	✔	>650 m

As shown in **Exhibit 5-4**, the observed departure sight distances meet or exceed the minimum distances specified by the TAC guidelines for vehicles making left or right-turns from the site access. **Exhibit 5-5** and **Exhibit 5-6** show the view of a motorist positioned at the site access and illustrate the observations presented in **Exhibit 5-4**.

Exhibit 5-5: Departure Sight Distance – Looking North from Site Access from a Position Approximately 1.5 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 5-6: Departure Sight Distance – Looking South from Site Access from a Position Approximately 1.5 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 5-5** and **Exhibit 5-6**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the proposed site access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

5.2 South Site Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the Proposed South Site Access.

5.2.1 Stopping Sight Distance

Stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the site access. For vehicles approaching the site, this distance is given by Equation 2.5.2 in TAC:

$$SSD = 0.278Vt + 0.039\frac{V^2}{a}$$

Where:

SSD = Stopping sight distance (m)
t = Brake reaction time (2.5 s)
V = Design speed (70 km/h)
a = Deceleration rate (3.4 m/s^2)

The resulting stopping sight distance requirements for the Proposed South Site Access onto Winston Churchill Boulevard are illustrated in **Exhibit 5-7**.

Exhibit 5-7: South Site Access – Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance	Maximum Distance Observed on Site
Approaching intersection from the north	105 m	✔	>550 m
Approaching intersection from the south	105 m	✔	>500 m

As shown in **Exhibit 5-7**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 5-8** and **Exhibit 5-9**.

Exhibit 5-8: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the Site Access)

Red arrow indicates the location of the proposed site access.

Exhibit 5-9: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the Site Access)

Red arrow indicates the location of the proposed site access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the site access. As shown in both **Exhibit 5-8** and **Exhibit 5-9**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound site traffic.

5.2.2 Departure Sight Distance

Departure sight distance (also known as Intersection Sight Distance) refers to the sight distance necessary for a driver to depart from a driveway and merge into traffic without causing a vehicle travelling along Winston Churchill Boulevard to have to decrease their speed by more than 30%. The specified departure sight distance for vehicles is given by Equation 9.9.1 in TAC:

$$ISD = 0.278\,(V_{major} \times t_g)$$

where:

ISD = Intersection sight distance (m)
V_{major} = Design speed (70 km/h)
t_g = Time gap for turning movement from stop (11.5 s for left-turns by trucks, 10.5 s for right-turns by trucks)

The departure sight distance requirements for the Proposed South Site Access onto Winston Churchill Boulevard are illustrated in **Exhibit 5-10**.

Exhibit 5-10: South Site Access – Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance	Maximum Distance Observed on Site
Left-turn from intersection – looking north	225 m	✔	>550 m
Left-turn from intersection – looking south	225 m	✔	>500 m
Right-turn from intersection – looking north	205 m	✔	>550 m

As shown in **Exhibit 5-10**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the site access. **Exhibit 5-11** and **Exhibit 5-12** show the view of a motorist positioned at the site access and illustrate the observations presented in **Exhibit 5-10**.

Exhibit 5-11: Departure Sight Distance – Looking North from Site Access from a Position Approximately 1.5 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 5-12: Departure Sight Distance – Looking South from Site Access from a Position Approximately 1.5 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 5-11** and **Exhibit 5-12**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the proposed site access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

5.3 Impact of Operating Speed on Sight Distances

As per **Sections 5.1** and **5.2**, an operating speed of 70 km/h (the posted speed limit of 60 km/h for Winston Churchill Boulevard, plus 10 km/h to account for driver speed variances under suburban conditions) was assumed for sight distance analyses. Should an operating speed of 80 km/h have been selected for Winston Churchill Boulevard (20 km/h to account for driver speed variances under suburban conditions), the required SSD and ISD values for this roadway according to TAC would have been 130 m and 260 m, respectively. Based on the maximum distances observed on site and shown in **Exhibit 5-1**, **Exhibit 5-4**, **Exhibit 5-7**, and **Exhibit 5-10**, it would seem that the available sight distances for both site accesses significantly exceed the minimum required distances according to TAC. As such, a difference in assumed operating speed in this case from 70 km/h to 80 km/h would not be anticipated to result in any sight distance deficiency.

5.4 Review of At-Grade Railway Crossing Standards

The proposed development is located south of an at-grade railway crossing at Winston Churchill Boulevard. This crossing consists of one track and is part of a railway spur that provides train access to several industrial land uses in the vicinity of the development site. Given the development site's proximity to this railway crossing, a review of Transport Canada's **Grade Crossing Regulations** (February 2021) ("GCR") and **Grade Crossing Standards** (January 2019) ("GCS") was undertaken to assess whether the location of the proposed north site access meets applicable standards.

According to the GCR, at least one of the following criteria must be met in order for construction of an access road (i.e., a driveway) onto a road approach to a public grade crossing to be permitted:

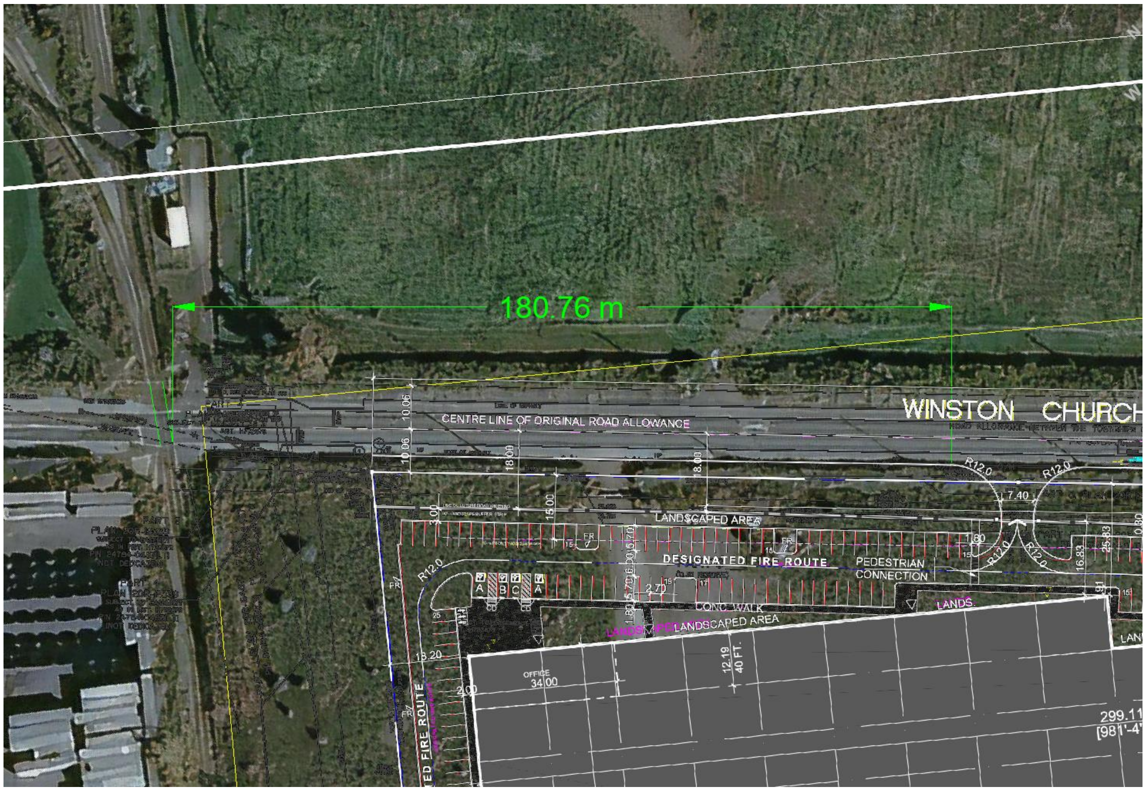
- The railway design speed is 25 km/h or less; or
- The distance between the nearest rail of the grade crossing and any point on the intersecting road exceeds 30 metres, as per the GCS.

A review of Transport Canada's Grade Crossing Inventory[5] indicates that the railway design speed at the railway crossing is 15 mph (approximately 24.1 km/h). Given that the railway design speed for the railway crossing is less than 25 km/h, criterion 1 is determined to be met.

With respect to criterion 2, the distance between the railway crossing and the proposed north site access is illustrated in **Exhibit 5-13**.

[5] https://open.canada.ca/data/en/dataset/d0f54727-6c0b-4e5a-aa04-ea1463cf9f4c

Exhibit 5-13: Distance between the Proposed North Site Access and the Railway Crossing



While criterion 2 does not need to be met due to criterion 1 meeting the necessary requirements, it is shown in **Exhibit 5-13** that the distance between the nearest rail of the railway crossing and the closest point of the proposed north site access is approximately 181 metres, which significantly exceeds the 30-metre requirement of criterion 2, as stipulated in the GCS.

Therefore, based on the guidance provided in the GCR and GCS, the location of the proposed north site access meets the relevant standards.

5.5 Access Location Analysis Summary

Based on our review of the sight distances at the location of the proposed accesses, stopping sight distances and departure sight distances are anticipated to meet or exceed the minimum requirements as specified by TAC. This suggests that departing vehicles are expected to be able to determine if a suitable gap in arterial road traffic exists, and approaching vehicles are expected to have an unobstructed view of outbound proposed development site traffic sufficient enough in order to safely react to a hazard.

Furthermore, based on our review of Transport Canada's Grade Crossing Regulations and Grade Crossing Standards, the location of the proposed north site access meets the relevant standards for separation from the railway crossing to the north.

5.6 Other Safety Factors

Based on field observations, all road segments in the study area have appropriate and clearly visible lane markings. Based on the 2028 future total analysis, it is concluded that all existing storage lengths can sufficiently accommodate the modelled queue lengths during both peak hours. As a result, no major weaving and merging issues are anticipated.

Given the low pedestrian and cyclist volumes observed, it is anticipated that there will be little to no pedestrian and cyclist activities in the study area. Thus, pedestrian and cyclists conflict with other road users are not anticipated.

6 Winston Churchill Boulevard Corridor Review

As requested by Review Agency staff, sight distance analysis was conducted at other existing and proposed accesses along Winston Churchill Boulevard between the at-grade railway crossing north of the development site, and Deer Run Avenue. The results of this analysis is presented in this section. It should be noted that stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the site access. For vehicles approaching the site, this distance is given by Equation 2.5.2 in TAC:

$$SSD = 0.278Vt + 0.039\frac{V^2}{a}$$

Where:

SSD	= Stopping sight distance (m)
t	= Brake reaction time (2.5 s)
V	= Design speed (70 km/h)
a	= Deceleration rate (3.4 m/s^2)

As well, departure sight distance (also known as Intersection Sight Distance) refers to the sight distance necessary for a driver to depart from a driveway and merge into traffic without causing a vehicle travelling along Winston Churchill Boulevard to have to decrease their speed by more than 30%. The specified departure sight distance for vehicles is given by Equation 9.9.1 in TAC:

$$ISD = 0.278\ (V_{major} \times t_g)$$

where:

ISD	=	Intersection sight distance (m)
V_{major}	=	Design speed (60 km/h)
t_g	=	Time gap for turning movement from stop (11.5 s for left-turns by trucks, 10.5 s for right-turns by trucks)

6.1 568 Winston Churchill Boulevard North Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 568 Winston Churchill north access.

6.1.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-1**.

Exhibit 6-1: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-1**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-2** and **Exhibit 6-3**.

Exhibit 6-2: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-3: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-2** and **Exhibit 6-3**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.1.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-4**.

Exhibit 6-4: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking north	205 m	✔

As shown in **Exhibit 6-4**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-5** and **Exhibit 6-6** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-4**.

Exhibit 6-5: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-6: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-5** and **Exhibit 6-6**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.2 568 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 568 Winston Churchill Boulevard south access.

6.2.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-7**.

Exhibit 6-7: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-7**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-8** and **Exhibit 6-9**.

Exhibit 6-8: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-9: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-8** and **Exhibit 6-9**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.2.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-10**.

Exhibit 6-10: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking north	205 m	✔

As shown in **Exhibit 6-10**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-11** and **Exhibit 6-12** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-10**.

Exhibit 6-11: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-12: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-11** and **Exhibit 6-12**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.3 Proposed 560 Winston Churchill Boulevard North Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the Proposed 560 Winston Churchill Boulevard north access.

6.3.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-13**.

Exhibit 6-13: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-13**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-14** and **Exhibit 6-15**.

Exhibit 6-14: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-15: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-14** and **Exhibit 6-15**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.3.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-16**.

Exhibit 6-16: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking north	205 m	✔

As shown in **Exhibit 6-16**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-17** and **Exhibit 6-18** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-16**.

Exhibit 6-17: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-18: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-17** and **Exhibit 6-18**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.4 Proposed 560 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the Proposed 560 Winston Churchill Boulevard south access.

6.4.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-19**.

Exhibit 6-19: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-19**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-20** and **Exhibit 6-21**.

Exhibit 6-20: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-21: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-20** and **Exhibit 6-21**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.4.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-22**.

Exhibit 6-22: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking north	205 m	✔

As shown in **Exhibit 6-22**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-23** and **Exhibit 6-24** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-22**.

Exhibit 6-23: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-24: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-23** and **Exhibit 6-24**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.5 Deer Run Avenue Emergency Access Gate

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing Deer Run Avenue emergency access gate.

6.5.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-25**.

Exhibit 6-25: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-25**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-26** and **Exhibit 6-27**.

Exhibit 6-26: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-27: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-26** and **Exhibit 6-27**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.5.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-28**.

Exhibit 6-28: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking north	205 m	✔

As shown in **Exhibit 6-28**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-29** and **Exhibit 6-30** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-28**.

Exhibit 6-29: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-30: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-29** and **Exhibit 6-30**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.6 535 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 535 Winston Churchill Boulevard south access.

6.6.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-31**.

Exhibit 6-31: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-31**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-32** and **Exhibit 6-33**.

Exhibit 6-32: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-33: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-32** and **Exhibit 6-33**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.6.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-34**.

Exhibit 6-34: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-34**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-35** and **Exhibit 6-36** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-34**.

Exhibit 6-35: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-36: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-35** and **Exhibit 6-36**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.7 535 Winston Churchill Boulevard North Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 535 Winston Churchill Boulevard north access.

6.7.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-37**.

Exhibit 6-37: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-37**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-38** and **Exhibit 6-39**.

Exhibit 6-38: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-39: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-38** and **Exhibit 6-39**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.7.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-40**.

Exhibit 6-40: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-40**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-41** and **Exhibit 6-42** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-40**.

Exhibit 6-41: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-42: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-41** and **Exhibit 6-42**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.8 555 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 555 Winston Churchill Boulevard south access.

6.8.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-43**.

Exhibit 6-43: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-43**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-44** and **Exhibit 6-45**.

Exhibit 6-44: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-45: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-44** and **Exhibit 6-45**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.8.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-46**.

Exhibit 6-46: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-46**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-47** and **Exhibit 6-48** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-46**.

Exhibit 6-47: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-48: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-47** and **Exhibit 6-48**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.9 555 Winston Churchill Boulevard North Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the 555 Winston Churchill Boulevard north access.

6.9.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-49**.

Exhibit 6-49: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-49**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-50** and **Exhibit 6-51**.

Exhibit 6-50: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-51: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-50** and **Exhibit 6-51**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.9.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-52**.

Exhibit 6-52: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✓
Left-turn from intersection – looking south	225 m	✓
Right-turn from intersection – looking south	205 m	✓

As shown in **Exhibit 6-52**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-53** and **Exhibit 6-54** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-52**.

Exhibit 6-53: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-54: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-53** and **Exhibit 6-54**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.10 595 Winston Churchill Boulevard Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 595 Winston Churchill Boulevard site access.

6.10.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-55**.

Exhibit 6-55: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-55**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-56** and **Exhibit 6-57**.

Exhibit 6-56: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-57: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-56** and **Exhibit 6-57**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.10.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-58**.

Exhibit 6-58: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-58**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-59** and **Exhibit 6-60** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-58**.

Exhibit 6-59: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-60: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-59** and **Exhibit 6-60**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.11 645 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 645 Winston Churchill Boulevard south access.

6.11.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-61**.

Exhibit 6-61: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-61**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-62** and **Exhibit 6-63**.

Exhibit 6-62: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-63: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-62** and **Exhibit 6-63**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.11.2 Departure Sight Distance

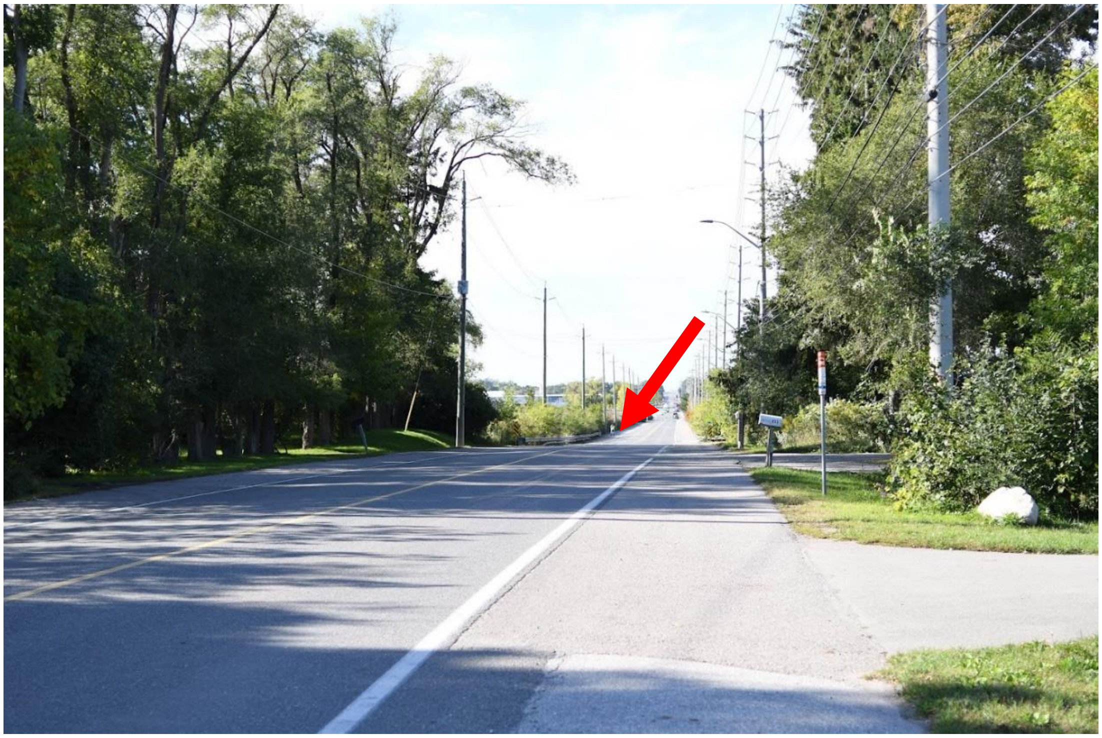
The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-64**.

Exhibit 6-64: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-64**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-65** and **Exhibit 6-66** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-64**.

Exhibit 6-65: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane



Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-66: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-65** and **Exhibit 6-66**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.12 645 Winston Churchill Boulevard North Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 645 Winston Churchill Boulevard north access.

6.12.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-67**.

Exhibit 6-67: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-67**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-68** and **Exhibit 6-69**.

Exhibit 6-68: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-69: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-68** and **Exhibit 6-69**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.12.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-70**.

Exhibit 6-70: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-70**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-71** and **Exhibit 6-72** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-70**.

Exhibit 6-71: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-72: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-71** and **Exhibit 6-72**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.13 655 Winston Churchill Boulevard Access / 663 Winston Churchill Boulevard South Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing combined 655 Winston Churchill Boulevard access / 663 Winston Churchill Boulevard south access.

6.13.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-73**.

Exhibit 6-73: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-73**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-74** and **Exhibit 6-75**.

Exhibit 6-74: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-75: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-74** and **Exhibit 6-75**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.13.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-76**.

Exhibit 6-76: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-76**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-77** and **Exhibit 6-78** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-76**.

Exhibit 6-77: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-78: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-77** and **Exhibit 6-78**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.14 663 Winston Churchill Boulevard North Site Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the existing 663 Winston Churchill Boulevard north access.

6.14.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-79**.

Exhibit 6-79: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-79**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-80** and **Exhibit 6-81**.

Exhibit 6-80: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-81: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-80** and **Exhibit 6-81**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.14.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-82**.

Exhibit 6-82: Departure Sight Distance Summary

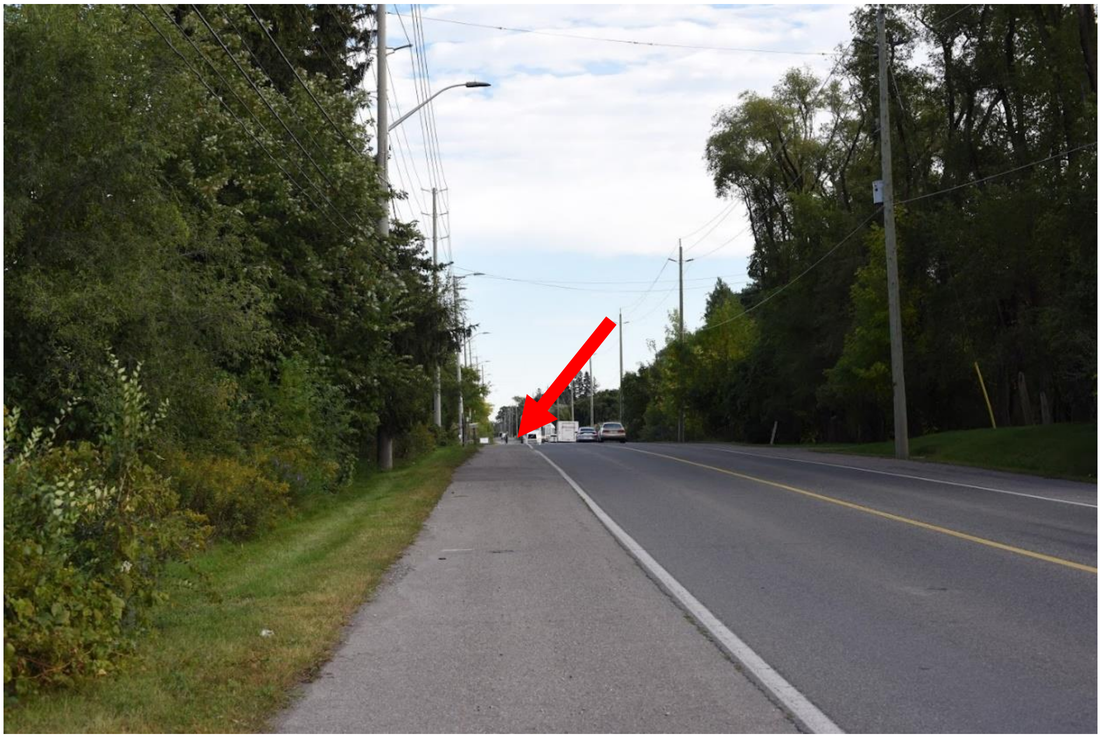
Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-82**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-83** and **Exhibit 6-84** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-82**.

Exhibit 6-83: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-84: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane



Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-83** and **Exhibit 6-84**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.15 Future Orr Road

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and the future Orr Road.

6.15.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-85**.

Exhibit 6-85: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-85**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-86** and **Exhibit 6-87**.

Exhibit 6-86: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-87: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-86** and **Exhibit 6-87**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.15.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-88**.

Exhibit 6-88: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-88**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-89** and **Exhibit 6-90** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-88**.

Exhibit 6-89: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-90: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-89** and **Exhibit 6-90**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.16 Proposed 759-805 Winston Churchill Boulevard Access

The following sections discuss stopping sight distance and departure sight distance at the intersection of Winston Churchill Boulevard and a proposed 759-805 Winston Churchill Boulevard access.

6.16.1 Stopping Sight Distance

The resulting stopping sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-91**.

Exhibit 6-91: Stopping Sight Distance Summary

Scenario	Minimum TAC Stopping Sight Distance	Meets Minimum TAC Stopping Sight Distance
Approaching intersection from the north	105 m	✔
Approaching intersection from the south	105 m	✔

As shown in **Exhibit 6-91**, stopping sight distance exceeds the minimum distance specified by TAC guidelines for vehicles approaching the access from the north and from the south. This is illustrated in **Exhibit 6-92** and **Exhibit 6-93**.

Exhibit 6-92: Stopping Sight Distance – North of Access (Looking Southbound from a point 105 m north of the access)

Red arrow indicates the location of the access.

Exhibit 6-93: Stopping Sight Distance – South of Access (Looking Northbound from a point 105 m south of the access)

Red arrow indicates the location of the access.

As noted above, stopping sight distance refers to the distance necessary for a driver travelling on Winston Churchill Boulevard to avoid a collision by coming to a complete stop in reaction to a vehicle departing from the access. As shown in both **Exhibit 6-92** and **Exhibit 6-93**, sightlines exceed these minimum requirements, indicating that a motorist on Winston Churchill Boulevard is expected to have an unobstructed view of outbound traffic.

6.16.2 Departure Sight Distance

The departure sight distance requirements for this access onto Winston Churchill Boulevard are illustrated in **Exhibit 6-94**.

Exhibit 6-94: Departure Sight Distance Summary

Scenario	Minimum TAC Departure Sight Distance	Meets Minimum TAC Departure Sight Distance
Left-turn from intersection – looking north	225 m	✔
Left-turn from intersection – looking south	225 m	✔
Right-turn from intersection – looking south	205 m	✔

As shown in **Exhibit 6-94**, the observed departure sight distances meet or exceed the minimum distances specified by TAC guidelines for vehicles making left or right-turns from the access. **Exhibit 6-95** and **Exhibit 6-96** show the view of a motorist positioned at the access and illustrate the observations presented in **Exhibit 6-94**.

Exhibit 6-95: Departure Sight Distance – Looking North from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

Exhibit 6-96: Departure Sight Distance – Looking South from the Access from a Position Approximately 1 m from the Edge of the Travelled Lane

Red arrow indicates the specified departure sight distance for vehicles (225 m).

As shown in **Exhibit 6-95** and **Exhibit 6-96**, the departure sight distance meets or exceeds the minimum distances specified by TAC. This indicates that sightlines are sufficient for outbound motorists from the access to determine if there is a suitable gap in Winston Churchill Boulevard traffic.

6.17 Impact of Operating Speed on Sight Distances

An operating speed of 70 km/h (the posted speed limit of 60 km/h for Winston Churchill Boulevard, plus 10 km/h to account for driver speed variances under suburban conditions) was assumed for sight distance analyses in **Section 6**. Should an operating speed of 80 km/h have been selected for Winston Churchill Boulevard (20 km/h to account for driver speed variances under suburban conditions), the required SSD and ISD values for this roadway according to TAC would have been 130 m and 260 m (a smaller ISD is required if the design vehicle is not a combination truck), respectively. Based on all of the site visit pictures shown in **Sections 6.1** to **6.16**, it would seem that the available sight distances for all accesses are sufficient and most if not all exceed the minimum required distances according to TAC. As such, a difference in assumed operating speed in this case from 70 km/h to 80 km/h would not be anticipated to result in any substantial sight distance deficiency.

6.18 Corridor Review Summary

Based on our review of the sight distances at existing and proposed accesses along Winston Churchill Boulevard within the study area, stopping sight distances and departure sight distances are anticipated to meet or exceed the minimum requirements as specified by TAC at all known locations. This suggests that departing vehicles are expected to be able to determine if a suitable gap in arterial road traffic exists, and approaching vehicles are expected to have an unobstructed view of outbound proposed traffic sufficient enough in order to safely react to a hazard.

6.19 Other Safety Factors

Based on field observations, all road segments in the study area have appropriate and clearly visible lane markings. While weaving and merging conflicts may occur at the closely spaced residential and commercial accesses on the east side of Winston Churchill Boulevard, volumes at these locations were observed to be very low. Therefore, the likelihood of actual conflicts occurring is expected to be very low. Nevertheless, access consolidation should be considered if these properties redevelop into uses which generate higher traffic volumes.

Given the low pedestrian and cyclist volumes observed, it is anticipated that there will be little to no pedestrian and cyclist activities in the study area. Thus, pedestrian and cyclists conflict with other road users are not anticipated. However, as the presence of paved shoulders on both sides of Winston Churchill Boulevard provides separation between vehicles and cyclists, appropriate replacement facilities should be considered if Winston Churchill Boulevard is rebuilt to an urban cross-section.

7 Vehicle Swept Path Analysis

A vehicle swept path analysis was conducted using AutoTurn to demonstrate that tractor trailer trucks can enter and exit the site in a forward motion, and that access to loading docks is functional. The vehicle swept path analysis is presented in **Appendix I** and indicates that access to loading docks by tractor trailer trucks via the proposed south site access is functional.

8 Study Conclusions and Recommendations

Arcadis undertook a transportation impact study and a safety study for the proposed development at 772 Winston Churchill Boulevard in Oakville, Ontario. The transportation impact study and the safety study demonstrated that there are no anticipated operational issues on the road network, and no anticipated safety issues associated with the development site because of the proposed development's construction.

The conclusions for the two portions of the study are summarized below.

8.1 Traffic Study

- Trip generation estimates and the corresponding future total traffic analysis are based on an earlier development concept, which consisted of approximately 3,153.40 m^2 GFA of additional space for warehouse uses over the proposed development. Based on the larger previous development concept, a total of 113 and 116 two-way trips are anticipated to be produced during the Weekday AM and PM peak hours, respectively. This takes into account no trip reduction due to non-auto trips such as transit and carpooling.
- The shared eastbound through / right-turn movement at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour was found to be operating above critical capacity thresholds under 2020 Existing Conditions. All remaining movements during the Weekday AM and PM Peak Hours were found to operate below critical capacity thresholds.
- The study area intersections are anticipated to operate with sufficient reserve capacity under the 2028 Future Background and 2028 Future Total Conditions during the Weekday AM and PM Peak Hours, with the exception of the shared eastbound through / right-turn and westbound left turn movements at the Winston Churchill Boulevard and Royal Windsor Drive intersection during the Weekday AM Peak Hour, as identified under 2020 Existing Conditions. The identified capacity constraint may be mitigated through signal timing adjustments.
- Overall, the traffic generated by the proposed development is anticipated to not have a significant impact on traffic operations within the study area. No new capacity or queuing concerns are anticipated as a result of the addition of site traffic, and increases to delays are minimal.

8.2 Access Location Analysis

- All known existing and proposed access and intersections along Winston Churchill Boulevard were observed to have sufficient sight line distances to accommodate vehicles movements, including heavy vehicles which require larger departure gaps.
- No major weaving, merging, pedestrian conflicts, cyclist conflicts, and heavy-vehicle conflicts are anticipated under present traffic volumes.
- Access consolidation may be considered if low-volume residential properties redevelop into uses which generate higher volumes of traffic.
- Replacement cycling facilities may be considered if Winston Churchill Boulevard is rebuilt to an urban cross-section.

8.3 Winston Churchill Boulevard Corridor Review

- Both proposed accesses to the development site have sufficient sight line distances to accommodate vehicles accessing the site, including heavy vehicles which require larger departure gaps.
- No major weaving, merging, pedestrian conflicts, cyclist conflicts, and heavy-vehicle conflicts are anticipated as a result of the proposed development's construction.

8.4 Vehicle Swept Path Analysis

- A vehicle swept path analysis was undertaken using AutoTurn to demonstrate that tractor trailer trucks can enter and exit the site in a forward motion, and that access to loading docks is functional. Based on the analysis, access to loading docks by tractor trailer trucks via the proposed south site access is functional.

Appendix A

Scope of Investigation

From:	Razao, Ricardo
To:	Andrae Griffith
Cc:	Jeff Pascua; Hamdani, Hashim; Barnes, Catherine
Subject:	RE: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard
Date:	Thursday, September 24, 2020 10:47:40 AM

Hi Andrae,

The Halton planner on file for the above-noted application is Anne Gariscsak (Anne.Gariscsak@halton.ca).

Thanks,
Ricardo

From: Barnes, Catherine <catherine.barnes@peelregion.ca>
Sent: September 24, 2020 10:18 AM
To: Andrae Griffith <andrae.griffith@ibigroup.com>; Razao, Ricardo <ricardo.razao@peelregion.ca>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>; Hamdani, Hashim <hashimali.hamdani@peelregion.ca>
Subject: RE: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

Hi Andrae,

We generally contact our planner – Ricardo Razao – who would then reach out to the planner in Halton. I have cc'd Ricardo as I believe he is our planner on the file or he will tell us who is assigned to this file. With that information the planner can reach out to the equivalent planner in Halton. Hope that helps.

Thank you,

Catherine Barnes
Region of Peel
Technical Analyst
Traffic Development & Permits
10 Peel Centre Drive Suite B, 4th Floor
Brampton, ON L6T 4B9
905-791-7800 x 7569
(Cell) 1 905-460-4206

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From: Andrae Griffith <andrae.griffith@ibigroup.com>
Sent: September 24, 2020 9:53 AM
To: Barnes, Catherine <catherine.barnes@peelregion.ca>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>; Hamdani, Hashim <hashimali.hamdani@peelregion.ca>
Subject: RE: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

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Hi Catherine,

Thank you for your comments. We look forward to your eventual review of our submission.

Do you have a contact for the appropriate staff at Halton Region to discuss our future scenarios?

Thank you,

Andrae Griffith
Pronouns: he, him, his

IBI GROUP
7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel +1 416 596 1930 ext 61450 fax +1 416 596 0644

From: Barnes, Catherine <catherine.barnes@peelregion.ca>
Sent: Thursday, September 24, 2020 9:32 AM
To: Andrae Griffith <andrae.griffith@ibigroup.com>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>; Hamdani, Hashim <hashimali.hamdani@peelregion.ca>
Subject: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

Hi Andrae,

The Region has reviewed the scope of work for 772 Winston Churchill Blvd and find it to be satisfactory. Please see the traffic comments below in red and the link here for the detailed Region of Peel TIS formatting and contact information for background traffic (growth rated, AADT, signal timing, etc).

Please contact Transportation to confirm growth rates along the subject Regional road(s).

- Please contact Damian Jamroz, Traffic Operations, to obtain the most recent TMCs and/or average annual daily traffic (AADT).
- Please contact Rick Laing, Supervisor of Traffic Signals and Streetlighting, to obtain traffic signal timing parameters and ensure that the information includes the appropriate walk/don't walk splits, recall modes and offsets.
- Please contact Development Services Planning staff (Ricardo Razao) to obtain details on surrounding developments in the area that would affect traffic capacity in the planning horizon year(s).

Please do not hesitate to contact me if you have any further questions of concerns. I trust this to be satisfactory.

Catherine Barnes
Region of Peel
Technical Analyst
Traffic Development & Permits
10 Peel Centre Drive Suite B, 4th Floor
Brampton, ON L6T 4B9
905-791-7800 x 7569
(Cell) 1 905-460-4206
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From: Andrae Griffith <andrae.griffith@ibigroup.com>
Sent: September 16, 2020 12:20 PM
To: Barnes, Catherine <catherine.barnes@peelregion.ca>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>
Subject: Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

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Dear Ms. Barnes,

In 2015, IBI Group submitted a transportation impact study for a proposed commercial development at

772 Winston Churchill Boulevard on the City of Mississauga / Town of Oakville border (attached for your reference). As the original 2015 concept was ultimately not constructed, we have been retained to update this study to reflect a new development concept consisting of an approximate 68,256 m^2 of warehouse uses. Based on this, the following provides our proposed scope of work for this transportation impact study update:

1. **Analysis Time Periods and Intersections:** Based on the proposed commercial development's nature and size, we plan to analyze the weekday AM peak period (7:00 a.m. – 9:00 a.m.) and weekday PM peak period (4:00 p.m. – 6:00 p.m.). The following intersections will be included in this analysis: AGREE
   1. Winston Churchill Boulevard & Royal Windsor Drive;
   2. Winston Churchill Boulevard & Beryl Road;
   3. Winston Churchill Boulevard & Lakeshore Road East / Lakeshore Road West;
   4. Winston Churchill Boulevard & Proposed North Site Access; and
   5. Winston Churchill Boulevard & Proposed South Site Access.
2. **2020 Existing Conditions:** The 2020 existing traffic operations will be analyzed using the software program Synchro (version 11) for the weekday AM and weekday PM peak periods, for the intersections listed above. We have budgeted for the acquisition of turning movement count data at the existing study area intersections. It should be noted that we have identified traffic counts collected in 2017 as being representative of pre-COVID-19 conditions. Given the circumstances, we propose to grow these counts to estimate 2020 conditions based on growth rates provided by the review agencies and / or other traffic data sources reflective of pre-COVID-19 conditions. AGREE
3. **2026 Background Traffic Conditions:** The 2026 background traffic volumes will be determined for the study area intersections, which coincides with five years from an assumed 2021 opening day of the development. We will identify an applicable background traffic growth rate and other area developments which may introduce traffic into the study area, based on discussions with the review agencies. Any future road network or intersection changes proposed by these entities, or outlined in their respective capital works programs, will be taken into consideration. PLEASE FIND THE CONTACTS IN THE LINK AND NOTES ABOVE.

   The 2026 background traffic analysis will identify and determine the impacts of the adjacent developments without the proposed site traffic under existing and future roadway conditions.
4. **Site Traffic Generation and Trip Distribution:** The trip generation for the proposed development will be based on the information presented in the Institute of Transportation Engineers ("ITE") publication, *Trip Generation, 10th Edition*. A review of the modal split will also be undertaken to account for the trips being made by non-auto modes of travel. The municipal Transportation Master Plans will be used as references for this review.

   The trip distribution for the site will be based on a review of existing travel patterns, the 2016 Transportation Tomorrow Survey (TTS), and the available road network. The forecast site traffic for the development will be added to the road network based on the trip distribution, and assigned to the network based on logical travel routes and available traffic capacity. AGREE
5. **2026 Total Traffic Conditions**: The estimated site traffic volumes will be combined with the 2026 background traffic volumes to determine the 2026 total traffic volumes for the study area intersections, and intersection operations analysis will be undertaken for the weekday AM and weekday PM peak periods. Any necessary road improvements required to accommodate total traffic volumes will be identified if necessary, such as additional turning lanes, storage length modifications, and / or traffic control signals. AGREE
6. **Access Location Analysis:** IBI Group will compare the available sightlines at the location of

the proposed accesses to Winston Churchill Boulevard against the applicable standards [i.e., Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)]. Approaching stopping sight distance and departure sight distances along Winston Churchill will be measured in the field, and mitigation measures to address sightline deficiencies will be discussed, as appropriate. AGREE

Site Plan Review:

High level review of the site plan (access location, site geometrics, parking lot layout, loading/refuse access) -Property requirements to be included as they will have an impact on the site.

We are aware of two previous submissions for traffic studies for the development site, with comments being provided by Halton Region, the Region of Peel, and the Town of Oakville. These comments have included the need to provide for a future signalized access opposing Orr Road, and also the provision of an exclusive northbound left-turn lane and southbound right-turn lane at this future signalized intersection. Our study update will have regard for these comments.

If you have any questions about the proposed scope of work for the 772 Winston Churchill Boulevard development, please do not hesitate to contact me. As Winston Churchill is a boundary road, please let me know if Halton Region staff are better suited to respond to this request. (Halton Region could be contacted for further information regarding background developments etc.)

Sincerely,

Andrae Griffith
Pronouns: he, him, his

A Message from IBI Group's CEO on COVID-19: https://www.ibigroup.com/covid19-response

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From: Andrae Griffith
To: "Robert.Clackett@halton.ca"
Subject: FW: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard
Date: Thursday, September 24, 2020 12:47:00 PM

Dear Mr. Clackett,

Ricardo Razao at the Region of Peel had identified Ms. Gariscsak as the planner on file for 772 Winston Churchill Boulevard. As per instructions her retirement announcement, please see our request below.

Sincerely,

Andrae Griffith
Pronouns: he, him, his

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7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel +1 416 596 1930 ext 61450 fax +1 416 596 0644

From: Andrae Griffith
Sent: Thursday, September 24, 2020 12:41 PM
To: Anne.Gariscsak@halton.ca
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>
Subject: FW: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

Dear Ms. Gariscsak,

In 2015, IBI Group submitted a transportation impact study for a proposed commercial development at 772 Winston Churchill Boulevard on the City of Mississauga / Town of Oakville border. As the original 2015 concept was ultimately not constructed, we have been retained to update this study to reflect a new development concept consisting of an approximate 68,256 m^2 of warehouse uses.

In order to inform our future transportation scenarios, could you please assist me in identifying growth rates and anticipated developments which may impact traffic volumes within our study area outlined below?

Please let me know if you have any questions or require any clarification regarding this request. Thank you for your time, and we trust that the Regional Municipality of Halton concurs with Peel Region's assessment of our transportation study scope of work.

Sincerely,

Andrae Griffith
Pronouns: he, him, his

IBI GROUP
7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel +1 416 596 1930 ext 61450 fax +1 416 596 0644

From: Barnes, Catherine <catherine.barnes@peelregion.ca>

Sent: Thursday, September 24, 2020 9:32 AM
To: Andrae Griffith <andrae.griffith@ibigroup.com>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>; Hamdani, Hashim <hashimali.hamdani@peelregion.ca>
Subject: Traffic comments - Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

Hi Andrae,

The Region has reviewed the scope of work for 772 Winston Churchill Blvd and find it to be satisfactory. Please see the traffic comments below in red and the link here for the detailed Region of Peel TIS formatting and contact information for background traffic (growth rated, AADT, signal timing, etc).

- Please contact Transportation to confirm growth rates along the subject Regional road(s).
- Please contact Damian Jamroz, Traffic Operations, to obtain the most recent TMCs and/or average annual daily traffic (AADT).
- Please contact Rick Laing, Supervisor of Traffic Signals and Streetlighting, to obtain traffic signal timing parameters and ensure that the information includes the appropriate walk/don't walk splits, recall modes and offsets.
- Please contact Development Services Planning staff (Ricardo Razao) to obtain details on surrounding developments in the area that would affect traffic capacity in the planning horizon year(s).

Please do not hesitate to contact me if you have any further questions of concerns. I trust this to be satisfactory.

