



TRANSPORTATION IMPACT STUDY (2ND SUBMISSION) August 2013

Lazy Pat Farm Property
(3269 Dundas Street West), North Oakville West

PREPARED FOR:



PREPARED BY:



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August 30, 2013

bclMC Realty Corp.
c/o Bentall Kennedy (Canada) LP
55 University Avenue, Suite 300
Toronto, Ontario M5J 2H7

Attention: Mr. Michael Reel, Vice President, Investment Management

Dear Mr. Reel,

Subject: Transportation Impact Study Update, Lazy Pat Farms Property
 (3269 Dundas Street West)
 North Oakville West

MMM Group Limited is pleased to present the findings of our Transportation Impact Study Update with respect to the proposed 407 West Employment Area (Lazy Pat Farms Property), in the Town of Oakville.

The findings indicate that the projected traffic volumes associated with the proposed development can be satisfactorily accommodated at the boundary road intersections with the recommended road improvements in place.

This Transportation Impact Study Update also addressed the Region/Town comments regarding the Transportation Impact Study prepared by MMM Group in May 2011, as follows:

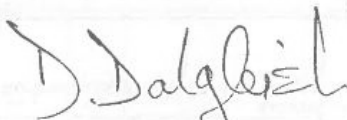
1. Comment: Include intersection v/c ratios in all traffic analysis summary tables based on HCM Synchro reports
All summary tables have been updated to include intersection v/c ratios based on HCM Synchro reports.
2. Comment: Internal intersections – required geometrics and traffic control
These are provided in the corresponding figures and Sections 8.2 – 8.3.
3. Comment: Confirm future lane configurations along Dundas Street
Details were established in meeting with Town/Region staff in November 2012 and have been reflected in the report.

4. Comment: Figures illustrating the location of the blocks assumed as Business Park, General Office, and Shopping Centre
The block locations and land use types are illustrated in Figure 2A.
5. Comment: Methodology for future background traffic for Phase 2 and Phase 3
New methodology was used and has been submitted to the Region for review in April 2013.
6. Comment: Signature and Seal by Professional Engineer
This study has been signed and sealed by a professional engineer.
7. Comment: Clarifications on Figure 19 and Section 8.3 regarding bus stop locations
Figure 19 has been revised to show near-side and far-side Stop A. Section 8.3 has been revised to include explanation of the different bus stop treatment on Burnhamthorpe Road and on Avenue One.

We thank you for the opportunity to undertake this study. We would be pleased to respond to any questions, should they arise.

Yours truly,

MMM GROUP LIMITED



Derek Dalgleish, M.Pl.
Senior Project Manager
Transportation Planning
Associate



Langston Lai, P.Eng.
Project Engineer
Transportation Planning



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1.0 Introduction

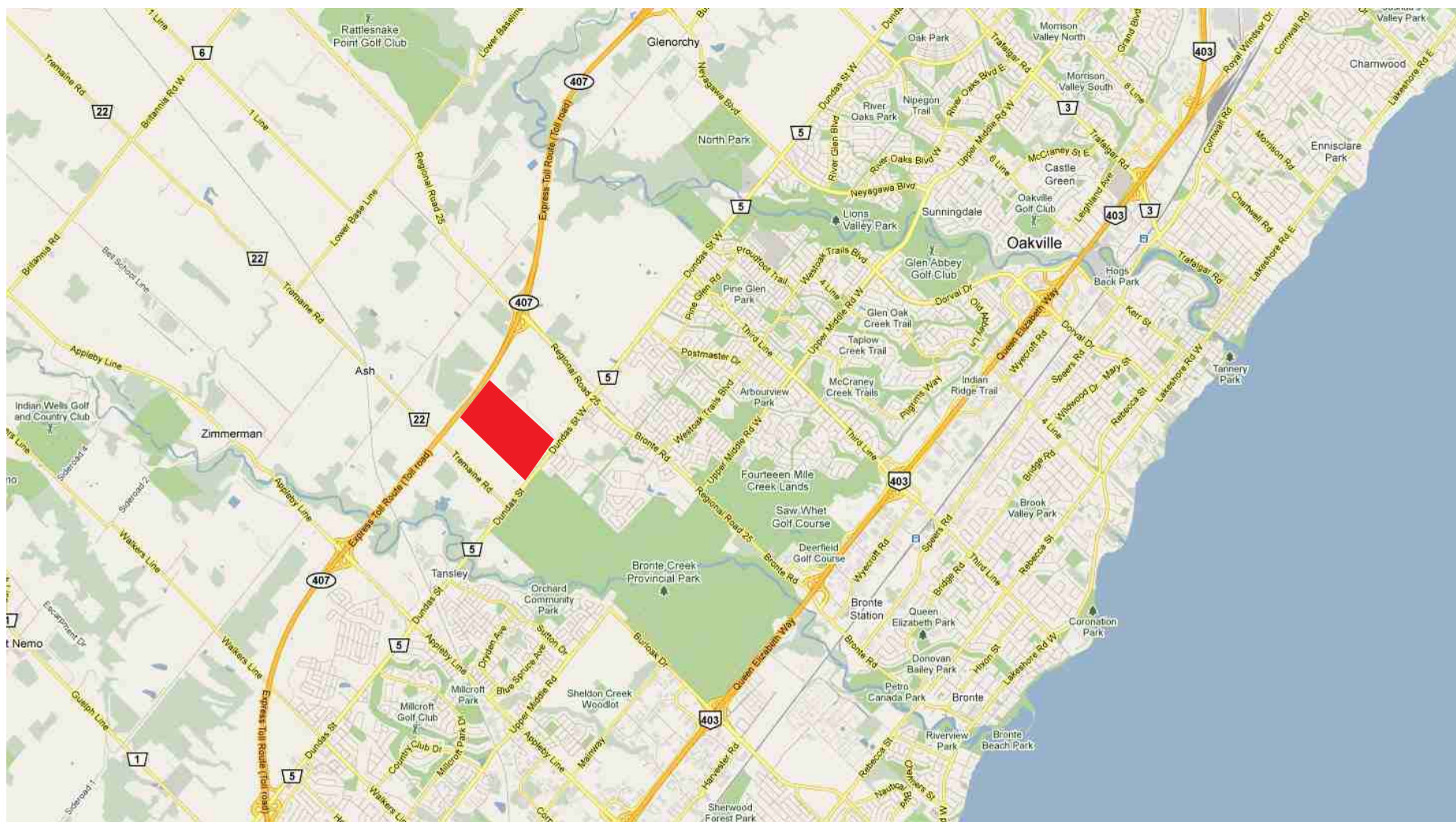
Bentall Kennedy (Canada) LP, on behalf of bcIMC Realty Corp., is proposing to develop the Lazy Pat Farms Property, located north of Dundas Street West and mid-block between Bronte Road and Tremaine Road at 3269 Dundas Street West, in the Town of Oakville. As per the North Oakville West Secondary Plan (NOWSP), the subject property is designated as an Employment District. A mix of uses, including General Employment, Light Employment and Employment Related Service-Commercial uses are proposed within the Lazy Pat Farms Property.

Figure 1 illustrates the site location.

In May 2011, MMM Group prepared and submitted a Transportation Impact Study related to the Subject Property. Following the submission, refinements have been made to the development proposal. The Town of Oakville and Halton Region also provided comments upon review of the May 2011 study.

Thus, this Transportation Impact Study Update has been prepared to reflect the changes in the development proposal and to respond to Town and Region comments. The study assumptions were established in the meeting with both the Town and Region staff in November 20, 2012. Further revisions to some of the assumptions were communicated to the Region in April 2013.

The study update has been completed to address the impacts of the proposed development on the boundary roadway intersections in the vicinity of the property in accordance with the Terms of Reference for Transportation Impact Studies in North Oakville. The study also includes Transit Facilities Plan and Pedestrian Circulation Plan. The associated analyses and findings are outlined herein.



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Source: Google Maps



2.0 407 West Employment Area Concept Plan

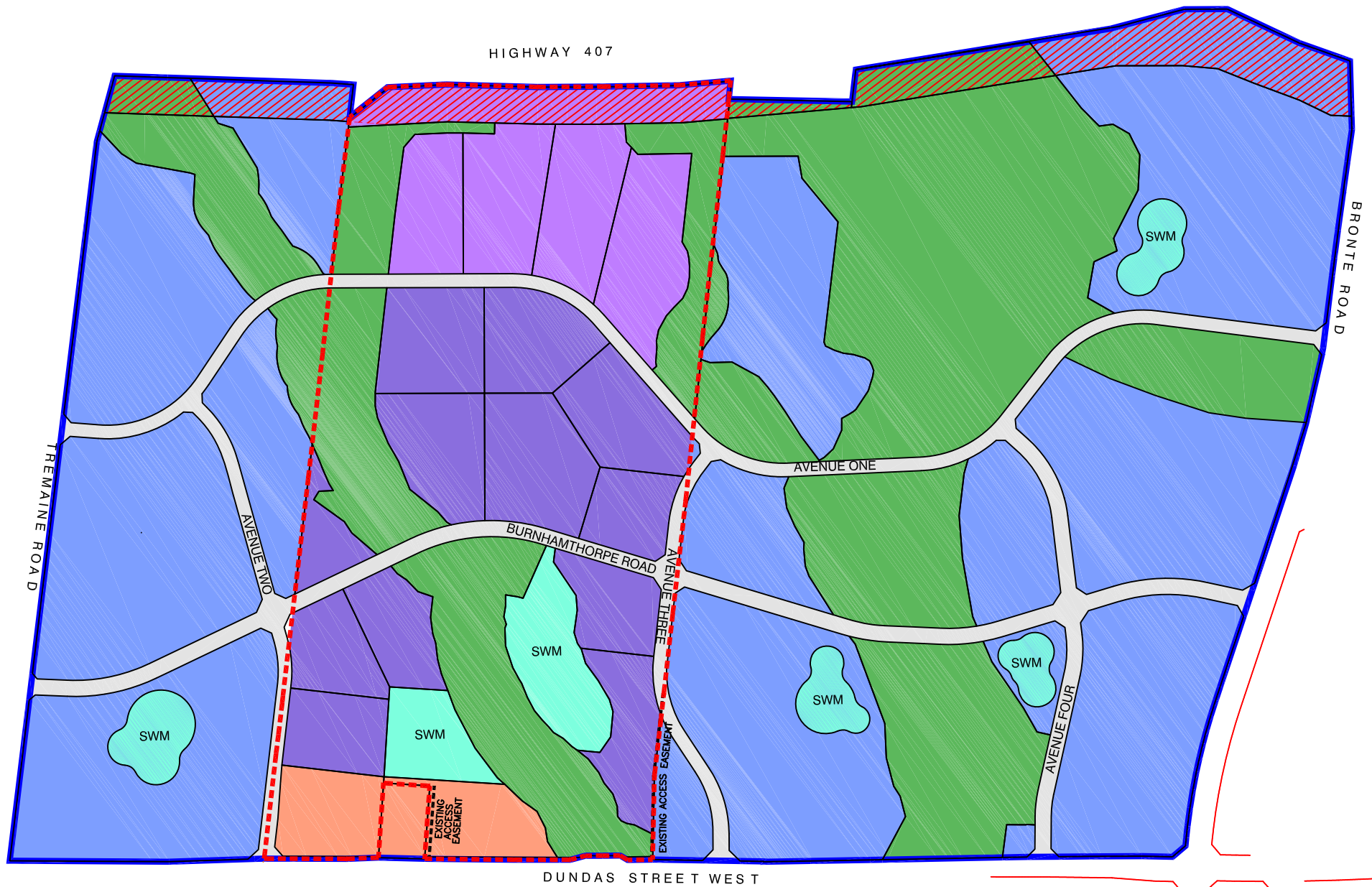
The development proposal is to accommodate an employment area on the Subject Property, which is intended to include light and general employment uses and limited retail and service commercial uses which serve the employment area in accordance with the Town's land use and planning directions for the 407 West Employment Area. The vision for the Subject Property is to develop an environmentally and economically sustainable employment district that will contribute to the dynamic character of the Town of Oakville. The concept plan is shown in Figure 2A.

The range of employment land uses for the Subject Property have been further characterized as light employment (prestige office uses), general employment, and service area (service/retail/office) uses, in accordance with the NOWSP and implementing Comprehensive Zoning By-law for North Oakville. The development concept envisions more prestige office uses adjacent to Highway 407 and Bronte Road, due to increased visibility along these major roads. Limited commercial (service/retail/office) uses are envisioned to be clustered at the intersections with Arterial Roads and Avenues along the Dundas Street corridor to serve the employment area. It is recognized that more general industrial uses, such as mixed warehousing and office uses may be accommodated internal to the employment area, and appropriately buffered from surrounding land uses.

The concept plan is consistent with the Town's NOWSP and incorporates an appropriate implementation of the proposed road network based on more detailed study. The road pattern follows a modified grid pattern which responds to the existing environmental and site conditions, while encouraging accessibility and a viable transit network throughout the 407 West Employment Area.

The concept plan accommodates three intersection locations with Dundas Street West, including the existing intersections with Valleyridge Drive and Zenon Drive/Colonel Williams Parkway. A new intersection at Dundas Street is proposed at approximately 750 metres from the Colonel Williams Parkway intersection. Two major east/west road corridors are proposed as identified in the NOWSP to provide access from Tremaine Road to Bronte Road, across the employment area. The southern east/west road aligns with the proposed New North Oakville Transportation Corridor (i.e., Burnhamthorpe Road extension) on the east side of Bronte Road. The spacing and locations of these intersections are consistent with the NOWSP and are intended to align with the secondary planning study being undertaken for the Dundas/Tremaine Secondary Plan area in the City of Burlington.

The development proposal identifies the natural heritage and open space system and stormwater management facilities based on the Town's NOWSP, which has been further refined for the Subject Property based upon the Environmental Implementation Report and Functional Servicing Study (EIR/FSS), prepared in support of these applications.



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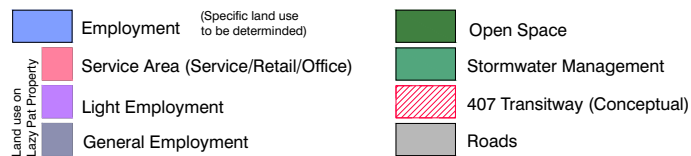


FIGURE 2A
407 West Employment Area
Concept Plan

3.0 Uses and Access

3.1 Uses

The Subject Property is situated mid-block between Bronte Road and Tremaine Road, and bounded by Dundas Street West to the south. The development proposal consists of a mix of General Employment lands, Light Employment lands, and Service Area Employment lands, with the remaining area used as open space and for stormwater management purposes. The subject property is within the North Oakville West Secondary Plan area, where the general development objective for employment uses is a minimum of 0.35 FSI.

The proposed development and the supporting internal road network will be developed in two phases. Figure 2B illustrates the proposed block plan related to the property by phase. As shown in Figure 2B, Blocks C2-1 to C2-3 are service area employment lands, Blocks G3-3 to G7-1 are general employment lands, and Blocks P2-1 to P2-4 are light employment lands. Table 3.1 summarizes the proposed uses and gross floor area by phase for the subject property.

Table 3.1 - Summary of Proposed Uses by Phase

Phase	Service Area Employment (Service/Retail/Office)	General Employment	Light Employment	Total by Phase
Phase 1	183,245 ft ²	590,379 ft ²	-	773,624 ft ²
Phase 2	-	366,145 ft ²	655,522 ft ²	1,021,667 ft ²
TOTAL	183,245 ft ²	956,524 ft ²	655,522 ft ²	1,795,291 ft ²

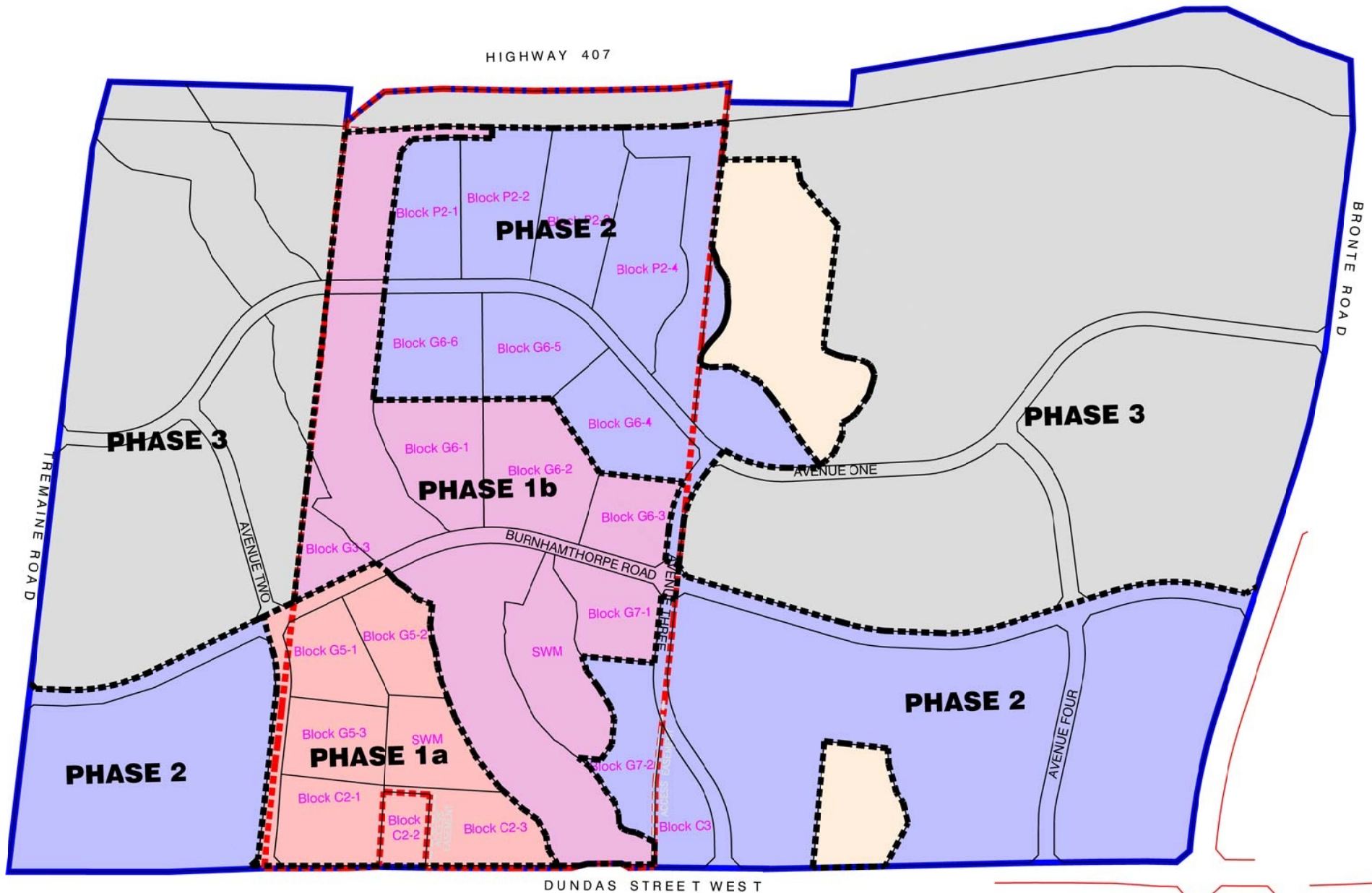
3.2 Access

The proposed development is part of the 407 West Employment Area bounded by Bronte Road, Tremaine Road, Dundas Street West, and Highway 407. On the basis of the Transportation Plan for the North Oakville West Secondary Plan (NOWSP), the 407 West Employment Area will be served by a grid network of roadways, as shown in Figure 2A, including:

- Two (2) east-west roadways, namely Avenue One and the New North Oakville Transportation Corridor (NNOTC), shown as Burnhamthorpe Road in Figure 2A; and
- Three (3) north-south roadways, namely Avenue Two, Avenue Three, and Avenue Four.

As shown in Figure 2A, both east-west roadways are parallel with Dundas Street West, connecting Tremaine Road and Bronte Road, between Hwy 407 and Dundas Street. Both roadways are expected to be aligned with the two future east-west roadways in the Tremaine and Dundas Secondary Plan Area to the west of Tremaine Road.

Avenue One will terminate at the intersection with Bronte Road.



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-  Phasing Boundary
-  Phase 1
-  Phase 2
-  Phase 3

FIGURE 2B
Proposed Block Plan by Phase

The proposed NNOTC extension (Burnhamthorpe Road) will extend through the Subject Property, from Bronte Road to beyond Tremaine Road to the west.

Avenue Two will run between Dundas Street West and Avenue One located approximately 450 metres to the east of Tremaine Road.

Avenue Three will be aligned with Colonel William Parkway at its intersection with Dundas Street West. It will intersect with Avenue One at its northerly terminus.

Similarly, Avenue Four will be aligned with Valleyridge Drive at its intersection with Dundas Street and will intersect with Avenue One at its northerly terminus.

Figure 2B shows the assumed phasing of the future road network in the 407 West Employment Area.

4.0 Existing Traffic Conditions

4.1 Boundary Roadways

The key boundary roadways in the vicinity of the property are Dundas Street West, Bronte Road, Tremaine Road, Colonel William Parkway, and Valleyridge Drive.

Dundas Street West which bounds the property to the south, is a major east-west arterial road under the jurisdiction of the Region of Halton. It has a speed limit of 60 km/h between Bronte Road and west of Valleyridge Drive. The speed limit becomes 80 km/h beyond west of Valleyridge Drive. It currently provides a six-lane cross-section with three lanes in each direction between east of Bronte Road and west of Valleyridge Drive, and reduces to a four-lane cross-section to the west.

Bronte Road, which is located to the east of the property, is a north-south arterial road under the jurisdiction of the Region of Halton and has a speed limit of 60 km/h in the vicinity of the property. It currently provides for a four-lane cross-section, with two lanes in each direction.

Tremaine Road, which is located to the west of the property, is a north-south arterial road under the jurisdiction of the Region of Halton, with a speed limit of 80 km/h. It currently provides a two-lane cross-section, with one lane in each direction.

Colonel William Parkway, which is located to the south-east of the property, is a north-south local road with a speed limit of 50 km/h, under the jurisdiction of the Town of Oakville. Currently, the road terminates at Dundas Street West, and becomes a private driveway north of Dundas Street West. It has a two-lane cross-section, with one lane in each direction.

Valleyridge Drive is located to the south-east of the property and is a north-south local road, with a speed limit of 50 km/h, under the jurisdiction of the Town of Oakville. It currently provides a two-lane cross-section, with one lane in each direction.

Figure 3 illustrates the existing lane configurations related to the boundary road intersections.

4.2 Transit Services

The subject property is served by Oakville Transit Routes 5 (Dundas) and 33 (Palermo). Transit Route 5 runs between the Uptown Core Terminal (Trafalgar Road/Dundas Street) and Dundas Street/Colonel William Parkway. It also loops around Colonel William Parkway, Richview Boulevard, and Bronte Road at the west tip of the route. Transit Route 30 runs between the Bronte Go station and Dundas Street/Colonel William Parkway intersection during the weekday peak hours only.

Transit Route 5 serves the Dundas Street West/Colonel William Parkway intersection every 40 minutes during both the weekday a.m. and p.m. peak hours, and every 30 to 40 minutes during the weekday off



Not to scale



Site Location



Signalized Control

FIGURE 3
EXISTING LANE CONFIGURATIONS

peak periods. Transit Route 30 serves the Dundas Street West/Colonel William Parkway intersection every 42 minutes during both the weekday a.m. and p.m. peak hours.

4.3 Traffic Data

Turning movement counts were undertaken by Accu-Traffic under MMM's direction on Tuesday, November 6, 2012 from 7:00 a.m. to 9:00 a.m., and from 4:00 p.m. to 6:00 p.m. at the following intersections:

- Dundas Street West and Bronte Road
- Dundas Street West and Tremaine Road
- Dundas Street West and Colonel William Parkway/Private Driveway
- Dundas Street West and Valleyridge Drive
- Bronte Road and Highway 407 Eastbound Off-Ramp

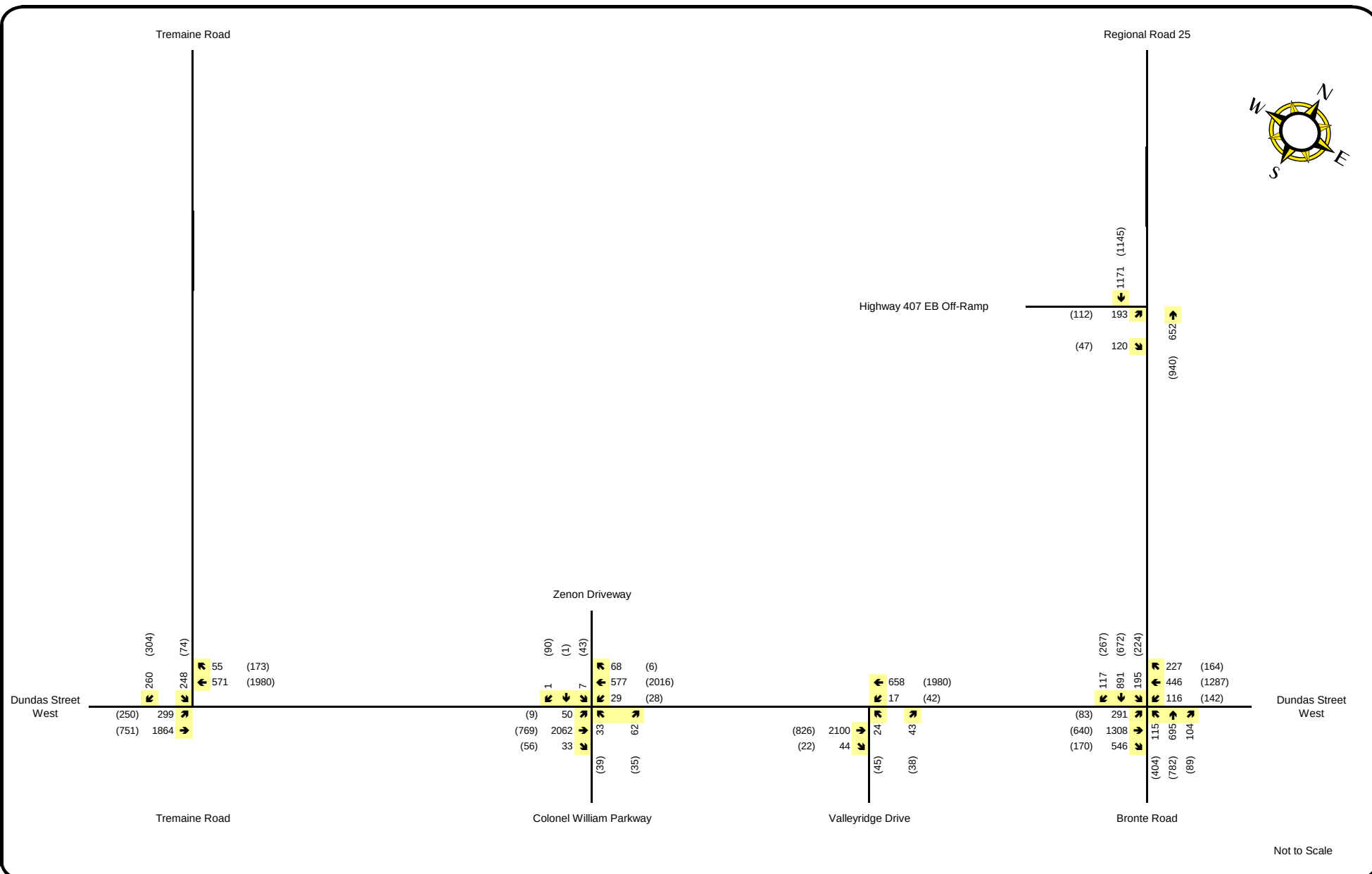
All the intersections analyzed are signalized intersections. The existing weekday a.m. and p.m. hour traffic volumes are shown in Figure 4.

