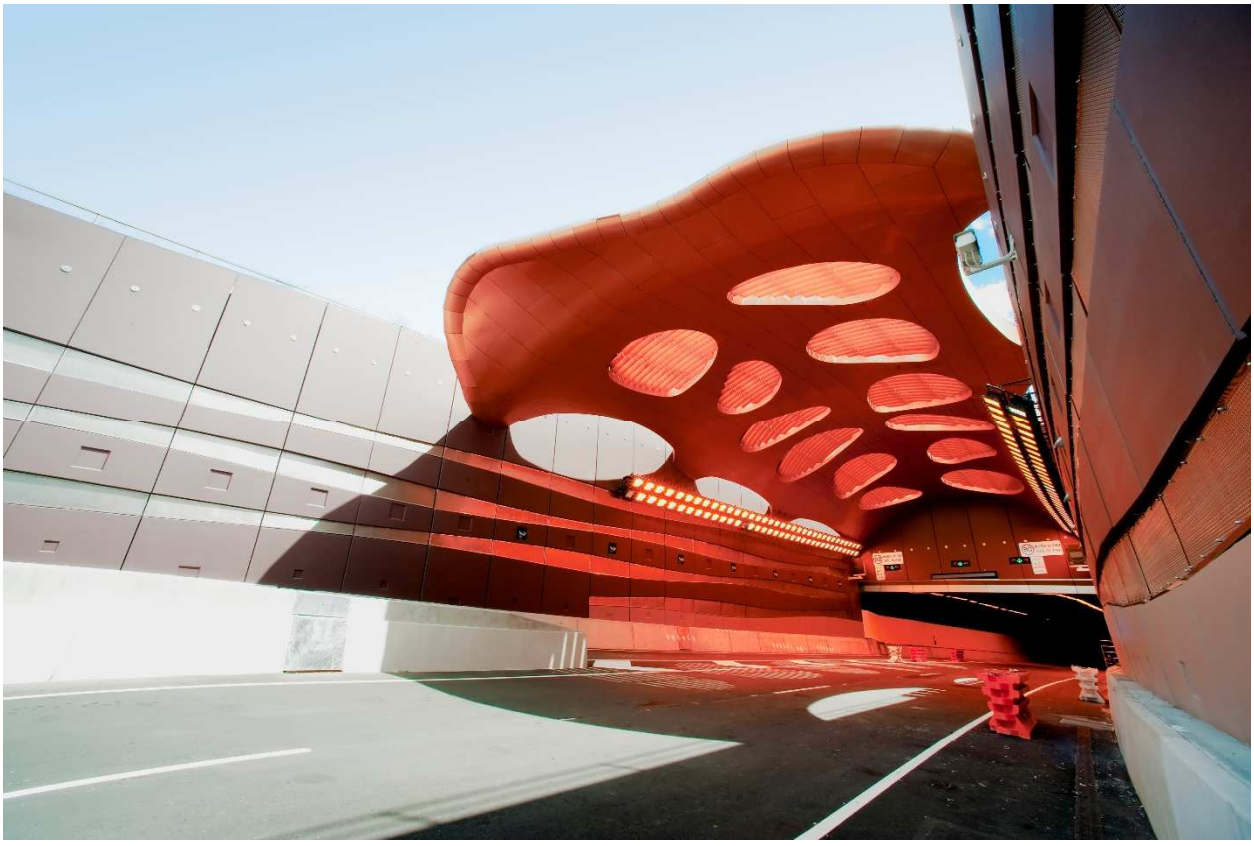
DUNPAR

PROPOSED RESIDENTIAL DEVELOPMENT AT 2620 CHALKWELL CLOSE, CITY OF MISSISSAUGA

TRANSPORTATION IMPACT STUDY

DECEMBER 14, 2023



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PROPOSED RESIDENTIAL DEVELOPMENT AT 2620 CHALKWELL CLOSE, CITY OF MISSISSAUGA

TRANSPORTATION IMPACT STUDY

DUNPAR

PROJECT NO.: CA0016714.5694
DATE: DECEMBER 2023

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December 14, 2023

Luke Johnston
Dunpar
105 Six Point Road
Etobicoke, ON M8Z 2X3

Subject: **Proposed Residential Development at 2620 Chalkwell Close, Mississauga**
Transportation Impact Study

Dear Mr. Johnston,

WSP Canada Inc. (WSP) is pleased to submit this Transportation Impact Study (TIS) for the proposed residential development located at 2620 Chalkwell Close in the City of Mississauga.

We have undertaken intersection capacity analyses of the study area. The proposed development is expected to generate 60 and 76 two-way vehicular trips during the weekday morning and afternoon peak hours, respectively. The traffic operations under future total conditions are very similar to those under background conditions and the projected future total analysis results are deemed acceptable from an intersection capacity perspective. There are no roadway improvements required.

The proposed site plan provided to WSP on December 8, 2023 and design vehicle simulations have been reviewed in accordance with the applicable standards. Recommendations made as part of the review are detailed in this report. It is our understanding that the outstanding recommendations will be addressed at in the next submission.

The proposed resident parking supply satisfies the Zoning By-law 0225-2007 requirements while the residential visitor parking does not. It is our opinion that the proposed parking supply is appropriate based on the site's transportation context, approved precedents in similar areas in Mississauga, and the recommended TDM measures. Detailed parking justification and a site-specific TDM plan are provided in this study.

We thank you for the opportunity to undertake this study. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,

David Lukezic, M.Eng., LEL, RPP
Project Manager

WSP ref.: CA0016714.5694

SIGNATURES

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1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Dunpar to prepare a Transportation Impact Study (TIS) in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) for the proposed residential development located at 2620 Chalkwell Close in the City of Mississauga. The site location and study are shown in **Figure 1-1**.

The site is located in the southeast corner of Sandgate park, bounded by the residential properties on Chalkwell Close and Karenza Road to the east and the residential properties on Truscott Drive to the south. Currently, the site is occupied by a public school (Elmcrest Public School) that has closed to students since 2016.

Based on the site plan provided to WSP on December 8, 2023, the development proposal involves redeveloping the existing school into 180 back-to-back townhouses. A total of 402 parking spaces are proposed for the development (401 spaces per recommendations in this study). Vehicular access to the proposed development will be provided via a private road extending into Chalkwell Close. The proposed site plan is shown in **Figure 1-2**.

A Terms of Reference (ToR) was circulated to the City of Mississauga and Region of Peel transportation staff prior to commencing the TIS and feedback from the City and Region was received. The ToR and the City and Region staff's responses are provided in **Appendix A**. Our study approach and findings are documented herein.

Figure 1-1
Site Location and Study Area

Figure 1-2
Site Plan

2 EXISTING TRANSPORTATION CONDITIONS

This section of the assessment describes the existing road network and traffic conditions within the study area.

2.1 BOUNDARY ROADWAYS

The following roadways make up the boundary road network that surrounds the subject site:

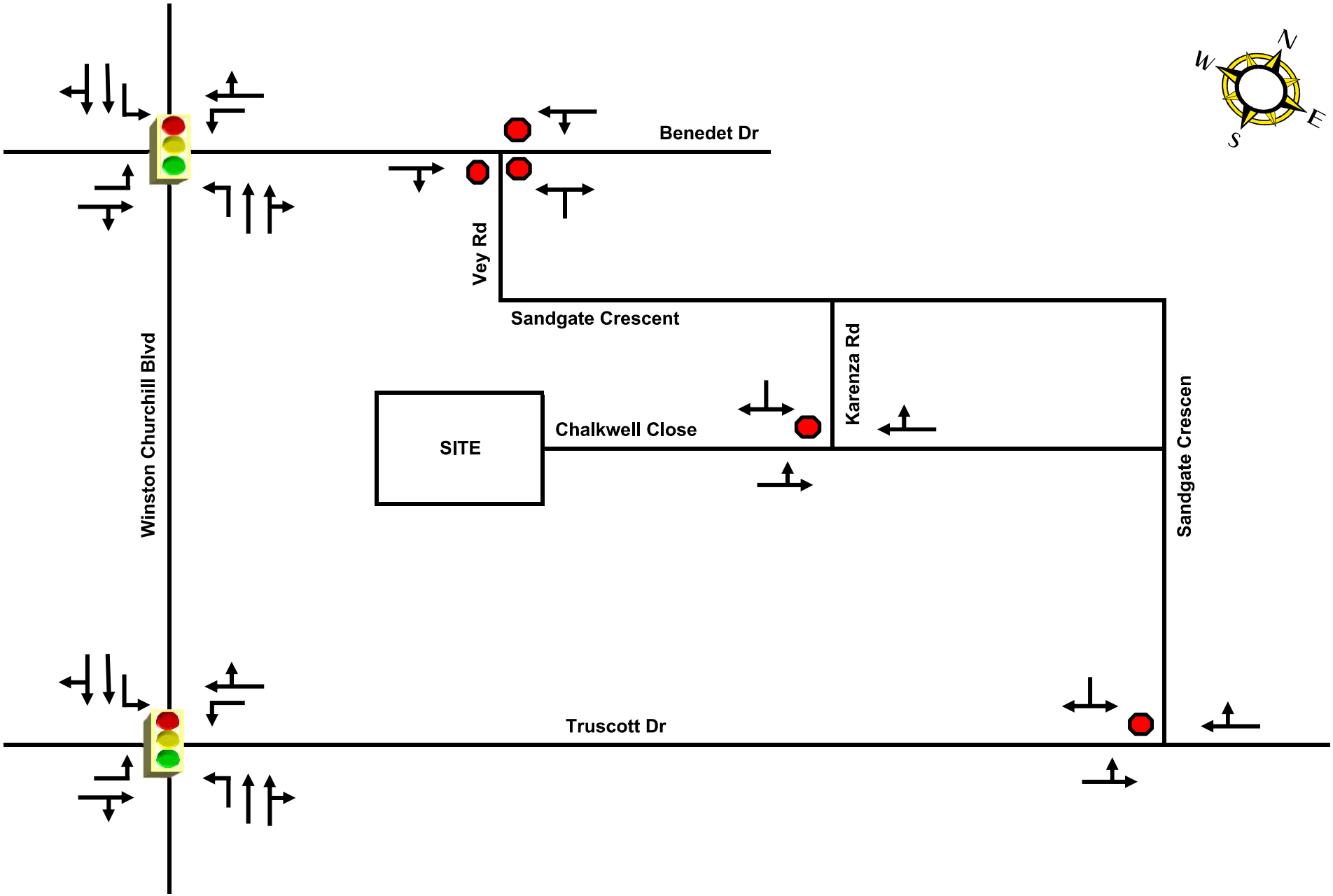
- **Winston Churchill Boulevard** is a north-south arterial road under the jurisdiction of the Region of Peel. Within the study area, Winston Churchill Boulevard has a four-lane cross-section with two through lanes in each direction and has auxiliary left-turn lanes at its intersections with other study roadways. This roadway has a posted speed limit of 60 km/h with sidewalks on both sides.
- **Benedet Drive** is an east-west collector road under the City of Mississauga's jurisdiction, which transitions into Sherwood Heights Drive west of Winston Churchill Boulevard. Benedet Drive has a two-lane cross-section with one through lane in each direction and has an auxiliary left-turn lane at its intersection with Winston Churchill Boulevard. This roadway has a posted speed limit of 40 km/h with sidewalks on the north side.
- **Sherwood Heights Drive** is an east-west collector road under the Town of Oakville's jurisdiction, which transitions into Benedet Drive east of Winston Churchill Boulevard. Sherwood Heights Drive has a four-lane cross-section east of South Sheridan Way with two lanes in each direction, including an auxiliary left-turn lane at its intersection with Winston Churchill Boulevard. This roadway has an unposted speed limit of 50 km/h with sidewalks on both sides.
- **Truscott Drive** is an east-west major collector road under the City of Mississauga's jurisdiction, which transitions into Kingsway Drive west of Winston Churchill Boulevard. Truscott Drive has a two-lane cross-section with one through lane in each direction and has an auxiliary left-turn lane at its intersection with Winston Churchill Boulevard. This roadway has a posted speed limit of 40 km/h with sidewalks on both sides.
- **Kingsway Drive** is an east-west major collector road under the Town of Oakville's jurisdiction, which transitions into Truscott Drive east of Winston Churchill Boulevard. Kingsway Drive has a two-lane cross-section with one through lane in each direction and has an auxiliary left-turn lane at its intersection with Winston Churchill Boulevard. This roadway has a posted speed limit of 50 km/h with bike lanes and sidewalks on both sides.
- **Chalkwell Close** is an east-west local road under the City of Mississauga's jurisdiction. Chalkwell Close has a two-lane cross-section with one through lane in each direction. This roadway has an unposted speed limit of 50 km/h with sidewalks on both sides.
- **Vey Road** is a north-south local road under the City of Mississauga's jurisdiction, connecting Benedet Drive to the north and Sandgate Crescent to the south. Vey Road has a two-lane cross-section with one through lane in each direction. This roadway has an unposted speed limit of 50 km/h with sidewalks on both sides.
- **Sandgate Crescent** is an open-loop-shaped local road under the City of Mississauga's jurisdiction. Sandgate Crescent has a two-lane cross-section with one lane in each direction. This roadway has an unposted speed limit of 50 km/h with sidewalks on both sides.
- **Karenza Road** is a north-south local road under the City of Mississauga's jurisdiction, connecting Sandgate Crescent to the north and Chalkwell Close to the south. Karenza Road has a two-lane cross-section with one

through lane in each direction. This roadway has an unposted speed limit of 50 km/h with sidewalks on both sides.

Based on the submitted ToR and the received feedback, the following existing intersections have been evaluated in this study:

- Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive (signalized);
- Winston Churchill Boulevard and Truscott Drive/Kingsway Drive (signalized);
- Benedet Drive and Vey Road (unsignalized);
- Truscott Drive and Sandgate Crescent (unsignalized); and
- Chalkwell Close and Karenza Road (unsignalized);

The existing lane configurations of the study road network are illustrated in **Figure 2-1**.



Legend

Traffic Signal

Stop Control

Lane Configuration

Figure 2-1
Existing lane Configuration

2.2 EXISTING TRANSIT SERVICE

The subject site is directly serviced by MiWay and Oakville Transit and can conveniently access GO Transit services via bus transfer or cycling. The existing transit network within the study area is described below and the local routes are illustrated in **Figure 2-2.**

MiWay

- **Route 29 (Park Royal-Homelands)** operates all day, every day and provides service between Clarkson GO Station and Erin Mills Station, generally in a north-south direction. Stops for this route closest to the site are along Truscott Drive near Sandgate Crescent. The headways of Route 29 during the weekday morning and afternoon peak periods are 36 minutes.
- **Route 45 (Winston Churchill)** operates all day, every day and provides service between Clarkson GO Station and Meadowvale Town Centre. Stops for this route closest to the site are located on Winston Churchill Boulevard at Benedet Drive and Winston Churchill Boulevard at Truscott Drive. The headways of Route 45 during the weekday morning and afternoon peak periods are approximately 40 minutes.

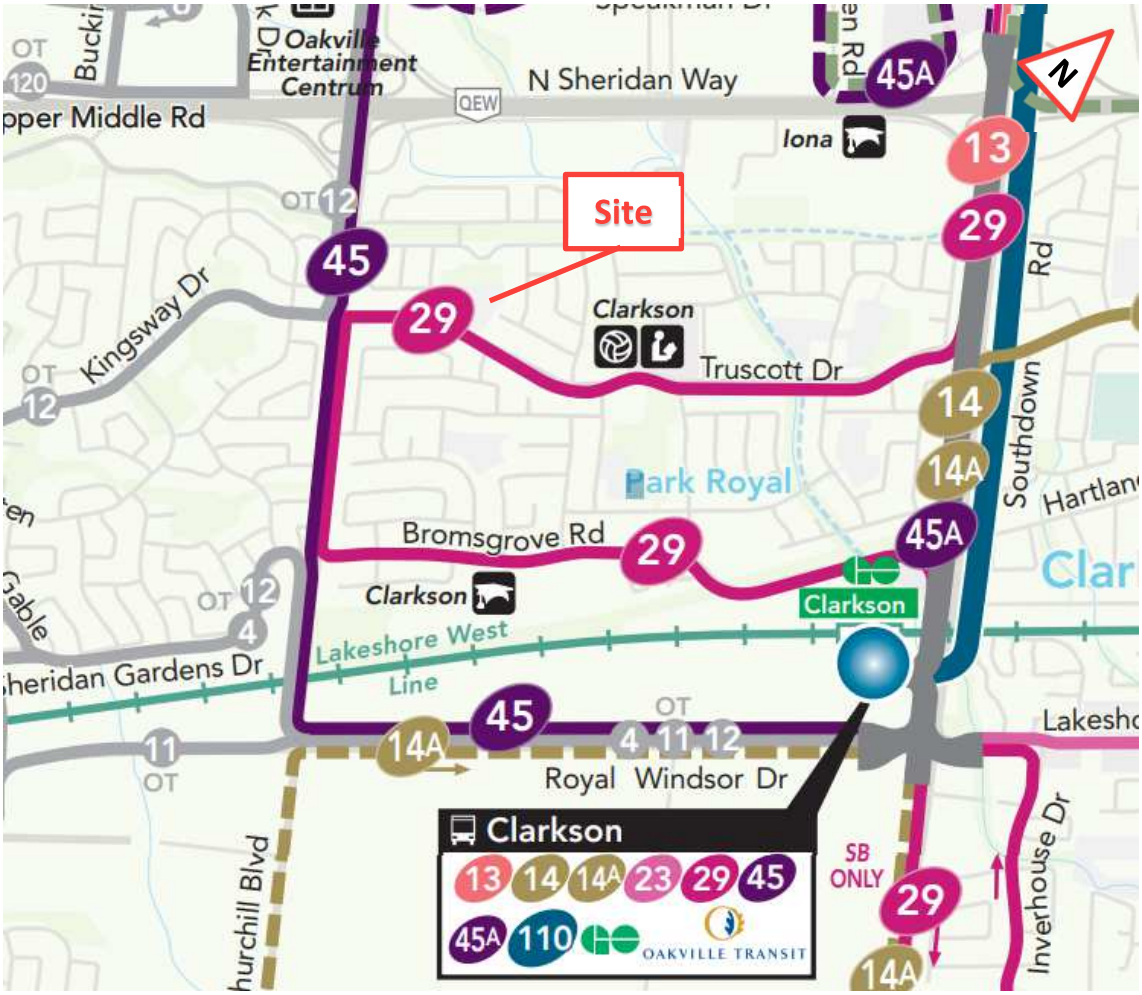
Oakville Transit

- **Route 12 (Winston Park)** operates on weekdays and provides service between Clarkson GO Station and the area of Laird Road and Ridgeway Drive, generally in a north-south direction. Stops for this route closest to the site are located on Winston Churchill Boulevard at Benedet Drive. The headways of Route 45 during the weekday morning and afternoon peak periods are approximately 30 minutes.

GO Transit

Clarkson GO is the closest GO Station to which is at a walking distance of approximately 2.6 kilometres from the site. As described above, the bus routes servicing the site have stops at Clarkson GO. Transit passengers from site can arrive at Clarkson GO Station within 16 to 20 minutes via a combination of walking and local bus or within seven to eight minutes via cycling (per Google Maps).

Figure 2-2: Existing Transit Network



Source: MiWay website, retrieved in November 2023.

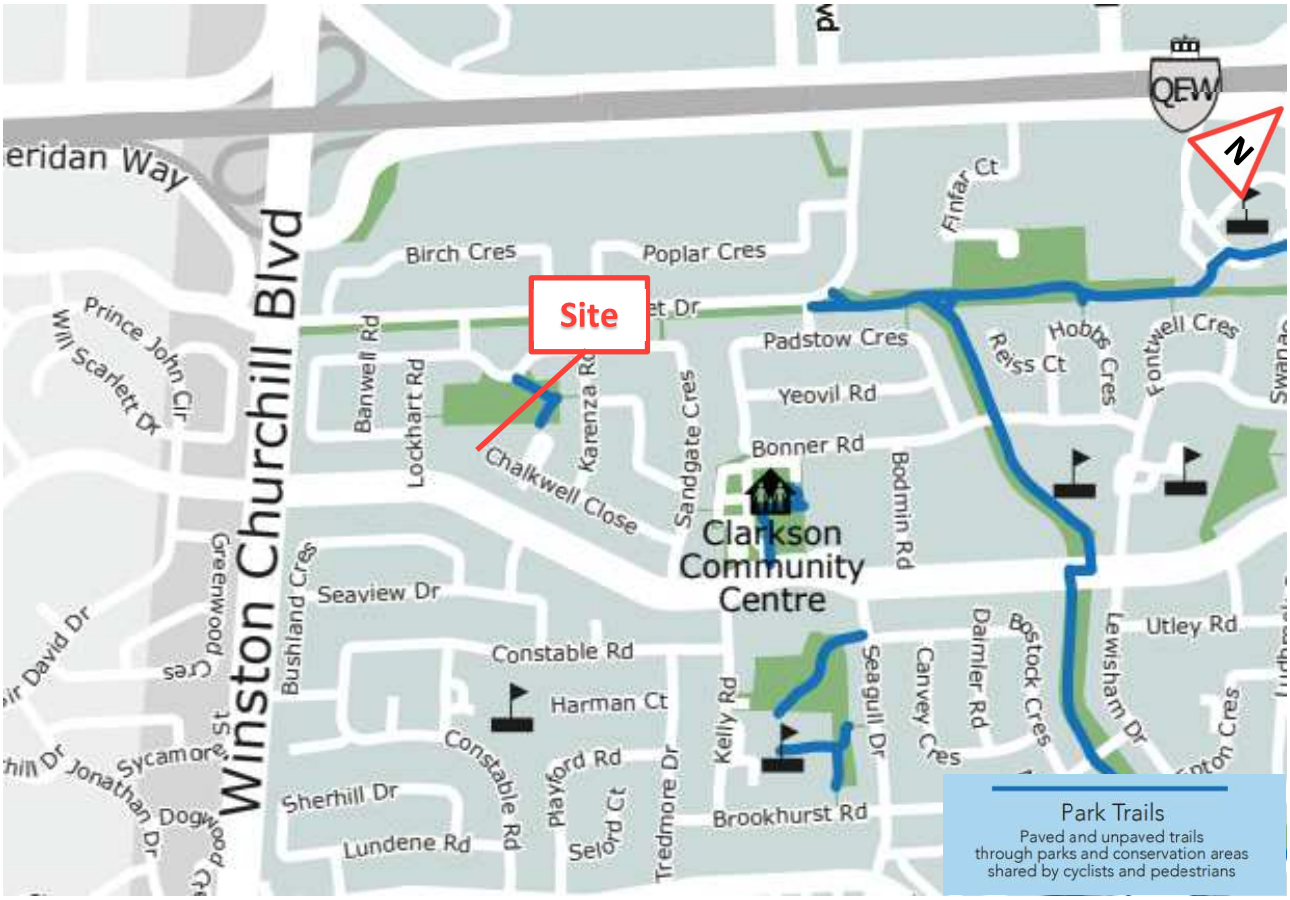
2.3 ACTIVE TRANSPORTATION FACILITIES

The area surrounding the subject site has well-developed pedestrian infrastructure. Most study roadways have pedestrian facilities in the form of sidewalks on both sides, except for Benedet Drive where sidewalks are provided only on the north side.

In terms of cycling, no roadway within the study areas has cycling facility provision, except for Kingsway Drive which has bike lanes in both directions. The study area has paved and unpaved park trails through parks and conservation area shared by cyclists and pedestrians.

The existing active transportation facility in the vicinity of the subject site is illustrated in **Figure 2-3.**

Figure 2-3: Active Transportation Network



Source: Mississauga Cycling Map, November 2023

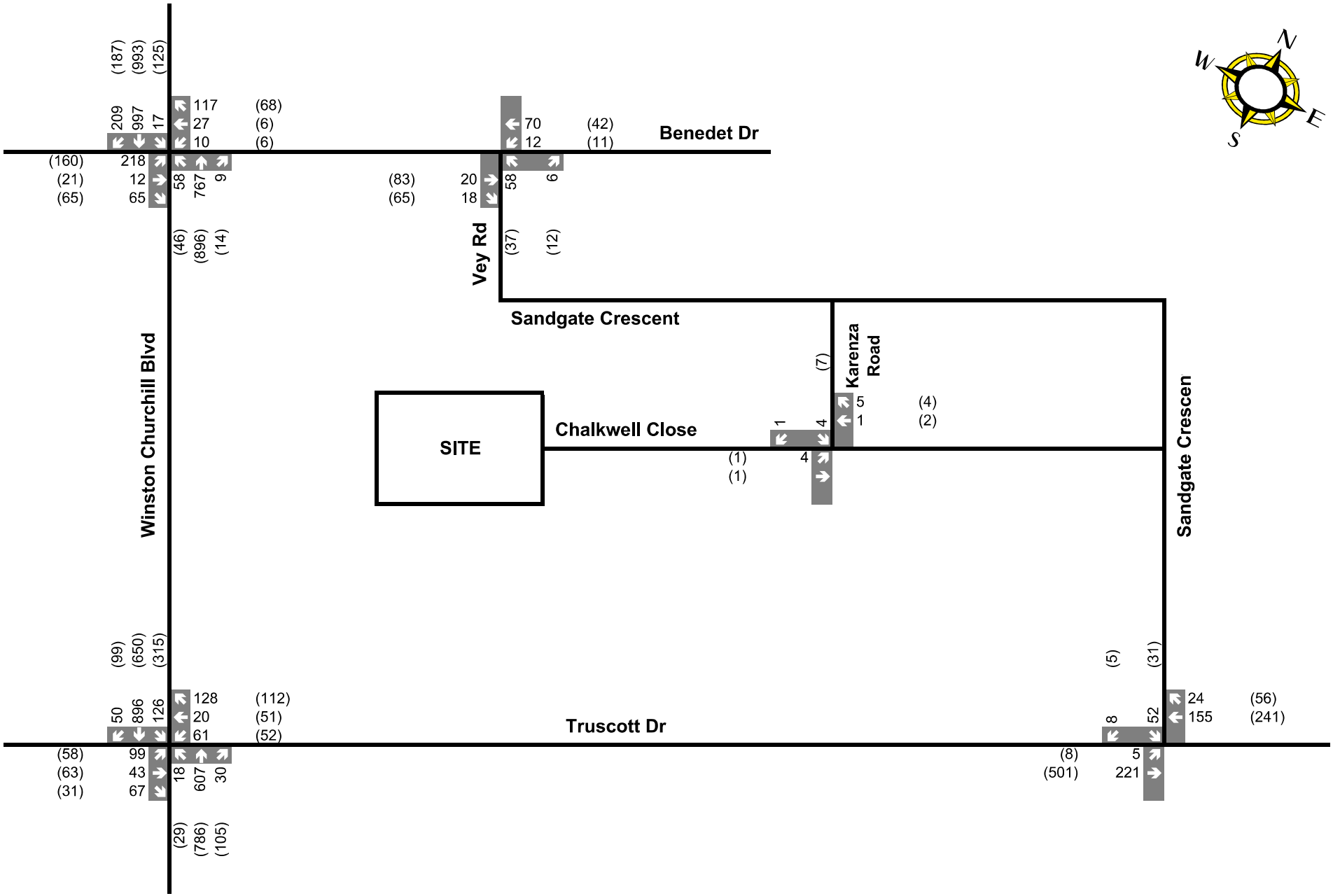
2.4 TRAFFIC DATA

WSP commissioned a third-party traffic collection firm (Horizon Data Services Ltd.) to collect existing turning movement counts (TMCs) at the study intersections during the weekday a.m. (7:00 to 9:00 a.m.), and p.m. (4:00 to 6:00 p.m.) peak periods. **Table 2-1** summarizes the TMCs collected for this study, as well as the source and date of the counts. Details of the existing TMCs are provided in **Appendix B**.

Table 2-1: Existing Traffic Data Information

Intersections	Date of the count	Source
Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive	Wednesday, November 08, 2023	Horizon Data Services Ltd.
Winston Churchill Boulevard and Truscott Drive/Kingsway Drive		
Benedet Drive and Vey Road		
Truscott Drive and Sandgate Crescent		
Chalkwell Close and Karenza Road		

The existing traffic volumes of the study network were established based on the surveyed TMCs, and link volumes were balanced where applicable. The existing traffic volumes during the weekday a.m. and p.m. peak hours are illustrated in **Figure 2-4**.



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 2-4
Existing Traffic Volumes

2.5 EXISTING TRAFFIC OPERATIONS

2.5.1 METHODOLOGY AND SYNCHRO PARAMETERS

METHODOLOGY

The operations of study intersections were analyzed using the Synchro 11 traffic analysis software, which incorporates the methodologies outlined in the Highway Capacity Manual (HCM), Transportation Research Board, 2000 and 2010. For this study, all reported results are based on the HCM 2000 methodologies as per the Region of Peel TIS requirements, unless otherwise noted. Intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity ratio (v/c) and delays for individual movements at an intersection. Level of Service (LOS) denoted by the letters 'A' through 'D' represents satisfactory traffic operations. LOS denoted by the letters 'E' and 'F' represents congested traffic conditions. The Level of Service definitions for signalized and unsignalized intersections are included in **Appendix C**.

SYNCHRO INPUT PARAMETERS

The Synchro input parameters used in the analysis were established in accordance with the applicable guidelines from the City of Mississauga, Region of Peel, and MTO. The key Synchro input parameters are listed below:

- Heavy vehicle percentages, pedestrian and cyclist volumes were based on the respective traffic surveys;
- Bus blockages were incorporated based on available scheduling information from the MiWay and Oakville Transit websites;
- A peak hour factor (PHF) of 1.0 was applied to all movements at the regional intersections per Peel Region Guidelines for Using Synchro and a peak hour factor (PHF) 0.92 was applied to all movements at the city intersections per City of Mississauga TIS Guidelines;
- A lane width of 3.7 metres was used for all through lanes and a width of 3.5 metres was used for all auxiliary turn lanes per Peel Region Guidelines for Using Synchro;
- A default ideal saturation flow rate of 1,900 vehicles per hour per lane was applied to all movements at the study intersections; and
- Latest signal timing plans were acquired from the Region (see **Appendix B**).

2.5.2 EXISTING INTERSECTION CAPACITY ANALYSIS

Traffic operations were analyzed at the study intersections to determine the existing LOS during the weekday a.m. and p.m. peak hours. The results of the intersection capacity analysis under existing conditions are summarized in **Table 2-2**. Detailed Synchro analysis worksheets are provided in **Appendix D**.

Table 2-2: Existing Intersection Capacity Analysis

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Signalized Intersections[1]				
Winston Churchill Blvd. & Benedet Dr./ Sherwood Heights Dr.	C (22)	-	C (24)	-
Winston Churchill Blvd. & Truscott Dr./ Kingsway Dr	B (13)	-	C (20)	-
Unsignalized Intersections[2]				
Benedet Dr. & Vey Rd. (AWSC)	A (8)	-	A (8)	-
Truscott Dr. & Sandgate Cres. (TWSC)	SB-LR B (12)	-	SB-LR C (16)	-
Chalkwell Close & Karenza Rd. (TWSC)	SB-LR A (9)	-	SB-LR A (9)	-

1 For signalized intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with values over 0.85.

2 For two-way stop-controlled intersections, overall level of service is based on the delay associated with the most critical movement. For all-way stop-controlled intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with LOS 'E' or 'F'.

As shown in **Table 2-2**, both signalized and unsignalized study intersections operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours under existing conditions with no critical movements. There are no constraints at the study intersections from a traffic capacity perspective.

2.5.3 QUEUING ASSESSMENT

Based on the results of the existing Synchro traffic analysis, **Table 2-3** shows the 50th and 95th percentile queue lengths for movements with exclusive turning lanes. The detailed queuing reports are provided in **Appendix D.**

Table 2-3: Existing Queuing Analysis

Intersection	Movement (Storage Length)[1]	50th Percentile Queue (95th Percentile Queue)	
		A.M. Peak Hour	P.M. Peak Hour
Winston Churchill Blvd. & Benedet Dr./Sherwood Heights Dr.	EB-L (60m)	54m (59m)	31m (48m)
	WB-L (40m)	3m (7m)	1m (5m)
	NB-L (85m)	5m (30m)	11m (24m)
	SB-L (120m)	1m (7m)	17m (27m)
Winston Churchill Blvd. & Truscott Dr/Kingsway Dr.	EB-L (50m)	28m (43m)	17m (28m)
	WB-L (20m)	17m (27m)	15m (24m)
	NB-L (80m)	1m (5m)	2m (10m)
	SB-L (110m)	1m (3m)	64m (117m)

1 Measured using Google Earth; available link distance was used when no storage lane; values rounded to the nearest five metres.

The results above show that the 95th percentile queues of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive exceed available storage lengths during the weekday a.m. and/or p.m. peak hours under existing conditions. It is deemed acceptable since the associated 50th percentile queues are well-within storage, meaning the queues can be adequately accommodated by the existing storage in an average cycle.

3 FUTURE BACKGROUND CONDITIONS

This section of our assessment describes the method of deriving future background traffic, the future transportation network plus the results of our future background traffic analysis within the study area.

3.1 TIME FRAME

The proposed development is assumed to be fully built out in one phase within a five-year time span (2028). The proposed future horizon years for this study are 2028 and 2033 which are the buildout year and five- year post-buildout horizons. All study intersections have been evaluated in the 2028 horizon and only the regional study intersections (along Winston Churchill Boulevard) have been evaluated in the 2033 horizon. The proposed horizon years and study area were confirmed by the City and Region staff through the ToR.

3.2 PLANNED TRANSPORTATION IMPROVEMENTS

According to the City of Mississauga 2018 Cycling Master Plan, bike lanes are proposed along Winston Churchill Boulevard and Truscott Drive, and multi-use trails are proposed along Benedet Drive. However, there are currently no known details regarding the implementation of these proposed active transportation improvements.

Based on the City and Region's responses to the ToR, we understand there are no roadway improvements planned within the study horizons that would impact traffic analysis.

3.3 BACKGROUND TRAFFIC GROWTH

WSP requested the general corridor growth rate information from the Region and per the Region's estimation, the annual growth rate along Winston Churchill Boulevard in the study area (between Benedet Drive and Stockholm Road) is 0.5 percent. Therefore, WSP applied an annual growth rate of 0.5 percent to the through movements along Winston Churchill Boulevard. The growth rate estimation obtained from the Region is provided in **Appendix E**.

A general traffic growth rate of 0.5 percent per annum was applied to the through movements along the study roadways. It is a conservative assumption because the area is mostly developed, and the other study roadways are lower-tier roads (local and collector) that are not expected to carry much of non-local traffic.

No background developments were included as part of the analysis based on the City's responses to the ToR.

3.4 FUTURE BACKGROUND TRAFFIC OPERATIONS

The 2028 and 2033 future background traffic forecasts corresponding to the weekday a.m. and p.m. peak hours were derived by applying the general growth rates to the existing traffic volumes. The resulting future background traffic volumes for the 2028 and 2033 horizons are illustrated in **Figure 3-1** and **Figure 3-2**, respectively. As noted previously, the future background traffic forecasts and analysis for 2033 include only the regional intersections (i.e., Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive and Winston Churchill Boulevard and Truscott Drive/Kingsway Drive).

3.4.1 2028 FUTURE BACKGROUND INTERSECTION CAPACITY ANALYSIS

Based on the 2028 future background traffic volumes shown in **Figure 3-1**, the intersection capacity analysis results are summarized in **Table 3-1**. Detailed Synchro worksheets are provided in **Appendix F**. Signal timings were unchanged from existing conditions.