Catherine Barnes
Region of Peel
Technical Analyst
Traffic Development & Permits
10 Peel Centre Drive Suite B, 4th Floor
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From: Andrae Griffith <andrae.griffith@ibigroup.com>
Sent: September 16, 2020 12:20 PM
To: Barnes, Catherine <catherine.barnes@peelregion.ca>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>
Subject: Transportation Impact Study Scope of Work - 772 Winston Churchill Boulevard

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Dear Ms. Barnes,

In 2015, IBI Group submitted a transportation impact study for a proposed commercial development at 772 Winston Churchill Boulevard on the City of Mississauga / Town of Oakville border (attached for your reference). As the original 2015 concept was ultimately not constructed, we have been retained to update this study to reflect a new development concept consisting of an approximate 68,256 m^2 of warehouse uses. Based on this, the following provides our proposed scope of work for this transportation impact study update:

1. **Analysis Time Periods and Intersections:** Based on the proposed commercial development's nature and size, we plan to analyze the weekday AM peak period (7:00 a.m. – 9:00 a.m.) and weekday PM peak period (4:00 p.m. – 6:00 p.m.). The following intersections will be included in this analysis: AGREE
    1. Winston Churchill Boulevard & Royal Windsor Drive;
    2. Winston Churchill Boulevard & Beryl Road;
    3. Winston Churchill Boulevard & Lakeshore Road East / Lakeshore Road West;
    4. Winston Churchill Boulevard & Proposed North Site Access; and
    5. Winston Churchill Boulevard & Proposed South Site Access.
2. **2020 Existing Conditions:** The 2020 existing traffic operations will be analyzed using the software program Synchro (version 11) for the weekday AM and weekday PM peak periods, for the intersections listed above. We have budgeted for the acquisition of turning movement count data at the existing study area intersections. It should be noted that we have identified traffic counts collected in 2017 as being representative of pre-COVID-19 conditions. Given the circumstances, we propose to grow these counts to estimate 2020 conditions based on growth rates provided by the review agencies and / or other traffic data sources reflective of pre-COVID-19 conditions. AGREE
3. **2026 Background Traffic Conditions:** The 2026 background traffic volumes will be determined for the study area intersections, which coincides with five years from an assumed 2021 opening day of the development. We will identify an applicable background traffic growth rate and other area developments which may introduce traffic into the study area, based on discussions with the review agencies. Any future road network or intersection changes proposed by these entities, or outlined in their respective capital works programs, will be taken into consideration. PLEASE FIND THE CONTACTS IN THE LINK AND NOTES ABOVE.

    The 2026 background traffic analysis will identify and determine the impacts of the adjacent developments without the proposed site traffic under existing and future roadway conditions.
4. **Site Traffic Generation and Trip Distribution:** The trip generation for the proposed development will be based on the information presented in the Institute of Transportation

Engineers ("ITE") publication, *Trip Generation, 10th Edition*. A review of the modal split will also be undertaken to account for the trips being made by non-auto modes of travel. The municipal Transportation Master Plans will be used as references for this review.

The trip distribution for the site will be based on a review of existing travel patterns, the 2016 Transportation Tomorrow Survey (TTS), and the available road network. The forecast site traffic for the development will be added to the road network based on the trip distribution, and assigned to the network based on logical travel routes and available traffic capacity. AGREE

5. **2026 Total Traffic Conditions**: The estimated site traffic volumes will be combined with the 2026 background traffic volumes to determine the 2026 total traffic volumes for the study area intersections, and intersection operations analysis will be undertaken for the weekday AM and weekday PM peak periods. Any necessary road improvements required to accommodate total traffic volumes will be identified if necessary, such as additional turning lanes, storage length modifications, and / or traffic control signals. AGREE

6. **Access Location Analysis:** IBI Group will compare the available sightlines at the location of the proposed accesses to Winston Churchill Boulevard against the applicable standards [i.e., Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)]. Approaching stopping sight distance and departure sight distances along Winston Churchill will be measured in the field, and mitigation measures to address sightline deficiencies will be discussed, as appropriate. AGREE

Site Plan Review:

High level review of the site plan (access location, site geometrics, parking lot layout, loading/refuse access) -Property requirements to be included as they will have an impact on the site.

We are aware of two previous submissions for traffic studies for the development site, with comments being provided by Halton Region, the Region of Peel, and the Town of Oakville. These comments have included the need to provide for a future signalized access opposing Orr Road, and also the provision of an exclusive northbound left-turn lane and southbound right-turn lane at this future signalized intersection. Our study update will have regard for these comments.

If you have any questions about the proposed scope of work for the 772 Winston Churchill Boulevard development, please do not hesitate to contact me. As Winston Churchill is a boundary road, please let me know if Halton Region staff are better suited to respond to this request. (Halton Region could be contacted for further information regarding background developments etc.)

Sincerely,

Andrae Griffith
Pronouns: he, him, his

A Message from IBI Group's CEO on COVID-19: *https://www.ibigroup.com/covid19-response*

IBI GROUP
7th Floor - 55 St. Clair Avenue West
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tel +1 416 596 1930 ext 61450 fax +1 416 596 0644

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From:	Andrae Griffith
To:	"Kuczynski, Roman"
Subject:	RE: Traffic Growth Rate Request - Winston Churchill Blvd, Lakeshore to Royal Windsor
Date:	Monday, October 5, 2020 2:45:00 PM

Hi Roman,

The we were able to identify background developments along the Winston Churchill corridor on the Halton side, but have not been able to identify a background growth rate. As this is an update of a previous TIS, we propose to maintain the same growth rate (2% compounded) as was previously provided in 2015. We expect that this will be conservative, as the AADT from Peel Open Data suggests that traffic growth has been largely flat over the last 10 years.

Sincerely,

Andrae Griffith
Pronouns: he, him, his

IBI GROUP
7th Floor - 55 St. Clair Avenue West
Toronto ON M4V 2Y7 Canada
tel +1 416 596 1930 ext 61450 fax +1 416 596 0644

From: Kuczynski, Roman <roman.kuczynski@peelregion.ca>
Sent: Wednesday, September 16, 2020 11:18 AM
To: Andrae Griffith <andrae.griffith@ibigroup.com>
Subject: RE: Traffic Growth Rate Request - Winston Churchill Blvd, Lakeshore to Royal Windsor

Hi Andrae,

This section of Winston Churchill Boulevard is a boundary road. On the Peel side we have an older employment area that it is not expected to undergo any significant change in the near future. On the Halton/Oakville side there are more residential uses. However, we do not have more detailed data to provide you with reliable growth rates for the location you specified. I would suggest to reach out either to the Region of Halton or the Town of Oakville to see if they can assist you. If they cannot assist, we can try to see what can be done to assist you.
So please try first with Halton or/and Oakville, and then let me know if you still need our help.

Regards.

Roman

Roman Kuczynski, MA, MCIP, RPP
Supervisor, Transportation System Planning
Region of Peel
Public Works Services

Transportation Division
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, Ontario L6T 4B9
Tel. (905) 791-7800 ext. 4381
Cell (289) 541-8156
Fax: (905) 791-1442
E-Mail: roman.kuczynski@peelregion.ca

From: Andrae Griffith <andrae.griffith@ibigroup.com>
Sent: September 15, 2020 12:40 PM
To: Kuczynski, Roman <roman.kuczynski@peelregion.ca>
Cc: Jeff Pascua <jeff.pascua@ibigroup.com>
Subject: Traffic Growth Rate Request - Winston Churchill Blvd, Lakeshore to Royal Windsor

CAUTION: EXTERNAL MAIL. DO NOT CLICK ON LINKS OR OPEN ATTACHMENTS YOU DO NOT TRUST.

Hi Roman,

IBI Group has been retained to prepare a Transportation Impact Study for a client who is seeking to construct a commercial development at 772 Winston Churchill Boulevard on the City of Mississauga / Town of Oakville border. In order to inform our future traffic scenarios, could you please assist me in obtaining growth rates for Winston Churchill Boulevard between Lakeshore Road West and Royal Windsor Drive?

Our existing conditions scenario is 2020 and our future horizon year is 2026. In addition, due to the effects of COVID-19, if you can provide advice on growth rates from 2017 to 2020 it would be greatly appreciated.

Thank you for your time, and please let me know if you have any questions or require further clarification. As Winston Churchill is a boundary road, please indicate if Halton Region is better suited to provide growth rate advice.

Sincerely,

Andrae Griffith
Pronouns: he, him, his

A Message from IBI Group's CEO on COVID-19: https://www.ibigroup.com/covid19-response

IBI GROUP

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Draft Site Plan Comments Report

Date:	2021-08-30
To: cc:	**Ashley Minns**, IBI Group **Ashley.minns@ibigroup.com** **Jamie Bunston**, 772 Winston Churchill Ltd. Partnership **jbunston@oneproperties.com**
From:	**Leigh Musson**, Acting Manager East District, Planning Services
Contact Info:	T: 905-845-6601 ext. 3371 F: 905-338-4414 E: leigh.musson@oakville.ca
Re:	**Site Plan Circulation Comments (1st submission)**
Application:	IBI Group
Description:	Two Industrial/Warehouse Buildings – 32,490 m^2 and 28,972 m^2
Address:	700 and 750 Winston Churchill Blvd. (772 Winston Churchill Blvd.)
Site Plan File #:	**SP.1601.029/01**

The above-noted site plan application has been circulated to various municipal departments and external agencies for review. Comments which have been received with respect to the site plan application are included below. Please be aware that comments from some departments and/or agencies may still be pending.

Please contact the staff member responsible for each set of comments, as listed below, in order to resolve any outstanding site plan approval issues. Kindly request the responsible staff member to send me an email/fax of all correspondence for our records.

Revised and coordinated plans and documents which fully address the attached comments must be submitted according to the process outlined in the **Step by Step Digital Submissions Guide** on the Town's website. Digital materials must be named in an organized and descriptive manner according to format outlined in Planning's **Digital Submission Naming Conventions** document.

You are also required to submit the following items (forming a complete resubmission package):

- **a cover letter describing how each comment within this report has been addressed.**
- a transmittal provided in .doc (Word) format listing the materials submitted, with their revision number and date and the titles and information presented in the format as provided at the end of this report

Furthermore, all reports, documents and drawings submitted must:

- be presented in metric measure that can be accurately scaled,
- be prepared, stamped and signed by a qualified professional architect (for site plan and architectural drawings), engineer (for site plan and engineering drawings/reports), or landscape architect (for landscape and tree protection drawings/reports)

Circulation Comments:

PLANNING SERVICES

1 Current Planning

Leigh Musson ext. 3371

2021-07-23 – Circulation 1

- Oakville Transportation comments to follow once received.
- Issues identified as part of the submission are included within this report
- Applicant is to hold a “Neighbourhood Meeting”, please confirm date
- Other issues may be identified through future reviews
- Applicant to enter into negotiations with the Town and be responsible for all costs for any external servicing requirements that require the use of Town land

Conditions of Final Site Plan Approval

- *Securities* – That the owner deposit securities with the Finance Department, in a form meeting the Finance Department's requirements **(as a certified cheque or letter of credit, not a standard cheque)**, in the lump-sum amount of **$XXX,XXX.XX (planning to calculate)**

  For your application, the lump-sum amount was calculated as follows:

  - **RES (low) - $20,000 + itemized essential elements = $XXX,XXX.XX**
  - **RES (mid & hi) and MU- $75,000 * ha + $500 * m = $XXX,XXX.XX**
  - **All others - $50,000 * ha + $500 * m = $XXX,XXX.XX**

- *Site Plan Agreement* – That the owner enter into a Site Plan Agreement with the Town, to be registered on title, containing clauses suitable to the Director of Planning, Director of Development Engineering and the Town Solicitor.

- *Final Plans* – That the owner submits a full set of coordinated, digital drawings in PDF format, to the satisfaction of the Planning Services Department.

Re-Circulation Fee

- A re-circulation fee of 15% of the in-effect application fee will be required after the 3rd submission and every resubmission thereafter (per fee by-law 2020-131, Schedule ‘A’ Section 10).

File Naming

Future submission materials must be named according to the following format:

- **File Number _ Condensed Name _ Version Number _ Date (with no spaces)**

For example, your set of files should look like the following list:

- 00_CoverLetter_v1_2020-02-28
- 01_Aerial_v1_2020-02-14

- 02_Survey_v1_2020-02-23
- 03_SitePlan_v1_2020-02-23
- 04_SitePlanDetails_v1_2020-02-23
- 05_FloorPlan_v1_2020-02-23
- 06_Landscape_v1_2020-02-18
- 07_LandscapeDetails_v1_2020-02-18
- 08_Servicing_v1_2020-02-15
- 09_Grading_v1_2020-02-15
- 10_SWM_v1_2020-01-30
- 11_TIS_TruckTurning_v1_2020-02-20
- 12_NoiseVibration_v1_2020-02-20
- 13_ESSQ_v1_2020-02-28
- 14_ESS1_v1_2020-02-28

Requirements:
- NO spaces in the file name.
- NO special characters within the file name (i.e. @ # $ % & * / \ |).
- ONLY Letters, Numbers, Dashes, Underscores and Periods are permitted in the file name.

Final Note:
- All submission of plans and/or studies must be clearly labelled and in a larger font size in the title block as the next submission by number, corresponding to the version number and date in the file name

2 Heritage Planner
Carolyn Van Sligtenhorst ext. 3875

2021-07-13 – Circulation 1

No Heritage Concerns

3 Urban Design
Philip Wiersma ext. 3795

2021-07-28 – Circulation 1

The following comments are based on materials circulated July 2, 2021 [Circ 1]

Comments

Development and public realm improvements shall be evaluated in accordance with the urban design direction provided in the Livable by Design Manual, as amended, to ascertain conformity with the urban design policies of Livable Oakville, the towns official plan. If not done previously, please review online Livable Oakville policies and the related standards contained in Livable by Design Manual (Part A & C).

Landscape (comment provided by Philip Wiersma)

1. [Circ 1] As done for Building A, all parking spaces adjacent to Building B should have an abutting walkway providing pedestrian access to a main entrance. Walkway should be at least 1.8m where abutting parking stalls, at least 1.5m in all other areas.

2. [Circ 1] Canopy cover target for this site is 20%. (as stated in the cover letter and calculation chart provided) Currently the canopy cover plan only proposes 10% coverage. Plans should be revised to provide the 20% canopy cover as necessary.

   It is my understanding that the town will not be taking the open space channel as a dedication. (as alluded to in the cover letter) As a result, the existing canopy cover contained within the open space channel should be factored into the canopy calculation. Since much of the plant material within the channel is recently planted, existing tree canopy cover can be projected as if it were proposed tree planting.

3. [Circ 1] With regards to the canopy cover plan, it is fine to group planting areas together; however, the tree groupings must be within the same continuous planting area. Revise canopy cover chart as necessary. Refer to the towns development application guidelines / terms of reference for additional information if needed.

4. [Circ 1] All pedestrian routes should be barrier free, including pedestrian crossings of internal drive aisles. Revise plans, including the grading plan, as necessary.

5. [Circ 1] Retaining walls in proximity to pedestrian areas should be provided with guard railings. Note location of guard railings on the plans and provide construction detail for how the railing will be constructed on/beside the retaining wall.

6. [Circ 1] No more than 10% of the proposed trees should be of the same genus. Revise planting as necessary.

7. [Circ 1] Along the Winston Churchill Boulevard frontage shrub planting (or hedge, berm, low wall / decorative fence, or combination thereof) should form a continuous screening element with a height of 750 – 1000mm above the parking area grade. Revise planting plan as necessary.

8. [Circ 1] Along the side yard abutting the railway corridor, one deciduous or coniferous tree planting should be provided for every 4.5m of abutting land, with a minimum 80% of the trees within the buffer strip as coniferous species; and a hedge, fence, berm or combination thereof, forming a continuous screening element with a minimum height of 1.8m.

9. [Circ 1] Regarding the lighting plan, fixture W4A or W4B are not acceptable due to the potential for light to be directed up into the sky. Revise type of fixture as necessary.

10. [Circ 1] Provide a note on the drawing stating: "All lighting devices shall be full cut off and night sky friendly, and shall be mitigated at the source so that no light (0.0 fc) will be directly projected onto adjacent properties."

11. [Circ 1] Applicant indicates on the site plan that snow will be removed from the site. See condition.

Built Form (comments provided by Nada Almasri)

12. [Circ 1] Consider projecting the office components on the frontage of Building A to create a sense of enclosure along Winston Churchil streetscape.

13. [Circ 1] For building façades greater than 30.0m in length, divide the horizontal dimension of the building by incorporating significant modulations (projections/recesses) in the massing and variety in architectural detailing. Design façades of longer buildings to give the appearance of a collection of finer grain structures.

14. [Circ 1] Design principal building entrances to the office components to be easily identifiable to the public.

15. [Circ 1] Screen rooftop mechanical equipment completely from view from the public realm using compatible building materials as used on the main building or integrate them into the overall design of the building. Reflect on the relative drawings.

16. [Circ 1] For rooftop equipment and enclosures taller than 2.0m in height, incorporate a minimum setback of 5.0m from all edges of the roof to reduce their visibility from the public realm. Reflect on the relative drawings.

Conclusion/Conditions

The following should be satisfied prior to final site plan approval:

- **Site Plan Agreement –** That the owner enter into a Site Plan Agreement with the Town, to be registered on title, containing clauses suitable to the Director of Planning, Director of Development Engineering, and the Town Solicitor, including but not limited to the following:

  That the owner and tenants / future purchasers will maintain a minimum tree canopy cover or potential canopy cover of 20% over the site area. Any tree removals granted by way of Town permits will require the replanting of trees so as to maintain this minimum tree canopy cover target to the satisfaction of the Town.

  That all owners and tenants / future purchasers are required to maintain all access ramps and driveways, parking and loading areas, and walkways, unobstructed to ensure safe operations within this private development, and as there is insufficient on site snow storage, all snow cleared from the access ramps and driveways, parking and loading areas, and walkways shall *be removed from the site. In no circumstance shall snow cleared from the site be placed in a manner that might damage private or public landscaping, fences, or impinge on adjacent properties or open space. The contracting for private snow removal from the site shall remain the sole responsibility of the owners and tenants / future purchasers.*

- **Urban Design**: That the owner submit and obtains final approval for the following to the satisfaction of the Planning Services Department:

a) Revised and final Site Plan
b) Revised and final Building Elevations
c) Revised and final Landscape Plan
d) Revised and final Grading Plan
e) Revised and final Lighting Plan
f) Revised and final Tree Canopy Plan and Canopy Calculation Chart

- **Additional comments may be provided after review of subsequently submitted revised materials.**

Circulation Comment Chronology

4 Development Engineering

George Golding George.golding@oakville.ca

2021-08-09 – Circulation 1

Technical Review

Material Reviewed:

Document	Type	From	Dated	Received
Stormwater Management Report – 772 Winston Churchill Boulevard	Report	A.M. Candaras Associates Inc.	April 2021	NA
Functional Servicing Report – 772 Winston Churchill Boulevard	Report	A.M. Candaras Associates Inc.	April 2021	NA
Drawings G1- Grading and SWM East Site Area Drawings G2- Grading and SWM West Site Area Drawings G3- Site Servicing and SWM East Site Area Drawings G4- Site Servicing and SWM East Site Area	Dwg	A.M. Candaras Associates Inc.	April 2021	NA

Drawing ESC-1 - Stage 1 ESC Plan Drawing ESC-2 - Stage 2 ESC Plan				

Background Information

Based on the circulation memo, the proponent wishes to complete the following:

- Construct two warehouse building and asphalt/paved areas within the subject property.
- Clearview Creek channel corridor was previously realigned to facilitate development within the subject property.
- Note: The subject property ultimately drains to the main branch of Clearview Creek. Review and comments to be coordinated with CVC staff.

Review of Stormwater Management Report

A Stormwater Management Report completed by A.M Candaras Associates Inc. (dated April 9, 2021) is support of the proposed development.
Note: The provided report was marked as final and was signed and sealed by a licensed professional engineer.

SWM Criteria:
SWM criteria appear to have been based on the previously approved Clearview Creek Subwatershed Study (completed by McCormick, Rankin Corporation (MRC), dated 2007).
Based on details provided within the SWM Report, the following SWM criteria have been used is support of the proposed SWM strategy for the site:

i. Post to pre-development controls for quantity controls onsite. The 100-year post to 2-year pre-development control is based on CVC's SWM Guideline. 100-year post to 2-year pre-development controls are being proposed as part of the overall SWM strategy for the subject site.
ii. Enhanced water quality control (Level 1) is required onsite.
iii. Per CVC's SWM Guidelines, onsite erosion controls will be required as part of the overall SWM strategy onsite.

Note: The outfall noted within the SWM report drains to a regulated watercourse (Clearview Creek). The regional floodplain has been established within this section of Clearview Creek.

Review of SWM Strategy:

- Report further states that SWM facilities are to be located outside of the regional floodplain.
- Based on details provided within the SWM report, the overall impervious coverage within the site under proposed conditions is approximately 84% and includes the Clearview Creek channel corridor.

Water Quality Control

- The SWM strategy is proposing enhanced water quality through three (3) OGS units onsite (Jellyfish type OGS unit), in parallel. Based on details provided within the SWM report, the

Jellyfish OGS unit was designed to provide 85% TSS removal and exceeds the minimum 80% TSS removal to meet enhanced (Level 1) water quality controls.

- The proposed units are situated directly downstream of the proposed quality and quantity control orifices within MH 4 OCS.
- Enhanced water quality controls appear to have been achieved. No further comment.

Erosion Control

Based on details provided within the SWM report, erosion controls are provided through 48-hr drawdown for the 25 mm storm event. This criteria is in accordance with CVC's SWM Guideline and MECP SWM manual and is appropriate. No further comment.

Water Quantity Control

Based on details provided within the SWM Report, water quantity controls are be proposed through a series or controls included:

- Underground SWM facility sized to provide 3,506 m^3 of storage.
- An additional 5100 m^3 of storage is proposed through parking lot storage controls.
- Rooftop controls are being proposed onsite, however; it is unclear whether they were implemented within the quantity controls. Confirmation is required.

Based on details provided within the SWM report and Drawing G-1, the proposed parking lot storage depth during the 100-year storm event is approximately 0.50 m in depth. Further, parking lot storage appears to be proposed as frequent as the 5-year storm event (proposed HWL 5-year is 93.68 m, the top of CB grates are as low as 93.50 m).

Per Section 3.1.3.06 Storm Water Management Implementation Report Requirements:

- Maximum ponding depth in parking areas is not to exceed 250mm, and no ponding shall be located in a fire route. No five-year ponding (nuisance) on pavement: use landscaped areas, roofs or underground structures.

The provided SWM strategy appears to exceed the max ponding depth (250 mm) in parking areas. The SWM strategy also is proposing frequent flooding within the parking lot areas as frequent as the 5-year storm event. This also does not appear to meet Town design standards. A comment will be provided.

Water Balance

Based on review of the Clearview Creek Sub watershed Study, given the industrial nature of the development and the risk of groundwater contamination, a post to pre-development water balance in not required. No further comment.

Proposed Outfall

Based on details provided within the SWM report, a conventional gravity type outfall cannot be achieved given the regional water levels within Clearview Creek, resulting in backwater conditions that would impact the function of the proposed SWM facility. Mechanical pumping is being proposed as opposed to the gravity system. Based on details provided within the SWM report, the design of the pumps and chamber is being completed by "John Brooks and will be included in next submission". The outlet details are required in support of the overall SWM design. A comment will be provided.

SWM Operation and Maintenance

Comments will be made as it related to OMM and routine maintenance of the SWM facility proposed within the subject development.

Review of Erosion and Sediment Control Plan

An ESC monitoring program is being proposed in accordance with recommendations made within the Clearview Creek Subwatershed Study.

- ESC plan is signed and sealed by a professional engineer.
- Heavy duty silt fencing is proposed around the perimeter of the subject property.
- The Stage 2 plans does not provide sufficient detail as it relates to ESC between the grading and servicing stage. Additional details are required.
- Based on details provided within Section 11 of the SWM report, the ESC plan is proposing to utilize and existing sedimentation basin for stage 1 (topsoil stripping and rough grading) of the ESC plan. There is no details related to the sedimentation basin sizing. Further, there is no details related to the temporary outlet structure and spillway. Additional details are required and should be documented within the SWM report and included within the design drawings.
- No construct dewatering was noted within ESC plans. Given the nature of the proposed works (construction of an underground storage facility), dewatering may be required. Confirmation is required. If dewatering is required, a detailed dewatering plan is required and is to be incorporated into the ESC plans.

Site Servicing and Functional Servicing Report

- Sanitary and water servicing for the subject development (772 Winston Churchill Blvd.) and the neighboring properties at 560 Winston Churchill Blvd and 568 Winston Churchill Blvd.
- Servicing was provided to the Region of Halton for review and approval. The preferred servicing plans for both water and sanitary appear to be based on input from Regional staff.
- Target flow rates are being proposed for the neighboring future development at 560 Winston Churchill Blvd. The existing catchment area used within Table 2 (Target Flows for 772 and 560 Winston Churchill) for the 560 Winston Churchill site does not appear to match that previously delineated catchment area presented within the Clearview Creek Subwatershed Study. The proposed development area does not appear to match the existing catchment area and does not appear to be in line with existing topography (based on internal review). A comment will be provided.
- Overland flow routes noted within the grading plans do not appear to be consistent with the SWM strategy proposed within the SWM report completed by A.M. Candaras.

Engineering Comments to Proponent:

Development Engineering has reviewed the submitted storm water management, grading and servicing materials and provides the following comments:

772 Winston Churchill Blvd. Development:

1. The following are comments related to the quantity control measures discussed within the Stormwater Management Report (A.M. Candaras, dated April 2021) in support of the proposed development at 772 Winston Churchill Road:

a. Based on details provided within the SWM report, quantity controls appear to be limited to underground storage (through the proposed underground storage facility) and parking lot storage (located between the two buildings). The SWM report also makes reference to rooftop controls for the two buildings proposed. Please confirm whether rooftop controls are being proposed and implemented within the overall SWM strategy within the subject site.

b. The approved Subwatershed Study contemplated a wet pond to meet the water quality and quantity targets. If another SWM measure is being considered, it should meet the functions of the SWM pond like for like, including the potential risk to private and public property. Please provide additional justification within the SWM report and confirm that the proposed SWM facility does not increase the potential risk to private and public property.

c. The SWM strategy appears to exceed the max ponding depth (250 mm) in parking areas during the 100-year storm event. In accordance with Section 3.1.3.06 within the Town of Oakville's Storm Water Management Implementation Report Requirements, the maximum ponding depth in parking areas is not to exceed 250 mm and no ponding shall be located in a fire route. 100-year ponding depths appear to exceed 0.50 m in areas of the parking lot and does not appear to meet the Town's SWM criteria. Please revise the design to reflect maximum ponding depths.

d. Please confirm that the SWM strategy and the proposed ponding within the subject site considers safe access.

e. The SWM strategy also is proposing frequent flooding within the parking lot areas as frequent as the 5-year storm event. In accordance with Section 3.1.3.06 within the Town of Oakville's Storm Water Management Implementation Report Requirements, no five-year ponding (nuisance) on pavement will be permitted and alternative quantity controls (use landscaped areas, roofs or underground structures) should be used.

f. Please note that as-built conditions and a certification letter (signed and sealed by the design engineer) will be required following construction to confirm that the proposed underground SWM facility and parking lot storage areas were constructed in accordance with the approved design. Please acknowledge this requirement.

g. Based on details provided within the Grading Plans, major overland flows a portion of the proposed parking lot area (fronting onto Winston Churchill Blvd) appears to be bypassing the proposed underground SWM facility and parking lot storage area. This does not appear to be consistent with what is proposed within the Stormwater Management Report. Please confirm.

2. The following are comments related to the proposed outfall and emergency spillway proposed within the subject development:

a. Based on details provided within the SWM report, the outfall design (specifically the design of the pumps and chamber system) has been deferred to others and will be provided in the next submission. Please provide additional details related to the proposed outfall design.

b. There is a concern that the proposed pump outfall will not function during a major storm event. Please confirm whether a backup power supply will be provided for the proposed outlet system (dual pumps) in the event of a power failure during a major storm event.

c. Please provide additional details and cross-section of the emergency spillway within the design drawings. Please provide sizing calculations within the provided SWM report. Please provide additional details related to how the emergency spillway was sized and whether the spillway was design to convey the 100-year storm event in the event the orifice controls become obstructed or the pumping system fails during a major storm event.

3. Please provide an operations and maintenance manual (OMM) in support of the proposed SWM facility as well as the proposed OGS units within the subject property. The owner of the property is to be aware of the OMM and completed routine inspections and maintenance activities in accordance with recommendations made within the manual.

4. Maintenance of the proposed Jellyfish type OGS units is a crucial component to consider ensuring there long-term performance. The owner needs to clearly understand the unique maintenance responsibilities inherent with these types of OGS units, particularly the maintenance costs. The owner should be capable of performing routine and long-term actions to maintain the function of the proposed OGS units. Please confirm.

5. The following are comments related to the ESC plan/strategy as noted within Drawings ESC-1 and ESC-2 completed by A.M. Candaras Associate Inc. dated April 2021:
   a. The ESC plan and all related measures are to be designed in accordance with the ESC Guidelines for Urban Construction (TRCA, 2019). Please acknowledge this and provide additional discussion within the SWM report.

   b. Based on details provided within the SWM report, ESC strategy for the subject property is to utilize the existing sedimentation basin within the property. It is unclear how this basin was design and whether this basin was designed in accordance with the ESC Guidelines for Urban Construction (TRCA, 2019). Please provide supporting sizing analysis and drawdown analysis in support of the proposed temporary sedimentation basin. If the facility does not meet design criteria within the guideline, the existing sedimentation basin is to be retrofitted.

   c. Please provide additional details as to how the temporary sedimentation basin will be decommissioned following stage 1 works and what ESC measures will be provided prior to site servicing (stage 2 works).

   d. Please confirm whether construction dewatering is required to facilitate the construction of the underground infrastructure associated with the proposed development. If dewatering is required/anticipated, please provide a detailed dewatering plan.

Functional Servicing Report for 772, 560 and 568 Winston Churchill Blvd:

6. The following are comments related to the Function Servicing Report (For Industrial Developments 772, 560 and 568 Winston Blvd) completed by A.M. Candaras Associates Inc. dated January 29, 2021:
   a. Table 2 within the FSR proposes target flow rates for the proposed developments at 772 Winston Churchill Blvd and the neighboring 560 Winston Churchill Blvd. The 560 Winston Churchill Blvd target flows uses a contributing catchment area of 8.93 ha. Based on the existing conditions catchment areas for Catchment 5 within the Clearview Clear Subwatershed Study, approximately 3.8 ha of land from the proposed 560 Winston Churchill

Blvd development is contributing to this reach of Clearview Creek under existing drainage conditions. The target flow rates for 560 Winston Churchill Blvd. are to be revised to match existing conditions catchment areas contributing to this reach of Clearview Creek.

b. Please confirm whether agreements are in place with the neighboring properties at 560 and 568 Winston Churchill Blvd for the construction of the proposed 300 mm diam. watermain along Winston Churchill Blvd.

c. Section 2.2 of the FSR makes reference to a 6.0 m wide regional easement within Town lands. Based on the legal plan included within Appendix B of the FSR, an 8.0 m wide easement is shown. Please clarify.

Conditions of Approval

Conditions which must be satisfied prior to final site plan approval:

1) That the owner submits the following information, to the satisfaction of the Development Engineering Department:
   1. Stormwater Management Brief/Letter *(See comments)*
   2. Grading, Drainage and Servicing Plans *(See comments)*
   3. Tree Inventory and Protection Plan *(See comments by Urban Forester)*
   4. Arborists Report *(See comments by Urban Forester)*
   5. Tree Protection Securities: That the applicant deposit tree securities to the Town of Oakville. *(See comments by Urban Forester)*
   6. Boulevard & Road Restoration Details to be provided on civil drawings.
   7. Town of Oakville staff will require a certification letter signed and sealed by a Professional Engineer stating that the permanent Stormwater Management Facility (proposed underground storage facility) is operational and has been built as per approved design. As-built confirmation of the proposed parking lot storage volumes and ponding extent are also required. Should there be discrepancies between the proposed and as-built works; additional engineering and/or on-site works may be required. As-constructed drawings are to be submitted upon the construction of the SWM facility. The following criteria must be met in order for the facility to be considered operational:
      i. The SWM facility must be at final grade.
      ii. Capacity of SWM facility must be confirmed to meet design detention volumes.
      iii. Outlet structures must be constructed and conform to the approved plans.
      iv. The as-built parking lot storage area is to be included within the confirmation letter.

2) That the owner submits the following information, to the satisfaction of the Engineering & Construction Department:

   Note: The applicant is to consult with the Engineering & Construction Department regarding the need and or requirements any further permits and reports.

   a) Reference Plan: That the owner is required to provide the appropriate reference plan / survey information as part of any dedication

5 Development Engineering, Forestry

Michelle Drmanic ext. 3982

2021-07-28 – Circulation 1

Urban Forestry has reviewed the first Site Plan circulation and has the following comments:

1. Table 1 on page 6 of the arborist report indicates that trees #1011 & 1012 are to be removed due to condition (severe lean) and construction impacts, however, the tree protection plan shows these trees to be retained, with tree protection barrier to be installed. Please confirm whether these trees are to be removed or preserved, and update the arborist report/tree protection plan accordingly.

2. The arborist report and tree protection plan propose removal of trees #1000-1010. As these trees are situated on the adjacent property, they cannot be removed unless written consent is obtained from the neighbouring property owner. If the neighbor agrees to removal of these trees, please submit a copy of the consent letter.

3. Tree protection barriers must be installed prior to obtaining final Site Plan approval. The tree protection barriers are to be installed at minimum TPZ distance, as per town standards/arborist report recommendations, and Development Services is to be notified for inspection and approval. The tree protection barriers must be constructed of mesh fence with 2x4" wood frame, to maintain sight lines/visibility.

4. Note: If any trees are to be removed, no trees can be cut until after final site plan approval.

6 Engineering and Construction, Transportation

Aquisha Khan 905-845-6601

Date – Circulation 1

Pending

INTERNAL DEPARTMENTS

7 Building Services, Building Code

Louisa He ext. 3142

2021-07-21 – Circulation 1

I had no comments on this submission.

8 Building Services, Fire Prevention
Jonathan O'Neil ext. 3183

2021-08-05 – Circulation 1

1. Submit a fire route application package with fee that meets the Town By-law requirements for drawing specification and be acceptable for inclusion onto the Town's By-law. The application package can be obtained from the Building Department or the Town's website at www.oakville.ca.

2. Received information related to storm water retention on the site. The area of water retention covers portions of the proposed designated fire route. Standing water causes access issues with vehicle control due to weight distribution and size of the fire apparatus.

9 Building Services, Zoning
Peter Kozelj ext. 3174

2021-08-17 – Circulation 1

Section 4.14 a) On lands subject to this By-law south of Dundas Street, no *building* may be erected or enlarged unless the land is serviced by municipal water and sewage systems. **Confirm.**

10 Engineering and Construction, Municipal Addressing
Sharon Coyne ext. 3323

2021-08-11 – Circulation 1

Addresses for the 2 new buildings.

Building A – 700 Winston Churchill Blvd.

Building B- 750 Winston Churchill Blvd.

11 Legal, Realty Services
Jim Knighton ext. 3022

2021-07-06 – Circulation 1

Subject to the Regions servicing recommendations, the applicant is required to enter into negotiations with the Town and be responsible for all costs associated with any external servicing requirements, including any easement and related costs.

The owner is to enter into satisfactory arrangements with the Town related to the payment of cash in lieu of parkland in accordance Section 42 of the Planning Act and the Town By-law 2008-105 and contact the Towns

Manager of Realty Services no later than 90 days prior to their intended date to draw the first building permit for the proposed development or redevelopment, to arrange coordination of the necessary appraisal

12 Parks and Open Space

Janis Olbina ext. 3148

2021-07-12 – Circulation 1

Based on the attached drawing (emailed August 10) that Leigh provided I have done a very quick markup to show where we (parks) think the 8m corridor should be placed….as far east as possible with edge of easement at bottom of berm slope. As much as this drawing shows a good number of trees, it doesn't differentiate between a newly planted tree, and one with more maturity. Before any final drawing/alignment is agreed to, the applicant(s) will need to prepare an updated, and detailed tree inventory/arborist report. They can probably start with Forestry's GIS records and update/amend as required.

Also, regarding the actual connections back to the Winston Churchill properties, I think there are better alternatives for connecting points. I have sketched a slightly new geometry for the 560 property that may allow for the sewer to avoid a portion of the berm. For 772, the drawing would have to be extended further north, where I think there is a gap in the existing berm – this may also reduce amount of trees needing removal.

We wish the 8m easement to be considered the maximum allowable corridor for both construction and permanent easements. The contractors doing the work will have to find a way to safely excavate/trench/bore without a massive excavation and spoils on either side.

EXTERNAL AGENCIES

13 Bell Canada

Ryan Courville planninganddevelopment@bell.ca

2021-08-17 – Circulation 1

Re: Site Plan Application - 772 Winston Churchill Blvd - File No: 1601.029/01; Your File No. 1601.029/01

Our File No. 91082

Dear Sir/Madam,

We have reviewed the circulation regarding the above noted application. The following paragraphs are to be included as a condition of approval:

"The Owner acknowledges and agrees to convey any easement(s) as deemed necessary by Bell Canada to service this new development. The Owner further agrees and acknowledges to convey such easements at no cost to Bell Canada.

The Owner agrees that should any conflict arise with existing Bell Canada facilities where a current and valid easement exists within the subject area, the Owner shall be responsible for the relocation of any such facilities or easements at their own cost."

The Owner is advised to contact Bell Canada at planninganddevelopment@bell.ca during the detailed utility design stage to confirm the provision of communication/telecommunication infrastructure needed to service the development.

It shall be noted that it is the responsibility of the Owner to provide entrance/service duct(s) from Bell Canada's existing network infrastructure to service this development. In the event that no such network infrastructure exists, in accordance with the Bell Canada Act, the Owner may be required to pay for the extension of such network infrastructure.

If the Owner elects not to pay for the above noted connection, Bell Canada may decide not to provide service to this development.

To ensure that we are able to continue to actively participate in the planning process and provide detailed provisioning comments, we note that we would be pleased to receive circulations on all applications received by the Municipality and/or recirculations.

Please note that WSP operates Bell's development tracking system, which includes the intake of municipal circulations. WSP is mandated to notify Bell when a municipal request for comments or for information, such as a request for clearance, has been received. All responses to these municipal circulations are generated by Bell, but submitted by WSP on Bell's behalf. WSP is not responsible for Bell's responses and for any of the content herein.

If you believe that these comments have been sent to you in error or have questions regarding Bell's protocols for responding to municipal circulations and enquiries, please contact planninganddevelopment@bell.ca

14 Canada Post

Anna Burdz tel. 647-355-3597

2021-07-20 – Circulation 1

Canada Post appreciates the opportunity to comment for the above referenced site plan application.
For this address mail delivery will be provided in the same manner as that provided to the surrounding area.

For mail delivery inquiry please contact Town of Oakville Post office at 905-338-1199

15 CN Rail

Nick Coleman tel. 905-760-5007

Date – Circulation 1

Pending

16 City of Mississauga

Katherine Morton - Katherine.morton@mississauga.ca

2021-08-11 – Circulation 1

Comments from Hugh Lynch – August 11/21
We understand this is a SP application within the current zoning permissions. Accordingly, the City of Mississauga will not be providing comment

17 Credit Valley Conservation

Annie Li tel. 905-670-1615 ext. 380

2021-08-03 – Circulation 1

Credit Valley Conservation
inspired by nature

VIA EMAIL

August 3, 2021

Planning Services
Town of Oakville
1225 Trafalgar Road
Oakville, ON
L6H 0H3

Attention: Leigh Musson – Acting Manager – Planning, Current Planning – East District

Re: Town File No. SP 1601.029/01 – 1st Submission
CVC File No. SP 21/029
IBI Group
772 Winston Churchill Blvd
Part of Lot 1, Concession 3 SDS
Town of Oakville

Credit Valley Conservation (CVC) staff have reviewed the subject application and offer comments based on the following roles and responsibilities:

1. Watershed Based Resource Management Agency and Public (commenting) Body under the Planning Act - providing comments based on CVC's Board approved policies;
2. Planning Advisory Services - providing environmental planning and technical advice/comments based on service agreements or memorandum of understanding;
3. Delegated Responsibilities – providing comments representing the provincial interest regarding natural hazards (except forest fires) as identified in Section 3.1 of the Provincial Policy Statement (2020);
4. Regulatory Responsibilities – providing comments to ensure the coordination of requirements under the Conservation Authorities Act Section 28 regulation, to eliminate unnecessary delay or duplication in process;
5. Source Protection Agency – providing advisory comments to assist with the implementation of the CTC Source Protection Plan under the Clean Water Act, as applicable.

The following plans and reports for the above noted application were reviewed:

- Survey prepared by KRCMAR dated February 3, 2015
- Architectural Drawings prepared by Baldassarra Architects: Site Plan (A-1.0); Elevation Drawings for Building A (A-3.0 & A3.1); and Elevation Drawings for Building B (A-3.0 & A3.1) last revision dated April 9, 2021
- Landscape Plans prepared by Insite Landscape Architects: Overall Landscape Plan (L-1); Landscape Plan Top Site Portion (L-2); Landscape Plan Lower Site Portion (L-3); Notes & Details (L-4) last revision dated April 7, 2021

August 3, 2021
Re: CVC File No. SP 21/029 (Town File No. 1601.29/01 IBI Group)
772 Winston Churchill Blvd
Town of Oakville

- Tree Protection Details (TPP-2) prepared by IBI Group dated May 31, 2021
- Arborist Report prepared by IBI Group dated May 31, 2021
- Functional Servicing Report prepared by A.M.Candaras Associates Inc. dated January 29, 2021
- Stormwater Management Report and Functional Servicing Report prepared by A.M.Candaras Associates Inc. dated April 9, 2021
- Grading Plans prepared by A.M.Candaras Associates Inc.: Grading and SWM Plan East Site Area (G-1); Grading and SWM Plan West Site Area (G-2); Site Servicing and SWM Plan East Site Area (G-3); & Site Servicing and SWM Plan West Site Area (G-4) last revision dated April 9, 2021
- Erosion and Sediment Control (ESC) Plans: Erosion and Sediment Control Plan (ESC-1); & Erosion and Sediment Control Plan – Stage 2 (ESC-2) prepared by A.M.Candaras last revision dated April 9, 2021

SITE CHARACTERISTICS:
The subject property is traversed by Clearview Creek and its associated Regulatory Floodplain and erosion hazard. The section of Clearview Creek on the subject property was previously re-aligned and engineered. It is the policy of CVC and the Province of Ontario to conserve and protect the significant physical, hydrological and biological features associated with the functions of the above noted characteristics and to recommend that no development be permitted which would adversely affect the natural features or ecological functions of these areas.

ONTARIO REGULATION 160/06:
This subject property is located within the Authority's regulated area. As such, the property is subject to the Development, Interference with Wetlands, and Alterations to Shorelines & Watercourses Regulation (Ontario Regulation 160/06). This regulation prohibits altering a watercourse, wetland or shoreline and prohibits development in areas adjacent to the Lake Ontario shoreline, river and stream valleys, hazardous lands and wetlands, without the prior written approval of Credit Valley Conservation (CVC) (i.e. the issuance of a permit).

PROPOSAL:
CVC staff understands that the purpose of this Site Plan application is to permit the construction of two industrial/warehouse buildings (32,490 m^2 and 28,972 m^2).

COMMENTS:
CVC staff have had an opportunity to review the current submission and provide the following comments to be addressed by the proponent.