4.4 Existing Intersection Operations

The operations of these intersections have been analyzed on the basis of the existing weekday a.m. and p.m. peak hour volumes as shown in Figure 4 and the existing signal timing plans which were purchased from the Town of Oakville and Halton Region. It should be noted that the volumes at each intersection reflect the individual peak hours of each intersection. Thus, the traffic volumes may not be quite balanced in some cases.

The signalized intersections were analyzed on the basis of the approach outlined in the Highway Capacity Manual, 2000 Edition, using Synchro v8.0. **Appendix A** provides the level of service definitions, according to the Highway Capacity Manual 2000.

The details related to the existing intersection operations are provided in **Appendix B**, with the resulting levels of service outlined in **Table 4.1**.



LEGEND
 XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 4
 Existing Traffic Volumes

Table 4.1 - Intersection Levels of Service Based on Existing Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road ⁽¹⁾	Signalized	D (37.8) [0.74]	-	D (41.1) [0.73]	NB-L (0.92)
Dundas Street West/ Valleyridge Drive ⁽¹⁾	Signalized	A (4.8) [0.50]	-	A (9.9) [0.46]	-
Dundas Street West/ Colonel William Parkway/ Private Driveway ⁽¹⁾	Signalized	B (10.1) [0.70]	-	C (20.8) [0.68]	-
Dundas Street West/ Tremaine Road ⁽¹⁾	Signalized	B (16.0) [0.75]	-	D (36.8) [0.87]	WB-T (1.01)
Bronte Road/Highway 407 Eastbound Off-Ramp ⁽¹⁾	Signalized	B (10.8) [0.46]	-	A (6.0) [0.40]	-

⁽¹⁾ For signalized intersections, levels of service are based on the overall intersection delay.

Note: The LOS results are based on HCM2000 output.

As indicated in Table 4.1, all intersections which were analyzed are currently operating at Level of Service (LOS) 'D' or better during the weekday a.m. and p.m. peak hours, based on delay. It is acknowledged however, that critical movements related to the Dundas Street West/Bronte Road intersection and the Dundas Street West/Tremaine Road intersections are currently operating close to, or slightly over capacity during the p.m. peak hour.

5.0 Site Generated Traffic

5.1 Land Use Assumptions

Although the Subject Property is expected to be developed in two phases and built-out by 2021, three horizon years have been assessed in this study to account for Phase 3 of the surrounding 407 West Employment Area (2031), as well as the different assumptions on auto modal split in the area between 2021 and 2031 horizons. The land use assumptions for the Subject Property by phase are summarized in Table 5.1. The estimated completion time of the individual phases and the corresponding horizon years are presented in Table 5.2.

Table 5.1 - Development Proposal by Phase

Phase	Service Area Employment		General Employment	Light Employment	Total
	Service and Retail Uses	Office Uses			
Phase 1	119,109 ft ²	64,136 ft ²	590,379 ft ²	-	773,624 ft ²
Phase 2	-	-	366,145 ft ²	655,522 ft ²	1,021,667 ft ²
Phase 3	-	-	-	-	-
TOTAL	119,109 ft ²	64,136 ft ²	956,524 ft ²	655,522 ft ²	1,795,291 ft ²

Table 5.2 - Proposed Development Phasing and Corresponding Study Horizon Years

Phase	Estimated Completion Time	Horizon Year
Phase 1a/1b (Phase 1)	Year 2013 – 2015	2016
Phase 2	Beyond 2016	2021
Phase 3*	N/A	2031

* The subject property is expected to be completed by 2021, Phase 3 analysis is undertaken to assess the traffic impacts of developments related to the surrounding 407 West Employment Area

5.2 Planned Road Improvements

To support Phase 1 development on the Subject Property, the following road infrastructure has been assumed for 2016 horizon:

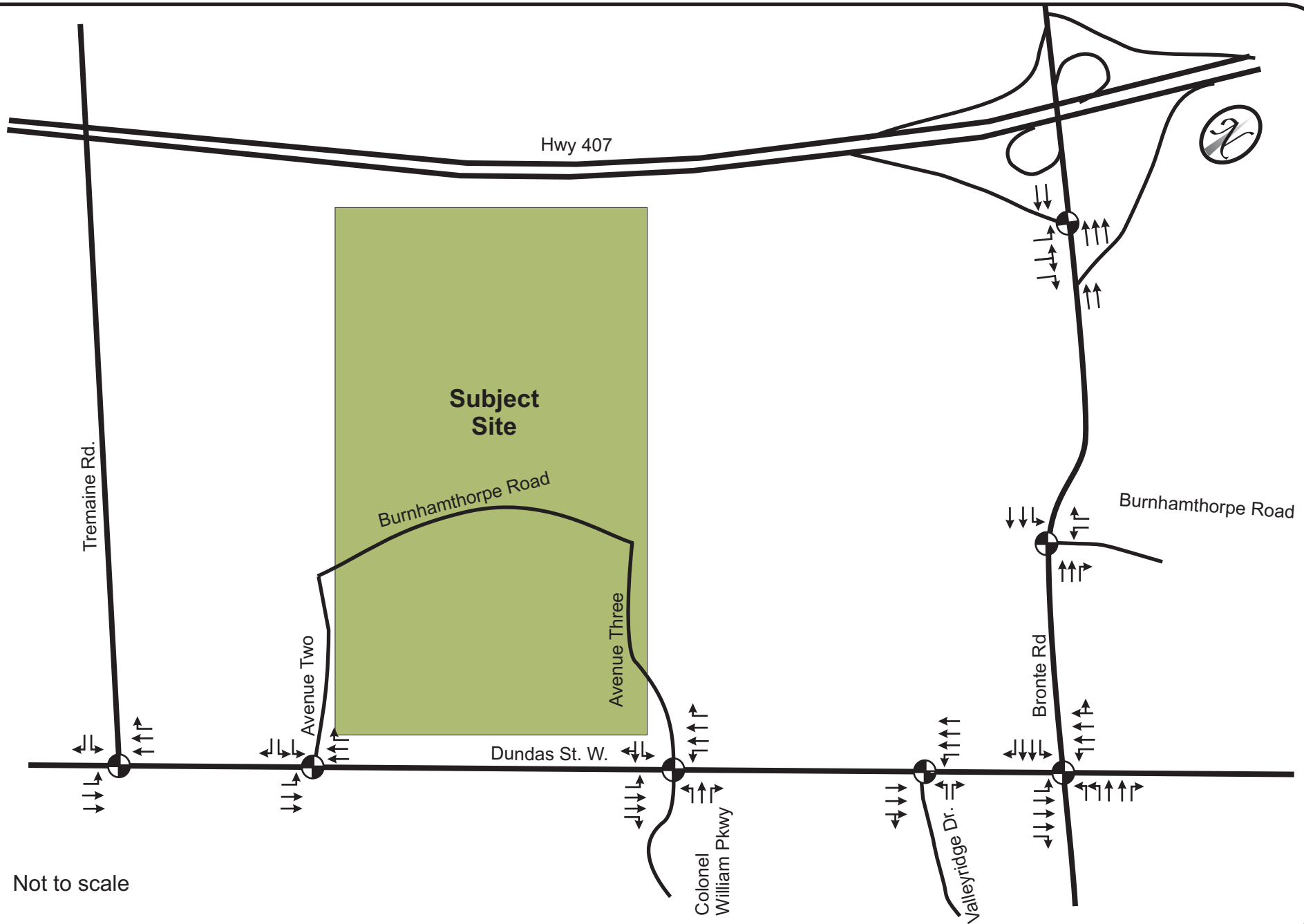
- The segment of Avenue Two between Dundas Street West and Burnhamthorpe Road extension is built.
- The existing driveway opposite Colonel William Driveway (Zenon driveway serving the existing GE site) would be realigned and intersect with Burnhamthorpe Road.
- Avenue Two and Avenue Three will be joined a segment of Burnhamthorpe Road.

Under the 2021 horizon, when the Phase 2 development is expected to be in place, the following road infrastructure has been assumed:

- In accordance with the Halton Region Road Capacity Program, the widening of Dundas Street West between Tremaine Road and Bronte Road from 4 to 6 lanes is expected to be in place by 2019. The two additional lanes are assumed to be high-occupancy vehicle (HOV) lanes for the 2021 horizon that will accommodate up to 350 vehicles per peak hour.
- Burnhamthorpe Road extension would be constructed between Tremaine Road and Bronte Road, connecting to the NNOTC to the east of Bronte Road.
- Part of Avenue One would be built to support the Phase 2 development on the subject property.
- Avenue Four would be built to Burnhamthorpe Road.

The 2031 horizon represents the full built-out scenario of the subject property as well as the neighbouring lands within the study area. All of the proposed road infrastructure is assumed to be in place to support the entire 407 West Employment lands.

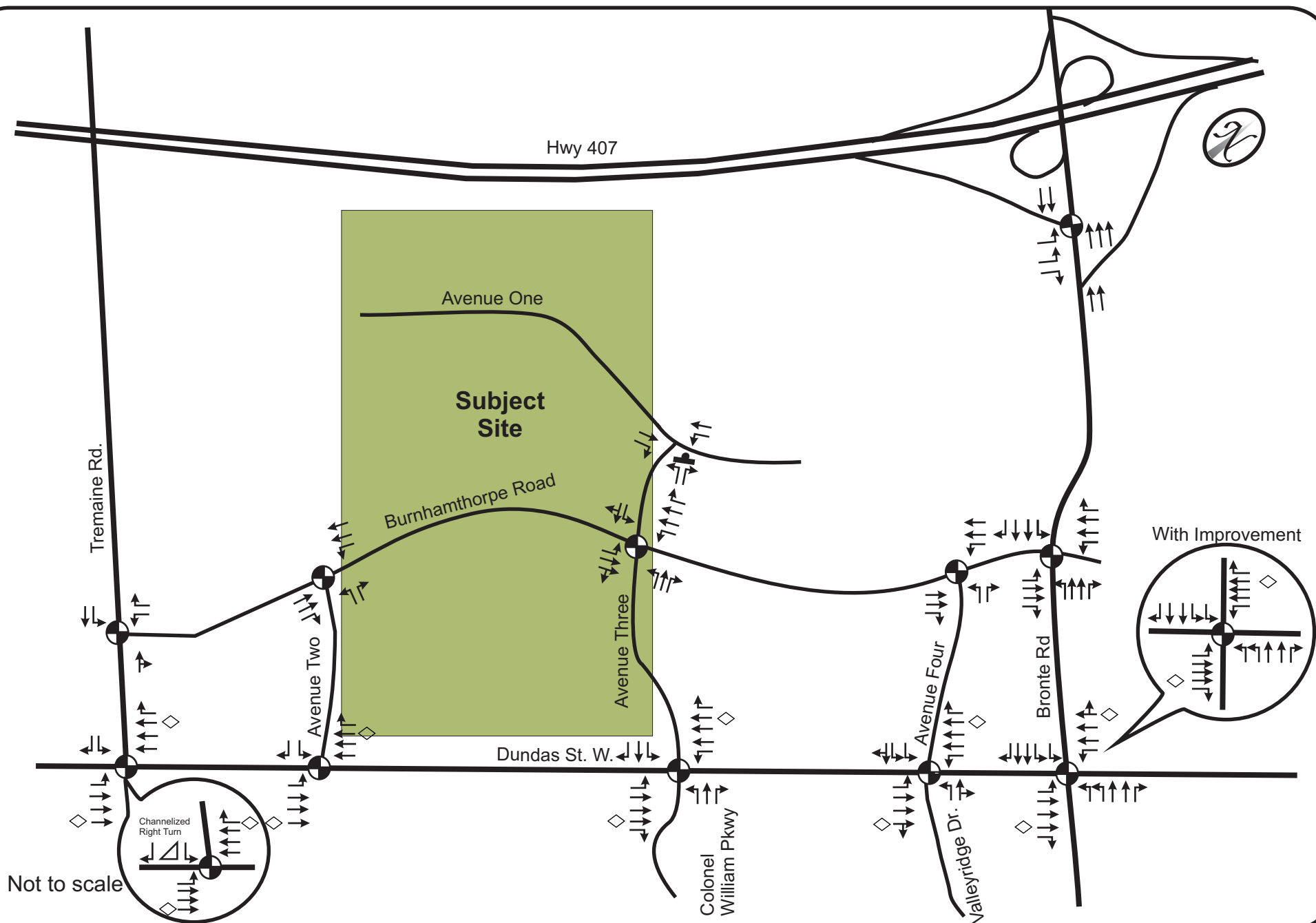
Figures 5, 6, and 7 illustrate the lane configurations anticipated for the 2016, 2021, and 2031 horizons, respectively. The proposed signalized operations for the internal intersections are based on signal warrants as detailed in Section 8.2.



Site Location



Signalized Control



Site Location

Stop Control

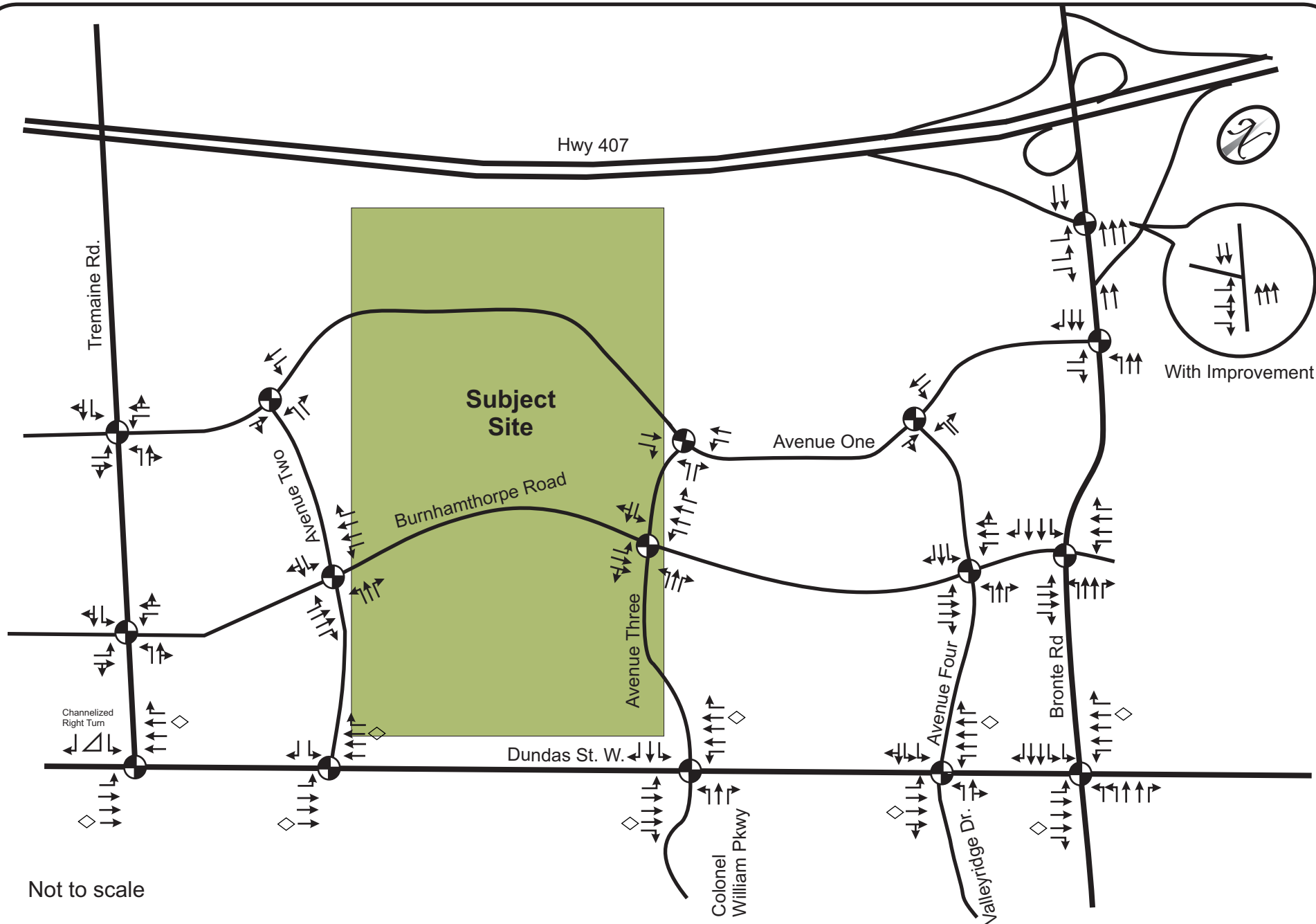


Signalized Control



HOV Lane

FIGURE 6
2021 FUTURE LANE CONFIGURATIONS



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5.3 Trip Generation

5.3.1 Trip Generation – General Employment

According to the comprehensive Zoning By-law for North Oakville (2009-189), permitted uses for the General Employment zone generally includes light employment uses (except hotel and service establishments), general industrial, outside storage and processing, among others.

The trip generation related to the proposed General Employment lands was determined using the Business Park (Land Use 770) code published in the ITE TRIP GENERATION MANUAL, 9TH EDITION.

The following equation and directional distributions from the ITE publications were used in the analysis:

Weekday A.M. Peak Hour: $\ln(T) = 0.97 \ln(X) + 0.49$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 T = Total Vehicle Trips
Distribution = 85% entering and 15% exiting

Weekday P.M. Peak Hour: $\ln(T) = 0.90 \ln(X) + 0.85$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 T = Total Vehicle Trips
Distribution = 26% entering and 74% exiting

5.3.2 Trip Generation – Light Employment

The proposed Light Employment lands mainly consist of office development, including general office, medical office, research and development, and information processing centres. The trip generation related to the proposed Light Employment lands was determined using the General Office (Land Use 710) code published in the ITE TRIP GENERATION MANUAL, 9TH EDITION.

The following equation and directional distributions from the ITE publications were used in the analysis:

Weekday A.M. Peak Hour: $\ln(T) = 0.80 \ln(X) + 1.57$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 T = Total Vehicle Trips
Distribution = 88% entering and 12% exiting

Weekday P.M. Peak Hour: $T = 1.12(X) + 78.4$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 T = Total Vehicle Trips
Distribution = 17% entering and 83% exiting

5.3.3 Trip Generation – Service Area Employment Uses

The proposed Service Area Employment lands mainly consist of a combination of service, retail and office uses, serving the employment uses.

The trip generation related to the office component of the Service Area Employment lands was determined using the General Office (Land Use 710) code published in the ITE TRIP GENERATION MANUAL, 9TH EDITION, as detailed in Section 5.3.2.

The trip generation related to the service and retail components of the Service Area Employment lands were determined using the Shopping Centre (Land Use 820) code published in the ITE TRIP GENERATION MANUAL, 9TH EDITION. The Shopping Centre Land Use was used as it provides the most appropriate trip rates and associated trip generation related to the service and retail components of the Service Area Employment lands.

The following equation and directional distributions from the ITE publications were used in the analysis related to the service and retail uses:

Weekday A.M. Peak Hour: $\ln(T) = 0.61 \ln(X) + 2.24$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 $T = \text{Total Vehicle Trips}$
Distribution = 62% entering and 38% exiting

Weekday P.M. Peak Hour: $\ln(T) = 0.67 \ln(X) + 3.31$
Where $X = 1,000 \text{ ft}^2 \text{ GFA}$
 $T = \text{Total Vehicle Trips}$
Distribution = 48% entering and 52% exiting

Internal Trips

As noted, the proposed Service Area Employment lands (blocks) consist of service, retail, and office uses. The service and retail components of the development are intended to serve the people who work in the proximity. Thus, it is expected that some of the vehicle trips will be joint trips (internal) between the different uses within the subject property, rather than new trips that are coming from the external. These trips can be made either by walking or by driving using internal roadways within the individual blocks.

The internal trip estimation within the Service Area Employment blocks is based on the procedure outlined in the ITE Trip Generation Handbook (2nd Edition). It should be noted that no joint trips were assumed for the a.m. peak hour, since the amount of internal trips in the a.m. peak period are few and insignificant.

Table 5.3 summarizes the typical internal capture rates for trip origins and trip destinations within a multi-use development as outlined in the ITE Trip Generation Handbook.

Table 5.3 - Typical Internal Capture Rates for Trip Origins and Trip Destinations for the Weekday P.M. Peak Hour

Trip Origin to Trip Destination	Capture Rate for Trip Origin	Trip Destination from Trip Origin	Capture Rate for Trip Destination
From Office To Retail	23%	To Retail from Office	2%
From Retail To Office	3%	To office From Retail	31%

The internal capture percentages were applied to the appropriate directional trip generation value. For instance:

- A. Internal trips from office to retail = 23 percent x P.M. outbound trips related to the office use
- B. Internal trips to retail from office = 2 percent x P.M. inbound trips related to the retail uses

The two internal trip values are compared and the lower value is selected. For instance, if internal trips from office to retail (A) consist of 15 trips, while the internal trips to retail from office (B) consist of 11 trips, the controlling value is 11 internal trips.

These internal trips are assumed to be made by walking or driving within the Service Area Employment block without accessing the public road network. Thus, these internal trips are subtracted from the overall trip generation related to the Service Area Employment blocks.

Pass-by Trips

The Service Area Employment blocks are anticipated to attract some trips from drivers who are already travelling along a roadway adjacent to a Service Area Employment block, and choose to make an intermediate stop while on their way to their primary destination. These are referred to as pass-by-trips. The pass-by trip percentage is the proportion of vehicles entering the development that would have already been travelling by the property while heading to other destinations, but made this intermediate stop along the way. Therefore, the site generated trips added to the boundary road network by the proposed development is typically reduced to account for a certain percentage of site trips which would be on the road network for other purposes, even if the subject development was not there.

This is expected to be the case for the Service Area Employment Blocks which are proposed to be located at the major intersections along Dundas Street West. No pass-by trips were assumed for the a.m. peak hour, as it is expected that the amount of pass-by trips during this time are few and insignificant.

The following equation from the ITE TRIP GENERATION HANDBOOK (2ND EDITION) was used to develop the average pass-by trip percentage for the weekday p.m. peak period for shopping centre uses:

$$\begin{aligned} \ln(T) &= -0.29 \ln(X) + 5.00 \\ \text{Where } X &= 1,000 \text{ ft}^2 \text{ GFA} \\ T &= \text{Average Pass-by Trip Percentage} \end{aligned}$$

The pass-by trip percentage reduction was applied after the internal trips are subtracted from the overall trip generation related to the individual Service Area Employment blocks.

5.3.4 Modal Split Adjustment

The Subject Property will be well served by various travel modes (e.g. bike path, transit, etc.). Since only nominal non-auto usage has been built into the ITE trip generation rates, further reduction was applied to reflect the growing transit services available in the NOWSP area and TDM initiatives implemented for the subject property, as well as the neighbouring lands.

As specified by the Region and the Town, a 10 percent and a 20 percent non-auto modal split are assumed for the area for the short-term horizons (2016 and 2021) and long-term horizon (2031), respectively. Accordingly, for the purpose of the assessment, the following non-auto split adjustments were applied to the trip generation related to the office uses (i.e. General Office and Business Park) by phase to account for the other travel modes.

Phase 1 (2016):	10 percent reduction
Phase 2 (2021):	10 percent reduction
Phase 3 (2031):	20 percent reduction

Tables 5.4A to 5.4C summarize the resulting trip generation related to the subject property, incorporating the non-auto split adjustment to the General Employment and Light Employment lands, and internal trip and pass-by trip reduction to the Service Area Employment lands by Phase.

Table 5.4A - Resulting Trip Generation – Phase 1 Lands (2016 Horizon)

Land	Trip Generation	Vehicle Trips					
		Weekday AM Peak Hour			Weekday PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
General Employment	Business Park (ITE)	694	123	817	207	590	797
	Trip Adjustment (10 percent reduction)*	69	13	82	19	61	80
	Sub-Total	625	110	735	188	529	717
Service Area Employment	General Office (ITE)	118	16	134	26	124	150
	Trip Adjustment (10 percent reduction)*	11	2	13	3	12	15
	Internal Trip Reduction	0	0	0	7	6	13
	Sub-Total	107	14	121	16	106	122
	Shopping Centre (ITE)	108	65	173	324	350	674
	Internal Trip Reduction	0	0	0	6	7	13
	Pass-By Trip Reduction	0	0	0	149	149	298
	Sub-Total	108	65	173	169	194	363
	TOTAL	840	189	1,029	373	829	1,202

*Applied to individual development blocks. The trip adjustments shown represent the total of the reduced trips by block.