Table 3-1: 2028 Future Background Intersection Capacity Analysis

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Signalized Intersections[1]				
Winston Churchill Blvd. & Benedet Dr./ Sherwood Heights Dr.	C (22)	-	C (25)	-
Winston Churchill Blvd. & Truscott Dr./ Kingsway Dr	B (13)	-	C (21)	-
Unsignalized Intersections[2]				
Benedet Dr. & Vey Rd. (AWSC)	A (8)	-	A (8)	-
Truscott Dr. & Sandgate Cres. (TWSC)	SB-LR B (12)	-	SB-LR C (17)	-
Chalkwell Close & Karenza Rd. (TWSC)	SB-LR A (9)	-	SB-LR A (9)	-

1 For signalized intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with values over 0.85.

2 For two-way stop-controlled intersections, overall level of service is based on the delay associated with the most critical movement. For all-way stop-controlled intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with LOS 'E' or 'F'.

Similar to the existing conditions, the signalized study intersections are projected to operate at overall LOS 'C' or better during the weekday a.m. and p.m. peak hours under the 2028 future background conditions with no critical movements. The maximum incremental increase in overall delay is one second.

The unsignalized study intersections are projected to operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours with no issues.

3.4.2 QUEUING ASSESSMENT - 2028

Based on the results of the 2028 future background Synchro traffic analysis, **Table 3-2** shows the forecasted 50th and 95th percentile queue lengths for movements with exclusive turning lanes. The detailed queuing reports are provided in **Appendix F**.

Table 3-2: 2028 Future Background Queuing Analysis

Intersection	Movement (Storage Length)[1]	50th Percentile Queue (95th Percentile Queue)	
		A.M. Peak Hour	P.M. Peak Hour
Winston Churchill Blvd. & Benedet Dr./Sherwood Heights Dr	EB-L (60m)	54m (59m)	31m (48m)
	WB-L (40m)	3m (7m)	1m (5m)
	NB-L (85m)	5m (30m)	11m (25m)
	SB-L (120m)	1m (7m)	17m (27m)
Winston Churchill Blvd. & Truscott Dr./Kingsway Dr.	EB-L (50m)	28m (43m)	17m (28m)
	WB-L (20m)	17m (27m)	15m (24m)
	NB-L (80m)	1m (5m)	2m (10m)
	SB-L (110m)	1m (3m)	64m (118m)

1 Measured using Google Earth; available link distance was used when no storage lane; values rounded to the nearest five metres.

Similar to the existing conditions, the 95th percentile queues of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive are projected to exceed available storage lengths during the weekday a.m. and/or p.m. peak hours under 2028 future background conditions. As rationalized previously, it is considered acceptable since the forecasted queues can still be adequately accommodated by the existing storage in an average cycle.

3.4.3 2033 FUTURE BACKGROUND INTERSECTION CAPACITY ANALYSIS

Based on the 2033 future background traffic volumes shown in **Figure 3-2**, the intersection capacity analysis results are summarized in **Table 3-3**. Detailed Synchro worksheets are provided in **Appendix F**. Signal timings were unchanged from existing conditions.

Table 3-3: 2033 Future Background Intersection Capacity Analysis

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Signalized Intersections[1]				
Winston Churchill Blvd. & Benedet Dr./ Sherwood Heights Dr.	C (22)	-	C (25)	-
Winston Churchill Blvd. & Truscott Dr./ Kingsway Dr	B (13)	-	C (21)	-

1 For signalized intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with values over 0.85.

The signalized study intersections are projected to operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours under the 2033 future background conditions without any critical movements. The results are very similar to the 2028 background conditions.

Overall, there are no constraints under future background conditions from an intersection capacity perspective.

3.4.4 QUEUING ASSESSMENT - 2033

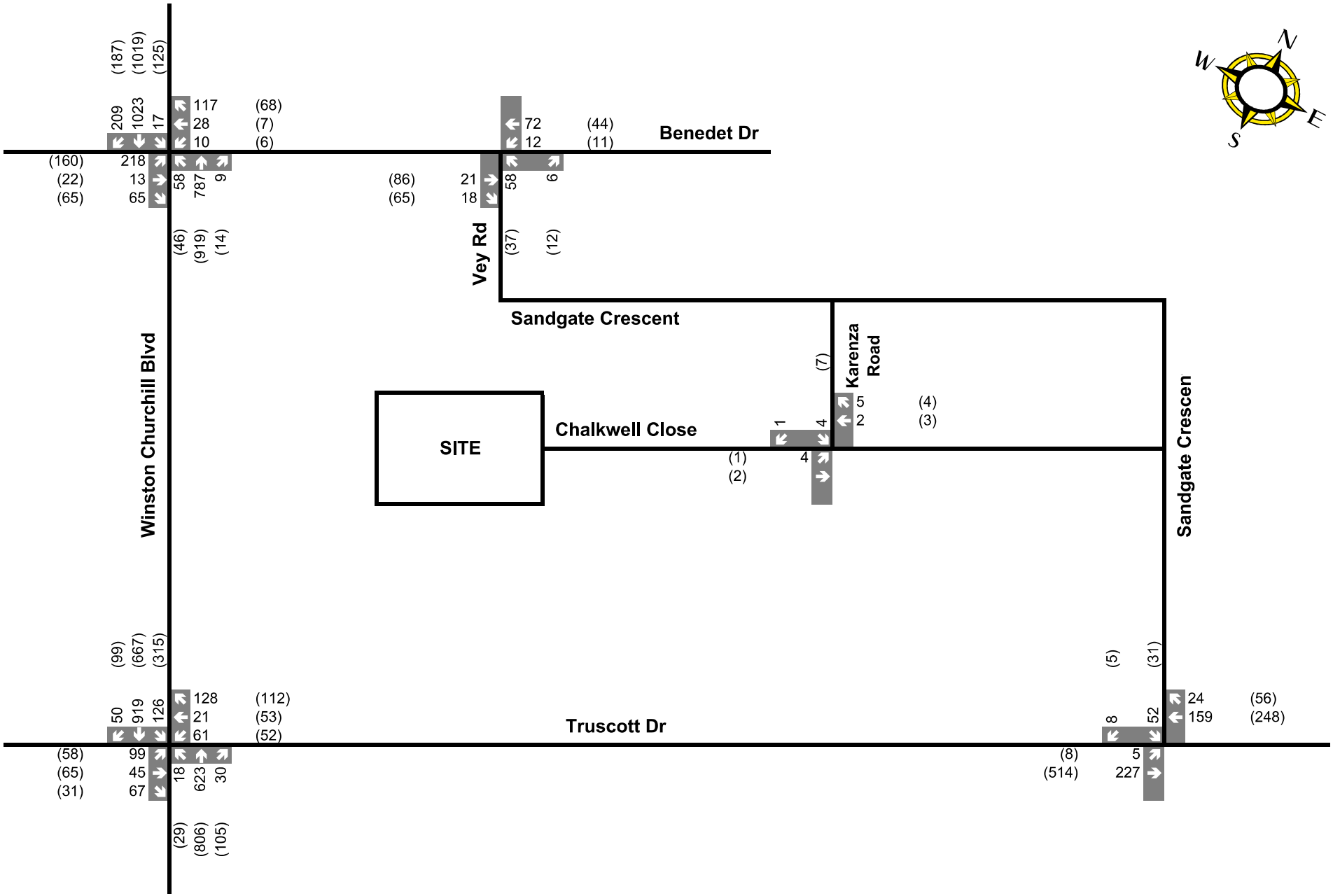
Based on the results of the 2033 future background Synchro traffic analysis, **Table 3-4** shows the 50th and 95th percentile queue lengths for movements with exclusive turning lanes. The detailed queuing reports are provided in **Appendix F**.

Table 3-4: 2033 Future Background Queuing Analysis

Intersection	Movement (Storage Length)[1]	50th Percentile Queue (95th Percentile Queue)	
		A.M. Peak Hour	P.M. Peak Hour
Winston Churchill Blvd. & Benedet Dr./Sherwood Heights Dr.	EB-L (60m)	54m (59m)	31m (48m)
	WB-L (40m)	3m (7m)	1m (5m)
	NB-L (85m)	6m (31m)	11m (24m)
	SB-L (120m)	1m (7m)	17m (27m)
Winston Churchill Blvd. & Truscott Dr./Kingsway Dr.	EB-L (50m)	28m (43m)	17m (28m)
	WB-L (20m)	17m (27m)	15m (24m)
	NB-L (80m)	1m (5m)	2m (10m)
	SB-L (110m)	1m (3m)	64m (118m)

1 Measured using Google Earth; available link distance was used when no storage lane; values rounded to the nearest five metres.

Same as before, most forecasted 95th percentile queues can be contained within the available storage during the weekday a.m. and p.m. peak hours under 2033 future background conditions, except for the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive. This is not a concern since the forecasted average queues are within the existing storage length.



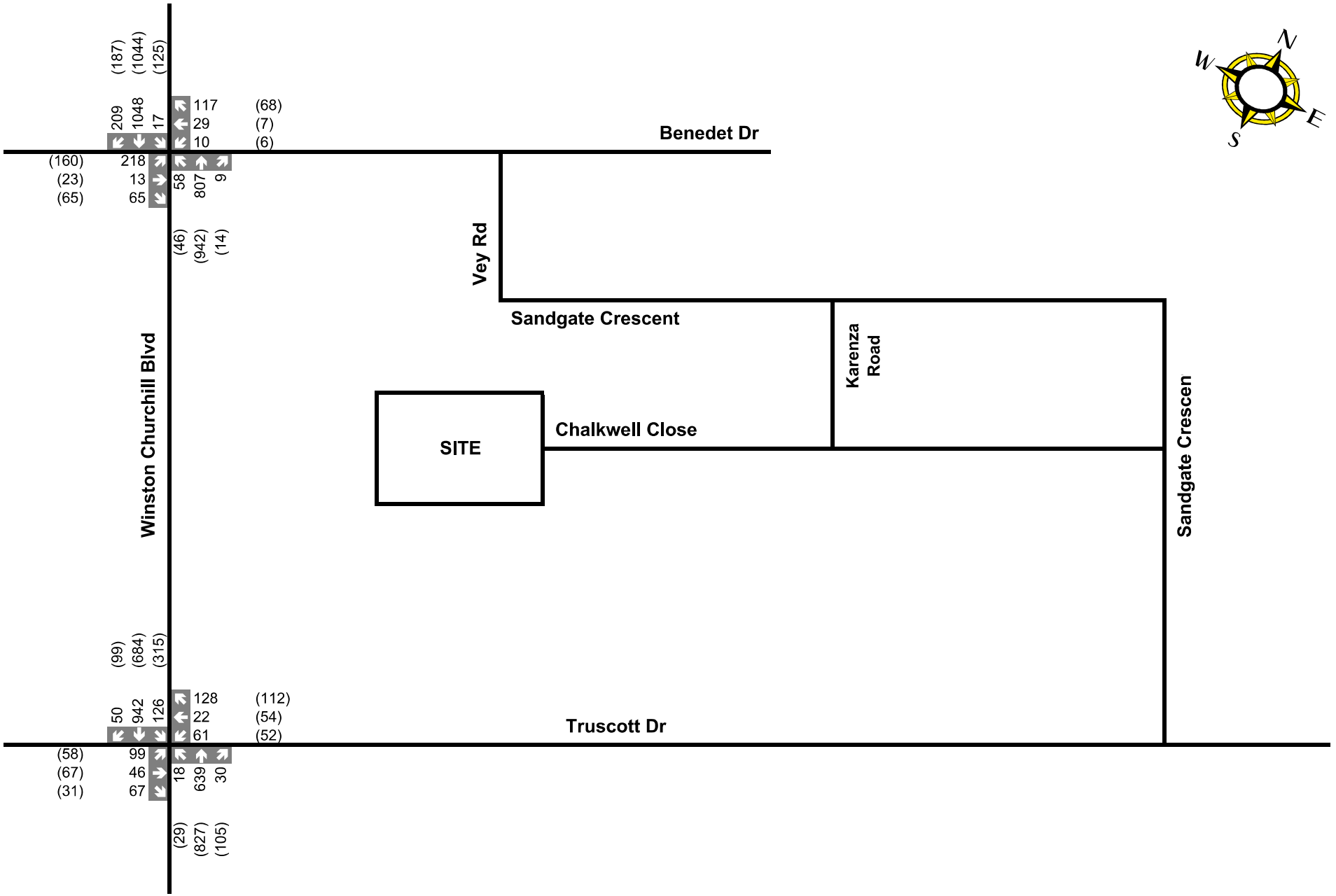
Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 3-1

2028 Future Background Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 3-2

2033 Future Background Traffic Volumes

4 SITE-GENERATED TRAFFIC

This section of our study describes the methodology for site traffic generation, distribution, and assignment.

4.1 SITE ACCESSES

As described in **Section 1**, vehicular access to the proposed residential building will be provided via a private roadway that extends into Chalkwell Close. The future total lane configurations of the study intersections are consistent with the future background conditions.

4.2 MODAL SPLITS AND TRIP GENERATION

Vehicular trips generated by the proposed development have been established in accordance with the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. Land Use Code (LUC) 215 – Single-Family Attached Housing was selected to calculate the new site trip generation.

Non-automobile trip reductions were applied to the calculation of trip generation. In order to determine the proportion of trips made by automobiles (including passengers), travel data from the 2016 Transportation Tomorrow Survey (TTS) database were examined. Home-based data was extracted from the TTS database for Traffic Analysis Zone 3614 where the subject site is located, which allows a representative sample of trip distribution and mode characteristics for residents in the area. The TTS modal splits for the peak directions in the study area are summarized in **Table 4-1** and the associated TTS queries are provided in **Appendix G**.

Table 4-1: Area Modal Split Percentages

Mode	Inbound[1]	Outbound[1]
Auto Driver	71.0%	49.4%
Auto Passenger	3.4%	11.2%
Transit (including GO Transit)	11.9%	8.7%
Rail Transit	9.0%	11.7%
Walking and Cycling	4.7%	19.1%
Non-Auto Modes	**25.6%**	**39.4%**

1 Based on home-based trip peak directions: a.m. outbound and p.m. inbound.

The vehicular trips generated by the proposed development during the weekday a.m. and p.m. peak hours are calculated in **Table 4-2**.

Table 4-2: Proposed Development Trip Generation

Land Use (Units)	Parameter	A.M. Peak Hour			P.M. Peak Hour		
		In	Out	Total	In	Out	Total
Proposed Back-to-Back Townhouses. (180 units)	Trip Generation Basis[1] (per unit)	T = 0.52 (X) – 5.7			T = 0.6 (X) – 3.93		
	Directional Distribution	25%	75%	100%	59%	41%	100%
	ITE Trips	22	66	88	61	43	104
	Modal Split Reduction Percentage[2]	21%	34%	-	21%	34%	-
	Modal Split Reduction	-5	-23	-28	-13	-15	-28
	Net Vehicular Trips	**17**	**43**	**60**	**48**	**28**	**76**

1 Based on LUC 215 – Single-Family Attached Housing. Not Close to Rail Transit from ITE.
2 ITE assumption of a five-percent non-vehicular trip rate considered. Modal split reduction based on the peak direction percentage.

As shown in the table above, the proposed development is estimated to generate 60 and 76 two-way auto trips during the weekday a.m. and p.m. peak hours, respectively.

4.3 TRIP DISTRIBUTION AND ASSIGNMENT

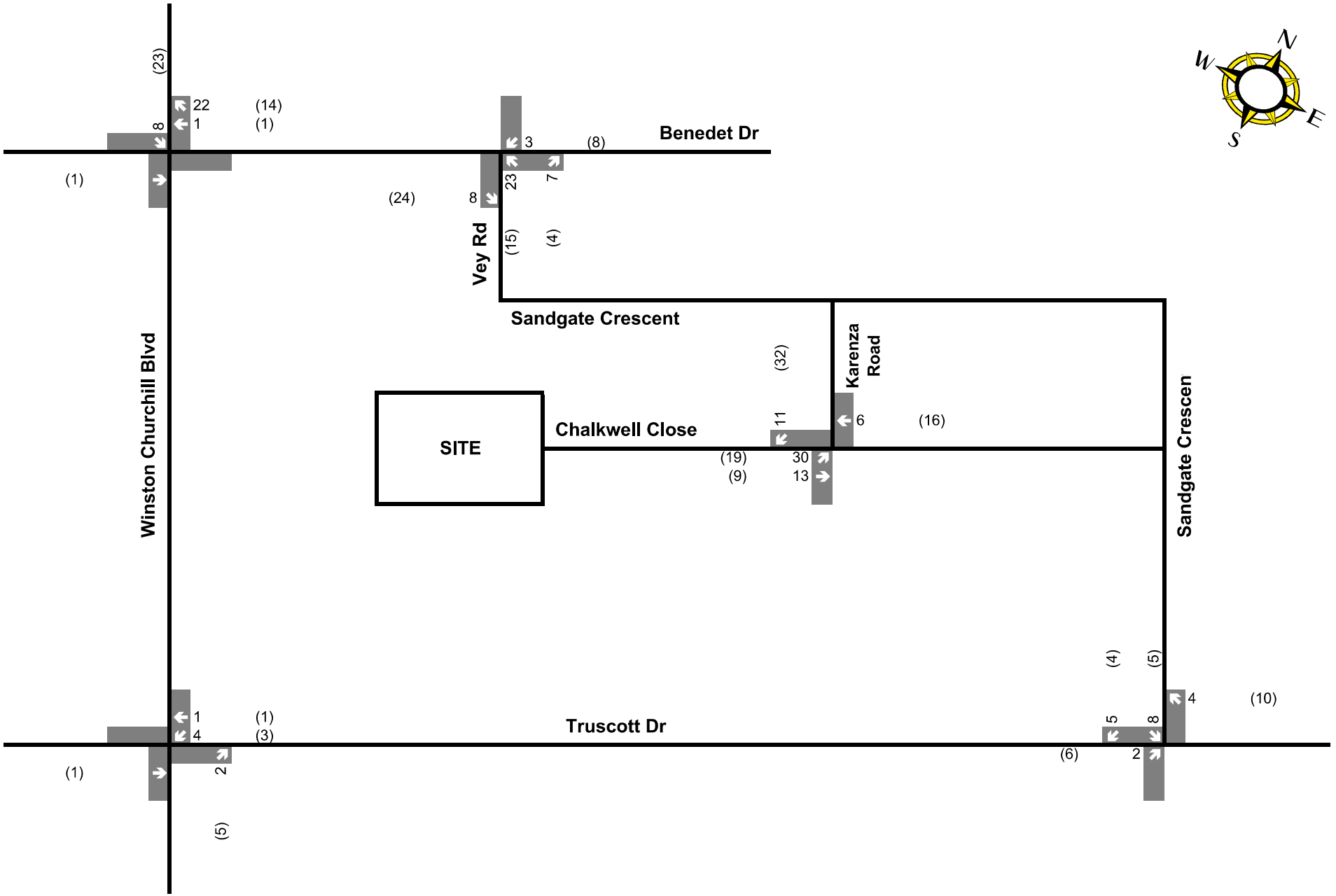
The projected site trip distribution was developed based on the existing distribution patterns according to the 2016 TTS database for home-based trips, using the same zones for determining area modal splits. **Table 4-3** summarizes the derived trip distribution in peak directions (a.m. outbound and p.m. inbound). The associated TTS data is provided in **Appendix G**. The TTS trip distribution percentages were slightly adjusted based on existing TMC patterns and rounded to the nearest five percent.

Table 4-3: Site Trip Distribution Summary

Direction	Inbound Distribution	Outbound Distribution
North	25%	25%
South	5%	5%
East	50%	50%
West	20%	20%
Total	100%	100%

1 Based on home-based trip peak directions: a.m. outbound and p.m. inbound.

Using the assessment in **Table 4-3**, the site-generated traffic was assigned to individual movements within the study area based on factors such as site access locations, ease of turning, shortest distances, the convenience of route choices and intersection configurations. The site traffic assignment during weekday a.m. and p.m. peak hours are illustrated in **Figure 4-1**.



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 4-1
Site Traffic Assignment

5 FUTURE TOTAL TRAFFIC CONDITIONS

This section describes the future total traffic volumes forecasts and the results of the future total traffic analysis within the study area.

5.1 FUTURE TOTAL INTERSECTION OPERATIONS

The 2028 and 2033 total traffic forecasts corresponding to the weekday a.m. and p.m. peak hours were derived by superimposing the traffic generated by the proposed development, shown in **Figure 4-1** onto the future background traffic volumes, shown in **Figure 3-1** and **Figure 3-2.** The resulting 2028 and 2033 future total traffic volumes are illustrated in **Figure 5-1** and **Figure 5-2**, respectively. As noted previously, the future total traffic forecasts and analysis for 2033 include only regional intersections.

5.1.1 2028 FUTURE TOTAL INTERSECTION CAPACITY ANALYSIS

Based on the 2028 future total traffic volumes shown in **Figure 5-1**, the intersection capacity analysis results are summarized in **Table 5-1**. Detailed Synchro worksheets are provided in **Appendix H**. Signal timings were unchanged from existing conditions.

Table 5-1: 2028 Future Total Intersection Capacity Analysis

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Signalized Intersections[1]				
Winston Churchill Blvd. & Benedet Dr./ Sherwood Heights Dr.	C (23)	-	C (25)	-
Winston Churchill Blvd. & Truscott Dr./ Kingsway Dr	B (13)	-	C (21)	-
Unsignalized Intersections[2]				
Benedet Dr. & Vey Rd. (AWSC)	A (8)	-	A (8)	-
Truscott Dr. & Sandgate Cres. (TWSC)	SB-LR B (12)	-	SB-LR C (17)	-
Chalkwell Close & Karenza Rd. (TWSC)	SB-LR A (9)	-	SB-LR A (9)	-

1 For signalized intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with values over 0.85.

2 For two-way stop-controlled intersections, overall level of service is based on the delay associated with the most critical movement. For all-way stop-controlled intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with LOS 'E' or 'F'.

As shown in **Table 5-1**, the 2028 future total intersection capacity results are very similar to those under the background conditions. The signalized study intersections are projected to operate at overall LOS 'C' or better

during the weekday a.m. and p.m. peak hours with no critical movements. The maximum incremental increase in overall delay from the 2028 background analysis is one second.

The unsignalized study intersections are forecasted to continue operating at LOS 'C' or better with no issues.

5.1.2 QUEUING ASSESSMENT - 2028

Based on the results of the 2028 future total Synchro analysis, **Table 5-2** shows the 50th and 95th percentile queue lengths for movements with exclusive turning lanes. The detailed queuing reports are provided in **Appendix H**.

Table 5-2: 2028 Future Total Queuing Analysis

Intersection	Movement (Storage Length)[1]	50th Percentile Queue (95th Percentile Queue)	
		A.M. Peak Hour	P.M. Peak Hour
Winston Churchill Blvd. & Benedet Dr./Sherwood Heights Dr.	EB-L (60m)	54m (59m)	31m (48m)
	WB-L (40m)	3m (7m)	1m (5m)
	NB-L (85m)	7m (30m)	11m (24m)
	SB-L (120m)	2m (9m)	20m (32m)
Winston Churchill Blvd. & Truscott Dr./Kingsway Dr.	EB-L (50m)	28m (43m)	17m (28m)
	WB-L (20m)	18m (29m)	15m (25m)
	NB-L (80m)	1m (5m)	2m (10m)
	SB-L (110m)	1m (3m)	64m (118m)

1 Measured using Google Earth; available link distance was used when no storage lane; values rounded to the nearest five metres.

The above queuing results are very similar to the 2028 background analysis. The 95th percentile queues of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive are projected to exceed available storage lengths during the weekday a.m. and/or p.m. peak hours under 2028 future total conditions. It is not of concern since the forecasted average queues are well-within available storage. The site traffic will not trigger any additional queuing issues and the incremental changes in queue lengths compared to the 2028 background conditions are minimal.

5.1.3 2033 FUTURE TOTAL INTERSECTION CAPACITY ANALYSIS

Based on the 2033 future total traffic volumes shown in **Figure 5-2**, the intersection capacity analysis results are summarized in **Table 5-3**. Detailed Synchro worksheets are provided in **Appendix H**. Signal timings were unchanged from existing conditions.

Table 5-3: 2033 Future Total Intersection Capacity Analysis

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Signalized Intersections[1]				
Winston Churchill Blvd. & Benedet Dr./ Sherwood Heights Dr.	C (23)	-	C (25)	-

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movements (v/c)	Overall LOS (Delay in Seconds)	Critical Movements (v/c)
Winston Churchill Blvd. & Truscott Dr./ Kingsway Dr	B (13)	-	C (21)	-

1 For signalized intersections, the level of service is based on the overall intersection delay. Critical v/c ratios are only listed for movements with values over 0.85.

Under the 2033 future total conditions, the signalized study intersections are projected to operate at overall LOS 'C' or better during the weekday a.m. and p.m. peak hours with no critical movements. Compared to the 2033 background conditions, the overall intersection delay has increased by a maximum of one second.

In conclusion, the boundary roadways can readily accommodate the site-generated trips without the need for any improvements, and the proposed development is anticipated to have a minimal relative impact on the study network from an intersection capacity perspective.

5.1.4 QUEUING ASSESSMENT - 2033

Based on the results of the 2033 future total Synchro analysis, **Table 5-4** shows the 50th and 95th percentile queue lengths for the movements with exclusive turning lanes. The detailed queuing reports are provided in **Appendix H**.

Table 5-4: 2033 Future Total Queuing Analysis

Intersection	Movement (Storage Length)[1]	50th Percentile Queue (95th Percentile Queue)	
		A.M. Peak Hour	P.M. Peak Hour
Winston Churchill Blvd. & Benedet Dr./Sherwood Heights Dr.	EB-L (60m)	54m (59m)	31m (48m)
	WB-L (40m)	3m (7m)	1m (5m)
	NB-L (85m)	7m (30m)	11m (24m)
	SB-L (120m)	2m (9m)	20m (32m)
Winston Churchill Blvd. & Truscott Dr./Kingsway Dr.	EB-L (50m)	28m (43m)	17m (28m)
	WB-L (20m)	18m (29m)	15m (25m)
	NB-L (80m)	1m (5m)	2m (10m)
	SB-L (110m)	1m (3m)	65m (118m)

1 Measured using Google Earth; available link distance was used when no storage lane; values rounded to the nearest five metres.

Most forecasted 95th percentile queues can be contained within the available storage during the weekday a.m. and p.m. peak hours under 2033 future total conditions, except for the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive. This is deemed acceptable since the queues can be accommodated within the available storage in an average cycle. The site traffic will not trigger any additional queuing issues and the incremental changes in queue lengths compared to the 2033 background conditions are minimal.

5.2 COMMUNITY IMPACT

Based on the traffic assessments in the previous sections, it was concluded that the boundary roadways can readily accommodate the site-generated trips without the need for any improvements. The proposed development is anticipated to have a minimal relative impact on the study network as opposed to the future background conditions.

The subject site is currently occupied by the Elmcrest Public School that has closed to student since 2016. As a comparison, WSP estimated the vehicular trips that the public school would generate if it was still open. For this purpose, student enrollment information was obtained from the Peel District School Board. In the last five years before school closure (2011 to 2015), the numbers of enrolled students at Elmcrest Public School ranged from 209 to 233 students, averaging 217 students. It is WSP's understanding that the last time the school exceeded its enrollment capacity was during the 1988/1989 school year with a total of 801 students, which is considered the maximum enrollment.

Based on the average (before closing) and maximum enrollment numbers, WSP estimated the "as-if" school trip generations in these two scenarios using ITE Trip Generation Manual 11th Edition in conjunction with modal split reduction. LUC 520 – Elementary School was selected from the ITE manual. School-related data was extracted from the TTS database for Zone 3614 where the site is located to derive non-auto modal split. The associated TTS queries are provided in **Appendix G**. **Table 5-5** summarizes the estimated school trip generation.

Table 5-5: "As If" Scenario – School Trip Generation

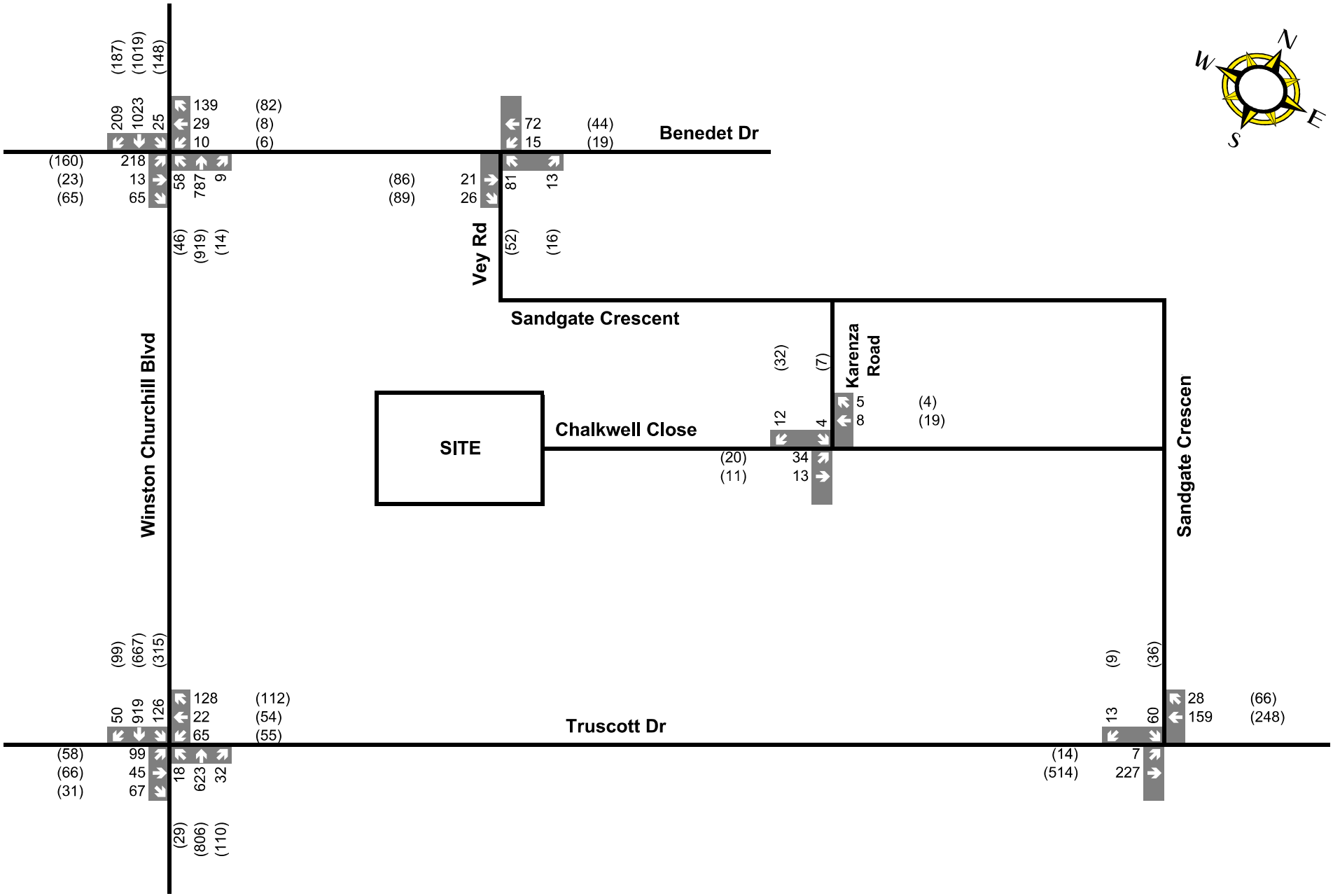
Land Use (Units)	Parameter	A.M. Peak Hour			P.M. Peak Hour		
		In	Out	Total	In	Out	Total
Elementary School (217 Students*) *Average enrollment before closing	Trip Generation Basis[1] (per unit)	0.40	0.34	0.74	0.07	0.09	0.16
	Directional Distribution	54%	46%	100%	46%	54%	100%
	ITE Trips	87	74	161	16	19	35
	Modal Split Reduction Percentage[2]	64%	58%	-	64%	58%	-
	Modal Split Reduction	-56	-43	-99	-10	-11	-21
	Net Vehicular Trips	**31**	**31**	**62**	**6**	**8**	**14**
Elementary School (801 Students*) *Maximum enrollment	Trip Generation Basis[1] (per unit)	0.40	0.34	0.74	0.07	0.09	0.16
	Directional Distribution	54%	46%	100%	46%	54%	100%
	ITE Trips	320	273	593	59	69	128
	Modal Split Reduction Percentage[2]	64%	58%	-	64%	58%	-
	Modal Split Reduction	-205	-157	-362	-38	-40	-78
	Net Vehicular Trips	**115**	**116**	**231**	**21**	**29**	**50**

1 Based on LUC 520 – Elementary School from ITE.

2 ITE assumption of a five-percent non-vehicular trip rate considered. Modal split reduction based on the peak direction percentage (a.m. inbound and p.m. outbound).

As shown in **Table 5-5**, the school is estimated to generate 62 and 14 two-way auto trips during the weekday a.m. and p.m. peak hours, respectively, based on the average enrollment number before closing. During the peak enrollment year of the school, it would generate approximately 231 and 50 two-way auto trips during the a.m. and p.m. peak hours respectively.

Compared to the school before it closed, the proposed development generates slightly fewer trips in the a.m. peak hour (60 vs. 62) but more in the p.m. peak hour (76 vs.14). This is because the school's p.m. peak-trip-generating hours are earlier than typical afternoon street peak period. The school would likely have a much more significant traffic impact than the proposed development when the enrollment number approaches capacity.



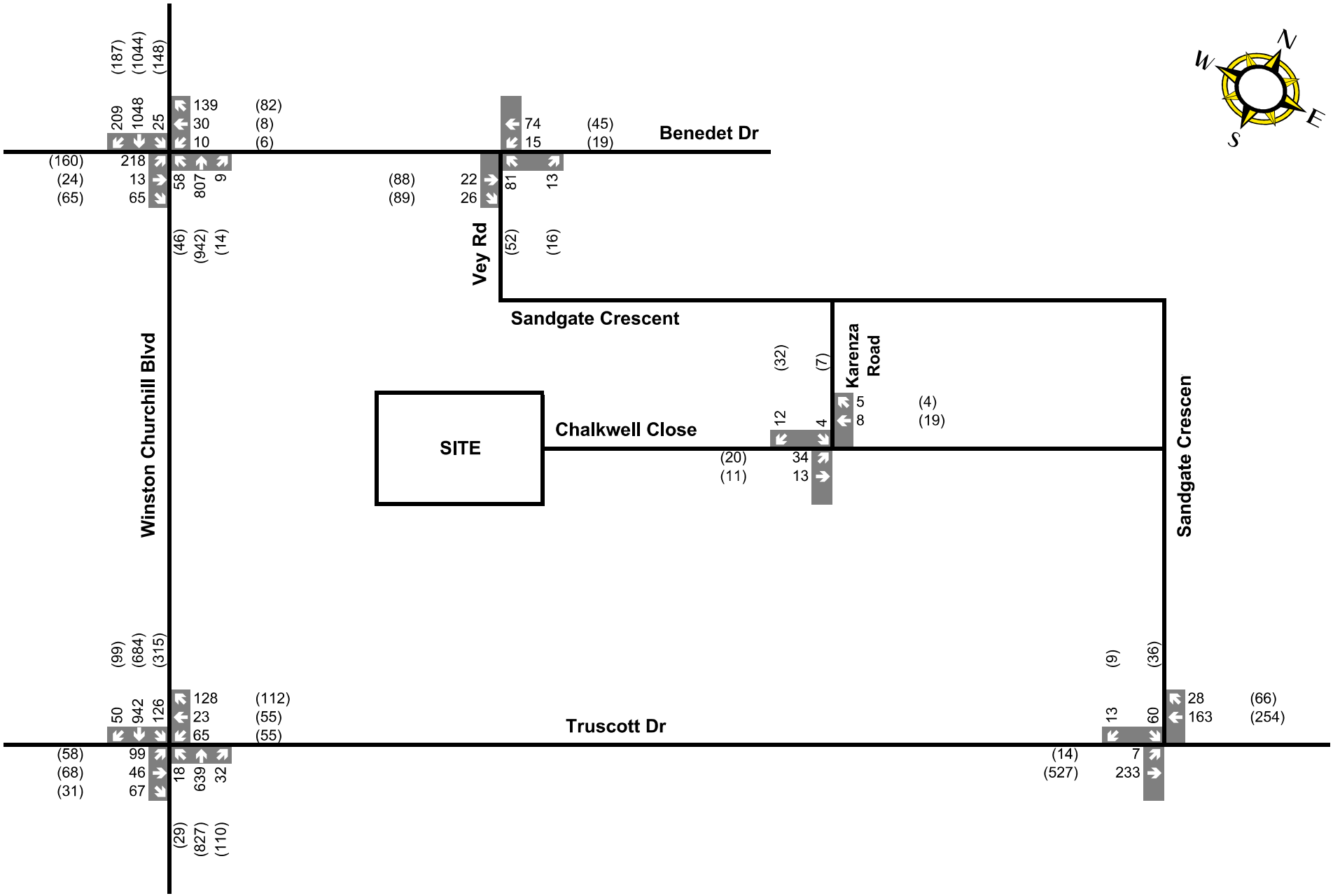
Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 5-1

2028 Future Total Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 5-2

2033 Future Total Traffic Volumes

6 SITE PLAN REVIEW

The site plan review and vehicle simulation detailed in this section are based on the site plan provided to WSP on December 8, 2023. It is WSP's understanding that the recommendations/comments made in this section will be addressed in the next submission.