General

1. Please provide a response matrix/letter in the next submission outlining how all of the below comments have been addressed.

2. The updated Regulatory Floodplain (see engineering comment 4 below for additional details) is to be delineated on the engineering and site plan drawings. Based on the review of the current drawings, it appears that the main access to the site would be located within the Regulatory Floodplain. Safe access to the site in accordance with CVC's policies is to be provided to the site. As such, in addition to the Regulatory Floodplain elevation delineation, please also provide a delineation of where the

floodplain depths at the proposed driveway and parking locations would be 0.3m in height (i.e. the Regulatory Floodplain elevation minus 0.3m) on the grading plans for our review and comment.

Engineering

3. The provided Site Servicing Plan does not show the hazards within and around the study area. Hazards (slope, erosion, etc.) and all the previously established development limits are to be clearly identified on the plans.

4. CVC has updated floodplain mapping for the subject property (attached). Please complete a formal data request for the hydraulic model that will provide the up to date and relevant water surface elevations. The water surface elevations as listed in the FSR/SWM Report must be updated to reflect the most current information.

5. CVC typically looks for proposed infrastructure to be located outside of the 100-year local erosion hazard. Provide a clear representation of the location of any proposed infrastructure as compared to the 100-year erosion hazard corridor and meander belt width delineations (associated with the regulated watercourse).

6. Confirmation from the proponent is required to ensure that routine maintenance of the proposed Stormtech and Jellyfish features will be completed to ensure long term functionality of the proposed systems.

7. The provided SWM report did not provide any analysis supporting how the proposed catchment area parameters were derived (soils, slopes, etc.). Additional analysis is required.

8. MH3 on Plan G-3 indicates 5 invert elevations for the pipes / sewers that connect to this maintenance hole. There is an arrow from MH3 to MH2. Please clarify whether this is a proposed sewer connection and if so, whether there is a concern that the flow will bypass the JellyFish units and therefore ultimately not achieve the intended 80% TSS Removal.

9. Please note that the CVC Stormwater Management Guideline (August 2012), link: https://cvc.ca/wp-content/uploads/2014/09/cvc-swm-criteria-appendices-Aug12-D-july14.pdf requires that a 24-hr SCS Type II storm is to be routed through the proposed SWM facilities to ensure that there is sufficient storage capacity.

10. Please ensure that the regional storm event for the post-development scenario is modelled as appropriate.

11. The proposed outfall to Clearview Creek is located at an elevation of 93.55m, which is above the 100-year elevation. The invert elevation of the stormtech chamber system is 90.23m, which is lower than the creek bed elevation. There is a concern of backwater in the case of an emergency and non-functioning pump during regional storm event. The storm sewer system relies on the pump, provide further detail on the impacts of a failed pumping system could have, particularly on the regional storm flows.

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Re: CVC File No. SP 21/029 (Town File No. 1601.29/01 IBI Group)
772 Winston Churchill Blvd
Town of Oakville

a. As previously noted, CVC will provide the most up to date floodplain information to ensure that the appropriate water surface elevations are used for the specified cross sections (adjacent to the outfall) for all storm events.

12. The storm sewer headwall is located at the top of the slope associated with the Clearview Creek corridor. The headwall appears to be cutting into the top of the slope to allow for construction of the outlets. Please confirm whether there is an opportunity to extend the headwall to be prevent cutting within the top of slope.

13. Please confirm that the rip rap at the outfall is sized appropriately based on the velocities and shear stresses of the target flow rates.

14. Section 11.1 of the Functional Servicing and SWM Report references a SWM pond (presumably within the post-development condition) but this has not been shown anywhere else in the submission.

15. The proponent is to demonstrate how major overland flows within the site will be directed to the proposed onsite SWM facilities. With regards to the subsurface water quantity controls (Stormtech systems) proposed within the site, please demonstrate how flows will be directed to Clearview Creek in the event of clogged outlets and/or the storage capacity is exceeded. Please provide supporting analysis and additional details.

    b. There is limited information and analysis within the report demonstrating overland flow routes and whether the provided routes can convey the 100-year storm event to the proposed stormtech chamber without bypassing.

16. No instream work is permitted as part of the outfall construction.

Erosion and Sediment Control

17. Please note that all ESC controls measures within the proposed development are to adhere to design criteria established within the *Erosion and Sediment Control Guidelines for Urban Construction (2019)*, link here: https://cvc.ca/wp-content/uploads/2020/03/rpt_ESCGuideforUrbanConstruction_f_2019.pdf

18. There are existing sediment basins that are being utilized for the Stage 1 ESC. Please demonstrate that these sediment basins meet the design criteria within the *Erosion and Sediment Control Guidelines for Urban Construction (2019)*. Provide additional design details including but not limited to the following:

    a. Sediment forebays, turbidity curtains, emergency spillways, drainage areas, drawdown times.

    b. Please provide supporting sizing analysis for the temporary sediment basins and sediment traps proposed onsite. Please confirm whether the temporary outlets meet the ESC Guidelines for Urban Construction criteria.

1255 Old Derry Road, Mississauga, Ontario L5N 6R4 | **cvc.ca** | T 905-670-1615 | TF 800-668-5557 | F 905-670-2210

Town of Oakville | 1225 Trafalgar Road, Oakville, Ontario L6H 0H3 | 905-845-6601 | www.oakville.ca

   c. Velocities calculations must be submitted to ensure that settling velocities are achieved.

   d. Given the potential for soil contamination onsite, the temporary sediment basin is to be lined prior to accepting flows.

19. There is no discussion relating to the temporary outlet structures meeting the ESC criteria as established within the *Erosion and Sediment Control Guidelines for Urban Construction (2019).* Additional details area required.

20. Plan ESC-1 makes reference to a temporary by-pass pumping of creek flows as well as infiltration trenches under the ESC Staging Notes. There is no indication on the drawings or report that the pumping of creek flows or infiltration trenches are proposed. Please provide additional clarity and update as required.

    a. If by-pass pumping is proposed, a detailed dewatering plan will be required.

21. Please include the following on the provided ESC plans for the following stages of the project:

    a. ESC plans are to address potential dewatering requirements during construction of the Stormtech systems. A hydrogeologist should be involved with the dewatering strategy for the site and facilities.

    b. ESC plans are to discuss how downstream water features are to be protected from sediment and sediment-laden runoff during active construction.

    c. ESC plans for topsoil stripping, as well as pre and post servicing staging is required.

Ecology

22. The subject property contains natural heritage features including a regulated watercourse. All development should be outside of this feature and set back a sufficient distance to afford the feature protection.

    a. To protect the feature gateless fencing should be installed along the creek corridor limit to deter encroachment.

23. The functional Servicing Report indicates stormwater will be discharged to Clearview Creek through outfall infrastructure. It is unclear if environmental impacts to this area have been assessed. Please confirm and describe any anticipated impacts to the watercourse as a result of the proposal and ensure that impacts are mitigated.

24. There is a pond on the site which is not proposed for retention. This feature should be investigated for the presence of wetland, fish habitat, turtle habitat and amphibian habitat. A site visit with CVC staff can be arranged to help assess this feature. The following comments apply to minimize the impact of the work. These notes should be included on the site plan.

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b. Fish Capture and Wildlife Capture collection permits must be acquired from the Ministry of Natural Resources and Forestry prior to any works.

c. A qualified professional with a valid collectors permit should be on site to complete the fish and wildlife rescue.

d. Ideally the works would occur between April 15 – September 30 of any given year. These works are not to be completed in the winter months.

25. The landscaping plans should be updated to ensure that, in regulated areas (i.e. adjacent to the creek corridor), only species listed in the CVC Plant Selection Guideline, link here: https://cvc.ca/wp-content/uploads/2018/04/Plant-Selection-Guideline-FINAL-APRIL-24th-2018.pdf are to be used. Several species proposed adjacent to the riparian area are not on this approved list. Please update the landscaping plans accordingly.

e. It is strongly recommended that Butternut be removed from the landscaping plans as this is a regulated Species at Risk, unless it is part of an approved compensation plan with the Ministry of Environment Conservation and Parks (MECP).

f. The soils on site may not be of adequate quality to support long term vegetation growth. Please review the CVC Heathy Soils Guideline, link here: https://cvc.ca/wp-content/uploads/2017/09/CVC-Healthy-Soils-Guidelines-NHS-Web-V5.pdf and implement the recommendations as necessary. Any soil management requirements are to be listed on the site plan.

26. According to the Arborist Report, trees will be removed as a result of this proposal. The trees on site have potential to provide habitat for breeding birds and bats. To avoid contravention of the *Migratory Bird Convention Act* and the *Fish and Wildlife Conservation Act* vegetation clearing should not occur from April 1 to October 31 of any given year. This timing window should be factored into project scheduling and be listed on the site plan.

27. Given that the works are proposed in or near water (e.g. SWM outfall, removal of open water feature/pond), it is the responsibility of the proponent to ensure that works, undertakings or activities do not cause the death of fish or cause the harmful alteration, disruption or destruction under the *Fisheries Act*. Please review the complete list of measures to avoid harm here: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html and implement those that are applicable to the proposed work. If it is not possible to avoid or mitigate impacts, proponents can submit a request for review from their region's Fish and Fish Habitat Protection Program office (contact info: fisheriesprotection@dfo-mpo.gc.ca or 1-855-852-8320). Please refer to the Fisheries and Oceans Canada (DFO) website for additional information.

August 3, 2021
Re: CVC File No. SP 21/029 (Town File No. 1601.29/01 IBI Group)
772 Winston Churchill Blvd
Town of Oakville

CONCLUSION:

We trust that these comments are sufficient. Please do not hesitate to contact the undersigned at 905-670-1615 (ext. 380) should you have any further questions or concerns.

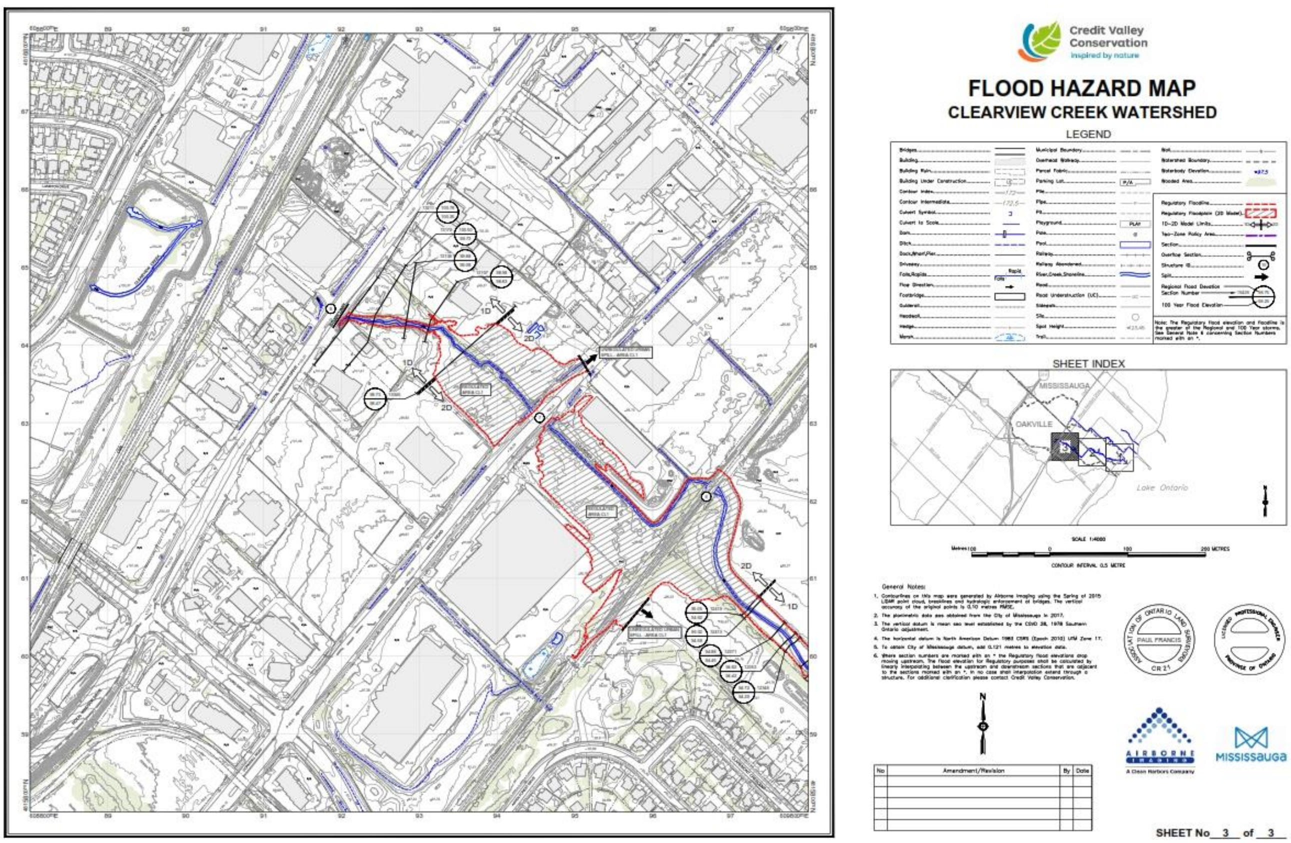
Please circulate CVC any future correspondence regarding this application.

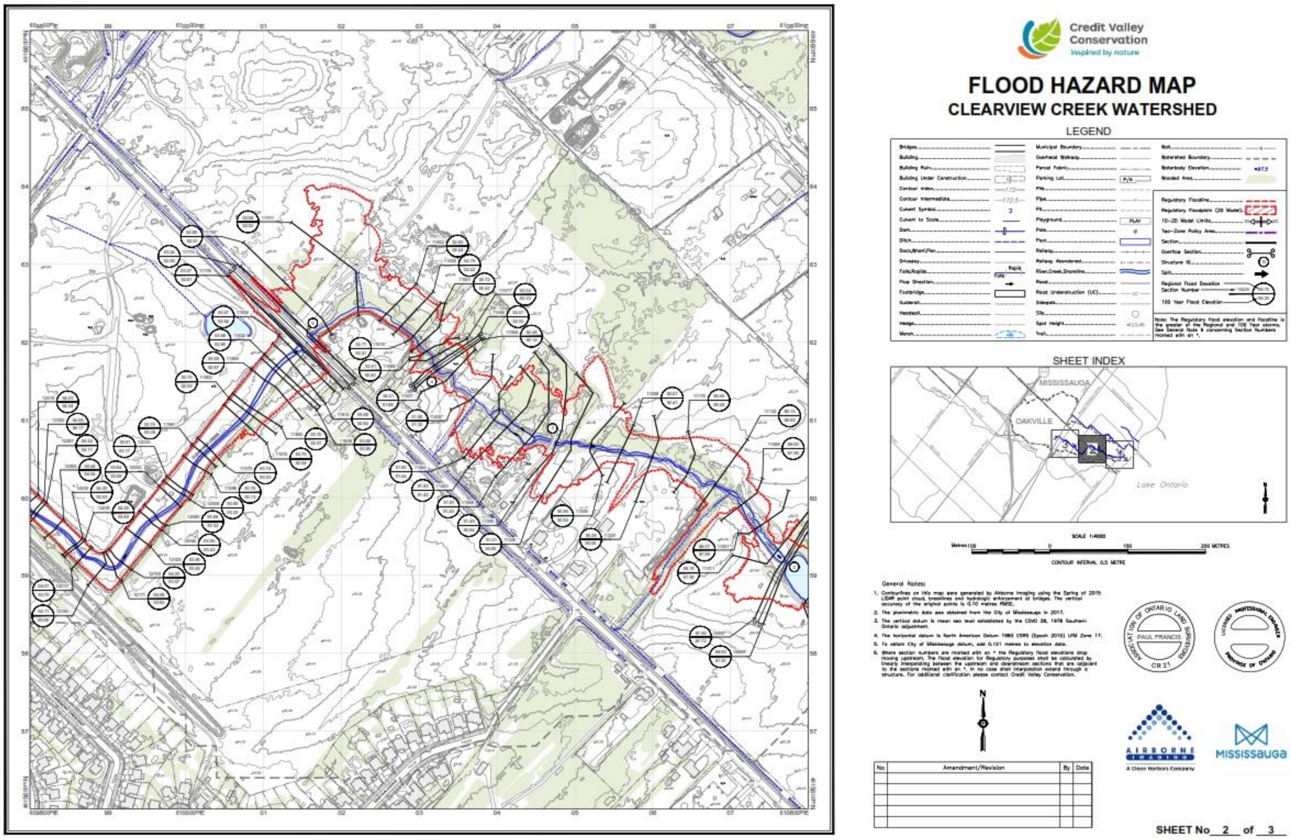
Sincerely,

Annie Li
Planner, Planning & Development Services

cc IBI Group c/o Ashely Minns

Attachments – CVC Flood Hazard Map Clearview Creek Watershed – Sheets 2 & 3





18 Enbridge Gas Pipelines Inc. Eastern Region

Bradley Davis tel. 289-649-2030 ext. 5213017

2021-07-28 – Circulation 1

This site does not currently have access to gas. A gas main extension would be required to service this property with gas. I suggest the developer reach out to Enbridge to begin servicing discussions.

19 Hydro One Network, Real Estate Services

Dolly Shetty dolly.shetty@hydroone.com

2021-07-14 – Circulation 1

We are in receipt of Application 1601 029-01 dated July 5, 2021. We have reviewed the documents concerning the noted Plan and have no comments or concerns at this time. **Our preliminary review considers issues affecting Hydro One's 'High Voltage Facilities and Corridor Lands' only.**

For proposals affecting 'Low Voltage Distribution Facilities' please consult your local area Distribution Supplier.

To confirm if Hydro One is your local distributor please follow the following link: http://www.hydroone.com/StormCenter3/

20 Ministry of Transportation - Ontario

Mario Panza Mario.panza@ontario.ca

2021-07-05 – Circulation 1

This site is outside of MTO's permit control area therefore we have no comments

21 Metrolinx

Tony To tel. 416-202-0809

Date – Circulation 1

Pending

22 Oakville Hydro, Engineering Dept

Dan Steele tel. 905-825-9400

2021-07-14 – Circulation 1

Three phase power is available from the distribution system located on: Winston Churchill Blvd. Space on the property is required to locate a pad-mounted transformer(s). An easement, registered in the name of "Oakville Hydro Electricity Distribution Inc.", is required for the transformer(s) and associated primary cable/duct bank. An electrical room with direct outside access and Stanley Canada Corporation locks is required per Oakville Hydro's "Conditions of Service". Please contact Oakville Hydro Engineering with service size, voltage requirement, and anticipated demand load as soon as information is available. At that time, a servicing cost will be prepared, to be borne by the applicant. Oakville Hydro will supply the transformer. Please note that transformer deliveries are approximately 16 weeks.

Any required pole relocations on Winston Churchill Blvd to be completed by Oakville Hydro at the expense of the owner/applicant.

23 Region of Halton, Planning & Public Works Dept

Quadri Adebayo tel. 905-825-6000 ext. 3105

2021-08-19 – Circulation 1

Regional Planning staff has completed the review of the above-referenced Site Plan application received March 8, 2021 that proposes a permit the construction of two industrial warehouse buildings on the subject property with ancillary parking spaces, and two access points from Winston Churchill Boulevard.

In order to inform the Town of Oakville decision, Regional staff have considered this submission from a Provincial and Regional policy perspective, and offer the following comments.

MATTERS OF PROVINCIAL & REGIONAL PLANNING INTEREST

Provincial Policy

The 2020 Provincial Policy Statement (PPS) and 2020 Growth Plan (GP) promote within settlement areas, development that will include commercial, industrial, and manufacturing uses that create employment and serve the operational function and economic viability of the planned uses within employment areas.

Once in receipt of revised site plan submission that satisfactorily addresses other technical comments/concerns identified in this letter, we would consider the application to be consistent with the PPS and conform to the GP, as it relates to the technical matters raised in the Region's comments.

Regional Policy

The subject lands are designated as 'Urban Area' within the 2009 Regional Official Plan (ROP). The Urban Area policies of the ROP provide that the range of permitted uses and the creation of new lots within the Urban Area will be in accordance with Local Official Plans and Zoning By-laws.

The subject lands also carry an "Employment Area" overlay within the ROP. The related policies within the ROP contemplates a balance of employment uses within urban areas that include industrial and commercial uses to meet long-term needs.

Land Use Compatibility (LUC)

According to the Part IV policies of the ROP (Healthy Communities Policies), the goal for environmental quality is to achieve a high-quality environment for the future generations that will maintain health and improve the quality of living. Section 143(10) of the ROP requires the Region to develop, in consultation with the Local Municipalities, the Province, Federal Government and railway agencies, Land Use Compatibility Guidelines to minimize the adverse effects of noise, vibration, odour, and air pollution from industrial, transportation and utility sources on sensitive land uses, including the application of separation distance between these non-compatible uses.

The Region has implemented LUC Guidelines to support the implementation of the ROP policies. The LUC Guideline as provided for under Section 192(5.1) of the ROP, can be accessed at https://www.halton.ca/Repository/Land-Use-Compatibility-Guidelines

The proposed development is in proximity to residential uses (sensitive land uses). Regional staff acknowledge receipt of the Preliminary Environmental Noise Report (by Jade Acoustics – June 25, 2021). The report primarily focused on analyzing sources of noise, receptors and noise mitigation measures (berms and acoustic fencing) using MECP guidelines for Class 1 Area exclusion limits for stationary and transportation noise sources (i.e. non-refrigerated truck activities, impulses associated with operations, and rooftop mechanical equipment).

The report also concludes that the Town/Region/MECP sound level limits are predicted to be met at the existing noise sensitive receptors with the incorporation of mitigation measure options (subject to future details about the building plans and tenants of the proposed development, including their mode of operations). Adding that further studies would be required when future details about the development become available.

In Regional staff opinion, the Site Plan application review stage is a development implementation stage where the finer-details of the built form is finalized. As such, a speculative location of rooftop mechanicals and other development installation will not suffice to assist staff to properly review the proposed development. Also, the proposed development did not account for the MECP's industrial 'class' system (D-6 Guidelines) in its assessment, on the basis of potential area of influence, and minimum separation distance that applies; within the context of noise, vibration, odour, and air pollution effects.

Therefore, it is recommended that the context of the environment assessment be expanded in the form a LUC report, in order to provide better clarity about the likely impact of the proposed industrial warehouse development on the surrounding sensitive land uses, how the proposal is in accordance with the D-6 guidelines, and any potential mitigation measures.

This LUC report request is also consistent with the review-requirements for the adjacent lands at 560-580 Winston Churchill Boulevard. The Region will be able to determine if the policies of the ROP are met when we receive an LUC report.

Please Note: The Region may require a peer review of any report by an appropriate agency or professional consultant retained by the Region at the proponent's expense.

Environmental Planning

A watercourse (Clearview Creek) that is within the Credit Valley Conservation (CVC) Authority's regulatory area traverses the subject lands. CVC staff provides environmental advisory services to the Region and Town in relation to the protection of certain natural heritage features and natural hazard land management.

Halton Region is in receipt of CVC review comments on August 3, 2021. Regional staff request that CVC comments and recommendations be considered and implemented with respect to any watercourse, floodplain, and/or natural hazard feature concerns, to CVC's satisfaction in a subsequent site plan application submission.

Archaeological Resources

In accordance with Section 167(6) of the ROP, the subject lands has Archaeological potential. An Archeological Assessment was reviewed by the Region for the proposed development at 560-580 Winston Churchill Boulevard.

Therefore, for consistency, prior to any site alteration, an Archaeological Assessment must be undertaken for the subject lands in accordance with the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (MHSTCI) standards. A confirmation of acceptance and filing of reports at the MHSTCI will also be required.

Potential Contamination

Section 147(17) of the Regional Official Plan requires the proponent 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 Region further expects that the proponent will follow the processes outlined in O. Reg. 153/04 in the preparation of supporting documentation.

Circulated with the subject application was an Environmental Site Screening Questionnaire (ESSQ), as well as a due diligence Phase II Environmental Site Assessment (ESA) was prepared by EXP (April 22, 2020).

Regional staff have reviewed the material and note the report was done in accordance to CSA Z769-00. Given that further work is required to delineate contamination in soil and sediment on site, staff kindly request a Phase II ESA report in accordance with O.Reg 153/04 requirements and incorporating existing work be submitted prior to site alteration. The report should also be accompanied with the borehole logs of existing groundwater monitoring wells.

Summary:

Regional Staff has considered the proposed development from a Regional Official Plan perspective, and the Region is currently not in a position to provide a favourable recommendation and/or conditions of site plan approval at this time as the requirements of LUC report, a Phase II ESA, an archaeological assessment, and favourable CVC recommendation for the subject lands are still outstanding.

In addition, the following technical matters related to site servicing and transportation need to be regarded.

OTHER MATTERS OF REGIONAL INTEREST

Municipal Servicing Infrastructure

Section 89(3) of the ROP requires that all new developments within the Urban Area be on the basis of connection to Halton's municipal water and waste water system.

Existing Servicing

- Road: The property abuts a Regional Road.
- Water main: There is no water main located adjacent to the property. Please note that the applicant should undertake their own fire flow testing in the area in order to confirm the design requirements for domestic water supply and fire protection.
- Sanitary Sewer: There is no sanitary sewer located adjacent to the property.

Prior to submission of this site plan application, the Owner had provided an updated Functional Servicing Report (FSR) - by A. M. Candaras Associates Inc. (August 31, 2020). This FSR was a comprehensive study that addressed the servicing at 772, 560/570/580 and 658 Winston Churchill Boulevard (WCB).

Regional staff has reviewed this report. The FSR indicated that the preferred servicing option to service this site is to construct a gravity sanitary sewer through the Town of Oakville's open space block to the west of the property (at Acacia Court), and to extend a new water main on Winston Churchill Boulevard (from Beryl Road to Deer Run Avenue). This is also the Region's preferred servicing option.

1. Servicing Installation through Town of Oakville Lands: The Owner will be responsible for the cost to arrange and transfer any access easements, license agreements, encroachment agreements and/or other arrangements required by the Town (e.g. construction, design and compensation works).
   The Region's servicing conditions (to be provided once other matters are addressed) reflect the above-noted FSR servicing strategy. However, for the sanitary sewer servicing, the conditions are based on the assumption that a Regional easement can be obtained from the Town of Oakville over their open space block, etc. Should the Town not allow a Regional easement over these lands, then the proposed servicing of this site will have to be re-evaluated and another servicing alternative selected.

2. Servicing Option for 658 WCB (addressed as 568 WCB in the FSR): The Region originally had concerns about servicing the property located at 658 WCB, since the sanitary sewer servicing of the subject lands will be through the Town of Oakville's open space block, and the property at 658 WCB will not have access to the proposed sewer.

   The FSR addressed this issue by recommending a private sanitary sewer force main to be extended from 658 WCB through the property at 560 WCB. This private force main would be located in a private easement on the subject lands and the necessary mutual servicing agreement for this would also have to be in place to ensure the force main is accessible for maintenance purposes by the owners at 658 WCB. The Region accepts the proposed method to service the property at 658 WCB.

3. Static Water Pressure: The FSR notes that the proposed static water pressures in this area are estimated to be at 44 psi. This proposed static pressure value is within the Regional standards, but it is on the lower end of the pressure range.

   This is a concern since the Region will require that backflow prevention devices to be installed in the proposed buildings within this development which can result in a pressure reduction at the building. This, along with other friction losses in the water system for this development, could result in the water pressure falling below what is allowed by the Building Code in the proposed buildings on this site. Due to this, there may be a need for a private pressure boosting pumps to be installed in the buildings as part of the plumbing system for this development.

4. Extension of Water main on WCB: The extension of the water main on Winston Churchill Boulevard will require crossing under the existing Canadian National Railway line located north of the site.

   The Owner shall be responsible for the design, construction, coordination, approval from Canadian National Railway and funding of all works required to work in the vicinity of the Canadian National Railway's lands and track system.

5. Storm Water Management: The review and approval of any storm water management report (SWM) should be collaboratively submitted through Halton's Development Project Manager & Peel Region respectively. Please note that both Halton Region and Peel Region will require pre and post development storm water flows from the site to the existing drainage system on Winston Churchill Boulevard (Regional Road 19) to be maintained both during and after construction, such that there are no adverse impacts to the existing drainage system on Winston Churchill Boulevard (Regional Road 19).

Summary:

In summary, we will be able to recommend Regional conditions related to municipal servicing once other technical requirements associated with the subject lands have been satisfactorily addressed.

Regional Transportation

Winston Churchill Boulevard is a boundary road between Halton and Peel Regions, and is operated and maintained by Peel Region. Peel Region's review and approval will also be required for any development application (including but not limited to: transportation study, access, right-of-way, etc.). As per the

Halton/Peel maintenance agreement, Halton Region's comments are provided for the consideration of Peel Region.

Based Section 173(8) of the ROP, the following Region of Halton staff offer the following transportation planning review comments:

Traffic Impact Study:

A Transportation Impact Study (TIS) prepared by IBI Group (April 2021) was reviewed by Regional staff. The TIS must be updated to include the following:

- Redistributed site trips based on the North Access comments (restricted to right-in/right-out), IF this access is supported by the Region of Peel;
- A function design plan with preliminary road improvements and design features must be provided prior to the approval of the transportation study (and with the study resubmission). This is required in order to ensure the feasibility of the required road improvements. This includes the traffic signal design, recommended northbound left turn and southbound right-turn lane (storage plus tapers) at the South Access, as well as a southbound right-turn lane (storage plus taper) at the North access (including access restriction measures); and
- A comprehensive holistic review of the entire corridor regarding access, from the railway tracks to the north, to Deer Run to the south and including all accesses proposed for 560 Winston Churchill Boulevard. This corridor review must also include all existing accesses on both sides of Winston Churchill Boulevard.

Access:

The TIS outlined the following:

(i.) That the Proposed North Site Access is to intersect Winston Churchill Boulevard at approximately 180 metres south from the north property line. This full-movement, un-signalized access is proposed to consist of one lane per direction."

(ii.) That the Proposed South Site Access is to intersect Winston Churchill Boulevard at approximately 56 metres north from the south property line and is approximately 180 metres south of the Proposed North Site Access. The intersection of Winston Churchill Boulevard and the Proposed South Site Access is proposed to be signalized and located opposite of Orr Road, located east of the development site, as described in further detail in Section 3.1.4.

Based on the above road access information, Regional staff offer the following comments:

(i.) The North access is shown in the transportation study as a full movement access. Halton Region cannot support this proposed access as a full movement access due to inadequate spacing from the full movement signalized intersection.

- The North access, with spacing of approximately 185-metres north of the South access, can be supported as a right-in/right-out access. There will be the requirement for a physical restriction (example: centre median, final approval by Region of Peel) and turn restriction signage for entering & exiting vehicles. Peel Region must also support the North access as a restricted right-in/ right-out access.

- The North access (restricted to right-in/right-out movements), will require a northbound right-turn lane (to remove turning vehicles/trucks from the single northbound through lane on Winston Churchill Boulevard).

(ii.) The South access will be a full movement signalized intersection with left and right-turn lanes. Due to the existing features on Winston Churchill Boulevard, such as the hydro poles/lines along both sides and the guardrail in the area of the south access (full movement, signalized), the developer will be required to design the accesses to the site based on acceptable infrastructure relocations.

(iii.) Final access/intersection approvals are subject to the review and approval of a transportation impact study. Access to a Regional road must comply with the Region's By-law No. 32-17, a By-law to prohibit, restrict and regulate access to the Regional road system and the Region's Access Management Guideline (2015). Peel Region must also support and approve the accesses to the site, specifically the north access.

(iv.) A functional design plan for the North and South accesses, with preliminary road improvements and design features, must be provided prior to the approval of the transportation study. This is required in order to ensure the feasibility of the required road improvements. Additionally, the requirement for a comprehensive holistic review of the entire corridor regarding access, from the railway tracks to the north to Deer Run to the south and including all accesses proposed for 560 Winston Churchill Boulevard. This corridor review must also include all existing accesses on both sides of Winston Churchill Boulevard.

Please note: Peel Region shall review and confirm the above-noted access requirements as part of their review.

Right-of-Way (ROW):

The Owner should note the following technical items prior to receiving conditions of site plan approval thus:

- Any lands within 20.75-metres of the centre line of the original 66ft right-of-way of Winston Churchill Boulevard (Regional Road 19) starting at the daylight triangle (at Future Orr Road) and tapering to 18-metres for a distance of 245-metres northerly (measured from the centreline) that are part of the subject property shall be dedicated to the Region of Peel for the purpose of road right-of-way widening and future road improvements.
- For the remaining frontage, any lands within 18-metres of the centre line of the original 66ft right-of-way of Winston Churchill Boulevard (Regional Road 19) that are part of the subject property shall be dedicated to the Region of Peel for the purpose of road right-of-way widening and future road improvements.
- A daylight triangle measuring 15m along Winston Churchill Boulevard (Regional Road 19) and 15m along the development south access (northwest and southwest corners) shall be dedicated to the Region of Peel for the purpose of road right-of-way widening and future road improvements.

- A 0.3m reserve is required across the entire frontage of the development property along Winston Churchill Boulevard (Regional Road 19), including the daylight triangle but excluding the approved entrance location, to the satisfaction of Peel Region.
- All lands to be dedicated to Peel Region shall be dedicated with clear title (free and clear of encumbrances or potential contamination) and a Certificate of title shall be provided, in a form satisfactory to the Director of Legal Services or his designate.

Please note: The applicant is to provide a survey sketch confirming the widening requirement is reflected on the site plan in accordance with the above.

Servicing Agreement

- The Owner must enter into a Servicing Agreement (with Peel Region) for the completion of required Works (road improvements) and all associated development construction processes and impacts. Road improvements will be determined after the review and approval of the final transportation impact study.
- The owner is responsible for all costs associated with the improvements detailed as part of the works and must submit for approval detail design drawings and cost estimates.
- The detailed design drawings are required for review and approval, by Halton Region and Peel Region, for all proposed/approved intersection/access road improvements, based on the approved Transportation Impact Study.

Setbacks & Zero Lot Lines

With respect to the development frontages, we request that setbacks be implemented/maintained from roadway right-of-way limits (i.e. Winston Churchill Blvd) based on Town of Oakville requirements.

Additionally, the applicant will be required to demonstrate that construction of any underground/above ground development infrastructure (underground parking, SWM tanks, buildings, etc.,) will not impact or encroach upon the Regional right of way (i.e.: temporary or permanent infrastructure including structural tiebacks will not be permitted within the Regional Right of Way).

The location of development infrastructure (including but not limited to - underground/above ground parking structure, building, SWM storage tank, etc.,) 0.0-metres from the property line would limit or potentially preclude the Region's ability to locate infrastructure, such as utilities, AND will limit any future Regional Capital Project's grading flexibility, within the Regional right-of-way in close proximity to the right-of-way limit, i.e. within the zone of influence.

Please note: Transportation Planning does not support setbacks of 0.0-metres from property line.

Construction Activities

- For construction methods - shoring/tiebacks, open excavation, etc., a detailed submission of construction methods is required for internal review by various Regional groups prior to proceeding with plans for construction through the Servicing Agreement/detailed design drawings.
- For construction – crane swings, if it is determined that the construction crane swing will impact the Region's right-of-way, the applicant must enter into the Encroachment Agreement and/or

submit a Municipal Consent application, with Engineering Drawings, for review and approval, which would go through Halton's internal review process to various staff & departments. There will be specific requirements for the Agreement/Municipal Consent, including fees, security deposit, etc., (to be determined by staff as part of the review process), and a due date for completion.
- For construction – access, construction access, traffic management plan and any proposed use of the Regional right-of-way, is subject to review and approval from Halton Region.

Summary:

Regional conditions related to Transportation Planning matters on this site plan will be provided after the Owner provides a revised TIS, a revised site plan and an updated survey sketch reflective of Transportation comments herein.

Waste Management

Based on the Region's Development Design Guidelines for Source Separation of Solid Waste, the Region will not provide the site waste collection services. The Owner must be on private waste collection.

Finance

1. The Owner will be required to pay all applicable Regional development charges in accordance with the Region of Halton Development Charge By-law(s), as amended.

2. To obtain the most current information which is subject to change, please visit our website at https://www.halton.ca/The-Region/Finance-and-Transparency/Financing-Growth/Development-Charges-Front-ending-Recovery-Payment

CONCLUSION

In conclusion, Regional Planning staff is unable to provide conditional site plan approval at this time. We will be in a position to provide our conditions in relation to this site plan application once:

- A satisfactory Land Use Compatibility report has been provided.
- An updated TIS, a revised survey sketch, and site plan are provided to the satisfaction of Transportation Planning, confirming the widening and access requirements of the Region.
- A satisfactory Archaeological Assessment has been provided.
- Supportive comments have been received from the Credit Valley Conservation.

Note: The applicant is advised that some of the comments and provided in this letter may impact the layout and other design elements of the plan.

Should you have any questions or concerns about the above comments, please contact me at (905) 825-6000 ext. 3105 or Quadri.Adebayo@halton.ca. **Please send a copy of the Town's decision on this application.**

24 Region of Peel, Development Services

Diana Guida tel. diana.guida@peelregion.ca

2021-07-28 – Circulation 1

Region of Peel
working with you

Public Works

10 Peel Centre Dr.
Suite B
Brampton, ON
L6T 4B9
tel: 905-791-7800

peelregion.ca

July 28, 2021

Leigh Musson
Planning Services
Town of Oakville
1225 Trafalgar Road
Oakville, ON
L6H 0H3

RE: Site Plan Application
772 Winston Churchill Bouvard
Town of Oakville
City File: 1601.029/01
Region File: SP-1601.029/01

Dear L. Musson,

Region of Peel staff have reviewed the above-noted site plan application and offer the following comments below.

Development Servicing and Engineering

Water Servicing & Sanitary Sewer Servicing

- Please be advised that connection to Region of Peel infrastructure is not permitted.

Regional Roads & Storm Water Requirements

- The Region of Peel has an Environmental Compliance Approval (9582-B9TRLW) for the Regional Municipality of Peel Stormwater Management System. Therefore, it is the Region's mandate that no additional flows are permitted and no new connections are made to Regional Roads.
- Development flows are to be directed to the Local Municipality's storm sewer system or watercourses, to the satisfaction of the Region of Peel, the local Conservation Authority and all concerned departments and agencies. Alternatively, flows can be mitigated using Low Impact Development Technologies. Developers are required to demonstrate how this will be achieved through a Stormwater Management Report.
- Prior to Site Plan Approval, the Region will require a satisfactory Stormwater Management Report.
    - We have received the SWMR dated 2021-04-09 and prepared by AM Candaras/A.M Candaras P.Eng. The Report will be assigned and comments will be provided to the Engineering Consultant.
- Please refer to the Region's Storm Water Management Report Criteria within the Functional Servicing and Stormwater Management Report document found online.
- Prior to Site Plan Approval, the non-refundable Report Fee of $515 is required as per the current Fees By-law 6-2021 (https://www.peelregion.ca/council/bylaws/bl-6-2021/). Due to the current circumstances, the Region of Peel is now taking payment

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Public Works

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Suite B
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L6T 4B9
tel: 905-791-7800

peelregion.ca

in the form of Electronic Funds Transfer (EFT). Please contact Iwona Frandsen at iwona.frandsen@peelregion.ca for EFT setup instructions.

- Prior to Site Plan Approval, a copy of the draft reference plan satisfactory to Traffic and Legal will be required.

General Servicing Comments

- All our design criteria, standards, specifications, procedures and report and submission requirements are found online at https://www.peelregion.ca/public-works/design-standards/#procedures
- If you have questions regarding the Site Servicing Application Submission Requirements, please contact Servicing Connections at siteplanservicing@peelregion.ca

Traffic Engineering

Access/Study Requirements

- A Traffic Impact Study (TIS) will be required; terms of reference has been received and found to be satisfactory.
- The Region is in support of the central right-in/right-out access. The access will need to be physically restricted by a centre median, finer details will be dealt with through next submissions and the Engineering Submission.
- The right-in/right-out access will need to be equipped with a right turn lane. The Region requests that a functional design be included as part of the next submission which addresses auxiliary turn lane requirements and geometrics for all accesses proposed off of Winston Churchill Boulevard, including all dimensions.
- The Region is in support of the southerly full moves access across from the future Orr Road, the Owner's consultant is to work with the developer across the road and the City to ensure the proper alignment of the access. Finer details will be dealt with through the next submissions and the Engineering Submission.

Property Requirements

- The Region requests the gratuitous dedication of lands to meet the Regional Official Plan requirement for Regional Road 19 (Winston Churchill Boulevard) which has a right of way of 41.5 metres, 20.75 metres from the centreline of the road allowance, within 245 metres of intersections to protect for the provision of but not limited to: utilities, sidewalks, multiuse pathways and transit bay/shelters.
- The Region will require the gratuitous dedication of a 15 x 15 metre daylight triangle at the intersection of Winston Churchill Boulevard and the future Orr Road, on either side of the access.
- The Region will require the gratuitous dedication of a 0.3 metre reserve along the frontage Regional Road 19 (Winston Churchill Boulevard) behind the property line and daylight triangles except at any approved access points.
- The applicant is required to gratuitously dedicate these lands to the Region, free and clear of all encumbrances. All costs associated with the transfer are the responsibility of the applicant. The applicant must provide the Region with the necessary title documents and reference plan(s) to confirm the Regions right-of-way.
- A draft reference plan will be required for our review and approval prior to the plans being deposited. All costs associated with preparation of plans and the transfer of the lands will be solely at the expense of the applicant.

Region of Peel
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Public Works

10 Peel Centre Dr.
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tel: 905-791-7800

peelregion.ca

Landscaping/Encroachments

- Landscaping, signs, fences, cranes, gateway features or any other encroachments are not permitted within the Region's easements and/or Right of Way limits.

Engineering Requirements

- A detailed engineering submission of road and access works will be required for our review and comment, designed, stamped and signed by a Licensed Ontario Professional Engineer. The engineering submission **MUST** include the removals, new construction and grading, typical sections and pavement markings and signing drawings. All works within Region of Peel's right of way must be designed in accordance to the Public Works, "Design Criteria and Development Procedures Manual" and "Material Specifications and Standard Drawings Manual".
- The Owner shall submit to the Region a detailed cost estimate, stamped and signed by a Licensed Ontario Professional Engineer, of the proposed road and access works within the Regional right of way.
- Securities shall be submitted in the form of either a letter of credit or certified cheque, in the amount of 100% of the approved estimated cost of road and access works along Regional Road 19 (Winston Churchill Boulevard).
- A 8.91% engineering and inspection fee shall be paid to the Region based on the approved estimated cost of road and access works (minimum $1,724.41).
- The Owner will be required to submit the following prior to commencement of works within the Region's right-of-way:
    - Completed Road Occupancy Permit and a permit fee as per the Region's user fees and charges By-law;
    - Completed Notice to Commence Work ;
    - Provide proof of insurance with the Region of Peel added to the certificate as an additional insured with $5 million minimum from the Contractor;
    - Please note that any proposed construction within the Region of Peel's right of way is pending PUCC approval (minimum six week process). Please note that PUCC circulation requirements have recently changed. We require PDF version of the full drawing set it is to be sent via email, and cannot exceed 10MB per email.
- All costs associated with the design and construction of road and access works will be 100% paid by the Owner.