Table 5.4B - Resulting Trip Generation – Phase 1 and 2 Lands (2021 Horizon)

Land	Trip Generation	Vehicle Trips					
		Weekday AM Peak Hour			Weekday PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Light Employment	General Office (ITE)	758	103	861	138	675	813
	Trip Adjustment (10 percent reduction)*	76	10	86	14	67	81
	Sub-Total	682	93	775	124	608	732
General Employment	Business Park (ITE)	1,127	199	1,326	338	960	1,298
	Trip Adjustment (10 percent reduction)*	113	21	134	34	96	130
	Sub-Total	1,014	178	1,192	304	864	1,168
Service Area Employment	General Office (ITE)	118	16	134	26	124	150
	Trip Adjustment (10 percent reduction)*	11	2	13	3	12	15
	Internal Trip Reduction	0	0	0	7	6	13
	Sub-Total	107	14	121	16	106	122
	Shopping Centre (ITE)	108	65	173	324	350	674
	Internal Trip Reduction	0	0	0	6	7	13
	Pass-By Trip Reduction	0	0	0	149	149	298
	Sub-Total	108	65	173	169	194	363
	TOTAL	1,911	350	2,261	613	1,772	2,385

*Applied to individual development blocks. The trip adjustments shown represent the total of the reduced trips by block.

Table 5.4C - Resulting Trip Generation – Phase 1 and 2 Lands (2031 Horizon)

Land	Trip Generation	Vehicle Trips					
		Weekday AM Peak Hour			Weekday PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Light Employment	General Office (ITE)	758	103	861	138	675	813
	Trip Adjustment (20 percent reduction)*	151	20	171	27	136	163
	Sub-Total	607	83	690	111	539	650
General Employment	Business Park	1,127	199	1,326	338	960	1,298
	Trip Adjustment (20 percent reduction)*	224	41	265	68	190	258
	Sub-Total	903	158	1,061	270	770	1,040
Service Area Employment	General Office (ITE)	118	16	134	26	124	150
	Trip Adjustment (20 percent reduction)*	24	3	27	6	24	30
	Internal Trip Reduction	0	0	0	6	6	12
	Sub-Total	94	13	107	14	94	108
	Shopping Centre (ITE)	108	65	173	324	350	674
	Internal Trip Reduction	0	0	0	6	6	12
	Pass-By Trip Reduction	0	0	0	150	150	300
	Sub-Total	108	65	173	168	194	362
	TOTAL	1,712	319	2,031	563	1,597	2,160

*Applied to individual development blocks. The trip adjustments shown represent the total of the reduced trips by block.

5.4 Trip Distribution and Assignment

The 2006 Transportation Tomorrow Survey (TTS) findings were reviewed to determine the site traffic distribution to the boundary roadways. The “auto-driver” data was used to determine the distribution related to the Subject Property, located in the Oakville Planning District (PD 39). Table 5.5 summarizes the regional distributions to/from PD 39, indicating the employment based distribution.

Table 5.5 - Employment Based General Trip Distribution

Direction	Percentage
Within Oakville	34%
Toronto	6%
York Region	1%
Durham Region	1%
Peel Region	23%
Burlington	18%
Milton	4%
Halton Hills	2%
Hamilton-Wentworth Region	11%
Total	100%

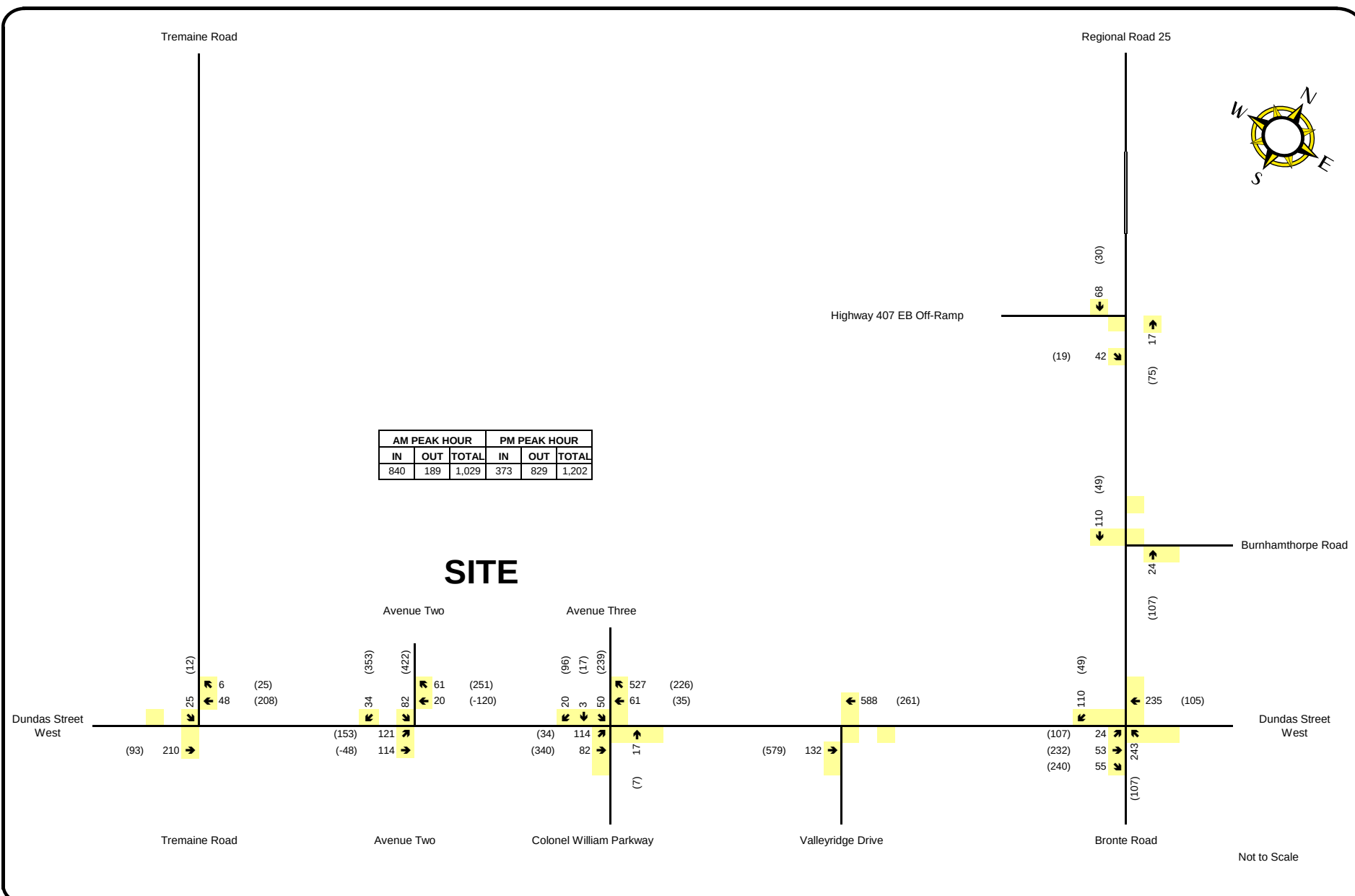
The traffic was assigned to the boundary road network accordingly based on the available road links anticipated to be in place during each phase.

Table 5.6 summarizes the trip assignments to the boundary road network by Phase, reflecting the respective assumed road network.

Table 5.6 - Trip Assignment by Phase

To/From	Trip Assignment Percentages		
	2016 (Phase 1)	2021 (Phase 2)	2031 (Phase 3)
Dundas Street East	28%	10%	10%
Dundas Street West	25%	19%	19%
Bronte Road North	4%	4%	4%
Bronte Road South	29%	23%	23%
Tremaine Road North	3%	3%	3%
Highway 407 East	4%	4%	4%
Highway 407 West	5%	11%	11%
NNOTC (Burnhamthorpe Road)	-	18%	18%
Colonel William Parkway	2%	4%	4%
Valleyridge Drive	-	4%	4%
Total	100%	100%	100%

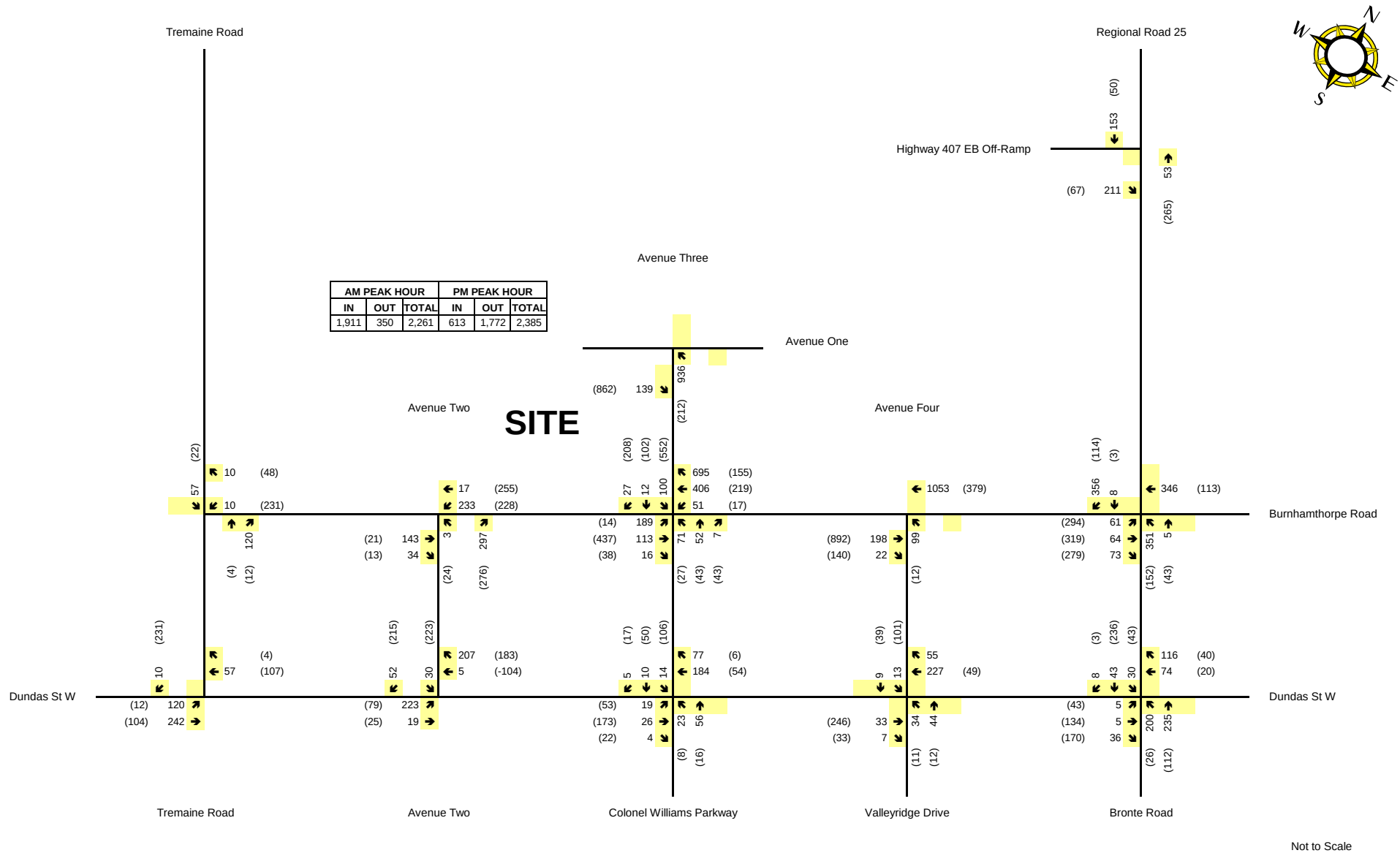
The resulting weekday a.m. and p.m. peak hour trip assignments related to the forecast site generated trips by Phase are illustrated in Figures 8A to 8C.



LEGEND

XX A.M. Peak Hour Volumes
(XX) P.M. Peak Hour Volumes

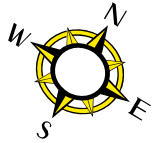
FIGURE 8A
2016 Site Generated Traffic Volumes



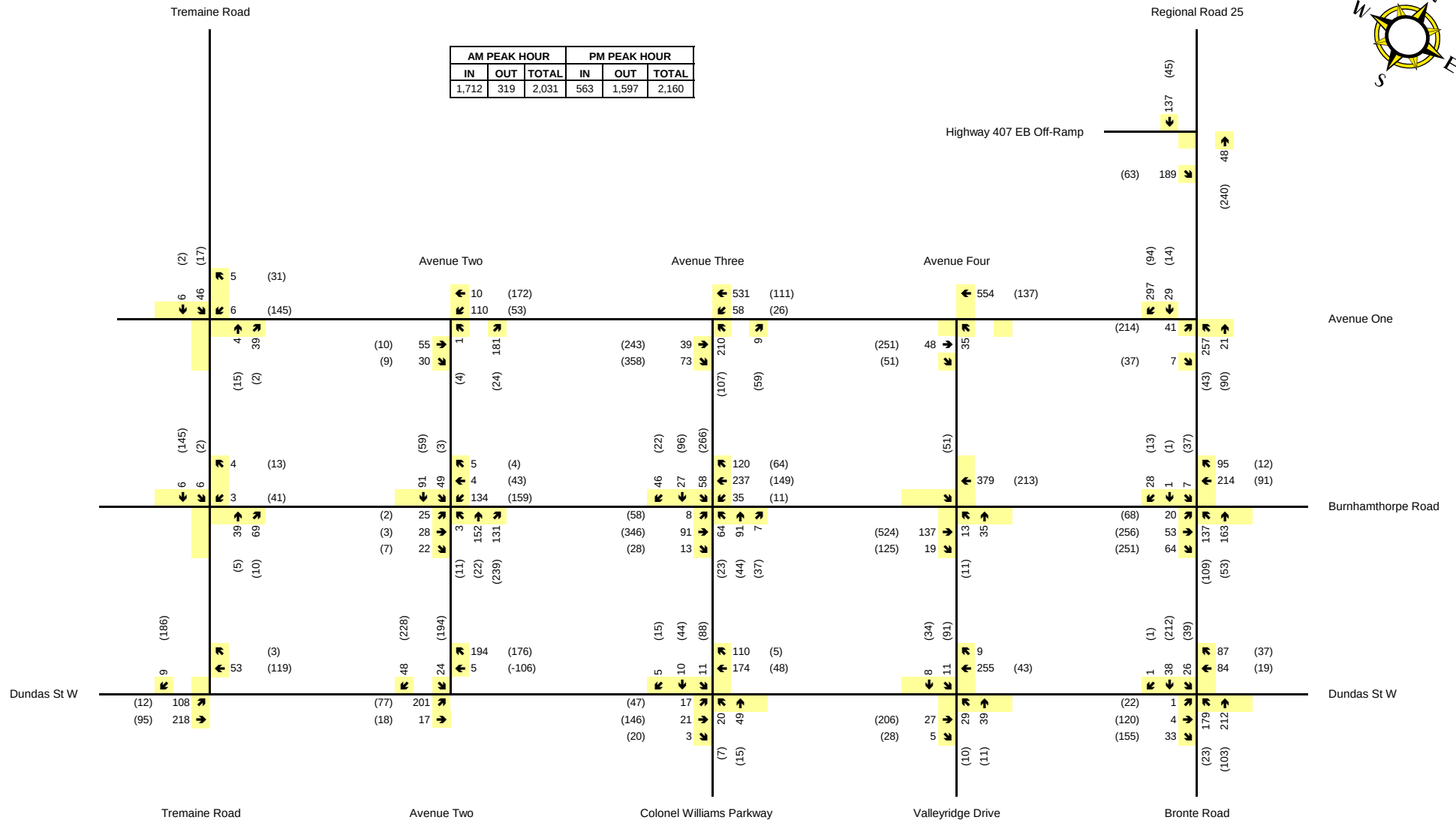
LEGEND

XX A.M. Peak Hour Volumes
(XX) P.M. Peak Hour Volumes

FIGURE 8B
2021 Site Generated Traffic Volumes



AM PEAK HOUR			PM PEAK HOUR		
IN	OUT	TOTAL	IN	OUT	TOTAL
1,712	319	2,031	563	1,597	2,160



Not to Scale



LEGEND

XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 8C
 2031 Site Generated Traffic Volumes

6.0 Future Background Traffic Conditions (2016 and 2021)

6.1 2016 Future Background Traffic Conditions

6.1.1 *Future Through Traffic Growth (2016)*

A through traffic growth rate of 1.0 percent per annum (linear) was applied to account for the general increases in traffic along the boundary major roadways, namely Dundas Street West, Bronte Road, and Tremaine Road. Figure 9 illustrates the traffic increases related to the general through traffic growth by 2016 for the weekday a.m. and p.m. peak hours.

6.1.2 *Traffic Increases Related to Other Developments (2016)*

In addition to the future through traffic growth noted, traffic related to other developments in the vicinity of the property has been included in the background traffic forecasts.

Bronte Creek Community and Pineberry Estates

The Bronte Creek Community is located south of Dundas Street West and served by Colonel William Parkway. The Bronte Creek Community is currently being constructed in phases, with the majority of the development already built at the time when the turning movement counts were undertaken. Based on the Revised Phasing Plan of Proposed Subdivision related to the Bronte Creek Community dated December 2009, a future increase of approximately 545 dwelling units is expected. These 545 dwelling units are conservatively assumed to be built by 2016.

Similarly, based on the Town of Oakville Planning and Development Council Report titled "Proposed Removal of "H" Holding Provision from lands identified on Schedule "B" in Zoning By-law No. 2002-38 Pineberry Estates" dated May 16, 2006, a future increase of approximately 104 dwelling units is expected for the Pineberry Estates lands, which is located east to the Bronte Creek Community. These 104 dwelling units are conservatively assumed to be built by 2016.

The trip generation related to these two residential developments was determined using the Single-Family Detached Housing (Land Use 210) and Residential Condominium/Townhouse (Land Use 230) codes published in the ITE TRIP GENERATION MANUAL, 8TH EDITION.

Table 6.1 summarizes the resulting trip generation.

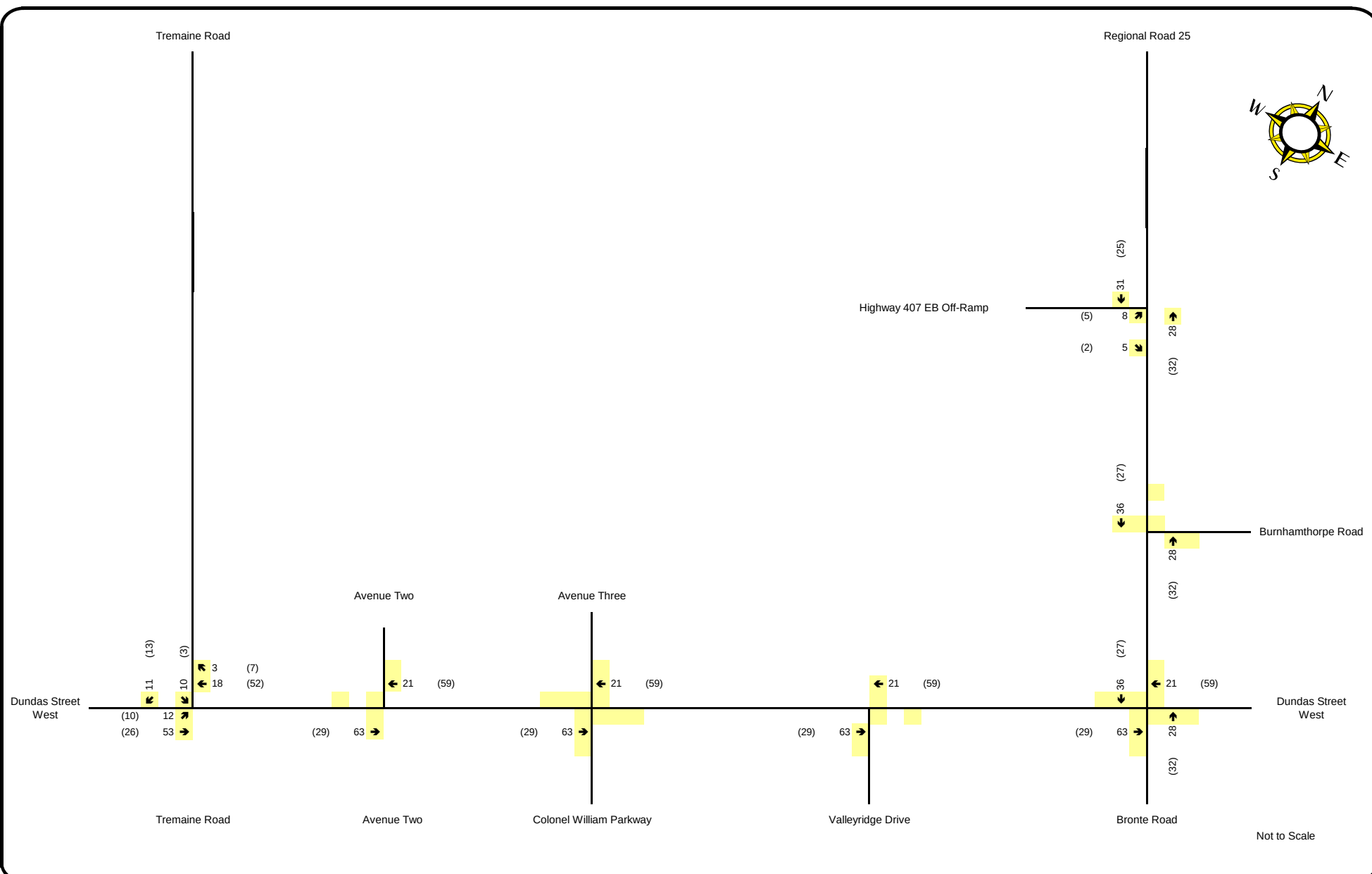


Table 6.1 - Trip Generation Related to Bronte Creek Community and Pineberry Estates (2016 Horizon)

Land Use (ITE Land Use Category)	Magnitude (Units)*	Vehicle Trips					
		Weekday AM Peak Hour			Weekday PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single Dwelling Unit (LU 210)	294	54	162	216	175	102	277
Townhouses (LU 230)	306	21	105	126	101	50	150
Apartments (LU 230)	49	5	24	29	22	11	33
TOTAL	649	80	291	371	298	163	414

* Estimated unit counts

The 2006 TTS findings were reviewed to determine the site traffic distribution to the boundary roadways. The “auto-driver” data was used to determine the distribution related to the Bronte Creek Community and Pineberry Estates Inc. lands, located in 2006 GTA Zone 4045 (Oakville area south of Dundas Avenue West, West of Bronte Road, North of Upper Middle Road, and East of Bronte Creek Provincial Park).

New Oakville Hospital and Assumed ORC Lands

The New Oakville Hospital by the Halton Healthcare Service is located at the north-west corner of Dundas Street West and Third Line, which is currently a greenfield. The New Oakville Hospital is scheduled to open in 2015. The first major hospital expansion is expected in 2020, and the final hospital expansion will happen in 2023.

The traffic increases related to the New Oakville Hospital site for the 2016, 2021, 2031 horizons were based on the *Halton Healthcare Services, New Oakville Hospital Transportation Impact Study* prepared by IBI Group in June 2010. The study also analyzed the traffic impacts related to the ORC lands adjacent to the New Oakville Hospital, in the Sixteen Hollow Employment Lands in the North Oakville West Secondary Plan area.

Thus, trip generation, distribution and traffic assignment related to the New Oakville Hospital, and ORC lands under the three horizons were taken directly from the IBI Group June 2010 report results, with some adjustments, recognizing the fact that the Burnhamthorpe Road extension, which provides an east-west alternative to Dundas Street West, would be in place by 2021.

Retirement Centre at 3136 Dundas Street West (FRAM Building Corp.)

This development proposal consists of a six-storey, 116 unit retirement centre. The trip generation related to this development was determined using the Senior Adult Housing (Land Use 252) code published in the ITE TRIP GENERATION MANUAL, 9TH EDITION. This development is expected to generate 22 trips in the a.m. peak hour and 25 trips in the p.m. peak hour.

Medical Office Building at 2525 Old Bronte Road (VGR Investments)

This development proposal consists of a five-storey medical building. The trip generation, distribution and traffic assignment are taken directly from the Traffic Impact Study entitled “Proposed Medical Building: Old Bronte Road/Dundas Street” prepared by BA Group in December 2010.

Mixed-Use Development at 2390 Khalsa Gate (Ballantry Homes)

This development proposal consists of 152 townhouse units, 3,000 square feet of commercial space and 12 gas fuelling stations. The trip generation, distribution and traffic assignment are taken directly from the Traffic Impact Study entitled “Khalsa Gate Mixed Use Development” prepared by Cole Engineering Group Limited in February 2010. A full-moves access at the Bronte Road/Khalsa Gate intersection was assumed.

Residential Development at 2385 & 2389 Khalsa Gate (Peppergate Developments)

This development proposal consists of 147 townhouse units. The trip generation, distribution and traffic assignment are taken directly from the Traffic Impact Study entitled “Khalsa Gate Residential Development” prepared by GENIVAR Inc. in November 2010.

Other Developments within the 407 West Employment Area

As the Subject Property is proposed to be developed in phases, it is expected that the other lands within the 407 West Employment Area will be developed in a similar fashion.

It should be noted that no formal development proposal has been submitted related to the other parcels of the 407 West Employment Area at the time this report is being prepared.

Development assumptions were prepared by MMM for the entire 407 West Employment Area for the purposes of our analysis. The land use assumptions for the other developments within the 407 West Employment Area by phase are summarized in Table 6.2. The development assumptions assume a minimum overall density of 0.35 FSI for the 407 West Employment Area.

Table 6.2 - Development Proposal Related to Other Parcels within the 407 West Employment Area by Phase

Phase	Assumed GFA (Mixed Uses)
Phase 1	35,585 ft ²
Phase 2	1,159,704 ft ²
Phase 3	2,333,702 ft ²
TOTAL	3,528,991 ft ²

The same trip generation approach detailed in Section 5.3 was applied for these other developments within the 407 West Employment Area. Similar to the approach in developing the site generated traffic, modal split adjustments were applied to the trip generation related to the office uses (i.e., General Office and Business Park) by Phase (i.e., Phase 1: 10 percent reduction; Phase 2: 10 percent reduction; and Phase 3: 15 percent reduction) to account for the other travel modes.