6.1 LOADING SUPPLY ASSESSMENT

As per City of Mississauga Zoning By-law 0225-2007, loading spaces are not required for back-to-back townhouses. Based on the correspondence with the Applicant, waste collection for the site will be conducted via curbside pickup by private contractors. Therefore, no loading space was provided on site.

6.2 SITE CIRCULATION

The AutoTURN 11.0 turning template software was used to simulate the circulation of the required design vehicles, as detailed below.

6.2.1 PASSENGER VEHICLE CIRCULATION

WSP completed a review of the proposed site circulation for passenger vehicles, using a P-TAC vehicle (5.6 metres long, per TAC 2017 standards). The passenger vehicle circulation review is illustrated in **Figure 6-1**. The review shows that there are no projected conflicts for passenger vehicle circulation on the site.

6.2.2 PASSENGER VEHICLE - CRITICAL PARKING SPACES

Critical parking spaces were identified in the northerly and easterly parking rows. As shown in **Figure 6-2**, the turnaround area to the north is required to be widened to allow a PTAC vehicle to ingress and egress the parking spaces successfully. In the parking row to the east of the site, the most easterly parking space is recommended to be removed and the turnaround area to be slightly widened to accommodate safe parking maneuvers.

6.2.3 WASTE COLLECTION

As stated above, in correspondence with the Applicant, waste collection will be conducted via private contractors. Therefore, no waste collection tests were conducted on the site.

6.2.4 LOADING OPERATION

WSP completed a review of the proposed site circulation for a loading vehicle. A medium single unit (MSU) loading truck (10.0 metres long, per TAC 2017 standards) was used as illustrated in **Figure 6-3.** The review shows that the loading truck will slightly encroach the island when conducting the turnaround operations in the west area of the site, and we recommend modifying the design of the island by slightly reducing the curb radius. All other maneuvers work well and are free from conflicts.

6.2.5 FIRE TRUCK

As shown in **Figure 6-4,** a standard City of Mississauga fire truck (12.8 metres long) was tested to demonstrate that it can park within 15 metres of the most easterly unit in the site and reverse to then exit the site. The

reversing distance is 83.5 metres, which is below the 90-metre requirement prescribed in the Ontario Building Code and there are no project conflicts.

6.3 SIGHT DISTANCE

A sight distance review at the critical parking spaces were based on TAC 2017 Table 2.5.2, with a design speed of 20 km/h. The sightline from the accessible parking space to the south is obstructed by the tree (see **Figure 6-5**). This tree is recommended to be removed. Additionally, for safety purposes, it is also recommended that the adjacent tree be removed. As a motorist exits the accessible space, there is potential for a collision to occur with any vehicles traveling south on the north-south roadway that intends to exit the site.

A second sight distance review was conducted at the easterly space of the west island. The sightline at this space is also obstructed by a tree (See **Figure 6-6**). It is recommended that this tree be removed for safety concerns, as motorists exiting this space require clear sightline to vehicles making the northbound left turn on the north-south roadway.

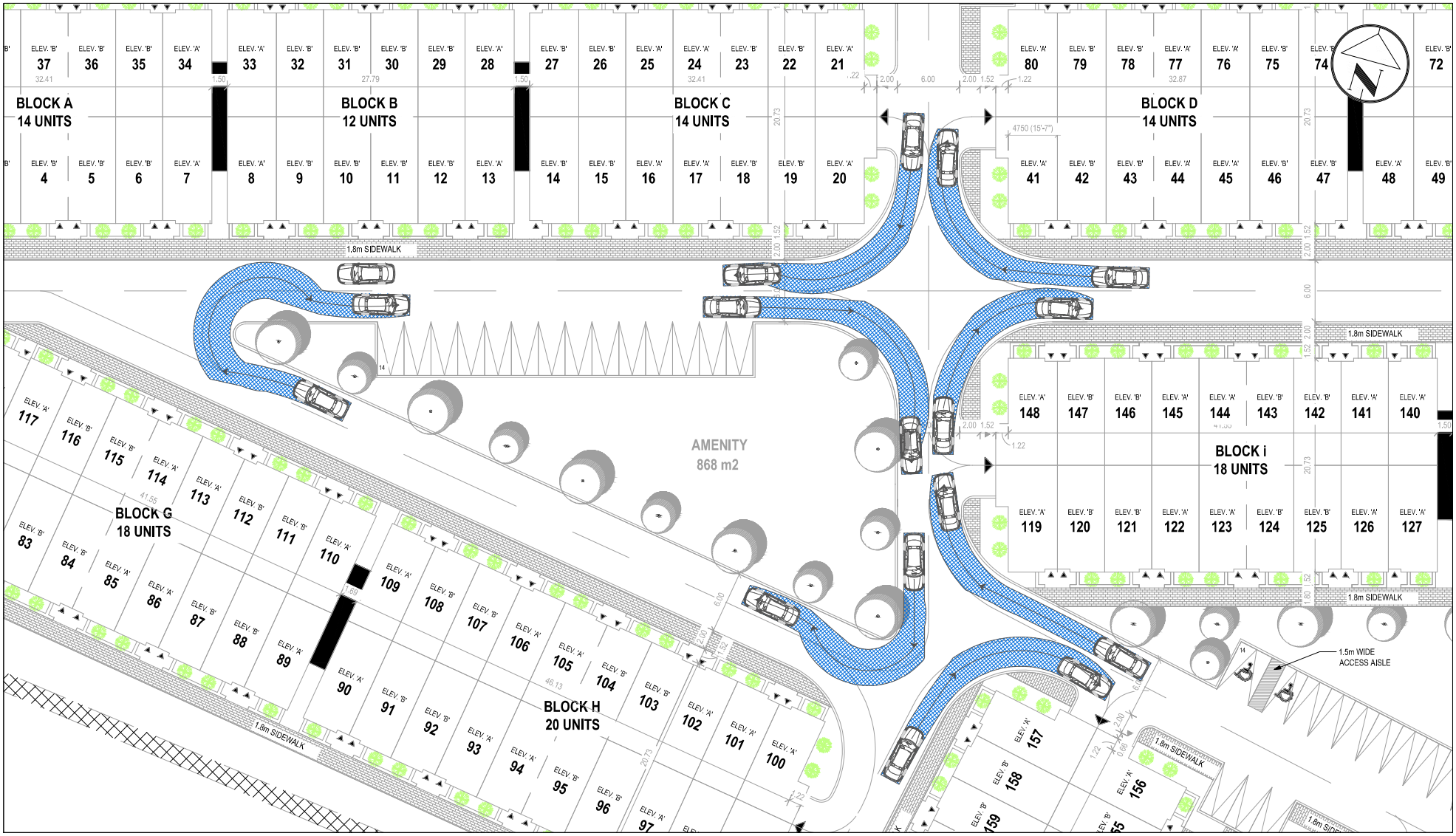
6.4 PAVEMENT MARKING AND SIGNAGE PLAN

The proposed pavement marking and signage plan for the site are shown in **Figure 6-7**.

Stop signs are proposed in accordance with the Ontario Traffic Manual (OTM) Books 2 and 5 at the east-west roadways intersecting with the north-south roadway. A stop bar and solid line dividing the two directions of traffic shall be placed in accordance with OTM book 11 at these locations.

Fire route signs are to be placed along the proposed fire route at the locations indicated in the figure.

Visitor parking signs should be placed on the end stalls at each of the parking rows.



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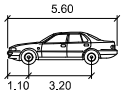
Source: A-100 - SITE PLAN.dwg, received December 11, 2023

Scale: 1:350

Figure 6-1
PTAC Circulation Test
2620 Chalkwell Close, Mississauga

P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9



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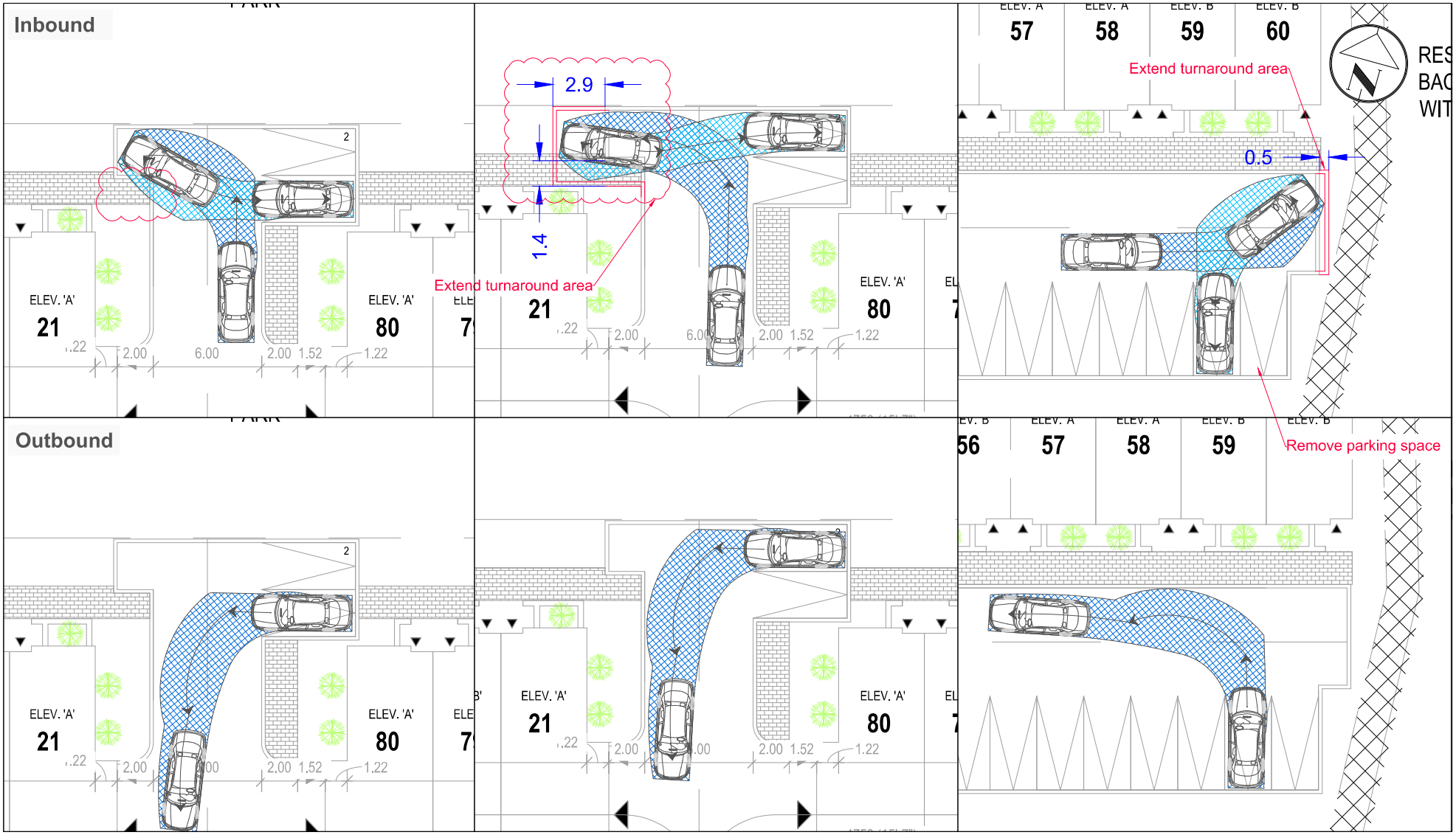

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Source: A-100 - SITE PLAN.dwg, received December 11, 2023

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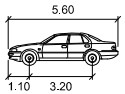
Figure 6-2
Critical Parking Space Tests
2620 Chalkwell Close, Mississauga

P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9



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Source: A-100 - SITE PLAN.dwg, received December 11, 2023

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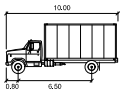
Figure 6-3
MSU Circulation Test
2620 Chalkwell Close, Mississauga

MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2



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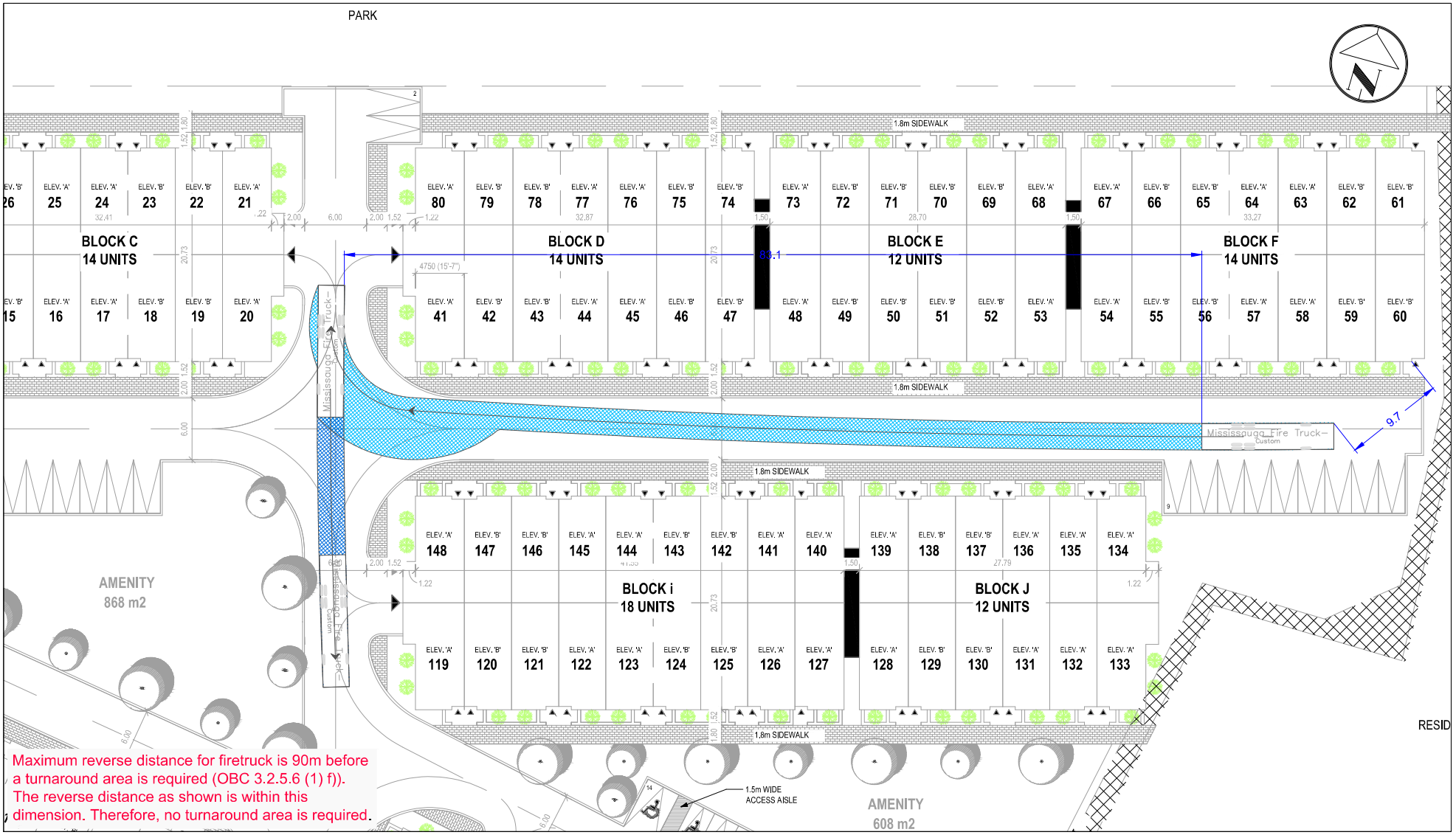

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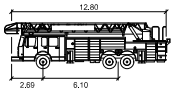
Figure 6-4
Fire Truck Access and Reverse Test
2620 Chalkwell Close, Mississauga

Mississauga Fire Truck-

	meters
Width	: 2.54
Track	: 2.54
Lock to Lock Time	: 6.0
Steering Angle	: 37.0



WSP - 2620 Chalkwell 12.12.2023.dwg_Fire OUT

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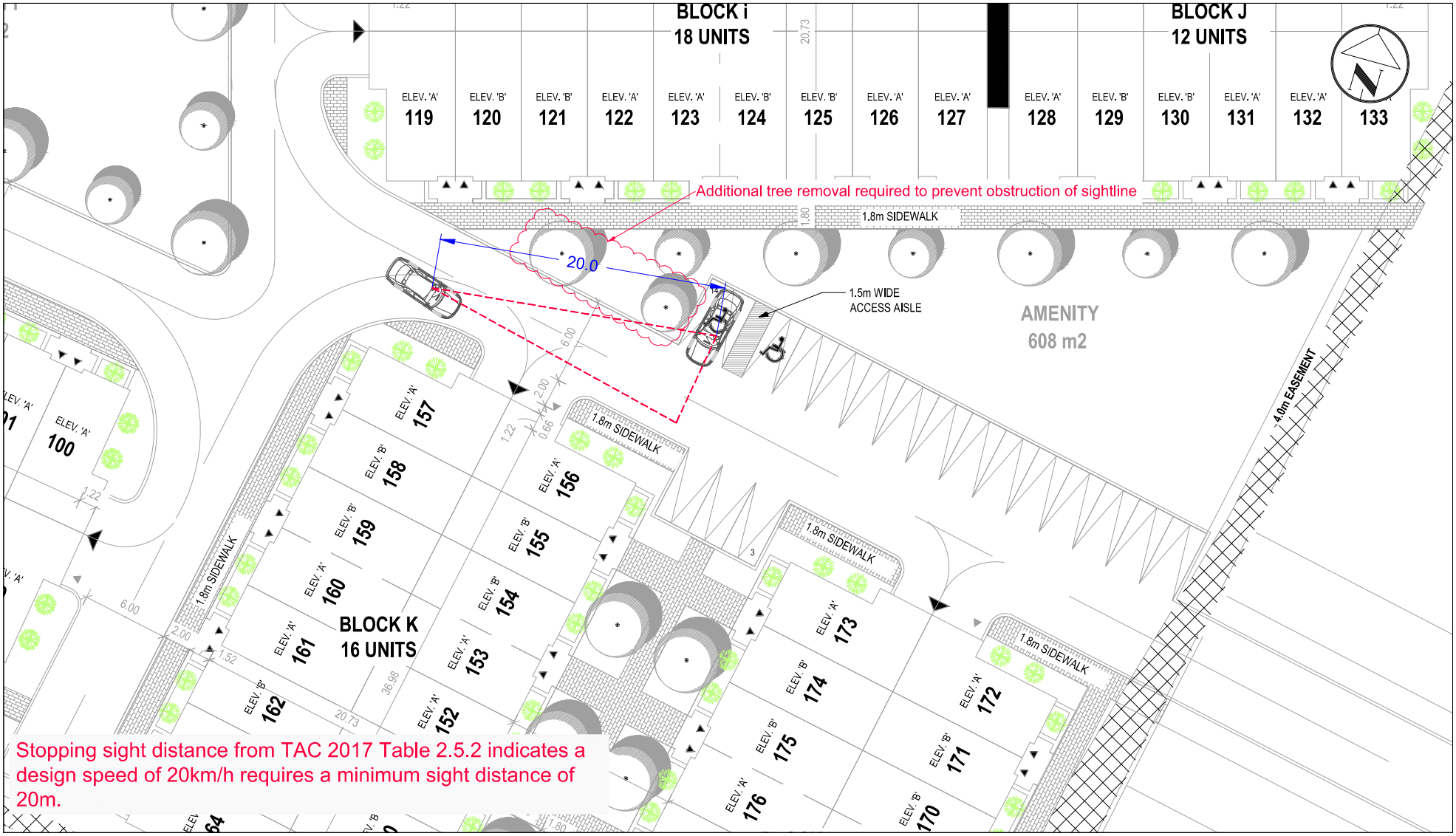

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Source: A-100 - SITE PLAN.dwg, received December 11, 2023

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Figure 6-5
Sightline Analysis Test - South
2620 Chalkwell Close, Mississauga

WSP - 2620 Chalkwell 12.12.2023.dwg_SightLine 1

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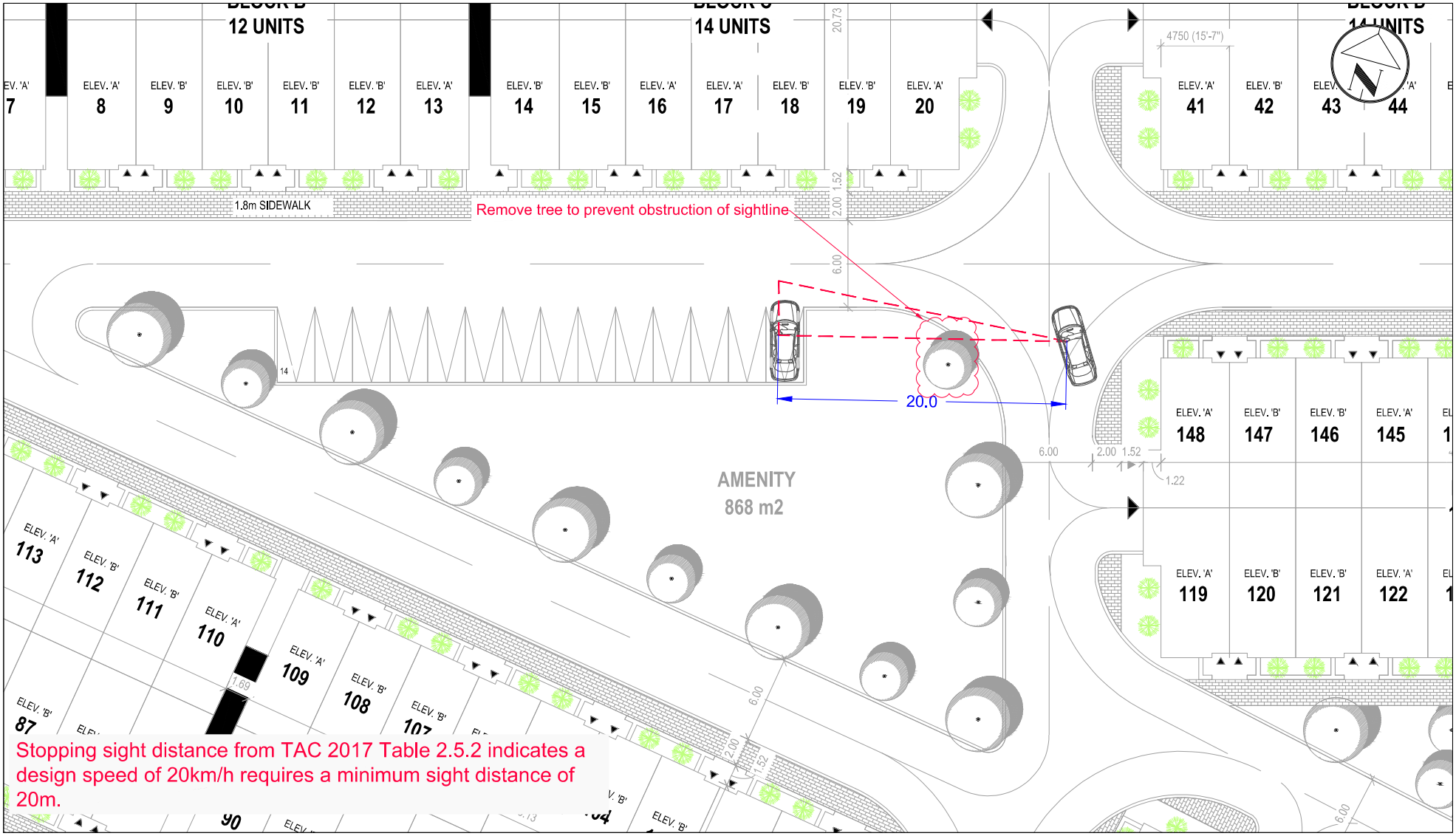

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Source: A-100 - SITE PLAN.dwg, received December 11, 2023

Scale: 1:350

Figure 6-6
Sightline Analysis Test - West
2620 Chalkwell Close, Mississauga

WSP - 2620 Chalkwell 12.12.2023.dwg_SightLine 2

Modified: 12/14/2023 11:49 AM By: CANH074130 Plot Date: 2023/12/14

SIGNAGE NOTES:

ALL SIGNAGE HAS BEEN PLACED IN THE OPTIMUM LOCATIONS. HOWEVER, MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT LOCAL CONDITIONS. WHERE POSSIBLE, SIGNAGE WILL BE INSTALLED ON LIGHT POLES.

THE SIGNS ARE IN ACCORDANCE WITH ONTARIO TRAFFIC MANUAL (OTM) BOOKS 2 AND 5

PAVEMENT MARKING NOTES:

THE PAVEMENT MARKINGS ARE IN ACCORDANCE WITH ONTARIO TRAFFIC MANUAL (OTM) BOOK 11.

Source: A-100 - SITE PLAN.dwg, received December 11, 2023

Scale: 1:550

Figure 6-7
Pavement Marking and Signage Plan
2620 Chalkwell Close, Mississauga

7 PARKING ASSESSMENT

7.1 VEHICULAR PARKING ASSESSMENT

7.1.1 ZONING BY-LAW 0225-2007 PARKING REQUIREMENTS

The subject lands located at 2620 Chalkwell Close are subject to the City of Mississauga Zoning By-law 0225-2007, and the parking requirements under Zoning By-law 0225-2007 were amended by By-law 0117-2022 in June 2022. The amended Zoning By-law adopts tiered parking standards that are based on the "precinct" that the site of interest is in. The subject site is located in Precinct 4 per Zoning Map 11. **Table 7-1** summarizes the minimum vehicular parking standards applicable to the site and the resulting requirements, according to Section 3.1.2.1 of the Zoning By-law.

Table 7-1: Zoning By-law 0225-2007 Vehicular Parking Requirements

Building	Proposed Use	By-law 0225-2007 Rates for Precinct 4	Number of Units	Required Parking Spaces[1]	Total Requirements
Back-to-Back Townhouses	Resident	2.0 spaces per unit	180	360	**405**
	Residential Visitor	0.25 spaces per unit		45	

1 Rounded to the nearest whole number.

Based on Zoning By-law 0225-2007, the proposed residential building is required to provide a minimum of 405 parking spaces, including 360 spaces for residents and 45 spaces for residential visitors.

As per the site plan provided to WSP on December 8, 2023, 360 resident parking spaces and 41 visitor parking spaces (decreased from 42 per recommendations in **Section 6**). The proposed visitor parking supply shows a deficiency of four spaces from the minimum By-law requirements (approximately nine percent).

7.1.2 PROPOSED PARKING SUPPLY RATES

Table 7-2 summarizes the proposed parking rates and number of parking spaces for the subject development.

Table 7-2: Proposed Vehicular Parking Supply

Building	Proposed Use	Proposed Supply Rates	Number of Units	Provided Parking Spaces	Total Supply
Back-to-Back Townhouses	Resident	2.0 spaces per unit	180	360	**401**
	Residential Visitor	0.23 spaces per unit		41[1]	

2 Decreased by one space from 42 per recommendations in Section 6.

As shown in **Table 7-2**, the proposed resident parking rate meets the Zoning By-law standards, and the proposed residential visitor rate is lower than the By-law requirements (0.23 vs. 0.25). It is our opinion that the By-law

residential visitor parking requirements overstate the parking needs for the subject site and the proposed rate is appropriate for the development.

The visitor parking deficiency is approximately nine percent. According to the City's relevant guidelines and responses to the submitted ToR, parking utilization surveys may not be needed to justify the reduced parking rate since the deficiency is less than 10 percent.

Justifications for the proposed residential visitor parking supply rate are provided in the following section.

7.2 PROPOSED PARKING SUPPLY RATE JUSTIFICATION

7.2.1 AREA NON-AUTO TRAVEL CONTEXT

TRANSIT SERVICES

The subject site is serviced by MiWay and Oakville Transit and can conveniently access GO Transit services via bus transfer. As documented in **Section 2.2,** two MiWay bus routes (Routes 29 and 45) and an Oakville Transit Route (Route 12) are available near the site. In addition, Clarkson GO Station is about a 16-to-20-minute bus ride or a seven-to-eight-minute bike ride away from the site, which provides frequent train services (Lakeshore West GO Line) as well as various bus services.

ACTIVE TRANSPORTATION FACILITIES

As documented in **Section 2.3**, the area surrounding the subject site has well-developed pedestrian infrastructure. Most study roadways have pedestrian facilities in the form of sidewalks on both sides, except for Benedet Drive where sidewalks are provided only on one side of the road.

Furthermore, the site is within walking distance of many utilitarian services and institutional uses, including a grocery store, community centre, restaurants, schools and other retail and commercial establishments.

7.2.2 APPROVED PRECEDENTS FOR RESIDENTIAL VISITOR PARKING REDUCTIONS

WSP completed a review of the approved exceptions in RM8 to RM12 Zones with reduced visitor parking rates for back-to-back and/or stacked townhouses (lower than 0.25 spaces per unit) listed under Sections 4.13A.2 to 4.14B.2 in Zoning By-law 0225-2007. **Table 7-3** provides a summary of the Exception Zones that have been approved with reduced residential visitor parking rates in Parking Precincts 3 and 4. These two precincts are selected because the subject site is Precinct 4 and Precinct 3 usually has comparable transportation context to Precinct 4. The back-to-back/stacked townhouses visitor parking standards are the same in all precincts. This table also includes a high-level comparison of transit context between the subject site and each referenced zone.

Table 7-3: Exceptions Zones with Reduced Visitor Parking Rates in Precincts 3 and 4

Exception Zone	Municipal Address[1]	Precinct	Approved Min. Residential Visitor Parking Rate[2]	Transit Context Comparison
RM8-4	3250 Bently Drive	4	0.15 spaces per unit	Similar to the site, this zone is serviced by three to four bus routes with no direct access to higher-order transit
RM8-5	5055 Oscar Peterson Boulevard	4	0.20 spaces per unit	Similar to the site, this zone is serviced by three to four bus routes with no direct access to higher-order transit

Exception Zone	Municipal Address[1]	Precinct	Approved Min. Residential Visitor Parking Rate[2]	Transit Context Comparison
RM8-6	2891 Rio Court	3	0.15 spaces per unit	This zone is serviced by five or more bus routes with no direct access to higher-order transit. The transit level of service is slightly more advantageous than the site
RM8-8	3135 Boxford Crescent	4	0.20 spaces per unit	Similar to the site, this zone is serviced by three to four bus routes with no direct access to higher-order transit
RM8-10	1205 Gooseberry Lane	4	0.20 spaces per unit	This zone is serviced by one bus route with no direct access to higher-order transit. The site has comparatively better transit accessibility
RM8-11	3472 Widdicombe Way	3	0.15 spaces per unit	This zone is serviced by five or more bus routes with no direct access to higher-order transit. The transit level of service is slightly more advantageous than the site
RM9-2	4045 Hickory Drive	3	0.20 spaces per unit	Similar to the site, this zone is serviced by three to four bus routes with no direct access to higher-order transit

1 Some Exceptions Zones include multiple municipal addresses on the same parcel. The listed address represents one of the municipal addresses contained in the same parcel.

2 If multiple reduced residential visitor parking rates were approved, the rate for back-to-back/stacked townhouses is shown.

As indicated in the table above, many developments in Precincts 3 and 4 have received approval for reduced residential visitor parking supply rates. Comparatively, the approved exceptions listed in **Table 7-3** sought more significant parking reductions than the proposed development, since the proposed visitor parking rate is 0.23 spaces per unit.

These parking reduction approvals provide strong precedents for the proposed visitor parking supply rate because not only are they located in Precincts 3 and 4, but also have very similar or at least comparable transit service context to the proposed development.

7.2.3 SITE-SPECIFIC TRANSPORTATION DEMAND MANAGEMENT MEASURES

A Transportation Demand Management (TDM) Plan defines a set of policies, initiatives, and programs to support the reduction in auto driver travel, whether by encouraging other travel modes (e.g., transit, walking, cycling or carpooling) or simply reducing trips by any mode.

TDM measures recommended for the proposed development that would encourage visitors to travel by non-auto means have been summarized below. Details of the complete TDM plan are provided in **Section 8**.

PEDESTRIAN CONNECTIONS

New pedestrian facilities have been proposed as part of the development plan, which will provide better connections to the existing pedestrian network and nearby utilitarian services.

CYCLING FACILITIES

Based on Zoning By-law 0225-2007, bicycle parking is not required for back-to-back townhouse developments. As a TDM measure, WSP recommends that some bicycle rings/racks be provided on-site that can be used by residents or visitors for temporary bicycle parking. The locations are to be determined at a later stage.

7.2.4 CONCLUSIONS

To conclude the justification and rationale provided above, it is our opinion that the proposed apartment residential visitor parking rate for the subject site is appropriate, based on the following key considerations:

- The subject lands are serviced by several surface bus routes and can conveniently access GO Transit services via bus transfer or cycling. The surrounding area has well-developed pedestrian infrastructure and various utilitarian services within walking distance of the site. Sidewalks have also been proposed on-site to facilitate pedestrian movements and enhance the synergy between the proposed development and nearby existing pedestrian facilities and commercial establishments.
- Many developments/sites in Precincts 3 and 4 have been approved with a reduced residential visitor parking rate of 0.15 or 0.20 spaces per unit. Those sites have very similar or comparable transportation and location contexts to the proposed development, which provides a strong precedent for the proposed visitor parking rate of 0.23 spaces per unit.
- Site-specific TDM strategies will be implemented to support the reduction in auto usage by visitors by encouraging other travel modes.

7.3 ACCESSIBLE PARKING

Table 7-4 summarizes the accessible parking standards outlined in Section 3.1.3.1 under Zoning By-law 0225-2007 (as amended) and the resulting requirements.