Waste Management

- This property is within the vicinity of St. Lawrence Cement landfill site. It is an inactive, private landfill located between Winston Churchill and Southdown Rd, at Lakeshore Blvd. The exact boundaries are unknown. No further information is available.
- Waste collection will be required through a private waste hauler.

Region of Peel
working with you

If you have any questions or concerns, please contact the undersigned at diana.guida@peelregion.ca

Yours truly,

Diana Guida
Junior Planner
Development Services

25 **Rogers**
Monica LaPointe tel. 416-913-0693

2021-07-05 – Circulation 1

ROGERS

July 5, 2021

Town of Oakville
Planning Department

Attention:	Leigh Musson
APPLICATION NO	1601.029/01 IBI Group -
APPLICATION TYPE	Site Plan Application
ADDRESS	772 Winston Churchill Boulevard
GENERAL LOCATION	Winston Churchill and Canadian Rail Company
DESCRIPTION	Two industrial/warehouse buildings
Rogers Reference Number	M213023

Rogers Communications ("**Rogers**") has reviewed the application for the above Site Plan and has determined that it intends to provide cable and telecommunications services. Accordingly, we request that municipal approval be granted subject to the following conditions:

1. Prior to Site Plan approval, the Developer/Owner will, at its own cost, grant all necessary easements and maintenance agreements required by those CRTC-licensed telephone companies and broadcasting distribution companies intending to serve the Site Plan (collectively, the "**Communications Service Providers**"). Immediately following registration of the Site Plan , the Developer/Owner will cause these documents to be registered on title.

2. Prior to Site Plan approval, the Developer/Owner will, with consultation with the applicable utilities and Communications Service Providers, prepare an overall utility distribution plan that shows the locations of all utility infrastructure for the Site Plan, as well as the timing and phasing of installation.

In addition, we kindly request to, where possible, receive copies of the following documents:
(1) the comments received from any of the Communications Service Providers during circulation;
(2) the proposed conditions of draft approval as prepared by municipal planners prior to their consideration by Council or any of its committees; and
(3) the planners' report recommending draft approval before it goes to Council or any of its committees.

Should you require further information or have any questions, please do not hesitate to contact me at gtaw.newarea@rci.rogers.com.

Yours truly

Monica LaPointe

Monica LaPointe
Coordinator
gtaw.newarea@rci.rogers.com
Rogers Communications, Wireline Access Network
3573 Wolfedale Rd, Mississauga Ontario

Resubmission Chart:

Please fill out this chart when preparing a resubmission and submit in WORD format.

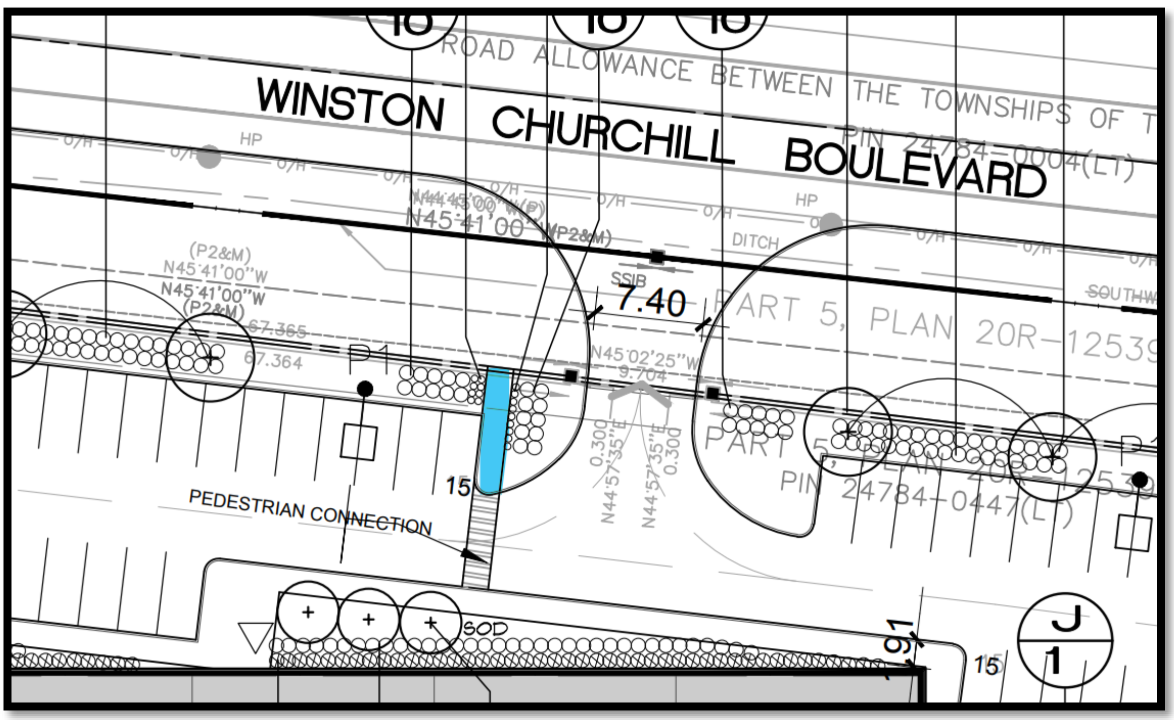
Drawings:	Drawing # /Doc #:	Rev. # & Date:		Consultant:
Reports and Studies:				
Documents:				

Site Plan Circulation Review – Transportation Comments

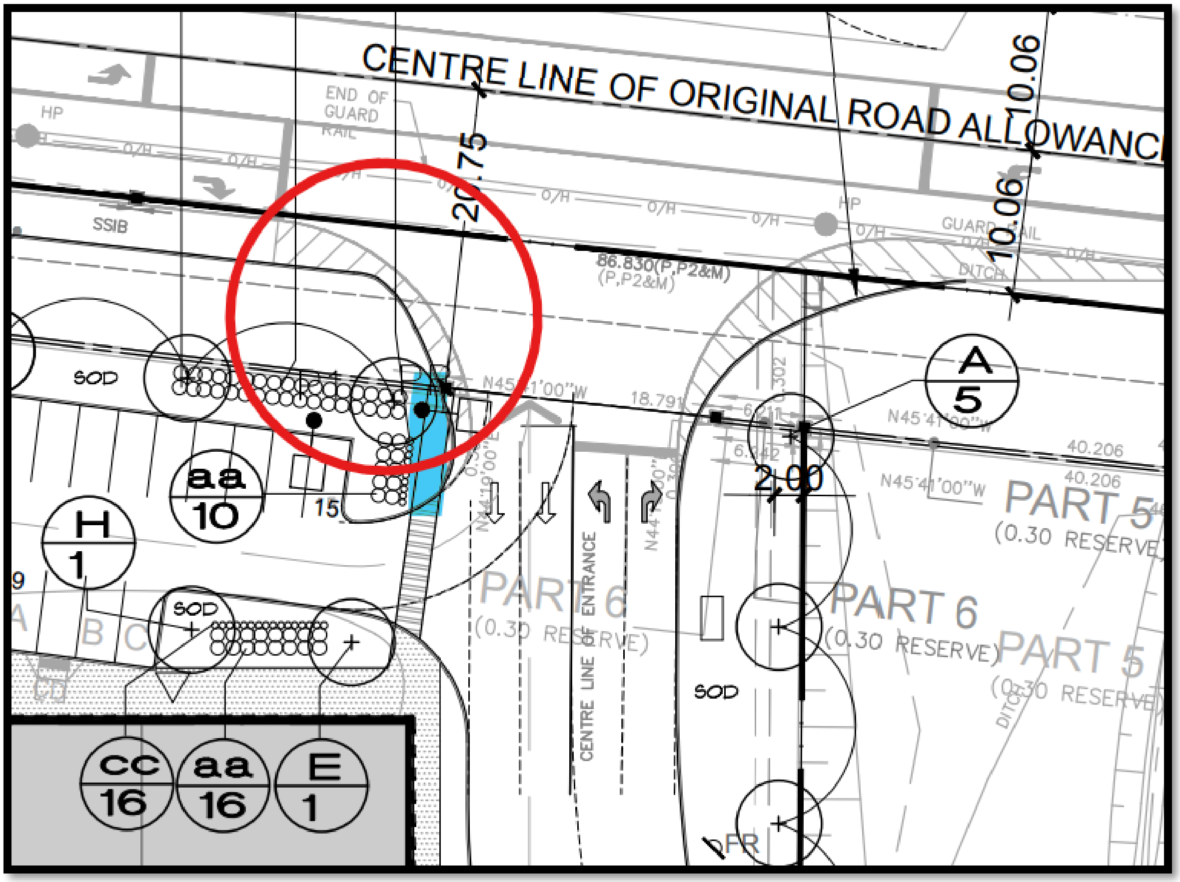
Date:	2021-07-23
To:	Leigh Musson
From:	Asad Yousfani/Aquisha Khan
File #:	1601.029/01
Address:	772 Winston Churchill Boulevard
Circulation Number	1

<u>Sustainable Transportation</u>

1. [Circ. 1] Can the applicant confirm these pedestrian connections will connect to the future pedestrian facility within the Region of Peel's road widening please?



This one below at the driveway should also take the future signal into consideration.



<u>Oakville Transit</u>

1. [Circ. 1] Oakville Transit provides door-to-door specialized transit service called care-A-van for persons with disabilities. Service is provided by low-floor, fully accessible 26ft buses supplemented in partnership with local taxi providers. Drivers will leave the vehicle and escort the customer to the first accessible public entrance. The vehicle will occupy part of the drive aisle for the duration of loading, unloading and securing mobility devices onboard.
2. [Circ. 1] Conventional transit service on Winston Churchill Boulevard is provided rush hour only by Miway (Mississauga Transit). All day conventional transit service to and from the Clarkson GO station provided by Oakville Transit and Miway is available at the intersection of Royal Windsor Drive and Winston Churchill Boulevard, approximately 600m from the site.

<u>Transportation</u>

[Circ. 1] Refer to the TIS – section 3.1.3 Background growth developments.

1. In addition to 560 WCB, the report needs to consider other developments for traffic analysis purposes. The link below has all of the Development Applications:

https://eos.oakville.ca/mobileOakville/index.html?viewer=EOS_Planning_and_Development.htmPlanDev

Other developments such as 2175 Cornwall and 2395 Cornwall road need to be considered. The traffic generated from these developments will be heading eastward or Cornwall, making a left on WCB and heading north. Therefore, the analyses at major intersection(s) need to be documented.

Aquisha Khan, P. Eng.
Transportation Engineer, Engineering & Construction
aquisha.khan@oakville.ca
(905) 845-6601

Appendix B

Signal Timing Plans

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**September 15, 2020**		**Prepared Date**	**September 15, 2020**
Database Rev	**iNet**		**Completed By**	**BL**
Timing Card / Field rev	**-**		**Checked By**	**TF**

Location: **Winston Churchill Boulevard @ Royal Windsor Drive**

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Royal Windsor Drive - EB P.P LT	5	0	0	3	0	0	10	14
2	Royal Windsor Drive - EB/WB	8	11	17	4.0	3.0	56	44	56
3	Winston Churchill Boulevard - SB Prot. LT	8	0	0	3.0	2.0	49	32	31
4	Winston Churchill Boulevard - NB/SB	8	14	23	4.0	3.3	35	34	39
5	Not in use	-	-	-	-	-	-	-	-
6	Not in use	-	-	-	-	-	-	-	-
7	Not in use	-	-	-	-	-	-	-	-
8	Not in use	-	-	-	-	-	-	-	-

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
06:00 - 09:30	AM	140	108
09:30 - 15:00 19:30 - 00:00	OFF	120	2
15:00 - 19:30	PM	140	104

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	September 15, 2020	Prepared Date	September 15, 2020
Database Rev	iNet	Completed By	BL
Timing Card / Field rev	-	Checked By	TF

Location: Winston Churchill Boulevard @ Beryl Road

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not in use	-	-	-	-	-	-	-	-
2	Winston Churchill Boulevard - SB	12	7	11	4.0	2.1	31	31	31
3	Not in use	-	-	-	-	-	-	-	-
4	Computer Phase	8	7	12	4.0	2.3	29	29	29
5	Not in use	-	-	-	-	-	-	-	-
6	Winston Churchill Boulevard - NB	12	7	11	4.0	2.1	31	31	31
7	Not in use	-	-	-	-	-	-	-	-
8	Beryl Road - EB	8	7	12	4.0	2.3	29	29	29

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
06:00 - 09:30	AM	60	5
09:30 - 15:00 19:30 - 03:00	OFF	60	13
15:00 - 19:30	PM	60	35

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	September 15, 2020	Prepared Date	September 15, 2020
Database Rev	iNet	Completed By	BL
Timing Card / Field rev	-	Checked By	TF

Location: Winston Churchill Boulevard @ Lakeshore Road

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not in use	-	-	-	-	-	-	-	-
2	Lakeshore Road - EB/WB	8	7	12	4.0	2.0	59	51	54
3	Not in use	-	-	-	-	-	-	-	-
4	Winston Churchill Boulevard - SB	8	7	10	4.0	2.2	31	34	36
5	Not in use	-	-	-	-	-	-	-	-
6	Not in use	-	-	-	-	-	-	-	-
7	Not in use	-	-	-	-	-	-	-	-
8	Not in use	-	-	-	-	-	-	-	-

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
06:45 - 09:15	AM	90	41
09:15 - 15:30 18:30 - 22:00	OFF	85	54
15:30 - 18:30	PM	90	89

Appendix C

Turning Movement Counts

Turning Movement Count (3 . WINSTON CHURCHILL BLVD & ROYAL WINDSOR DR) CustID: 01902061 MioID: 380805

Start Time	Southbound WINSTON CHURCHILL BLVD						Westbound ROYAL WINDSOR DR						Northbound WINSTON CHURCHILL BLVD						Eastbound ROYAL WINDSOR DR						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
07:00:00	55	24	19	0	0	98	4	72	30	0	0	106	10	16	17	0	0	43	13	160	23	0	0	196	443
07:15:00	80	33	18	0	1	131	4	71	21	0	0	96	7	24	18	0	0	49	9	224	16	1	1	250	526
07:30:00	84	35	32	0	0	151	7	99	34	0	1	140	10	28	17	0	0	55	17	205	18	0	0	240	586
07:45:00	137	63	51	0	0	251	9	106	35	0	0	150	7	26	27	0	0	60	19	186	23	0	0	228	689
Hourly	356	155	120	0	1	631	24	348	120	0	1	492	34	94	79	0	0	207	58	775	80	1	1	914	2244
08:00:00	91	38	37	0	0	166	10	139	39	0	0	188	3	29	24	0	0	56	31	196	18	0	0	245	655
08:15:00	154	77	60	0	1	291	6	116	34	0	0	156	5	35	28	0	0	68	35	170	21	0	1	226	741
08:30:00	80	68	51	0	0	199	7	122	46	0	0	175	8	31	26	0	0	65	35	155	29	0	0	219	658
08:45:00	96	56	44	0	0	196	12	92	42	1	2	147	8	35	23	0	1	66	25	167	14	0	0	206	615
Hourly	421	239	192	0	1	852	35	469	161	1	2	666	24	130	101	0	1	255	126	688	82	0	1	896	2669
BREAK																									
11:00:00	38	20	21	0	0	79	11	85	40	0	0	136	11	30	14	0	0	55	27	94	5	0	0	126	396
11:15:00	54	20	8	0	0	82	16	83	67	0	0	166	8	25	15	0	0	48	23	106	9	0	0	138	434
11:30:00	41	23	28	0	0	92	7	83	57	0	0	147	10	37	18	0	0	65	28	83	12	0	1	123	427
11:45:00	62	25	33	0	0	120	14	116	64	0	0	194	10	37	6	0	0	53	23	85	7	0	0	115	482
Hourly	195	88	90	0	0	373	48	367	228	0	0	643	39	129	53	0	0	221	101	368	33	0	1	502	1739
12:00:00	56	20	28	0	0	104	13	97	78	0	0	188	14	35	10	0	0	59	29	79	16	0	0	124	475
12:15:00	57	23	28	0	2	108	9	89	62	0	0	160	13	31	7	0	0	51	30	92	12	1	0	135	454
12:30:00	42	35	22	0	0	99	10	94	64	1	0	169	14	22	14	0	0	50	40	90	14	0	0	144	462
12:45:00	67	42	36	0	0	145	16	96	67	0	0	179	15	27	13	0	0	55	24	111	17	0	0	152	531
Hourly	222	120	114	0	2	456	48	376	271	1	0	696	56	115	44	0	0	215	123	372	59	1	0	555	1922
13:00:00	55	28	14	0	0	97	20	122	69	0	0	211	20	30	14	0	2	64	17	96	12	0	1	125	497
13:15:00	40	31	37	0	0	108	8	93	56	0	1	157	12	36	20	0	0	68	26	96	8	0	0	130	463
13:30:00	29	24	24	0	0	77	7	85	62	0	0	154	7	17	14	0	0	38	19	75	13	0	0	107	376
13:45:00	83	33	17	0	0	133	6	130	52	0	1	188	21	27	5	0	1	53	21	106	8	0	0	135	509
Hourly	207	116	92	0	0	415	41	430	239	0	2	710	60	110	53	0	3	223	83	373	41	0	1	497	1845
BREAK																									
15:00:00	51	31	34	0	0	116	9	111	82	0	0	202	35	33	14	0	0	82	32	85	16	0	0	133	533
15:15:00	37	33	30	0	0	100	18	128	74	0	0	220	27	34	18	0	0	79	37	105	16	0	0	158	557
15:30:00	37	36	32	0	2	105	10	136	57	1	1	204	29	40	21	0	0	90	47	111	11	0	1	169	568
15:45:00	52	48	35	0	0	135	16	137	80	0	1	233	24	54	17	0	1	95	35	96	7	0	1	138	601
Hourly	177	148	131	0	2	456	53	512	293	1	2	859	115	161	70	0	1	346	151	397	50	0	2	598	2259
16:00:00	38	23	27	0	2	88	13	170	93	0	0	276	31	42	16	0	0	89	34	116	15	0	4	165	618
16:15:00	38	45	39	0	1	122	18	178	106	0	1	302	21	42	15	0	0	78	43	131	9	0	0	183	685
16:30:00	52	58	37	0	1	147	14	172	91	0	3	277	30	69	9	0	0	108	31	115	15	0	0	161	693
16:45:00	55	45	44	0	0	144	21	196	126	0	0	343	26	60	20	0	0	106	36	128	17	0	0	181	774
Hourly	183	171	147	0	4	501	66	716	416	0	4	1198	108	213	60	0	0	381	144	490	56	0	4	690	2770
17:00:00	49	58	44	0	0	151	17	164	134	0	1	315	48	78	12	0	0	138	39	129	13	0	0	181	785
17:15:00	48	42	28	0	0	118	20	196	105	0	0	321	25	59	19	0	1	103	43	163	13	0	0	219	761
17:30:00	54	31	27	0	0	112	23	216	178	0	0	417	15	53	16	0	0	84	36	121	8	0	0	165	778
17:45:00	62	24	31	0	1	117	14	170	129	0	1	313	18	40	8	0	1	66	40	120	3	0	0	163	659
Hourly	213	155	130	0	1	498	74	746	546	0	2	1366	106	230	55	0	2	391	158	533	37	0	0	728	2983
Grand Total	1974	1192	1016	0	11	4182	389	3964	2274	3	13	6630	542	1182	515	0	7	2239	944	3996	438	2	10	5380	**18431**
Approach%	47.2%	28.5%	24.3%	0%		-	5.9%	59.8%	34.3%	0%		-	24.2%	52.8%	23%	0%		-	17.5%	74.3%	8.1%	0%		-	-
Totals %	10.7%	6.5%	5.5%	0%		22.7%	2.1%	21.5%	12.3%	0%		36%	2.9%	6.4%	2.8%	0%		12.1%	5.1%	21.7%	2.4%	0%		29.2%	-

Heavy	80	104	39	0	-	21	296	117	0	-	88	85	44	0	-	37	303	106	1	-	-
Heavy %	4.1%	8.7%	3.8%	0%	-	5.4%	7.5%	5.1%	0%	-	16.2%	7.2%	8.5%	0%	-	3.9%	7.6%	24.2%	50%	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & ROYAL WINDSOR DR
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (4 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD						Westbound ROYAL WINDSOR DR						Northbound WINSTON CHURCHILL BLVD						Eastbound ROYAL WINDSOR DR						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
08:00:00	91	38	37	0	0	166	10	139	39	0	0	188	3	29	24	0	0	56	31	196	18	0	0	245	655
08:15:00	154	77	60	0	1	291	6	116	34	0	0	156	5	35	28	0	0	68	35	170	21	0	1	226	741
08:30:00	80	68	51	0	0	199	7	122	46	0	0	175	8	31	26	0	0	65	35	155	29	0	0	219	658
08:45:00	96	56	44	0	0	196	12	92	42	1	2	147	8	35	23	0	1	66	25	167	14	0	0	206	615
Grand Total	421	239	192	0	1	852	35	469	161	1	2	666	24	130	101	0	1	255	126	688	82	0	1	896	**2669**
Approach%	49.4%	28.1%	22.5%	0%		-	5.3%	70.4%	24.2%	0.2%		-	9.4%	51%	39.6%	0%		-	14.1%	76.8%	9.2%	0%		-	-
Totals %	15.8%	9%	7.2%	0%		31.9%	1.3%	17.6%	6%	0%		25%	0.9%	4.9%	3.8%	0%		9.6%	4.7%	25.8%	3.1%	0%		33.6%	-
PHF	0.68	0.78	0.8	0		0.73	0.73	0.84	0.88	0.25		0.89	0.75	0.93	0.9	0		0.94	0.9	0.88	0.71	0		0.91	-
Heavy	14	18	8	0		40	2	33	14	0		49	8	8	4	0		20	6	33	9	0		48	-
Heavy %	3.3%	7.5%	4.2%	0%		4.7%	5.7%	7%	8.7%	0%		7.4%	33.3%	6.2%	4%	0%		7.8%	4.8%	4.8%	11%	0%		5.4%	-
Lights	407	221	184	0		812	33	436	147	1		617	16	122	97	0		235	120	655	73	0		848	-
Lights %	96.7%	92.5%	95.8%	0%		95.3%	94.3%	93%	91.3%	100%		92.6%	66.7%	93.8%	96%	0%		92.2%	95.2%	95.2%	89%	0%		94.6%	-
Single-Unit Trucks	8	7	6	0		21	2	10	7	0		19	2	4	3	0		9	2	9	5	0		16	-
Single-Unit Trucks %	1.9%	2.9%	3.1%	0%		2.5%	5.7%	2.1%	4.3%	0%		2.9%	8.3%	3.1%	3%	0%		3.5%	1.6%	1.3%	6.1%	0%		1.8%	-
Buses	4	1	1	0		6	0	6	5	0		11	0	2	1	0		3	1	8	0	0		9	-
Buses %	1%	0.4%	0.5%	0%		0.7%	0%	1.3%	3.1%	0%		1.7%	0%	1.5%	1%	0%		1.2%	0.8%	1.2%	0%	0%		1%	-
Articulated Trucks	2	10	1	0		13	0	17	2	0		19	6	2	0	0		8	3	16	4	0		23	-
Articulated Trucks %	0.5%	4.2%	0.5%	0%		1.5%	0%	3.6%	1.2%	0%		2.9%	25%	1.5%	0%	0%		3.1%	2.4%	2.3%	4.9%	0%		2.6%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Pedestrians%	-	-	-	-	20%		-	-	-	-	40%		-	-	-	-	20%		-	-	-	-	20%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & ROYAL WINDSOR DR
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

Peak Hour: 12:00 PM - 01:00 PM Weather: Light Snow Showers (-3 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD						Westbound ROYAL WINDSOR DR						Northbound WINSTON CHURCHILL BLVD						Eastbound ROYAL WINDSOR DR						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
12:00:00	56	20	28	0	0	104	13	97	78	0	0	188	14	35	10	0	0	59	29	79	16	0	0	124	475
12:15:00	57	23	28	0	2	108	9	89	62	0	0	160	13	31	7	0	0	51	30	92	12	1	0	135	454
12:30:00	42	35	22	0	0	99	10	94	64	1	0	169	14	22	14	0	0	50	40	90	14	0	0	144	462
12:45:00	67	42	36	0	0	145	16	96	67	0	0	179	15	27	13	0	0	55	24	111	17	0	0	152	531
Grand Total	222	120	114	0	2	456	48	376	271	1	0	696	56	115	44	0	0	215	123	372	59	1	0	555	**1922**
Approach%	48.7%	26.3%	25%	0%		-	6.9%	54%	38.9%	0.1%		-	26%	53.5%	20.5%	0%		-	22.2%	67%	10.6%	0.2%		-	-
Totals %	11.6%	6.2%	5.9%	0%		23.7%	2.5%	19.6%	14.1%	0.1%		36.2%	2.9%	6%	2.3%	0%		11.2%	6.4%	19.4%	3.1%	0.1%		28.9%	-
PHF	0.83	0.71	0.79	0		0.79	0.75	0.97	0.87	0.25		0.93	0.93	0.82	0.79	0		0.91	0.77	0.84	0.87	0.25		0.91	-
Heavy	7	11	9	0		27	3	44	17	0		64	19	10	6	0		35	6	52	21	0		79	-
Heavy %	3.2%	9.2%	7.9%	0%		5.9%	6.3%	11.7%	6.3%	0%		9.2%	33.9%	8.7%	13.6%	0%		16.3%	4.9%	14%	35.6%	0%		14.2%	-
Lights	215	109	105	0		429	45	332	254	1		632	37	105	38	0		180	117	320	38	1		476	-
Lights %	96.8%	90.8%	92.1%	0%		94.1%	93.8%	88.3%	93.7%	100%		90.8%	66.1%	91.3%	86.4%	0%		83.7%	95.1%	86%	64.4%	100%		85.8%	-
Single-Unit Trucks	2	3	1	0		6	2	13	10	0		25	10	5	4	0		19	3	16	13	0		32	-
Single-Unit Trucks %	0.9%	2.5%	0.9%	0%		1.3%	4.2%	3.5%	3.7%	0%		3.6%	17.9%	4.3%	9.1%	0%		8.8%	2.4%	4.3%	22%	0%		5.8%	-
Buses	3	0	0	0		3	0	3	3	0		6	0	0	0	0		0	0	3	0	0		3	-
Buses %	1.4%	0%	0%	0%		0.7%	0%	0.8%	1.1%	0%		0.9%	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.5%	-
Articulated Trucks	2	8	8	0		18	1	28	4	0		33	9	5	2	0		16	3	33	8	0		44	-
Articulated Trucks %	0.9%	6.7%	7%	0%		3.9%	2.1%	7.4%	1.5%	0%		4.7%	16.1%	4.3%	4.5%	0%		7.4%	2.4%	8.9%	13.6%	0%		7.9%	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	100%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & ROYAL WINDSOR DR
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

Peak Hour: 05:00 PM - 06:00 PM Weather: Snow (-3 °C)

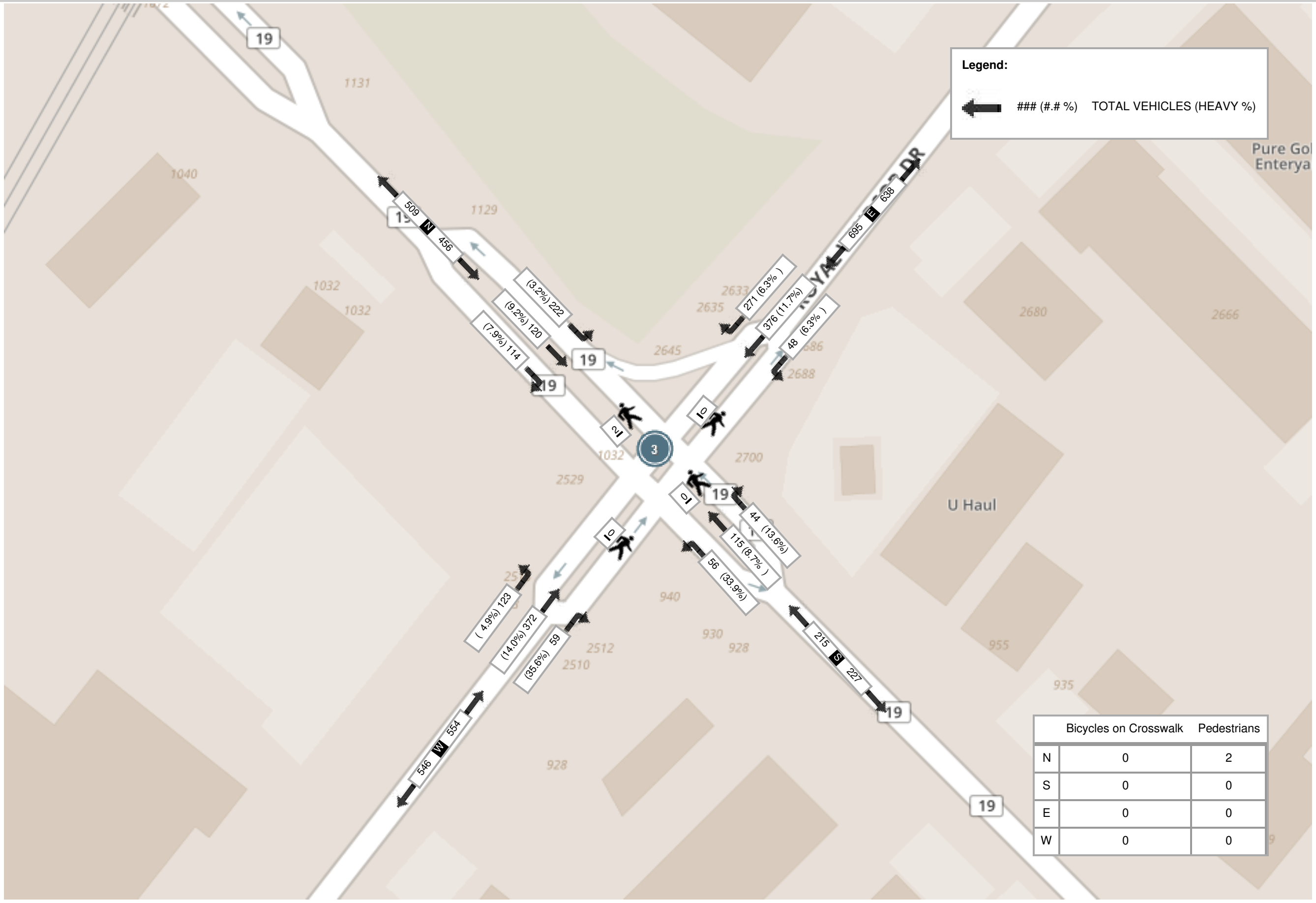
Start Time	Southbound WINSTON CHURCHILL BLVD						Westbound ROYAL WINDSOR DR						Northbound WINSTON CHURCHILL BLVD						Eastbound ROYAL WINDSOR DR						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
17:00:00	49	58	44	0	0	151	17	164	134	0	1	315	48	78	12	0	0	138	39	129	13	0	0	181	785
17:15:00	48	42	28	0	0	118	20	196	105	0	0	321	25	59	19	0	1	103	43	163	13	0	0	219	761
17:30:00	54	31	27	0	0	112	23	216	178	0	0	417	15	53	16	0	0	84	36	121	8	0	0	165	778
17:45:00	62	24	31	0	1	117	14	170	129	0	1	313	18	40	8	0	1	66	40	120	3	0	0	163	659
Grand Total	213	155	130	0	1	498	74	746	546	0	2	1366	106	230	55	0	2	391	158	533	37	0	0	728	**2983**
Approach%	42.8%	31.1%	26.1%	0%		-	5.4%	54.6%	40%	0%		-	27.1%	58.8%	14.1%	0%		-	21.7%	73.2%	5.1%	0%		-	-
Totals %	7.1%	5.2%	4.4%	0%		16.7%	2.5%	25%	18.3%	0%		45.8%	3.6%	7.7%	1.8%	0%		13.1%	5.3%	17.9%	1.2%	0%		24.4%	-
PHF	0.86	0.67	0.74	0		0.82	0.8	0.86	0.77	0		0.82	0.55	0.74	0.72	0		0.71	0.92	0.82	0.71	0		0.83	-
Heavy	7	3	1	0		11	3	19	12	0		34	6	3	2	0		11	1	23	14	0		38	-
Heavy %	3.3%	1.9%	0.8%	0%		2.2%	4.1%	2.5%	2.2%	0%		2.5%	5.7%	1.3%	3.6%	0%		2.8%	0.6%	4.3%	37.8%	0%		5.2%	-
Lights	206	152	129	0		487	71	727	534	0		1332	100	227	53	0		380	157	510	23	0		690	-
Lights %	96.7%	98.1%	99.2%	0%		97.8%	95.9%	97.5%	97.8%	0%		97.5%	94.3%	98.7%	96.4%	0%		97.2%	99.4%	95.7%	62.2%	0%		94.8%	-
Single-Unit Trucks	1	0	1	0		2	1	5	4	0		10	2	3	0	0		5	0	6	4	0		10	-
Single-Unit Trucks %	0.5%	0%	0.8%	0%		0.4%	1.4%	0.7%	0.7%	0%		0.7%	1.9%	1.3%	0%	0%		1.3%	0%	1.1%	10.8%	0%		1.4%	-
Buses	4	0	0	0		4	0	6	5	0		11	0	0	2	0		2	0	6	0	0		6	-
Buses %	1.9%	0%	0%	0%		0.8%	0%	0.8%	0.9%	0%		0.8%	0%	0%	3.6%	0%		0.5%	0%	1.1%	0%	0%		0.8%	-
Articulated Trucks	2	3	0	0		5	2	8	3	0		13	4	0	0	0		4	1	11	10	0		22	-
Articulated Trucks %	0.9%	1.9%	0%	0%		1%	2.7%	1.1%	0.5%	0%		1%	3.8%	0%	0%	0%		1%	0.6%	2.1%	27%	0%		3%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	20%		-	-	-	-	20%		-	-	-	-	40%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	20%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (4 °C)

	Bicycles on Crosswalk	Pedestrians
N	0	1
S	0	1
E	0	2
W	0	1

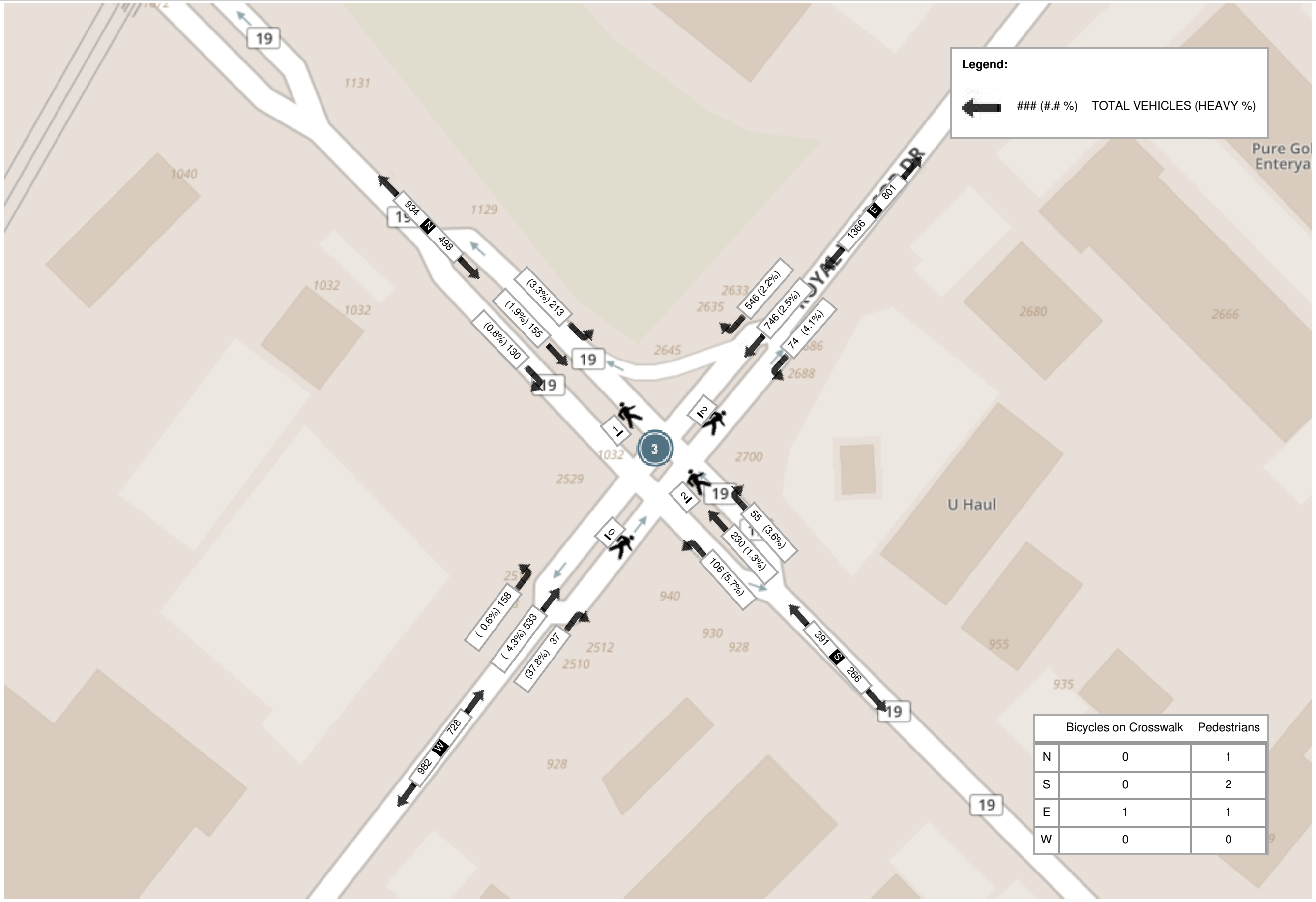
Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & ROYAL WINDSOR DR
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

Peak Hour: 12:00 PM - 01:00 PM Weather: Light Snow Showers (-3 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	2
S	0	0
E	0	0
W	0	0

Peak Hour: 05:00 PM - 06:00 PM Weather: Snow (-3 °C)



	Bicycles on Crosswalk	Pedestrians
N	0	1
S	0	2
E	1	1
W	0	0

Spectrum

Turning Movement Count (2 . WINSTON CHURCHILL BLVD & BERYL RD) CustID: 01901714 MioID: 380803

Start Time	Southbound WINSTON CHURCHILL BLVD					Northbound WINSTON CHURCHILL BLVD					Eastbound BERYL RD					Int. Total (15 min)
	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	Left	Right	U-Turn	Peds	Approach Total	
07:00:00	34	8	0	0	42	1	31	0	0	32	3	10	0	0	13	87
07:15:00	33	5	0	0	38	4	31	0	0	35	9	12	0	0	21	94
07:30:00	51	9	0	0	60	2	32	0	0	34	20	17	0	0	37	131
07:45:00	57	17	0	0	74	3	35	0	0	38	14	9	0	0	23	135
Hourly	175	39	0	0	214	10	129	0	0	139	46	48	0	0	94	447
08:00:00	52	11	0	0	63	3	44	0	0	47	14	16	0	0	30	140
08:15:00	76	13	0	0	89	3	42	0	0	45	19	15	0	0	34	168
08:30:00	73	29	0	0	102	2	40	0	0	42	24	17	0	0	41	185
08:45:00	52	19	0	0	71	4	41	0	0	45	17	13	0	0	30	146
Hourly	253	72	0	0	325	12	167	0	0	179	74	61	0	0	135	639
BREAK																
11:00:00	18	14	0	0	32	3	26	0	0	29	21	2	0	0	23	84
11:15:00	21	20	0	0	41	3	23	0	0	26	15	6	0	0	21	88
11:30:00	29	12	0	0	41	8	33	0	0	41	18	5	0	0	23	105
11:45:00	24	17	0	0	41	7	40	0	0	47	10	6	0	0	16	104
Hourly	92	63	0	0	155	21	122	0	0	143	64	19	0	0	83	381
12:00:00	26	20	0	0	46	9	33	0	0	42	16	5	0	0	21	109
12:15:00	24	15	0	0	39	4	37	0	0	41	11	7	0	0	18	98
12:30:00	32	22	0	0	54	6	32	0	0	38	11	11	0	0	22	114
12:45:00	44	20	0	0	64	4	26	0	0	30	20	7	0	0	27	121
Hourly	126	77	0	0	203	23	128	0	0	151	58	30	0	0	88	442
13:00:00	38	16	0	0	54	5	42	0	0	47	15	4	0	0	19	120
13:15:00	25	16	0	0	41	6	31	0	0	37	16	3	0	0	19	97
13:30:00	35	8	0	0	43	4	26	0	0	30	18	2	0	0	20	93
13:45:00	31	12	0	0	43	6	37	0	0	43	14	3	0	0	17	103
Hourly	129	52	0	0	181	21	136	0	0	157	63	12	0	0	75	413
BREAK																
15:00:00	35	18	0	0	53	13	58	0	0	71	13	8	1	0	22	146
15:15:00	38	15	0	0	53	7	55	0	0	62	19	4	0	0	23	138
15:30:00	42	16	0	0	58	11	50	0	0	61	23	2	0	0	25	144
15:45:00	38	24	0	0	62	10	61	0	0	71	25	9	0	0	34	167
Hourly	153	73	0	0	226	41	224	0	0	265	80	23	1	0	104	595
16:00:00	37	16	0	1	53	9	61	0	0	70	16	7	0	0	23	146
16:15:00	46	31	0	0	77	4	56	0	1	60	23	3	0	0	26	163