For Service Area Employment lands of the other developments, internal trips and pass-by trips have been calculated using the same approach as that applied for site generated traffic.

The same trip distribution and assignment assumptions were applied to the other developments within the 407 West Employment Area.

Resulting Trip Generation Related to Other Developments in the 407 West Employment Lands for Phase 1

With Avenue Two and the Phase 1 developments of the subject property in place, the development located at the north-east quadrant of Dundas Street West/Avenue Two intersection is expected to be built by 2016. Table 6.3 summarizes the resulting trip generation related to this development.

Table 6.3 - Resulting Trip Generation Related to Other Development within the 407 West Employment Area (Phase 1 - 2016 Horizon)

Blocks	Trip Generation (Vehicle Trips)					
	Weekday AM Peak Hour			Weekday PM Peak Hour*		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Other 407 West Employment Area Development (Phase 1)	69	28	97	50	114	164

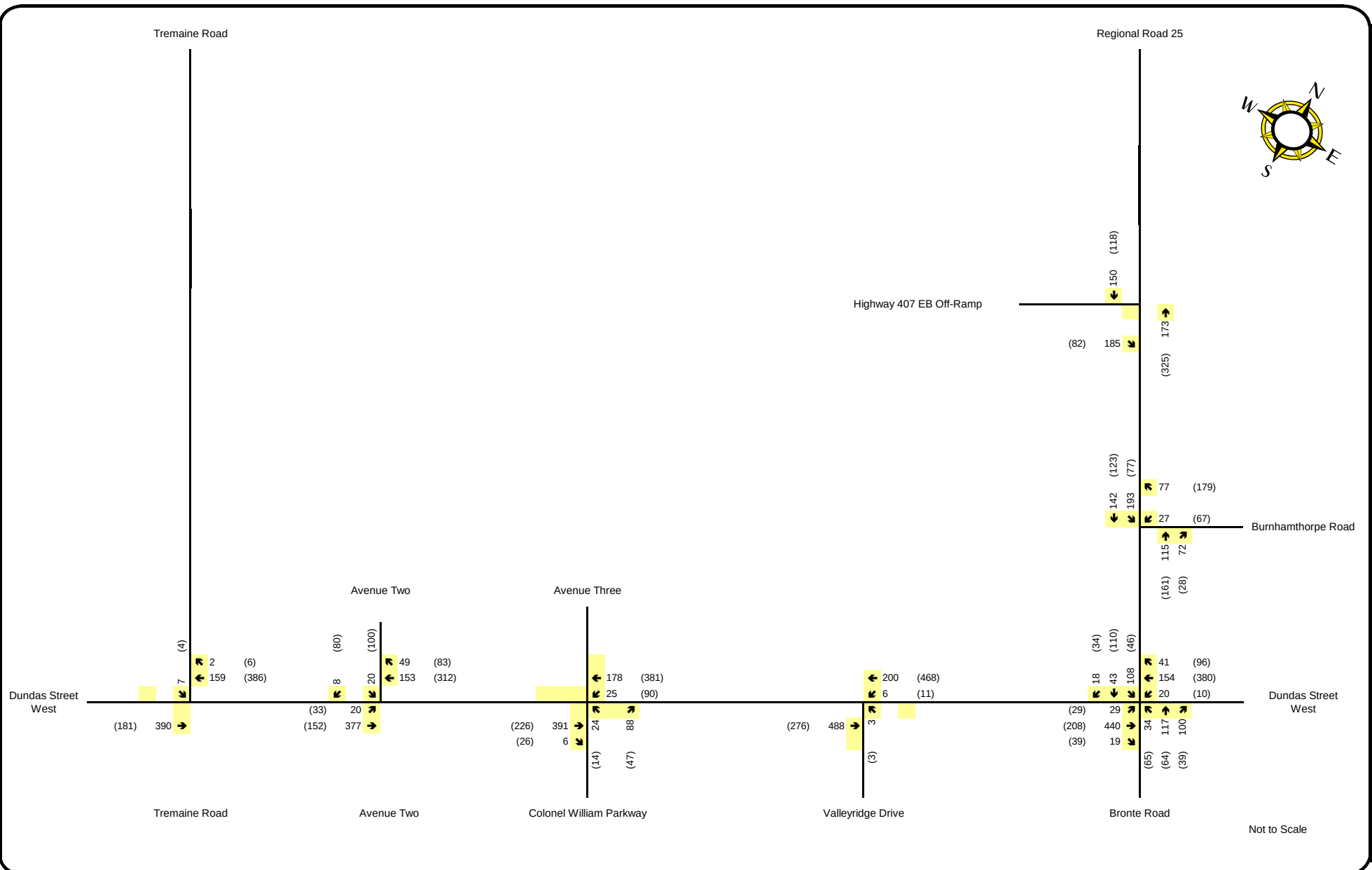
**Does not include 66 inbound/66 outbound pass-by trips.*

Figure 10 illustrates the traffic generated by all these background developments under horizon 2016 during the weekday a.m. and p.m. peak hours, assuming the boundary road network as indicated in Figure 5 by 2016.

6.1.3 2016 Future Background Traffic Operations

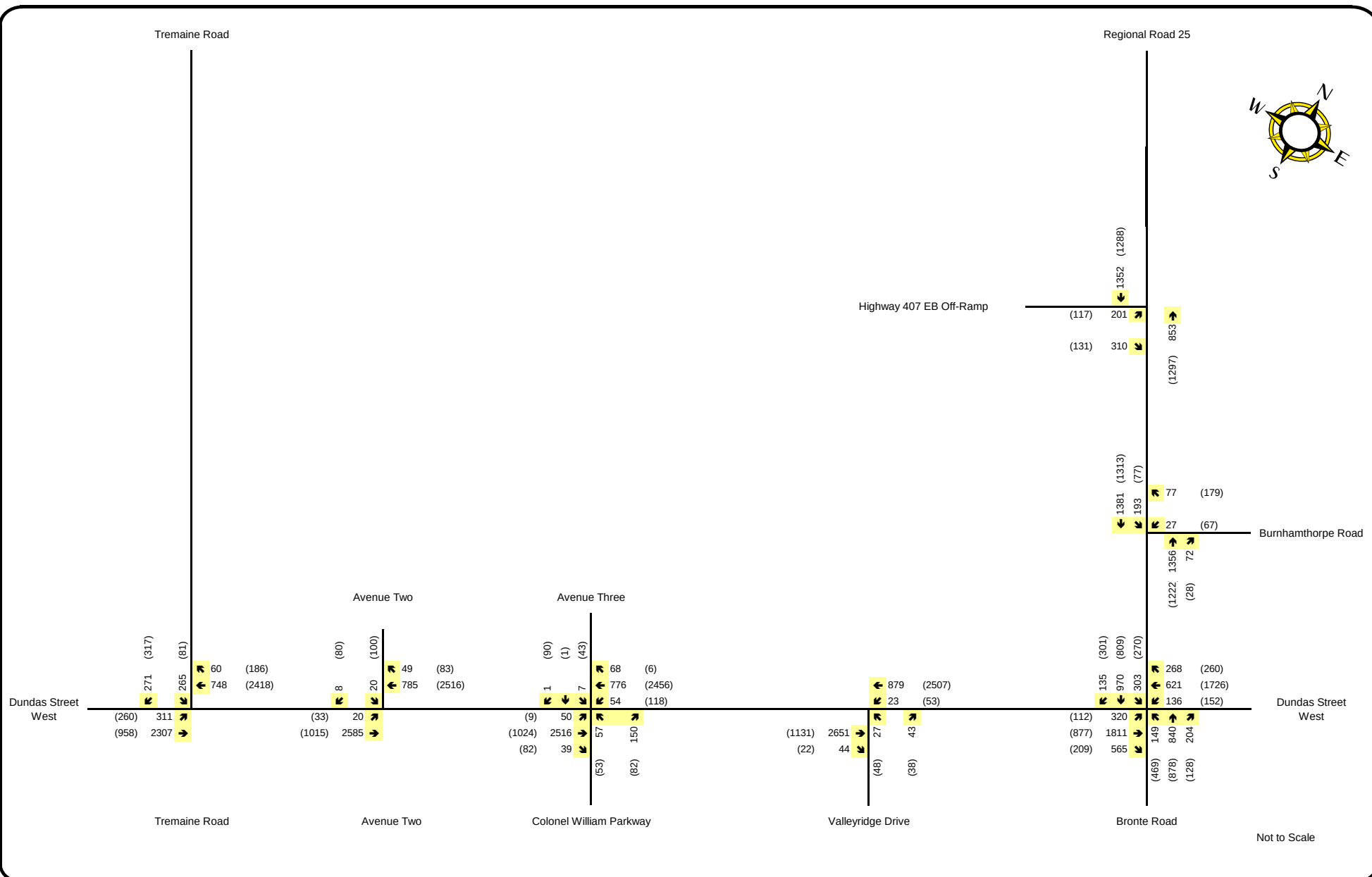
The 2016 future background traffic were developed by superimposing the general through traffic growth indicated in Figure 9, as well as the traffic increases related to the other developments as indicated in Figure 10, onto the respective existing traffic volumes indicated in Figure 4.

Figure 11 illustrates the resulting 2016 future background traffic volumes during the weekday a.m. and p.m. peak hours.



LEGEND
 XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 10
 Other Developments in 2016
 Background Traffic Volumes



LEGEND
 XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 11
 2016 Future Background Traffic Volumes

The 2016 future background traffic were then analyzed on the basis of the 2016 background traffic volumes illustrated in Figure 11 for the weekday a.m. and p.m. peak hours. The resulting levels of service are outlined in Table 6.4. The details related to the future background operations are provided in Appendix C.

The traffic signal timings for key intersections during the a.m. and p.m. peak hours have been adjusted to optimize the intersections, while the cycle lengths remain the same.

Table 6.4 - Intersection Levels of Service Based on 2016 Future Background Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road ⁽¹⁾	Signalized	D (36.5) [0.91]	EB-L (0.87) EB-T (0.90) SB-L (1.13) SB-T (0.86)	D (49.2) [0.88]	WB-TR (1.04) NB-L (0.89)
Dundas Street West/ Valleyridge Drive ⁽¹⁾	Signalized	A (2.5) [0.61]	-	A (3.8) [0.56]	-
Dundas Street West/ Colonel William Parkway/ Avenue Three ⁽¹⁾	Signalized	B (10.4) [0.84]	EB-T (0.98)	B (18.1) [0.80]	WB-T (0.90)
Dundas Street West/ Avenue Two ⁽¹⁾	Signalized	D (54.5) [0.76]	EB-T (1.10)	E (61.8) [0.83]	WB-T (1.15)
Dundas Street West/ Tremaine Road ⁽¹⁾	Signalized	C (20.6) [0.87]	EB-T (0.92)	D (44.5) [0.95]	WB-T (1.06)
Bronte Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	A (5.7) [0.60]	-	A (8.1) [0.46]	-
Bronte Road/Highway 407 Eastbound Off-Ramp ⁽¹⁾	Signalized	B (13.6) [0.63]	-	A (7.8) [0.43]	-

(1) For signalized intersections, levels of service are based on the overall intersection delay.

Note: The LOS results are based on HCM2000 output.

As indicated in Table 6.4, all intersections which were analyzed are expected to continue operating at good to acceptable overall Levels of Service based on the projected 2016 future background traffic volumes.

A number of individual movements at the intersections along Dundas Street West are expected to operate close to, or over capacity. This is attributed to the general through traffic increases along Bronte Road and Dundas Street West, as well as traffic related the other developments in the area. Majority of the critical movements at the intersections along Dundas Street West are associated with the peak direction traffic along Dundas Street West, i.e., the eastbound direction during the a.m. peak hour, and the westbound direction during the p.m. peak hour. The results indicate that there is insufficient capacity along Dundas Street West to accommodate the forecast corridor traffic growth. The planned Dundas Street West widening in the study area (construction currently scheduled to commence in 2017) is clearly needed to

address area roadway capacity constraints. It should be noted that Dundas Street West widening was previously scheduled to start in 2015 (as identified in the Halton Region Capital Projects Map (2012-2021)) and assumed to be completed by 2016.

In addition, provision of an exclusive westbound right-turn lane at the Dundas Street West/Bronte Road intersection would improve the forecast v/c ratios of the westbound through and right-turn movements to below 1.0.

6.2 2021 Future Background Traffic Conditions

6.2.1 Future Through Traffic Growth (2021)

For 2021 horizon, a through traffic growth rate of 1.0 percent per annum (linear) was applied to account for the general increases in traffic along the north-south boundary roadways, namely Bronte Road and Tremaine Road. No growth has been assumed for Dundas Street West between 2016 and 2021. Figure 12 illustrates the traffic increases related to the general through traffic growth by 2021 for the weekday a.m. and p.m. peak hours.

6.2.2 Traffic Increases Related to Other Developments (2021)

Other developments in the vicinity of the property have been included in the background traffic forecasts for the 2021 horizon, including those reflected in the 2016 background traffic conditions, as well as the assumed Phase 2 developments within the 407 West Employment Area within the North Oakville West Secondary Plan.

Other Developments within the 407 West Employment Area (2021)

The trip generation approach applied to other developments within the 407 West Employment Area under Phase 2 is similar to that for Phase 1.

A 10 percent modal split reduction was applied to the trip generation related to the office uses under Phase 2 to reflect the increased non-auto modal split as a result of better transit usage and TDM initiatives.

Table 6.5 summarizes the resulting trip generation related to other developments within the 407 West Employment Area under Phase 2.

Table 6.5 - Resulting Trip Generation Related to Other Developments within the 407 West Employment Area (Phase 1 and 2 - 2021 Horizon)

	Trip Generation (Vehicle Trips)					
	Weekday AM Peak Hour			Weekday PM Peak Hour*		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Other 407 West Employment Area Developments (Phase 1 and 2)	1,449	361	1,810	726	1,626	2,352

*Does not include 415 inbound/415 outbound pass-by trips.

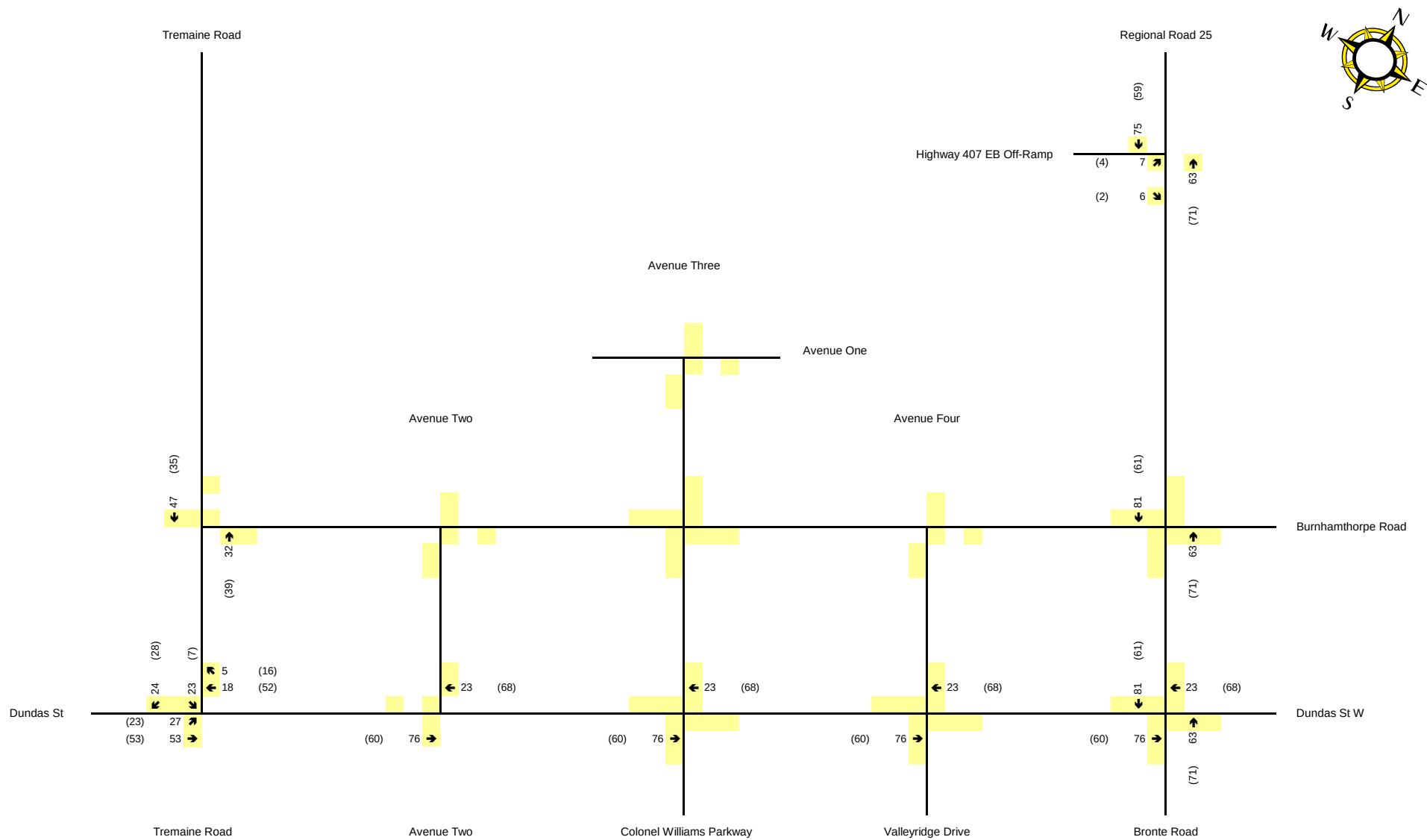


Figure 13 illustrates the traffic generated by all background developments considered under 2021 horizon during the weekday a.m. and p.m. peak hours, including traffic associated with Phase 1 and 2 developments within the 407 West Employment Area, assuming the boundary road network as indicated in Figure 6 by 2021.

Traffic Associated with Phase 1 Development of the Subject Lands

As noted, the 407 West Employment Area is expected to be developed in phases. It is the expectation that the internal road network and other supporting infrastructure in the area will be developed in phases accordingly. It is reasonable to assume that the Phase 1 developments in the Subject Property and the associated infrastructure will be in place before 2021 when the Phase 2 developments in the 407 West Employment Area outside the subject lands are built. As a result, the traffic associated with Phase 1 development of the subject lands has been included in 2021 future background traffic volumes.

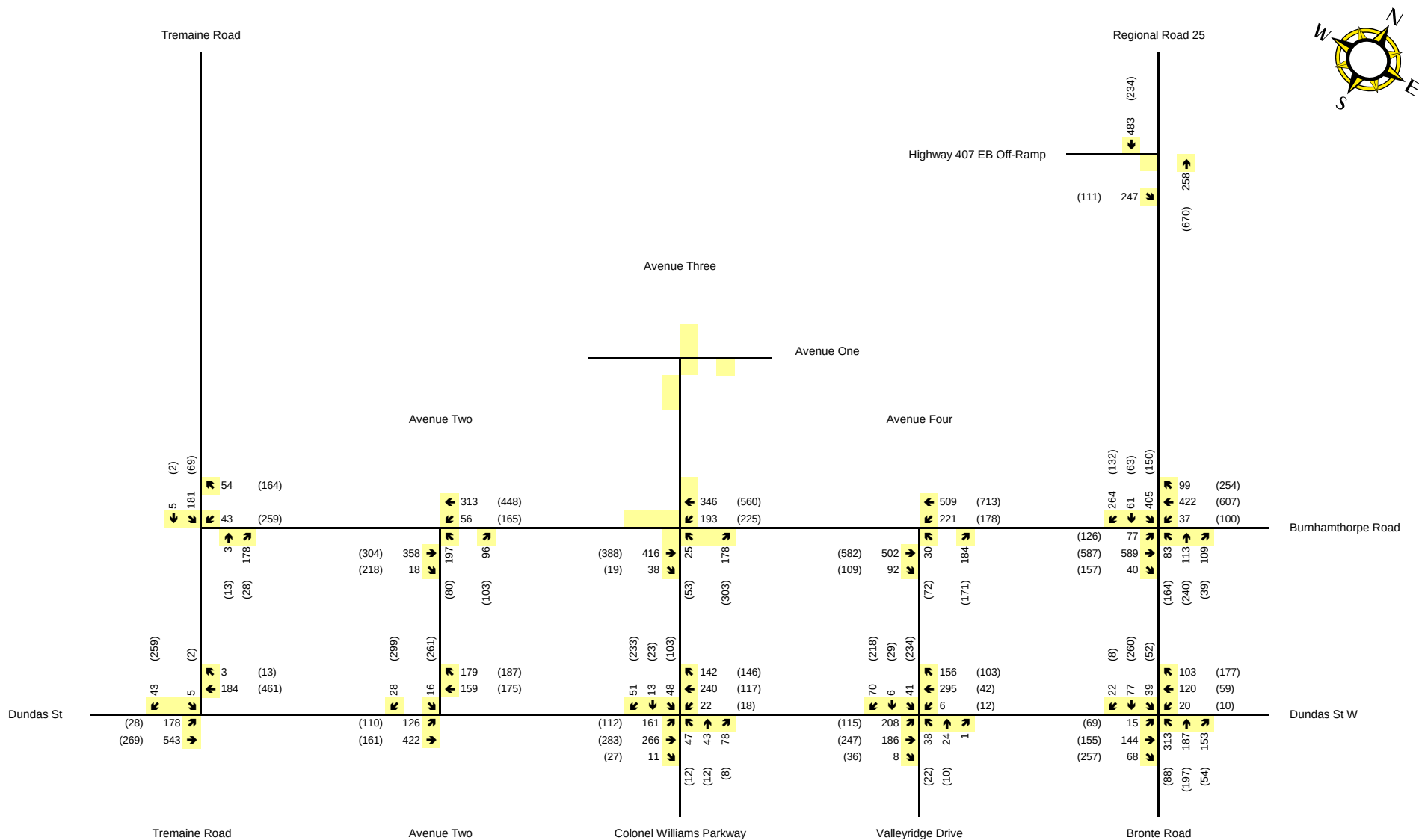
6.2.3 Future Background Traffic Conditions (2021)

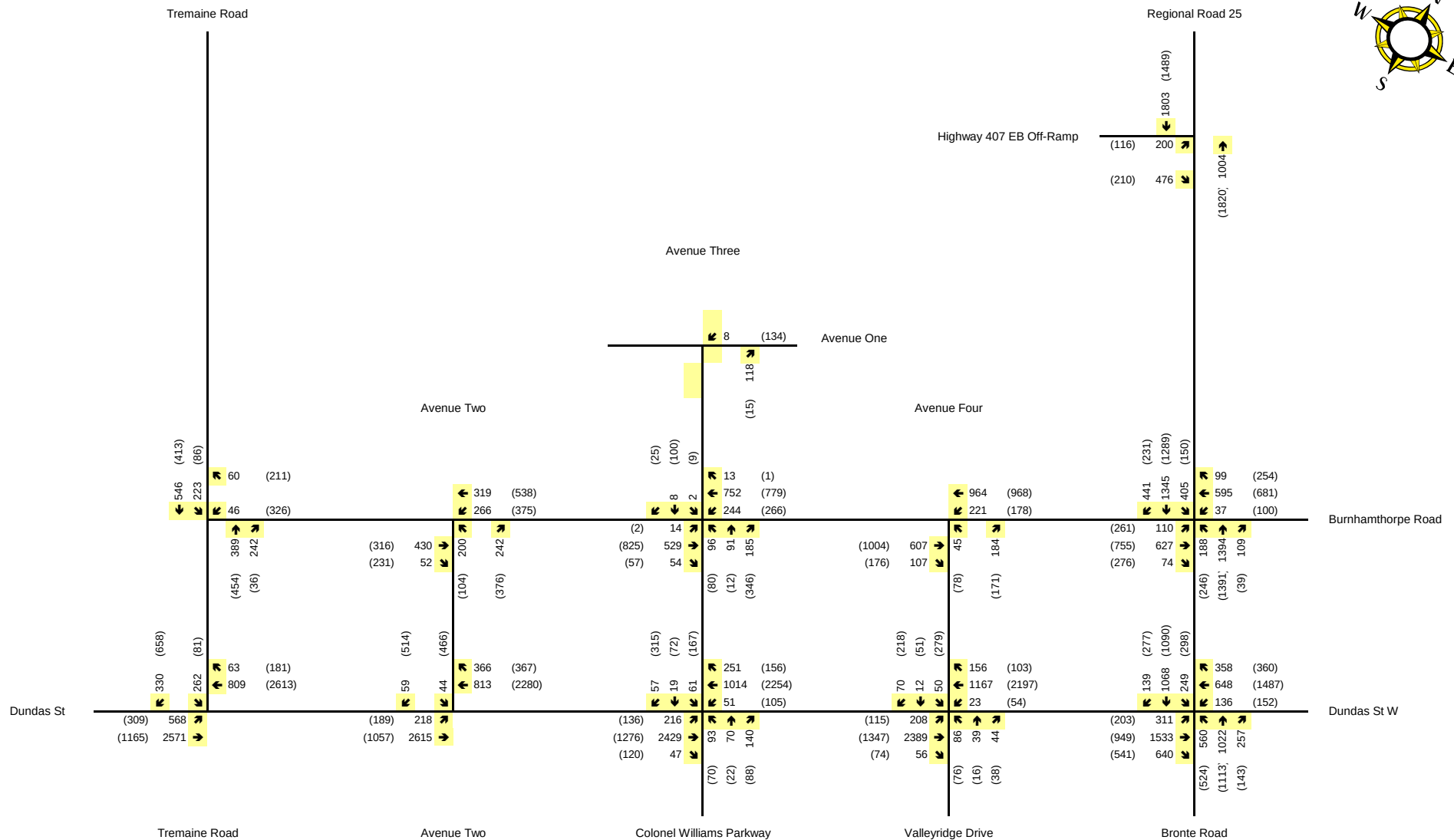
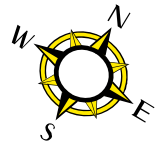
The 2021 future background traffic were developed by superimposing the general through traffic growth indicated in Figure 12, the traffic increases related to the other developments as indicated in Figure 13, as well as the Phase 1 site generated traffic onto the respective existing traffic volumes indicated in Figure 4.