Table 7-4: Zoning By-law 0225-2007 Accessible Parking Requirements

Building	Proposed Visitor Parking Supply	By-law 0225-2007 Accessible Parking Rate	Required Accessible Parking Spaces[1]
Back-to-Back Townhouses	41 spaces	4% of the total visitor parking spaces (between 13 and 100)	2 (1 Type 'A' and 1 Type 'B')

1 Rounded up to the nearest whole number.
2 Type 'A' accessible space: 5.2 metres by 3.4 metres with a 1.5-metre-wide access aisle.
3 Type 'B' accessible space: 5.2 metres by 2.4 metres with a 1.5-metre-wide access aisle.

Based on the site plan provided on December 8, 2023, two accessible parking spaces are proposed on the ground level, including one Type 'A' and one Type 'B' spaces, satisfying the By-law requirements.

8 TRANSPORTATION DEMAND MANAGEMENT

The following outlines the TDM elements recommended for the proposed development.

8.1 ENCOURAGE THE USE OF TRANSIT SERVICES

The subject site is directly serviced by several MiWay and Oakville bus routes and can access GO Transit services via bus transfer or cycling. To encourage the use of transit for future commuters of the site, WSP recommends the following measures:

- Provide transit information to future occupants of the development, such as transit route schedules, maps, and brochures. Such information can be provided to the residents in the form of an information package at the time of closing.
- Provide Presto cards with pre-loaded funds to new residents at the time of closing as an incentive for new residents to become familiar with the benefits and convenience of the local transit network. The recommended amount is $50.

8.2 ENCOURAGE WALKING

The area surrounding the subject site has well-developed pedestrian infrastructure. The site itself is within walking distance of many utilitarian services and commercial establishments. New pedestrian connections have also been proposed as part of the development plan.

It is recommended that information on the amenities within walking distance of this site, including shopping, services (banking, clinics, etc.), restaurants, institutions, and facilities (libraries, community centres, etc.) be provided to the residents in the form of an information package at the time of closing.

8.3 ENCOURAGING CYCLING

Based on Zoning By-law 0225-2007, bicycle parking is not required for back-to-back townhouse developments. As a TDM measure, WSP recommends that some bicycle rings/racks be provided on-site that can be used by visitors for temporary bicycle parking. The locations are to be determined at a later stage.

8.4 INFORMATION PACKAGES FOR NEW RESIDENTS

To help facilitate non-auto trips, it is important to provide transportation information to new residents so that they can view and understand their travel options before establishing new travel habits. This will increase the chance that new residents incorporate these alternatives into their travel patterns after moving into the development.

The developer will provide information about transportation options to new residents in an information package that will include items such as:

- Existing transit services, including a MiWay ride guide, a GO Transit system map, route navigators for each area transit route and seven-day schedules for nearby stops for each of these routes. Transit information will be provided by City staff.
- Presto cards for future residents with pre-loaded funds (the recommended amount is $50).
- A map of the surrounding area with sidewalks and bicycle facilities, cycling and pedestrian safety tips, and information on active transportation events. The information will be prepared by the City.

The developer will be responsible for coordinating with the City and distributing the information packages at the time of closing.

9 SUMMARY AND RECOMMENDATIONS

This TIS has been completed for the proposed residential development located at 2620 Chalkwell Close in the City of Mississauga. The development proposal involves redeveloping the existing public school occupying the site (closed) into 180 back-to-back townhouse units and 402 parking spaces (401 per recommendations of this study). Vehicular access to the proposed development will be provided via a private road extending into Chalkwell Close.

The findings of this TIS and recommendations are outlined in the subsequent sections.

9.1 SUMMARY

TRAFFIC OPERATIONS ASSESSMENT

Under existing conditions:

- The signalized study intersections operate at overall LOS 'C' or better during the weekday a.m. and p.m. peak hours with no critical movements.
- The unsignalized study intersections operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours with no critical movements.
- The 95th percentile queue of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive exceed available storage lengths during the weekday a.m. and/or p.m. peak hours. It is deemed acceptable given the queue can still be contained in an average cycle. There are no other queuing issues.

Under future background conditions:

- All study intersections were analyzed for the 2028 horizon year and only the regional intersections (signalized) were analyzed for the 2033 horizon year. This applies to all future scenarios.
- Signal timings were unchanged under future background conditions. The signalized intersections are projected to operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours with no critical movements.
- The unsignalized study intersections are projected to operate at LOS 'C' or better the weekday a.m. and p.m. peak hours, with no critical movements.
- The 95th percentile queue of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive exceed available storage lengths during the weekday a.m. and/or p.m. peak hours. It is deemed acceptable given the queue can still be contained in an average cycle. There are no other queuing issues.

Under future total conditions:

- The proposed development is estimated to generate 60 and 76 two-way auto trips during the weekday a.m. and p.m. peak hours, respectively.
- Signal timings were unchanged under future background conditions. The signalized intersections are projected to operate at LOS 'C' or better during the weekday a.m. and p.m. peak hours with no critical movements.
- The unsignalized study intersections are projected to operate at LOS 'C' or better the weekday a.m. and p.m. peak hours, with no critical movements.

- Same as the background conditions, the 95th percentile queue of the westbound left-turn and southbound left-turn movements at Winston Churchill Boulevard and Truscott Drive exceed available storage lengths during the weekday a.m. and/or p.m. peak hours. It is deemed acceptable given the queue can still be contained in an average cycle. There are no other queuing issues.
- The boundary roadways can readily accommodate the site-generated trips without the need for any improvements. The proposed development is anticipated to have a minimal relative impact on the study network as opposed to the future background conditions.
- If the elementary school on-site was open, it would generate 62 and 14 two-way auto trips during the weekday a.m. and p.m. peak hours, respectively, based on the average enrollment number before it closed. The proposed development generates slightly fewer trips during the a.m. peak hour but notably more during the p.m. peak hour since the school dismisses earlier than typical afternoon street peak period. In its peak years, the school is estimated to 231 and 50 two-way auto trips during the a.m. and p.m. peak hours, respectively, and it would have a much more significant traffic impact than the proposed development.

SITE PLAN REVIEW

The proposed site plan provided to WSP on December 8, 2023 and design vehicle simulations have been reviewed in accordance with the applicable standards. The site plan review is detailed in **Section 6** and recommendations made as part of the review are summarized in **Section 9.2.** It is our understanding that the outstanding recommendations will be addressed in the subsequent submission.

PARKING ASSESSMENT

The proposed resident parking supply satisfies the Zoning By-law 0225-2007 requirements while the residential visitor parking does not (0.23 vs 0.25). It is our opinion that the proposed parking supply is appropriate based on the site's transportation context, approved precedents in similar areas in Mississauga, and the recommended TDM measures. Detailed justifications are provided in **Section 7.2**.

Based on Zoning By-law 0225-2007, the proposed development is required to provide two accessible parking spaces, including one Type 'A' and one Type 'B'. The proposed accessible parking supply satisfies the By-law requirements.

TRANSPORTATION DEMAND MANAGEMENT

TDM measures recommended for the proposed development are outlined in **Section 8**. The recommended TDM measures will promote sustainable travel modes and thus, reduce single-occupancy vehicle trips.

9.2 RECOMMENDATIONS

WSP recommends the following for the proposed development, and we understand that the site plan-related recommendations will be incorporated in the subsequent submission:

- Remove the critical parking space as identified in **Figure 6-2** due to accessibility constraints.
- Provide larger turnaround areas at the locations shown in **Figure 6-2** for passenger vehicle maneuvers.
- Revise the amenity island design to allow loading truck maneuvers, as shown in **Figure 6-3**.
- Remove the trees identified in **Figure 6-5** and **Figure 6-6** due to sightline constraints.
- Provide pavement marking and signage per **Figure 6-7.**

- Implement the recommended TDM measures detailed in **Section 8** to reduce automobile dependency and promote alternative travel modes for the proposed development.

APPENDIX

A TERMS OF REFERENCE

TIS TERMS OF REFERENCE

TO: Kate Vassilyev, City of Mississauga, Evan Pu, City of Mississauga, Catherine Barnes, Region of Peel

FROM: David Lukezic, WSP Canada Inc.

CC: Xinwei Dong, WSP Canada Inc.

SUBJECT: 2620 Chalkwell Close – TIS Terms of Reference Confirmation Request

DATE: November 17, 2023

WSP Canada Inc. is undertaking a Transportation Impact Study (TIS) and Parking Study in support of a ZBA/OPA application for the proposed development at 2620 Chalkwell Close in the City of Mississauga and would like to confirm the terms of reference with the City of Mississauga and Region of Peel. The development proposal involves redeveloping the existing land uses on the subject site into 180 back-to-back townhouses with a total of 401 parking spaces (360 for residents and 41 for visitors). The site will be served by vehicular access via Chalkwell Close. The site location context is shown in **Figure 1** and the preliminary concept plan is shown in **Figure 2**.

Figure 1 - Site Location

100 Commerce Valley Drive West
Thornhill, ON
Canada L3T 0A1

T: +1 905 882-1100
F: +1 905 882-0055

wsp.com

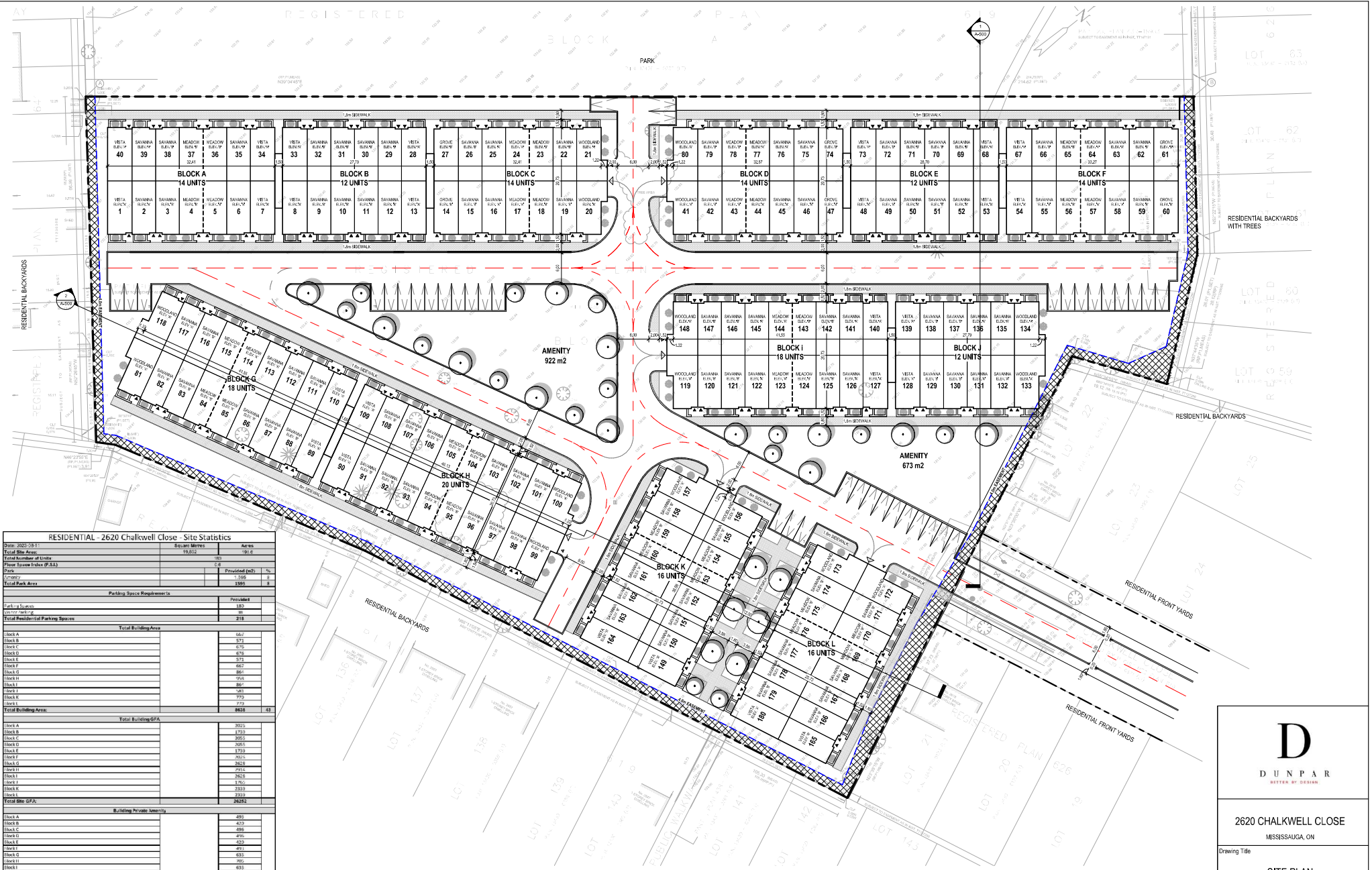

Figure 2 - Site Plan

RESIDENTIAL - 2620 Chalkwell Close - Site Statistics

Date: 2023-08-11	Square Metres	Acres
Total Site Area:	19,802	191.6
Total Number of Units:	183	
Floor Space Index (F.S.I.)	0.6	
Park		
Amenity	1,595	8
Total Park Area	1595	8

Parking Space Requirements	Provided	
Parking Spaces	183	
Visitor Parking	35	
Total Residential Parking Spaces:	218	

Total Building Area		
Block A	667	
Block B	571	
Block C	675	
Block D	676	
Block E	573	
Block F	667	
Block G	864	
Block H	954	
Block I	864	
Block J	583	
Block K	770	
Block L	770	
Total Building Area:	8638	43

Total Building GFA		
Block A	3023	
Block B	1733	
Block C	3053	
Block D	3053	
Block E	1739	
Block F	3025	
Block G	2628	
Block H	2914	
Block I	2628	
Block J	1760	
Block K	2333	
Block L	2333	
Total Site GFA:	26252	

Building Private Amenity		
Block A	493	
Block B	423	
Block C	496	
Block D	496	
Block E	423	
Block F	491	
Block G	633	
Block H	705	
Block I	633	
Block J	417	
Block K	562	
Block L	562	
Total Paved Area:	3560	18

D

DUNPAR

BETTER. BY DESIGN.

2620 CHALKWELL CLOSE

MISSISSAUGA, ON

Drawing Title

SITE PLAN

Date 08/11/23

Page No. A-100

This document presents an outline for the TIS to be completed for this development. The proposed outline has been prepared to align with the City of Mississauga TIS Guideline, 2022, the City of Mississauga TOR for Parking Utilization Studies for Site Specific Applications, 2021 and Peel Region TIS Guidelines, 2017. The TIS will cover the following aspects, which are expanded upon further in the following sections.

- Study area and data collection
- Traffic operations analysis:
    - Existing conditions
    - Horizon year/analysis periods/scenario
    - Future background conditions
    - Site-generated trips: generation and distribution
    - Future total conditions
- Bicycle and vehicle parking, and loading evaluation
- Site plan review: design vehicle manoeuvring and site layout
- Transportation Demand Management measures
- Recommendation and conclusion

STUDY AREA AND DATA COLLECTION

Based on the location and magnitude of the proposed development, we have included the following study intersections for the TIS.

Study intersections

- Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive (signalized),
- Winston Churchill Boulevard and Truscott Drive and Kingsway Drive (signalized),
- Benedet Drive and Vey Road (unsignalized),
- Truscott Drive and Sandgate Crescent (unsignalized),
- Sandgate Crescent and Vey Road (unsignalized),
- Sandgate Crescent and Karenza Road (unsignalized),
- Chalkwell Close and Karenza Road (unsignalized), and
- Chalkwell Close and Sandgate Crescent (unsignalized).

Third-party traffic counters specialized in traffic data collection were commissioned by WSP to survey traffic volumes at the study intersection during the typical weekday a.m. (7-9) and p.m. (4-6) peak periods. The turning movement counts were collected on November 8, 2023.

We will obtain the latest signal timing plans from the Region of Peel.

HORIZON YEAR AND ANALYSIS SCENARIO

The City of Mississauga TIS Guideline, 2022 requires analysis of future transportation conditions for a horizon year five years from the date of the study unless an earlier date for full occupancy of the project can be identified and approved in advance by City staff. Therefore, the horizon year(s) of 2023 and 2028 will be analyzed in the TIS.

EXISTING TRAFFIC ANALYSIS

Synchro 11.0 Traffic Software, which is the software implementation of the Highway Capacity Manual, the recognized standard for traffic operations analysis in North America will be used to analyze the traffic volumes collected at the existing study intersections. The existing conditions will be modelled based on the existing transportation network, lane configurations and surveyed parameters for the peak hour traffic volumes.

FUTURE BACKGROUND TRAFFIC ANALYSIS

Future background volumes for the 2028 horizon year will be developed by considering the applicable general growth, planned changes to the surrounding road network and background developments. The general growth will be developed based on a review of available historical traffic data and applicable background studies. If the authority has a specific preference on corridor growth rate assumption, it is respectfully requested that they advise of such in their response to this TOR.

Based on WSP's review of the City's development application status webpage, the following background developments are proposed to be included based on their proximity to the site:

- 2560 South Sheridan Way, front and rear additions to existing industrial building (492 m^2).
- 2620 Speakman Drive, expansion of existing building (5,763 m^2)

WSP would respectfully request that the City provide TIS studies for these developments. If TIS studies were not completed (or not available), WSP will estimate the traffic increases related to these other developments and assign this traffic to the boundary roadways in the vicinity of the subject site. The background development volumes and any applicable general growth volumes will then be superimposed onto the existing volumes.

The future background traffic operations will be performed, which includes identifying whether improvements to the study area road network are required as a result of other background developments and general background traffic growth in the area. These elements should not be attributed to the subject development.

TRIP GENERATION AND ASSIGNMENT

WSP will develop site-generated trips using the latest Institute of Transportation Engineers Trip Generation Manual, 11th Edition, in conjunction with modal split reductions derived from Transportation Tomorrow Survey (TTS) data, as applicable. The site-generated trips will be distributed to the boundary road network using TTS data and existing traffic patterns, as applicable.

FUTURE TOTAL TRAFFIC ANALYSIS

The site-generated traffic will be superimposed onto the future background volumes to develop the future total traffic volumes on the basis of the projected a.m. and p.m. peak hour volumes for the 2028 horizon year. The future study intersection performances will be evaluated in accordance with the requirements of the City's and Region's TIS Guidelines.

The study will focus on the level of impact the proposed development will have on the boundary road network. If necessary, improvements to facilitate the additional site-generated traffic would be outlined and evaluated as part of sensitivity scenarios.

PARKING REVIEW

WSP will complete a thorough review of the City's By-law requirements relative to the proposed parking supply for the development.

Based on the current site plan with 38 parking spaces for visitors, the difference from the by-law requirement of 45 spaces is more than 10% and a Parking Utilization Study would be needed based on the City of Mississauga TOR for Parking Utilization Studies. However, rather than completing a more comprehensive Parking Utilization Study, we suggest adding three parking spaces for visitors and justify the lower parking rate using a "letter justification" based on the nature of the operation and its land use circumstances as noted on the first page of the guidelines. We will provide commentary on the appropriateness of the proposed supply, which may be based on:

- Area non-automobile transportation context, including cycling, walking, and transit.
- Planned non-automobile transportation improvements in the area and their anticipated impact on automobile usage.
- Other approved developments in the area with the same or lower visitor parking rate (if any).
- Transportation Demand Management plan.

SITE PLANNING

Comprehensive site access and circulation reviews of the development plan will be completed using AutoTURN to ensure that automobile and fire truck manoeuvres can be adequately accommodated. Some visitor parking spaces may need to potentially be relocated to ensure adequate space for vehicles entering and exiting the visitor parking spaces.

It should be noted that waste collection is proposed to be private, therefore the circulation review will not include a waste collection vehicle.

We will also review sightlines at critical locations. And prepare a pavement marking and signage plan.

TRANSPORTATION DEMAND MANAGEMENT PLAN

WSP will identify a package of TDM strategy that is suitable for the development context. This includes outlining the quantity of TDM initiatives proposed, responsibility and a cost summary of the TDM measures.

RECOMMENDATIONS AND CONCLUSIONS

The findings of the above-noted evaluation will be documented in a TIS and submitted to the City and Region for review.

We sincerely thank you for reviewing our terms of reference and would appreciate your feedback and confirmation by November 24, 2023. If you have any questions, please contact me at 289-982-4742 or david.lukezic@wsp.com.

Lukezic, Dave

From: Lukezic, Dave
Sent: November 21, 2023 4:25 PM
To: 'Evan Pu'; kate.vassilyev@mississauga.c; catherine.barnes@peelregion.ca
Cc: Dong, Xinwei
Subject: RE: 2620 Chalkwell Close TIS TOR

Hi Evan,

Thanks for your response.

Note that 360 residential parking spaces will be provided. The stats on the site plan, which indicate 180 residential parking spaces is a typo. That will be corrected in the site plan for submission.

Thanks

David Lukezic, M.Eng., LEL, RPP
Project Manager
Transportation Planning and Science

DIRECT LINE 289-982-4742

100 Commerce Valley Drive West
Thornhill, Ontario,
L3T 0A1 Canada

wsp.com

From: Evan Pu <Evan.Pu@mississauga.ca>
Sent: Tuesday, November 21, 2023 3:04 PM
To: Lukezic, Dave <David.Lukezic@wsp.com>; kate.vassilyev@mississauga.c; catherine.barnes@peelregion.ca
Cc: Dong, Xinwei <Xinwei.Dong@wsp.com>
Subject: RE: 2620 Chalkwell Close TIS TOR

Hello David,

Thank you for providing the proposal for parking study.

If three additional spaces can be added to visitor parking, and the ultimate deficiency is less than 10%, then a justification letter may be acceptable.

However, please note that if you are still proposing 1 parking space for each townhouse unit, there would still be a 50% deficiency for resident parking based on the current zoning by-law requirements. In that case, a Parking Utilization Study for resident parking would still be required

Staff encourage the applicant to review parking **Terms of Reference** and confirm survey parameters with staff should a PUS is required.

Please let us know if you have additional questions.

Regards,

Evan Pu
Transportation Planner, Municipal Parking
T 905-615-3200 ext. 4705
evan.pu@mississauga.ca

City of Mississauga | Transportation and Works Department,
Traffic Management and Municipal Parking Division I Municipal Parking Section

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From: Lukezic, Dave <David.Lukezic@wsp.com>
Sent: Friday, November 17, 2023 17:51
To: kate.vassilyev@mississauga.c; Evan Pu <Evan.Pu@mississauga.ca>; catherine.barnes@peelregion.ca
Cc: Dong, Xinwei <Xinwei.Dong@wsp.com>
Subject: 2620 Chalkwell Close TIS TOR

Hi Kate, Evan and Catherine

WSP Canada Inc. is undertaking a Transportation Impact Study (TIS) and Parking Study in support of a ZBA/OPA application for the proposed development at 2620 Chalkwell Close in the City of Mississauga and would like to confirm the terms of reference (attached) with the City of Mississauga and Region of Peel.

We sincerely thank you for reviewing our terms of reference and would appreciate your feedback and confirmation by November 24, 2023. If you have any questions, please contact me.

Thanks

David Lukezic, M.Eng., LEL, RPP
Project Manager
Transportation Planning and Science

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Appendix B

APPROVED
By Kate Vassilyev at 11:13 am, Nov 22, 2023

Pre-Study Consultation Checklist

Description	Information	Section Reference
Development Information		
Development Description (land use, size, and number of phases of development)	• Phase 1: 180 back-to-back townhouses • Phase 2: N/A • Phase 3: N/A	2.3.6
Transportation Impact Assessment		
Step 1 – Screening		
Type of Application (attach a drawing)	▪ Official Plan Amendment ▪ Zoning Amendment ☐ Site Plan Control Application ☐ Plan of Subdivision ☐ Other_____	2.3.5
Screening Criteria	▪ Trip Generation Trigger Satisfied ☐ Location Trigger Satisfied ☐ Operational/Safety Trigger Satisfied	2.2.1
Type of Study	▪ Transportation Impact Study ☐ Access Review ☐ No Additional Study Required	2.2.1
Step 2 – Scoping		
Study Area (intersections to be analyzed) Note: The Transportation Consultant is responsible to identify any further intersections	▪ Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive (signalized) ▪ Winston Churchill Boulevard and Truscott Drive and Kingsway Drive (signalized) ▪ Benedet Drive and Vey Road (unsignalized) ▪ Truscott Drive and Sandgate Crescent (unsignalized) ▪ ~~Sandgate Crescent and Vey Road (unsignalized)~~ ▪ ~~Sandgate Crescent and Karenza Road (unsignalized)~~ ▪ Chalkwell Close and Karenza Road (unsignalized) ▪ ~~Chalkwell Close and Sandgate Crescent (unsignalized)~~	2.3.8

impacted as the study progresses.		

Description	Information	Section Reference
Horizon Years	▪ 5 years from date of TIS Interim years_____ ▪ Other. For Regional intersections 5 and 10 years from date of TIS.	2.3.9
Analysis Periods	▪ AM weekday peak hour of adjacent roadway ▪ PM weekday peak hour of adjacent roadway ☐ Saturday peak hour of adjacent roadway ☐ AM weekday peak hour of development ☐ PM weekday peak hour of development ☐ Saturday peak hour of development ☐ Other _____	2.3.10
Input Parameters and Assumptions (potential deviations)	▪ Appendix D provides typical Synchro Analysis Parameters for City intersections ▪ The following parameters would be used for Regional Road intersections based the the Regions's TIS guidelines: • Saturation flow rate of 1,900 vehicles per hour • 7 metre lane width on Regional roads; and • 5 metre lane width on the intersecting street(s) and/or access(es)	2.3.13
Existing Transportation Conditions	☐ City data sources ▪ New data collection. Third-party traffic counters specialized in traffic data collection were commissioned by WSP to survey traffic volumes at the study intersection during the typical weekday a.m. (7-9) and p.m. (4-6) peak periods. The turning movement counts were collected on November 8, 2023. ☐ Other _____	2.3.14
Planned Network Improvements (with timing)	▪ Please confirm if there are any planned network improvements	2.3.16
Other Planned Developments (per City's Website)	▪ Based on WSP's review of the City's development application status webpage, the following background developments are proposed to be included based on their proximity to the site: • ~~2560 South Sheridan Way, front and rear additions to existing industrial building (492 m^2).~~ • ~~2620 Speakman Drive, expansion of existing building (5,763 m^2)~~ WSP would respectfully request that the City provide TIS studies for these developments. If TIS studies were not completed (or not available), WSP will estimate the traffic increases related to these other developments and assign this traffic to the boundary	2.3.17

	roadways in the vicinity of the subject site.	
Identification of Mitigation Improvement Measures	☐ Neighbourhood Traffic Management Plan ▪ Other. WSP would evaluate the operation of the study intersections using Performance Evaluation Requirements in Appendix C of the City TIS guidelines.	2.3.23
Safety Analysis (any special issues)	▪ WSP will review sightlines at critical locations and prepare a pavement marking and signage plan.	2.3.25
Site Access and Circulation (design vehicles)	▪ Passenger Car (P) ☐ Light Single Unit Truck (LSU) ▪ Medium Single Unit Truck (MSU) ☐ Heavy Single Unit Truck (HSU) ▪ Pumper Fire Truck ☐ WB-20 Tractor Semi-Trailer Truck ☐ Other_____ ▪ It should be noted that waste collection is proposed to be private, therefore the circulation review will not include a waste collection vehicle.	2.3.26
Impacts During Construction (any special issues)	▪ We propose that a traffic management plan during construction be prepared as part of SPA.	2.3.27

Description	Information	Section Reference
Step 3 – Forecasting		
Growth Rate	▪ Obtained from City ▪ Historical traffic counts ☐ Travel demand forecasts ☐ Proposed Growth Rate: _____	2.3.15
Site Trip Generation	▪ ITE Trip Generation Manual ☐ "First Principles" ☐ Observed rates for similar developments in area ☐ Other. _____	2.3.19
Trip Reductions	☐ Internal capture reductions for mixed-use developments ☐ Pass-by reductions ▪ Other. Modal split reductions derived from Transportation Tomorrow Survey (TTS) data, as applicable.	2.3.19
Trip Distribution	▪ Local traffic patterns ▪ TTS ☐ Travel demand model ☐ Population and employment distribution ☐ Market analysis of catchment area ☐ Other _____	2.3.20
Trip Assignment	▪ Local traffic patterns ▪ Shortest distance ▪ Site layout, access design and logical routing ▪ Existing turning movements ☐ Other _____	2.3.21
Transportation Demand Management Plan		
Format	▪ Within a TIA Report ☐ Standalone	3.2.1
Type of Transportation Demand Management Plan	☐ TDM Statement ▪ TDM Scheme	3.2.2
Pedestrian Circulation Plan		
Format	▪ Within a TIA Report ☐ Standalone	4.2.1
Additional Comments		

WSP will complete a thorough review of the City's By-law requirements relative to the proposed parking supply for the development.

Based on the current site plan with 38 parking spaces for visitors, the difference from the by-law requirement of 45 spaces is more than 10% and a Parking Utilization Study would be needed based on the City of Mississauga TOR for Parking Utilization Studies. However, rather than completing a more comprehensive Parking Utilization Study, we suggest adding three parking spaces for visitors and justify the lower parking rate using a "letter justification" based on the nature of the operation and its land use circumstances as noted on the first page of the guidelines. We will provide commentary on the appropriateness of the proposed supply, which may be based on:

- Area non-automobile transportation context, including cycling, walking, and transit.
- Planned non-automobile transportation improvements in the area and their anticipated impact on automobile usage.
- Other approved developments in the area with the same or lower visitor parking rate (if any).
- Transportation Demand Management plan.

1. Please refer to cross out items for intersections to be analyzed and background developments in the area.
2. The Traffic Impact Study is to comply with the City of Mississauga Traffic Impact Study Guidelines.
3. The Traffic Impact Study is required to be signed and stamped by a Professional Engineer.
4. The TIS shall include a section in the report to address Community Impacts. This section shall include summary statements outlining the resulting traffic increases to the critical streets, movements and intersections. Comments or concerns from the community through future public meetings and engagements that are related to traffic shall also be addressed in this section.

Lukezic, Dave

From: Barnes, Catherine <catherine.barnes@peelregion.ca>
Sent: November 21, 2023 9:19 AM
To: Lukezic, Dave
Cc: Hamdani, Hashim; Shen, Yifan; kate.vassilyev@mississauga.ca; Evan.Pu@mississauga.ca
Subject: RE: Transportation Development comments - Terms of Reference - 2620 Chalkwell Close

HI David (apologies),

We are ok with your proposed below, as long as the City is ok with the same.

Thank you,

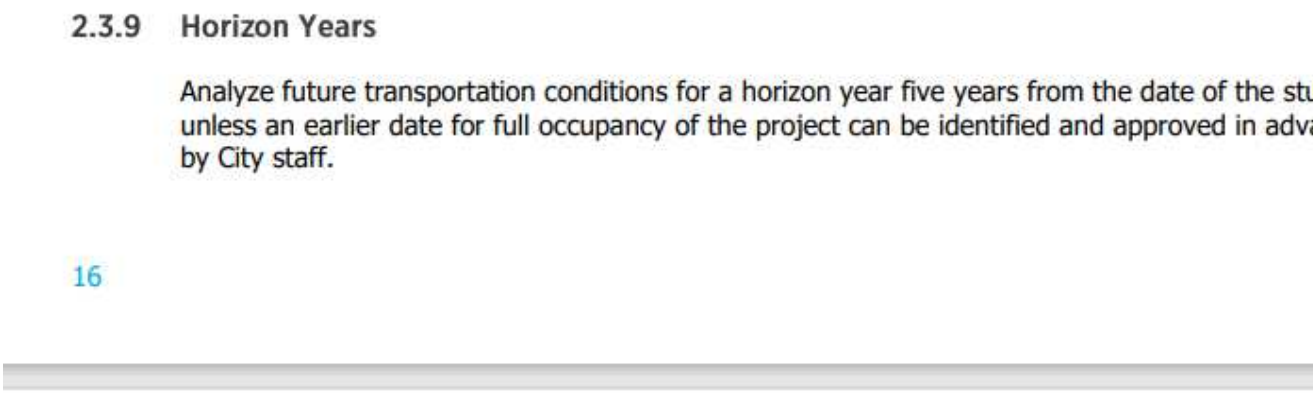
Catherine Barnes
Region of Peel
Specialist, Transportation Development
Transportation Division, Public Works.
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON , L6T 4B9
During this Health Emergency please contact me via email as I am out of the office working remotely.

From: Lukezic, Dave <David.Lukezic@wsp.com>
Sent: November 20, 2023 2:15 PM
To: Barnes, Catherine <catherine.barnes@peelregion.ca>
Cc: Hamdani, Hashim <hashimali.hamdani@peelregion.ca>; Shen, Yifan <yifan.shen@peelregion.ca>; kate.vassilyev@mississauga.ca; Evan.Pu@mississauga.ca
Subject: RE: Transportation Development comments - Terms of Reference - 2620 Chalkwell Close

Hi Catherine,

Thanks for providing your comments. Please note that the horizon years requirements are different in the City of Mississauga and Region of Peel TIS Guidelines. Below are the horizon year requirements from both guidelines.

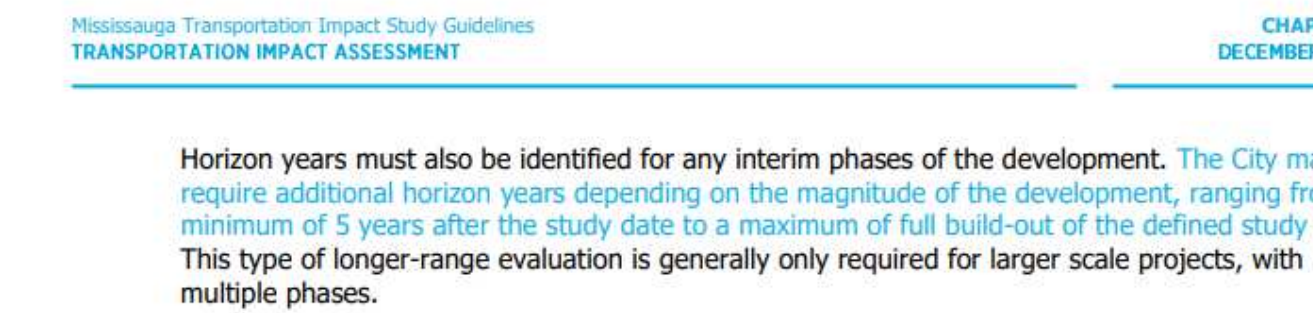
Mississauga Guidelines



2.3.9 Horizon Years

Analyze future transportation conditions for a horizon year five years from the date of the stu
unless an earlier date for full occupancy of the project can be identified and approved in adva
by City staff.