16:30:00	52	25	0	0	77	10	75	0	0	85	21	3	0	0	24	186
16:45:00	52	28	0	0	80	7	79	0	0	86	29	5	0	0	34	200
Hourly	187	100	0	1	287	30	271	0	1	301	89	18	0	0	107	695
17:00:00	55	25	0	0	80	11	75	0	0	86	25	8	0	0	33	199
17:15:00	52	22	0	0	74	8	66	0	0	74	31	9	0	0	40	188
17:30:00	44	22	0	1	66	8	53	0	0	61	18	9	0	0	27	154
17:45:00	27	13	0	0	40	5	39	0	0	44	20	2	0	0	22	106
Hourly	178	82	0	1	260	32	233	0	0	265	94	28	0	0	122	647
Grand Total	1293	558	0	2	1851	190	1410	0	1	1600	568	239	1	0	808	**4259**
Approach%	69.9%	30.1%	0%		-	11.9%	88.1%	0%		-	70.3%	29.6%	0.1%		-	-
Totals %	30.4%	13.1%	0%		43.5%	4.5%	33.1%	0%		37.6%	13.3%	5.6%	0%		19%	-
Heavy	135	67	0		-	39	127	0		-	64	36	0		-	-
Heavy %	10.4%	12%	0%		-	20.5%	9%	0%		-	11.3%	15.1%	0%		-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (4 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD					Northbound WINSTON CHURCHILL BLVD					Eastbound BERYL RD					Int. Total (15 min)
	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	Left	Right	U-Turn	Peds	Approach Total	
08:00:00	52	11	0	0	63	3	44	0	0	47	14	16	0	0	30	140
08:15:00	76	13	0	0	89	3	42	0	0	45	19	15	0	0	34	168
08:30:00	73	29	0	0	102	2	40	0	0	42	24	17	0	0	41	185
08:45:00	52	19	0	0	71	4	41	0	0	45	17	13	0	0	30	146
Grand Total	253	72	0	0	325	12	167	0	0	179	74	61	0	0	135	**639**
Approach%	77.8%	22.2%	0%		-	6.7%	93.3%	0%		-	54.8%	45.2%	0%		-	**-**
Totals %	39.6%	11.3%	0%		50.9%	1.9%	26.1%	0%		28%	11.6%	9.5%	0%		21.1%	**-**
PHF	0.83	0.62	0		0.8	0.75	0.95	0		0.95	0.77	0.9	0		0.82	**-**
Heavy	17	8	0		25	5	15	0		20	5	10	0		15	**-**
Heavy %	6.7%	11.1%	0%		7.7%	41.7%	9%	0%		11.2%	6.8%	16.4%	0%		11.1%	**-**
Lights	236	64	0		300	7	152	0		159	69	51	0		120	**-**
Lights %	93.3%	88.9%	0%		92.3%	58.3%	91%	0%		88.8%	93.2%	83.6%	0%		88.9%	**-**
Single-Unit Trucks	13	7	0		20	4	3	0		7	1	9	0		10	**-**
Single-Unit Trucks %	5.1%	9.7%	0%		6.2%	33.3%	1.8%	0%		3.9%	1.4%	14.8%	0%		7.4%	**-**
Buses	0	0	0		0	0	2	0		2	2	1	0		3	**-**
Buses %	0%	0%	0%		0%	0%	1.2%	0%		1.1%	2.7%	1.6%	0%		2.2%	**-**
Articulated Trucks	4	1	0		5	1	10	0		11	2	0	0		2	**-**
Articulated Trucks %	1.6%	1.4%	0%		1.5%	8.3%	6%	0%		6.1%	2.7%	0%	0%		1.5%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

Peak Hour: 12:00 PM - 01:00 PM Weather: Light Snow Showers (-3 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD					Northbound WINSTON CHURCHILL BLVD					Eastbound BERYL RD					Int. Total (15 min)
	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	Left	Right	U-Turn	Peds	Approach Total	
12:00:00	26	20	0	0	46	9	33	0	0	42	16	5	0	0	21	109
12:15:00	24	15	0	0	39	4	37	0	0	41	11	7	0	0	18	98
12:30:00	32	22	0	0	54	6	32	0	0	38	11	11	0	0	22	114
12:45:00	44	20	0	0	64	4	26	0	0	30	20	7	0	0	27	121
Grand Total	126	77	0	0	203	23	128	0	0	151	58	30	0	0	88	**442**
Approach%	62.1%	37.9%	0%		-	15.2%	84.8%	0%		-	65.9%	34.1%	0%		-	-
Totals %	28.5%	17.4%	0%		45.9%	5.2%	29%	0%		34.2%	13.1%	6.8%	0%		19.9%	-
PHF	0.72	0.88	0		0.79	0.64	0.86	0		0.9	0.73	0.68	0		0.81	-
Heavy	25	9	0		34	5	19	0		24	10	9	0		19	-
Heavy %	19.8%	11.7%	0%		16.7%	21.7%	14.8%	0%		15.9%	17.2%	30%	0%		21.6%	-
Lights	101	68	0		169	18	109	0		127	48	21	0		69	-
Lights %	80.2%	88.3%	0%		83.3%	78.3%	85.2%	0%		84.1%	82.8%	70%	0%		78.4%	-
Single-Unit Trucks	11	7	0		18	3	10	0		13	7	6	0		13	-
Single-Unit Trucks %	8.7%	9.1%	0%		8.9%	13%	7.8%	0%		8.6%	12.1%	20%	0%		14.8%	-
Buses	0	0	0		0	0	0	0		0	0	0	0		0	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Articulated Trucks	14	2	0		16	2	9	0		11	3	3	0		6	-
Articulated Trucks %	11.1%	2.6%	0%		7.9%	8.7%	7%	0%		7.3%	5.2%	10%	0%		6.8%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-

Spectrum

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & BERYL RD
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

Peak Hour: 04:00 PM - 05:00 PM Weather: Snow (-3 °C)

Start Time	**Southbound** WINSTON CHURCHILL BLVD					**Northbound** WINSTON CHURCHILL BLVD					**Eastbound** BERYL RD					**Int. Total (15 min)**
	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	Left	Right	U-Turn	Peds	Approach Total	
16:00:00	37	16	0	1	53	9	61	0	0	70	16	7	0	0	23	146
16:15:00	46	31	0	0	77	4	56	0	1	60	23	3	0	0	26	163
16:30:00	52	25	0	0	77	10	75	0	0	85	21	3	0	0	24	186
16:45:00	52	28	0	0	80	7	79	0	0	86	29	5	0	0	34	200
Grand Total	187	100	0	1	287	30	271	0	1	301	89	18	0	0	107	**695**
Approach%	65.2%	34.8%	0%		-	10%	90%	0%		-	83.2%	16.8%	0%		-	**-**
Totals %	26.9%	14.4%	0%		41.3%	4.3%	39%	0%		43.3%	12.8%	2.6%	0%		15.4%	**-**
PHF	0.9	0.81	0		0.9	0.75	0.86	0		0.88	0.77	0.64	0		0.79	**-**
Heavy	14	11	0		25	7	10	0		17	5	3	0		8	**-**
Heavy %	7.5%	11%	0%		8.7%	23.3%	3.7%	0%		5.6%	5.6%	16.7%	0%		7.5%	**-**
Lights	173	89	0		262	23	261	0		284	84	15	0		99	**-**
Lights %	92.5%	89%	0%		91.3%	76.7%	96.3%	0%		94.4%	94.4%	83.3%	0%		92.5%	**-**
Single-Unit Trucks	4	4	0		8	6	2	0		8	2	3	0		5	**-**
Single-Unit Trucks %	2.1%	4%	0%		2.8%	20%	0.7%	0%		2.7%	2.2%	16.7%	0%		4.7%	**-**
Buses	0	3	0		3	1	2	0		3	0	0	0		0	**-**
Buses %	0%	3%	0%		1%	3.3%	0.7%	0%		1%	0%	0%	0%		0%	**-**
Articulated Trucks	10	4	0		14	0	6	0		6	3	0	0		3	**-**
Articulated Trucks %	5.3%	4%	0%		4.9%	0%	2.2%	0%		2%	3.4%	0%	0%		2.8%	**-**
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	50%		-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	50%		-	-	-	0%		-	-	-	0%		**-**

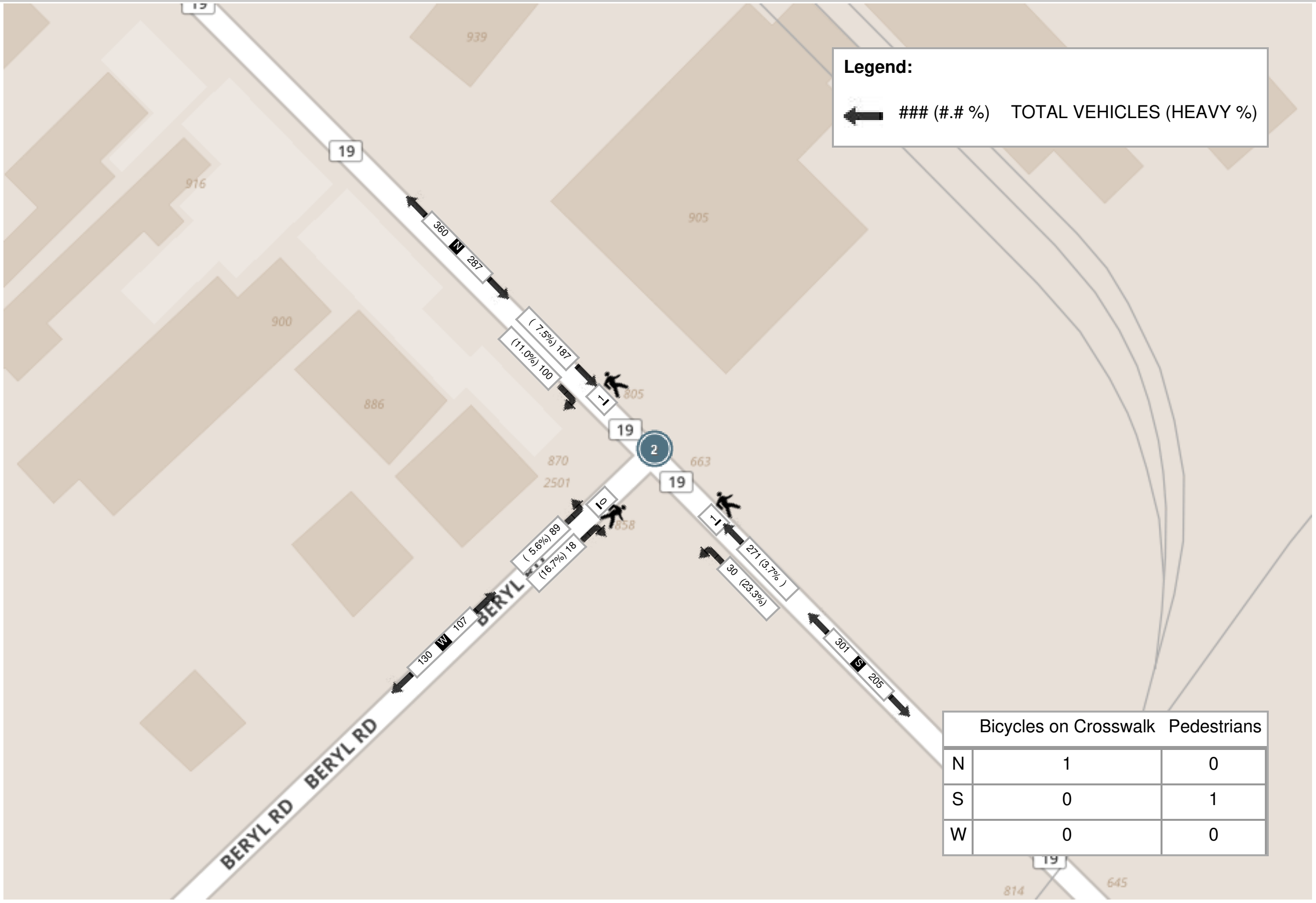
Peak Hour: 08:00 AM - 09:00 AM   Weather: Overcast (4 °C)

	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	0
W	0	0

Peak Hour: 12:00 PM - 01:00 PM   Weather: Light Snow Showers (-3 °C)

	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	0
W	0	0

Peak Hour: 04:00 PM - 05:00 PM Weather: Snow (-3 °C)



	Bicycles on Crosswalk	Pedestrians
N	1	0
S	0	1
W	0	0

Turning Movement Count (1 . WINSTON CHURCHILL BLVD & LAKESHORE RD) CustID: 01900000 MioID: 380801

Start Time	Southbound WINSTON CHURCHILL BLVD					Westbound LAKESHORE RD E					Eastbound LAKESHORE RD W					Int. Total (15 min)
	Left	Right	U-Turn	Peds	Approach Total	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	
07:00:00	26	11	0	0	37	11	11	0	0	22	18	38	0	0	56	115
07:15:00	37	10	0	0	47	14	12	0	0	26	21	72	0	0	93	166
07:30:00	38	15	0	0	53	12	11	0	0	23	30	82	0	0	112	188
07:45:00	46	18	0	0	64	16	9	0	0	25	26	72	0	0	98	187
Hourly	147	54	0	0	201	53	43	0	0	96	95	264	0	0	359	656
08:00:00	59	17	0	0	76	8	4	0	0	12	38	75	0	0	113	201
08:15:00	55	21	0	0	76	29	6	0	0	35	35	45	0	0	80	191
08:30:00	49	40	0	0	89	22	10	0	0	32	29	80	0	0	109	230
08:45:00	37	24	0	0	61	24	8	0	0	32	35	74	0	0	109	202
Hourly	200	102	0	0	302	83	28	0	0	111	137	274	0	0	411	824
BREAK																
11:00:00	8	10	0	0	18	11	12	0	0	23	13	24	0	0	37	78
11:15:00	11	10	0	0	21	16	8	0	0	24	15	24	0	0	39	84
11:30:00	11	21	0	0	32	23	23	0	0	46	17	22	0	0	39	117
11:45:00	7	15	0	0	22	27	23	0	0	50	17	31	0	0	48	120
Hourly	37	56	0	0	93	77	66	0	0	143	62	101	0	0	163	399
12:00:00	17	19	0	0	36	30	28	0	0	58	15	26	0	0	41	135
12:15:00	18	12	0	1	30	22	20	0	0	42	18	24	0	0	42	114
12:30:00	23	11	0	1	34	34	19	0	0	53	16	22	0	0	38	125
12:45:00	25	25	0	0	50	24	21	0	0	45	10	25	0	0	35	130
Hourly	83	67	0	2	150	110	88	0	0	198	59	97	0	0	156	504
13:00:00	29	11	0	0	40	17	23	0	0	40	16	23	0	0	39	119
13:15:00	16	12	0	0	28	22	16	0	0	38	15	15	1	0	31	97
13:30:00	17	15	0	0	32	21	18	0	0	39	13	27	0	0	40	111
13:45:00	14	14	0	0	28	32	30	0	0	62	9	22	0	0	31	121
Hourly	76	52	0	0	128	92	87	0	0	179	53	87	1	0	141	448
BREAK																
15:00:00	16	22	0	0	38	36	52	0	0	88	15	31	0	0	46	172
15:15:00	16	28	0	0	44	35	47	0	1	82	14	22	0	0	36	162
15:30:00	13	26	0	0	39	64	50	0	0	114	13	42	0	0	55	208
15:45:00	10	31	0	0	41	49	45	0	0	94	23	51	0	0	74	209
Hourly	55	107	0	0	162	184	194	0	1	378	65	146	0	0	211	751
16:00:00	11	25	1	0	37	53	42	0	0	95	18	30	0	0	48	180
16:15:00	12	30	0	0	42	48	43	0	0	91	13	46	0	0	59	192

16:30:00	26	34	0	0	60	66	59	0	0	125	21	37	0	0	58	243
16:45:00	18	31	0	0	49	52	56	0	0	108	25	51	0	0	76	233
Hourly	67	120	1	0	188	219	200	0	0	419	77	164	0	0	241	848
17:00:00	23	40	0	0	63	50	62	0	0	112	27	42	0	0	69	244
17:15:00	22	36	0	0	58	46	52	0	0	98	18	42	0	0	60	216
17:30:00	13	39	0	0	52	66	31	0	0	97	24	31	0	0	55	204
17:45:00	6	27	0	0	33	49	29	0	0	78	12	33	1	0	46	157
Hourly	64	142	0	0	206	211	174	0	0	385	81	148	1	0	230	821
Grand Total	729	700	1	2	1430	1029	880	0	1	1909	629	1281	2	0	1912	**5251**
Approach%	51%	49%	0.1%		-	53.9%	46.1%	0%		-	32.9%	67%	0.1%		-	**-**
Totals %	13.9%	13.3%	0%		27.2%	19.6%	16.8%	0%		36.4%	12%	24.4%	0%		36.4%	**-**
Heavy	155	15	0		-	9	139	0		-	16	13	0		-	**-**
Heavy %	21.3%	2.1%	0%		-	0.9%	15.8%	0%		-	2.5%	1%	0%		-	**-**
Bicycles	0	0	0		-	1	0	0		-	0	0	0		-	**-**
Bicycle %	0%	0%	0%		-	0.1%	0%	0%		-	0%	0%	0%		-	**-**

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (4 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD					Westbound LAKESHORE RD E					Eastbound LAKESHORE RD W					Int. Total (15 min)
	Left	Right	U-Turn	Peds	Approach Total	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	
08:00:00	59	17	0	0	76	8	4	0	0	12	38	75	0	0	113	201
08:15:00	55	21	0	0	76	29	6	0	0	35	35	45	0	0	80	191
08:30:00	49	40	0	0	89	22	10	0	0	32	29	80	0	0	109	230
08:45:00	37	24	0	0	61	24	8	0	0	32	35	74	0	0	109	202
Grand Total	200	102	0	0	302	83	28	0	0	111	137	274	0	0	411	**824**
Approach%	66.2%	33.8%	0%		-	74.8%	25.2%	0%		-	33.3%	66.7%	0%		-	-
Totals %	24.3%	12.4%	0%		36.7%	10.1%	3.4%	0%		13.5%	16.6%	33.3%	0%		49.9%	-
PHF	0.85	0.64	0		0.85	0.72	0.7	0		0.79	0.9	0.86	0		0.91	-
Heavy	28	5	0		33	2	17	0		19	3	2	0		5	-
Heavy %	14%	4.9%	0%		10.9%	2.4%	60.7%	0%		17.1%	2.2%	0.7%	0%		1.2%	-
Lights	172	97	0		269	81	11	0		92	134	272	0		406	-
Lights %	86%	95.1%	0%		89.1%	97.6%	39.3%	0%		82.9%	97.8%	99.3%	0%		98.8%	-
Single-Unit Trucks	10	4	0		14	2	4	0		6	3	2	0		5	-
Single-Unit Trucks %	5%	3.9%	0%		4.6%	2.4%	14.3%	0%		5.4%	2.2%	0.7%	0%		1.2%	-
Buses	0	1	0		1	0	2	0		2	0	0	0		0	-
Buses %	0%	1%	0%		0.3%	0%	7.1%	0%		1.8%	0%	0%	0%		0%	-
Articulated Trucks	18	0	0		18	0	11	0		11	0	0	0		0	-
Articulated Trucks %	9%	0%	0%		6%	0%	39.3%	0%		9.9%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-

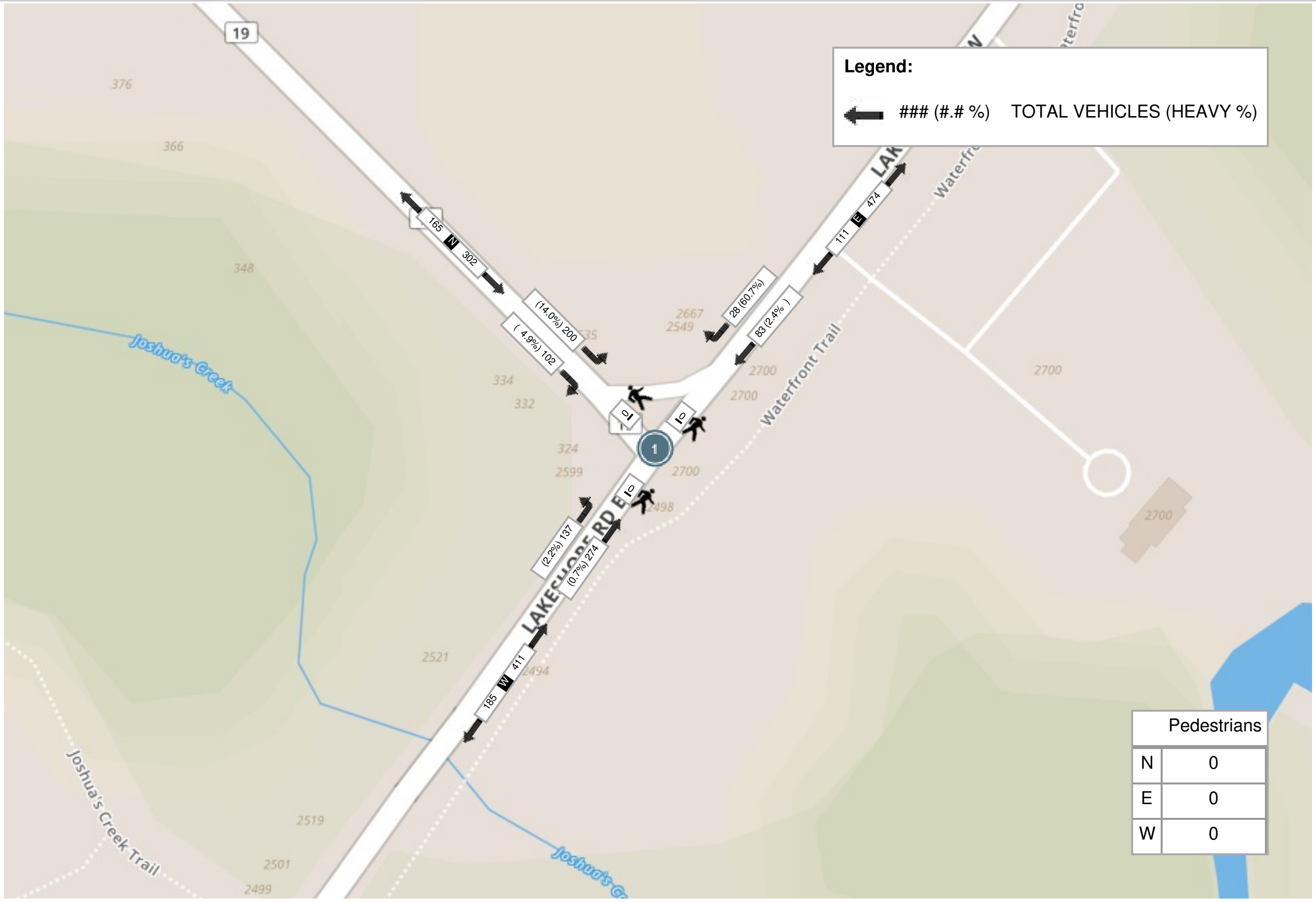
Peak Hour: 12:00 PM - 01:00 PM   Weather: Light Snow Showers (-3 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD					Westbound LAKESHORE RD E					Eastbound LAKESHORE RD W					Int. Total (15 min)
	Left	Right	U-Turn	Peds	Approach Total	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	U-Turn	Peds	Approach Total	
12:00:00	17	19	0	0	36	30	28	0	0	58	15	26	0	0	41	135
12:15:00	18	12	0	1	30	22	20	0	0	42	18	24	0	0	42	114
12:30:00	23	11	0	1	34	34	19	0	0	53	16	22	0	0	38	125
12:45:00	25	25	0	0	50	24	21	0	0	45	10	25	0	0	35	130
Grand Total	83	67	0	2	150	110	88	0	0	198	59	97	0	0	156	**504**
Approach%	55.3%	44.7%	0%		-	55.6%	44.4%	0%		-	37.8%	62.2%	0%		-	-
Totals %	16.5%	13.3%	0%		29.8%	21.8%	17.5%	0%		39.3%	11.7%	19.2%	0%		31%	-
PHF	0.83	0.67	0		0.75	0.81	0.79	0		0.85	0.82	0.93	0		0.93	-
Heavy	31	1	0		32	1	22	0		23	2	3	0		5	-
Heavy %	37.3%	1.5%	0%		21.3%	0.9%	25%	0%		11.6%	3.4%	3.1%	0%		3.2%	-
Lights	52	66	0		118	109	66	0		175	57	94	0		151	-
Lights %	62.7%	98.5%	0%		78.7%	99.1%	75%	0%		88.4%	96.6%	96.9%	0%		96.8%	-
Single-Unit Trucks	12	1	0		13	1	12	0		13	1	3	0		4	-
Single-Unit Trucks %	14.5%	1.5%	0%		8.7%	0.9%	13.6%	0%		6.6%	1.7%	3.1%	0%		2.6%	-
Buses	0	0	0		0	0	0	0		0	0	0	0		0	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Articulated Trucks	19	0	0		19	0	10	0		10	1	0	0		1	-
Articulated Trucks %	22.9%	0%	0%		12.7%	0%	11.4%	0%		5.1%	1.7%	0%	0%		0.6%	-
Pedestrians	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	100%		-	-	-	0%		-	-	-	0%		-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-

Peak Hour: 04:00 PM - 05:00 PM Weather: Snow (-3 °C)

Start Time	Southbound WINSTON CHURCHILL BLVD Left	Right	U-Turn	Peds	Approach Total	Westbound LAKESHORE RD E Thru	Right	U-Turn	Peds	Approach Total	Eastbound LAKESHORE RD W Left	Thru	U-Turn	Peds	Approach Total	Int. Total (15 min)
16:00:00	11	25	1	0	37	53	42	0	0	95	18	30	0	0	48	180
16:15:00	12	30	0	0	42	48	43	0	0	91	13	46	0	0	59	192
16:30:00	26	34	0	0	60	66	59	0	0	125	21	37	0	0	58	243
16:45:00	18	31	0	0	49	52	56	0	0	108	25	51	0	0	76	233
Grand Total	67	120	1	0	188	219	200	0	0	419	77	164	0	0	241	**848**
Approach%	35.6%	63.8%	0.5%		-	52.3%	47.7%	0%		-	32%	68%	0%		-	-
Totals %	7.9%	14.2%	0.1%		22.2%	25.8%	23.6%	0%		49.4%	9.1%	19.3%	0%		28.4%	-
PHF	0.64	0.88	0.25		0.78	0.83	0.85	0		0.84	0.77	0.8	0		0.79	-
Heavy	18	0	0		18	1	13	0		14	3	1	0		4	-
Heavy %	26.9%	0%	0%		9.6%	0.5%	6.5%	0%		3.3%	3.9%	0.6%	0%		1.7%	-
Lights	49	120	1		170	218	187	0		405	74	163	0		237	-
Lights %	73.1%	100%	100%		90.4%	99.5%	93.5%	0%		96.7%	96.1%	99.4%	0%		98.3%	-
Single-Unit Trucks	7	0	0		7	0	6	0		6	2	0	0		2	-
Single-Unit Trucks %	10.4%	0%	0%		3.7%	0%	3%	0%		1.4%	2.6%	0%	0%		0.8%	-
Buses	0	0	0		0	1	2	0		3	1	1	0		2	-
Buses %	0%	0%	0%		0%	0.5%	1%	0%		0.7%	1.3%	0.6%	0%		0.8%	-
Articulated Trucks	11	0	0		11	0	5	0		5	0	0	0		0	-
Articulated Trucks %	16.4%	0%	0%		5.9%	0%	2.5%	0%		1.2%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-
Bicycles on Road	0	0	0	0	-	1	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-

Peak Hour: 08:00 AM - 09:00 AM   Weather: Overcast (4 °C)

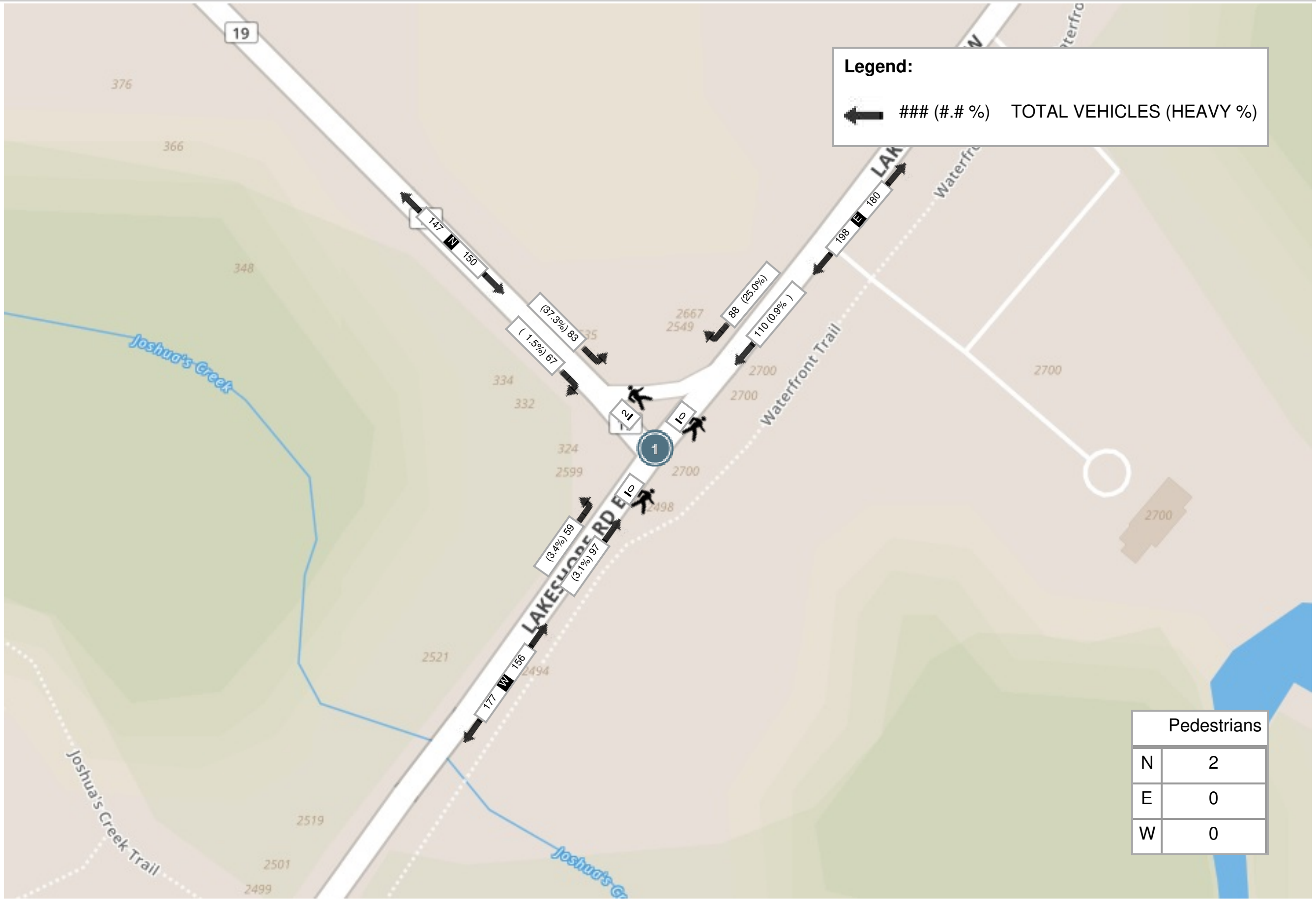


	Pedestrians
N	0
E	0
W	0

Spectrum

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & LAKESHORE RD
Date: Tue, Jan 31, 2017 Deployment Lead: Chris Koukaras

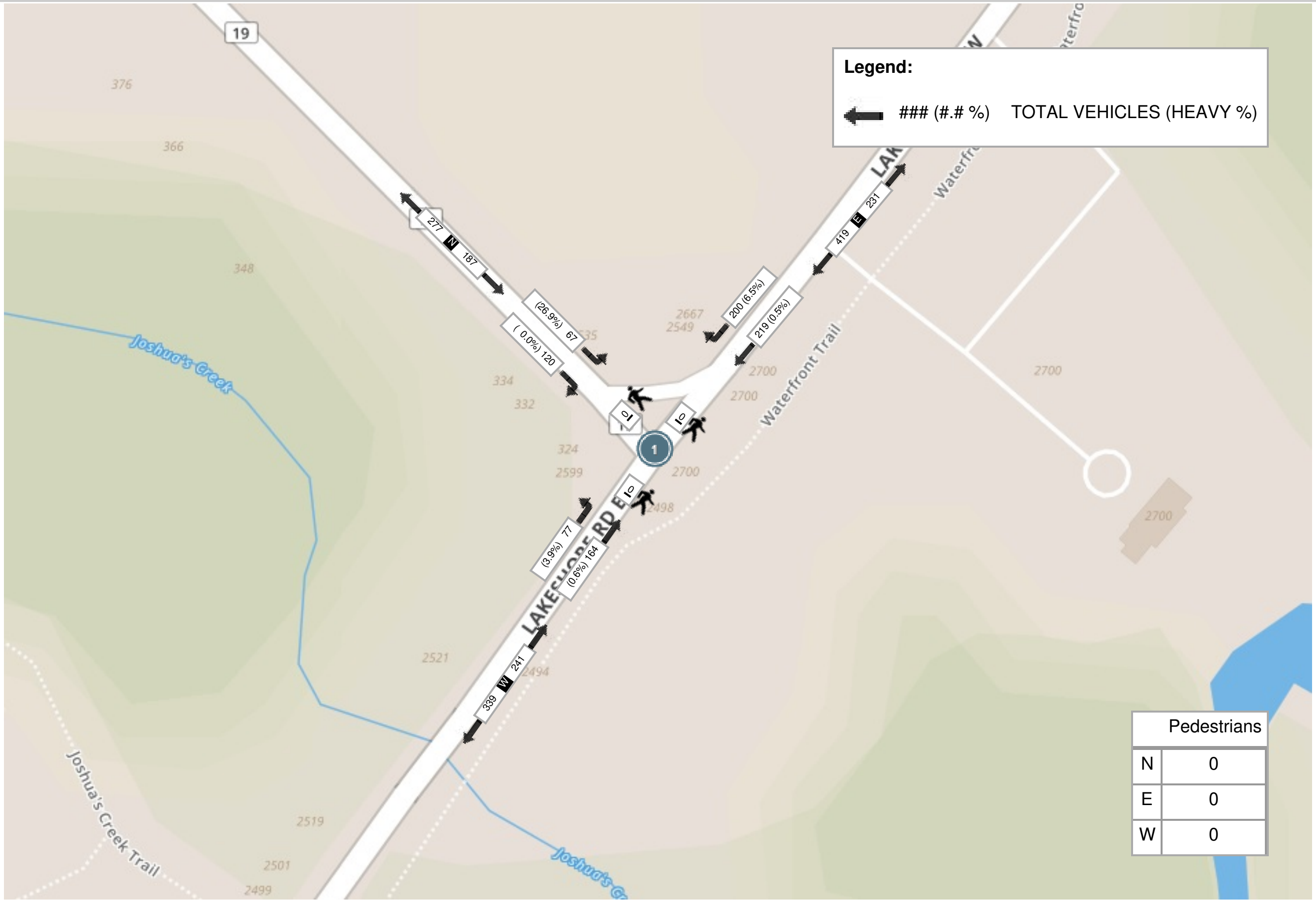
Peak Hour: 12:00 PM - 01:00 PM Weather: Light Snow Showers (-3 °C)



Spectrum

Turning Movement Count
Location Name: WINSTON CHURCHILL BLVD & LAKESHORE RD
Date: Tue, Jan 31, 2017   Deployment Lead: Chris Koukaras

Peak Hour: 04:00 PM - 05:00 PM   Weather: Snow (-3 °C)



Pedestrians	
N	0
E	0
W	0

Turning Movement Count (1 . ROYAL WINDSOR DR & WINSTON CHURCHILL BLVD) CustID: 01902061 MioID: 636402

Start Time	N Approach WINSTON CHURCHILL BLVD						E Approach ROYAL WINDSOR DR						S Approach WINSTON CHURCHILL BLVD						W Approach ROYAL WINDSOR DR						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total		
07:00:00	13	39	78	0	0	130	38	59	4	0	1	101	17	10	10	0	0	37	17	159	19	0	0	195	463	
07:15:00	29	33	100	0	0	162	25	86	6	0	0	117	22	21	4	0	0	47	11	234	25	0	0	270	596	
07:30:00	39	60	118	0	0	217	40	118	3	0	2	161	14	26	7	0	0	47	26	218	23	0	1	267	692	
07:45:00	48	59	164	0	0	271	48	115	4	0	0	167	25	35	9	0	0	69	25	258	30	0	2	313	820	2571
08:00:00	56	53	138	0	0	247	49	132	8	0	0	189	19	26	5	0	0	50	8	222	35	0	1	265	751	2859
08:15:00	58	64	184	0	0	306	56	120	6	0	0	182	33	45	7	0	0	85	25	229	31	0	0	285	858	3121
08:30:00	51	67	108	0	1	226	47	143	11	0	1	201	31	38	7	0	0	76	24	219	40	0	0	283	786	3215
08:45:00	47	66	122	0	0	235	47	128	12	0	2	187	18	34	8	0	0	60	29	189	28	0	0	246	728	3123
BREAK																										
16:00:00	39	50	59	0	0	148	90	188	16	0	1	294	17	56	23	0	1	96	11	122	32	0	1	165	703	
16:15:00	39	50	54	0	1	143	77	155	9	0	0	241	17	55	26	0	0	98	7	130	43	0	1	180	662	
16:30:00	31	47	49	1	2	128	127	156	18	0	0	301	26	87	34	0	0	147	13	159	37	0	0	209	785	
16:45:00	37	44	55	1	1	137	133	205	21	0	0	359	12	57	27	0	0	96	11	122	35	0	0	168	760	2910
17:00:00	36	50	79	0	1	165	138	186	15	0	2	339	20	78	41	0	0	139	12	136	46	0	1	194	837	3044
17:15:00	28	55	81	0	0	164	109	183	15	0	1	307	27	78	26	0	0	131	21	178	49	0	0	248	850	3232
17:30:00	31	44	75	0	0	150	204	230	23	0	1	457	19	59	27	0	0	105	9	143	40	0	1	192	904	3351
17:45:00	29	37	44	0	1	110	160	221	33	0	1	414	16	53	19	0	1	88	10	157	42	0	1	209	821	3412
18:00:00	33	48	47	0	0	128	136	176	21	0	0	333	13	32	31	0	0	76	16	118	33	1	0	168	705	3280
18:15:00	24	46	45	0	0	115	107	130	21	0	0	258	11	45	16	0	0	72	18	120	34	0	0	172	617	3047
18:30:00	27	34	40	0	0	101	118	185	28	0	1	331	11	22	9	0	0	42	20	103	30	0	0	153	627	2770
18:45:00	17	37	57	0	0	111	84	92	7	0	0	183	10	28	16	0	0	54	9	109	32	0	0	150	498	2447
Grand Total	712	983	1697	2	7	3394	1833	3008	281	0	13	5122	378	885	352	0	2	1615	322	3325	684	1	9	4332	**14463**	-
Approach%	21%	29%	50%	0.1%		-	35.8%	58.7%	5.5%	0%		-	23.4%	54.8%	21.8%	0%		-	7.4%	76.8%	15.8%	0%		-	-	-
Totals %	4.9%	6.8%	11.7%	0%		23.5%	12.7%	20.8%	1.9%	0%		35.4%	2.6%	6.1%	2.4%	0%		11.2%	2.2%	23%	4.7%	0%		30%	-	-
Heavy	12	21	10	0		-	16	75	2	0		-	3	9	29	0		-	28	103	9	0		-	-	-
Heavy %	1.7%	2.1%	0.6%	0%		-	0.9%	2.5%	0.7%	0%		-	0.8%	1%	8.2%	0%		-	8.7%	3.1%	1.3%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (-3.68 °C)

Start Time	N Approach WINSTON CHURCHILL BLVD						E Approach ROYAL WINDSOR DR						S Approach WINSTON CHURCHILL BLVD						W Approach ROYAL WINDSOR DR						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:45:00	48	59	164	0	0	271	48	115	4	0	0	167	25	35	9	0	0	69	25	258	30	0	2	313	820
08:00:00	56	53	138	0	0	247	49	132	8	0	0	189	19	26	5	0	0	50	8	222	35	0	1	265	751
08:15:00	58	64	184	0	0	306	56	120	6	0	0	182	33	45	7	0	0	85	25	229	31	0	0	285	858
08:30:00	51	67	108	0	1	226	47	143	11	0	1	201	31	38	7	0	0	76	24	219	40	0	0	283	786
Grand Total	213	243	594	0	1	1050	200	510	29	0	1	739	108	144	28	0	0	280	82	928	136	0	3	1146	**3215**
Approach%	20.3%	23.1%	56.6%	0%		-	27.1%	69%	3.9%	0%		-	38.6%	51.4%	10%	0%		-	7.2%	81%	11.9%	0%		-	-
Totals %	6.6%	7.6%	18.5%	0%		32.7%	6.2%	15.9%	0.9%	0%		23%	3.4%	4.5%	0.9%	0%		8.7%	2.6%	28.9%	4.2%	0%		35.6%	-
PHF	0.92	0.91	0.81	0		0.86	0.89	0.89	0.66	0		0.92	0.82	0.8	0.78	0		0.82	0.82	0.9	0.85	0		0.92	-
Heavy	3	5	1	0		9	4	20	0	0		24	1	2	7	0		10	3	9	6	0		18	-
Heavy %	1.4%	2.1%	0.2%	0%		0.9%	2%	3.9%	0%	0%		3.2%	0.9%	1.4%	25%	0%		3.6%	3.7%	1%	4.4%	0%		1.6%	-
Lights	207	227	574	0		1008	180	476	29	0		685	101	138	19	0		258	76	904	129	0		1109	-
Lights %	97.2%	93.4%	96.6%	0%		96%	90%	93.3%	100%	0%		92.7%	93.5%	95.8%	67.9%	0%		92.1%	92.7%	97.4%	94.9%	0%		96.8%	-
Mediums	3	11	19	0		33	16	14	0	0		30	6	4	2	0		12	3	15	1	0		19	-
Mediums %	1.4%	4.5%	3.2%	0%		3.1%	8%	2.7%	0%	0%		4.1%	5.6%	2.8%	7.1%	0%		4.3%	3.7%	1.6%	0.7%	0%		1.7%	-
Articulated Trucks	3	5	1	0		9	4	20	0	0		24	1	2	7	0		10	3	9	6	0		18	-
Articulated Trucks %	1.4%	2.1%	0.2%	0%		0.9%	2%	3.9%	0%	0%		3.2%	0.9%	1.4%	25%	0%		3.6%	3.7%	1%	4.4%	0%		1.6%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	20%		-	-	-	-	0%		-	-	-	-	40%		-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
Bicycles on Crosswalk%	-	-	-	-	20%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	20%		-

Spectrum

Turning Movement Count
Location Name: ROYAL WINDSOR DR & WINSTON CHURCHILL BLVD
Date: Wed, Mar 27, 2019   Deployment Lead: Patrick Filopoulos