Figure 14 illustrates the resulting 2021 future background traffic volumes during the weekday a.m. and p.m. peak hours.

The 2021 future background traffic were then analyzed on the basis of the 2021 background traffic volumes illustrated in Figure 14 for the weekday a.m. and p.m. peak hours. The resulting levels of service are outlined in Table 6.6.

As noted, the traffic signal timings for key intersections during the a.m. and p.m. peak hours have been adjusted to optimize the intersections, while the cycle lengths remain the same.





LEGEND
 XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 14
 2021 Future Background Traffic Volumes

Table 6.6 - Intersection Levels of Service Based on 2021 Future Background Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road – Without Intersection Improvement ⁽¹⁾	Signalized	E (59.4) [1.04]	EB-L (1.36) EB-T (1.07) NB-L (1.03) SB-T (0.89)	F (82.1) [1.12]	EB-L (0.94) WB-TR (1.31) NB-L (1.08) NB-T (0.88) SB-L (0.96) SB-T (0.89)
Dundas Street West/ Bronte Road – With Intersection Improvement (WB-R, Double SB-L) ⁽¹⁾	Signalized	D (51.5) [0.99]	EB-L (1.03) EB-T (1.07) NB-L (1.03) SB-T (0.89)	D (51.0) [1.00]	EB-L (0.94) WB-T (1.04) NB-L (1.08) NB-T (0.87) SB-T (0.89)
Dundas Street West/ Valleyridge Drive/ Avenue Four ⁽¹⁾	Signalized	B (19.8) [0.78]	-	C (20.4) [0.83]	WB-T (0.96)
Dundas Street West/ Colonel William Parkway/ Avenue Three ⁽¹⁾	Signalized	B (17.9) [0.79]	EB-T (0.92)	C (33.2) [0.87]	WB-T (0.94)
Dundas Street West/ Avenue Two ⁽¹⁾	Signalized	C (31.7) [0.73]	EB-T (0.98)	D (38.6) [0.94]	EB-L (0.94) WB-T (1.00) SB-L (0.88) SB-R (0.86)
Dundas Street West/ Tremaine Road ⁽¹⁾ Without Intersection Improvement ⁽¹⁾	Signalized	C (21.0) [0.85]	EB-T (0.86)	F (83.9) [1.17]	WB-T (1.14) SB-R (1.33)
Dundas Street West/ Tremaine Road ⁽¹⁾ With Intersection Improvement (SB-R) ⁽¹⁾	Signalized	B (19.8) [0.83]	EB-T (0.86)	D (53.6) [0.91]	WB-T (1.12)
Bronte Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	D (41.6) [0.90]	NB-T (0.93) SB-L (0.94)	C (34.2) [0.86]	NB-L (0.87) NB-T (0.87) SB-T (0.90)
Bronte Road/Highway 407 Eastbound Off-Ramp ⁽¹⁾	Signalized	B (16.2) [0.75]	SB-T (0.86)	A (10.0) [0.58]	-
Tremaine Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	A (7.4) [0.44]	-	B (13.2) [0.53]	-
Burnhamthorpe Road/ Avenue Four ⁽¹⁾	Signalized	A (9.9) [0.38]	-	A (8.8) [0.53]	-

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Burnhamthorpe Road/ Avenue Three ⁽¹⁾	Signalized	B (17.1) [0.47]	-	C (28.5) [0.58]	EB-TR (0.92) WB-L (0.92)
Burnhamthorpe Road/ Avenue Two ⁽¹⁾	Signalized	B (15.5) [0.49]	-	B (11.0) [0.51]	-
Avenue One/ Avenue Three ⁽²⁾	Stop- Controlled	A (8.7)	NB-R (0.11)	A (8.4)	NB-R (0.01)

(1) For signalized intersections, levels of service are based on the overall intersection delay.

(2) For two-way stop controlled intersections, the level of service is based on delay associated with the critical movement.

Note: The LOS results are based on HCM2000 output.

As indicated in Table 6.6, with the assumed through traffic growth and traffic increases related to other developments in the area by horizon 2021, as well as the assumed road network in the 407 West Employment Area (i.e., Burnhamthorpe Road from Tremaine Road to Bronte Road), the intersections which were analyzed are expected to operate at slightly worse overall Levels of Service (LOS) based on delay during the weekday a.m. and p.m. peak hours under the 2021 future background conditions, as compared to the 2016 future background conditions. Intersections, such as Dundas Street West/Avenue Two intersection are forecast to operate at slightly better Levels of Service (LOS), which can be attributed to the planned Dundas Street widening from four-lane to six-lanes, as well as some diversion of traffic from Dundas Street West to Burnhamthorpe Road.

Both the Dundas Street West/Bronte Road and Dundas Street West/Tremaine Road intersections are forecast to operate at LOS 'F' during the weekday p.m. peak hour under the 2021 future background conditions, with critical movements operating over capacity. To improve the traffic operations at these intersections, the following road improvements are recommended for 2021 horizon:

For Dundas Street West/Bronte Road intersection:

- Addition of an exclusive westbound right turn lane
- Conversion of the existing single southbound left turn lane to double left turn lane

For Dundas Street West/Tremaine Road intersection:

- Conversion of the existing southbound right-turn lane to a channelized configuration.
- Addition of a receiving taper lane at the westerly leg of the intersection to allow the southbound right-turn traffic to operate under free flow operations and merge into the westbound through traffic lane

These improvements may be implemented at the same time as the Region planned Dundas Street widening between Bronte Road and Tremaine Road. With these improvements in place, the intersections are expected to operate at LOS 'D' during the weekday a.m. and p.m. peak hours.

It is acknowledged that some individual movements at the Dundas Street West/Bronte Road intersection during the weekday a.m. peak hour, and some critical movements at Dundas Street West/Bronte Road, Dundas Street West/Avenue Two, and Dundas Street West/Tremaine Road intersections during the weekday p.m. peak hour are forecast to continue to operate slightly over capacity, with the recommended improvements in place.

All the other boundary roadway intersections and intersections within the 407 West Employment Lands are forecast to operate at good levels of service (LOS 'C' or better), based on delay.

7.0 Future Total Traffic Conditions (2016 and 2021)

7.1 Basis of Assessment

The future total traffic conditions for 2016 and 2021 horizons were estimated by superimposing the site generated traffic volumes illustrated in Figures 8A through 8B onto the future background traffic volumes illustrated in Figures 11 and 14. The resulting total traffic forecasts for the weekday a.m. and p.m. peak hours are illustrated in Figures 15A through 15B for the 2016 and 2021 horizons, respectively.

7.2 Future Total Traffic Intersection Operations

The future total traffic conditions for the two horizon years (i.e., 2016 and 2021) were analyzed on the basis of the future total traffic volumes illustrated in Figures 15A through 15B. The resulting Levels of Service are detailed in Tables 7.1A through 7.1B. The details related to the future total operations are provided in Appendix D.

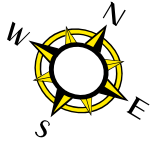
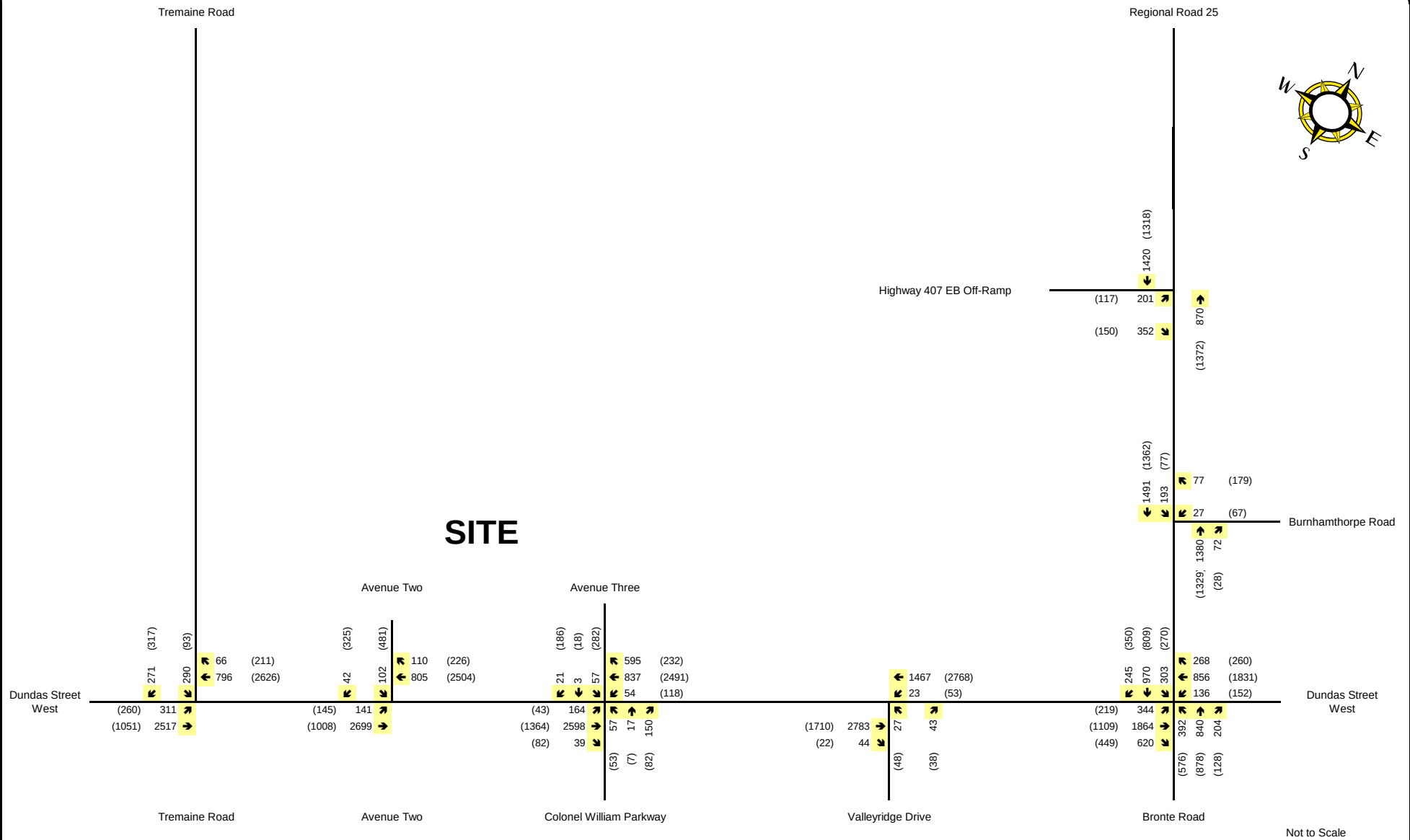
Table 7.1A - Intersection Levels of Service Based on 2016 Future Total Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road ⁽¹⁾	Signalized	D (44.5) [0.95]	EB-L (1.10) EB-T (0.94) NB-L (1.01) SB-L (1.11) SB-T (0.87)	E (66.5) [0.97]	EB-L (0.92) WB-TR (1.15) NB-L (1.10)
Dundas Street West/ Valleyridge Drive ⁽¹⁾	Signalized	A (2.7) [0.64]	-	A (4.3) [0.61]	-
Dundas Street West/ Colonel William Parkway/ Avenue Three ⁽¹⁾	Signalized	B (13.9) [0.87]	EB-T (1.01)	E (63.7) [1.01]	WB-T (1.19)
Dundas Street West/ Avenue Two ⁽¹⁾	Signalized	E (65.2) [0.82]	EB-T (1.15)	E (56.7) [0.97]	WB-T (1.17)
Dundas Street West/ Tremaine Road ⁽¹⁾	Signalized	C (31.2) [0.95]	EB-T (1.01)	D (51.7) [1.03]	EB-L (0.99) WB-T (1.13)
Bronte Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	A (5.7) [0.62]	-	A (8.3) [0.49]	-
Bronte Road/Highway 407 Eastbound Off-Ramp ⁽¹⁾	Signalized	B (14.5) [0.68]	-	A (8.0) [0.46]	-

⁽¹⁾ For signalized intersections, levels of service are based on the overall intersection delay.

Note: The LOS results are based on HCM2000 output.

SITE



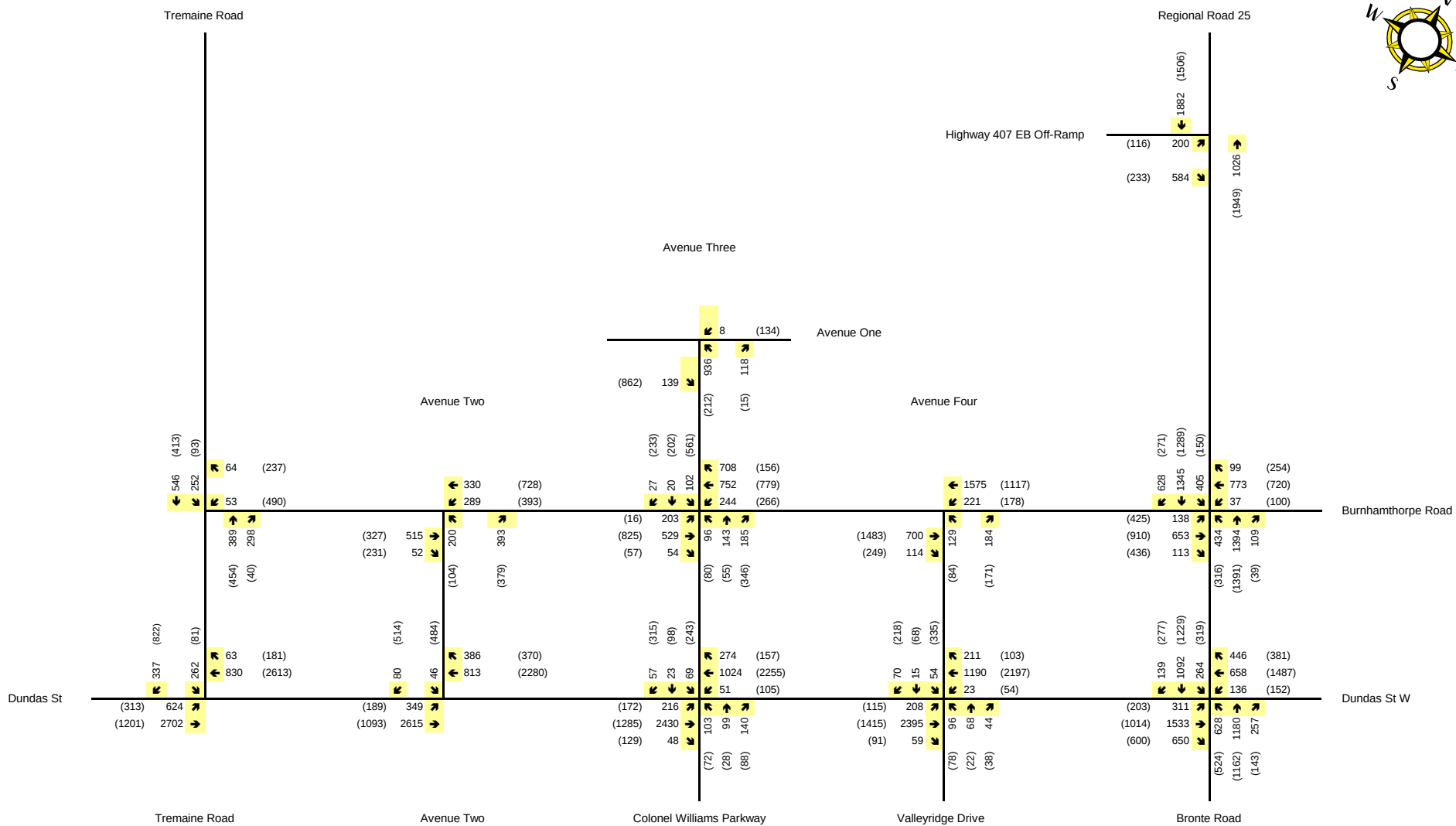
Not to Scale



LEGEND

- XX A.M. Peak Hour Volumes
- (XX) P.M. Peak Hour Volumes

FIGURE 15A
2016 Future Total Traffic Volumes



LEGEND
 XX A.M. Peak Hour Volumes
 (XX) P.M. Peak Hour Volumes

FIGURE 15B
 2021 Future Total Traffic Volumes

As indicated in Table 7.1A, on the basis of the 2016 future total traffic forecasts the boundary roadways intersections are expected to continue to operate at similar overall levels of service based on delay, as compared to the 2016 future background conditions, with the exception of Dundas Street West/Bronte Road, Dundas Street West/Avenue Three, and Dundas Street West/Avenue Two intersections. It is acknowledged that some individual movements at many of the intersections are forecast to continue to operate close to, or over capacity.

Similar to the 2016 future background conditions, majority of these critical movements are associated with the peak direction traffic along Dundas Street West. The planned Dundas Street West widening in the study area (construction currently scheduled to commence in 2017) is clearly needed to address area roadway capacity constraints. Provision of an exclusive westbound right-turn lane at the Dundas Street West/Bronte Road intersection would improve the forecast v/c ratio of the westbound through and right-turn movements to below 1.0.

Table 7.1B - Intersection Levels of Service Based on 2021 Future Total Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road – Without Intersection Improvement ⁽¹⁾	Signalized	E (69.9) [1.14]	EB-L (1.59) EB-T (1.12) WB-TR (0.90) NB-L (1.04) SB-L (1.11) SB-T (0.91)	F (81.7) [1.16]	EB-L (1.05) WB-TR (1.16) NB-L (1.40) NB-T (0.93) SB-L (1.27) SB-T (1.02)
Dundas Street West/ Bronte Road – With Intersection Improvement (WB-R, and Double SB-L) ⁽¹⁾	Signalized	E (56.7) [1.02]	EB-L (1.07) EB-T (1.09) NB-L (1.09) SB-T (0.91)	D (51.3) [1.05]	EB-L (1.04) WB-T (1.02) NB-L (1.02) SB-T (1.02)
Dundas Street West/ Valleyridge Drive/ Avenue Four ⁽¹⁾	Signalized	C (21.1) [0.79]	-	C (22.3) [0.85]	WB-T (0.97)
Dundas Street West/ Colonel William Parkway/ Avenue Three ⁽¹⁾	Signalized	B (19.2) [0.80]	EB-T (0.93)	C (34.6) [0.95]	WB-T (0.97) SB-L (0.86)
Dundas Street West/ Avenue Two ⁽¹⁾	Signalized	C (32.7) [0.73]	EB-T (0.98)	D (36.0) [0.95]	EB-L (0.94) WB-T (1.00) SB-L (0.91) SB-R (0.86)
Dundas Street West/ Tremaine Road ⁽¹⁾ Without Intersection Improvement ⁽¹⁾	Signalized	C (22.8) [0.89]	EB-L (0.86) EB-T (0.90)	F (110.0) [1.29]	WB-T (1.14) SB-R (1.66)

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Tremaine Road ⁽¹⁾ With Intersection Improvement (SB-R) ⁽¹⁾	Signalized	C (22.7) [0.89]	EB-L (0.86) EB-T (0.90)	D (51.7) [0.93]	WB-T (1.12)
Bronte Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	D (54.6) [0.97]	WB-T (0.93) NB-L (0.97) NB-T (0.93) SB-L (0.97) SB-T (0.93) SB-R (0.91)	D (46.0) [0.98]	EB-L (0.97) NB-L (1.01) NB-T (0.96) SB-T (1.05)
Bronte Road/Highway 407 Eastbound Off-Ramp ⁽¹⁾	Signalized	C (27.1) [0.95]	EB-R (0.95) SB-T (0.95)	B (10.2) [0.59]	-
Tremaine Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	A (8.0) [0.48]	-	C (26.2) [0.64]	-
Burnhamthorpe Road/ Avenue Four ⁽¹⁾	Signalized	B (11.6) [0.63]	-	B (15.2) [0.74]	EB-T (0.85)
Burnhamthorpe Road/ Avenue Three ⁽¹⁾	Signalized	C (27.8) [0.50]	-	D (36.9) [0.97]	EB-TR (0.92) WB-L (0.92) SB-L (0.97)
Burnhamthorpe Road/ Avenue Two ⁽¹⁾	Signalized	B (17.8) [0.55]	-	B (15.7) [0.54]	-
Avenue One/ Avenue Three ⁽²⁾	Stop- Controlled	E (40.1)	NB-L (0.96)	B (13.6)	NB-L (0.34)

(1) For signalized intersections, levels of service are based on the overall intersection delay.

(2) For two-way stop controlled intersections, the level of service is based on delay associated with the critical movement.

Note: The LOS results are based on HCM2000 output.

As indicated in Table 7.1B, most intersections which were analyzed are expected to continue to operate at similar levels of service as compared to the 2021 future background traffic conditions during the a.m. and p.m. peak hour. It is acknowledged that some movements at these intersections are forecast to operate over capacity.

Similar to the 2021 future background traffic conditions, both Dundas Street West/Bronte Road and Dundas Street West/Tremaine Road intersections are forecast to operate at LOS 'F' during the p.m. peak hour under 2021 future total traffic conditions without any intersection improvements. With the proposed intersection improvements, the intersections are expected to operate at acceptable LOS 'E' or better during the a.m. and p.m. peak hour.

Some individual movements at the Dundas Street West/Bronte Road intersection during the weekday a.m. peak hour, and some critical movements at Dundas Street West/Bronte Road, Bronte Road/Burnhamthorpe Road, Dundas Street West/Avenue Two, and Dundas Street West/Tremaine Road intersections during the weekday p.m. peak hour are forecast to continue to operate over capacity, with the recommended improvements in place.

8.0 Future Total Traffic Conditions (2031)

As noted, Subject Property is expected to be fully built-out and occupied by 2021. The remainder of the 407 West Employment Area is expected to be built-out over the following ten years (i.e., by 2031). Thus, 2031 total traffic conditions have been assessed to identify the impacts of development within the 407 West Employment Area beyond the Subject Property. For this long-term development horizon, a 20 percent non-auto modal split was assumed for all developments within the 407 West Employment Area and a 20 percent reduction was applied to trip generation associated with the developments.

8.1.1 Future Through Traffic Growth (2031)

No growth has been assumed for Dundas Street West beyond 2016. Similarly, no growth has been assumed for Bronte Road and Tremaine Road beyond 2021. Thus, the future through traffic growth for Horizon 2031 has been assumed to be the same as that for 2021, as shown in Figure 12.

8.1.2 Traffic Increases Related to Other Developments (2031)

Other developments in the vicinity of the property have been included in the background traffic forecasts for 2031 horizon, including those reflected in the 2021 background traffic conditions, the Tremaine and Dundas Secondary Plan area, as well as the assumed Phase 3 developments within the 407 West Employment Area.

Tremaine and Dundas Secondary Plan Area

The Tremaine and Dundas Secondary Plan area is located on the west side of Tremaine Road, in the City of Burlington. The traffic impact related to the lands within the Tremaine and Dundas Secondary Plan area was studied in the Tremaine and Dundas Secondary Plan Transportation Report prepared by Dillon Consulting Limited in September 2009.

As noted in the Dillon report, the development timeframe of the Tremaine and Dundas Secondary Plan area is uncertain. However, the traffic related to the potential developments in the Tremaine and Dundas Secondary Plan and roadway connections onto Tremaine Road detailed in the Dillon report have been included in this study. This represents a conservative approach. Three land use concepts were considered in the Dillon report. Mixed use represented a more aggressive option, which would generate the most traffic.

Thus, the traffic increases related to the potential developments in the Tremaine and Dundas Secondary Plan area based on the mixed use option examined in the September 2009, Dillon report were reflected in the 2031 future traffic forecasts.

Other Developments within the 407 West Employment Area (2031)

The trip generation approach applied to other developments within the 407 West Employment Area under Phase 3 is similar to that for Phase 1 and 2.

A 20 percent reduction is applied to the trip generation rates related to the office uses under Phase 3 to reflect the increased non-auto modal split as a result of better transit usage and TDM initiatives.

Table 8.1 summarizes the resulting trip generation related to other developments within the 407 West Employment Area under Phase 3.

Table 8.1 - Resulting Trip Generation Related to Other Developments within the 407 West Employment Area (Phase 1, 2 and 3 - 2031 Horizon)

Blocks	Trip Generation (Vehicle Trips)					
	Weekday AM Peak Hour			Weekday PM Peak Hour*		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Other 407 West Employment Area Developments (Phase 1, 2, and 3)	3,560	697	4,257	1,238	3,408	4,646

**Does not include 416 inbound/416 outbound pass-by trips.*

Figure 16 illustrates the traffic generated by all background developments considered under Horizon 2031 during the weekday a.m. and p.m. peak hours, including traffic associated with Phase 1 to 3 developments within the 407 West Employment Area, assuming the boundary road network as indicated in Figure 7 by 2031.