16

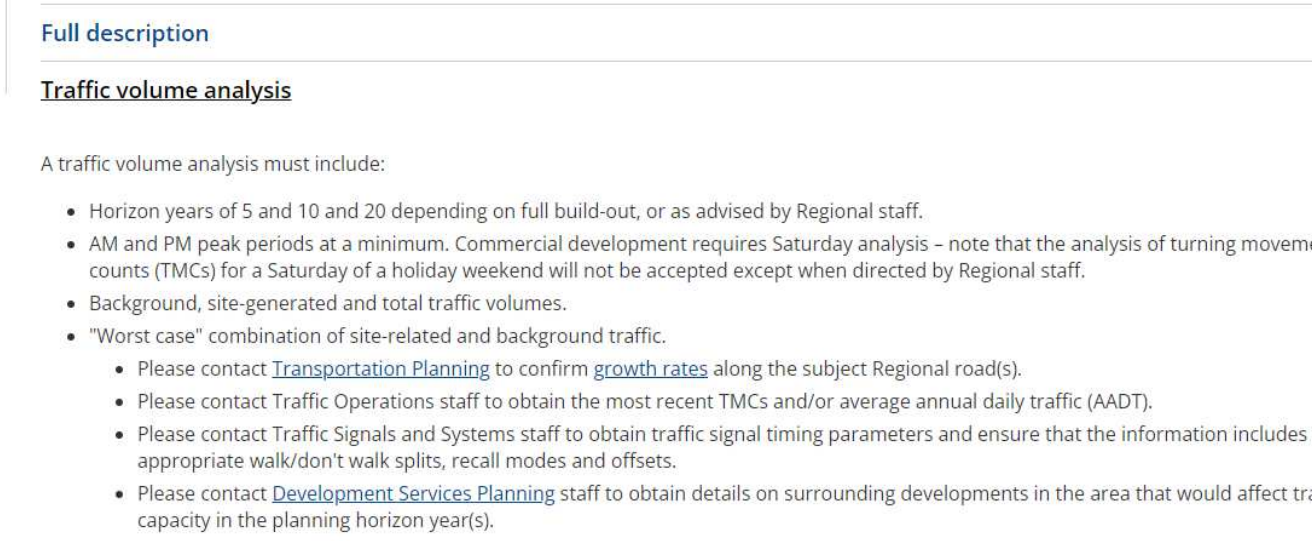


Mississauga Transportation Impact Study Guidelines
TRANSPORTATION IMPACT ASSESSMENT

CHAP
DECEMBE

Horizon years must also be identified for any interim phases of the development. The City ma
require additional horizon years depending on the magnitude of the development, ranging fr
minimum of 5 years after the study date to a maximum of full build-out of the defined study
This type of longer-range evaluation is generally only required for larger scale projects, with
multiple phases.

Region Guidelines



Full description

Traffic volume analysis

A traffic volume analysis must include:

- Horizon years of 5 and 10 and 20 depending on full build-out, or as advised by Regional staff.
- AM and PM peak periods at a minimum. Commercial development requires Saturday analysis – note that the analysis of turning movem
  counts (TMCs) for a Saturday of a holiday weekend will not be accepted except when directed by Regional staff.
- Background, site-generated and total traffic volumes.
- "Worst case" combination of site-related and background traffic.
  - Please contact Transportation Planning to confirm growth rates along the subject Regional road(s).
  - Please contact Traffic Operations staff to obtain the most recent TMCs and/or average annual daily traffic (AADT).
  - Please contact Traffic Signals and Systems staff to obtain traffic signal timing parameters and ensure that the information includes
    appropriate walk/don't walk splits, recall modes and offsets.
  - Please contact Development Services Planning staff to obtain details on surrounding developments in the area that would affect tra
    capacity in the planning horizon year(s).

The development is proposed to be built in one phase. Note that the Region Guidelines does not specify 5 & 10 year min after build out. Therefore, rather that assessing the proposed buildout and 5-year and 10-year post buildout, I propose the following:

- 2023 existing conditions

- 2028 background and total conditions (all City and two Regional intersections)
- 2033 background and total conditions (two Regional intersections only)

Based on the site location, site traffic would not use Stockholm Road to access the development and we do not think it is necessary to include this intersection in the study area of the TIS.

Please advise if the proposed horizon years are acceptable to the Region.

Thanks

David Lukezic, M.Eng., LEL, RPP
Project Manager
Transportation Planning and Science

DIRECT LINE 289-982-4742

100 Commerce Valley Drive West
Thornhill, Ontario,
L3T 0A1 Canada

wsp.com

From: Barnes, Catherine <catherine.barnes@peelregion.ca>
Sent: Monday, November 20, 2023 8:37 AM
To: Lukezic, Dave <David.Lukezic@wsp.com>
Cc: Hamdani, Hashim <hashimali.hamdani@peelregion.ca>; Shen, Yifan <yifan.shen@peelregion.ca>; kate.vassilyev@mississauga.ca; Evan.Pu@mississauga.ca
Subject: Transportation Development comments - Terms of Reference - 2620 Chalkwell Close

Hi Luke,

The Region has reviewed the Terms of Reference you provided and offer the following comments;

- Horizon year – generally the Region asks for 5 & 10 year min after build out and not after the study date. As the project will not be even started in 2023, we believe the Horizon years should be adjusted.
- IF the City wants to include Stockholm Road in the study, the Region will support that ask.
- We offer no further comments at this time.

As this will be a City led project we will let the City comment on the rest of the TOR. We look forward to reviewing the TIS when available.

Thank you,

Catherine Barnes
Region of Peel
Specialist, Transportation Development
Transportation Division, Public Works.
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON , L6T 4B9
During this Health Emergency please contact me via email as I am out of the office working remotely.

Region of Peel
working with you

P **Please consider the environment before printing this email.**

Our working hours may be different. Please do not feel obligated to reply outside of your working hours.

The Region of Peel is situated on the Treaty Lands and Territory of the Mississaugas of the Credit First Nation as well as the traditional territory of the Anishinabeg, Huron-Wendat and Haudenosaunee peoples.

-LAEmHhHzdJzBlTWfa4Hgs7pbKl

APPENDIX

B TRAFFIC DATA

Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Benedet Drive
Site Code : 00000000
Start Date : 2023-11-08

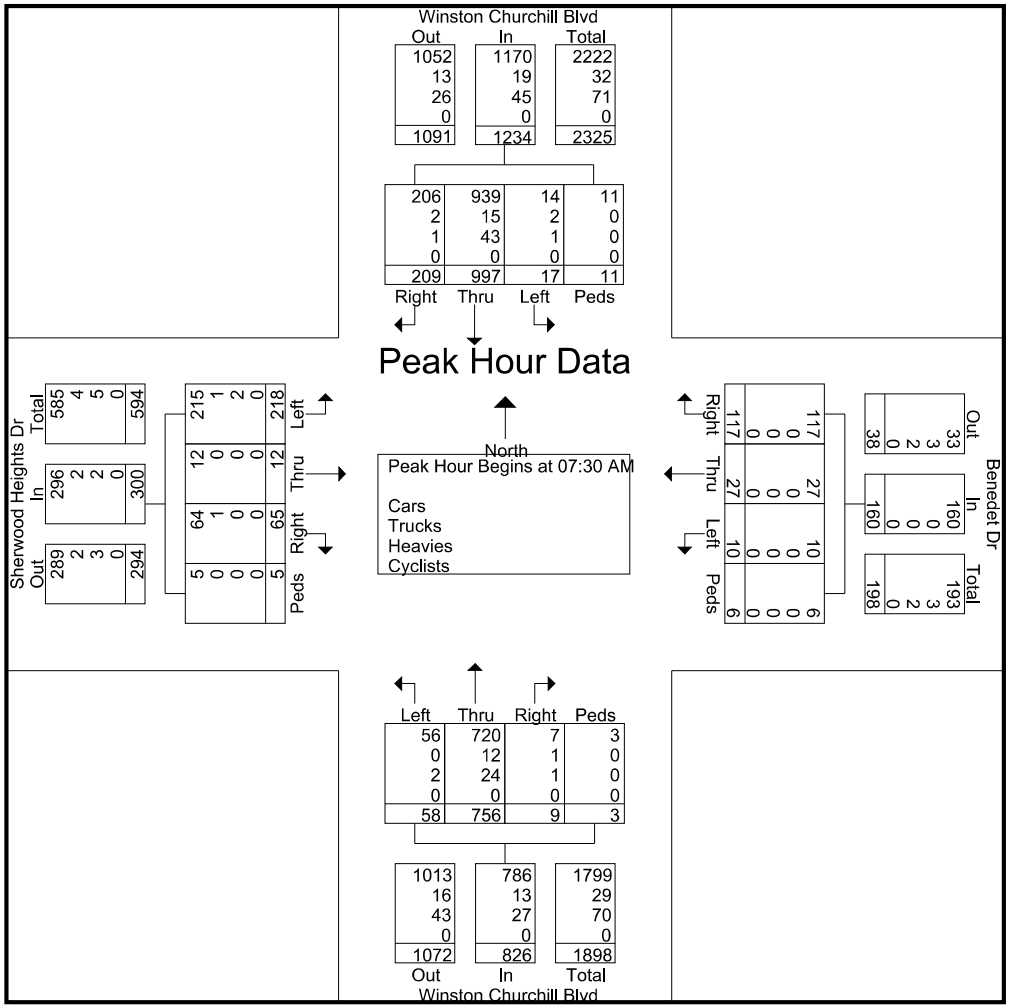
	Winston Churchill Blvd From North					Benedet Dr From East					Winston Churchill Blvd From South					Sherwood Heights Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	44	206	3	2	255	**34**	**10**	**6**	1	**51**	2	172	10	**2**	186	20	**4**	52	**4**	**80**	572
07:45 AM	46	**284**	3	**4**	337	26	6	3	2	37	**3**	199	**19**	1	222	**21**	4	51	1	77	673
08:00 AM	**61**	235	5	2	303	32	3	1	0	36	2	166	14	0	182	9	1	**59**	0	69	590
08:15 AM	58	272	**6**	3	**339**	25	8	0	**3**	36	2	**219**	15	0	**236**	15	3	56	0	74	**685**
Total Volume	209	997	17	11	1234	117	27	10	6	160	9	756	58	3	826	65	12	218	5	300	2520
% App. Total	16.9	80.8	1.4	0.9		73.1	16.9	6.2	3.8		1.1	91.5	7	0.4		21.7	4	72.7	1.7		
PHF	.857	.878	.708	.688	.910	.860	.675	.417	.500	.784	.750	.863	.763	.375	.875	.774	.750	.924	.313	.938	.920
Cars	206	939	14	11	1170	117	27	10	6	160	7	720	56	3	786	64	12	215	5	296	2412
% Cars	98.6	94.2	82.4	100	94.8	100	100	100	100	100	77.8	95.2	96.6	100	95.2	98.5	100	98.6	100	98.7	95.7
Trucks	2	15	2	0	19	0	0	0	0	0	1	12	0	0	13	1	0	1	0	2	34
% Trucks	1.0	1.5	11.8	0	1.5	0	0	0	0	0	11.1	1.6	0	0	1.6	1.5	0	0.5	0	0.7	1.3
Heavies	1	43	1	0	45	0	0	0	0	0	1	24	2	0	27	0	0	2	0	2	74
% Heavies	0.5	4.3	5.9	0	3.6	0	0	0	0	0	11.1	3.2	3.4	0	3.3	0	0	0.9	0	0.7	2.9
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Benedet Drive
Site Code : 00000000
Start Date : 2023-11-08
Page No : 4



Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Benedet Drive
Site Code : 00000000
Start Date : 2023-11-08
Page No : 9

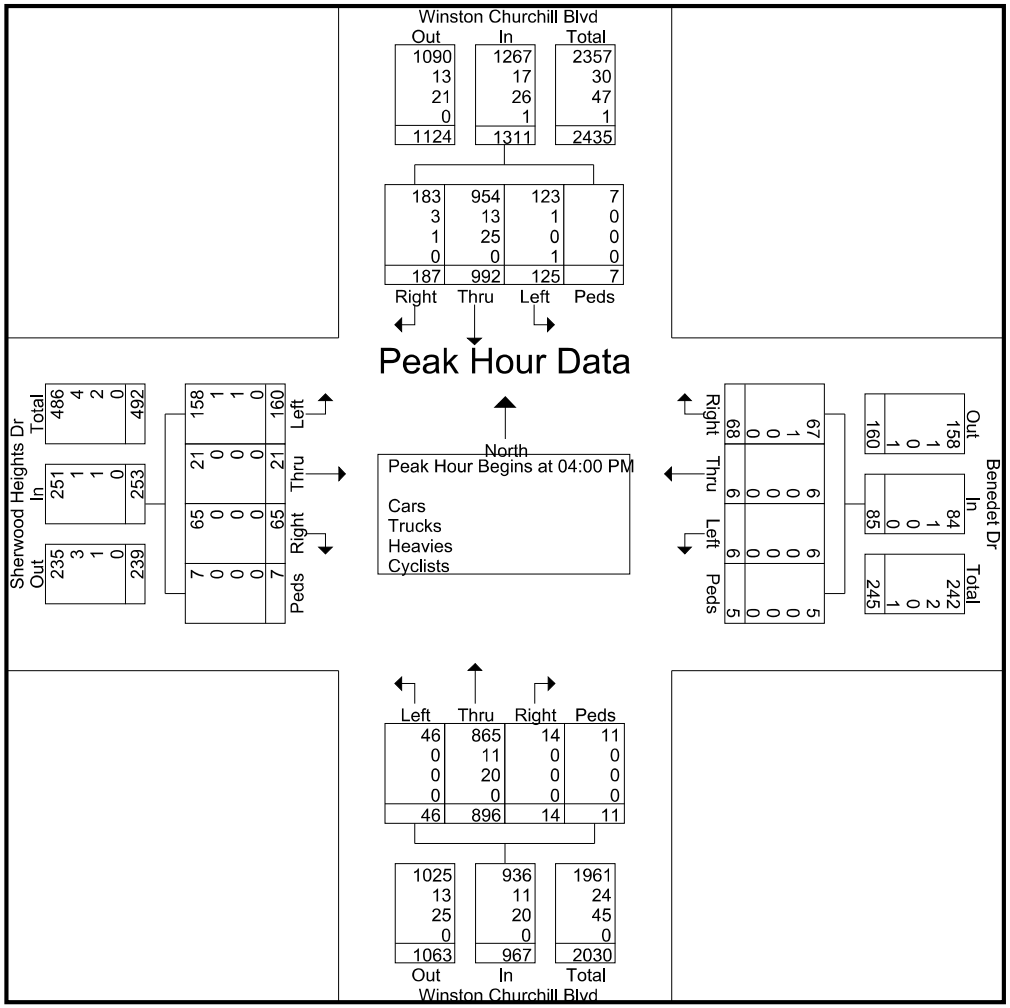
	Winston Churchill Blvd From North					Benedet Dr From East					Winston Churchill Blvd From South					Sherwood Heights Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	47	248	21	2	318	19	**2**	**5**	0	**26**	4	242	10	**5**	261	9	**8**	46	2	65	670
04:15 PM	45	208	26	**3**	282	14	0	1	**4**	19	2	**244**	13	4	**263**	**24**	3	30	2	59	623
04:30 PM	**48**	262	37	1	348	**20**	2	0	0	22	**6**	205	**16**	1	228	16	4	**52**	**3**	**75**	**673**
04:45 PM	47	**274**	**41**	1	**363**	15	2	0	1	18	2	205	7	1	215	16	6	32	0	54	650
Total Volume	187	992	125	7	1311	68	6	6	5	85	14	896	46	11	967	65	21	160	7	253	2616
% App. Total	14.3	75.7	9.5	0.5		80	7.1	7.1	5.9		1.4	92.7	4.8	1.1		25.7	8.3	63.2	2.8		
PHF	.974	.905	.762	.583	.903	.850	.750	.300	.313	.817	.583	.918	.719	.550	.919	.677	.656	.769	.583	.843	.972
Cars	183	954	123	7	1267	67	6	6	5	84	14	865	46	11	936	65	21	158	7	251	2538
% Cars	97.9	96.2	98.4	100	96.6	98.5	100	100	100	98.8	100	96.5	100	100	96.8	100	100	98.8	100	99.2	97.0
Trucks	3	13	1	0	17	1	0	0	0	1	0	11	0	0	11	0	0	1	0	1	30
% Trucks	1.6	1.3	0.8	0	1.3	1.5	0	0	0	1.2	0	1.2	0	0	1.1	0	0	0.6	0	0.4	1.1
Heavies	1	25	0	0	26	0	0	0	0	0	0	20	0	0	20	0	0	1	0	1	47
% Heavies	0.5	2.5	0	0	2.0	0	0	0	0	0	0	2.2	0	0	2.1	0	0	0.6	0	0.4	1.8
Cyclists	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Cyclists	0	0	0.8	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0

Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Benedet Drive
Site Code : 00000000
Start Date : 2023-11-08
Page No : 10



Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Truscott Drive
Site Code : 00000000
Start Date : 2023-11-08

	Winston Churchill Blvd From North					Truscott Dr From East					Winston Churchill Blvd From South					Kingsway Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	9	**245**	31	**5**	**290**	**37**	**6**	**20**	1	**64**	5	150	4	**3**	162	**21**	11	23	0	55	**571**
08:00 AM	12	210	32	0	254	29	4	7	0	40	7	**160**	5	0	**172**	13	5	20	**1**	39	505
08:15 AM	12	232	**36**	0	280	32	6	18	**2**	58	8	150	**6**	0	164	14	8	27	0	49	551
08:30 AM	**17**	188	27	2	234	30	4	16	1	51	**10**	147	3	0	160	19	**19**	**29**	0	**67**	512
Total Volume	50	875	126	7	1058	128	20	61	4	213	30	607	18	3	658	67	43	99	1	210	2139
% App. Total	4.7	82.7	11.9	0.7		60.1	9.4	28.6	1.9		4.6	92.2	2.7	0.5		31.9	20.5	47.1	0.5		
PHF	.735	.893	.875	.350	.912	.865	.833	.763	.500	.832	.750	.948	.750	.250	.956	.798	.566	.853	.250	.784	.937
Cars	48	825	120	7	1000	126	19	58	4	207	27	566	18	3	614	67	42	96	1	206	2027
% Cars	96.0	94.3	95.2	100	94.5	98.4	95.0	95.1	100	97.2	90.0	93.2	100	100	93.3	100	97.7	97.0	100	98.1	94.8
Trucks	0	19	1	0	20	0	0	2	0	2	1	10	0	0	11	0	1	1	0	2	35
% Trucks	0	2.2	0.8	0	1.9	0	0	3.3	0	0.9	3.3	1.6	0	0	1.7	0	2.3	1.0	0	1.0	1.6
Heavies	2	31	5	0	38	2	0	1	0	3	2	31	0	0	33	0	0	2	0	2	76
% Heavies	4.0	3.5	4.0	0	3.6	1.6	0	1.6	0	1.4	6.7	5.1	0	0	5.0	0	0	2.0	0	1.0	3.6
Cyclists	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Cyclists	0	0	0	0	0	0	5.0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0.0

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Your Traffic Count Specialist

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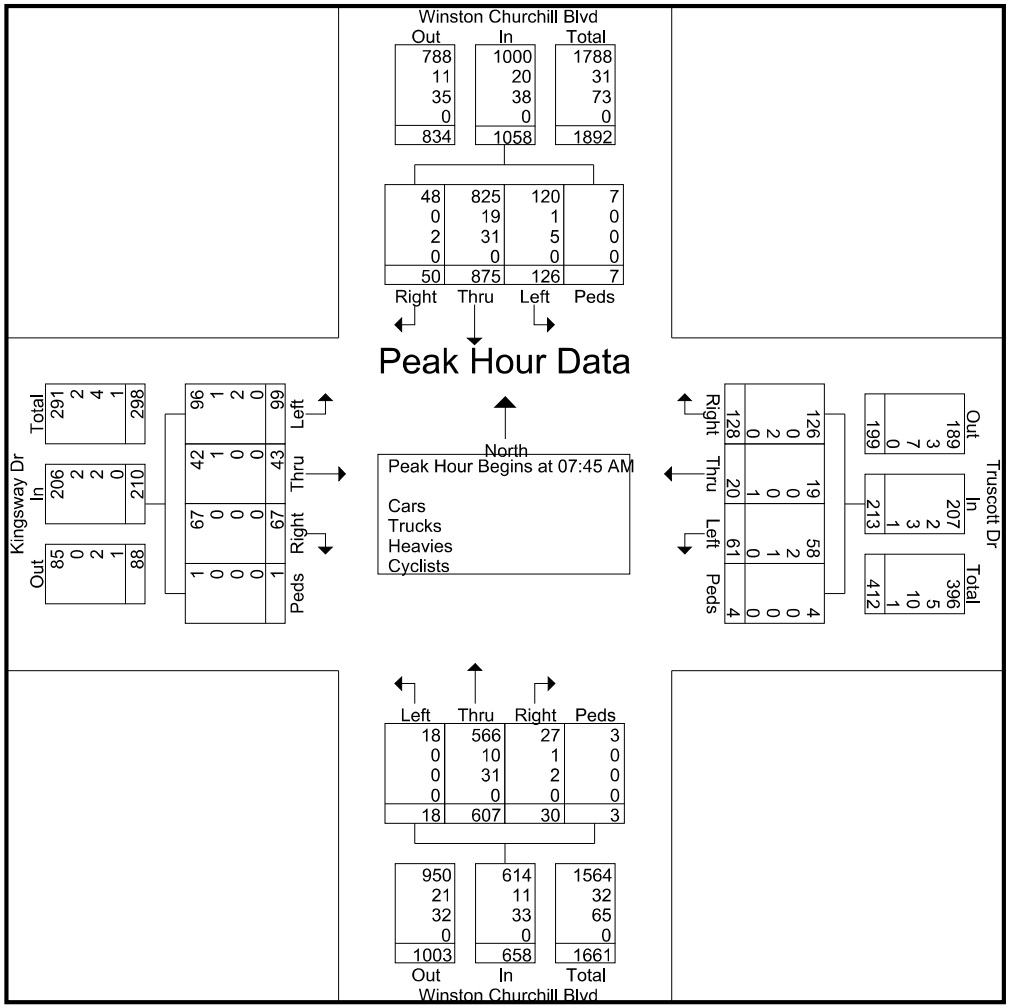

Horizon Data Services Ltd

(416) 840-6619

Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Truscott Drive
Site Code : 00000000
Start Date : 2023-11-08
Page No : 9

	Winston Churchill Blvd From North					Truscott Dr From East					Winston Churchill Blvd From South					Kingsway Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	26	161	68	**1**	256	**30**	8	11	**1**	50	22	**209**	6	1	**238**	8	7	16	2	33	577
04:30 PM	27	152	84	1	264	26	13	3	0	42	18	209	0	1	228	4	**20**	**18**	**3**	**45**	579
04:45 PM	**31**	**177**	**99**	0	**307**	29	**19**	16	1	**65**	21	168	**12**	**2**	203	7	20	14	0	41	**616**
05:00 PM	15	160	64	0	239	27	11	**22**	0	60	**44**	181	11	1	237	**12**	16	10	1	39	575
Total Volume	99	650	315	2	1066	112	51	52	2	217	105	767	29	5	906	31	63	58	6	158	2347
% App. Total	9.3	61	29.5	0.2		51.6	23.5	24	0.9		11.6	84.7	3.2	0.6		19.6	39.9	36.7	3.8		
PHF	.798	.918	.795	.500	.868	.933	.671	.591	.500	.835	.597	.917	.604	.625	.952	.646	.788	.806	.500	.878	.953
Cars	97	617	311	2	1027	111	51	50	2	214	103	737	29	5	874	31	63	56	6	156	2271
% Cars	98.0	94.9	98.7	100	96.3	99.1	100	96.2	100	98.6	98.1	96.1	100	100	96.5	100	100	96.6	100	98.7	96.8
Trucks	0	7	3	0	10	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	21
% Trucks	0	1.1	1.0	0	0.9	0	0	0	0	0	0	1.4	0	0	1.2	0	0	0	0	0	0.9
Heavies	2	26	1	0	29	1	0	2	0	3	2	19	0	0	21	0	0	2	0	2	55
% Heavies	2.0	4.0	0.3	0	2.7	0.9	0	3.8	0	1.4	1.9	2.5	0	0	2.3	0	0	3.4	0	1.3	2.3
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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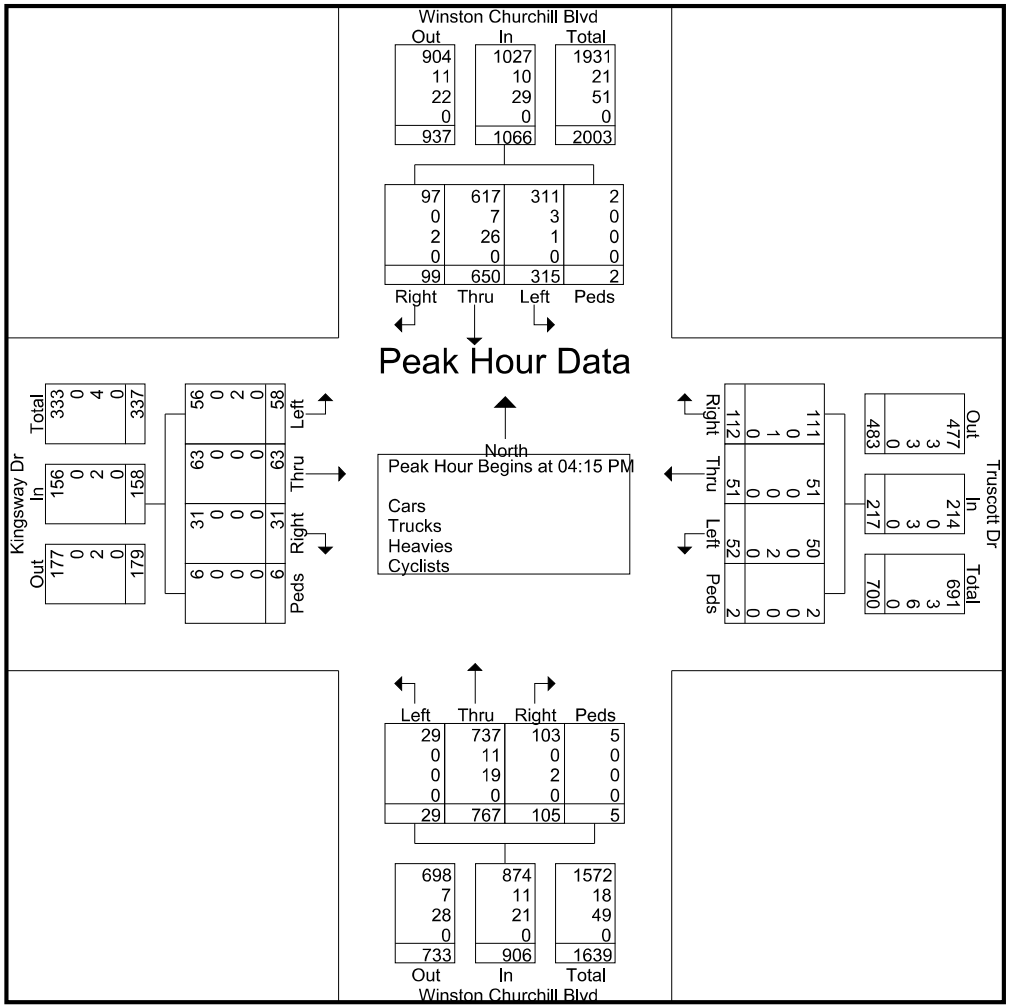
Your Traffic Count Specialist

File Name : Winston Churchill Boulevard at Truscott Drive
Site Code : 00000000
Start Date : 2023-11-08
Page No : 10



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Your Traffic Count Specialist

File Name : Benedet Drive at Vey Road
Site Code : 00000000
Start Date : 2023-11-08
Page No : 3

	From North					Benedet Dr From East					Vey Rd From South					Benedet Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	0	**20**	2	0	**22**	1	0	**19**	0	**20**	4	4	0	0	8	**50**
07:45 AM	0	0	0	0	0	0	18	2	**2**	22	**2**	0	12	0	14	4	5	0	0	9	45
08:00 AM	0	0	0	0	0	0	17	**4**	0	21	1	0	12	0	13	1	**7**	0	**1**	9	43
08:15 AM	0	0	0	0	0	0	15	3	1	19	2	0	15	0	17	**8**	4	0	0	**12**	48
Total Volume	0	0	0	0	0	0	70	11	3	84	6	0	58	0	64	17	20	0	1	38	186
% App. Total	0	0	0	0		0	83.3	13.1	3.6		9.4	0	90.6	0		44.7	52.6	0	2.6		
PHF	.000	.000	.000	.000	.000	.000	.875	.688	.375	.955	.750	.000	.763	.000	.800	.531	.714	.000	.250	.792	.930
Cars	0	0	0	0	0	0	70	7	3	80	5	0	58	0	63	15	17	0	1	33	176
% Cars	0	0	0	0	0	0	100	63.6	100	95.2	83.3	0	100	0	98.4	88.2	85.0	0	100	86.8	94.6
Trucks	0	0	0	0	0	0	0	2	0	2	1	0	0	0	1	1	2	0	0	3	6
% Trucks	0	0	0	0	0	0	0	18.2	0	2.4	16.7	0	0	0	1.6	5.9	10.0	0	0	7.9	3.2
Heavies	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	1	0	0	2	4
% Heavies	0	0	0	0	0	0	0	18.2	0	2.4	0	0	0	0	0	5.9	5.0	0	0	5.3	2.2
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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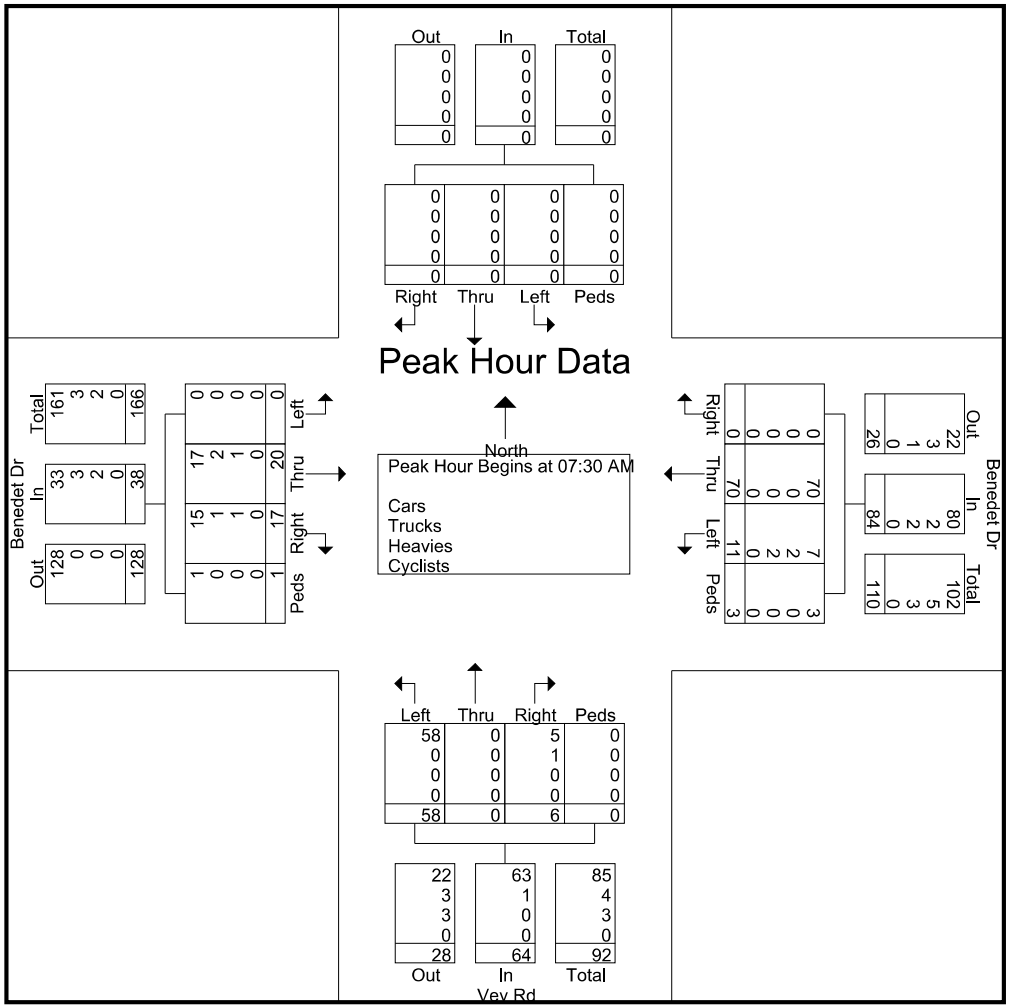
Your Traffic Count Specialist

File Name : Benedet Drive at Vey Road
Site Code : 00000000
Start Date : 2023-11-08
Page No : 4



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Your Traffic Count Specialist

File Name : Benedet Drive at Vey Road
Site Code : 00000000
Start Date : 2023-11-08
Page No : 9

	From North					Benedet Dr From East					Vey Rd From South					Benedet Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	**12**	**4**	0	**16**	2	0	**10**	0	12	18	23	0	0	41	**69**
04:45 PM	0	0	0	0	0	0	8	2	**1**	11	3	0	9	0	12	15	**31**	0	0	**46**	69
05:00 PM	0	0	0	0	0	0	10	4	0	14	3	0	8	0	11	11	17	0	0	28	53
05:15 PM	0	0	0	0	0	0	12	1	0	13	**4**	0	10	0	**14**	**19**	12	0	0	31	58
Total Volume	0	0	0	0	0	0	42	11	1	54	12	0	37	0	49	63	83	0	0	146	249
% App. Total	0	0	0	0		0	77.8	20.4	1.9		24.5	0	75.5	0		43.2	56.8	0	0		
PHF	.000	.000	.000	.000	.000	.000	.875	.688	.250	.844	.750	.000	.925	.000	.875	.829	.669	.000	.000	.793	.902
Cars	0	0	0	0	0	0	42	11	1	54	12	0	37	0	49	63	83	0	0	146	249
% Cars	0	0	0	0	0	0	100	100	100	100	100	0	100	0	100	100	100	0	0	100	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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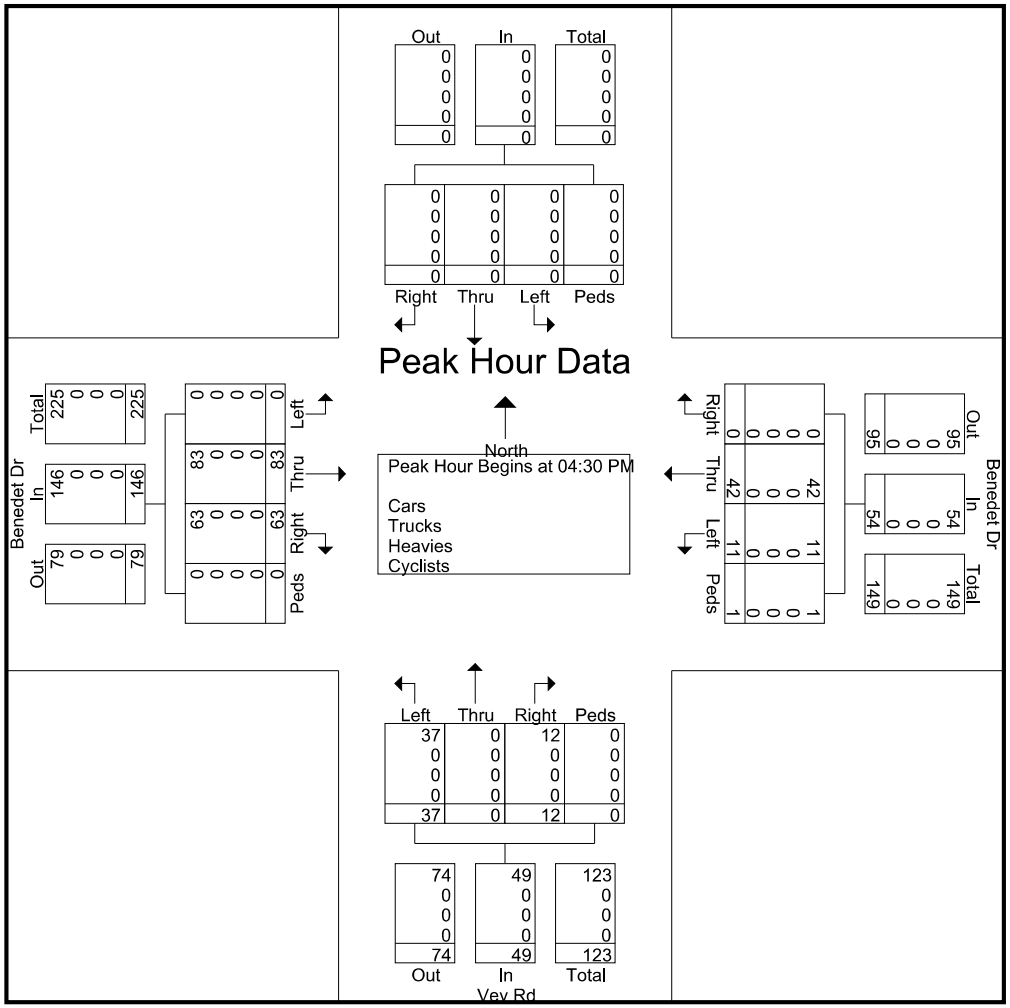
Your Traffic Count Specialist