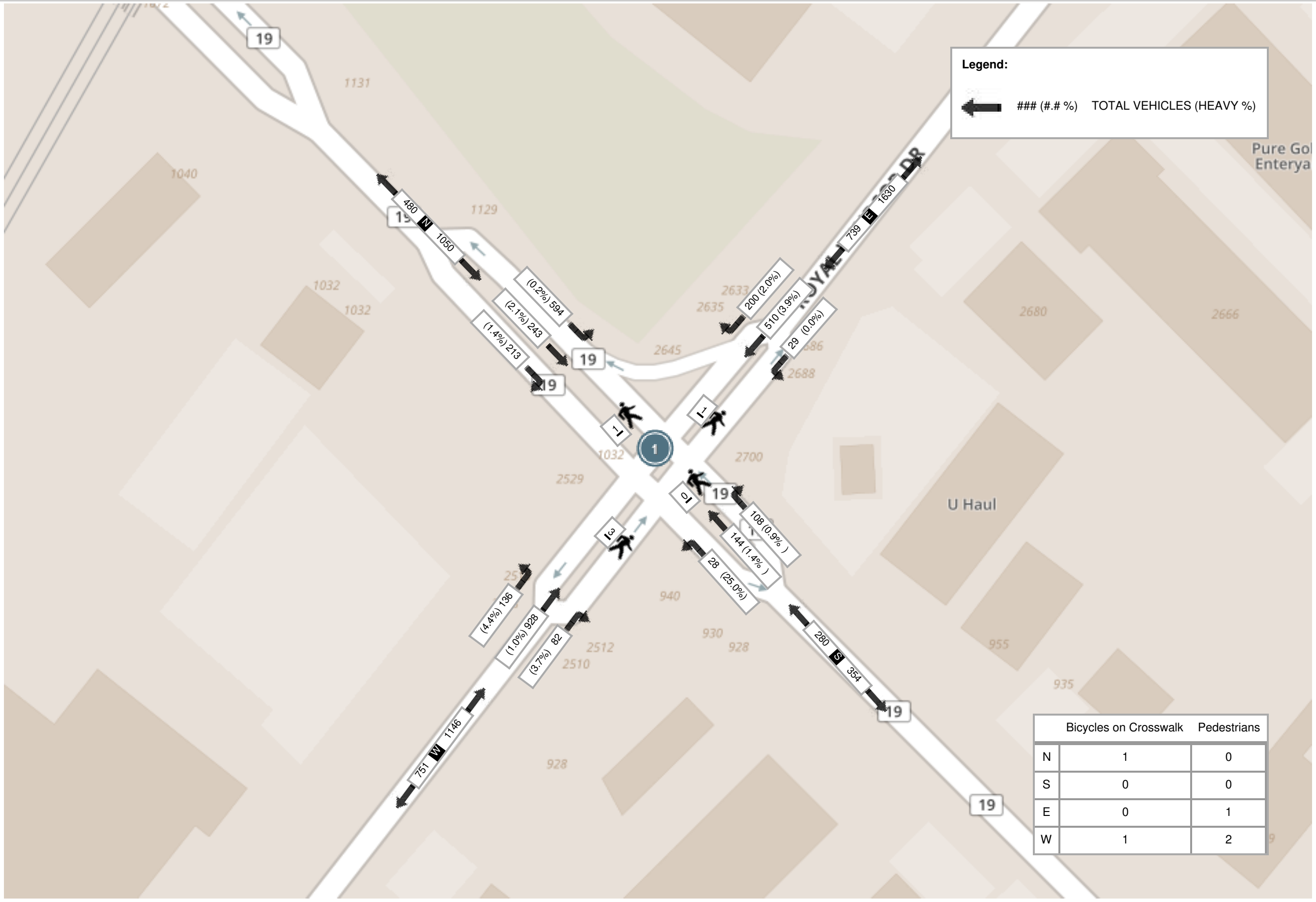
Peak Hour: 05:00 PM - 06:00 PM   Weather:

Start Time	N Approach WINSTON CHURCHILL BLVD						E Approach ROYAL WINDSOR DR						S Approach WINSTON CHURCHILL BLVD						W Approach ROYAL WINDSOR DR						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
17:00:00	36	50	79	0	1	165	138	186	15	0	2	339	20	78	41	0	0	139	12	136	46	0	1	194	837
17:15:00	28	55	81	0	0	164	109	183	15	0	1	307	27	78	26	0	0	131	21	178	49	0	0	248	850
17:30:00	31	44	75	0	0	150	204	230	23	0	1	457	19	59	27	0	0	105	9	143	40	0	1	192	904
17:45:00	29	37	44	0	1	110	160	221	33	0	1	414	16	53	19	0	1	88	10	157	42	0	1	209	821
Grand Total	124	186	279	0	2	589	611	820	86	0	5	1517	82	268	113	0	1	463	52	614	177	0	3	843	**3412**
Approach%	21.1%	31.6%	47.4%	0%		-	40.3%	54.1%	5.7%	0%		-	17.7%	57.9%	24.4%	0%		-	6.2%	72.8%	21%	0%		-	-
Totals %	3.6%	5.5%	8.2%	0%		17.3%	17.9%	24%	2.5%	0%		44.5%	2.4%	7.9%	3.3%	0%		13.6%	1.5%	18%	5.2%	0%		24.7%	-
PHF	0.86	0.85	0.86	0		0.89	0.75	0.89	0.65	0		0.83	0.76	0.86	0.69	0		0.83	0.62	0.86	0.9	0		0.85	-
Heavy	0	2	2	0		4	4	10	1	0		15	1	1	4	0		6	7	29	0	0		36	-
Heavy %	0%	1.1%	0.7%	0%		0.7%	0.7%	1.2%	1.2%	0%		1%	1.2%	0.4%	3.5%	0%		1.3%	13.5%	4.7%	0%	0%		4.3%	-
Lights	124	176	268	0		568	592	802	83	0		1477	78	263	105	0		446	38	578	175	0		791	-
Lights %	100%	94.6%	96.1%	0%		96.4%	96.9%	97.8%	96.5%	0%		97.4%	95.1%	98.1%	92.9%	0%		96.3%	73.1%	94.1%	98.9%	0%		93.8%	-
Mediums	0	8	9	0		17	15	8	2	0		25	3	4	4	0		11	7	7	2	0		16	-
Mediums %	0%	4.3%	3.2%	0%		2.9%	2.5%	1%	2.3%	0%		1.6%	3.7%	1.5%	3.5%	0%		2.4%	13.5%	1.1%	1.1%	0%		1.9%	-
Articulated Trucks	0	2	2	0		4	4	10	1	0		15	1	1	4	0		6	7	29	0	0		36	-
Articulated Trucks %	0%	1.1%	0.7%	0%		0.7%	0.7%	1.2%	1.2%	0%		1%	1.2%	0.4%	3.5%	0%		1.3%	13.5%	4.7%	0%	0%		4.3%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	3	-	-
Pedestrians%	-	-	-	-	9.1%		-	-	-	-	36.4%		-	-	-	-	9.1%		-	-	-	-	27.3%		-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	9.1%		-	-	-	-	9.1%		-	-	-	-	0%		-	-	-	-	0%		-

Spectrum

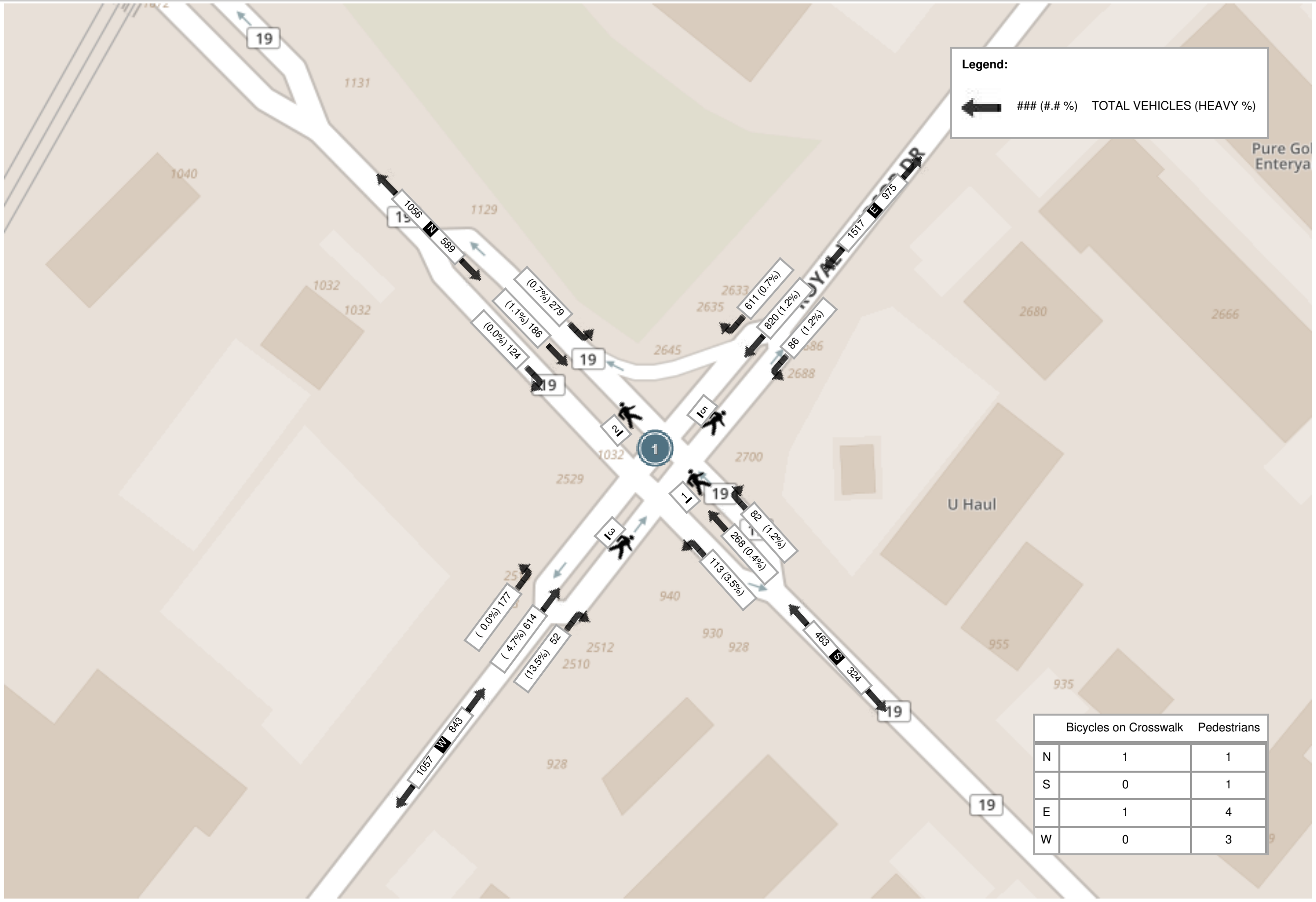
Turning Movement Count
Location Name: ROYAL WINDSOR DR & WINSTON CHURCHILL BLVD
Date: Wed, Mar 27, 2019 Deployment Lead: Patrick Filopoulos

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (-3.68 °C)



	Bicycles on Crosswalk	Pedestrians
N	1	0
S	0	0
E	0	1
W	1	2

Peak Hour: 05:00 PM - 06:00 PM Weather:



	Bicycles on Crosswalk	Pedestrians
N	1	1
S	0	1
E	1	4
W	0	3

Appendix D

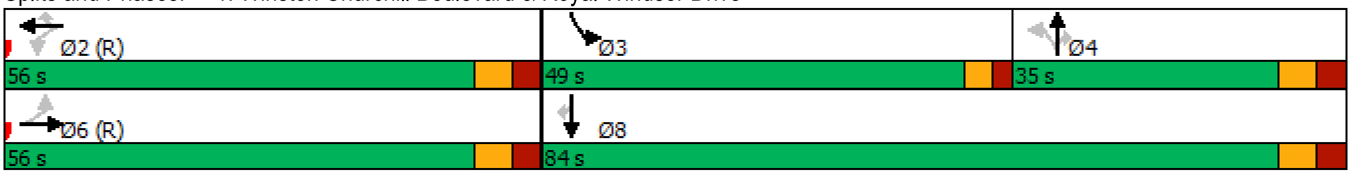
2020 Existing Conditions Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	126	995	35	549	161	24	150	101	421	327	192
Future Volume (vph)	126	995	35	549	161	24	150	101	421	327	192
Lane Group Flow (vph)	126	1077	35	549	161	24	150	101	421	327	192
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	6	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	56.0	56.0	56.0	56.0	56.0	35.0	35.0	35.0	49.0	84.0	84.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	25.0%	25.0%	25.0%	35.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag						Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
v/c Ratio	0.56	0.90	0.67	0.46	0.27	0.09	0.12	0.17	0.76	0.18	0.21
Control Delay	48.2	53.7	96.9	36.8	5.6	33.8	32.3	6.8	64.9	16.1	5.5
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	48.2	53.7	96.9	36.8	5.6	33.8	32.3	6.8	64.9	16.1	5.5
LOS	D	D	F	D	A	C	C	A	E	B	A
Approach Delay		53.1		32.9			23.0			35.8	
Approach LOS		D		C			C			D	
Queue Length 50th (m)	28.1	147.5	8.2	61.8	0.0	4.5	14.8	0.0	58.0	23.0	6.9
Queue Length 95th (m)	51.3	#180.8	#28.7	78.7	15.0	12.1	24.4	13.2	72.7	31.3	18.6
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	225	1201	52	1193	607	280	1206	604	1080	1851	911
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	0.56	0.90	0.67	0.46	0.27	0.09	0.12	0.17	0.39	0.18	0.21

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 108 (77%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 40.6	Intersection LOS: D
Intersection Capacity Utilization 101.6%	ICU Level of Service G
Analysis Period (min) 15	

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

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	995	82	35	549	161	24	150	101	421	327	192
Future Volume (vph)	126	995	82	35	549	161	24	150	101	421	327	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1737	3418		1722	3411	1437	1371	3444	1537	3437	3380	1550
Flt Permitted	0.35	1.00		0.08	1.00	1.00	0.55	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	644	3418		148	3411	1437	800	3444	1537	3437	3380	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	995	82	35	549	161	24	150	101	421	327	192
RTOR Reduction (vph)	0	5	0	0	0	105	0	0	66	0	0	62
Lane Group Flow (vph)	126	1072	0	35	549	56	24	150	35	421	327	130
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1
Heavy Vehicles (%)	5%	5%	11%	6%	7%	9%	33%	6%	4%	3%	8%	4%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Effective Green, g (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	225	1196		51	1193	502	280	1205	537	557	1851	849
v/s Ratio Prot		c0.31			0.16			0.04		c0.12	c0.10	
v/s Ratio Perm	0.20			0.24		0.04	0.03		0.02			0.08
v/c Ratio	0.56	0.90		0.69	0.46	0.11	0.09	0.12	0.07	0.76	0.18	0.15
Uniform Delay, d1	36.8	43.1		38.9	35.3	30.8	30.5	30.9	30.3	56.0	15.8	15.6
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	9.7	10.6		55.4	1.3	0.5	0.6	0.2	0.2	5.8	0.2	0.4
Delay (s)	46.5	53.7		94.4	36.5	31.2	31.1	31.1	30.5	61.8	16.1	16.0
Level of Service	D	D		F	D	C	C	C	C	E	B	B
Approach Delay (s)		53.0			38.1			30.9			36.5	
Approach LOS		D			D			C			D	

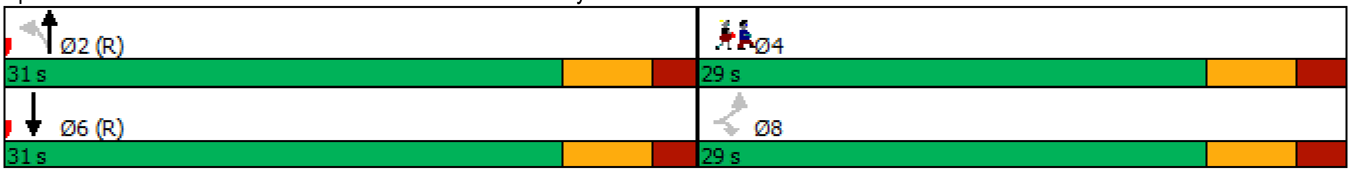
Intersection Summary			
HCM 2000 Control Delay	42.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	74	61	12	201	372	
Future Volume (vph)	74	61	12	201	372	
Lane Group Flow (vph)	74	61	12	201	444	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	8.8	8.8	42.9	42.9	42.9	
Actuated g/C Ratio	0.15	0.15	0.72	0.72	0.72	
v/c Ratio	0.30	0.24	0.02	0.16	0.35	
Control Delay	25.7	9.5	4.5	4.7	5.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.7	9.5	4.5	4.7	5.6	
LOS	C	A	A	A	A	
Approach Delay	18.4			4.7	5.6	
Approach LOS	B			A	A	
Queue Length 50th (m)	7.5	0.0	0.4	6.9	17.1	
Queue Length 95th (m)	16.7	8.1	2.0	15.7	35.6	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	645	570	485	1248	1252	
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	0.11	0.11	0.02	0.16	0.35	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 5 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 7.5 Intersection LOS: A
Intersection Capacity Utilization 41.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	74	61	12	201	372	72
Future Volume (vph)	74	61	12	201	372	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1706	1408	1285	1748	1746	
Flt Permitted	0.95	1.00	0.50	1.00	1.00	
Satd. Flow (perm)	1706	1408	679	1748	1746	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	74	61	12	201	372	72
RTOR Reduction (vph)	0	54	0	0	7	0
Lane Group Flow (vph)	74	7	12	201	437	0
Heavy Vehicles (%)	7%	16%	42%	9%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	7.2	7.2	40.4	40.4	40.4	
Effective Green, g (s)	7.2	7.2	40.4	40.4	40.4	
Actuated g/C Ratio	0.12	0.12	0.67	0.67	0.67	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	204	168	457	1176	1175	
v/s Ratio Prot				0.11	c0.25	
v/s Ratio Perm	c0.04	0.01	0.02			
v/c Ratio	0.36	0.04	0.03	0.17	0.37	
Uniform Delay, d1	24.3	23.4	3.3	3.6	4.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.1	0.1	0.3	0.9	
Delay (s)	25.4	23.5	3.4	3.9	5.2	
Level of Service	C	C	A	A	A	
Approach Delay (s)	24.5			3.9	5.2	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	41.0%	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)	177	396	97	36	287	146
Future Volume (vph)	177	396	97	36	287	146
Lane Group Flow (vph)	177	396	97	36	287	146
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	25.0	25.0	25.0	25.0	23.2	23.2
Total Split (s)	59.0	59.0	59.0	59.0	31.0	31.0
Total Split (%)	65.6%	65.6%	65.6%	65.6%	34.4%	34.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	Max	Max	Min	Min
Act Effct Green (s)	57.4	57.4	57.4	57.4	20.4	20.4
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.23	0.23
v/c Ratio	0.21	0.33	0.08	0.05	0.79	0.31
Control Delay	8.5	9.1	7.4	3.0	48.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	9.1	7.4	3.0	48.4	6.5
LOS	A	A	A	A	D	A
Approach Delay		8.9	6.2		34.3	
Approach LOS		A	A		C	
Queue Length 50th (m)	11.9	29.0	5.9	0.0	46.4	0.0
Queue Length 95th (m)	23.8	49.7	12.9	3.6	70.5	13.2
Internal Link Dist (m)		154.6	591.9		764.6	
Turn Bay Length (m)	75.0			90.0	125.0	
Base Capacity (vph)	833	1212	1200	659	441	534
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	0.33	0.08	0.05	0.65	0.27

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 41 (46%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 18.2 Intersection LOS: B

Intersection Capacity Utilization 46.9% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Road East/Lakeshore Road West & Winston Churchill Boulevard

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	177	396	97	36	287	146
Future Volume (vph)	177	396	97	36	287	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lane Util. Factor	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)	1789	1902	1883	1014	1601	1555
Flt Permitted	0.69	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1308	1902	1883	1014	1601	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	177	396	97	36	287	146
RTOR Reduction (vph)	0	0	0	13	0	113
Lane Group Flow (vph)	177	396	97	23	287	33
Heavy Vehicles (%)	2%	1%	2%	61%	14%	5%
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	57.4	57.4	57.4	57.4	20.4	20.4
Effective Green, g (s)	57.4	57.4	57.4	57.4	20.4	20.4
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.23	0.23
Clearance Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	834	1213	1200	646	362	352
v/s Ratio Prot		c0.21	0.05			
v/s Ratio Perm	0.14			0.02	c0.18	0.02
v/c Ratio	0.21	0.33	0.08	0.04	0.79	0.09
Uniform Delay, d1	6.8	7.5	6.2	6.0	32.8	27.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.7	0.1	0.1	11.3	0.1
Delay (s)	7.4	8.2	6.4	6.1	44.1	27.6
Level of Service	A	A	A	A	D	C
Approach Delay (s)		7.9	6.3		38.5	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	158	702	74	826	546	106	268	55	213	223	130
Future Volume (vph)	158	702	74	826	546	106	268	55	213	223	130
Lane Group Flow (vph)	158	739	74	826	546	106	268	55	213	223	130
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	1	6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	1	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	44.3	44.3	44.3	44.3	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	14.0	70.0	56.0	56.0	56.0	39.0	39.0	39.0	31.0	70.0	70.0
Total Split (%)	10.0%	50.0%	40.0%	40.0%	40.0%	27.9%	27.9%	27.9%	22.1%	50.0%	50.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	67.0	63.0	49.5	49.5	49.5	43.7	43.7	43.7	14.0	62.7	62.7
Actuated g/C Ratio	0.48	0.45	0.35	0.35	0.35	0.31	0.31	0.31	0.10	0.45	0.45
v/c Ratio	0.58	0.48	0.31	0.66	0.60	0.31	0.24	0.10	0.62	0.14	0.17
Control Delay	29.8	28.1	37.7	41.4	5.7	40.7	37.1	1.5	68.2	23.1	4.0
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	29.8	28.1	37.7	41.4	5.7	40.7	37.1	1.5	68.2	23.1	4.0
LOS	C	C	D	D	A	D	D	A	E	C	A
Approach Delay		28.4		27.7			33.4			35.7	
Approach LOS		C		C			C			D	
Queue Length 50th (m)	24.5	73.8	14.9	101.7	0.0	22.4	29.0	0.0	29.6	18.8	0.0
Queue Length 95th (m)	38.6	91.3	29.2	124.2	26.0	40.8	42.4	2.2	41.8	27.1	11.5
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	278	1543	238	1252	903	345	1128	543	638	1602	786
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	0.57	0.48	0.31	0.66	0.60	0.31	0.24	0.10	0.33	0.14	0.17

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 104 (74%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

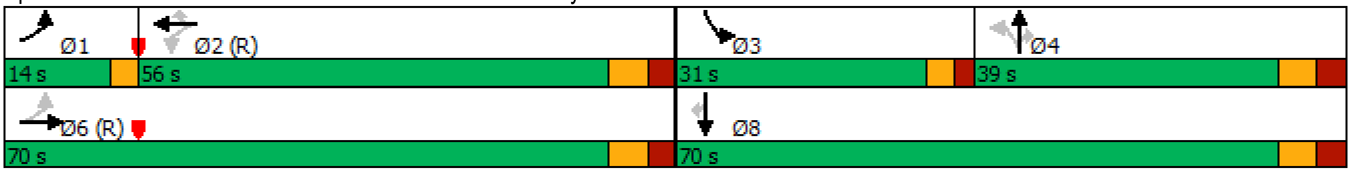
Maximum v/c Ratio: 0.66

Intersection Signal Delay: 30.0 Intersection LOS: C

Intersection Capacity Utilization 91.3% ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive



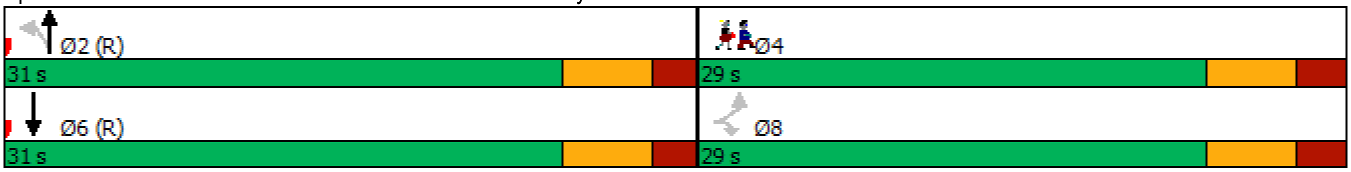
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	702	37	74	826	546	106	268	55	213	223	130
Future Volume (vph)	158	702	37	74	826	546	106	268	55	213	223	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	3425		1754	3544	1556	1720	3614	1535	3437	3579	1596
Flt Permitted	0.18	1.00		0.37	1.00	1.00	0.61	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	342	3425		675	3544	1556	1109	3614	1535	3437	3579	1596
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	158	702	37	74	826	546	106	268	55	213	223	130
RTOR Reduction (vph)	0	3	0	0	0	353	0	0	38	0	0	72
Lane Group Flow (vph)	158	736	0	74	826	193	106	268	17	213	223	58
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	1%	4%	38%	4%	3%	2%	6%	1%	4%	3%	2%	1%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	1	6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	63.0	63.0		49.5	49.5	49.5	43.7	43.7	43.7	14.0	62.7	62.7
Effective Green, g (s)	63.0	63.0		49.5	49.5	49.5	43.7	43.7	43.7	14.0	62.7	62.7
Actuated g/C Ratio	0.45	0.45		0.35	0.35	0.35	0.31	0.31	0.31	0.10	0.45	0.45
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	263	1541		238	1253	550	346	1128	479	343	1602	714
v/s Ratio Prot	c0.04	0.21			c0.23			0.07		c0.06	0.06	
v/s Ratio Perm	0.22			0.11		0.12	c0.10		0.01			0.04
v/c Ratio	0.60	0.48		0.31	0.66	0.35	0.31	0.24	0.04	0.62	0.14	0.08
Uniform Delay, d1	26.1	27.0		32.9	38.1	33.4	36.6	35.8	33.5	60.5	22.8	22.1
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	3.8	1.1		3.4	2.7	1.8	2.3	0.5	0.1	3.5	0.2	0.2
Delay (s)	29.9	28.0		36.2	40.9	35.2	38.9	36.3	33.6	63.9	22.9	22.4
Level of Service	C	C		D	D	D	D	D	C	E	C	C
Approach Delay (s)		28.4			38.5			36.6			38.2	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.3
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	89	18	30	340	234	
Future Volume (vph)	89	18	30	340	234	
Lane Group Flow (vph)	89	18	30	340	334	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	9.2	9.2	42.5	42.5	42.5	
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.71	
v/c Ratio	0.34	0.08	0.05	0.26	0.28	
Control Delay	26.0	11.2	4.8	5.4	4.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.0	11.2	4.8	5.4	4.9	
LOS	C	B	A	A	A	
Approach Delay	23.5			5.3	4.9	
Approach LOS	C			A	A	
Queue Length 50th (m)	9.1	0.0	1.0	13.1	11.0	
Queue Length 95th (m)	18.9	4.4	3.8	27.7	24.6	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	651	539	618	1298	1213	
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	0.14	0.03	0.05	0.26	0.28	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 35 (58%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 41.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	89	18	30	340	234	100
Future Volume (vph)	89	18	30	340	234	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1722	1396	1484	1832	1693	
Flt Permitted	0.95	1.00	0.56	1.00	1.00	
Satd. Flow (perm)	1722	1396	874	1832	1693	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	18	30	340	234	100
RTOR Reduction (vph)	0	16	0	0	15	0
Lane Group Flow (vph)	89	2	30	340	319	0
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	17%	23%	4%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	7.6	7.6	40.0	40.0	40.0	
Effective Green, g (s)	7.6	7.6	40.0	40.0	40.0	
Actuated g/C Ratio	0.13	0.13	0.67	0.67	0.67	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	218	176	582	1221	1128	
v/s Ratio Prot				0.19	c0.19	
v/s Ratio Perm	c0.05	0.00	0.03			
v/c Ratio	0.41	0.01	0.05	0.28	0.28	
Uniform Delay, d1	24.1	22.9	3.5	4.1	4.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.0	0.2	0.6	0.6	
Delay (s)	25.4	22.9	3.6	4.7	4.7	
Level of Service	C	C	A	A	A	
Approach Delay (s)	25.0			4.6	4.7	
Approach LOS	C			A	A	

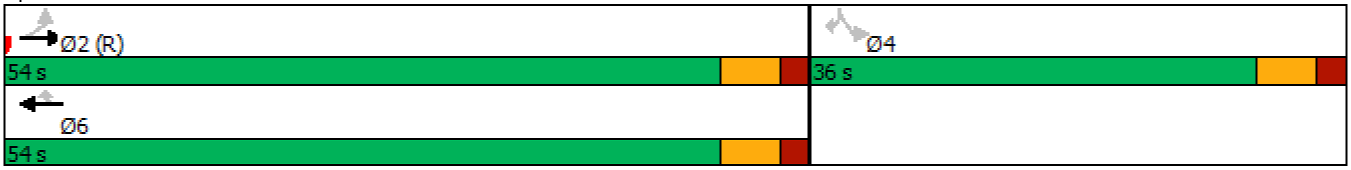
Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	103	231	233	267	91	161
Future Volume (vph)	103	231	233	267	91	161
Lane Group Flow (vph)	103	231	233	267	91	161
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	25.0	25.0	25.0	25.0	23.2	23.2
Total Split (s)	54.0	54.0	54.0	54.0	36.0	36.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	Max	Max	Min	Min
Act Effct Green (s)	66.4	66.4	66.4	66.4	11.4	11.4
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.13	0.13
v/c Ratio	0.12	0.16	0.16	0.23	0.50	0.47
Control Delay	4.3	4.2	4.2	1.1	45.4	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	4.2	4.2	1.1	45.4	10.4
LOS	A	A	A	A	D	B
Approach Delay		4.3	2.5		23.1	
Approach LOS		A	A		C	
Queue Length 50th (m)	4.1	9.6	9.7	0.0	15.0	0.0
Queue Length 95th (m)	10.5	20.0	20.2	6.4	27.9	15.8
Internal Link Dist (m)		154.6	591.9		764.6	
Turn Bay Length (m)	75.0			90.0	125.0	
Base Capacity (vph)	835	1404	1418	1173	479	648
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	0.16	0.16	0.23	0.19	0.25

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 89 (99%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 7.8 Intersection LOS: A
Intersection Capacity Utilization 40.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Lakeshore Road East/Lakeshore Road West & Winston Churchill Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	103	231	233	267	91	161
Future Volume (vph)	103	231	233	267	91	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.2	6.2
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	1.00
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)	1755	1902	1921	1495	1448	1633
Flt Permitted	0.61	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1133	1902	1921	1495	1448	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	103	231	233	267	91	161
RTOR Reduction (vph)	0	0	0	70	0	141
Lane Group Flow (vph)	103	231	233	197	91	20
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	4%	1%	0%	7%	26%	0%
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	66.4	66.4	66.4	66.4	11.4	11.4
Effective Green, g (s)	66.4	66.4	66.4	66.4	11.4	11.4
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.13	0.13
Clearance Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	835	1403	1417	1102	183	206
v/s Ratio Prot		0.12	0.12			
v/s Ratio Perm	0.09			c0.13	c0.06	0.01
v/c Ratio	0.12	0.16	0.16	0.18	0.50	0.10
Uniform Delay, d1	3.4	3.5	3.5	3.6	36.6	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	0.2	0.4	2.1	0.2
Delay (s)	3.7	3.8	3.8	3.9	38.7	35.0
Level of Service	A	A	A	A	D	C
Approach Delay (s)		3.8	3.9		36.3	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix E

ITE Trip Generation Manual Source Data

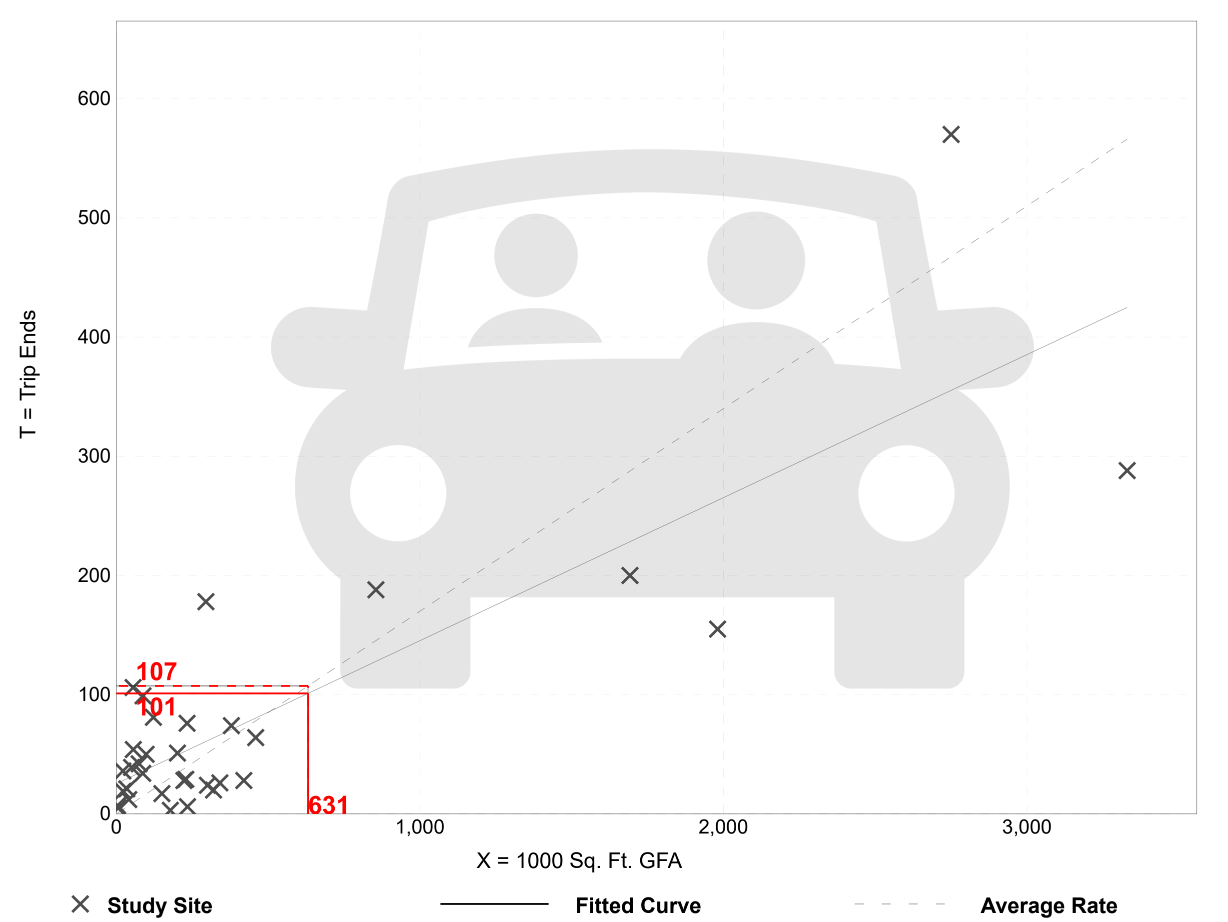
Warehousing
(150)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	34
Avg. 1000 Sq. Ft. GFA:	451
Directional Distribution:	77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.20

Data Plot and Equation



Fitted Curve Equation: T = 0.12(X) + 25.32 **R^2= 0.69**

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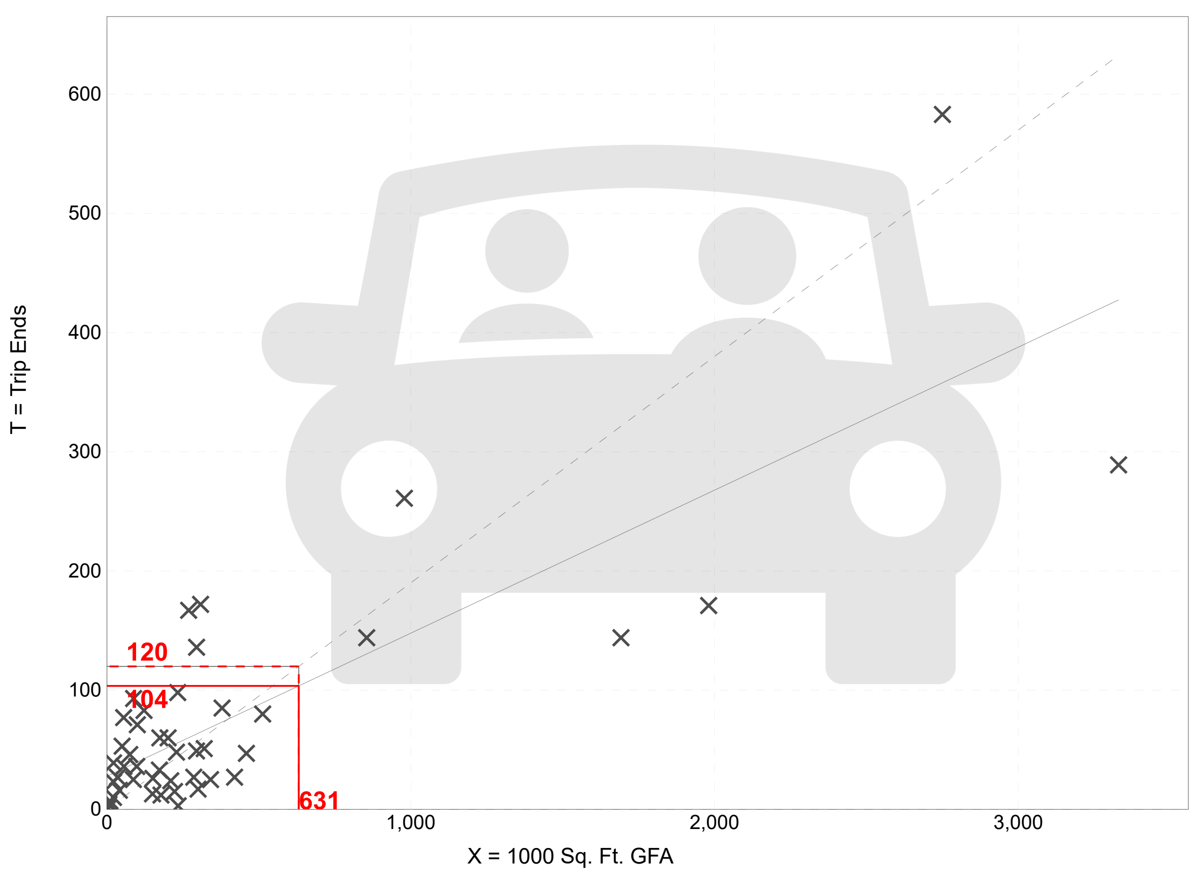
Warehousing
(150)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	47
Avg. 1000 Sq. Ft. GFA:	400
Directional Distribution:	27% entering, 73% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.19	0.01 - 1.80	0.18

Data Plot and Equation



× **Study Site** — **Fitted Curve** - - - **Average Rate**

Fitted Curve Equation: T = 0.12(X) + 27.82 **R^2= 0.65**

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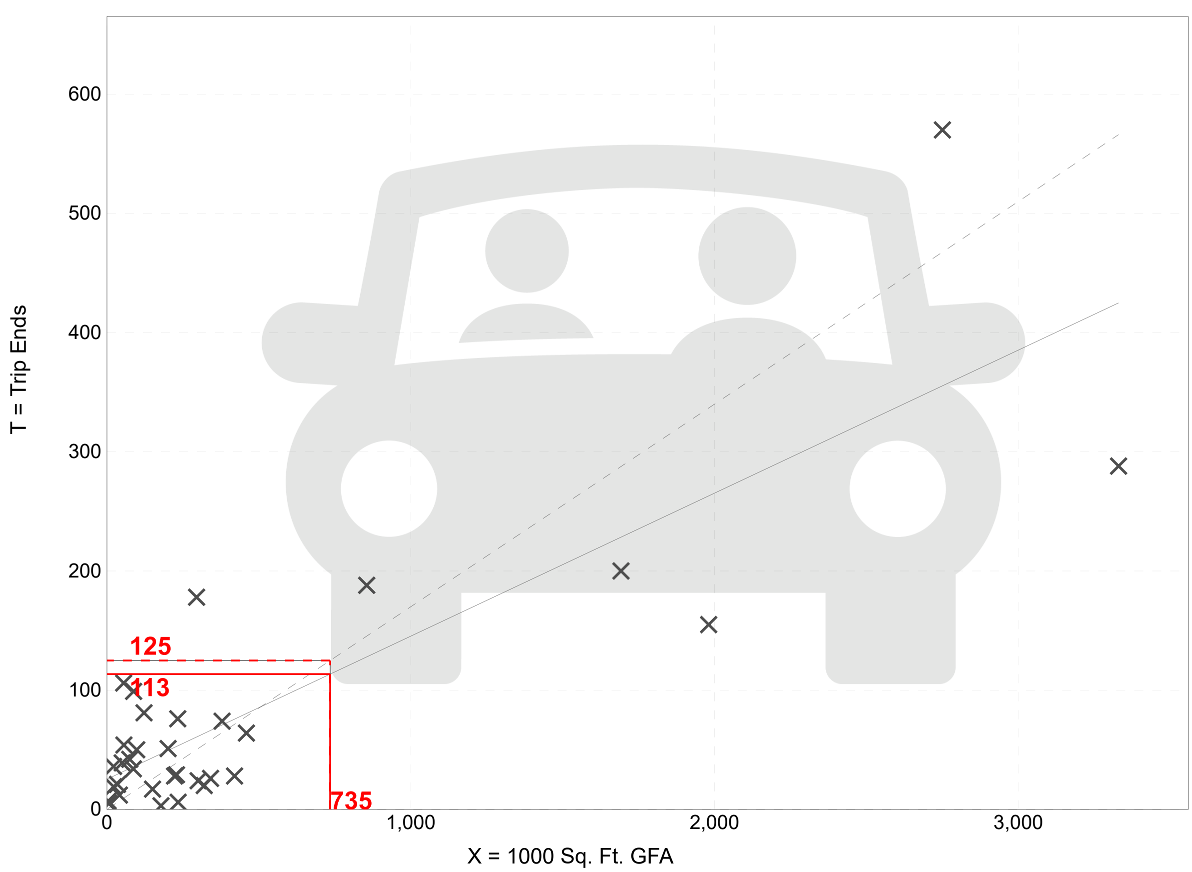
Warehousing
(150)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	34
Avg. 1000 Sq. Ft. GFA:	451
Directional Distribution:	77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.20