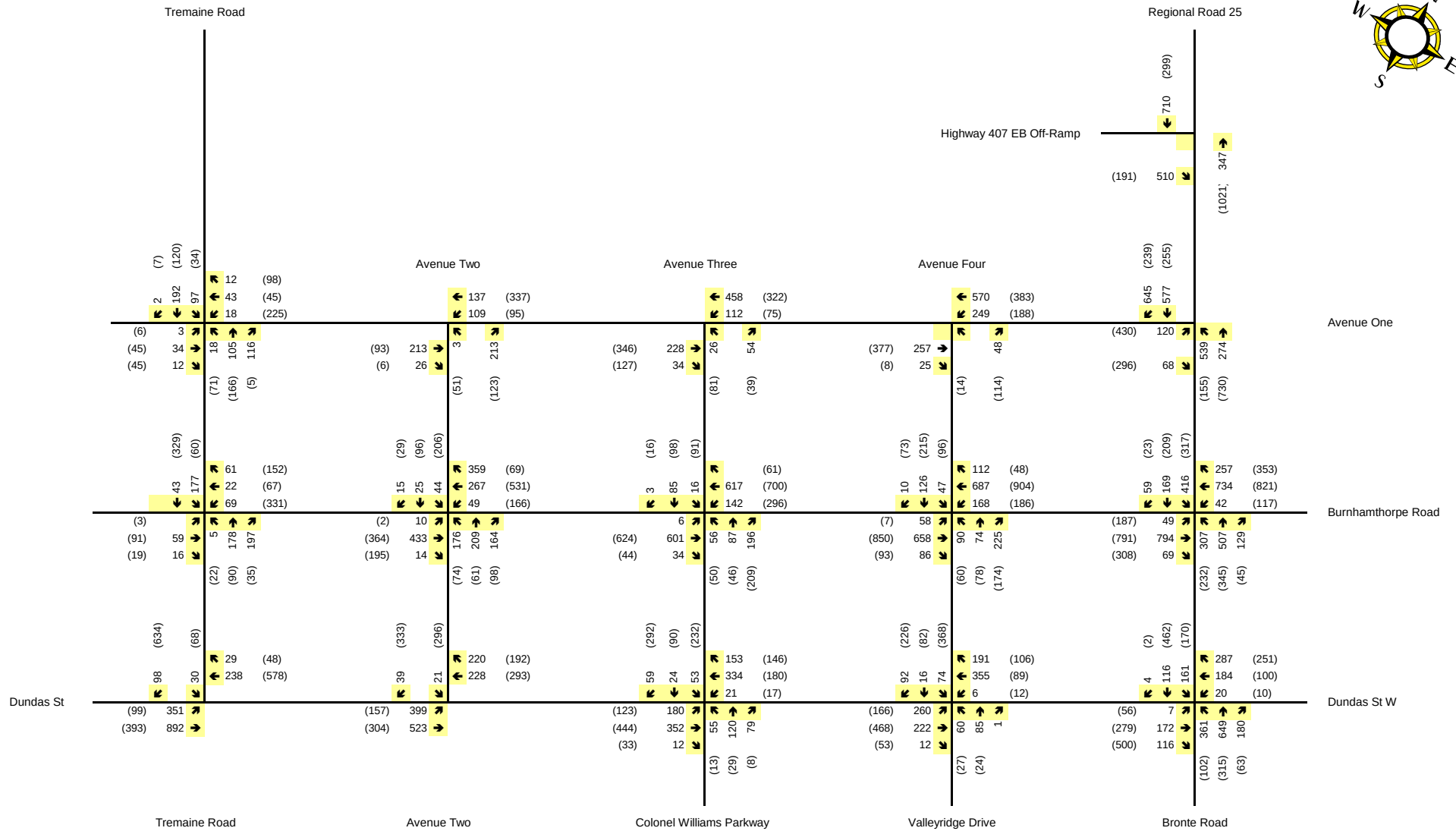
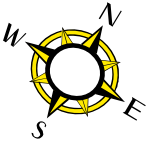
8.1.3 Future Traffic Conditions (2031)

The 2031 future total traffic were developed by superimposing the general through traffic growth indicated in Figure 12, the traffic increases related to the other developments as indicated in Figure 16, as well as the site generated traffic in 2031 horizon as indicated in Figure 8C onto the respective existing traffic volumes indicated in Figure 4.

Figure 17 illustrates the resulting 2031 future total traffic volumes during the weekday a.m. and p.m. peak hours.

The 2031 future total traffic were then analyzed on the basis of the 2031 total traffic volumes illustrated in Figure 17 for the weekday a.m. and p.m. peak hours. The resulting levels of service are outlined in Table 8.2.

Based on discussions with Halton Region, the two additional lanes after Dundas Street widening in 2019 will initially be used as HOV lanes and are expected to become dedicated BRT lanes in 2031. It is our understanding that the conversion of HOV lanes to BRT lanes will be subject to future transit ridership, as



Not to Scale



LEGEND

XX A.M. Peak Hour Volumes
(XX) P.M. Peak Hour Volumes

FIGURE 16
Other Developments in 2031
Background Traffic Volumes

well as planning and operation of local transit authorities. Thus, two lane configuration scenarios were considered for the operations of the boundary intersections along Dundas Street: Scenario 1 – HOV lane, and Scenario 2 – BRT lane. Under Scenario 2, the two additional lanes are reserved for buses only, and the remaining two lanes in each direction are available for both general purpose and high-occupancy vehicular traffic along Dundas Street West.

As noted, the traffic signal timings for key intersections during the a.m. and p.m. peak hours have been adjusted to optimize the intersections, while the cycle lengths remain the same.

Table 8.2 - Intersection Levels of Service Based on 2031 Future Total Traffic Volumes

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Bronte Road ⁽¹⁾	Signalized (Scenario 1: HOV)	E (71.1) [1.13]	EB-L (1.15) EB-T (1.14) EB-R (0.89) WB-R (0.90) NB-L (1.09) NB-T (1.04) SB-L (1.19) SB-T (0.93)	E (69.5) [1.11]	EB-R (1.11) WB-T (1.05) NB-L (1.10) NB-T (0.93) SB-L (1.06) SB-T (1.14)
	Signalized (Scenario 2: BRT)	F (81.6) [1.18]	EB-L (1.09) EB-T (1.28) EB-R (0.89) WB-R (0.90) NB-L (1.09) NB-T (1.04) SB-L (1.19) SB-T (0.93)	E (79.7) [1.17]	EB-T (0.88) EB-R (1.11) WB-T (1.18) NB-L (1.10) NB-T (0.93) SB-L (1.06) SB-T (1.14)
Dundas Street West/ Valleyridge Drive/ Avenue Four ⁽¹⁾	Signalized (Scenario 1: HOV)	C (24.2) [0.83]	EB-TR (0.88)	D (41.6) [0.95]	WB-T (1.07) SB-L (0.99)
	Signalized (Scenario 2: BRT)	C (26.0) [0.89]	EB-TR (0.95)	E (66.9) [1.03]	WB-T (1.20) SB-L (0.99)
Dundas Street West/ Colonel William Parkway/ Avenue Three ⁽¹⁾	Signalized (Scenario 1: HOV)	B (17.4) [0.84]	EB-T (0.88)	E (57.1) [1.06]	WB-T (1.09) SB-L (1.04)
	Signalized (Scenario 2: BRT)	C (20.3) [0.93]	EB-T (0.99)	F (82.3) [1.14]	WB-T (1.22) SB-L (1.04)

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Dundas Street West/ Avenue Two ⁽¹⁾	Signalized (Scenario 1: HOV)	D (40.8) [0.75]	EB-L (0.94) EB-T (1.02)	E (57.8) [1.08]	EB-L (1.09) WB-T (1.09) SB-L (0.98) SB-R (1.03)
	Signalized (Scenario 2: BRT)	E (71.1) [0.84]	EB-L (0.94) EB-T (1.15)	F (82.7) [1.17]	EB-L (1.16) WB-T (1.20) SB-L (0.98) SB-R (1.06)
Dundas Street West/ Tremaine Road ⁽¹⁾	Signalized (Scenario 1: HOV)	D (37.0) [0.96]	EB-L (0.99) EB-T (1.02)	E (59.1) [1.06]	EB-L (0.94) WB-T (1.17)
	Signalized (Scenario 2: BRT)	E (65.2) [1.06]	EB-L (0.99) EB-T (1.15)	F (89.3) [1.15]	EB-L (0.94) WB-T (1.32)
Bronte Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	E (63.9) [1.15]	EB-L (1.13) EB-T (0.94) WB-T (1.03) NB-L (1.02) NB-T (1.11) SB-L (1.13) SB-T (0.88)	E (57.0) [1.06]	EB-L (1.02) EB-T (1.01) WB-T (0.97) NB-L (0.99) NB-T (0.99) SB-L (1.02) SB-T (0.95)
Bronte Road/ Avenue One ⁽¹⁾	Signalized	E (68.1) [1.10]	NB-L (1.16) SB-T (1.15) SB-R (0.92)	D (39.8) [0.99]	EB-L (0.97) NB-L (0.94) NB-T (0.96) SB-T (0.93)
Bronte Road/Highway 407 Eastbound Off-Ramp - Without Intersection Improvement ⁽¹⁾	Signalized	E (72.1) [1.17]	EB-R (1.27) SB-T (1.10)	B (15.9) [0.74]	-
Bronte Road/Highway 407 Eastbound Off-Ramp - With Intersection Improvement (Eastbound Shared Left- Right Lane) ⁽¹⁾	Signalized	C (22.3) [0.92]	EB-LR (0.85) EB-R (0.93) SB-T (0.92)	B (11.1) [0.63]	-
Tremaine Road/ Burnhamthorpe Road ⁽¹⁾	Signalized	B (10.6) [0.63]	-	C (34.3) [0.83]	WB-L (0.99)
Tremaine Road/ Avenue One ⁽¹⁾	Signalized	A (7.4) [0.49]	-	C (22.8) [0.72]	WB-L (0.88)

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)	LOS (delay in seconds) [v/c]	Critical Movement(s) (v/c)
Burnhamthorpe Road/ Avenue Four ⁽¹⁾	Signalized	B (19.7) [0.51]	-	C (20.8) [0.71]	EB-T (0.93) WB-L (0.93)
Burnhamthorpe Road/ Avenue Three ⁽¹⁾	Signalized	C (22.4) [0.52]	-	C (29.9) [0.96]	EB-T (0.92) WB-L (0.92) SB-L (0.92)
Burnhamthorpe Road/ Avenue Two ⁽¹⁾	Signalized	C (24.5) [0.48]	-	C (23.5) [0.60]	-
Avenue One/ Avenue Four ⁽²⁾	Signalized	B (10.9) [0.77]	-	B (13.1) [0.48]	-
Avenue One/ Avenue Three ⁽¹⁾	Signalized	C (27.4) [0.81]	WB-T (0.86)	B (14.1) [0.52]	-
Avenue One/ Avenue Two ⁽²⁾	Signalized	C (27.0) [0.35]	-	B (12.1) [0.39]	-

(1) For signalized intersections, levels of service are based on the overall intersection delay.

Note: The LOS results are based on HCM2000 output.

Similar to the 2021 future total traffic conditions, the capacity analyses indicate that all the boundary road intersections are forecast to operate at Levels of Service 'E' or better during the roadway a.m. and p.m. peak hours under Scenario 1 (HOV lanes along Dundas Street West). Under Scenario 2, when two lanes along Dundas Street West are dedicated for bus use only, the boundary intersections along Dundas Street West are forecast to operate at Levels of Service 'C' to 'E' during the a.m. peak hour, and at Levels of Service 'E' to 'F' during the p.m. peak hour.

It is acknowledged that some individual movements at the intersections along Dundas Street West are forecast to continue to operate close to, or over capacity under both Scenarios. Some individual movements at the intersections along Bronte Road are also forecast to operate close to, or over capacity.

The Bronte Road/Highway 407 Eastbound Off-Ramp intersection is forecast to operate with critical movements that are over-capacity during the weekday a.m. peak hour. Currently, the intersection has two left-turn lanes and one right-turn lane in the eastbound direction. To accommodate the anticipated traffic related to potential developments in the area south of Highway 407, it is recommended that the lane configurations be modified to one left-turn lane, one shared left/right lane, and one right-turn lane in the eastbound direction. No changes are proposed to the lane configurations related to the other approaches.

With the proposed intersection improvement, the intersection is expected to operate at a highly acceptable LOS 'C', with all critical movements operating within capacity.

It should be noted that the current assessment only includes road improvements which were identified in the Halton Region Capital Projects (2012-2021). It is expected that more road improvements will be identified beyond 2021 to accommodate the potential traffic growth within the Region in the future.

Moreover, the road network within the NOWSP area is intended to reflect the principles of continuity and connectivity of roads. These principles are viewed as key elements of the secondary plan. A network of roads, with direct connections to existing roads, provides an efficient way for future workers to travel, whether by automobile, transit, walking or cycling.

Furthermore, a 20 percent modal split has been applied to the office uses in the trip generation calculation under the 2031 horizon year. However, it is conceivable that higher transit use would be achieved with the full implementation of high-order transit in the Dundas Street corridor, as envisioned in Metrolinx' the Big Move, and the protected Highway 407 Transitway along the south side of existing Highway 407. With high-frequency BRT or equivalent services operating in these corridors and connecting to a network of high-order transit providing convenient and attractive transit between North Oakville and adjacent urban areas of the Region and surroundings, it is possible that even more people could choose to use transit as congestion and delays on area roads and highways continue to increase. The details related to the future transit service are discussed in Section 9.0.

8.2 Signal Warrants for Internal Intersections

Signal warrants have been undertaken for internal intersections in the West Employment Lands on the basis of the forecast 2031 future total traffic volumes and the Ontario Traffic Manual Book 12 methodology (Justification 7 – Projected Volumes). Details of the signal warrants are provided in **Appendix E**. The signal warrant results are summarized in Table 8.3.

Table 8.3- Signal Warrant Summary

Intersection	Justification 1 (Minimum Vehicular Volume)	Justification 2 (Delay to Cross Traffic)	Signal Warranted
Burnhamthorpe Road/ Avenue Two	90%	54%	Not Warranted
Burnhamthorpe Road/ Avenue Three	100%	79%	Warranted
Burnhamthorpe Road/ Avenue Four	100%	93%	Warranted
Avenue One/ Avenue Two	39%	13%	Not Warranted
Avenue One/ Avenue Three	46%	77%	Not Warranted
Avenue One/ Avenue Four	14%	39%	Not Warranted

As indicated, signals are warranted for both Burnhamthorpe Road/Avenue Three and Burnhamthorpe Road/Avenue Four intersections.

For the other internal intersections, intersection operation analysis was undertaken based on all-way stop control. Table 8.4 summarizes the results.

Table 8.4 - Intersection Levels of Service Based on 2031 Future Total Traffic Volumes and All-Way Stop Control

Intersection	Control Type	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		LOS (delay in seconds)	Critical Movement(s) (v/c)	LOS (delay in seconds)	Critical Movement(s) (v/c)
Burnhamthorpe Road/ Avenue Two ⁽¹⁾	AWSC	F (104.7)	-	F (106.7)	-
Avenue One/ Avenue Two	AWSC	C (15.4)	-	C (17.1)	-
Avenue One/ Avenue Three	AWSC	F (202.1)	-	F (52.0)	-
Avenue One/ Avenue Four	AWSC	F (193.3)	-	F (51.5)	-

(1) Due to the limitation of Synchro software, the Burnhamthorpe Road/Avenue Two intersection was assumed to have one shared left/through lane and one shared through/right lane for the eastbound and westbound approaches, and one left-turn lane and one shared through/right lane for the northbound and southbound approaches in the analysis. The analysis results represent a conservative assessment.

As shown, most intersections are expected to operate at LOS 'F' under all-way stop control. Even though signal is not warranted for these other internal intersections, it is recommended that these intersections be protected for signalization.

8.3 Lane Configurations for Internal Intersections

The lane configurations for the six (6) internal intersections as indicated in Figures 7 were developed based on left-turn warrant and right-turn warrant criteria in the Geometric Design Standards for Ontario Highways, as well as the North Oakville Terms of Reference for Transportation Functional Design Studies.

Left-Turn Lane Warrants

According to the Section E.9 of the Geometric Design Standards for Ontario Highways, the left-turn lane requirements are determined based on 1) Volume warrants; and 2) Accident warrants. For future roadway intersections, the volume warrants are used. For a roadway with a two-lane crossing section, such as the Avenues, volume warrant for a left-turn lane is determined on the basis of the design speed, turning, advancing, and opposing design hour volumes at the subject intersection. For a roadway with a four-lane cross-section, such as Burnhamthorpe Road, volume warrant for a left-turn lane is determined based on turning, and opposing design hour volumes.

The details of the left-turn lane warrants for the internal intersections were provided in Appendix F.

Right-Turn Lane Warrants

According to the Section E.7.2 of the Geometric Design Standards for Ontario Highways, the right-turn lane may be considered when right turning traffic volumes for the design hour is 60 vehicles per hour or more. The North Oakville Terms of Reference for Transportation Functional Design Studies also states that right-turn lanes at signalized intersections where the traffic volume of right-turning traffic will exceed ten percent of the approaching volume. Thus, right-turn lane is considered warranted for the internal intersections when both criteria are met. The details of the right-turn lane warrants for the internal intersections were provided in Appendix F.

Storage Length Requirements

Queue lengths forecasts for the turn lanes at the internal intersections, as well as the boundary roadway intersections have been estimated on the basis of the 95th percentile queue from the Synchro analysis for 2031 future total traffic conditions. Table 8.5 summarizes the queuing assessment and the proposed required storage length for the turn lanes.

Table 8.5- Queuing Assessment and Proposed Turn Lane Storage Length Required

Intersection	Lane	95 th Percentile		Minimum Storage Length
		Weekday AM Peak Hour	Weekday PM Peak Hour	
Dundas Street West/ Avenue Four	EB-L	52 m	48 m	55 m
	WB-L	< 1 vehicle length	< 1 vehicle length	15 m
	WB-R	11 m	< 1 vehicle length	15 m
	NB-L	43 m	34 m	45 m
	SB-L	19 m	90 m	90 m
Dundas Street West/ Avenue Three	EB-L	< 1 vehicle length	27 m	30 m
	EB-R	< 1 vehicle length	14 m	15 m
	WB-L	15 m	20 m	20 m
	WB-R	54 m	10 m	55 m
	NB-L	41 m	23 m	45 m
	NB-R	20 m	11 m	20 m
	SB-L	24 m	135 m	135 m
	SB-R	11 m	64 m	65 m
Dundas Street West/ Avenue Two	EB-L	130 m	95 m	130 m
	WB-R	89 m	22 m	90 m
	SB-L	18 m	181 m	185 m
Bronte Road/ Burnhamthorpe Road	EB-L	49 m	97 m	100 m
	EB-R	25 m	138 m	140 m
	WB-L	29 m	31 m	35 m
	WB-R	79 m	78 m	80 m
	NB-L	96 m	89 m	100 m
	NB-R	9 m	< 1 vehicle length	15 m
	SB-L	82 m	97 m	100 m
	SB-R	< 1 vehicle length	< 1 vehicle length	15 m

Intersection	Lane	95 th Percentile		Minimum Storage Length
		Weekday AM Peak Hour	Weekday PM Peak Hour	
Burnhamthorpe Road/ Avenue Four	EB-L	21 m	< 1 vehicle length	25 m
	EB-R	19 m	12 m	20 m
	WB-L	39 m	39 m	40 m
	NB-L	24 m	18 m	25 m
	NB-R	26 m	15 m	30 m
	SB-L	15 m	33 m	35 m
	SB-R	< 1 vehicle length	< 1 vehicle length	15 m
Burnhamthorpe Road/ Avenue Three	EB-L	< 1 vehicle length	14 m	15 m
	WB-L	45 m	72 m	75 m
	WB-R	20 m	< 1 vehicle length	20 m
	NB-L	28 m	20 m	30 m
	NB-R	17 m	15 m	20 m
	SB-L	24 m	98 m	100 m
Burnhamthorpe Road/ Avenue Two ⁽¹⁾	EB-L	< 1 vehicle length	< 1 vehicle length	15 m
	EB-R	< 1 vehicle length	14 m	15 m
	WB-L	43 m	80 m	80 m
	WB-R	58 m	16 m	60 m
	NB-L	37 m	21 m	40 m
	NB-R	21 m	17 m	25 m
	SB-L	31 m	46 m	50 m
Tremaine Road/ Burnhamthorpe Road	EB-L	< 1 vehicle length	< 1 vehicle length	15 m
	WB-L	24 m	100.0 m	100 m
	NB-L	< 1 vehicle length	< 1 vehicle length	15 m
	SB-L	14 m	< 1 vehicle length	15 m
Bronte Road/ Avenue One	EB-L	56 m	227 m	230 m
	NB-L	205 m	44 m	205 m
	SB-R	227 m	17 m	230 m
Avenue One/ Avenue Four	WB-L	23 m	23 m	25 m
	NB-L	11 m	7 m	15 m
Avenue One/ Avenue Three	EB-R	< 1 vehicle length	22 m	25 m
	WB-L	23 m	29 m	30 m
	NB-L	50 m	41 m	50 m
Avenue One/ Avenue Two	WB-L	12 m	14 m	15m
	NB-L	< 1 vehicle length	19 m	20 m
Tremaine Road/ Avenue One	EB-L	< 1 vehicle length	< 1 vehicle length	15 m
	WB-L	12 m	100 m	100 m
	NB-L	< 1 vehicle length	9 m	15 m
	SB-L	15 m	12 m	15 m

9.0 Transit

9.1 Town's Transit-First Planning Approach

Transit is being promoted as an integral part of the transportation and land use plans for the North Oakville Secondary Plan areas. As part of the North Oakville West Secondary Plan (NOWSP) area, the proposed development is subject to the Town's Transit-First planning approach being promoted for North Oakville.

As a basic premise of the Transit-First planning approach, the transportation network and corridor designs reflect a desire for an increased reliance and priority on transit in the future. The early introduction of transit services and the need for transit to provide a viable travel alternative at all stages of development is a fundamental element of the transportation policies and network in North Oakville.

Transit-First's emphasis is aimed at capturing transit ridership prior to people in new development areas establishing travel habits that rely solely on the automobile.

Transit-First has the benefit of being environmentally friendly and supporting land use intensification and reduced roadway rights-of-way from the very onset of development, which promotes the fundamental objective of environmental sustainability.

9.2 Transit Service Concept

9.2.1 *Inter-regional Transit Corridors*

The transit network and hierarchy of services in the Town's NOWSP reflect the anticipated intensity and mix of uses in corridors and utilize the continuous and connected grid network of planned roads. At the top of this hierarchy is the GO Rail service, meeting the needs of the inter-regional traveler. Currently focused primarily on the commuter trip to Toronto, increasing levels of service, including reverse flow trips will make GO Rail an effective choice for a wider range of inter-regional travel, including midday trips, trips to the eastern GTA, as well as Burlington and Hamilton.

GO Transit is continually expanding its inter-regional bus network to serve demands, and expanded services in the Highway 407 and Highway 403 corridors will eventually lead to the development of bus rapid transit (BRT) services with high-frequency connections to the rest of the GTA.

In addition, there is a 407 GO bus service that currently serves a park and ride stop at the Highway 407 interchange with Bronte Road. In the future, the planned Highway 407 Transitway along the south side of the existing Highway 407 will provide high-frequency BRT adjacent to the property. As part of the development of the Highway 407 Transitway, a planned Transitway station is to be located in the southeast quadrant of Highway 407 and Bronte Road, in close proximity of the property. It is anticipated that GO Transit and Oakville Transit routes will serve this terminal.

9.2.2 *Town Services*

Within Oakville, future transit services are designed to be implemented in two layers: corridor services, comprising Primary and Secondary Corridors, and Community Services.

These transit services are intended to provide connections to terminals, major destinations, and neighbourhoods. This is intended to make travel by transit convenient and attractive and thus maximize the ability of residents and employees to use transit.

Corridor services provide the basic grid of the service, including inter-municipal connections and connections to the inter-regional network of transit services. Primary and secondary corridors are distinguished by the level of service they offer.

Primary Transit Corridors

Primary Transit Corridor services provide high-frequency service connections within Oakville, as well as inter-municipal connections and connections to the inter-regional network of services. Transit service in the Primary Transit Corridors is ultimately expected to operate in the range of 2 to 5 minutes, with initial service frequencies of 3 to 10 minutes. To ensure that services in these Primary Corridors operate with minimum delay, additional infrastructure will be used to provide transit priority. This will include Reserved Bus Lanes (RBL) and High Occupancy Vehicle (HOV) lanes and transit priority measures at intersections, including possible signal priority measures and queue-jump lanes.

Dundas Street within the Town is identified as a Primary Transit Corridor and is identified in the Metrolinx 15-year plan as a potential rapid transit corridor. Dundas Street is envisioned to transform over time from the introduction of HOV lanes to RBLs, ultimately. In accordance with the Oakville Transit's current Service Design Standards, minimum peak service frequency is anticipated to be in the range of 10 to 20 minutes.

Secondary Transit Corridors

Secondary Transit Corridors are similar to the Primary Transit Corridors in that they provide a high level of service, operate on the grid network of streets and provide cross-boundary connections. Ultimately, Secondary Corridors are expected to have service levels in the 10- to 15-minute range.

In the vicinity of the proposed development, Bronte Road and Burnhamthorpe Road, east of Bronte Road, are identified as Secondary Transit Corridors. In accordance with the Oakville Transit's current Service Design Standards, minimum peak service frequency is anticipated to be in the range of 20 to 40 minutes.

In addition to planned service levels, the Town's standard designs for transit streets - Arterials, Avenues and Connectors - have been developed specifically to accommodate the function and frequency of the transit service that is planned. Therefore, planned roadway facilities in these corridors appropriately reflect the anticipated transit types and service levels in the corridors.

Community Services

Community, or local, services are planned to operate on the interconnected and continuous grid network of planned roads. Local services provide the highest degree of local access. Routes are expected to operate at levels of service between 15 and 30 minutes. These routes are intended to provide direct access to lower demand areas, and are expected to operate on the network of arterial, avenue and connector roads. Riders will use these routes to access local destinations and as connections to the corridor routes for longer distance trips.

Within the subject property, Burnhamthorpe Road and Avenue One, between Bronte Road and Tremaine Road, and Avenue Two, Avenue Three and Avenue Four, between Dundas Street and Avenue One, are intended to accommodate Community Services, in accordance with the NOWSP. In accordance with the Oakville Transit's current Service Design Standards, minimum peak service frequency is anticipated to be in the range of 20 to 60 minutes.

The proposed transit services serving the subject property are shown in Figure 18.