File Name : Benedet Drive at Vey Road
Site Code : 00000000
Start Date : 2023-11-08
Page No : 10



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Your Traffic Count Specialist

File Name : Truscott Drive at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08

	Sandgate Cres From North					Truscott Dr From East					From South					Truscott Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	0	11	0	12	6	34	0	0	40	0	0	0	0	0	0	48	**3**	0	51	103
08:15 AM	1	0	11	**4**	16	4	**45**	0	0	**49**	0	0	0	0	0	0	56	1	**2**	59	124
08:30 AM	**3**	0	**19**	2	**24**	**10**	39	0	0	49	0	0	0	0	0	0	56	0	0	56	**129**
08:45 AM	3	0	11	2	16	4	37	0	**1**	42	0	0	0	0	0	0	**61**	1	0	**62**	120
Total Volume	8	0	52	8	68	24	155	0	1	180	0	0	0	0	0	0	221	5	2	228	476
% App. Total	11.8	0	76.5	11.8		13.3	86.1	0	0.6		0	0	0	0		0	96.9	2.2	0.9		
PHF	.667	.000	.684	.500	.708	.600	.861	.000	.250	.918	.000	.000	.000	.000	.000	.000	.906	.417	.250	.919	.922
Cars	8	0	49	8	65	23	148	0	1	172	0	0	0	0	0	0	210	5	2	217	454
% Cars	100	0	94.2	100	95.6	95.8	95.5	0	100	95.6	0	0	0	0	0	0	95.0	100	100	95.2	95.4
Trucks	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
% Trucks	0	0	1.9	0	1.5	0	0.6	0	0	0.6	0	0	0	0	0	0	0.9	0	0	0.9	0.8
Heavies	0	0	2	0	2	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	16
% Heavies	0	0	3.8	0	2.9	0	3.2	0	0	2.8	0	0	0	0	0	0	4.1	0	0	3.9	3.4
Cyclists	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
% Cyclists	0	0	0	0	0	4.2	0.6	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0.4

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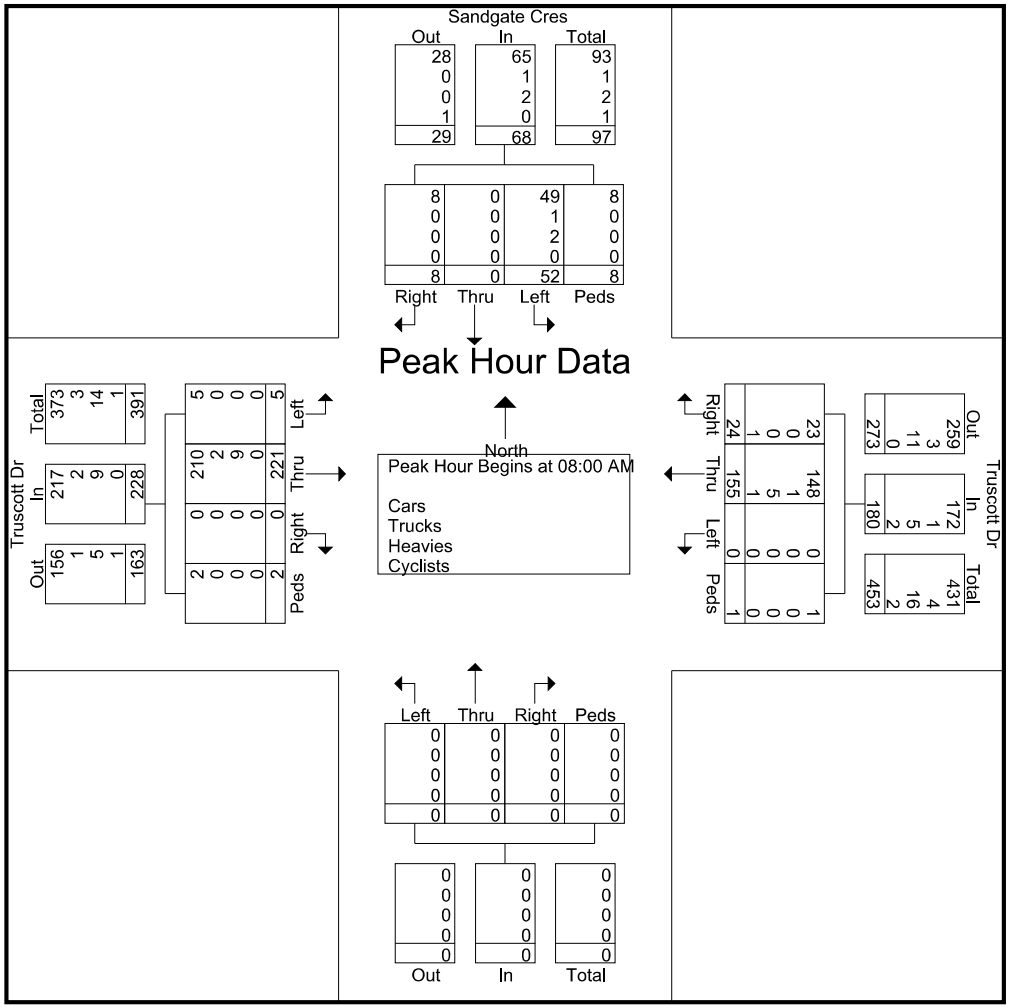
Your Traffic Count Specialist

File Name : Truscott Drive at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08
Page No : 4



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Your Traffic Count Specialist

File Name : Truscott Drive at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08

	Sandgate Cres From North					Truscott Dr From East					From South					Truscott Dr From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**2**	0	1	0	3	10	51	0	0	61	0	0	0	0	0	0	121	0	0	121	185
04:45 PM	1	0	10	1	12	14	**67**	0	0	81	0	0	0	0	0	0	**136**	**3**	0	**139**	**232**
05:00 PM	1	0	**12**	**3**	**16**	**19**	66	0	0	**85**	0	0	0	0	0	0	121	3	0	124	225
05:15 PM	1	0	8	1	10	13	57	0	0	70	0	0	0	0	0	0	123	2	0	125	205
Total Volume	5	0	31	5	41	56	241	0	0	297	0	0	0	0	0	0	501	8	0	509	847
% App. Total	12.2	0	75.6	12.2		18.9	81.1	0	0		0	0	0	0		0	98.4	1.6	0		
PHF	.625	.000	.646	.417	.641	.737	.899	.000	.000	.874	.000	.000	.000	.000	.000	.000	.921	.667	.000	.915	.913
Cars	5	0	31	5	41	56	239	0	0	295	0	0	0	0	0	0	498	8	0	506	842
% Cars	100	0	100	100	100	100	99.2	0	0	99.3	0	0	0	0	0	0	99.4	100	0	99.4	99.4
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0.2	0.1
Heavies	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
% Heavies	0	0	0	0	0	0	0.8	0	0	0.7	0	0	0	0	0	0	0.4	0	0	0.4	0.5
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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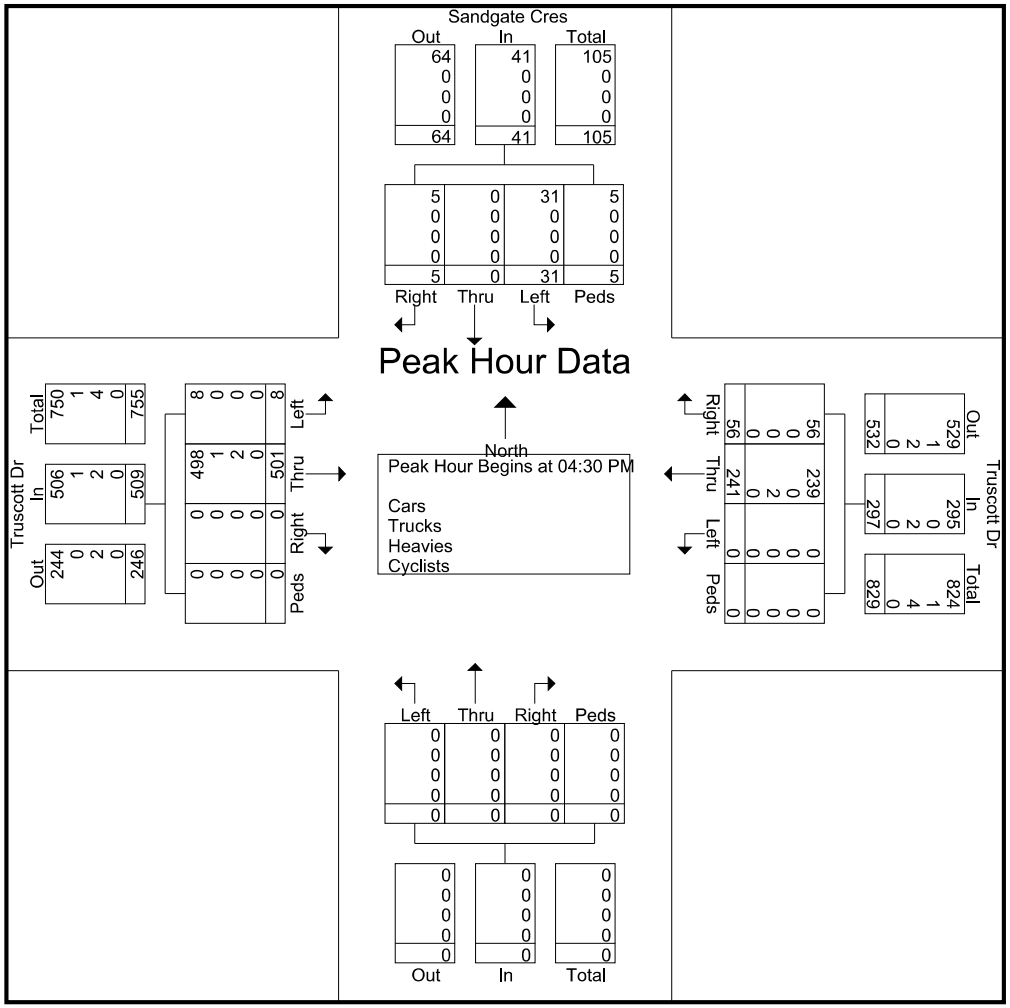
Your Traffic Count Specialist

File Name : Truscott Drive at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08
Page No : 10



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Your Traffic Count Specialist

File Name : Chalkwell Close at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08

	Sandgate Cres From North					From East					Sandgate Cres From South					Chalkwell Cl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	9	0	0	9	0	0	0	0	0	0	6	**3**	0	**9**	3	0	0	0	3	21
08:15 AM	0	9	0	0	9	0	0	0	0	0	0	4	0	0	4	2	0	0	**2**	4	17
08:30 AM	0	**16**	0	0	**16**	0	0	0	0	0	0	**7**	1	0	8	4	0	0	0	4	**28**
08:45 AM	0	8	0	**1**	9	0	0	0	0	0	0	7	0	0	7	**6**	0	0	0	**6**	22
Total Volume	0	42	0	1	43	0	0	0	0	0	0	24	4	0	28	15	0	0	2	17	88
% App. Total	0	97.7	0	2.3		0	0	0	0		0	85.7	14.3	0		88.2	0	0	11.8		
PHF	.000	.656	.000	.250	.672	.000	.000	.000	.000	.000	.000	.857	.333	.000	.778	.625	.000	.000	.250	.708	.786
Cars	0	40	0	1	41	0	0	0	0	0	0	24	4	0	28	14	0	0	2	16	85
% Cars	0	95.2	0	100	95.3	0	0	0	0	0	0	100	100	0	100	93.3	0	0	100	94.1	96.6
Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Trucks	0	2.4	0	0	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1
Heavies	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
% Heavies	0	2.4	0	0	2.3	0	0	0	0	0	0	0	0	0	0	6.7	0	0	0	5.9	2.3
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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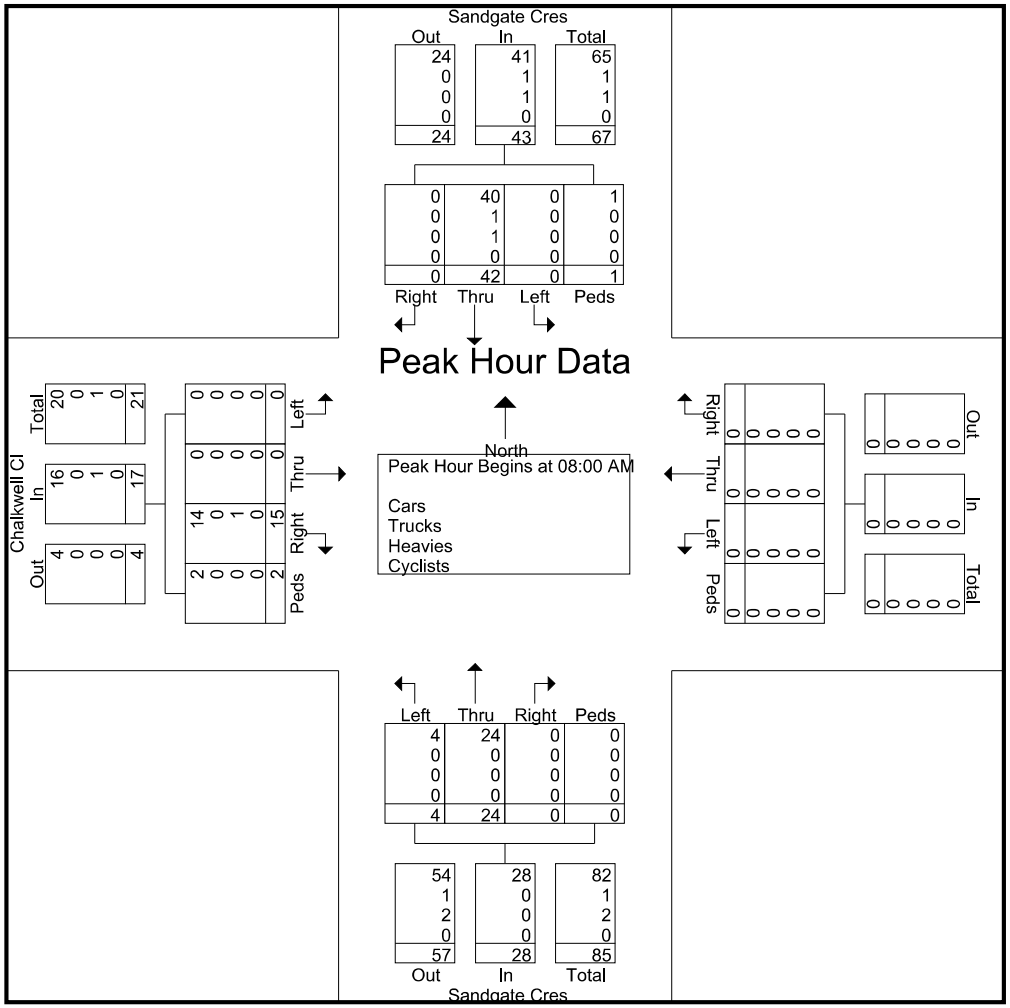
Your Traffic Count Specialist

File Name : Chalkwell Close at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08
Page No : 4



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Your Traffic Count Specialist

File Name : Chalkwell Close at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08
Page No : 9

	Sandgate Cres From North					From East					Sandgate Cres From South					Chalkwell Cl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	3	0	1	4	0	0	0	0	0	0	10	0	0	10	0	0	0	**2**	2	16
04:45 PM	0	**9**	0	0	9	0	0	0	0	0	0	14	0	0	14	1	0	0	0	1	24
05:00 PM	0	9	0	**2**	**11**	0	0	0	0	0	0	**17**	**6**	0	**23**	**4**	0	0	0	**4**	**38**
05:15 PM	0	5	0	0	5	0	0	0	0	0	0	11	3	0	14	4	0	0	0	4	23
Total Volume	0	26	0	3	29	0	0	0	0	0	0	52	9	0	61	9	0	0	2	11	101
% App. Total	0	89.7	0	10.3		0	0	0	0		0	85.2	14.8	0		81.8	0	0	18.2		
PHF	.000	.722	.000	.375	.659	.000	.000	.000	.000	.000	.000	.765	.375	.000	.663	.563	.000	.000	.250	.688	.664
Cars	0	26	0	3	29	0	0	0	0	0	0	51	9	0	60	9	0	0	2	11	100
% Cars	0	100	0	100	100	0	0	0	0	0	0	98.1	100	0	98.4	100	0	0	100	100	99.0
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclists	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	1.9	0	0	1.6	0	0	0	0	0	1.0

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Your Traffic Count Specialist

File Name : Chalkwell Close at Sandgate Crescent
Site Code : 00000000
Start Date : 2023-11-08
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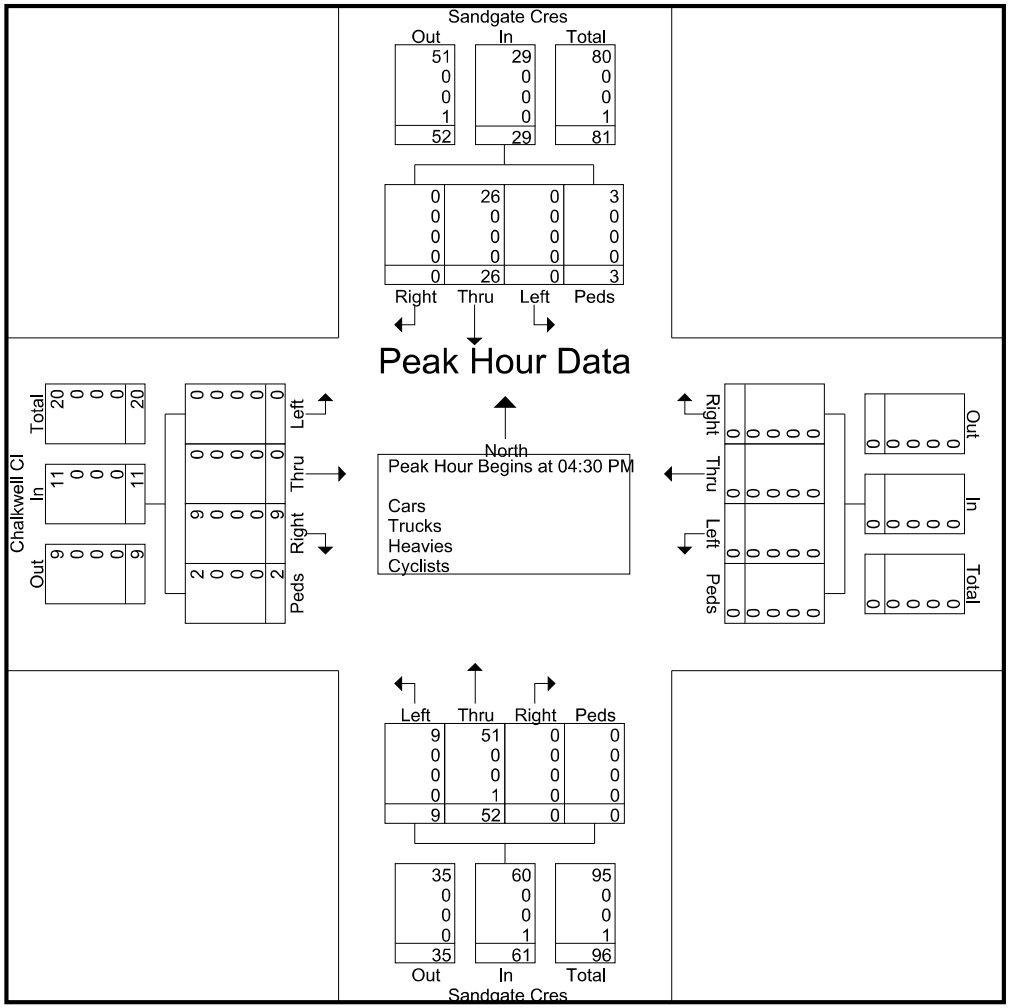


REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**November 16, 2023**		**Prepared Date**	**November 16, 2023**
Database Rev	**iNET**		**Completed By**	**JV**
Timing Card / Field rev	**14**		**Checked By**	**MH**

Location — **Winston Churchill Boulevard and Benedet Drive/Sherwood Heights Drive**

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Winston Churchill Boulevard - SBLT Prot. Perm.	5	-	-	3	-	11	10	11
2	Winston Churchill Boulevard - NB/SB	8	10	24	4	2.5	63	53	70
3	Benedet Drive - EBLT Prot. Perm.	5	-	-	3	-	24	15	17
4	Benedet Dr./Sherwood Heights Dr. - EB/WB	8	10	24	4	3.5	42	42	42
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)
6:00 - 9:30	AM	140	33
9:30 - 15:00 19:30 - 3:00	OFF	120	50
15:00 - 19:30	PM	140	10

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**November 16, 2023**		**Prepared Date**	**November 16, 2023**
Database Rev	**iNET**		**Completed By**	**JV**
Timing Card / Field rev	**15**		**Checked By**	**MH**

Location — **Winston Churchill Boulevard and Truscott Drive/Kingsway Drive**

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not in Use	-	-	-	-	-	-	-	-
2	Winston Churchill Boulevard - SB	8	10	17	4	2	96	84	96
3	Not in Use	-	-	-	-	-	-	-	-
4	Kingsway Drive - WB	8	10	26	4	3.5	44	36	44
5	Winston Churchill Boulevard - SBLT Prot. Perm.	5	-	-	3	-	-	-	14
6	Winston Churchill Boulevard - NB	8	10	17	4	2	96	84	82
7	Not in Use	-	-	-	-	-	-	-	-
8	Truscott Drive - EB	8	10	26	4	3.5	44	36	44

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
6:00 - 9:30	AM	140	18
9:30 - 15:00 19:30 - 3:00	OFF	120	53
15:00 - 19:30	PM	140	81

APPENDIX

C LOS DEFINITION

Levels of Service – Highway Capacity Manual

Signalized Intersections

Level of Service	Stopped Delay per Vehicle (sec)	Expected delay to Minor Street traffic from the Major Street
A	< 10	Most vehicles arrive during the green phase and do not stop; traffic progression is extremely favourable.
B	10.1 - 20.0	More vehicles stop than for LOS A; traffic progression is good.
C	20.1 - 35.0	Individual cycle failures may appear and the number of vehicles stopping is significant; traffic progression is fair.
D	35.1 - 55.0	Individual cycle failures are noticeable and many vehicles stop; traffic progression is unfavourable.
E	55.1 - 80.0	Individual cycle failures are frequent; traffic progression is poor; acceptable delay is at its limit.
F	> 80	Many individual cycle failures; arrival flow rate exceeds capacity; delay is unacceptable to most drivers.

Source: Highway Capacity Manual, HCM2000

HIGHWAY LOS Signalized 12-09-18

Levels of Service – Highway Capacity Manual

Unsignalized Intersection

Level of Service	Average Control Delays (s/veh)	Expected delay to Minor Street traffic from the Major Street
A	0 - 10	Little or no delay.
B	> 10 – 15	Short traffic delay.
C	> 15 – 25	Average traffic delay.
D	> 25 – 35	Long traffic delay.
E	> 35 – 50	Very long traffic delay.
F	> 50	Extreme delay encountered with queuing, which may cause severe congestion affecting other traffic movements in the intersection.

Source: Highway Capacity Manual, HCM 2000

UNSIGNALIZED LOS 12-09-18

APPENDIX

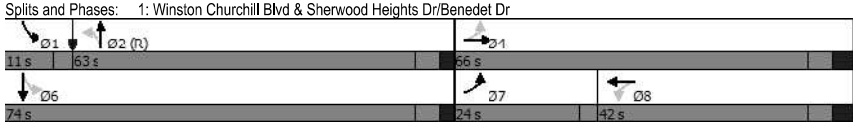
D EXISTING SYNCHRO REPORTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	12	65	10	27	117	58	767	9	17	997	209
Future Volume (vph)	218	12	65	10	27	117	58	767	9	17	997	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	60.0		0.0	40.0		0.0	85.0		0.0	120.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Frt		0.873			0.878			0.998			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1628	0	1785	1652	0	1716	3427	0	1513	3332	0
Flt Permitted	0.476			0.707			0.181			0.295		
Satd. Flow (perm)	868	1628	0	1324	1652	0	327	3427	0	468	3332	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			117			1			24	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		140.8			345.3			305.5			258.1	
Travel Time (s)		10.1			31.1			18.3			15.5	
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Adj. Flow (vph)	218	12	65	10	27	117	58	767	9	17	997	209
Shared Lane Traffic (%)												
Lane Group Flow (vph)	218	77	0	10	144	0	58	776	0	17	1206	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	1.00	1.01	1.01	1.00	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		5.0	8.0	
Minimum Split (s)	8.0	41.5		41.5	41.5		40.5	40.5		8.0	40.5	
Total Split (s)	24.0	66.0		42.0	42.0		63.0	63.0		11.0	74.0	
Total Split (%)	17.1%	47.1%		30.0%	30.0%		45.0%	45.0%		7.9%	52.9%	
Yellow Time (s)	3.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	3.5		3.5	3.5		2.5	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		None	Max	
Act Effct Green (s)	45.6	41.1		18.4	18.4		80.9	80.9		88.4	84.9	
Actuated g/C Ratio	0.33	0.29		0.13	0.13		0.58	0.58		0.63	0.61	
v/c Ratio	0.54	0.15		0.06	0.45		0.31	0.39		0.05	0.59	
Control Delay	39.5	8.6		45.8	16.7		25.5	17.2		14.8	20.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.5	8.6		45.8	16.7		25.5	17.2		14.8	20.7	
LOS	D	A		D	B		C	B		B	C	
Approach Delay		31.4			18.6			17.8			20.6	
Approach LOS		C			B			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 33 (24%), Referenced to phase 2:NBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 88.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Winston Churchill Blvd & Sherwood Heights Dr/Benedet Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	218	77	10	144	58	776	17	1206
v/c Ratio	0.54	0.15	0.06	0.45	0.31	0.39	0.05	0.59
Control Delay	39.5	8.6	45.8	16.7	25.5	17.2	14.8	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	8.6	45.8	16.7	25.5	17.2	14.8	20.7
Queue Length 50th (m)	54.0	2.7	2.8	7.7	5.3	41.4	1.4	86.3
Queue Length 95th (m)	59.1	12.4	7.3	24.6	29.9	119.5	6.6	171.0
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	414	718	326	495	188	1980	355	2030
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	0.53	0.11	0.03	0.29	0.31	0.39	0.05	0.59

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	12	65	10	27	117	58	767	9	17	997	209
Future Volume (vph)	218	12	65	10	27	117	58	767	9	17	997	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.88		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1628		1779	1652		1715	3427		1511	3332	
Flt Permitted	0.48	1.00		0.71	1.00		0.18	1.00		0.30	1.00	
Satd. Flow (perm)	874	1628		1324	1652		327	3427		469	3332	
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)	218	12	65	10	27	117	58	767	9	17	997	209
RTOR Reduction (vph)	0	46	0	0	102	0	0	0	0	0	9	0
Lane Group Flow (vph)	218	31	0	10	42	0	58	776	0	17	1197	0
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.1	41.1		18.4	18.4		79.1	79.1		84.9	84.9	
Effective Green, g (s)	41.1	41.1		18.4	18.4		79.1	79.1		84.9	84.9	
Actuated g/C Ratio	0.29	0.29		0.13	0.13		0.56	0.56		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	378	477		174	217		184	1936		305	2020	
v/s Ratio Prot	c0.08	0.02			0.03			0.23		0.00	c0.36	
v/s Ratio Perm	c0.09			0.01			0.18			0.03		
v/c Ratio	0.58	0.07		0.06	0.20		0.32	0.40		0.06	0.59	
Uniform Delay, d1	40.1	35.6		53.2	54.2		16.1	17.1		11.7	16.9	
Progression Factor	1.00	1.00		1.00	1.00		0.85	0.84		1.00	1.00	
Incremental Delay, d2	2.1	0.1		0.1	0.4		4.3	0.6		0.1	1.3	
Delay (s)	42.2	35.7		53.3	54.6		18.1	14.9		11.8	18.2	
Level of Service	D	D		D	D		B	B		B	B	
Approach Delay (s)		40.5			54.6			15.2			18.1	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	88.8%	ICU Level of Service	E	
Analysis Period (min)	15			

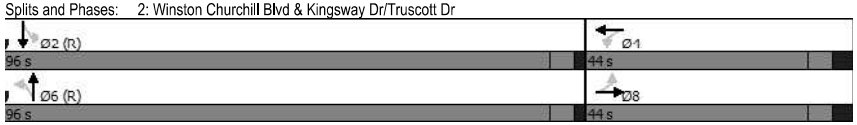
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	43	67	61	20	128	18	607	30	126	896	50
Future Volume (vph)	99	43	67	61	20	128	18	607	30	126	896	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	50.0		0.0	20.0		0.0	80.0		0.0	110.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Frt		0.909			0.870			0.993			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1716	1710	0	1700	1602	0	1785	3365	0	1700	3395	0
Flt Permitted	0.575			0.682			0.280			0.401		
Satd. Flow (perm)	1032	1710	0	1217	1602	0	526	3365	0	715	3395	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54			128			7			8	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		124.3			246.6			351.0			305.5	
Travel Time (s)		8.9			22.2			21.1			18.3	
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Adj. Flow (vph)	99	43	67	61	20	128	18	607	30	126	896	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	99	110	0	61	148	0	18	637	0	126	946	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	1.01	1.01	1.00	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	43.5	43.5		43.5	43.5		33.0	33.0		33.0	33.0	
Total Split (s)	44.0	44.0		44.0	44.0		96.0	96.0		96.0	96.0	
Total Split (%)	31.4%	31.4%		31.4%	31.4%		68.6%	68.6%		68.6%	68.6%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.5	3.5		3.5	3.5		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lead/Lag												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	22.7	22.7		22.7	22.7		103.8	103.8		103.8	103.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
v/c Ratio	0.59	0.34		0.31	0.40		0.05	0.26		0.24	0.38	
Control Delay	65.9	27.0		51.7	13.1		8.2	7.3		1.8	1.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.9	27.0		51.7	13.1		8.2	7.3		1.8	1.1	
LOS	E	C		D	B		A	A		A	A	
Approach Delay		45.5			24.4			7.3			1.2	
Approach LOS		D			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 18 (13%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 9.6		Intersection LOS: A	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Winston Churchill Blvd & Kingsway Dr/Truscott Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	110	61	148	18	637	126	946
v/c Ratio	0.59	0.34	0.31	0.40	0.05	0.26	0.24	0.38
Control Delay	65.9	27.0	51.7	13.1	8.2	7.3	1.8	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	27.0	51.7	13.1	8.2	7.3	1.8	1.1
Queue Length 50th (m)	28.3	15.0	16.6	5.3	1.0	22.7	0.9	3.3
Queue Length 95th (m)	42.5	29.1	27.1	22.3	5.1	49.6	2.7	7.4
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	269	485	317	512	390	2496	530	2518
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	0.37	0.23	0.19	0.29	0.05	0.26	0.24	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	43	67	61	20	128	18	607	30	126	896	50
Future Volume (vph)	99	43	67	61	20	128	18	607	30	126	896	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1705	1709		1695	1602		1784	3364		1693	3395	
Flt Permitted	0.57	1.00		0.68	1.00		0.28	1.00		0.40	1.00	
Satd. Flow (perm)	1032	1709		1217	1602		525	3364		715	3395	
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)	99	43	67	61	20	128	18	607	30	126	896	50
RTOR Reduction (vph)	0	45	0	0	107	0	0	2	0	0	2	0
Lane Group Flow (vph)	99	65	0	61	41	0	18	635	0	126	944	0
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	22.7	22.7		22.7	22.7		103.8	103.8		103.8	103.8	
Effective Green, g (s)	22.7	22.7		22.7	22.7		103.8	103.8		103.8	103.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	277		197	259		389	2494		530	2517	
v/s Ratio Prot		0.04			0.03			0.19			c0.28	
v/s Ratio Perm	c0.10			0.05			0.03			0.18		
v/c Ratio	0.59	0.23		0.31	0.16		0.05	0.25		0.24	0.38	
Uniform Delay, d1	54.4	51.1		51.7	50.4		4.8	5.8		5.7	6.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.11	0.10	
Incremental Delay, d2	5.5	0.4		0.9	0.3		0.2	0.2		0.9	0.4	
Delay (s)	59.9	51.5		52.6	50.7		5.1	6.0		1.5	1.0	
Level of Service	E	D		D	D		A	A		A	A	
Approach Delay (s)		55.5			51.3			6.0			1.1	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

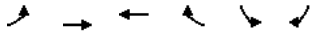
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	20	18	12	70	58	6
Future Volume (vph)	20	18	12	70	58	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.936				0.986	
Flt Protected				0.993	0.957	
Satd. Flow (prot)	1583	0	0	1810	1743	0
Flt Permitted				0.993	0.957	
Satd. Flow (perm)	1583	0	0	1810	1743	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	345.3			109.6	70.9	
Travel Time (s)	31.1			9.9	5.1	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	12%	37%	0%	0%	17%
Adj. Flow (vph)	22	20	13	76	63	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	0	0	89	70	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	1.01	0.99	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	20	18	12	70	58	6
Future Volume (vph)	20	18	12	70	58	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	20	13	76	63	7

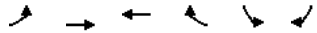
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	42	89	70
Volume Left (vph)	0	13	63
Volume Right (vph)	20	0	7
Hadj (s)	-0.05	0.12	0.15
Departure Headway (s)	4.1	4.2	4.3
Degree Utilization, x	0.05	0.10	0.08
Capacity (veh/h)	855	833	799
Control Delay (s)	7.3	7.7	7.7
Approach Delay (s)	7.3	7.7	7.7
Approach LOS	A	A	A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	221	155	24	52	8
Future Volume (vph)	5	221	155	24	52	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.982		0.982	
Flt Protected		0.999			0.959	
Satd. Flow (prot)	0	1830	1809	0	1682	0
Flt Permitted		0.999			0.959	
Satd. Flow (perm)	0	1830	1809	0	1682	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		135.3	96.6		91.5	
Travel Time (s)		9.7	7.0		6.6	
Confl. Peds. (#/hr)	8			8	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	4%	0%	6%	0%
Bus Blockages (#/hr)	0	0	2	2	0	0
Adj. Flow (vph)	5	240	168	26	57	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	245	194	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.01	0.99	1.00	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

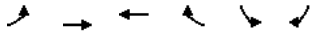
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 26.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	221	155	24	52	8
Future Volume (Veh/h)	5	221	155	24	52	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	240	168	26	57	9
Pedestrians		2	1		8	
Lane Width (m)		3.7	3.7		3.5	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	202				440	191
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	202				440	191
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	100				90	99
cM capacity (veh/h)	1373				561	849