Data Plot and Equation



× **Study Site** — **Fitted Curve** - - - **Average Rate**

Fitted Curve Equation: T = 0.12(X) + 25.32 **R^2= 0.69**

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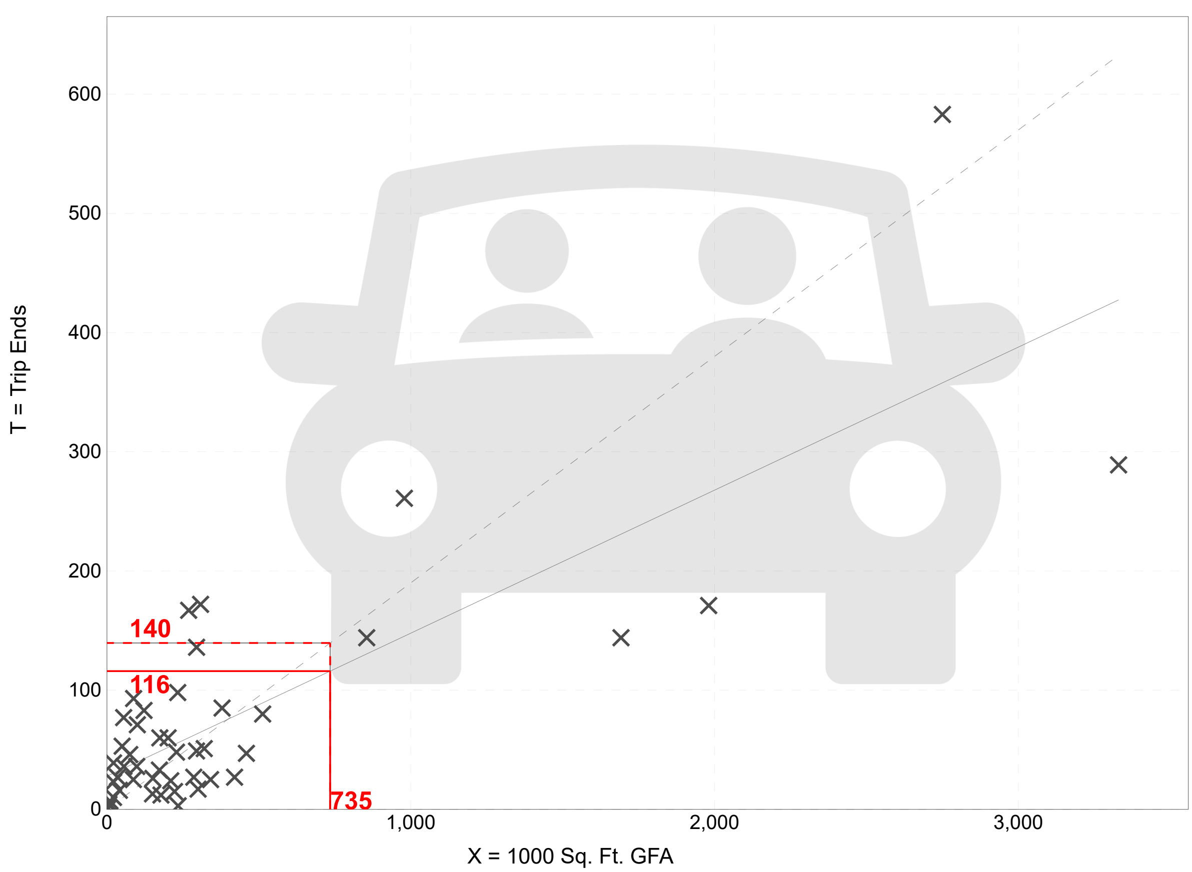
Warehousing
(150)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	47
Avg. 1000 Sq. Ft. GFA:	400
Directional Distribution:	27% entering, 73% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.19	0.01 - 1.80	0.18

Data Plot and Equation



Fitted Curve Equation: T = 0.12(X) + 27.82 **R^2= 0.65**

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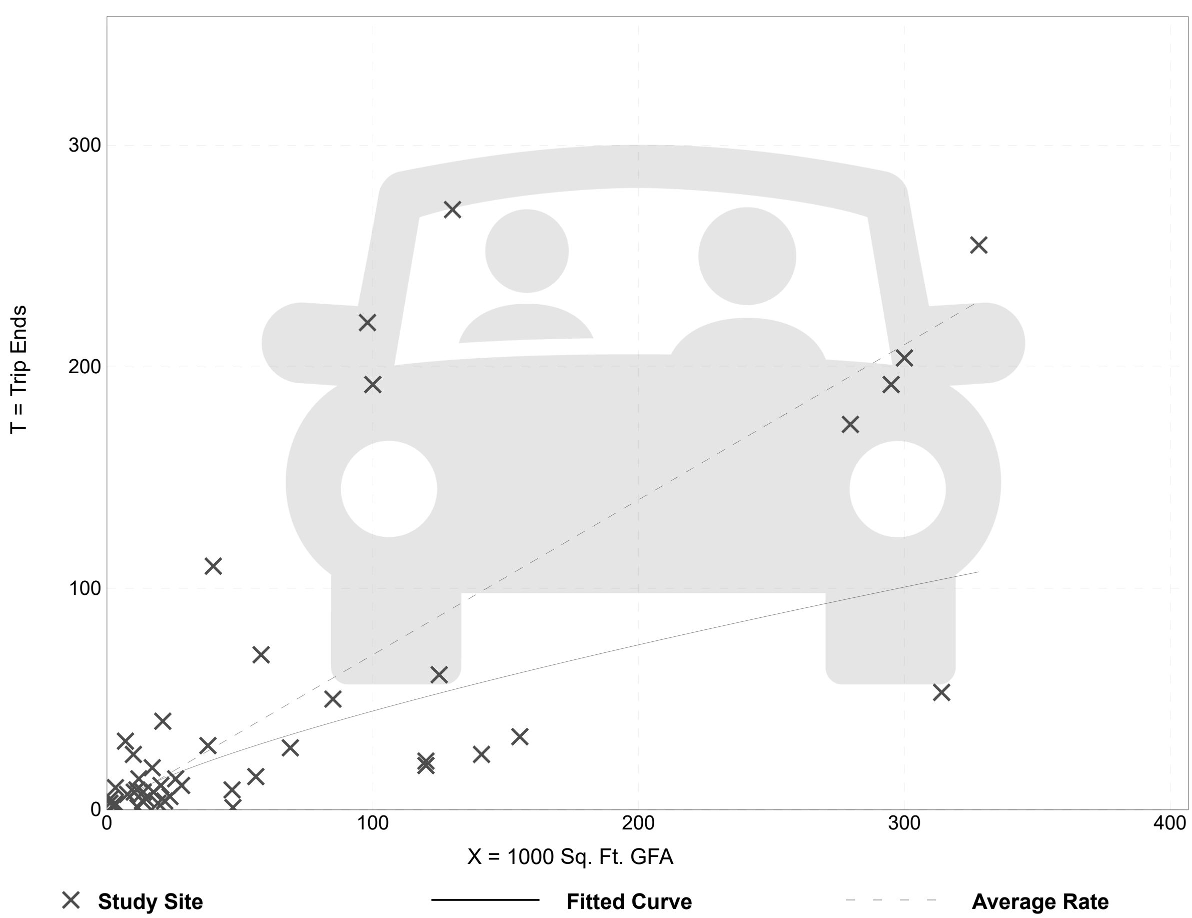
General Light Industrial
(110)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	45
Avg. 1000 Sq. Ft. GFA:	73
Directional Distribution:	88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.70	0.02 - 4.46	0.65

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.74 Ln(X) + 0.39 **R^2= 0.52**

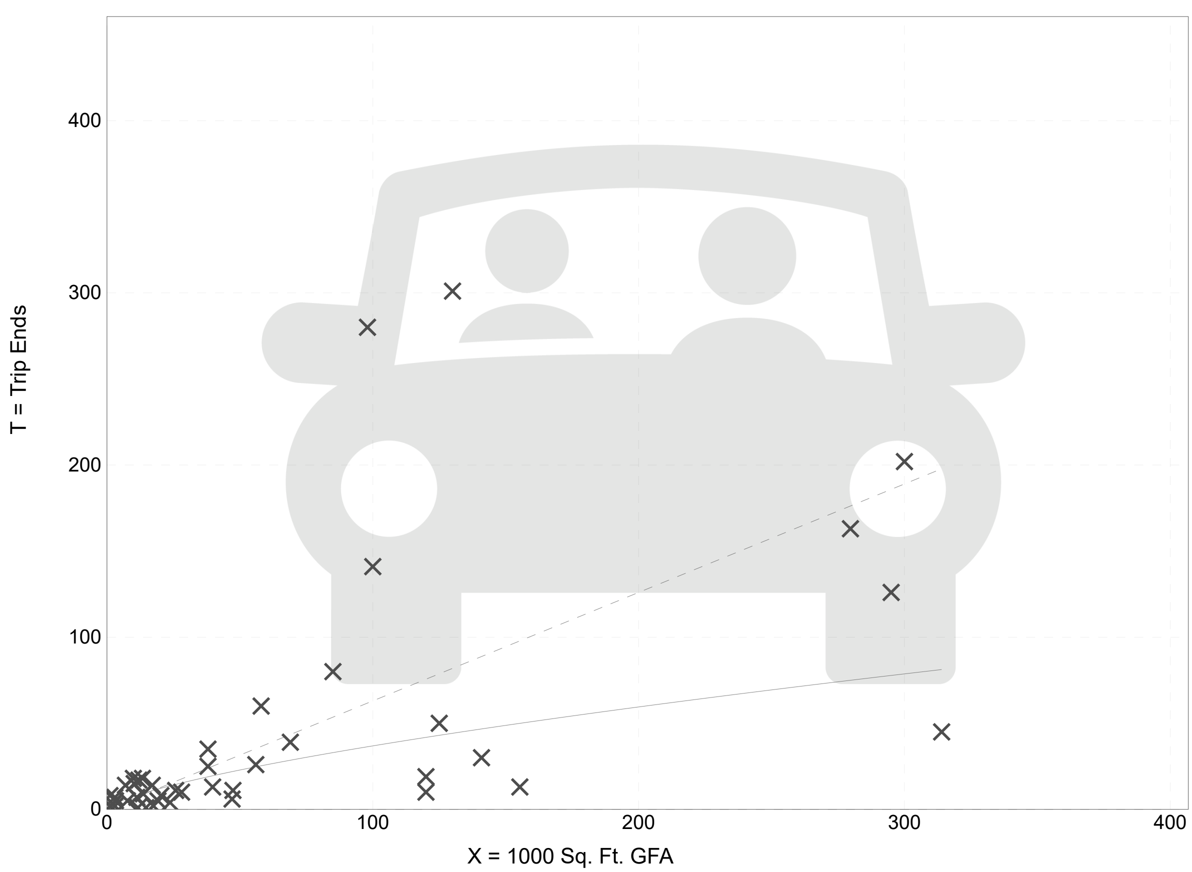
General Light Industrial
(110)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	44
Avg. 1000 Sq. Ft. GFA:	67
Directional Distribution:	13% entering, 87% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.63	0.07 - 7.02	0.68

Data Plot and Equation



× **Study Site** —— **Fitted Curve** - - - **Average Rate**

Fitted Curve Equation: Ln(T) = 0.69 Ln(X) + 0.43 **R^2= 0.52**

Appendix F

2028 Future Background Conditions
Synchro Reports

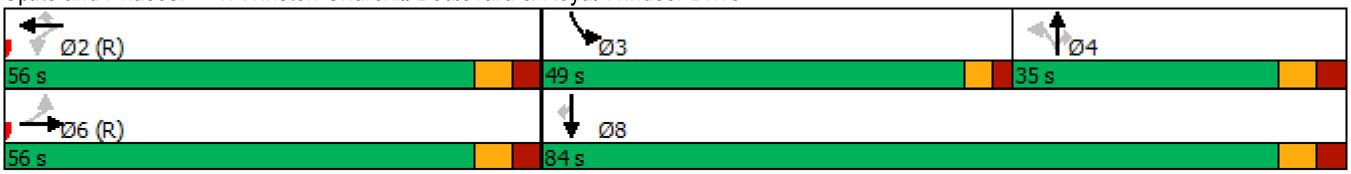
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	126	1166	87	643	161	44	213	116	421	547	192
Future Volume (vph)	126	1166	87	643	161	44	213	116	421	547	192
Lane Group Flow (vph)	126	1333	87	643	161	44	213	116	421	547	192
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	6	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	56.0	56.0	56.0	56.0	56.0	35.0	35.0	35.0	49.0	84.0	84.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	25.0%	25.0%	25.0%	35.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag						Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
v/c Ratio	0.68	1.12	1.67	0.54	0.27	0.19	0.18	0.19	0.76	0.30	0.22
Control Delay	59.1	107.2	403.6	38.5	5.6	36.7	32.9	10.1	64.9	17.6	8.6
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	59.1	107.2	403.6	38.5	5.6	36.7	32.9	10.1	64.9	17.6	8.6
LOS	E	F	F	D	A	D	C	B	E	B	A
Approach Delay		103.1		68.2			26.3			33.3	
Approach LOS		F		E			C			C	
Queue Length 50th (m)	29.7	~222.4	~35.0	74.8	0.0	8.5	21.4	3.8	58.0	41.5	12.7
Queue Length 95th (m)	#60.3	#265.6	#57.2	94.0	15.0	19.7	33.2	18.3	72.7	52.9	25.5
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	186	1190	52	1193	607	226	1206	600	1080	1851	891
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	0.68	1.12	1.67	0.54	0.27	0.19	0.18	0.19	0.39	0.30	0.22

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 108 (77%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.67
Intersection Signal Delay: 66.8 Intersection LOS: E
Intersection Capacity Utilization 109.0% 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: 1: Winston Churchill Boulevard & Royal Windsor Drive



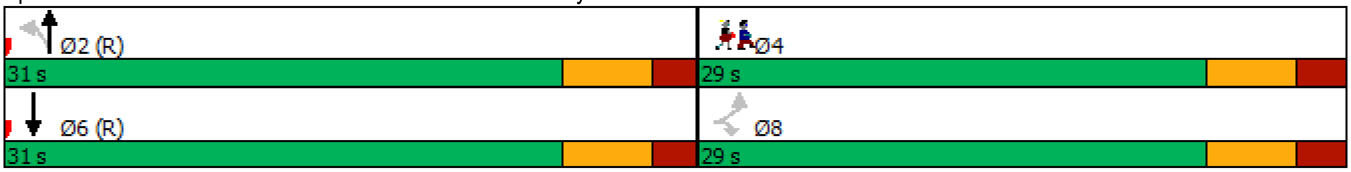
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
Future Volume (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1737	3380		1722	3411	1437	1371	3444	1537	3437	3380	1550
Flt Permitted	0.29	1.00		0.08	1.00	1.00	0.45	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	531	3380		148	3411	1437	646	3444	1537	3437	3380	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
RTOR Reduction (vph)	0	8	0	0	0	105	0	0	62	0	0	43
Lane Group Flow (vph)	126	1325	0	87	643	56	44	213	54	421	547	149
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1
Heavy Vehicles (%)	5%	5%	11%	6%	7%	9%	33%	6%	4%	3%	8%	4%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Effective Green, g (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	1183		51	1193	502	226	1205	537	557	1851	849
v/s Ratio Prot		0.39			0.19			0.06		c0.12	c0.16	
v/s Ratio Perm	0.24			c0.59		0.04	0.07		0.04			0.10
v/c Ratio	0.68	1.12		1.71	0.54	0.11	0.19	0.18	0.10	0.76	0.30	0.18
Uniform Delay, d1	38.8	45.5		45.5	36.5	30.8	31.7	31.5	30.7	56.0	17.1	15.8
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	18.4	65.8		387.6	1.7	0.5	1.9	0.3	0.4	5.8	0.4	0.5
Delay (s)	57.2	111.3		433.1	38.2	31.2	33.7	31.8	31.0	61.8	17.5	16.3
Level of Service	E	F		F	D	C	C	C	C	E	B	B
Approach Delay (s)		106.6			75.5			31.8			33.4	
Approach LOS		F			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	70.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	77	67	12	296	716	
Future Volume (vph)	77	67	12	296	716	
Lane Group Flow (vph)	77	67	12	296	801	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	8.9	8.9	42.8	42.8	42.8	
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.71	
v/c Ratio	0.31	0.25	0.05	0.24	0.64	
Control Delay	25.8	9.3	5.2	5.1	9.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.8	9.3	5.2	5.1	9.7	
LOS	C	A	A	A	A	
Approach Delay	18.1			5.1	9.7	
Approach LOS	B			A	A	
Queue Length 50th (m)	7.8	0.0	0.4	10.9	43.9	
Queue Length 95th (m)	17.1	8.4	2.1	23.4	93.8	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	645	574	266	1246	1261	
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	0.12	0.12	0.05	0.24	0.64	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 5 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 59.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	77	67	12	296	716	85
Future Volume (vph)	77	67	12	296	716	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	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)	1706	1408	1285	1748	1763	
Flt Permitted	0.95	1.00	0.28	1.00	1.00	
Satd. Flow (perm)	1706	1408	373	1748	1763	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	77	67	12	296	716	85
RTOR Reduction (vph)	0	59	0	0	4	0
Lane Group Flow (vph)	77	8	12	296	797	0
Heavy Vehicles (%)	7%	16%	42%	9%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	7.3	7.3	40.3	40.3	40.3	
Effective Green, g (s)	7.3	7.3	40.3	40.3	40.3	
Actuated g/C Ratio	0.12	0.12	0.67	0.67	0.67	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	171	250	1174	1184	
v/s Ratio Prot				0.17	c0.45	
v/s Ratio Perm	c0.05	0.01	0.03			
v/c Ratio	0.37	0.05	0.05	0.25	0.67	
Uniform Delay, d1	24.2	23.3	3.3	3.9	5.9	
Progression Factor	1.00	1.00	1.04	1.00	1.00	
Incremental Delay, d2	1.1	0.1	0.4	0.5	3.1	
Delay (s)	25.4	23.4	3.8	4.4	9.0	
Level of Service	C	C	A	A	A	
Approach Delay (s)	24.5			4.4	9.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	59.8%	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)	221	464	114	44	333	170
Future Volume (vph)	221	464	114	44	333	170
Lane Group Flow (vph)	221	464	114	44	333	170
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	25.0	25.0	25.0	25.0	23.2	23.2
Total Split (s)	59.0	59.0	59.0	59.0	31.0	31.0
Total Split (%)	65.6%	65.6%	65.6%	65.6%	34.4%	34.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	Max	Max	Min	Min
Act Effct Green (s)	55.6	55.6	55.6	55.6	22.2	22.2
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.25	0.25
v/c Ratio	0.28	0.39	0.10	0.07	0.84	0.33
Control Delay	9.7	10.5	8.0	2.8	51.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	10.5	8.0	2.8	51.9	6.2
LOS	A	B	A	A	D	A
Approach Delay		10.3	6.6		36.4	
Approach LOS		B	A		D	
Queue Length 50th (m)	17.1	39.4	7.8	0.0	53.0	0.0
Queue Length 95th (m)	30.0	60.1	14.9	4.0	#91.0	14.1
Internal Link Dist (m)		154.6	591.9		764.6	
Turn Bay Length (m)	75.0			90.0	125.0	
Base Capacity (vph)	795	1175	1163	643	441	551
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	0.28	0.39	0.10	0.07	0.76	0.31

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 41 (46%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 53.0%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 3: Lakeshore Road East/Lakeshore Road West & Winston Churchill Boulevard

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	221	464	114	44	333	170
Future Volume (vph)	221	464	114	44	333	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lane Util. Factor	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)	1789	1902	1883	1014	1601	1555
Flt Permitted	0.68	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1288	1902	1883	1014	1601	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	221	464	114	44	333	170
RTOR Reduction (vph)	0	0	0	17	0	128
Lane Group Flow (vph)	221	464	114	27	333	42
Heavy Vehicles (%)	2%	1%	2%	61%	14%	5%
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	55.6	55.6	55.6	55.6	22.2	22.2
Effective Green, g (s)	55.6	55.6	55.6	55.6	22.2	22.2
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.25	0.25
Clearance Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	795	1175	1163	626	394	383
v/s Ratio Prot		c0.24	0.06			
v/s Ratio Perm	0.17			0.03	c0.21	0.03
v/c Ratio	0.28	0.39	0.10	0.04	0.85	0.11
Uniform Delay, d1	7.9	8.7	7.0	6.8	32.3	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.0	0.2	0.1	15.2	0.1
Delay (s)	8.8	9.7	7.2	6.9	47.5	26.4
Level of Service	A	A	A	A	D	C
Approach Delay (s)		9.4	7.1		40.4	
Approach LOS		A	A		D	

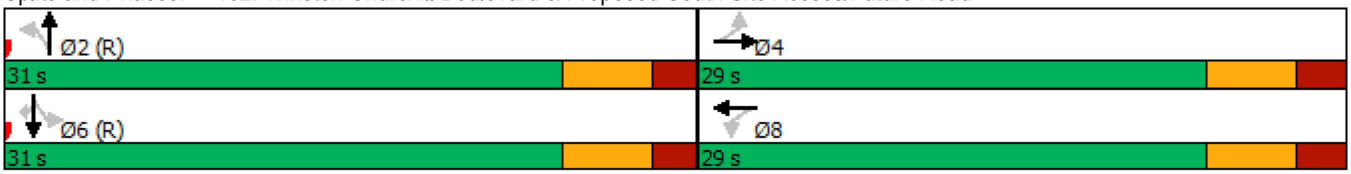
Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBT	NBT	SBL	SBT	Ø4
Lane Configurations					
Traffic Volume (vph)	0	248	239	544	
Future Volume (vph)	0	248	239	544	
Lane Group Flow (vph)	60	251	239	544	
Turn Type	NA	NA	Perm	NA	
Protected Phases	8	2		6	4
Permitted Phases			6		
Detector Phase	8	2	6	6	
Switch Phase					
Minimum Initial (s)	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.1	6.1	6.1	
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	8.0	47.8	47.8	47.8	
Actuated g/C Ratio	0.13	0.80	0.80	0.80	
v/c Ratio	0.09	0.17	0.26	0.36	
Control Delay	0.3	3.5	8.8	9.2	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	0.3	3.5	8.8	9.2	
LOS	A	A	A	A	
Approach Delay	0.3	3.5		9.1	
Approach LOS	A	A		A	
Queue Length 50th (m)	0.0	8.8	18.3	46.5	
Queue Length 95th (m)	0.0	15.9	m36.1	88.2	
Internal Link Dist (m)	410.5	222.0		147.2	
Turn Bay Length (m)			20.0		
Base Capacity (vph)	930	1497	904	1498	
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	0.06	0.17	0.26	0.36	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.36	
Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 60.7%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 102: Winston Churchill Boulevard & Proposed South Site Access/Future Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	60	0	248	3	239	544	0
Future Volume (vph)	0	0	0	0	0	60	0	248	3	239	544	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.3			6.1		6.1	6.1	
Lane Util. Factor					1.00			1.00		1.00	1.00	
Frt					0.86			1.00		1.00	1.00	
Flt Protected					1.00			1.00		0.95	1.00	
Satd. Flow (prot)					1629			1880		1789	1883	
Flt Permitted					1.00			1.00		0.60	1.00	
Satd. Flow (perm)					1629			1880		1137	1883	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	0	60	0	248	3	239	544	0
RTOR Reduction (vph)	0	0	0	0	55	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	5	0	0	251	0	239	544	0
Turn Type	Perm				NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)					4.8			42.8		42.8	42.8	
Effective Green, g (s)					4.8			42.8		42.8	42.8	
Actuated g/C Ratio					0.08			0.71		0.71	0.71	
Clearance Time (s)					6.3			6.1		6.1	6.1	
Vehicle Extension (s)					3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)					130			1341		811	1343	
v/s Ratio Prot					c0.00			0.13			c0.29	
v/s Ratio Perm										0.21		
v/c Ratio					0.04			0.19		0.29	0.41	
Uniform Delay, d1					25.5			2.8		3.1	3.5	
Progression Factor					1.00			1.00		2.15	2.23	
Incremental Delay, d2					0.1			0.3		0.7	0.7	
Delay (s)					25.6			3.2		7.5	8.5	
Level of Service					C			A		A	A	
Approach Delay (s)		0.0			25.6			3.2			8.2	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

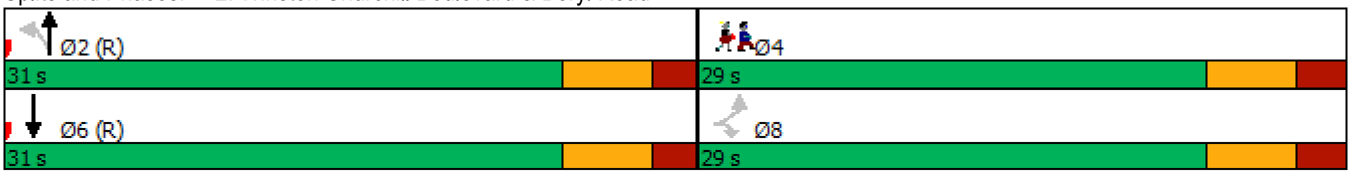
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	104	20	33	607	339	
Future Volume (vph)	104	20	33	607	339	
Lane Group Flow (vph)	104	20	33	607	447	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	9.6	9.6	42.1	42.1	42.1	
Actuated g/C Ratio	0.16	0.16	0.70	0.70	0.70	
v/c Ratio	0.38	0.08	0.06	0.47	0.37	
Control Delay	26.2	10.6	3.8	6.9	6.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.2	10.6	3.8	6.9	6.1	
LOS	C	B	A	A	A	
Approach Delay	23.7			6.8	6.1	
Approach LOS	C			A	A	
Queue Length 50th (m)	10.5	0.0	0.3	35.2	17.8	
Queue Length 95th (m)	21.1	4.5	m2.4	77.9	38.3	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	651	540	544	1286	1211	
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	0.04	0.06	0.47	0.37	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 35 (58%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 8.3	Intersection LOS: A
Intersection Capacity Utilization 48.9%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	104	20	33	607	339	108
Future Volume (vph)	104	20	33	607	339	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	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	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1722	1396	1484	1832	1713	
Flt Permitted	0.95	1.00	0.50	1.00	1.00	
Satd. Flow (perm)	1722	1396	775	1832	1713	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	104	20	33	607	339	108
RTOR Reduction (vph)	0	17	0	0	11	0
Lane Group Flow (vph)	104	3	33	607	436	0
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	17%	23%	4%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	8.0	8.0	39.6	39.6	39.6	
Effective Green, g (s)	8.0	8.0	39.6	39.6	39.6	
Actuated g/C Ratio	0.13	0.13	0.66	0.66	0.66	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	229	186	511	1209	1130	
v/s Ratio Prot				c0.33	0.25	
v/s Ratio Perm	c0.06	0.00	0.04			
v/c Ratio	0.45	0.01	0.06	0.50	0.39	
Uniform Delay, d1	24.0	22.6	3.6	5.2	4.7	
Progression Factor	1.00	1.00	0.71	0.92	1.00	
Incremental Delay, d2	1.4	0.0	0.2	1.4	1.0	
Delay (s)	25.4	22.6	2.8	6.2	5.6	
Level of Service	C	C	A	A	A	
Approach Delay (s)	25.0			6.0	5.6	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G

2028 Future Total Conditions Synchro Reports

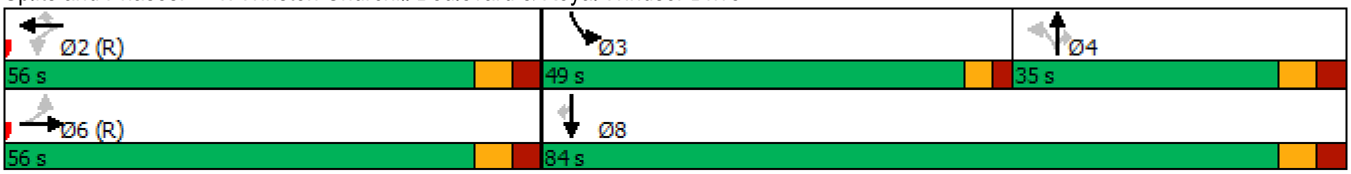
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	126	1166	87	643	161	57	221	117	421	585	192
Future Volume (vph)	126	1166	87	643	161	57	221	117	421	585	192
Lane Group Flow (vph)	126	1369	87	643	161	57	221	117	421	585	192
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	6	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	56.0	56.0	56.0	56.0	56.0	35.0	35.0	35.0	49.0	84.0	84.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	25.0%	25.0%	25.0%	35.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag						Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
v/c Ratio	0.68	1.15	1.67	0.54	0.27	0.26	0.18	0.20	0.76	0.32	0.22
Control Delay	59.1	119.5	403.6	38.5	5.6	38.5	33.0	10.2	64.9	17.9	8.6
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	59.1	119.5	403.6	38.5	5.6	38.5	33.0	10.2	64.9	17.9	8.6
LOS	E	F	F	D	A	D	C	B	E	B	A
Approach Delay		114.4		68.2			27.0			32.9	
Approach LOS		F		E			C			C	
Queue Length 50th (m)	29.7	~233.5	~35.0	74.8	0.0	11.3	22.3	4.0	58.0	45.1	12.7
Queue Length 95th (m)	#60.3	#276.7	#57.2	94.0	15.0	24.9	34.3	18.5	72.7	57.0	25.5
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	186	1187	52	1193	607	217	1206	600	1080	1851	891
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	0.68	1.15	1.67	0.54	0.27	0.26	0.18	0.20	0.39	0.32	0.22

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 108 (77%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.67
Intersection Signal Delay: 70.9 Intersection LOS: E
Intersection Capacity Utilization 110.2% ICU Level of Service H
Analysis Period (min) 15

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

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
Future Volume (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1737	3363		1722	3411	1437	1372	3444	1537	3437	3380	1550
Flt Permitted	0.29	1.00		0.08	1.00	1.00	0.43	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	531	3363		148	3411	1437	623	3444	1537	3437	3380	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
RTOR Reduction (vph)	0	10	0	0	0	105	0	0	62	0	0	43
Lane Group Flow (vph)	126	1359	0	87	643	56	57	221	55	421	585	149
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1
Heavy Vehicles (%)	5%	5%	11%	6%	7%	9%	33%	6%	4%	3%	8%	4%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Effective Green, g (s)	49.0	49.0		49.0	49.0	49.0	49.0	49.0	49.0	22.7	76.7	76.7
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.35	0.35	0.35	0.35	0.16	0.55	0.55
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	1177		51	1193	502	218	1205	537	557	1851	849
v/s Ratio Prot		0.40			0.19			0.06		c0.12	c0.17	
v/s Ratio Perm	0.24			c0.59		0.04	0.09		0.04			0.10
v/c Ratio	0.68	1.15		1.71	0.54	0.11	0.26	0.18	0.10	0.76	0.32	0.18
Uniform Delay, d1	38.8	45.5		45.5	36.5	30.8	32.6	31.6	30.7	56.0	17.3	15.8
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	18.4	79.4		387.6	1.7	0.5	2.9	0.3	0.4	5.8	0.4	0.5
Delay (s)	57.2	124.9		433.1	38.2	31.2	35.5	31.9	31.1	61.8	17.8	16.3
Level of Service	E	F		F	D	C	D	C	C	E	B	B
Approach Delay (s)		119.2			75.5			32.2			33.0	
Approach LOS		F			E			C			C	

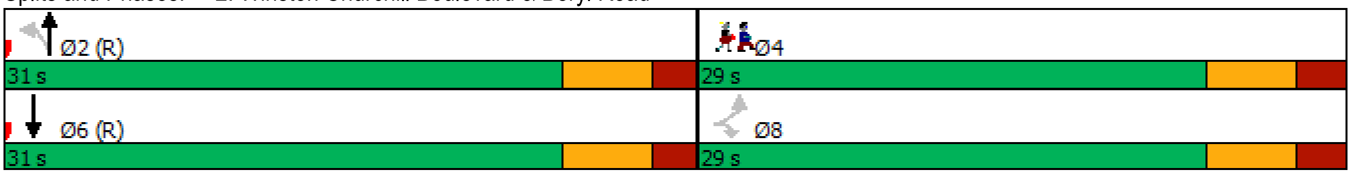
Intersection Summary			
HCM 2000 Control Delay	74.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	77	67	12	318	790	
Future Volume (vph)	77	67	12	318	790	
Lane Group Flow (vph)	77	67	12	318	875	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	8.9	8.9	42.8	42.8	42.8	
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.71	
v/c Ratio	0.31	0.25	0.05	0.26	0.69	
Control Delay	25.8	9.3	5.0	4.8	11.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.8	9.3	5.0	4.8	11.6	
LOS	C	A	A	A	B	
Approach Delay	18.1			4.8	11.6	
Approach LOS	B			A	B	
Queue Length 50th (m)	7.8	0.0	0.4	10.9	51.9	
Queue Length 95th (m)	17.1	8.4	2.1	23.1	#138.9	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	645	574	224	1246	1263	
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	0.12	0.12	0.05	0.26	0.69	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 5 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 10.6	Intersection LOS: B
Intersection Capacity Utilization 63.7%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	77	67	12	318	790	85
Future Volume (vph)	77	67	12	318	790	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	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)	1706	1408	1285	1748	1765	
Flt Permitted	0.95	1.00	0.23	1.00	1.00	
Satd. Flow (perm)	1706	1408	316	1748	1765	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	77	67	12	318	790	85
RTOR Reduction (vph)	0	59	0	0	4	0
Lane Group Flow (vph)	77	8	12	318	871	0
Heavy Vehicles (%)	7%	16%	42%	9%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	7.3	7.3	40.3	40.3	40.3	
Effective Green, g (s)	7.3	7.3	40.3	40.3	40.3	
Actuated g/C Ratio	0.12	0.12	0.67	0.67	0.67	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	171	212	1174	1185	
v/s Ratio Prot				0.18	c0.49	
v/s Ratio Perm	c0.05	0.01	0.04			
v/c Ratio	0.37	0.05	0.06	0.27	0.74	
Uniform Delay, d1	24.2	23.3	3.4	4.0	6.4	
Progression Factor	1.00	1.00	0.95	0.91	1.00	
Incremental Delay, d2	1.1	0.1	0.5	0.6	4.1	
Delay (s)	25.4	23.4	3.7	4.2	10.5	
Level of Service	C	C	A	A	B	
Approach Delay (s)	24.5			4.1	10.5	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	63.7%	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)	234	464	114	44	333	174
Future Volume (vph)	234	464	114	44	333	174
Lane Group Flow (vph)	234	464	114	44	333	174
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	25.0	25.0	25.0	25.0	23.2	23.2
Total Split (s)	59.0	59.0	59.0	59.0	31.0	31.0
Total Split (%)	65.6%	65.6%	65.6%	65.6%	34.4%	34.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	Max	Max	Min	Min
Act Effct Green (s)	55.6	55.6	55.6	55.6	22.2	22.2
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.25	0.25
v/c Ratio	0.29	0.39	0.10	0.07	0.84	0.34
Control Delay	9.9	10.5	8.0	2.8	51.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.9	10.5	8.0	2.8	51.9	6.2
LOS	A	B	A	A	D	A
Approach Delay		10.3	6.6		36.2	
Approach LOS		B	A		D	
Queue Length 50th (m)	18.4	39.4	7.8	0.0	53.0	0.0
Queue Length 95th (m)	32.0	60.1	14.9	4.0	#91.0	14.2
Internal Link Dist (m)		154.6	591.9		764.6	
Turn Bay Length (m)	75.0			90.0	125.0	
Base Capacity (vph)	795	1175	1163	643	441	554
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	0.39	0.10	0.07	0.76	0.31

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 41 (46%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 19.5	Intersection LOS: B
Intersection Capacity Utilization 53.0%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 3: Lakeshore Road East/Lakeshore Road West & Winston Churchill Boulevard

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	234	464	114	44	333	174
Future Volume (vph)	234	464	114	44	333	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lane Util. Factor	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)	1789	1902	1883	1014	1601	1555
Flt Permitted	0.68	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1288	1902	1883	1014	1601	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	234	464	114	44	333	174
RTOR Reduction (vph)	0	0	0	17	0	131
Lane Group Flow (vph)	234	464	114	27	333	43
Heavy Vehicles (%)	2%	1%	2%	61%	14%	5%
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	55.6	55.6	55.6	55.6	22.2	22.2
Effective Green, g (s)	55.6	55.6	55.6	55.6	22.2	22.2
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.25	0.25
Clearance Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	795	1175	1163	626	394	383
v/s Ratio Prot		c0.24	0.06			
v/s Ratio Perm	0.18			0.03	c0.21	0.03
v/c Ratio	0.29	0.39	0.10	0.04	0.85	0.11
Uniform Delay, d1	8.0	8.7	7.0	6.8	32.3	26.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.0	0.2	0.1	15.2	0.1
Delay (s)	9.0	9.7	7.2	6.9	47.5	26.4
Level of Service	A	A	A	A	D	C
Approach Delay (s)		9.5	7.1		40.3	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2	0	330	820	37
Future Volume (Veh/h)	0	2	0	330	820	37
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	2	0	330	820	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				171	343	
pX, platoon unblocked	0.68	0.68	0.68			
vC, conflicting volume	1150	820	857			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	982	499	554			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	188	388	691			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	2	330	820	37
Volume Left	0	0	0	0
Volume Right	2	0	0	37
cSH	388	691	1700	1700
Volume to Capacity	0.01	0.00	0.48	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.0
Control Delay (s)	14.3	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	14.3	0.0	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

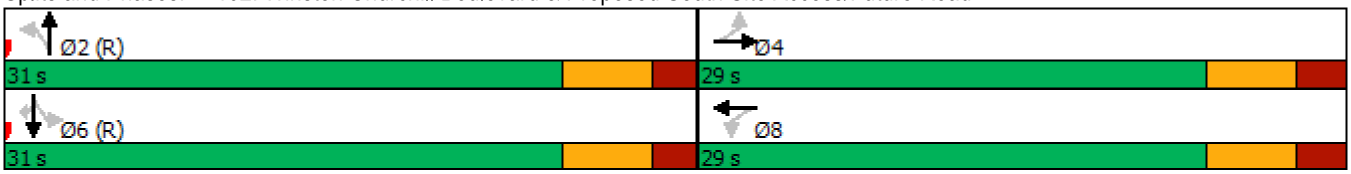
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	22	0	0	13	248	239	546	37
Future Volume (vph)	22	0	0	13	248	239	546	37
Lane Group Flow (vph)	22	2	60	13	251	239	546	37
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4	8		2		6	
Permitted Phases	4			2		6		6
Detector Phase	4	4	8	2	2	6	6	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	25.3	25.3	25.3	24.1	24.1	24.1	24.1	24.1
Total Split (s)	29.0	29.0	29.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.3	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	8.1	8.1	8.1	47.7	47.7	47.7	47.7	47.7
Actuated g/C Ratio	0.14	0.14	0.14	0.80	0.80	0.80	0.80	0.80
v/c Ratio	0.11	0.01	0.09	0.02	0.17	0.26	0.36	0.03
Control Delay	24.1	0.0	0.3	3.8	3.6	8.7	9.2	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	0.0	0.3	3.8	3.6	8.7	9.2	2.6
LOS	C	A	A	A	A	A	A	A
Approach Delay		22.1	0.3		3.6		8.8	
Approach LOS		C	A		A		A	
Queue Length 50th (m)	2.2	0.0	0.0	0.4	8.8	18.9	47.9	0.3
Queue Length 95th (m)	7.5	0.0	0.0	1.8	16.3	m32.0	89.1	m0.9
Internal Link Dist (m)		66.0	410.5		222.0		147.2	
Turn Bay Length (m)				20.0		20.0		20.0
Base Capacity (vph)	581	726	930	666	1494	902	1496	1284
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.00	0.06	0.02	0.17	0.26	0.36	0.03

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 7.5 Intersection LOS: A
Intersection Capacity Utilization 62.0% ICU Level of Service B
Analysis Period (min) 15

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

Splits and Phases: 102: Winston Churchill Boulevard & Proposed South Site Access/Future Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	0	2	0	0	60	13	248	3	239	546	37
Future Volume (vph)	22	0	2	0	0	60	13	248	3	239	546	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3			6.3		6.1	6.1		6.1	6.1	6.1
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.86		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1789	1601			1629		1789	1880		1789	1883	1601
Flt Permitted	0.82	1.00			1.00		0.44	1.00		0.60	1.00	1.00
Satd. Flow (perm)	1538	1601			1629		838	1880		1137	1883	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	0	2	0	0	60	13	248	3	239	546	37
RTOR Reduction (vph)	0	2	0	0	55	0	0	0	0	0	0	11
Lane Group Flow (vph)	22	0	0	0	5	0	13	251	0	239	546	26
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	4.9	4.9			4.9		42.7	42.7		42.7	42.7	42.7
Effective Green, g (s)	4.9	4.9			4.9		42.7	42.7		42.7	42.7	42.7
Actuated g/C Ratio	0.08	0.08			0.08		0.71	0.71		0.71	0.71	0.71
Clearance Time (s)	6.3	6.3			6.3		6.1	6.1		6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	125	130			133		596	1337		809	1340	1139
v/s Ratio Prot		0.00			0.00			0.13			c0.29	
v/s Ratio Perm	c0.01						0.02			0.21		0.02
v/c Ratio	0.18	0.00			0.04		0.02	0.19		0.30	0.41	0.02
Uniform Delay, d1	25.7	25.3			25.4		2.5	2.9		3.2	3.5	2.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		2.11	2.20	3.74
Incremental Delay, d2	0.7	0.0			0.1		0.1	0.3		0.7	0.7	0.0
Delay (s)	26.3	25.3			25.5		2.6	3.2		7.4	8.4	9.5
Level of Service	C	C			C		A	A		A	A	A
Approach Delay (s)		26.3			25.5			3.2			8.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

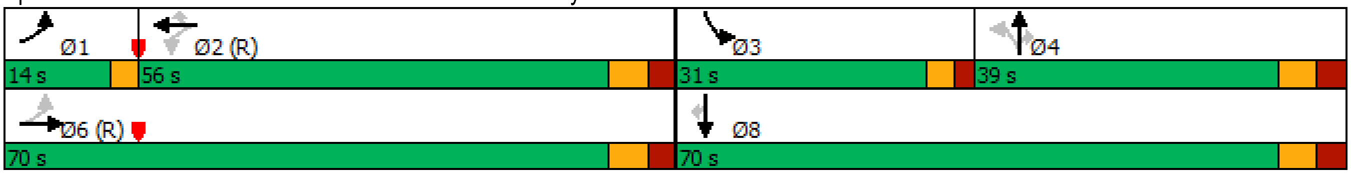
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	158	823	90	968	546	208	463	104	213	313	130
Future Volume (vph)	158	823	90	968	546	208	463	104	213	313	130
Lane Group Flow (vph)	158	893	90	968	546	208	463	104	213	313	130
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	1	6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	1	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	44.3	44.3	44.3	44.3	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	14.0	70.0	56.0	56.0	56.0	39.0	39.0	39.0	31.0	70.0	70.0
Total Split (%)	10.0%	50.0%	40.0%	40.0%	40.0%	27.9%	27.9%	27.9%	22.1%	50.0%	50.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	67.0	63.0	49.4	49.4	49.4	43.7	43.7	43.7	14.0	62.7	62.7
Actuated g/C Ratio	0.48	0.45	0.35	0.35	0.35	0.31	0.31	0.31	0.10	0.45	0.45
v/c Ratio	0.70	0.59	0.50	0.77	0.64	0.66	0.41	0.19	0.62	0.20	0.17
Control Delay	38.8	30.4	47.6	45.5	9.0	53.8	39.9	7.3	68.2	23.8	4.0
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	38.8	30.4	47.6	45.5	9.0	53.8	39.9	7.3	68.2	23.8	4.0
LOS	D	C	D	D	A	D	D	A	E	C	A
Approach Delay		31.7		33.2			39.2			34.3	
Approach LOS		C		C			D			C	
Queue Length 50th (m)	24.5	94.9	19.6	125.7	12.6	49.9	53.2	0.0	29.6	27.1	0.0
Queue Length 95th (m)	#43.9	115.6	38.9	151.6	48.5	#86.1	71.9	13.7	41.8	37.2	11.5
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	230	1524	180	1251	858	317	1128	550	638	1602	786
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	0.69	0.59	0.50	0.77	0.64	0.66	0.41	0.19	0.33	0.20	0.17