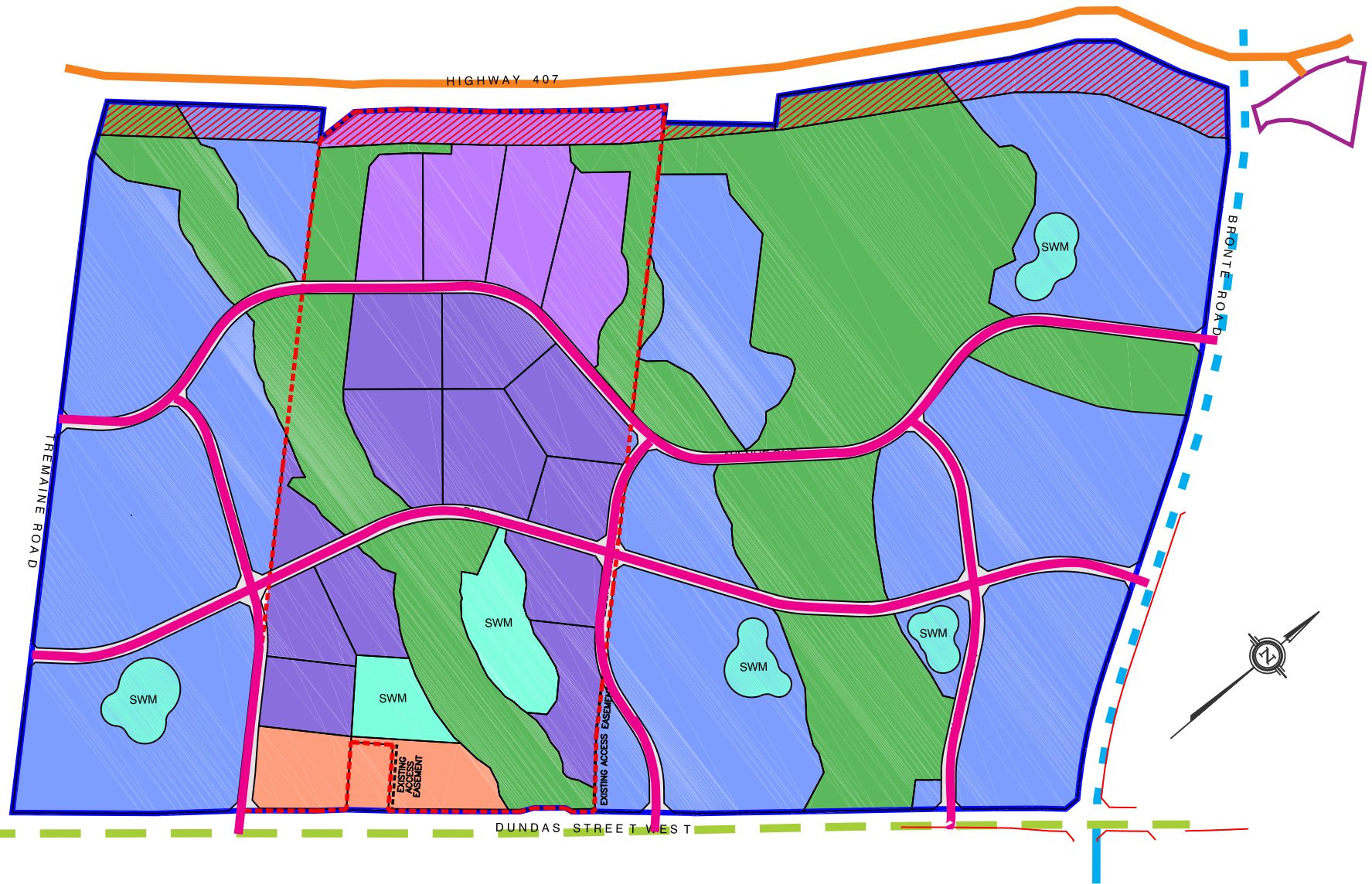
9.3 Transit Infrastructure Requirements

Roads within the subject property are to be designed in accordance with the Town's Standard right-of-way for an Avenue/Transit Corridor (22.0m ROW) - Employment Area. The Town standard is designed to accommodate transit service, and comprises a 3.75m travel lane and a 2.5m curb-side parking lane in each direction, for a total pavement width of 12.5m.

It is anticipated that on-street parking will be prohibited in proximity of intersections to accommodate transit stops.

Intersection curb radii are to be designed to accommodate transit vehicles, as well as heavy trucks, while recognizing objectives related to increased walking and cycling and safety.

As a general guideline, roadway infrastructure requirements for the hierarchy of transit services in and adjacent to the subject property are considered for implementation at the service thresholds outlined in Table 9.1.



- Legend**
- Site Area
 - Inter-Regional Transit Service Corridor
 - Secondary Transit Corridor Service
 - Community Service
 - Highway 407 Transit Terminal
 - Primary Transit Service Corridor

Figure 18
Transit Corridors
Bentall - 407 West Employment Area
Oakville, Ontario

Table 9.1 - Typical Service and Technology Levels

Transit Service Type	Combined Headway*	Road Infrastructure Requirement
Community Service	15 to 30 minutes	Not typically
Secondary Transit Corridor	10 to 15 minutes	Transit priorities at congested areas
Primary Transit Corridor	3 to 10 minutes 2 to 5 minutes	HOV lanes Reserved Bus Lanes
Inter-regional Transit Corridor	less than 3 minutes	Separate ROW

* Combined headway is defined as the average time between all scheduled bus services in the corridor.

At service levels consistent with the current Oakville Transit Service Design Standards, transit infrastructure improvements or enhancements are not warranted for the roadways in or adjacent to the subject property.

As previously identified, Dundas Street is envisioned to transform over time from the introduction of HOV lanes to Reserved Bus Lanes in its ultimate configuration.

9.4 Bus Stops and Passenger Amenities

Passenger amenities are to be based upon the needs and volumes of passengers at each stop type and location in accordance with the approved Oakville Transit Service Design Standards and direction provided by the Town's North Oakville Secondary Plan, Transit Plan, August 2009.

Passenger amenities are to be placed with consideration to the pedestrian circulation and an unobstructed landing pad to ensure that ramps can be deployed for accessibility at stops.

In accordance with the North Oakville Secondary Plan Transit Plan guidelines, bus stops are to be located so that all employees are generally within 400 metres walking distance of a bus stop. To achieve this goal, bus stops are to have a maximum spacing of approximately 250m along a transit route.

Figure 19 shows the proposed spacing of bus stops, by type within the subject property and adjacent lands in the NOWSP area. The location of bus stops is generally consistent with the objective of achieving a maximum spacing of 250m along transit routes.

The bus stop types shown in Figure 19 have been established based on the Town's bus stop types and warrants for bus stop amenities, as presented in the North Oakville Secondary Plan Transit Plan.

Table 9.2 presents the warrants for the proposed bus stop locations within the subject property and adjacent lands in the NOWSP area.

Where appropriate, consideration has been given to locating bus stops on the near side of intersections to minimize interference to roadway operations when traffic is heavy on the far side of the intersection. With near-side bus stop locations, buses can service passengers while stopped at a red light and drivers will

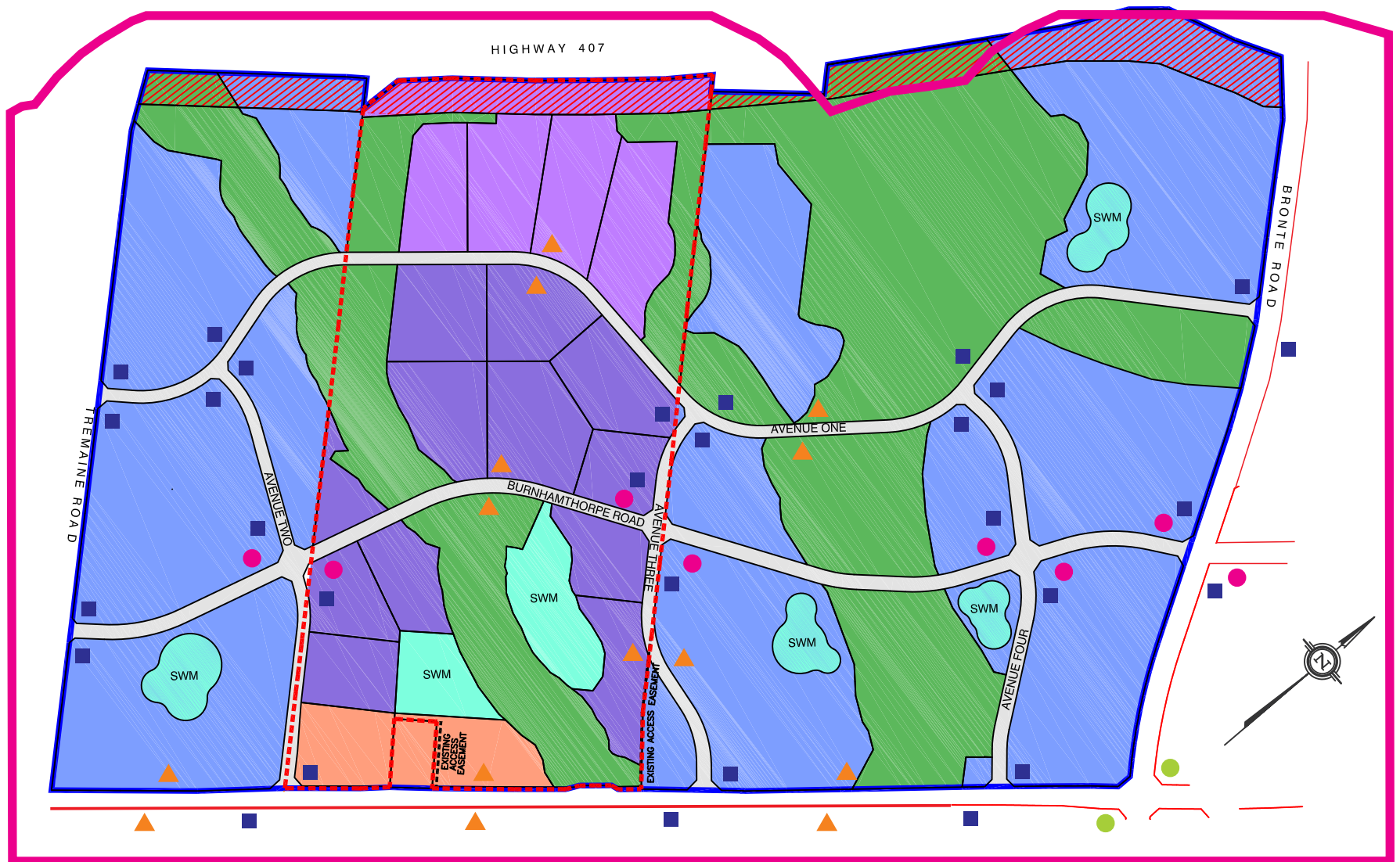


Figure 19
 Transit Stop Locations
 Bentall - 407 West Employment Area
 Oakville, Ontario

have an opportunity to look for on-coming traffic, including other buses that may have passengers loading and unloading. Relative to near-side stop locations, far-side stop locations may increase the potential for rear-end accidents, since drivers often do not anticipate buses stopping after having just proceeded through the intersection. Where there is potential for high volumes of right-turn traffic at an intersection and/or for multi-lane roads where there is sufficient opportunity for vehicles to pass a stopped bus without substantial impedence, a far-side stop location may be preferred due to the improved driver sightlines that this typically creates.

Table 9.2 - Warrants for Bus Stop Locations and Passenger Amenities

		Boarding/Transfer	Mobility Needs	Activity	Exposure	Wait Time	Request	Total	Stop Type	Intersection Location
Dundas Street										
	intersection with Bronte Rd	10	0	0	3	0	0	13	Transit Node	Near-side
	intersection with Avenue	10	0	0	3	0	0	13	Stop A	Near-side
	mid-block	0	0	0	3	0	0	3	Stop D	Mid-block
Bronte Road										
	intersection with Dundas St	10	0	0	3	2	0	15	Transit Node	Far-side
	intersection with Burnhamthorpe Rd	10	0	0	3	2	0	15	Stop A	Near-side
	intersection with Avenue	10	0	0	3	2	0	15	Stop A	Near-side
	mid-block	0	0	0	3	2	0	5	Stop D	Mid-block
Burnhamthorpe Road										
	intersection with Bronte Rd	10	0	0	3	2	0	15	Stop A	Far-side
	intersection with Tremaine Rd	10	0	0	3	2	0	15	Stop A	Near-side
	intersection with Avenue	10	0	0	3	2	0	15	Stop A	Far-side
	mid-block	0	0	0	3	2	0	5	Stop D	Mid-block
Tremaine Road										
	intersection with Dundas St	10	0	0	3	2	0	15	Stop A	Far-side
	intersection with Burnhamthorpe Rd	10	0	0	3	2	0	15	Stop A	Near-side
	intersection with Avenue	10	0	0	3	2	0	15	Stop A	Near-side
	mid-block	0	0	0	3	2	0	5	Stop D	Mid-block
Avenues										
	intersection with Dundas St	10	0	0	0	2	0	12	Stop A	Far-side
	intersection with Bronte Rd	10	0	0	0	2	0	12	Stop A	Far-side
	intersection with Tremaine Rd	10	0	0	0	2	0	12	Stop A	Near-side
	intersection with Burnhamthorpe Rd	10	0	0	0	2	0	12	Stop A	Near-side
	intersection with Avenue	10	0	0	0	2	0	12	Stop A	Near-side
	mid-block	0	0	0	0	2	0	2	Stop D	Mid-block

In addition to these important considerations, the proposed locations also take into account the anticipated primary flow of passenger transfers at the proposed locations and the desire to locate stops in the same quadrant of the intersection to reduce walking distances for passengers that are transferring between routes.

It is noted that the different treatment between Burnhamthorpe Road and Avenue One is based on different expectations with respect to potential function and character of the roads, traffic volumes, and turning movements. As a continuous roadway connection across North Oakville, Burnhamthorpe Road is expected to serve a regional function, in addition to supporting area development. This, in part, is expected to result in higher traffic volumes and intersection turning movements along Burnhamthorpe Road relative to Avenue One. Based on this expectation, it is considered desirable to plan for far-side bus stop locations, so potential high volumes of right-turn movements will not be obstructed by stopped transit vehicles.

Sufficient right-of-way is to be provided at all stop locations to accommodate the required bus stop amenities.

9.5 Transit Market Potential

Figure 19 illustrates the transit service coverage within the subject property and adjacent lands in the NOWSP area, based on the anticipated transit corridors and proposed bus stop locations. It is evident from the figure that the vast majority of future employees within the subject property and adjacent lands in the NOWSP area will be within a convenient and comfortable walk of transit service.

Based on the proposed uses and anticipated transit service, transit market potential estimates were derived for the NOWSP area.

The anticipated transit service and proposed employment uses are estimated to lead to increased transit use in the NOWSP area relative to the base case analysis (i.e., presumption of limited transit use, similar to existing levels). Compared to the 2031 base case, the proposed Transit Concept is estimated to generate in the order of 500 “new” potential transit trips during the a.m. and p.m. peak hours, respectively, at complete build-out. These are trips that would otherwise be expected to use private automobiles for travel, if transit was not implemented in the NOWSP area at the levels envisioned.

Projected future transit market potential related to development of the subject property, is considerably less. For the subject property, compared to the base case, the new potential transit trips are estimated to be in the order of 150 trips during the a.m. and p.m. peak hours, respectively, at complete build-out.

Based on the estimated employment uses in NOWSP area by 2031, these levels of anticipated transit use likely represent an increase in transit use during the roadway a.m. and p.m. peak hours approaching 7 and 5 percent, respectively, relative to the base case for the entire NOWSP area.

9.6 Implementation

It is anticipated that local transit service can be provided to the subject property either as extensions of existing routes or through the creation of new routes, in accordance with existing Oakville Transit Service Design Standards. The determination of future transit routing and service levels would be at the discretion of Oakville Transit.

It is anticipated that services will be phased in over time, so that initial services are convenient and timely, but cost-effective to deliver. As previously noted, the subject property is served by Oakville Transit Route 5 (Dundas), which runs between the Uptown Core Terminal (Trafalgar Road/Dundas Street) and Dundas Street West/Colonel Williams Parkway. This route currently loops around Colonel William Parkway, Richview Boulevard, and Bronte Road at the west tip of the route. It is possible that this existing transit route could be modified and extended to the subject property (at least initially) as a way to introduce service at levels similar to the existing Route 5 service frequencies. These initial transit services could then be intensified as demand grows to establish regularly scheduled local routes consistent with the NOWSP policies and Oakville Transit Service Design Standards.

Actual service levels and, thus, the number of buses required will be dependent on available resources, service standards and policies at the time of implementation, and matching service levels with demand.

10.0 Cycling and Pedestrians

The Town of Oakville Active Transportation Master Plan (ATMP), September 2009, recommended a convenient and continuous pedestrian and cycling network that minimizes risk to users and is integrated with other facilities (Regional, bordering municipalities, transit, end of trip, etc.). Subsequently, the Town completed the North Oakville Trails Plan, May 2013, with a cycling/trail system designed specifically for the communities north of Dundas Street, including the NOWSP area. It is the Town's intent that the North Oakville Trails Plan will be incorporated into the Active Transportation Master Plan at the next available update.

The North Oakville Trails Plan has five objectives:

Provide Connections between Neighbourhoods and Different Land Uses, and Provide Links to Schools and Parks: The Plan will assist in making connections between land uses, such as residential and employment areas. The network should include limited connections through the Natural Heritage System. It should also create connections to the developed lands south of Dundas Street.

Support Connections to Major Transit Stations and Transportation Hubs: The Plan should support north Oakville's transit-first approach. It will assist in promoting connections to transit stations and transportation hubs, and reduce the demand for parking requirements. These areas will provide adequate provision of bicycle storage facilities to encourage the use of the trails plan network.

Suitable for a Variety of Users: The Plan will provide a level of comfort, safety, and interest to encourage walking and cycling from a variety of users.

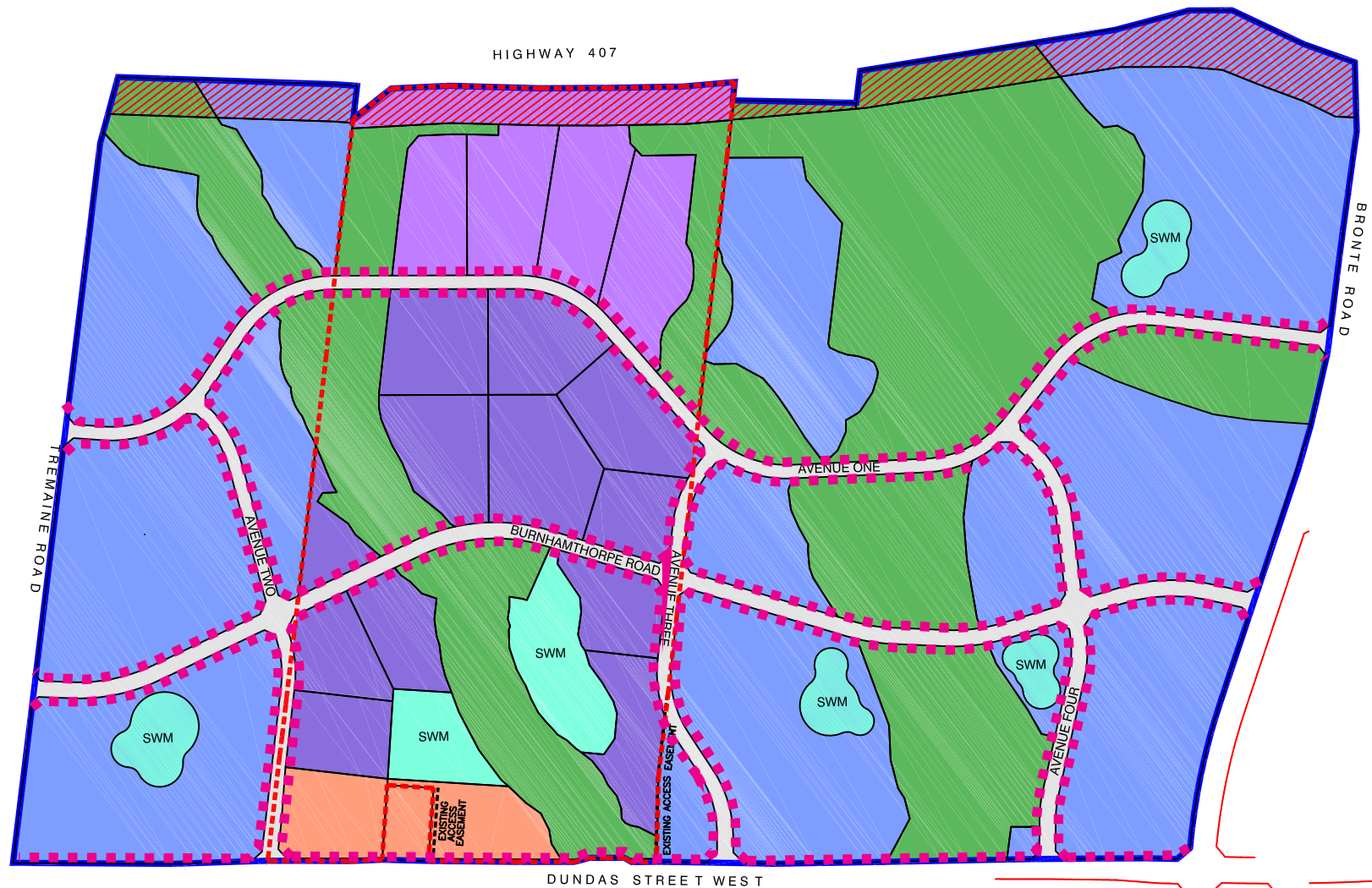
Encourage Alternative Modes of Transportation: The Plan will decrease the dependence on the private automobile and encourage cycling and walking as a mode of utilitarian transportation. The Plan will provide additional opportunities to active transportation users to travel throughout north Oakville.

Limit the Impacts to the Natural Heritage System: The Plan will provide a cohesive system of links and connections that will discourage the creation of unauthorized trails within the Natural Heritage System.

With these objectives in mind and based on the proposed network of pedestrian and cycling facilities in the ATMP and North Oakville Trails Plan, a Pedestrian Circulation Plan and Cycling and Trails Network is proposed for the subject property and adjacent lands in the NOWSP area.

10.1 Pedestrian Circulation Plan

The Pedestrian Circulation Plan is shown in Figure 20. The proposed plan provides an extensive, fully connected network of sidewalks throughout the planned employment area, comprising 1.5m-wide sidewalks on both sides of all Avenues within the subject property and adjacent lands in the NOWSP area.



Legend

- Pedestrian Circulation Path
- - - - - Site Area

Figure 20
 Pedestrian Circulation Plan
 Bentall - 407 West Employment Area
 Oakville, Ontario

The sidewalks are proposed to be provided and located in accordance with the Town's typical cross-section for an Avenue/Transit Corridor (22.0m ROW) - Employment Area.

It is anticipated that marked pedestrian crossings will be provided at signalized intersections within the subject property and adjacent lands in the NOWSP area. Where applicable, pedestrian crossings are to be designed and implemented in accordance with Town or Region engineering design practices.

10.2 Cycling Facilities

The Cycling and Trails Network is shown in Figure 21. Bicycles are designated as a vehicle under the Highway Traffic Act (HTA) and as such are required to obey all of the same rules and regulations as automobiles when being operated on a public roadway. The cycling routes proposed as part of the Town's North Oakville Trail Plans network comprise several facility types, each with its own set of minimum design parameters. These are generally consistent with the Ministry of Transportation (MTO) and the Transportation Association of Canada (TAC) guidelines for the design of on-road facilities and standards for signing the on-road cycling system.

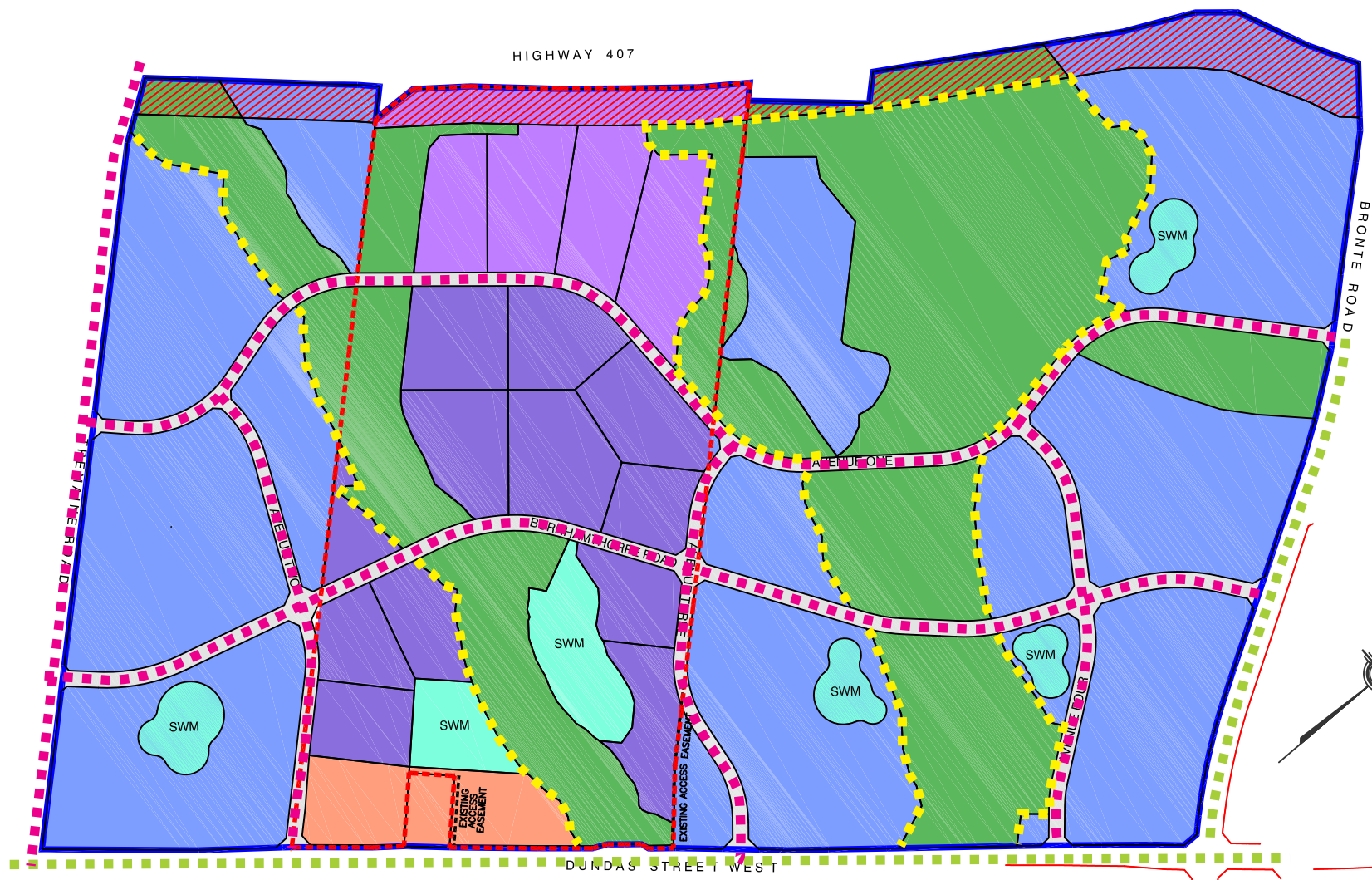
The cycling component of the Town's North Oakville Trails Plan network for the 407 West Employment Lands consists of multi-use trails and signed bike routes. For roadways labelled as Regional Bicycle Facility in the North Oakville Trails Plan, the type of bicycle facility will need to be determined by the Region; however, the following has been assumed for the boundary Regional roadways based on both the ATMP and the North Oakville Trails Plan:

- A 3.0 metre asphalt multi-use trail in the boulevard on Bronte Road between Dundas Street and Avenue One;
- A 3.0 metre asphalt multi-use trail in the boulevard on Dundas Street; and
- A signed bicycle route on Tremaine Road.