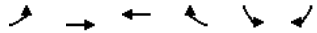
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	245	194	66
Volume Left	5	0	57
Volume Right	0	26	9
cSH	1373	1700	588
Volume to Capacity	0.00	0.11	0.11
Queue Length 95th (m)	0.1	0.0	3.0
Control Delay (s)	0.2	0.0	11.9
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.9
Approach LOS			B

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		26.4%	ICU Level of Service	A
Analysis Period (min)		15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	4	0	1	5	4	1
Future Volume (vph)	4	0	1	5	4	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.887		0.973	
Flt Protected		0.950			0.962	
Satd. Flow (prot)	0	1825	1704	0	1466	0
Flt Permitted		0.950			0.962	
Satd. Flow (perm)	0	1825	1704	0	1466	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		83.1	206.5		266.9	
Travel Time (s)		6.0	14.9		19.2	
Confl. Peds. (#/hr)	4			4	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	25%	0%
Adj. Flow (vph)	4	0	1	5	4	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	4	6	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.01	0.99	0.99	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	0	1	5	4	1
Future Volume (Veh/h)	4	0	1	5	4	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	1	5	4	1
Pedestrians			1		4	
Lane Width (m)			3.7		3.5	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	10				16	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	10				16	8
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1618				939	1077

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	4	6	5
Volume Left	4	0	4
Volume Right	0	5	1
cSH	1618	1700	964
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	7.2	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.8
Approach LOS			A

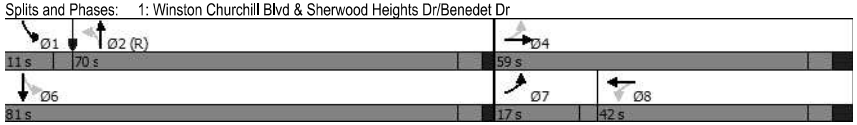
Intersection Summary					
Average Delay		4.8			
Intersection Capacity Utilization		14.6%	ICU Level of Service		A
Analysis Period (min)		15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	21	65	6	6	68	46	896	14	125	993	187
Future Volume (vph)	160	21	65	6	6	68	46	896	14	125	993	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	60.0		0.0	40.0		0.0	85.0		0.0	120.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	0.98		0.99	0.98		1.00	1.00		1.00	1.00	
Frt		0.887			0.862			0.998			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1671	0	1785	1594	0	1785	3475	0	1767	3392	0
Flt Permitted	0.624			0.701			0.206			0.237		
Satd. Flow (perm)	1141	1671	0	1301	1594	0	387	3475	0	440	3392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			68			1			24	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		140.8			345.3			305.5			258.1	
Travel Time (s)		10.1			31.1			18.3			15.5	
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Adj. Flow (vph)	160	21	65	6	6	68	46	896	14	125	993	187
Shared Lane Traffic (%)												
Lane Group Flow (vph)	160	86	0	6	74	0	46	910	0	125	1180	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	1.00	1.01	1.01	1.00	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	8.0		8.0	8.0		8.0	8.0		5.0	8.0	
Minimum Split (s)	8.0	41.5		41.5	41.5		40.5	40.5		8.0	40.5	
Total Split (s)	17.0	59.0		42.0	42.0		70.0	70.0		11.0	81.0	
Total Split (%)	12.1%	42.1%		30.0%	30.0%		50.0%	50.0%		7.9%	57.9%	
Yellow Time (s)	3.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	3.5		3.5	3.5		2.5	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		None	Max	
Act Effct Green (s)	41.7	37.2		23.6	23.6		78.3	78.3		92.3	88.8	
Actuated g/C Ratio	0.30	0.27		0.17	0.17		0.56	0.56		0.66	0.63	
v/c Ratio	0.40	0.18		0.03	0.23		0.21	0.47		0.35	0.55	
Control Delay	37.8	10.9		40.8	12.5		35.0	32.8		14.8	18.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.8	10.9		40.8	12.5		35.0	32.8		14.8	18.3	
LOS	D	B		D	B		C	C		B	B	
Approach Delay		28.4			14.6			33.0			18.0	
Approach LOS		C			B			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 10 (7%), Referenced to phase 2:NBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 76.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Winston Churchill Blvd & Sherwood Heights Dr/Benedet Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	86	6	74	46	910	125	1180
v/c Ratio	0.40	0.18	0.03	0.23	0.21	0.47	0.35	0.55
Control Delay	37.8	10.9	40.8	12.5	35.0	32.8	14.8	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	10.9	40.8	12.5	35.0	32.8	14.8	18.3
Queue Length 50th (m)	30.8	3.9	1.4	1.3	10.7	127.4	16.6	122.0
Queue Length 95th (m)	48.3	15.9	5.2	14.6	23.8	145.6	27.2	146.1
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	403	655	320	444	216	1944	365	2160
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	0.40	0.13	0.02	0.17	0.21	0.47	0.34	0.55

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	21	65	6	6	68	46	896	14	125	993	187
Future Volume (vph)	160	21	65	6	6	68	46	896	14	125	993	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1671		1763	1594		1782	3474		1767	3393	
Flt Permitted	0.62	1.00		0.70	1.00		0.21	1.00		0.24	1.00	
Satd. Flow (perm)	1144	1671		1302	1594		386	3474		441	3393	
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)	160	21	65	6	6	68	46	896	14	125	993	187
RTOR Reduction (vph)	0	47	0	0	57	0	0	0	0	0	9	0
Lane Group Flow (vph)	160	39	0	6	17	0	46	910	0	125	1171	0
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	38.7	38.7		22.0	22.0		76.8	76.8		87.3	87.3	
Effective Green, g (s)	38.7	38.7		22.0	22.0		76.8	76.8		87.3	87.3	
Actuated g/C Ratio	0.28	0.28		0.16	0.16		0.55	0.55		0.62	0.62	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	374	461		204	250		211	1905		346	2115	
v/s Ratio Prot	c0.04	0.02			0.01			0.26		0.02	c0.35	
v/s Ratio Perm	c0.08			0.00			0.12			0.21		
v/c Ratio	0.43	0.08		0.03	0.07		0.22	0.48		0.36	0.55	
Uniform Delay, d1	40.4	37.5		50.0	50.3		16.2	19.3		12.4	15.1	
Progression Factor	1.00	1.00		1.00	1.00		1.41	1.46		1.00	1.00	
Incremental Delay, d2	0.8	0.1		0.1	0.1		2.2	0.8		0.6	1.1	
Delay (s)	41.2	37.6		50.0	50.4		25.2	29.1		13.0	16.2	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		39.9			50.3			28.9			15.9	
Approach LOS		D			D			C			B	

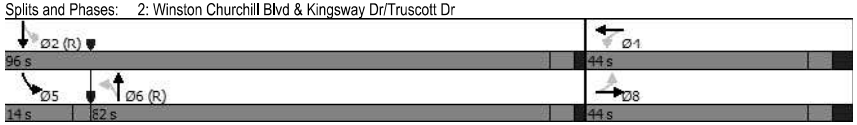
Intersection Summary				
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	76.7%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	63	31	52	51	112	29	786	105	315	650	99
Future Volume (vph)	58	63	31	52	51	112	29	786	105	315	650	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	50.0		0.0	20.0		0.0	80.0		0.0	110.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		0.99	0.99		0.99	1.00		1.00	1.00	
Frt		0.951			0.897			0.982			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1716	1816	0	1716	1695	0	1785	3430	0	1750	3351	0
Flt Permitted	0.465			0.696			0.367			0.280		
Satd. Flow (perm)	839	1816	0	1251	1695	0	686	3430	0	515	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			76			16			24	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		124.3			246.6			351.0			305.5	
Travel Time (s)		8.9			22.2			21.1			18.3	
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Adj. Flow (vph)	58	63	31	52	51	112	29	786	105	315	650	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	94	0	52	163	0	29	891	0	315	749	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01	1.01	0.99	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		5	2	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		5.0	8.0	
Minimum Split (s)	43.5	43.5		43.5	43.5		33.0	33.0		8.0	33.0	
Total Split (s)	44.0	44.0		44.0	44.0		82.0	82.0		14.0	96.0	
Total Split (%)	31.4%	31.4%		31.4%	31.4%		58.6%	58.6%		10.0%	68.6%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	3.5	3.5		3.5	3.5		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lead/Lag							Lag	Lag		Lead		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	
Act Effct Green (s)	16.6	16.6		16.6	16.6		96.6	96.6		112.9	109.9	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.81	0.78	
v/c Ratio	0.59	0.41		0.35	0.61		0.06	0.38		0.62	0.28	
Control Delay	78.2	49.0		59.4	38.6		10.7	10.9		27.2	15.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	78.2	49.0		59.4	38.6		10.7	10.9		27.2	15.7	
LOS	E	D		E	D		B	B		C	B	
Approach Delay		60.2			43.6			10.9			19.1	
Approach LOS		E			D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 81 (58%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 81.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Winston Churchill Blvd & Kingsway Dr/Truscott Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	94	52	163	29	891	315	749
v/c Ratio	0.59	0.41	0.35	0.61	0.06	0.38	0.62	0.28
Control Delay	78.2	49.0	59.4	38.6	10.7	10.9	27.2	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.2	49.0	59.4	38.6	10.7	10.9	27.2	15.7
Queue Length 50th (m)	16.8	21.6	14.6	24.8	2.3	47.4	63.5	88.0
Queue Length 95th (m)	27.6	33.4	23.9	41.0	9.5	96.7	117.3	134.1
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	218	486	326	498	473	2371	512	2635
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	0.27	0.19	0.16	0.33	0.06	0.38	0.62	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	63	31	52	51	112	29	786	105	315	650	99
Future Volume (vph)	58	63	31	52	51	112	29	786	105	315	650	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1713	1815		1708	1695		1775	3432		1749	3352	
Flt Permitted	0.47	1.00		0.70	1.00		0.37	1.00		0.28	1.00	
Satd. Flow (perm)	839	1815		1251	1695		686	3432		515	3352	
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)	58	63	31	52	51	112	29	786	105	315	650	99
RTOR Reduction (vph)	0	15	0	0	67	0	0	5	0	0	5	0
Lane Group Flow (vph)	58	79	0	52	96	0	29	886	0	315	744	0
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	16.6	16.6		16.6	16.6		96.6	96.6		109.9	109.9	
Effective Green, g (s)	16.6	16.6		16.6	16.6		96.6	96.6		109.9	109.9	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.79	0.79	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	99	215		148	200		473	2368		495	2631	
v/s Ratio Prot		0.04			0.06			0.26		c0.05	0.22	
v/s Ratio Perm	c0.07			0.04			0.04			c0.45		
v/c Ratio	0.59	0.37		0.35	0.48		0.06	0.37		0.64	0.28	
Uniform Delay, d1	58.4	56.9		56.7	57.7		7.0	9.1		5.1	4.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		4.26	3.04	
Incremental Delay, d2	8.6	1.1		1.4	1.8		0.2	0.5		2.3	0.2	
Delay (s)	67.0	57.9		58.2	59.5		7.3	9.5		24.1	12.9	
Level of Service	E	E		E	E		A	A		C	B	
Approach Delay (s)		61.4			59.2			9.5			16.2	
Approach LOS		E			E			A			B	

Intersection Summary				
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.5	
Intersection Capacity Utilization	81.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	83	65	11	42	37	12
Future Volume (vph)	83	65	11	42	37	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.5	3.5	3.7	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.940				0.967	
Flt Protected				0.990	0.964	
Satd. Flow (prot)	1806	0	0	1902	1751	0
Flt Permitted				0.990	0.964	
Satd. Flow (perm)	1806	0	0	1902	1751	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	345.3			109.6	70.9	
Travel Time (s)	31.1			9.9	5.1	
Confl. Peds. (#/hr)						1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	90	71	12	46	40	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	161	0	0	58	53	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	1.01	1.01	0.99	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	83	65	11	42	37	12
Future Volume (vph)	83	65	11	42	37	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	71	12	46	40	13

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	161	58	53
Volume Left (vph)	0	12	40
Volume Right (vph)	71	0	13
Hadj (s)	-0.26	0.04	0.00
Departure Headway (s)	3.8	4.2	4.3
Degree Utilization, x	0.17	0.07	0.06
Capacity (veh/h)	924	835	781
Control Delay (s)	7.6	7.5	7.6
Approach Delay (s)	7.6	7.5	7.6
Approach LOS	A	A	A

Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			

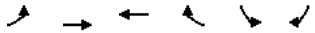
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	501	241	56	31	5
Future Volume (vph)	8	501	241	56	31	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.975		0.983	
Flt Protected		0.999			0.958	
Satd. Flow (prot)	0	1900	1843	0	1769	0
Flt Permitted		0.999			0.958	
Satd. Flow (perm)	0	1900	1843	0	1769	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		135.3	96.6		91.5	
Travel Time (s)		9.7	7.0		6.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	2	2	0	0
Adj. Flow (vph)	9	545	262	61	34	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	554	323	0	39	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.01	0.99	1.00	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	501	241	56	31	5
Future Volume (Veh/h)	8	501	241	56	31	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	545	262	61	34	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	323				856	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	323				856	292
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				90	99
cM capacity (veh/h)	1248				329	752

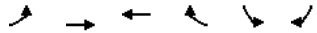
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	554	323	39
Volume Left	9	0	34
Volume Right	0	61	5
cSH	1248	1700	354
Volume to Capacity	0.01	0.19	0.11
Queue Length 95th (m)	0.2	0.0	2.9
Control Delay (s)	0.2	0.0	16.4
Lane LOS	A		C
Approach Delay (s)	0.2	0.0	16.4
Approach LOS			C

Intersection Summary					
Average Delay		0.8			
Intersection Capacity Utilization		42.8%	ICU Level of Service		A
Analysis Period (min)		15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	1	2	4	7	0
Future Volume (vph)	1	1	2	4	7	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.910			
Flt Protected		0.976			0.950	
Satd. Flow (prot)	0	1875	1748	0	1785	0
Flt Permitted		0.976			0.950	
Satd. Flow (perm)	0	1875	1748	0	1785	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		83.1	206.5		266.9	
Travel Time (s)		6.0	14.9		19.2	
Confl. Peds. (#/hr)					2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	1	1	2	4	8	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2	6	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.01	0.99	0.99	1.01	1.01	1.01
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	1	2	4	7	0
Future Volume (Veh/h)	1	1	2	4	7	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	1	2	4	8	0
Pedestrians			2			
Lane Width (m)			3.7			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	6				9	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6				9	4
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1628				1014	1080

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	2	6	8
Volume Left	1	0	8
Volume Right	0	4	0
cSH	1628	1700	1014
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	3.6	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	3.6	0.0	8.6
Approach LOS			A

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		13.3%	ICU Level of Service	A
Analysis Period (min)		15		

APPENDIX

E BACKGROUND GROWTH

Date: November 20, 2023
Requestor: Xinwei Dong, WSP
Request Type: Growth Rate Data Request
Location: Winston Churchill Blvd between Benedet Drive and Stockholm

Xinwei Dong,

See below the forecasted compound annual growth rate values for Winston Churchill Blvd between Benedet Drive and Stockholm Road.

2011 to 2021	2021 to 2031
0.5%	0.5%

These growth rates are estimated using several sources including socioeconomic data and results from the Region of Peel's Travel Demand Forecasting Model. Please note that this area may be further affected by future growth (after 2031 and beyond). It is important to exercise professional judgment when using these values.

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

Regards,

Ucchas Saha
Transportation Planner, Transportation Planning
Transportation Division | Public Works | Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9

APPENDIX

F FUTURE BACKGROUND SYNCHRO REPORTS

APPENDIX

F-1 *2028 HORIZON*

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	218	78	10	145	58	796	17	1232
v/c Ratio	0.54	0.15	0.06	0.46	0.32	0.40	0.05	0.61
Control Delay	39.6	9.6	45.8	16.8	26.3	17.3	14.9	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	9.6	45.8	16.8	26.3	17.3	14.9	21.0
Queue Length 50th (m)	54.0	3.7	2.8	8.0	5.4	42.9	1.4	89.4
Queue Length 95th (m)	59.1	13.3	7.3	24.9	30.3	122.7	6.6	176.9
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	413	718	325	495	181	1982	348	2034
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	0.53	0.11	0.03	0.29	0.32	0.40	0.05	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	13	65	10	28	117	58	787	9	17	1023	209
Future Volume (vph)	218	13	65	10	28	117	58	787	9	17	1023	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.88		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1632		1779	1654		1715	3428		1511	3333	
Flt Permitted	0.47	1.00		0.71	1.00		0.17	1.00		0.29	1.00	
Satd. Flow (perm)	868	1632		1323	1654		314	3428		457	3333	
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)	218	13	65	10	28	117	58	787	9	17	1023	209
RTOR Reduction (vph)	0	44	0	0	102	0	0	0	0	0	9	0
Lane Group Flow (vph)	218	34	0	10	43	0	58	796	0	17	1223	0
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.0	41.0		18.4	18.4		79.2	79.2		85.0	85.0	
Effective Green, g (s)	41.0	41.0		18.4	18.4		79.2	79.2		85.0	85.0	
Actuated g/C Ratio	0.29	0.29		0.13	0.13		0.57	0.57		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	376	477		173	217		177	1939		298	2023	
v/s Ratio Prot	c0.08	0.02			0.03			0.23		0.00	c0.37	
v/s Ratio Perm	c0.09			0.01			0.18			0.03		
v/c Ratio	0.58	0.07		0.06	0.20		0.33	0.41		0.06	0.60	
Uniform Delay, d1	40.2	35.8		53.2	54.2		16.2	17.2		11.7	17.1	
Progression Factor	1.00	1.00		1.00	1.00		0.86	0.84		1.00	1.00	
Incremental Delay, d2	2.2	0.1		0.1	0.5		4.8	0.6		0.1	1.3	
Delay (s)	42.3	35.8		53.4	54.7		18.6	15.0		11.8	18.4	
Level of Service	D	D		D	D		B	B		B	B	
Approach Delay (s)		40.6			54.6			15.3			18.3	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	89.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

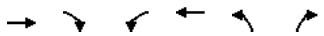
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	112	61	149	18	653	126	969
v/c Ratio	0.60	0.35	0.31	0.41	0.05	0.26	0.24	0.38
Control Delay	66.1	28.3	51.8	13.2	8.2	7.3	1.9	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.1	28.3	51.8	13.2	8.2	7.3	1.9	1.1
Queue Length 50th (m)	28.4	16.1	16.6	5.5	1.0	23.5	1.0	3.7
Queue Length 95th (m)	42.5	30.4	27.2	22.8	5.1	51.0	2.8	7.6
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	267	484	314	512	378	2496	520	2518
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	0.37	0.23	0.19	0.29	0.05	0.26	0.24	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	45	67	61	21	128	18	623	30	126	919	50
Future Volume (vph)	99	45	67	61	21	128	18	623	30	126	919	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1705	1712		1695	1604		1784	3365		1693	3396	
Flt Permitted	0.57	1.00		0.68	1.00		0.27	1.00		0.39	1.00	
Satd. Flow (perm)	1027	1712		1207	1604		511	3365		702	3396	
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)	99	45	67	61	21	128	18	623	30	126	919	50
RTOR Reduction (vph)	0	44	0	0	107	0	0	2	0	0	2	0
Lane Group Flow (vph)	99	68	0	61	42	0	18	651	0	126	967	0
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	22.7	22.7		22.7	22.7		103.8	103.8		103.8	103.8	
Effective Green, g (s)	22.7	22.7		22.7	22.7		103.8	103.8		103.8	103.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	277		195	260		378	2494		520	2517	
v/s Ratio Prot		0.04			0.03			0.19			c0.28	
v/s Ratio Perm	c0.10			0.05			0.04			0.18		
v/c Ratio	0.60	0.25		0.31	0.16		0.05	0.26		0.24	0.38	
Uniform Delay, d1	54.4	51.2		51.8	50.5		4.9	5.8		5.7	6.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.12	0.10	
Incremental Delay, d2	5.7	0.5		0.9	0.3		0.2	0.3		0.9	0.4	
Delay (s)	60.1	51.7		52.7	50.7		5.1	6.1		1.6	1.0	
Level of Service	E	D		D	D		A	A		A	A	
Approach Delay (s)		55.6			51.3			6.0			1.1	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	76.7%	ICU Level of Service	D	
Analysis Period (min)	15			

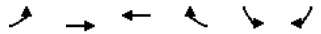
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	21	18	12	72	58	6
Future Volume (vph)	21	18	12	72	58	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	20	13	78	63	7

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	43	91	70
Volume Left (vph)	0	13	63
Volume Right (vph)	20	0	7
Hadj (s)	-0.05	0.12	0.15
Departure Headway (s)	4.1	4.2	4.3
Degree Utilization, x	0.05	0.11	0.08
Capacity (veh/h)	853	834	797
Control Delay (s)	7.3	7.7	7.7
Approach Delay (s)	7.3	7.7	7.7
Approach LOS	A	A	A

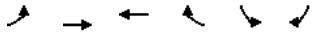
Intersection Summary			
Delay		7.6	
Level of Service		A	
Intersection Capacity Utilization		22.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	227	159	24	52	8
Future Volume (Veh/h)	5	227	159	24	52	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	247	173	26	57	9
Pedestrians		2	1		8	
Lane Width (m)		3.7	3.7		3.5	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	207				452	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	207				452	196
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	100				90	99
cM capacity (veh/h)	1367				552	843

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	252	199	66
Volume Left	5	0	57
Volume Right	0	26	9
cSH	1367	1700	579
Volume to Capacity	0.00	0.12	0.11
Queue Length 95th (m)	0.1	0.0	3.1
Control Delay (s)	0.2	0.0	12.0
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	12.0
Approach LOS			B

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		26.7%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	0	2	5	4	1
Future Volume (Veh/h)	4	0	2	5	4	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	2	5	4	1
Pedestrians			1		4	
Lane Width (m)			3.7		3.5	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	11				18	8
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	11				18	8
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1616				938	1076

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	4	7	5
Volume Left	4	0	4
Volume Right	0	5	1
cSH	1616	1700	963
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	7.2	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	87	6	75	46	933	125	1206
v/c Ratio	0.38	0.17	0.03	0.23	0.23	0.50	0.37	0.58
Control Delay	36.1	11.0	40.8	12.7	36.0	34.3	15.5	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	11.0	40.8	12.7	36.0	34.3	15.5	19.4
Queue Length 50th (m)	30.8	4.1	1.4	1.6	10.5	131.2	16.6	126.4
Queue Length 95th (m)	48.3	16.3	5.2	14.8	24.6	149.0	27.2	151.0
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	425	656	320	445	197	1870	344	2092
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	0.38	0.13	0.02	0.17	0.23	0.50	0.36	0.58

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	22	65	6	7	68	46	919	14	125	1019	187
Future Volume (vph)	160	22	65	6	7	68	46	919	14	125	1019	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1674		1763	1598		1783	3474		1767	3395	
Flt Permitted	0.63	1.00		0.70	1.00		0.19	1.00		0.23	1.00	
Satd. Flow (perm)	1152	1674		1300	1598		366	3474		419	3395	
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)	160	22	65	6	7	68	46	919	14	125	1019	187
RTOR Reduction (vph)	0	46	0	0	57	0	0	0	0	0	9	0
Lane Group Flow (vph)	160	41	0	6	18	0	46	933	0	125	1197	0
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.1	40.1		23.6	23.6		75.3	75.3		85.9	85.9	
Effective Green, g (s)	40.1	40.1		23.6	23.6		75.3	75.3		85.9	85.9	
Actuated g/C Ratio	0.29	0.29		0.17	0.17		0.54	0.54		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	386	479		219	269		196	1868		330	2083	
v/s Ratio Prot	c0.04	0.02			0.01			0.27		0.02	c0.35	
v/s Ratio Perm	c0.08			0.00			0.13			0.21		
v/c Ratio	0.41	0.08		0.03	0.07		0.23	0.50		0.38	0.57	
Uniform Delay, d1	39.3	36.5		48.6	49.0		17.1	20.4		13.2	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.41	1.46		1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.1	0.1		2.6	0.9		0.7	1.2	
Delay (s)	40.0	36.6		48.7	49.1		26.8	30.7		14.0	17.3	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		38.8			49.0			30.5			17.0	
Approach LOS		D			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

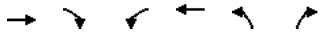
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	96	52	165	29	911	315	766
v/c Ratio	0.59	0.41	0.35	0.62	0.06	0.38	0.63	0.29
Control Delay	78.4	49.3	59.2	40.0	10.7	11.1	27.9	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.4	49.3	59.2	40.0	10.7	11.1	27.9	15.8
Queue Length 50th (m)	16.8	22.2	14.6	26.0	2.3	49.2	64.0	91.2
Queue Length 95th (m)	27.6	33.9	23.9	42.4	9.5	99.6	118.2	137.2
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	215	486	325	497	464	2369	502	2635
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	0.27	0.20	0.16	0.33	0.06	0.38	0.63	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	65	31	52	53	112	29	806	105	315	667	99
Future Volume (vph)	58	65	31	52	53	112	29	806	105	315	667	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1713	1818		1708	1697		1775	3433		1749	3353	
Flt Permitted	0.46	1.00		0.69	1.00		0.36	1.00		0.27	1.00	
Satd. Flow (perm)	829	1818		1249	1697		675	3433		502	3353	
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)	58	65	31	52	53	112	29	806	105	315	667	99
RTOR Reduction (vph)	0	15	0	0	65	0	0	5	0	0	5	0
Lane Group Flow (vph)	58	81	0	52	100	0	29	906	0	315	761	0
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	16.7	16.7		16.7	16.7		96.4	96.4		109.8	109.8	
Effective Green, g (s)	16.7	16.7		16.7	16.7		96.4	96.4		109.8	109.8	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.78	0.78	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	98	216		148	202		464	2363		486	2629	
v/s Ratio Prot		0.04			0.06			0.26		c0.05	0.23	
v/s Ratio Perm	c0.07			0.04			0.04			c0.46		
v/c Ratio	0.59	0.38		0.35	0.49		0.06	0.38		0.65	0.29	
Uniform Delay, d1	58.4	56.8		56.7	57.7		7.1	9.2		5.3	4.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		4.21	3.02	
Incremental Delay, d2	9.2	1.1		1.4	1.9		0.3	0.5		2.5	0.2	
Delay (s)	67.7	57.9		58.1	59.6		7.4	9.7		24.7	13.0	
Level of Service	E	E		E	E		A	A		C	B	
Approach Delay (s)		61.6			59.2			9.6			16.4	
Approach LOS		E			E			A			B	

Intersection Summary				
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.5	
Intersection Capacity Utilization	81.7%	ICU Level of Service	D	
Analysis Period (min)	15			

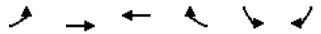
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	86	65	11	44	37	12
Future Volume (vph)	86	65	11	44	37	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	93	71	12	48	40	13

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	164	60	53
Volume Left (vph)	0	12	40
Volume Right (vph)	71	0	13
Hadj (s)	-0.26	0.04	0.00
Departure Headway (s)	3.8	4.2	4.4
Degree Utilization, x	0.17	0.07	0.06
Capacity (veh/h)	922	834	779
Control Delay (s)	7.6	7.5	7.7
Approach Delay (s)	7.6	7.5	7.7
Approach LOS	A	A	A

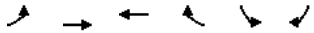
Intersection Summary			
Delay		7.6	
Level of Service		A	
Intersection Capacity Utilization		22.1%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	514	248	56	31	5
Future Volume (Veh/h)	8	514	248	56	31	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	559	270	61	34	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	331				878	300
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	331				878	300
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				89	99
cM capacity (veh/h)	1240				319	744

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	568	331	39
Volume Left	9	0	34
Volume Right	0	61	5
cSH	1240	1700	344
Volume to Capacity	0.01	0.19	0.11
Queue Length 95th (m)	0.2	0.0	3.0
Control Delay (s)	0.2	0.0	16.8
Lane LOS	A		C
Approach Delay (s)	0.2	0.0	16.8
Approach LOS			C

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		43.5%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	2	3	4	7	0
Future Volume (Veh/h)	1	2	3	4	7	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2	3	4	8	0
Pedestrians			2			
Lane Width (m)			3.7			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	7				11	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	7				11	5
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1627				1012	1078

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	3	7	8
Volume Left	1	0	8
Volume Right	0	4	0
cSH	1627	1700	1012
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	2.4	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	2.4	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX

F-2 2033 HORIZON

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	218	78	10	146	58	816	17	1257
v/c Ratio	0.54	0.15	0.06	0.46	0.33	0.41	0.05	0.62
Control Delay	39.6	10.5	45.8	17.1	27.1	17.5	14.9	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	10.5	45.8	17.1	27.1	17.5	14.9	21.3
Queue Length 50th (m)	54.0	4.6	2.8	8.3	5.6	44.4	1.4	92.4
Queue Length 95th (m)	59.1	14.0	7.3	25.2	30.5	126.5	6.6	182.5
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	412	715	325	496	174	1982	341	2033
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	0.53	0.11	0.03	0.29	0.33	0.41	0.05	0.62

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	13	65	10	29	117	58	807	9	17	1048	209
Future Volume (vph)	218	13	65	10	29	117	58	807	9	17	1048	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.88		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1632		1779	1656		1715	3428		1512	3335	
Flt Permitted	0.47	1.00		0.71	1.00		0.17	1.00		0.28	1.00	
Satd. Flow (perm)	863	1632		1323	1656		301	3428		444	3335	
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)	218	13	65	10	29	117	58	807	9	17	1048	209
RTOR Reduction (vph)	0	41	0	0	102	0	0	0	0	0	9	0
Lane Group Flow (vph)	218	37	0	10	44	0	58	816	0	17	1248	0
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.0	41.0		18.4	18.4		79.2	79.2		85.0	85.0	
Effective Green, g (s)	41.0	41.0		18.4	18.4		79.2	79.2		85.0	85.0	
Actuated g/C Ratio	0.29	0.29		0.13	0.13		0.57	0.57		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	375	477		173	217		170	1939		290	2024	
v/s Ratio Prot	c0.08	0.02			0.03			0.24		0.00	c0.37	
v/s Ratio Perm	c0.09			0.01			0.19			0.03		
v/c Ratio	0.58	0.08		0.06	0.20		0.34	0.42		0.06	0.62	
Uniform Delay, d1	40.2	35.8		53.2	54.3		16.4	17.3		11.8	17.3	
Progression Factor	1.00	1.00		1.00	1.00		0.85	0.84		1.00	1.00	
Incremental Delay, d2	2.3	0.1		0.1	0.5		5.2	0.7		0.1	1.4	
Delay (s)	42.5	35.9		53.4	54.7		19.2	15.1		11.9	18.7	
Level of Service	D	D		D	D		B	B		B	B	
Approach Delay (s)		40.7			54.6			15.4			18.6	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	90.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	113	61	150	18	669	126	992
v/c Ratio	0.60	0.35	0.31	0.41	0.05	0.27	0.25	0.39
Control Delay	66.2	28.8	51.8	13.5	8.2	7.4	1.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.2	28.8	51.8	13.5	8.2	7.4	1.9	1.2
Queue Length 50th (m)	28.4	16.6	16.6	5.8	1.0	24.2	1.0	4.0
Queue Length 95th (m)	42.6	31.2	27.2	23.1	5.2	52.6	2.8	7.7
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	266	484	313	513	367	2495	511	2517
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	0.37	0.23	0.19	0.29	0.05	0.27	0.25	0.39

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	46	67	61	22	128	18	639	30	126	942	50
Future Volume (vph)	99	46	67	61	22	128	18	639	30	126	942	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1705	1713		1695	1606		1784	3366		1693	3396	
Flt Permitted	0.57	1.00		0.67	1.00		0.26	1.00		0.39	1.00	
Satd. Flow (perm)	1023	1713		1202	1606		496	3366		689	3396	
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)	99	46	67	61	22	128	18	639	30	126	942	50
RTOR Reduction (vph)	0	43	0	0	107	0	0	2	0	0	2	0
Lane Group Flow (vph)	99	70	0	61	43	0	18	667	0	126	990	0
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Effective Green, g (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	278		195	261		367	2493		510	2515	
v/s Ratio Prot		0.04			0.03			0.20			c0.29	
v/s Ratio Perm	c0.10			0.05			0.04			0.18		
v/c Ratio	0.60	0.25		0.31	0.16		0.05	0.27		0.25	0.39	
Uniform Delay, d1	54.3	51.2		51.7	50.4		4.9	5.9		5.8	6.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.12	0.10	
Incremental Delay, d2	5.7	0.5		0.9	0.3		0.3	0.3		0.9	0.4	
Delay (s)	60.0	51.6		52.6	50.7		5.1	6.1		1.6	1.0	
Level of Service	E	D		D	D		A	A		A	A	
Approach Delay (s)		55.5			51.3			6.1			1.1	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	77.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	88	6	75	46	956	125	1231
v/c Ratio	0.38	0.17	0.03	0.23	0.24	0.51	0.38	0.59
Control Delay	36.1	11.1	40.8	12.7	36.6	34.9	15.7	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	11.1	40.8	12.7	36.6	34.9	15.7	19.7
Queue Length 50th (m)	30.8	4.3	1.4	1.6	10.6	134.9	16.6	130.5
Queue Length 95th (m)	48.3	16.3	5.2	14.8	24.2	152.7	27.2	156.1
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	425	657	320	445	188	1870	335	2092
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	0.38	0.13	0.02	0.17	0.24	0.51	0.37	0.59

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	23	65	6	7	68	46	942	14	125	1044	187
Future Volume (vph)	160	23	65	6	7	68	46	942	14	125	1044	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1676		1763	1598		1783	3474		1767	3397	
Flt Permitted	0.63	1.00		0.70	1.00		0.19	1.00		0.22	1.00	
Satd. Flow (perm)	1152	1676		1299	1598		351	3474		403	3397	
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)	160	23	65	6	7	68	46	942	14	125	1044	187
RTOR Reduction (vph)	0	46	0	0	57	0	0	0	0	0	9	0
Lane Group Flow (vph)	160	42	0	6	18	0	46	956	0	125	1222	0
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.1	40.1		23.6	23.6		75.3	75.3		85.9	85.9	
Effective Green, g (s)	40.1	40.1		23.6	23.6		75.3	75.3		85.9	85.9	
Actuated g/C Ratio	0.29	0.29		0.17	0.17		0.54	0.54		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	386	480		218	269		188	1868		321	2084	
v/s Ratio Prot	c0.04	0.02			0.01			0.28		0.02	c0.36	
v/s Ratio Perm	c0.08			0.00			0.13			0.22		
v/c Ratio	0.41	0.09		0.03	0.07		0.24	0.51		0.39	0.59	
Uniform Delay, d1	39.3	36.6		48.6	49.0		17.2	20.6		13.4	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.41	1.47		1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.1	0.1		2.9	0.9		0.8	1.2	
Delay (s)	40.0	36.6		48.7	49.1		27.2	31.2		14.2	17.5	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		38.8			49.0			31.0			17.2	
Approach LOS		D			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	78.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	98	52	166	29	932	315	783
v/c Ratio	0.59	0.42	0.35	0.62	0.06	0.39	0.65	0.30
Control Delay	77.8	50.2	58.9	40.9	10.8	11.3	28.6	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.8	50.2	58.9	40.9	10.8	11.3	28.6	16.0
Queue Length 50th (m)	16.7	23.0	14.5	26.9	2.4	51.4	64.5	94.4
Queue Length 95th (m)	27.6	34.9	23.9	43.2	9.5	102.6	118.2	140.1
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	215	486	325	496	455	2362	491	2631
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	0.27	0.20	0.16	0.33	0.06	0.39	0.64	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	67	31	52	54	112	29	827	105	315	684	99
Future Volume (vph)	58	67	31	52	54	112	29	827	105	315	684	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1713	1820		1708	1699		1776	3434		1750	3355	
Flt Permitted	0.46	1.00		0.69	1.00		0.36	1.00		0.27	1.00	
Satd. Flow (perm)	828	1820		1247	1699		664	3434		488	3355	
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)	58	67	31	52	54	112	29	827	105	315	684	99
RTOR Reduction (vph)	0	14	0	0	63	0	0	5	0	0	5	0
Lane Group Flow (vph)	58	84	0	52	103	0	29	927	0	315	778	0
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	16.9	16.9		16.9	16.9		96.1	96.1		109.6	109.6	
Effective Green, g (s)	16.9	16.9		16.9	16.9		96.1	96.1		109.6	109.6	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.78	0.78	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	99	219		150	205		455	2357		476	2626	
v/s Ratio Prot		0.05			0.06			0.27		c0.05	0.23	
v/s Ratio Perm	c0.07			0.04			0.04			c0.47		
v/c Ratio	0.59	0.38		0.35	0.50		0.06	0.39		0.66	0.30	
Uniform Delay, d1	58.2	56.7		56.5	57.6		7.2	9.4		5.5	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		4.23	3.00	
Incremental Delay, d2	8.6	1.1		1.4	1.9		0.3	0.5		2.9	0.2	
Delay (s)	66.8	57.9		57.9	59.5		7.5	9.9		26.1	13.1	
Level of Service	E	E		E	E		A	A		C	B	
Approach Delay (s)		61.2			59.1			9.8			16.9	
Approach LOS		E			E			A			B	

Intersection Summary				
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.5	
Intersection Capacity Utilization	82.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

APPENDIX

G TTS DATA

Home-Based Modal Split

Tue Nov 21 2023 13:25:49 GMT+0530 (India Standard Time) - Run Time: 2771ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:
(2006 GTA zone of origin - gta06_orig In 3614
and
Start time of trip - start_time In 0630-0930
and
Trip purpose of origin - purp_orig In H

Trip 2016
Table:

	Mississauga	Mode Splits
Transit excluding GO rail	334	9%
Cycle	39	1%
Auto driver	1899	49%
GO rail only	266	7%
Joint GO rail and local transit	183	5%
Auto passenger	242	6%
School bus	130	3%
Paid rideshare	59	2%
Walk	695	18%

Auto – Driver	49.4%
Auto – Passenger	11.2%
Transit	8.7%
Rail Transit	11.7%
Walking and Cycling	19.1%

Tue Nov 21 2023 13:26:58 GMT+0530 (India Standard Time) - Run Time: 3051ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:
(2006 GTA zone of destination - gta06_dest In 3614
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of destination - purp_dest In H

Trip 2016
Table:

	Mississauga	Mode Splits
Transit excluding GO rail	345	12%
Auto driver	2056	71%
GO rail only	168	6%
Joint GO rail and local transit	92	3%
Auto passenger	97	3%
Walk	137	5%

Auto – Driver	71.0%
Auto – Passenger	3.4%
Transit	11.9%
Rail Transit	9.0%
Walking and Cycling	4.7%

TTS Trip Distribution Summary

In order to inform the trip assignment stage of the analysis, informaton about the general trip distribution is required to inform the analysis. The distribution represents the proportion of trips to and away from the site in any given direction. The following pages summarizes the general trip distribution results, which were calculated using Transportation Tomorrow Survey (TTS) 2016 trip origin and destination data. Trips were grouped under cardinal directions based on the relative angle between trip origin and destination, and appropriate adjustments were made to the calculation to conform to local geography and street grid.