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 104 (74%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 34.1	Intersection LOS: C
Intersection Capacity Utilization 99.2%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	823	70	90	968	546	208	463	104	213	313	130
Future Volume (vph)	158	823	70	90	968	546	208	463	104	213	313	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	3378		1754	3544	1556	1720	3614	1535	3437	3579	1596
Flt Permitted	0.12	1.00		0.28	1.00	1.00	0.56	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	222	3378		510	3544	1556	1017	3614	1535	3437	3579	1596
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	158	823	70	90	968	546	208	463	104	213	313	130
RTOR Reduction (vph)	0	4	0	0	0	310	0	0	72	0	0	72
Lane Group Flow (vph)	158	889	0	90	968	236	208	463	32	213	313	58
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	1%	4%	38%	4%	3%	2%	6%	1%	4%	3%	2%	1%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	1	6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	63.0	63.0		49.4	49.4	49.4	43.7	43.7	43.7	14.0	62.7	62.7
Effective Green, g (s)	63.0	63.0		49.4	49.4	49.4	43.7	43.7	43.7	14.0	62.7	62.7
Actuated g/C Ratio	0.45	0.45		0.35	0.35	0.35	0.31	0.31	0.31	0.10	0.45	0.45
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	219	1520		179	1250	549	317	1128	479	343	1602	714
v/s Ratio Prot	c0.05	0.26			c0.27			0.13		c0.06	0.09	
v/s Ratio Perm	0.27			0.18		0.15	c0.20		0.02			0.04
v/c Ratio	0.72	0.58		0.50	0.77	0.43	0.66	0.41	0.07	0.62	0.20	0.08
Uniform Delay, d1	28.2	28.7		35.6	40.3	34.6	41.7	38.0	33.8	60.5	23.4	22.1
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	11.1	1.7		9.7	4.7	2.4	10.2	1.1	0.3	3.5	0.3	0.2
Delay (s)	39.3	30.4		45.4	45.1	37.0	51.8	39.1	34.1	63.9	23.7	22.4
Level of Service	D	C		D	D	D	D	D	C	E	C	C
Approach Delay (s)		31.7			42.3			41.8			36.5	
Approach LOS		C			D			D			D	

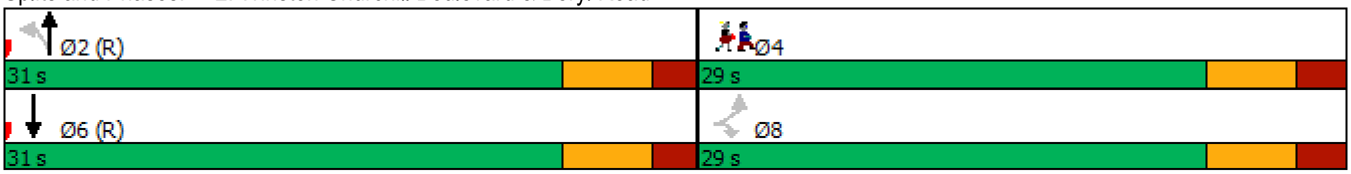
Intersection Summary			
HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	22.3
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	Ø4
Lane Configurations						
Traffic Volume (vph)	104	20	33	671	365	
Future Volume (vph)	104	20	33	671	365	
Lane Group Flow (vph)	104	20	33	671	473	
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	4
Permitted Phases	8	8	2			
Detector Phase	8	8	2	2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	12.0	8.0
Minimum Split (s)	25.3	25.3	24.1	24.1	24.1	25.3
Total Split (s)	29.0	29.0	31.0	31.0	31.0	29.0
Total Split (%)	48.3%	48.3%	51.7%	51.7%	51.7%	48%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.1	2.1	2.1	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.1	6.1	6.1	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	9.6	9.6	42.1	42.1	42.1	
Actuated g/C Ratio	0.16	0.16	0.70	0.70	0.70	
v/c Ratio	0.38	0.08	0.06	0.52	0.39	
Control Delay	26.2	10.6	5.1	9.3	6.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.2	10.6	5.1	9.3	6.3	
LOS	C	B	A	A	A	
Approach Delay	23.7			9.1	6.3	
Approach LOS	C			A	A	
Queue Length 50th (m)	10.5	0.0	0.6	47.3	19.5	
Queue Length 95th (m)	21.1	4.5	m3.2	93.6	41.7	
Internal Link Dist (m)	906.5			318.9	243.4	
Turn Bay Length (m)	80.0		115.0			
Base Capacity (vph)	651	540	524	1286	1214	
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	0.04	0.06	0.52	0.39	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 35 (58%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 52.3%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 2: Winston Churchill Boulevard & Beryl Road



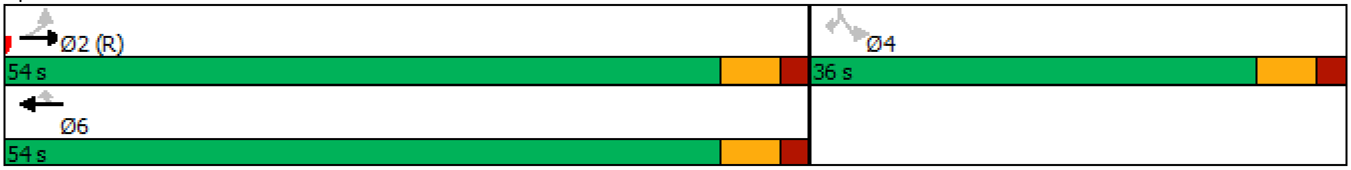
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	104	20	33	671	365	108
Future Volume (vph)	104	20	33	671	365	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.1	6.1	6.1	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	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	0.97	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1722	1396	1484	1832	1717	
Flt Permitted	0.95	1.00	0.48	1.00	1.00	
Satd. Flow (perm)	1722	1396	746	1832	1717	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	104	20	33	671	365	108
RTOR Reduction (vph)	0	17	0	0	10	0
Lane Group Flow (vph)	104	3	33	671	463	0
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	17%	23%	4%	7%	11%
Bus Blockages (#/hr)	0	0	0	2	0	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	8	8	2			
Actuated Green, G (s)	8.0	8.0	39.6	39.6	39.6	
Effective Green, g (s)	8.0	8.0	39.6	39.6	39.6	
Actuated g/C Ratio	0.13	0.13	0.66	0.66	0.66	
Clearance Time (s)	6.3	6.3	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	229	186	492	1209	1133	
v/s Ratio Prot				c0.37	0.27	
v/s Ratio Perm	c0.06	0.00	0.04			
v/c Ratio	0.45	0.01	0.07	0.56	0.41	
Uniform Delay, d1	24.0	22.6	3.6	5.5	4.7	
Progression Factor	1.00	1.00	0.97	1.18	1.00	
Incremental Delay, d2	1.4	0.0	0.3	1.8	1.1	
Delay (s)	25.4	22.6	3.8	8.3	5.8	
Level of Service	C	C	A	A	A	
Approach Delay (s)	25.0			8.0	5.8	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	52.3%	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)	125	271	274	310	116	226
Future Volume (vph)	125	271	274	310	116	226
Lane Group Flow (vph)	125	271	274	310	116	226
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	25.0	25.0	25.0	25.0	23.2	23.2
Total Split (s)	54.0	54.0	54.0	54.0	36.0	36.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	Max	Max	Min	Min
Act Effct Green (s)	65.1	65.1	65.1	65.1	12.7	12.7
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.14	0.14
v/c Ratio	0.16	0.20	0.20	0.27	0.57	0.53
Control Delay	5.2	5.0	5.0	1.2	46.1	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	5.0	5.0	1.2	46.1	9.6
LOS	A	A	A	A	D	A
Approach Delay		5.0	3.0		22.0	
Approach LOS		A	A		C	
Queue Length 50th (m)	5.6	12.6	12.7	0.0	19.0	0.0
Queue Length 95th (m)	13.8	25.7	25.9	7.5	33.3	17.7
Internal Link Dist (m)		154.6	591.9		764.6	
Turn Bay Length (m)	75.0			90.0	125.0	
Base Capacity (vph)	789	1374	1388	1166	479	691
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	0.16	0.20	0.20	0.27	0.24	0.33

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 89 (99%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.5	Intersection LOS: A
Intersection Capacity Utilization 43.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Lakeshore Road East/Lakeshore Road West & Winston Churchill Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	125	271	274	310	116	226
Future Volume (vph)	125	271	274	310	116	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.2	6.2
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	1.00
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)	1755	1902	1921	1495	1448	1633
Flt Permitted	0.59	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1092	1902	1921	1495	1448	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	125	271	274	310	116	226
RTOR Reduction (vph)	0	0	0	86	0	194
Lane Group Flow (vph)	125	271	274	224	116	32
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	4%	1%	0%	7%	26%	0%
Turn Type	Perm	NA	NA	Perm	Perm	Perm
Protected Phases		2	6			
Permitted Phases	2			6	4	4
Actuated Green, G (s)	65.1	65.1	65.1	65.1	12.7	12.7
Effective Green, g (s)	65.1	65.1	65.1	65.1	12.7	12.7
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.14	0.14
Clearance Time (s)	6.0	6.0	6.0	6.0	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	789	1375	1389	1081	204	230
v/s Ratio Prot		0.14	0.14			
v/s Ratio Perm	0.11			c0.15	c0.08	0.02
v/c Ratio	0.16	0.20	0.20	0.21	0.57	0.14
Uniform Delay, d1	3.9	4.0	4.0	4.1	36.1	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3	0.3	0.4	3.6	0.3
Delay (s)	4.3	4.3	4.3	4.5	39.7	34.1
Level of Service	A	A	A	A	D	C
Approach Delay (s)		4.3	4.4		36.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	11	0	704	372	13
Future Volume (Veh/h)	0	11	0	704	372	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	11	0	704	372	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				171	343	
pX, platoon unblocked	0.88					
vC, conflicting volume	1076	372	385			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1019	372	385			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	231	674	1173			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	11	704	372	13
Volume Left	0	0	0	0
Volume Right	11	0	0	13
cSH	674	1173	1700	1700
Volume to Capacity	0.02	0.00	0.22	0.01
Queue Length 95th (m)	0.4	0.0	0.0	0.0
Control Delay (s)	10.4	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.4	0.0	0.0	
Approach LOS	B			

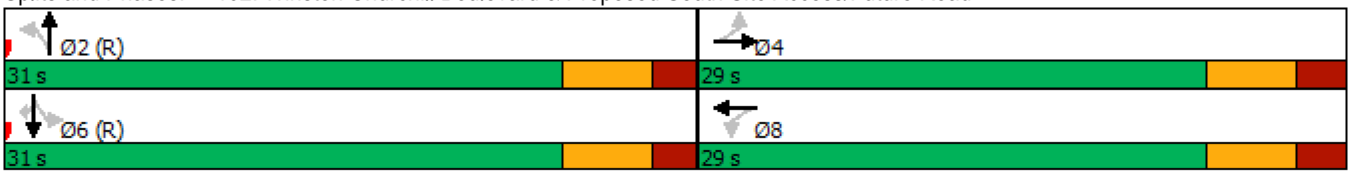
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	64	0	2	0	5	464	54	316	13
Future Volume (vph)	64	0	2	0	5	464	54	316	13
Lane Group Flow (vph)	64	10	0	178	5	464	54	316	13
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	25.3	25.3	25.3	25.3	24.1	24.1	24.1	24.1	24.1
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.1	6.1	6.1	6.1	6.1
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	9.1	9.1		9.1	38.5	38.5	38.5	38.5	38.5
Actuated g/C Ratio	0.15	0.15		0.15	0.64	0.64	0.64	0.64	0.64
v/c Ratio	0.35	0.02		0.45	0.01	0.38	0.09	0.26	0.01
Control Delay	28.1	0.1		8.3	4.6	6.5	2.7	3.0	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	0.1		8.3	4.6	6.5	2.7	3.0	0.0
LOS	C	A		A	A	A	A	A	A
Approach Delay		24.3		8.3		6.5		2.9	
Approach LOS		C		A		A		A	
Queue Length 50th (m)	6.6	0.0		0.2	0.2	19.1	0.9	4.9	0.0
Queue Length 95th (m)	15.3	0.0		13.4	1.2	39.1	2.5	9.2	m0.0
Internal Link Dist (m)		66.0		410.5		222.0		147.2	
Turn Bay Length (m)					20.0		20.0		20.0
Base Capacity (vph)	454	859		725	688	1208	579	1208	1049
Starvation Cap Reductn	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.01		0.25	0.01	0.38	0.09	0.26	0.01

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.45	
Intersection Signal Delay: 6.7	Intersection LOS: A
Intersection Capacity Utilization 72.8%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 102: Winston Churchill Boulevard & Proposed South Site Access/Future Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	0	10	2	0	176	5	464	0	54	316	13
Future Volume (vph)	64	0	10	2	0	176	5	464	0	54	316	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3			6.3		6.1	6.1		6.1	6.1	6.1
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1789	1601			1631		1789	1883		1789	1883	1601
Flt Permitted	0.64	1.00			1.00		0.57	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1202	1601			1626		1071	1883		902	1883	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	64	0	10	2	0	176	5	464	0	54	316	13
RTOR Reduction (vph)	0	8	0	0	149	0	0	0	0	0	0	5
Lane Group Flow (vph)	64	2	0	0	29	0	5	464	0	54	316	8
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	9.1	9.1			9.1		38.5	38.5		38.5	38.5	38.5
Effective Green, g (s)	9.1	9.1			9.1		38.5	38.5		38.5	38.5	38.5
Actuated g/C Ratio	0.15	0.15			0.15		0.64	0.64		0.64	0.64	0.64
Clearance Time (s)	6.3	6.3			6.3		6.1	6.1		6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	242			246		687	1208		578	1208	1027
v/s Ratio Prot		0.00						c0.25			0.17	
v/s Ratio Perm	c0.05				0.02		0.00			0.06		0.01
v/c Ratio	0.35	0.01			0.12		0.01	0.38		0.09	0.26	0.01
Uniform Delay, d1	22.8	21.6			22.0		3.9	5.1		4.1	4.6	3.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		0.51	0.50	1.00
Incremental Delay, d2	1.2	0.0			0.2		0.0	0.9		0.3	0.5	0.0
Delay (s)	24.0	21.6			22.2		3.9	6.0		2.4	2.8	3.9
Level of Service	C	C			C		A	A		A	A	A
Approach Delay (s)		23.7			22.2			6.0			2.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix H

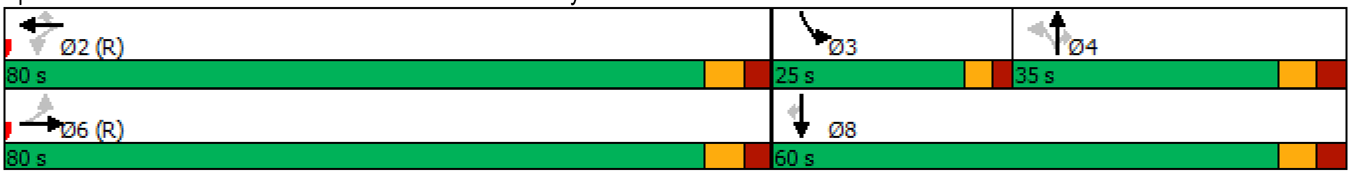
2028 Future Background and 2028 Future Total Conditions (Mitigated) Synchro Reports

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	126	1166	87	643	161	44	213	116	421	547	192
Future Volume (vph)	126	1166	87	643	161	44	213	116	421	547	192
Lane Group Flow (vph)	126	1333	87	643	161	44	213	116	421	547	192
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	6	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	80.0	80.0	80.0	80.0	80.0	35.0	35.0	35.0	25.0	60.0	60.0
Total Split (%)	57.1%	57.1%	57.1%	57.1%	57.1%	25.0%	25.0%	25.0%	17.9%	42.9%	42.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag						Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	73.0	73.0	73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.20	0.20	0.20	0.14	0.38	0.38
v/c Ratio	0.37	0.75	0.88	0.36	0.19	0.34	0.31	0.32	0.88	0.43	0.27
Control Delay	23.8	29.4	96.0	20.5	3.0	56.9	49.2	23.2	78.9	33.8	4.8
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	23.8	29.4	96.0	20.5	3.0	56.9	49.2	23.2	78.9	33.8	4.8
LOS	C	C	F	C	A	E	D	C	E	C	A
Approach Delay		28.9		24.7			42.0			45.4	
Approach LOS		C		C			D			D	
Queue Length 50th (m)	20.1	147.2	20.7	53.6	0.0	10.6	26.8	10.7	59.5	58.9	0.0
Queue Length 95th (m)	36.5	175.0	#57.1	67.4	10.8	23.2	39.1	28.4	#85.1	75.2	15.4
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	343	1770	99	1778	826	130	693	365	491	1272	703
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	0.37	0.75	0.88	0.36	0.19	0.34	0.31	0.32	0.86	0.43	0.27

Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 108 (77%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 34.1	Intersection LOS: C
Intersection Capacity Utilization 109.0%	ICU Level of Service H
Analysis Period (min) 15	

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

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
Future Volume (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1737	3380		1722	3411	1437	1371	3444	1537	3437	3380	1550
Flt Permitted	0.36	1.00		0.10	1.00	1.00	0.45	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	658	3380		190	3411	1437	646	3444	1537	3437	3380	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	1166	167	87	643	161	44	213	116	421	547	192
RTOR Reduction (vph)	0	8	0	0	0	77	0	0	56	0	0	120
Lane Group Flow (vph)	126	1325	0	87	643	84	44	213	60	421	547	72
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1
Heavy Vehicles (%)	5%	5%	11%	6%	7%	9%	33%	6%	4%	3%	8%	4%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	73.0	73.0		73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Effective Green, g (s)	73.0	73.0		73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Actuated g/C Ratio	0.52	0.52		0.52	0.52	0.52	0.20	0.20	0.20	0.14	0.38	0.38
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	1762		99	1778	749	130	693	309	478	1272	583
v/s Ratio Prot		0.39			0.19			0.06		c0.12	c0.16	
v/s Ratio Perm	0.19			c0.46		0.06	0.07		0.04			0.05
v/c Ratio	0.37	0.75		0.88	0.36	0.11	0.34	0.31	0.19	0.88	0.43	0.12
Uniform Delay, d1	19.8	26.4		29.6	19.8	17.0	47.9	47.6	46.5	59.1	32.5	28.6
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	3.0	3.0		61.8	0.6	0.3	6.9	1.1	1.4	17.1	1.1	0.4
Delay (s)	22.8	29.4		91.4	20.3	17.3	54.8	48.7	47.9	76.2	33.5	29.0
Level of Service	C	C		F	C	B	D	D	D	E	C	C
Approach Delay (s)		28.8			26.7			49.2			48.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

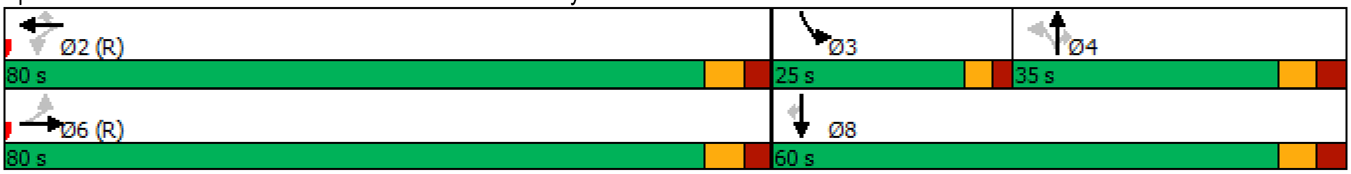
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	126	1166	87	643	161	57	221	117	421	585	192
Future Volume (vph)	126	1166	87	643	161	57	221	117	421	585	192
Lane Group Flow (vph)	126	1369	87	643	161	57	221	117	421	585	192
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6		2			4		3	8	
Permitted Phases	6		2		2	4		4			8
Detector Phase	6	6	2	2	2	4	4	4	3	8	8
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	35.0	35.0	35.0	35.0	35.0	44.3	44.3	44.3	13.0	44.3	44.3
Total Split (s)	80.0	80.0	80.0	80.0	80.0	35.0	35.0	35.0	25.0	60.0	60.0
Total Split (%)	57.1%	57.1%	57.1%	57.1%	57.1%	25.0%	25.0%	25.0%	17.9%	42.9%	42.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	2.0	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lead/Lag						Lag	Lag	Lag	Lead		
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min	Max	Max
Act Effct Green (s)	73.0	73.0	73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.20	0.20	0.20	0.14	0.38	0.38
v/c Ratio	0.37	0.78	0.97	0.36	0.19	0.46	0.32	0.32	0.88	0.46	0.27
Control Delay	23.8	30.3	121.9	20.5	3.0	62.9	49.4	23.4	78.9	34.4	4.8
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	23.8	30.3	121.9	20.5	3.0	62.9	49.4	23.4	78.9	34.4	4.8
LOS	C	C	F	C	A	E	D	C	E	C	A
Approach Delay		29.8		27.2			43.7			45.3	
Approach LOS		C		C			D			D	
Queue Length 50th (m)	20.1	153.8	22.4	53.6	0.0	14.1	27.8	10.9	59.5	63.9	0.0
Queue Length 95th (m)	36.5	183.0	#59.6	67.4	10.8	29.3	40.3	28.6	#85.1	80.8	15.4
Internal Link Dist (m)		940.6		1191.3			60.8			610.4	
Turn Bay Length (m)	130.0		105.0		230.0	125.0		65.0	115.0		95.0
Base Capacity (vph)	343	1764	90	1778	826	125	693	365	491	1272	703
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	0.37	0.78	0.97	0.36	0.19	0.46	0.32	0.32	0.86	0.46	0.27

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 140
Offset: 108 (77%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 35.2 Intersection LOS: D
Intersection Capacity Utilization 110.2% ICU Level of Service H
Analysis Period (min) 15

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

Splits and Phases: 1: Winston Churchill Boulevard & Royal Windsor Drive

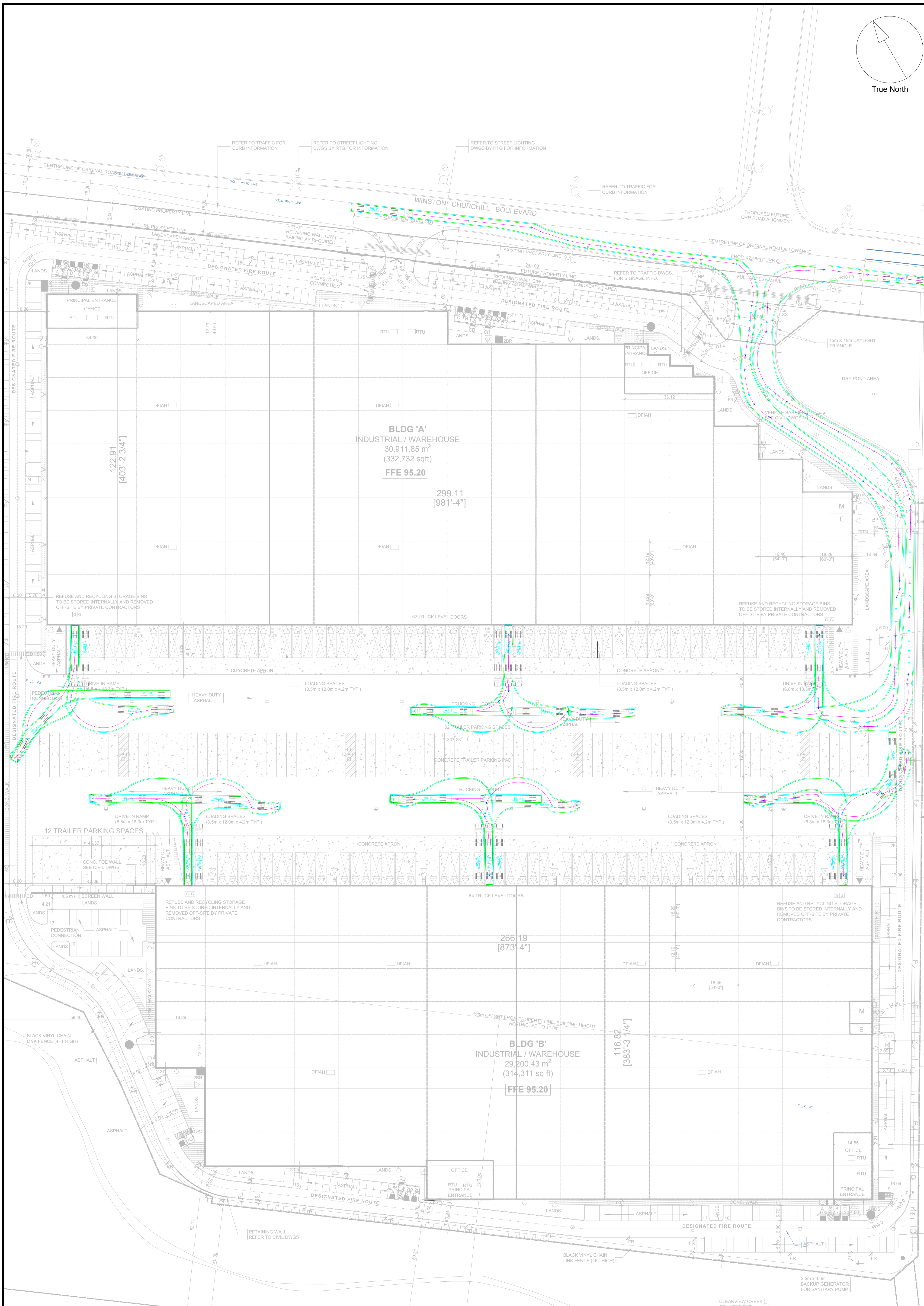


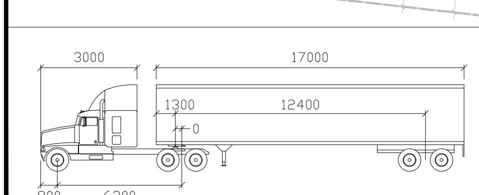
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
Future Volume (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1737	3363		1722	3411	1437	1372	3444	1537	3437	3380	1550
Flt Permitted	0.36	1.00		0.10	1.00	1.00	0.43	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	658	3363		173	3411	1437	623	3444	1537	3437	3380	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	1166	203	87	643	161	57	221	117	421	585	192
RTOR Reduction (vph)	0	10	0	0	0	77	0	0	56	0	0	120
Lane Group Flow (vph)	126	1359	0	87	643	84	57	221	61	421	585	72
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1
Heavy Vehicles (%)	5%	5%	11%	6%	7%	9%	33%	6%	4%	3%	8%	4%
Bus Blockages (#/hr)	0	0	1	0	0	7	0	0	2	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases		6			2			4		3	8	
Permitted Phases	6			2		2	4		4			8
Actuated Green, G (s)	73.0	73.0		73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Effective Green, g (s)	73.0	73.0		73.0	73.0	73.0	28.2	28.2	28.2	19.5	52.7	52.7
Actuated g/C Ratio	0.52	0.52		0.52	0.52	0.52	0.20	0.20	0.20	0.14	0.38	0.38
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.3	7.3	7.3	5.0	7.3	7.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	1753		90	1778	749	125	693	309	478	1272	583
v/s Ratio Prot		0.40			0.19			0.06		c0.12	c0.17	
v/s Ratio Perm	0.19			c0.50		0.06	0.09		0.04			0.05
v/c Ratio	0.37	0.78		0.97	0.36	0.11	0.46	0.32	0.20	0.88	0.46	0.12
Uniform Delay, d1	19.8	26.9		32.3	19.8	17.0	49.2	47.7	46.5	59.1	32.9	28.6
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	3.0	3.4		86.1	0.6	0.3	11.5	1.2	1.4	17.1	1.2	0.4
Delay (s)	22.8	30.3		118.4	20.3	17.3	60.7	48.9	47.9	76.2	34.1	29.0
Level of Service	C	C		F	C	B	E	D	D	E	C	C
Approach Delay (s)		29.7			29.4			50.3			48.1	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix I

Vehicle Swept Path Analysis





WB-20

mm

Tractor Width	: 2600	Lock to Lock Time	: 6.0
Trailer Width	: 2600	Steering Angle	: 28.2
Tractor Track	: 2600	Articulating Angle	: 70.0
Trailer Track	: 2600		

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FIGURE NAME
Transportation Maneuverability Plans - WB-20 Truck Site Circulation and Critical Loading Areas

FIGURE NO. 01
REVISION 02

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10mm
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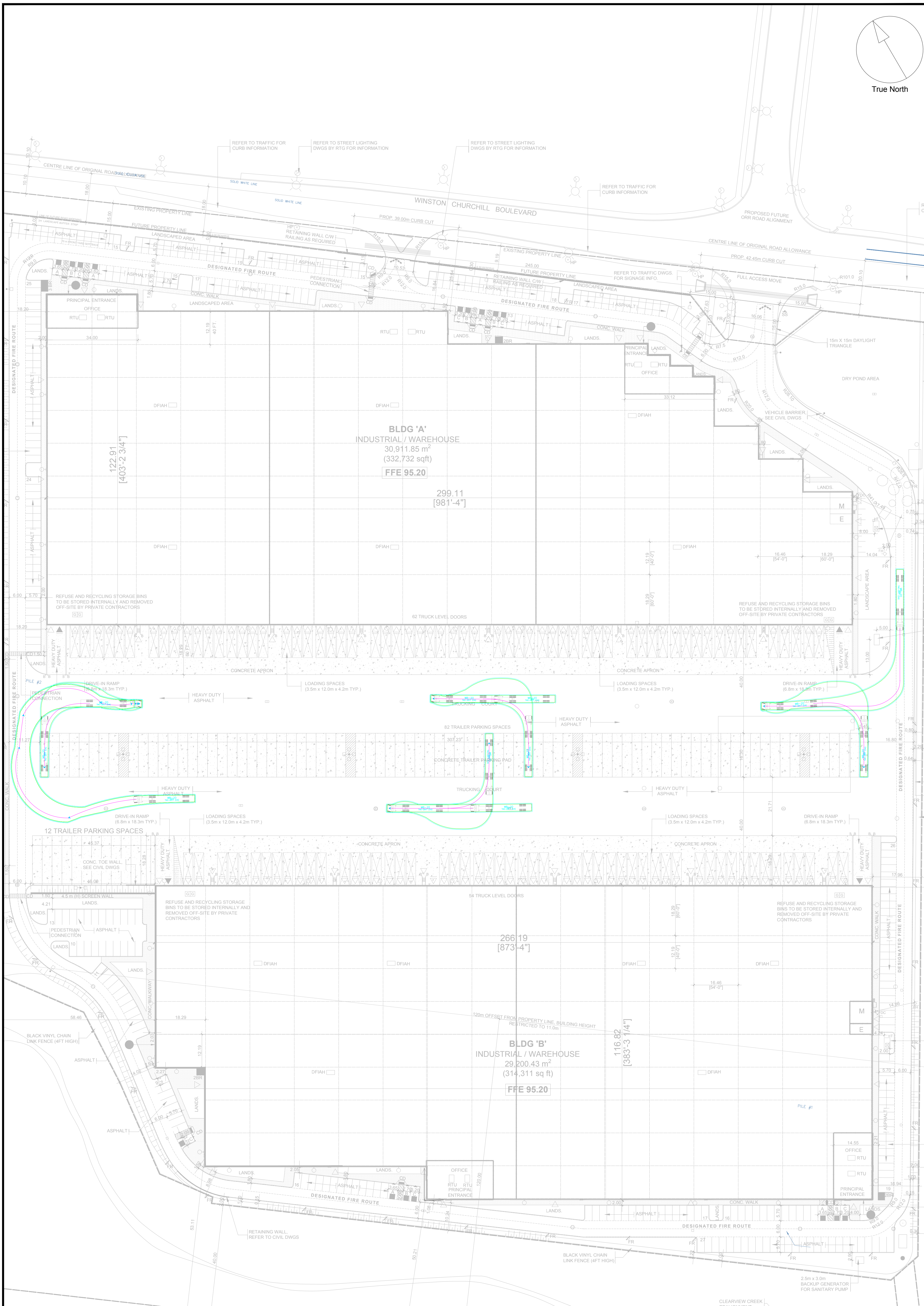
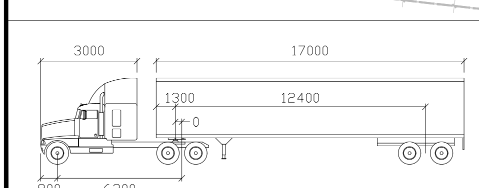
1 in





WB-20

mm

Tractor Width	: 2600	Lock to Lock Time	: 6.0
Trailer Width	: 2600	Steering Angle	: 28.2
Tractor Track	: 2600	Articulating Angle	: 70.0
Trailer Track	: 2600		

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FIGURE NAME
Transportation Maneuverability Plans - WB-20 Truck - Trailer Parking

FIGURE NO. 02
REVISION 02

10mm

SCALE CHECK
1 in

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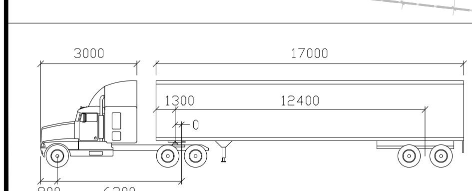

WB-20

mm

Tractor Width	: 2600	Lock to Lock Time	: 6.0
Trailer Width	: 2600	Steering Angle	: 28.2
Tractor Track	: 2600	Articulating Angle	: 70.0
Trailer Track	: 2600		

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FIGURE NAME
Transportation Maneuverability Plans - WB-20 Truck - Trailer Parking

FIGURE NO.	REVISION
03	02

10mm
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1 in

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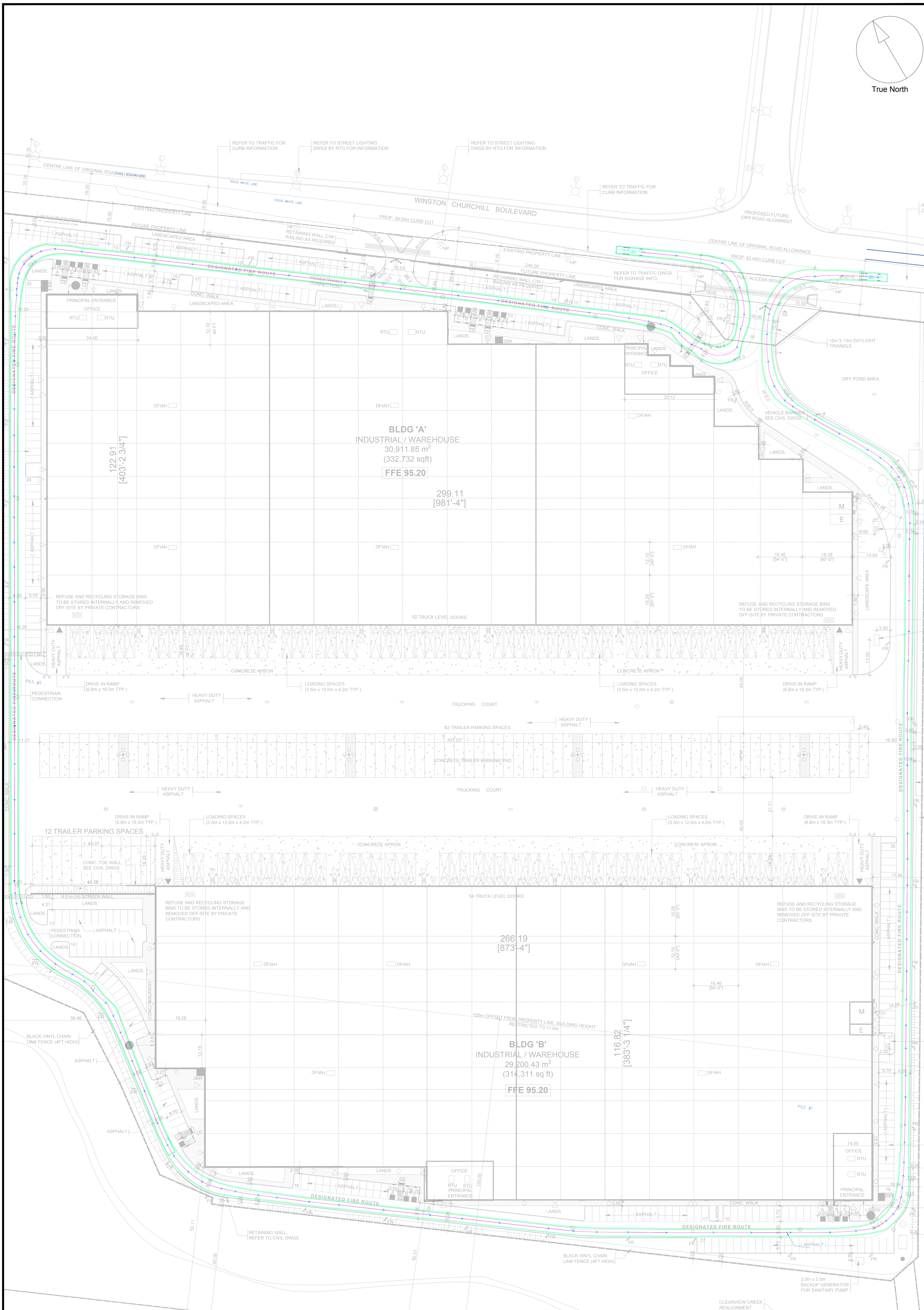

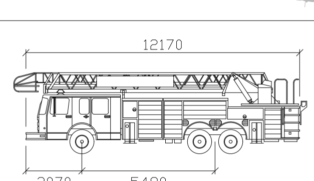

Typical Fire-Truck

	mm
Width	: 2540
Track	: 2540
Lock to Lock Time	: 6.0
Steering Angle	: 45.0

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FIGURE NAME
Transportation Maneuverability Plans - Typical Fire Truck - Site Circulation

FIGURE NO. 04
REVISION 02

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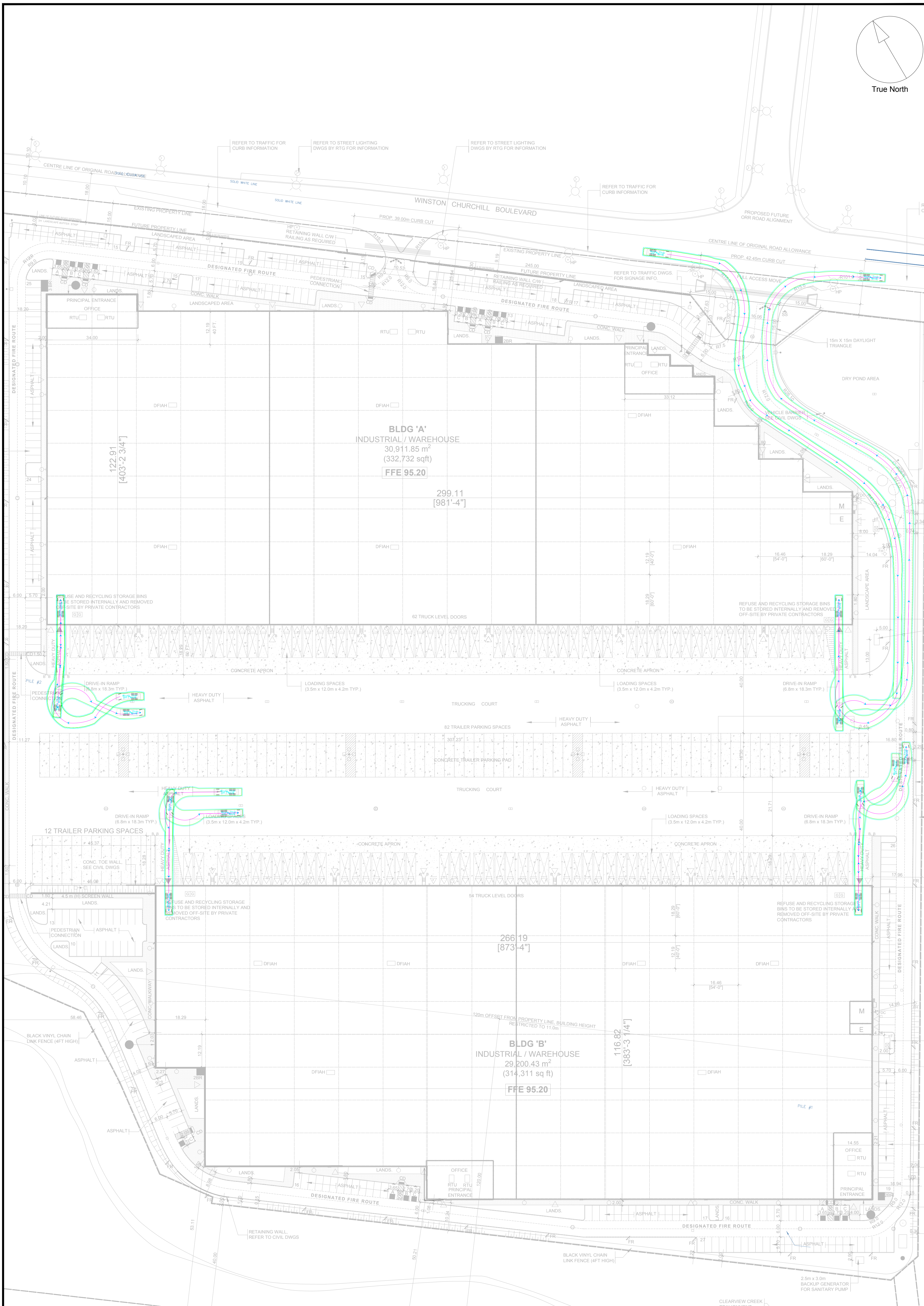

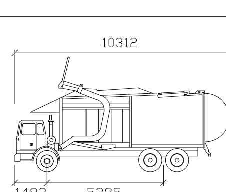

Wayne Titan

mm

Width : 2578
Track : 2438
Lock to Lock Time : 6.0
Steering Angle : 45.0

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FIGURE NAME
Transportation Maneuverability Plans - Wayne Titan - Waste Collection

FIGURE NO.	REVISION
05	02

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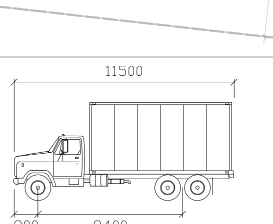

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PROJECT NO: 133556	

FIGURE NAME	FIGURE NO.	REVISION
Transportation Maneuverability Plans - HSU Truck - Drive-in Ramps	06	02

10mm

SCALE CHECK 1 in

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