The "TTS Directional Distribution Summary" on the next page presents a summary of the calculations described above, along with notes on any details specific to the analysis in this report. The table shows the total number of trips to and from the subject site categorized into general directions (North, Northeast, East etc.) and the percentage share of trips in each general direction in all directions.

The pages after show graphical illustrations of the categorizations for all Traffic Analysis Zones (TAZ) in the TTS survey area. Note that the latest survey zones were last updated in 2006.

These results are used as reference information for the trip assignment. They do not directly determine the trip assignment on the study network. The final trip assignments are completed based on a combination of local context, engineering experience, and engineering judgement, with the trip distribution information presented here to illustrate general travel behaviour.

TTS Directional Distribution Summary: 2620 Chalkwell Close

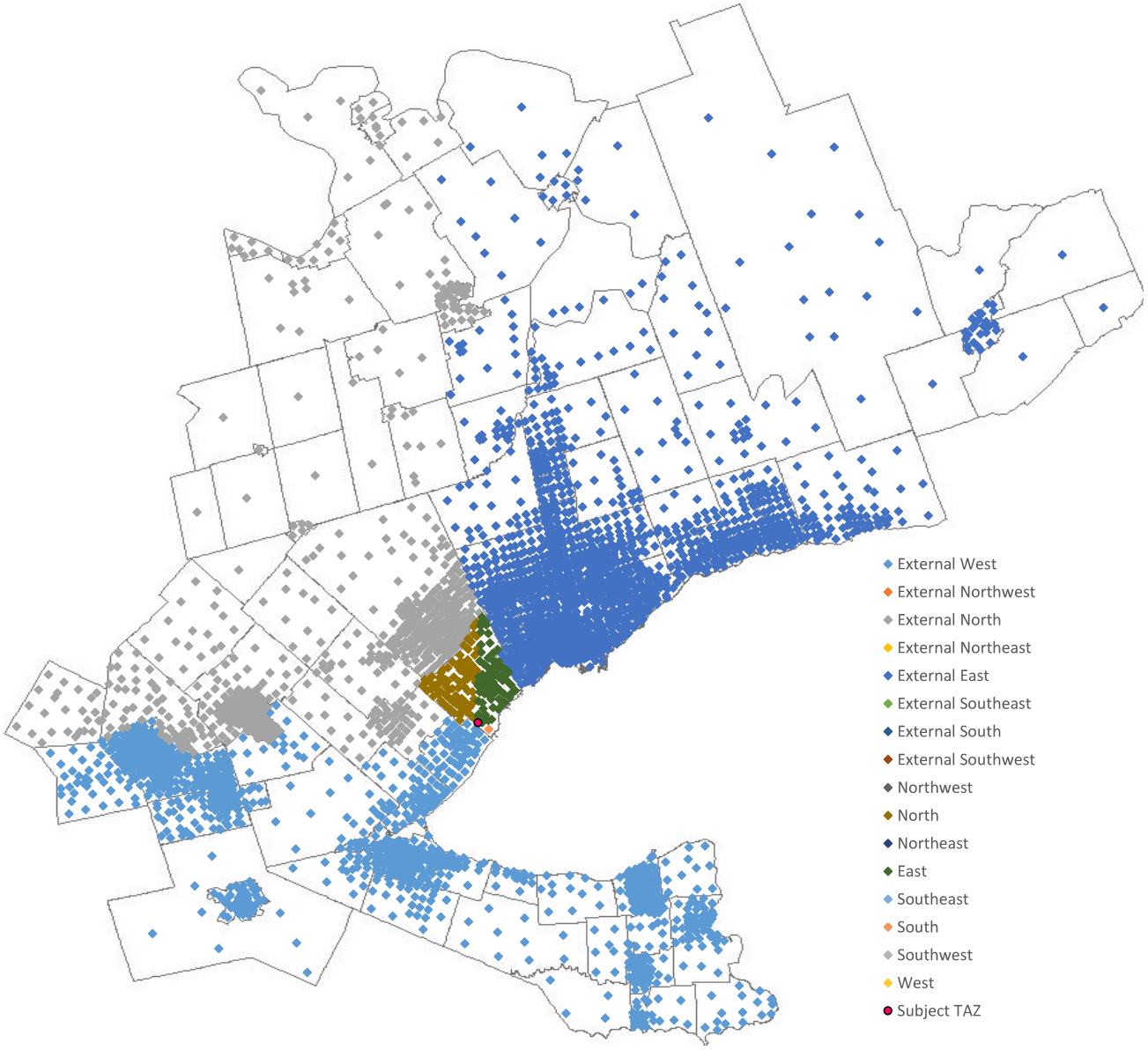
Notes:

1. Directions determined based on centroid coordinates of destination/origin planning districts.
2. 'Internal' refers to local trips made within the home planning district(s), while 'External' refers to trips made to areas outside of the home planning district(s).
3. 'I' refers to local trips made within the subject TAZ that do not have a cardinal direction assigned to them. These trips are excluded from the analysis.

			Internal										External								
	Time Period	Direction	I	NW	N	NE	E	SE	S	SW	W	Total	NW	N	NE	E	SE	S	SW	W	Total
Trips	A.M.	Inbound	0	0	0	0	43	0	5	0	0	48	0	0	0	50	0	0	0	0	50
		Outbound	0	0	376	0	305	0	0	0	0	681	0	96	0	673	0	0	0	455	1224
	P.M.	Inbound	0	0	394	0	435	0	54	0	0	883	0	96	0	673	0	0	0	429	1198
		Outbound	0	0	29	0	76	0	0	0	0	105	0	0	0	34	0	0	0	177	211
Percentage	A.M.	Inbound	0%	0%	0%	0%	44%	0%	5%	0%	0%	49%	0%	0%	0%	51%	0%	0%	0%	0%	51%
		Outbound	0%	0%	20%	0%	16%	0%	0%	0%	0%	36%	0%	5%	0%	35%	0%	0%	0%	24%	64%
	P.M.	Inbound	0%	0%	19%	0%	21%	0%	3%	0%	0%	42%	0%	5%	0%	32%	0%	0%	0%	21%	58%
		Outbound	0%	0%	9%	0%	24%	0%	0%	0%	0%	33%	0%	0%	0%	11%	0%	0%	0%	56%	67%

AM outbound and PM inbound were used.

TAZ Directional Categorisation Visualisation (Complete TTS Survey Area)



School-Based Modal Split

Fri Dec 01 2023 12:17:46 GMT+0530 (India Standard Time) - Run Time: 2809ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of school - pd_sch

Filters:
(2006 GTA zone of destination - gta06_dest In 3614
and
Start time of trip - start_time In 0630-0930
and
Trip purpose of destination - purp_dest In S

Trip 2016
Table:

	Mississauga	Mode Splits
Transit excluding GO rail	289	13.8%
Auto driver	87	4.1%
Auto passenger	560	26.7%
School bus	593	28.3%
Walk	569	27.1%
	non auto	69.2%

Fri Dec 01 2023 12:22:43 GMT+0530 (India Standard Time) - Run Time: 3993ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of school - pd_sch

Filters:
(2006 GTA zone of origin - gta06_orig In 3614
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of origin - purp_orig In S

Trip 2016
Table:

	Mississauga	Mode Splits
Transit excluding GO rail	81	14.8%
Auto driver	16	2.9%
Auto passenger	189	34.6%
School bus	128	23.4%
Walk	133	24.3%
	non auto	62.5%

APPENDIX

H FUTURE TOTAL SYNCHRO REPORTS

APPENDIX

H-1 *2028 HORIZON*

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	218	78	10	168	58	796	25	1232
v/c Ratio	0.57	0.15	0.06	0.50	0.32	0.41	0.07	0.61
Control Delay	40.5	9.6	45.8	16.4	27.1	18.3	14.7	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.5	9.6	45.8	16.4	27.1	18.3	14.7	21.0
Queue Length 50th (m)	53.9	3.7	2.8	8.3	6.9	51.0	2.1	89.5
Queue Length 95th (m)	59.1	13.3	7.3	26.4	30.3	123.4	8.7	176.9
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	392	718	325	510	180	1931	345	2033
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	0.56	0.11	0.03	0.33	0.32	0.41	0.07	0.61

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	13	65	10	29	139	58	787	9	25	1023	209
Future Volume (vph)	218	13	65	10	29	139	58	787	9	25	1023	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.88		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1632		1779	1647		1715	3428		1511	3333	
Flt Permitted	0.41	1.00		0.71	1.00		0.18	1.00		0.28	1.00	
Satd. Flow (perm)	747	1632		1323	1647		320	3428		452	3333	
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)	218	13	65	10	29	139	58	787	9	25	1023	209
RTOR Reduction (vph)	0	44	0	0	121	0	0	0	0	0	9	0
Lane Group Flow (vph)	218	34	0	10	47	0	58	796	0	25	1223	0
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.0	41.0		18.4	18.4		77.7	77.7		85.0	85.0	
Effective Green, g (s)	41.0	41.0		18.4	18.4		77.7	77.7		85.0	85.0	
Actuated g/C Ratio	0.29	0.29		0.13	0.13		0.56	0.56		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	358	477		173	216		177	1902		306	2023	
v/s Ratio Prot	c0.09	0.02			0.03			0.23		0.00	c0.37	
v/s Ratio Perm	c0.09			0.01			0.18			0.05		
v/c Ratio	0.61	0.07		0.06	0.22		0.33	0.42		0.08	0.60	
Uniform Delay, d1	40.3	35.8		53.2	54.4		16.9	18.1		11.9	17.1	
Progression Factor	1.00	1.00		1.00	1.00		0.86	0.84		1.00	1.00	
Incremental Delay, d2	2.9	0.1		0.1	0.5		4.8	0.7		0.1	1.3	
Delay (s)	43.2	35.8		53.4	54.9		19.3	15.8		12.0	18.4	
Level of Service	D	D		D	D		B	B		B	B	
Approach Delay (s)		41.3			54.8			16.0			18.3	
Approach LOS		D			D			B			B	

Intersection Summary					
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.63				
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0		
Intersection Capacity Utilization	90.5%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group

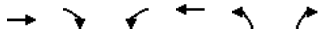
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	112	65	150	18	655	126	969
v/c Ratio	0.60	0.35	0.33	0.41	0.05	0.26	0.24	0.38
Control Delay	66.2	28.2	52.5	13.5	8.2	7.3	1.9	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.2	28.2	52.5	13.5	8.2	7.3	1.9	1.1
Queue Length 50th (m)	28.4	16.1	17.8	5.8	1.0	23.6	1.0	3.7
Queue Length 95th (m)	42.6	30.4	28.8	23.1	5.1	51.2	2.8	7.6
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	266	484	314	513	378	2494	519	2517
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	0.37	0.23	0.21	0.29	0.05	0.26	0.24	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	45	67	65	22	128	18	623	32	126	919	50
Future Volume (vph)	99	45	67	65	22	128	18	623	32	126	919	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1705	1712		1695	1606		1784	3363		1693	3396	
Flt Permitted	0.57	1.00		0.68	1.00		0.27	1.00		0.39	1.00	
Satd. Flow (perm)	1023	1712		1207	1606		510	3363		700	3396	
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)	99	45	67	65	22	128	18	623	32	126	919	50
RTOR Reduction (vph)	0	44	0	0	107	0	0	2	0	0	2	0
Lane Group Flow (vph)	99	68	0	65	43	0	18	653	0	126	967	0
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Effective Green, g (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	278		196	261		377	2491		518	2515	
v/s Ratio Prot		0.04			0.03			0.19			c0.28	
v/s Ratio Perm	c0.10			0.05			0.04			0.18		
v/c Ratio	0.60	0.25		0.33	0.16		0.05	0.26		0.24	0.38	
Uniform Delay, d1	54.3	51.1		51.9	50.4		4.9	5.8		5.7	6.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.12	0.10	
Incremental Delay, d2	5.7	0.5		1.0	0.3		0.2	0.3		0.9	0.4	
Delay (s)	60.0	51.6		52.9	50.7		5.1	6.1		1.6	1.0	
Level of Service	E	D		D	D		A	A		A	A	
Approach Delay (s)		55.5			51.4			6.1			1.1	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	76.7%	ICU Level of Service	D	
Analysis Period (min)	15			

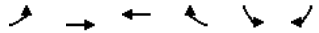
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	21	26	15	72	81	13
Future Volume (vph)	21	26	15	72	81	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	28	16	78	88	14

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	51	94	102
Volume Left (vph)	0	16	88
Volume Right (vph)	28	0	14
Hadj (s)	-0.10	0.14	0.13
Departure Headway (s)	4.1	4.3	4.3
Degree Utilization, x	0.06	0.11	0.12
Capacity (veh/h)	842	808	795
Control Delay (s)	7.4	7.9	8.0
Approach Delay (s)	7.4	7.9	8.0
Approach LOS	A	A	A

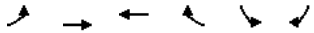
Intersection Summary			
Delay		7.8	
Level of Service		A	
Intersection Capacity Utilization		24.0%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	227	159	28	60	13
Future Volume (Veh/h)	7	227	159	28	60	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	247	173	30	65	14
Pedestrians		2	1		8	
Lane Width (m)		3.7	3.7		3.5	
Walking Speed (m/s)		1.2	1.2		1.2	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	211				460	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	211				460	198
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	99				88	98
cM capacity (veh/h)	1363				545	841

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	255	203	79
Volume Left	8	0	65
Volume Right	0	30	14
cSH	1363	1700	581
Volume to Capacity	0.01	0.12	0.14
Queue Length 95th (m)	0.1	0.0	3.7
Control Delay (s)	0.3	0.0	12.2
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	12.2
Approach LOS			B

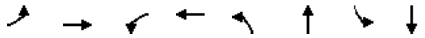
Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization		29.0%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	13	8	5	4	12
Future Volume (Veh/h)	34	13	8	5	4	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	14	9	5	4	13
Pedestrians			1		4	
Lane Width (m)			3.7		3.5	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	18				104	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	18				104	16
tC, single (s)	4.1				6.6	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.7	3.3
p0 queue free %	98				100	99
cM capacity (veh/h)	1607				818	1066

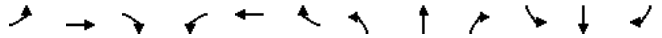
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	51	14	17
Volume Left	37	0	4
Volume Right	0	5	13
cSH	1607	1700	995
Volume to Capacity	0.02	0.01	0.02
Queue Length 95th (m)	0.6	0.0	0.4
Control Delay (s)	5.3	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	5.3	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	88	6	90	46	933	148	1206
v/c Ratio	0.38	0.17	0.03	0.27	0.23	0.50	0.43	0.58
Control Delay	36.2	11.1	40.8	12.2	35.8	34.4	16.5	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.2	11.1	40.8	12.2	35.8	34.4	16.5	19.4
Queue Length 50th (m)	30.8	4.3	1.4	1.8	10.5	131.2	20.0	126.4
Queue Length 95th (m)	48.3	16.3	5.2	16.3	24.4	148.7	31.7	151.0
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	422	657	320	455	196	1866	344	2092
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	0.38	0.13	0.02	0.20	0.23	0.50	0.43	0.58

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	23	65	6	8	82	46	919	14	148	1019	187
Future Volume (vph)	160	23	65	6	8	82	46	919	14	148	1019	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1676		1763	1597		1783	3474		1767	3395	
Flt Permitted	0.62	1.00		0.70	1.00		0.20	1.00		0.22	1.00	
Satd. Flow (perm)	1137	1676		1299	1597		366	3474		418	3395	
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)	160	23	65	6	8	82	46	919	14	148	1019	187
RTOR Reduction (vph)	0	46	0	0	68	0	0	0	0	0	9	0
Lane Group Flow (vph)	160	42	0	6	22	0	46	933	0	148	1197	0
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.1	40.1		23.6	23.6		75.2	75.2		85.9	85.9	
Effective Green, g (s)	40.1	40.1		23.6	23.6		75.2	75.2		85.9	85.9	
Actuated g/C Ratio	0.29	0.29		0.17	0.17		0.54	0.54		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	480		218	269		196	1866		330	2083	
v/s Ratio Prot	c0.04	0.02			0.01			0.27		0.02	c0.35	
v/s Ratio Perm	c0.08			0.00			0.13			0.25		
v/c Ratio	0.42	0.09		0.03	0.08		0.23	0.50		0.45	0.57	
Uniform Delay, d1	39.3	36.6		48.6	49.1		17.2	20.5		13.5	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.41	1.45		1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.1	0.1		2.6	0.9		1.0	1.2	
Delay (s)	40.0	36.6		48.7	49.2		26.8	30.7		14.5	17.3	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		38.8			49.2			30.5			17.0	
Approach LOS		D			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

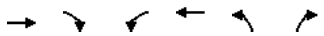
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	97	55	166	29	916	315	766
v/c Ratio	0.59	0.42	0.37	0.62	0.06	0.39	0.64	0.29
Control Delay	77.8	49.9	59.8	40.9	10.8	11.1	28.2	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.8	49.9	59.8	40.9	10.8	11.1	28.2	15.9
Queue Length 50th (m)	16.7	22.7	15.4	26.9	2.4	50.0	64.3	91.5
Queue Length 95th (m)	27.6	34.4	25.0	43.2	9.5	100.1	118.2	137.2
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	215	486	325	496	463	2362	499	2631
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	0.27	0.20	0.17	0.33	0.06	0.39	0.63	0.29

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	66	31	55	54	112	29	806	110	315	667	99
Future Volume (vph)	58	66	31	55	54	112	29	806	110	315	667	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1713	1819		1708	1699		1775	3430		1749	3353	
Flt Permitted	0.46	1.00		0.69	1.00		0.36	1.00		0.27	1.00	
Satd. Flow (perm)	828	1819		1248	1699		675	3430		498	3353	
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)	58	66	31	55	54	112	29	806	110	315	667	99
RTOR Reduction (vph)	0	14	0	0	63	0	0	5	0	0	5	0
Lane Group Flow (vph)	58	83	0	55	103	0	29	911	0	315	761	0
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	16.9	16.9		16.9	16.9		96.2	96.2		109.6	109.6	
Effective Green, g (s)	16.9	16.9		16.9	16.9		96.2	96.2		109.6	109.6	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.78	0.78	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	99	219		150	205		463	2356		482	2624	
v/s Ratio Prot		0.05			0.06			0.27		c0.05	0.23	
v/s Ratio Perm	c0.07			0.04			0.04			c0.46		
v/c Ratio	0.59	0.38		0.37	0.50		0.06	0.39		0.65	0.29	
Uniform Delay, d1	58.2	56.7		56.6	57.6		7.2	9.3		5.4	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		4.20	3.02	
Incremental Delay, d2	8.6	1.1		1.5	1.9		0.3	0.5		2.7	0.2	
Delay (s)	66.8	57.8		58.1	59.5		7.4	9.8		25.2	13.1	
Level of Service	E	E		E	E		A	A		C	B	
Approach Delay (s)		61.2			59.2			9.7			16.6	
Approach LOS		E			E			A			B	

Intersection Summary				
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.5	
Intersection Capacity Utilization	81.9%	ICU Level of Service	D	
Analysis Period (min)	15			

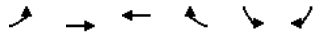
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	86	89	19	44	52	16
Future Volume (vph)	86	89	19	44	52	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	93	97	21	48	57	17

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	190	69	74
Volume Left (vph)	0	21	57
Volume Right (vph)	97	0	17
Hadj (s)	-0.31	0.06	0.02
Departure Headway (s)	3.8	4.3	4.4
Degree Utilization, x	0.20	0.08	0.09
Capacity (veh/h)	914	811	760
Control Delay (s)	7.8	7.7	7.9
Approach Delay (s)	7.8	7.7	7.9
Approach LOS	A	A	A

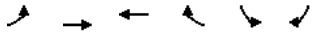
Intersection Summary			
Delay		7.8	
Level of Service		A	
Intersection Capacity Utilization		27.5%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	514	248	66	36	9
Future Volume (Veh/h)	14	514	248	66	36	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	559	270	72	39	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	342				895	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342				895	306
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				87	99
cM capacity (veh/h)	1228				310	739

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	574	342	49
Volume Left	15	0	39
Volume Right	0	72	10
cSH	1228	1700	352
Volume to Capacity	0.01	0.20	0.14
Queue Length 95th (m)	0.3	0.0	3.8
Control Delay (s)	0.3	0.0	16.9
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	16.9
Approach LOS			C

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization		48.3%	ICU Level of Service A
Analysis Period (min)		15	



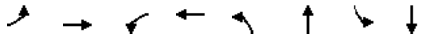
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	11	19	4	7	32
Future Volume (Veh/h)	20	11	19	4	7	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	12	21	4	8	35
Pedestrians			2			
Lane Width (m)			3.7			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	25				81	23
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	25				81	23
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	97
cM capacity (veh/h)	1603				912	1054

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	34	25	43
Volume Left	22	0	8
Volume Right	0	4	35
cSH	1603	1700	1024
Volume to Capacity	0.01	0.01	0.04
Queue Length 95th (m)	0.3	0.0	1.1
Control Delay (s)	4.7	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	4.7	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay		5.2	
Intersection Capacity Utilization		18.4%	ICU Level of Service A
Analysis Period (min)		15	

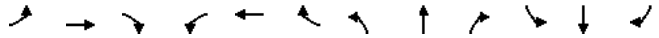
APPENDIX

H-2 2033 HORIZON



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	218	78	10	169	58	816	25	1257
v/c Ratio	0.57	0.15	0.06	0.50	0.34	0.42	0.08	0.62
Control Delay	40.6	10.5	45.8	16.6	27.9	18.4	14.8	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	10.5	45.8	16.6	27.9	18.4	14.8	21.4
Queue Length 50th (m)	53.8	4.6	2.8	8.6	7.0	52.0	2.1	92.9
Queue Length 95th (m)	59.1	14.0	7.3	26.6	30.3	127.1	8.7	182.5
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	391	715	325	511	172	1931	338	2032
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	0.56	0.11	0.03	0.33	0.34	0.42	0.07	0.62

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	13	65	10	30	139	58	807	9	25	1048	209
Future Volume (vph)	218	13	65	10	30	139	58	807	9	25	1048	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.88		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1744	1632		1779	1649		1715	3428		1512	3335	
Flt Permitted	0.40	1.00		0.71	1.00		0.17	1.00		0.28	1.00	
Satd. Flow (perm)	742	1632		1323	1649		307	3428		439	3335	
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)	218	13	65	10	30	139	58	807	9	25	1048	209
RTOR Reduction (vph)	0	41	0	0	121	0	0	0	0	0	9	0
Lane Group Flow (vph)	218	37	0	10	48	0	58	816	0	25	1248	0
Confl. Peds. (#/hr)	11		3	3		11	5		6	6		5
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	4%	5%	23%	18%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	5	5
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	41.0	41.0		18.4	18.4		77.7	77.7		85.0	85.0	
Effective Green, g (s)	41.0	41.0		18.4	18.4		77.7	77.7		85.0	85.0	
Actuated g/C Ratio	0.29	0.29		0.13	0.13		0.56	0.56		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	357	477		173	216		170	1902		299	2024	
v/s Ratio Prot	c0.09	0.02			0.03			0.24		0.00	c0.37	
v/s Ratio Perm	c0.09			0.01			0.19			0.05		
v/c Ratio	0.61	0.08		0.06	0.22		0.34	0.43		0.08	0.62	
Uniform Delay, d1	40.3	35.8		53.2	54.4		17.1	18.2		11.9	17.3	
Progression Factor	1.00	1.00		1.00	1.00		0.85	0.84		1.00	1.00	
Incremental Delay, d2	3.1	0.1		0.1	0.5		5.2	0.7		0.1	1.4	
Delay (s)	43.4	35.9		53.4	54.9		19.9	15.9		12.1	18.7	
Level of Service	D	D		D	D		B	B		B	B	
Approach Delay (s)		41.4			54.8			16.2			18.6	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	91.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

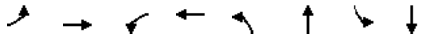
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	113	65	151	18	671	126	992
v/c Ratio	0.60	0.35	0.33	0.41	0.05	0.27	0.25	0.39
Control Delay	66.6	28.8	52.6	13.6	8.2	7.4	1.9	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.6	28.8	52.6	13.6	8.2	7.4	1.9	1.2
Queue Length 50th (m)	28.4	16.6	17.8	6.0	1.0	24.3	1.0	4.0
Queue Length 95th (m)	42.6	31.2	28.8	23.7	5.2	52.7	2.8	7.7
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	265	484	313	513	367	2495	509	2517
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	0.37	0.23	0.21	0.29	0.05	0.27	0.25	0.39

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	46	67	65	23	128	18	639	32	126	942	50
Future Volume (vph)	99	46	67	65	23	128	18	639	32	126	942	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1705	1713		1695	1608		1784	3364		1693	3396	
Flt Permitted	0.57	1.00		0.67	1.00		0.26	1.00		0.39	1.00	
Satd. Flow (perm)	1018	1713		1202	1608		496	3364		687	3396	
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)	99	46	67	65	23	128	18	639	32	126	942	50
RTOR Reduction (vph)	0	43	0	0	107	0	0	2	0	0	2	0
Lane Group Flow (vph)	99	70	0	65	44	0	18	669	0	126	990	0
Confl. Peds. (#/hr)	7		3	3		7	1		4	4		1
Heavy Vehicles (%)	4%	3%	0%	5%	0%	2%	0%	7%	10%	5%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	2	2	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Effective Green, g (s)	22.8	22.8		22.8	22.8		103.7	103.7		103.7	103.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	278		195	261		367	2491		508	2515	
v/s Ratio Prot		0.04			0.03			0.20			c0.29	
v/s Ratio Perm	c0.10			0.05			0.04			0.18		
v/c Ratio	0.60	0.25		0.33	0.17		0.05	0.27		0.25	0.39	
Uniform Delay, d1	54.4	51.2		51.9	50.4		4.9	5.9		5.8	6.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.12	0.10	
Incremental Delay, d2	5.8	0.5		1.0	0.3		0.3	0.3		1.0	0.4	
Delay (s)	60.1	51.6		52.9	50.7		5.1	6.1		1.6	1.0	
Level of Service	E	D		D	D		A	A		A	A	
Approach Delay (s)		55.6			51.4			6.1			1.1	
Approach LOS		E			D			A			A	

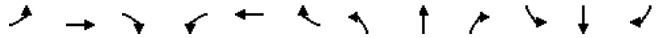
Intersection Summary				
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	77.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group



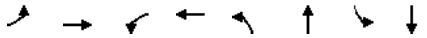
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	160	89	6	90	46	956	148	1231
v/c Ratio	0.38	0.17	0.03	0.27	0.24	0.51	0.45	0.59
Control Delay	36.2	11.2	40.8	12.2	36.3	35.0	16.8	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.2	11.2	40.8	12.2	36.3	35.0	16.8	19.7
Queue Length 50th (m)	30.8	4.5	1.4	1.8	10.6	134.7	20.0	130.5
Queue Length 95th (m)	48.3	16.8	5.2	16.3	24.1	152.8	31.7	156.1
Internal Link Dist (m)		116.8		321.3		281.5		234.1
Turn Bay Length (m)	60.0		40.0		85.0		120.0	
Base Capacity (vph)	422	658	319	455	189	1866	335	2092
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	0.38	0.14	0.02	0.20	0.24	0.51	0.44	0.59

Intersection Summary



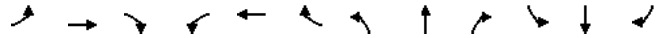
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	24	65	6	8	82	46	942	14	148	1044	187
Future Volume (vph)	160	24	65	6	8	82	46	942	14	148	1044	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1742	1679		1764	1597		1783	3474		1767	3397	
Flt Permitted	0.62	1.00		0.70	1.00		0.19	1.00		0.22	1.00	
Satd. Flow (perm)	1137	1679		1298	1597		352	3474		403	3397	
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)	160	24	65	6	8	82	46	942	14	148	1044	187
RTOR Reduction (vph)	0	46	0	0	68	0	0	0	0	0	9	0
Lane Group Flow (vph)	160	43	0	6	22	0	46	956	0	148	1222	0
Confl. Peds. (#/hr)	7		11	11		7	7		5	5		7
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	4%	0%	1%	4%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	4	0	4	4
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.1	40.1		23.6	23.6		75.2	75.2		85.9	85.9	
Effective Green, g (s)	40.1	40.1		23.6	23.6		75.2	75.2		85.9	85.9	
Actuated g/C Ratio	0.29	0.29		0.17	0.17		0.54	0.54		0.61	0.61	
Clearance Time (s)	3.0	7.5		7.5	7.5		6.5	6.5		3.0	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	480		218	269		189	1866		322	2084	
v/s Ratio Prot	c0.04	0.03			0.01			0.28		0.03	c0.36	
v/s Ratio Perm	c0.08			0.00			0.13			0.26		
v/c Ratio	0.42	0.09		0.03	0.08		0.24	0.51		0.46	0.59	
Uniform Delay, d1	39.3	36.6		48.6	49.1		17.3	20.7		13.7	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.41	1.46		1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.1	0.1		2.9	0.9		1.0	1.2	
Delay (s)	40.0	36.7		48.7	49.2		27.1	31.2		14.7	17.5	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		38.8			49.2			31.0			17.2	
Approach LOS		D			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	78.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	99	55	167	29	937	315	783
v/c Ratio	0.59	0.42	0.36	0.62	0.06	0.40	0.65	0.30
Control Delay	77.6	50.3	59.6	41.5	10.9	11.3	28.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.6	50.3	59.6	41.5	10.9	11.3	28.8	16.0
Queue Length 50th (m)	16.7	23.3	15.4	27.5	2.4	51.8	64.6	94.4
Queue Length 95th (m)	27.7	35.2	25.0	44.0	9.5	103.2	118.3	140.0
Internal Link Dist (m)		100.3		222.6		327.0		281.5
Turn Bay Length (m)	50.0		20.0		80.0		110.0	
Base Capacity (vph)	214	486	324	495	455	2358	488	2630
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	0.27	0.20	0.17	0.34	0.06	0.40	0.65	0.30

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	68	31	55	55	112	29	827	110	315	684	99
Future Volume (vph)	58	68	31	55	55	112	29	827	110	315	684	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.90		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1713	1821		1708	1700		1776	3432		1750	3355	
Flt Permitted	0.46	1.00		0.69	1.00		0.36	1.00		0.26	1.00	
Satd. Flow (perm)	824	1821		1246	1700		664	3432		485	3355	
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)	58	68	31	55	55	112	29	827	110	315	684	99
RTOR Reduction (vph)	0	14	0	0	62	0	0	5	0	0	5	0
Lane Group Flow (vph)	58	85	0	55	105	0	29	932	0	315	778	0
Confl. Peds. (#/hr)	2		5	5		2	6		2	2		6
Heavy Vehicles (%)	4%	0%	0%	4%	0%	1%	0%	4%	2%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	2	0	3	3
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		8			4			6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	17.0	17.0		17.0	17.0		96.0	96.0		109.5	109.5	
Effective Green, g (s)	17.0	17.0		17.0	17.0		96.0	96.0		109.5	109.5	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.69	0.69		0.78	0.78	
Clearance Time (s)	7.5	7.5		7.5	7.5		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	100	221		151	206		455	2353		474	2624	
v/s Ratio Prot		0.05			0.06			0.27		c0.05	0.23	
v/s Ratio Perm	c0.07			0.04			0.04			c0.47		
v/c Ratio	0.58	0.38		0.36	0.51		0.06	0.40		0.66	0.30	
Uniform Delay, d1	58.1	56.7		56.5	57.6		7.2	9.5		5.6	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		4.28	3.00	
Incremental Delay, d2	7.9	1.1		1.5	2.0		0.3	0.5		2.9	0.2	
Delay (s)	66.0	57.8		58.0	59.5		7.5	10.0		26.7	13.2	
Level of Service	E	E		E	E		A	A		C	B	
Approach Delay (s)		60.8			59.2			9.9			17.1	
Approach LOS		E			E			A			B	

Intersection Summary					
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.67				
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.5		
Intersection Capacity Utilization	82.6%	ICU Level of Service	E		
Analysis Period (min)	15				

c Critical Lane Group