Within the subject property and adjacent lands within the NOWSP area, all bicycle facilities are proposed to be on-road signed bicycle routes.

The purpose of designating a signed only bicycle route is to promote a road for cycling because it is deemed to be well suited for cycling; it may provide an important connection between destinations, or it is a preferred route identified by cyclists. In the case of signed on-road bicycle routes, the travel lane is shared by motorists and cyclists. These are roads where traffic volumes and vehicle speeds are relatively low. Under these conditions, cyclists can share the road with motor vehicles and there is no need to create a designated space for cyclists. Bicycle route marker signs located at intersections and at regular intervals aid users with wayfinding.

On-road signed bicycle routes are proposed along Burnhamthorpe Road between Bronte Road and Tremaine Road, and along all the Avenues within the NOWSP area. These proposed on-road bicycle routes are to be accommodated within the Town's Avenue/Transit Corridor (22.0m ROW) - Employment



Legend

- Site Area
- Multi-Use Trail (Off-Road / In Boulevard)
- Signed Bike Route (On-Road)
- Major Trails

Area. The proposed bicycle facilities provide connections to bike lanes along Burnhamthorpe Road, east of Bronte Road, and along Colonel William Parkway, south of Dundas Street. The proposed on-road signed bicycle routes within the subject property and adjacent lands of the NOWSP area also connect to planned bicycle facilities on the boundary Regional boundary roads.

It is anticipated that bicycle facilities crossing the Regional boundary roads will be provided at signalized intersections, and where applicable, these crossings are to be designed and implemented in accordance with recommendations of the Town's Active Transportation Master Plan.

10.3 Major Trails

The development proposal outlines the proposed natural heritage and open space system based on the Town's North Oakville Trails Plan and NOWSP Transportation Plan. The central open space system and adjacent stormwater management will accommodate pedestrian trails and passive recreational uses, integrated with the adjacent employment development. As shown in Figure 21, major trails are proposed around the Zenon Woodlot/Core area, located east to the subject property, as well as along the west side of the valley feature of the realigned channel from the Bentall property along Dundas Street West to the northwest corner of the 407 West Employment Lands.

Major Trails are off-road, soft surface pathways used primarily by pedestrians, although cycling is not restricted. Major trails will be typically 2.1 – 2.4 metres wide, with a compacted limestone screenings surface, and asphalt paving on slopes greater than 5 percent. Signage should be provided for recreational cyclists and pedestrians. Major trails within the NHS will not receive regular winter maintenance.

11.0 Summary and Conclusions

This Transportation Impact Study addresses the impacts of the proposed phased developments on the subject property in the 407 West Employment Area on the boundary roadway intersections in the vicinity of the property. The Subject Property is located mid-block between Bronte Road and Tremaine Road, and bounded by Dundas Street West to the south.

The proposed development is expected to generate the following number of vehicle trips under the 2016, 2021, 2031 horizon:

- 840 inbound/189 outbound vehicle trips and 373 inbound/829 outbound vehicle trips during the roadway a.m. and p.m. peak hours, respectively, under the 2016 horizon year;
- 1,911 inbound/350 outbound vehicle trips and 613 inbound/1,772 outbound vehicle trips during the roadway a.m. and p.m. peak hours, respectively, under the 2021 horizon year;
- 1,712 inbound/319 outbound vehicle trips and 563 inbound/1,597 outbound vehicle trips during the roadway a.m. and p.m. peak hours, respectively, under the 2031 horizon year.

Under the 2016, 2021, and 2031 future total traffic conditions, all of the boundary road intersections are expected to operate at good to acceptable (LOS 'E' or better) levels of service based on delay, assuming the two additional lanes constructed during Dundas Street widening will continue to operate as HOV lanes in 2013 horizon. It is acknowledged that some critical movements at many of the boundary intersections analyzed are forecast to operate over capacity.

Road improvements have been identified as being needed to accommodate the forecast future growth in background traffic unrelated to the property. These include:

- Addition of a westbound exclusive right turn lane and conversion of the existing single southbound left turn lane to double left turn lanes at the Dundas Street West/Bronte Road intersection for horizon 2021;
- Channelization of the southbound right turn lane configuration, with the southbound right turn traffic operating under free flow operations at the Dundas Street/Tremaine Road intersection for horizon 2021;
- Conversion of the existing two eastbound left turn lanes to a left turn eastbound lane and a shared left/right eastbound lane at the Bronte Road/Highway 407 Eastbound Off-Ramp intersection for horizon 2031.

A network of transit, cycling and pedestrian facilities is planned for the Subject Property, with connections to future planned facilities within the rest of the NOWSP area and the Town. Facilities are intended to be located and designed in accordance with Town guidelines and standards. It is anticipated that the network of transit, cycling and pedestrian facilities can support in the order of a 20 percent reduction in travel during the roadway peak hours, relative to the 2031 base case.

Based on the study findings, it is concluded that the boundary road network can satisfactorily accommodate the additional traffic generated by the proposed development on the Subject Property.

J:\01 PROJECTS\2009jobs\14-09222.GKS (407 West Employment Area)\2012 Work\Report\BentallLazyPatPropertyTIS (2013-08-30).docx

APPENDIX A

Level of service Definitions

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS⁽¹⁾

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	$> 10 \text{ and } \leq 15$
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	$> 15 \text{ and } \leq 25$
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	$> 25 \text{ and } \leq 35$
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	$> 35 \text{ and } \leq 50$
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS⁽¹⁾

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 5 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	$> 10 \text{ and } \leq 20$
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	$> 20 \text{ and } \leq 35$
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	$> 35 \text{ and } \leq 55$
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$> 55 \text{ and } \leq 80$
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

APPENDIX B

Capacity Analyses Existing Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

7/3/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	193	120	0	652	1171	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3161	1490		4812	3380	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3161	1490		4812	3380	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	193	120	0	652	1171	0
RTOR Reduction (vph)	0	75	0	0	0	0
Lane Group Flow (vph)	193	45	0	652	1171	0
Confl. Peds. (#/hr)	2	1			1	
Heavy Vehicles (%)	12%	8%	0%	9%	8%	10%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	20.0	20.0		53.0	53.0	
Effective Green, g (s)	20.0	20.0		55.0	55.0	
Actuated g/C Ratio	0.24	0.24		0.65	0.65	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	743	350		3113	2187	
v/s Ratio Prot	c0.06			0.14	c0.35	
v/s Ratio Perm		0.03				
v/c Ratio	0.26	0.13		0.21	0.54	
Uniform Delay, d1	26.5	25.6		6.1	8.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.8		0.2	0.9	
Delay (s)	27.3	26.4		6.3	9.0	
Level of Service	C	C		A	A	
Approach Delay (s)	27.0			6.3	9.0	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay		10.8		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.46				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		10.0
Intersection Capacity Utilization		48.4%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Existing AM Peak Hour

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

7/3/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	299	1864	571	55	248	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	5.0	7.0	5.0	7.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1754	3510	3349	1533	1755	1555
Flt Permitted	0.40	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	730	3510	3349	1533	1755	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	299	1864	571	55	248	260
RTOR Reduction (vph)	0	0	0	24	0	213
Lane Group Flow (vph)	299	1864	571	31	248	47
Confl. Peds. (#/hr)	2			2		
Heavy Vehicles (%)	4%	4%	9%	4%	4%	5%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	84.2	84.2	68.3	68.3	21.8	21.8
Effective Green, g (s)	86.2	86.2	70.3	68.3	23.8	21.8
Actuated g/C Ratio	0.72	0.72	0.59	0.57	0.20	0.18
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	2.5
Lane Grp Cap (vph)	642	2521	1961	872	348	282
v/s Ratio Prot	0.05	c0.53	0.17		c0.14	
v/s Ratio Perm	0.28			0.02		0.03
v/c Ratio	0.47	0.74	0.29	0.04	0.71	0.17
Uniform Delay, d1	6.1	10.2	12.4	11.4	44.9	41.4
Progression Factor	1.00	1.00	0.57	0.82	1.00	1.00
Incremental Delay, d2	0.5	2.0	0.4	0.1	6.3	0.2
Delay (s)	6.6	12.1	7.4	9.3	51.2	41.6
Level of Service	A	B	A	A	D	D
Approach Delay (s)		11.4	7.6		46.3	
Approach LOS		B	A		D	
Intersection Summary						
HCM 2000 Control Delay		16.0		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.75				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		73.6%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

Existing AM Peak Hour

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

7/3/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Volume (vph)	50	2062	33	29	577	68	33	0	62	7	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	7.0	2.0	5.0	7.0	7.0		7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00		0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	
Satd. Flow (prot)	1690	3510	1633	1659	3349	1585	1674		1585	1601	1633	
Flt Permitted	0.42	1.00	1.00	0.06	1.00	1.00	0.76		1.00	0.76	1.00	
Satd. Flow (perm)	755	3510	1633	101	3349	1585	1335		1585	1276	1633	
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)	50	2062	33	29	577	68	33	0	62	7	0	1
RTOR Reduction (vph)	0	0	8	0	0	18	0	0	58	0	1	0
Lane Group Flow (vph)	50	2062	25	29	577	50	33	0	4	7	0	0
Heavy Vehicles (%)	8%	4%	0%	10%	9%	3%	9%	0%	3%	14%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm		Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	94.7	89.8	89.8	92.3	88.6	88.6	8.5		8.5	8.5	8.5	
Effective Green, g (s)	98.7	91.8	89.8	96.3	90.6	88.6	8.5		8.5	8.5	8.5	
Actuated g/C Ratio	0.82	0.76	0.75	0.80	0.75	0.74	0.07		0.07	0.07	0.07	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0		7.0	7.0	7.0	
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	3.5		3.5	0.2	0.2	
Lane Grp Cap (vph)	674	2685	1222	155	2528	1170	94		112	90	115	
v/s Ratio Prot	c0.00	c0.59		c0.01	0.17						0.00	
v/s Ratio Perm	0.06		0.02	0.14		0.03	c0.02		0.00	0.01		
v/c Ratio	0.07	0.77	0.02	0.19	0.23	0.04	0.35		0.04	0.08	0.00	
Uniform Delay, d1	2.0	8.0	3.9	9.1	4.4	4.2	53.1		51.9	52.1	51.8	
Progression Factor	0.44	0.97	1.00	4.38	1.05	2.25	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.0	1.5	0.0	0.6	0.2	0.1	2.7		0.2	0.1	0.0	
Delay (s)	0.9	9.3	3.9	40.5	4.8	9.6	55.8		52.1	52.2	51.8	
Level of Service	A	A	A	D	A	A	E		D	D	D	
Approach Delay (s)		9.0			6.8		53.4			52.2		
Approach LOS		A			A		D			D		
Intersection Summary												
HCM 2000 Control Delay		10.1			HCM 2000 Level of Service		B					
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)		14.0					
Intersection Capacity Utilization		89.5%			ICU Level of Service		E					
Analysis Period (min)		15										
c Critical Lane Group												

Existing AM Peak Hour

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

7/3/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱	↱	↰	↱	↰	↱
Volume (vph)	2100	44	17	658	24	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		2.0	5.0	7.0	7.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Flt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5029		1825	4768	1755	1601
Flt Permitted	1.00		0.07	1.00	0.95	1.00
Satd. Flow (perm)	5029		127	4768	1755	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2100	44	17	658	24	43
RTOR Reduction (vph)	1	0	0	0	0	40
Lane Group Flow (vph)	2143	0	17	658	24	3
Heavy Vehicles (%)	4%	2%	0%	10%	4%	2%
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.3		97.7	97.7	8.3	8.3
Effective Green, g (s)	93.3		99.7	99.7	8.3	8.3
Actuated g/C Ratio	0.78		0.83	0.83	0.07	0.07
Clearance Time (s)	7.0		4.0	7.0	7.0	7.0
Vehicle Extension (s)	6.0		3.0	6.0	5.0	5.0
Lane Grp Cap (vph)	3910		167	3961	121	110
v/s Ratio Prot	c0.43		0.00	c0.14	c0.01	
v/s Ratio Perm			0.08			0.00
v/c Ratio	0.55		0.10	0.17	0.20	0.03
Uniform Delay, d1	5.2		3.2	2.0	52.7	52.1
Progression Factor	0.82		0.71	0.25	1.00	1.00
Incremental Delay, d2	0.4		0.3	0.1	1.7	0.2
Delay (s)	4.6		2.5	0.6	54.4	52.3
Level of Service	A		A	A	D	D
Approach Delay (s)	4.6			0.6	53.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		4.8			HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.50				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	14.0
Intersection Capacity Utilization		59.9%			ICU Level of Service	B
Analysis Period (min)		15				
c Critical Lane Group						

Existing AM Peak Hour

Synchro 7 - Report
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HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

7/3/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰↰	↰↰↰	↰	↰	↰↰↰	↰
Volume (vph)	291	1308	546	116	446	227	115	695	104	195	891	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	7.0	2.0	5.0		2.0	5.0	7.0	2.0	5.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5043	1570	1573	4555		3340	3411	1541	1630	3411	1458
Flt Permitted	0.30	1.00	1.00	0.12	1.00		0.95	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	567	5043	1570	196	4555		3340	3411	1541	371	3411	1458
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)	291	1308	546	116	446	227	115	695	104	195	891	117
RTOR Reduction (vph)	0	0	144	0	74	0	0	0	72	0	0	79
Lane Group Flow (vph)	291	1308	402	116	599	0	115	695	32	195	891	38
Heavy Vehicles (%)	2%	4%	4%	16%	10%	8%	6%	7%	6%	12%	7%	12%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	55.7	44.5	44.5	46.8	39.6		7.7	36.4	36.4	48.5	38.6	38.6
Effective Green, g (s)	57.7	46.5	44.5	50.8	41.6		9.7	38.4	36.4	52.3	40.6	38.6
Actuated g/C Ratio	0.48	0.39	0.37	0.42	0.35		0.08	0.32	0.30	0.44	0.34	0.32
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0		2.5	4.0	4.0	2.5	4.0	4.0
Lane Grp Cap (vph)	416	1954	582	188	1579		269	1091	467	286	1154	468
v/s Ratio Prot	c0.08	c0.26		0.05	0.13		0.03	0.20		c0.07	c0.26	
v/s Ratio Perm	0.25		0.26	0.21					0.02	0.23		0.03
v/c Ratio	0.70	0.67	0.69	0.62	0.38		0.43	0.64	0.07	0.68	0.77	0.08
Uniform Delay, d1	19.9	30.4	31.9	23.3	29.5		52.5	34.8	29.7	23.6	35.6	28.3
Progression Factor	1.45	1.24	1.43	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	1.6	5.8	5.1	0.7		0.8	1.4	0.1	6.0	3.5	0.1
Delay (s)	33.1	39.3	51.4	28.4	30.2		53.3	36.2	29.8	29.6	39.0	28.4
Level of Service	C	D	D	C	C		D	D	C	C	D	C
Approach Delay (s)		41.5			29.9			37.6			36.5	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.8		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				14.0			
Intersection Capacity Utilization			78.2%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

7/3/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	112	47	0	940	1145	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3372	1512		5092	3544	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3372	1512		5092	3544	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	112	47	0	940	1145	0
RTOR Reduction (vph)	0	41	0	0	0	0
Lane Group Flow (vph)	112	6	0	940	1145	0
Confl. Peds. (#/hr)	3					
Heavy Vehicles (%)	5%	6%	0%	3%	3%	44%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases	4					
Actuated Green, G (s)	11.0	11.0		62.0	62.0	
Effective Green, g (s)	11.0	11.0		64.0	64.0	
Actuated g/C Ratio	0.13	0.13		0.75	0.75	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	436	195		3833	2668	
v/s Ratio Prot	c0.03			0.18	c0.32	
v/s Ratio Perm	0.00					
v/c Ratio	0.26	0.03		0.25	0.43	
Uniform Delay, d1	33.3	32.3		3.2	3.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.3		0.2	0.5	
Delay (s)	34.7	32.6		3.3	4.3	
Level of Service	C			A	A	
Approach Delay (s)	34.1			3.3	4.3	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay	6.0		HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.40					
Actuated Cycle Length (s)	85.0		Sum of lost time (s)		10.0	
Intersection Capacity Utilization	45.0%		ICU Level of Service		A	
Analysis Period (min)	15					
c Critical Lane Group						

Existing PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

7/3/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	250	751	1980	173	74	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	5.0	7.0	5.0	7.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1755	3544	3544	1551	1807	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	108	3544	3544	1551	1807	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	250	751	1980	173	74	304
RTOR Reduction (vph)	0	0	0	40	0	138
Lane Group Flow (vph)	250	751	1980	133	74	166
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	4%	3%	3%	3%	1%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	88.4	88.4	64.6	64.6	17.6	17.6
Effective Green, g (s)	90.4	90.4	66.6	64.6	19.6	17.6
Actuated g/C Ratio	0.75	0.75	0.55	0.54	0.16	0.15
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	2.5
Lane Grp Cap (vph)	380	2669	1966	834	295	232
v/s Ratio Prot	c0.12	0.21	c0.56		0.04	
v/s Ratio Perm	0.38			0.09		c0.10
v/c Ratio	0.66	0.28	1.01	0.16	0.25	0.71
Uniform Delay, d1	35.7	4.6	26.7	14.0	43.8	48.8
Progression Factor	1.00	1.00	1.05	1.02	1.00	1.00
Incremental Delay, d2	4.1	0.3	19.0	0.3	0.3	9.3
Delay (s)	39.7	4.9	46.9	14.6	44.1	58.1
Level of Service	D	A	D	B	D	E
Approach Delay (s)		13.6	44.3		55.4	
Approach LOS		B	D		E	
Intersection Summary						
HCM 2000 Control Delay			36.8	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio			0.87			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization			88.6%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

Existing PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

7/3/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	769	56	28	2016	6	39	0	35	43	1	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	7.0	2.0	5.0	7.0	7.0		7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00		0.85	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	
Satd. Flow (prot)	1644	3544	1633	1825	3544	1228	1772		1585	1738	1604	
Flt Permitted	0.06	1.00	1.00	0.34	1.00	1.00	0.70		1.00	0.76	1.00	
Satd. Flow (perm)	112	3544	1633	647	3544	1228	1302		1585	1385	1604	
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)	9	769	56	28	2016	6	39	0	35	43	1	90
RTOR Reduction (vph)	0	0	15	0	0	2	0	0	32	0	82	0
Lane Group Flow (vph)	9	769	41	28	2016	4	39	0	3	43	9	0
Heavy Vehicles (%)	11%	3%	0%	0%	3%	33%	3%	0%	3%	5%	0%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm		Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	88.6	87.4	87.4	93.6	89.9	89.9	10.9		10.9	10.9	10.9	
Effective Green, g (s)	92.6	89.4	87.4	97.1	91.9	89.9	10.9		10.9	10.9	10.9	
Actuated g/C Ratio	0.77	0.75	0.73	0.81	0.77	0.75	0.09		0.09	0.09	0.09	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0		7.0	7.0	7.0	
Vehicle Extension (s)	2.5	5.0	5.0	3.0	5.0	5.0	3.5		3.5	0.2	0.2	
Lane Grp Cap (vph)	127	2640	1189	579	2714	919	118		143	125	145	
v/s Ratio Prot	c0.00	0.22		c0.00	c0.57						0.01	
v/s Ratio Perm	0.05		0.02	0.04		0.00	0.03		0.00	c0.03		
v/c Ratio	0.07	0.29	0.03	0.05	0.74	0.00	0.33		0.02	0.34	0.06	
Uniform Delay, d1	7.9	5.0	4.5	2.4	7.6	3.8	51.1		49.7	51.2	49.9	
Progression Factor	2.47	1.92	6.60	2.22	2.64	1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3	0.1	0.0	1.7	0.0	1.9		0.1	0.6	0.1	
Delay (s)	19.6	9.8	30.0	5.3	21.9	3.8	53.1		49.8	51.8	49.9	
Level of Service	B	A	C	A	C	A	D		D	D	D	
Approach Delay (s)		11.3			21.6			51.5			50.5	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		20.8			HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio		0.68										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		74.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Existing PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

7/3/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	826	22	42	1980	45	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		2.0	5.0	6.0	6.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Flt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5076		1706	5092	1789	1512
Flt Permitted	1.00		0.31	1.00	0.95	1.00
Satd. Flow (perm)	5076		558	5092	1789	1512
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	826	22	42	1980	45	38
RTOR Reduction (vph)	1	0	0	0	0	35
Lane Group Flow (vph)	847	0	42	1980	45	3
Heavy Vehicles (%)	3%	0%	7%	3%	2%	8%
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Actuated Green, G (s)	88.9		97.9	97.9	9.1	9.1
Effective Green, g (s)	90.9		99.9	99.9	9.1	9.1
Actuated g/C Ratio	0.76		0.83	0.83	0.08	0.08
Clearance Time (s)	7.0		4.0	7.0	6.0	6.0
Vehicle Extension (s)	6.0		3.0	6.0	5.0	5.0
Lane Grp Cap (vph)	3845		531	4239	135	114
v/s Ratio Prot	0.17		0.00	c0.39	c0.03	
v/s Ratio Perm			0.06			0.00
v/c Ratio	0.22		0.08	0.47	0.33	0.03
Uniform Delay, d1	4.2		1.8	2.8	52.6	51.3
Progression Factor	1.59		2.18	3.33	1.00	1.00
Incremental Delay, d2	0.1		0.0	0.3	3.0	0.2
Delay (s)	6.9		3.9	9.4	55.6	51.5
Level of Service	A		A	A	E	D
Approach Delay (s)	6.9			9.3	53.7	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		9.9			HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.46				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	13.0
Intersection Capacity Utilization		55.8%			ICU Level of Service	B
Analysis Period (min)		15				
c Critical Lane Group						

Existing PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

7/3/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰	↰	↰↰↰	↰
Volume (vph)	83	640	170	142	1287	164	404	782	89	224	672	267
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	7.0	2.0	5.0		2.0	5.0	7.0	2.0	5.0	7.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5092	1633	1755	5055		3506	3544	1526	1825	3544	1541
Flt Permitted	0.09	1.00	1.00	0.33	1.00		0.95	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	165	5092	1633	609	5055		3506	3544	1526	321	3544	1541
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)	83	640	170	142	1287	164	404	782	89	224	672	267
RTOR Reduction (vph)	0	0	108	0	13	0	0	0	63	0	0	85
Lane Group Flow (vph)	83	640	62	142	1438	0	404	782	26	224	672	182
Heavy Vehicles (%)	2%	3%	0%	4%	2%	2%	1%	3%	7%	0%	3%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	49.1	43.6	43.6	53.1	45.6		13.0	34.6	34.6	46.2	33.9	33.9
Effective Green, g (s)	53.1	45.6	43.6	57.1	47.6		15.0	36.6	34.6	50.2	35.9	33.9
Actuated g/C Ratio	0.44	0.38	0.36	0.48	0.40		0.12	0.31	0.29	0.42	0.30	0.28
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	2.5	6.0	6.0	2.5	6.0		2.5	4.0	4.0	2.5	4.0	4.0
Lane Grp Cap (vph)	174	1934	593	380	2005		438	1080	439	313	1060	435
v/s Ratio Prot	c0.03	0.13		c0.03	c0.28		c0.12	c0.22		0.09	0.19	
v/s Ratio Perm	0.18		0.04	0.15					0.02	0.21		0.12
v/c Ratio	0.48	0.33	0.10	0.37	0.72		0.92	0.72	0.06	0.72	0.63	0.42
Uniform Delay, d1	22.6	26.4	25.3	18.3	30.5		51.9	37.2	30.9	25.4	36.4	35.0
Progression Factor	1.41	1.25	4.78	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.5	0.3	0.5	2.2		24.9	2.6	0.1	7.1	1.4	0.9
Delay (s)	33.4	33.5	121.2	18.7	32.8		76.8	39.8	31.0	32.5	37.8	35.9
Level of Service	C	C	F	B	C		E	D	C	C	D	D
Approach Delay (s)		50.2			31.5			50.9			36.3	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				14.0			
Intersection Capacity Utilization			82.5%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

APPENDIX C

Capacity Analyses Future Background Traffic Operations

2016
Future Background Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/20/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	201	310	0	853	1352	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Flt Protected	1.00	0.99		1.00	1.00	
Flt Permitted	1.00	1.00		1.00	1.00	
Satd. Flow (prot)	3161	1491		4812	3380	
Satd. Flow (perm)	3161	1491		4812	3380	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	201	310	0	853	1352	0
RTOR Reduction (vph)	0	38	0	0	0	0
Lane Group Flow (vph)	201	272	0	853	1352	0
Confl. Peds. (#/hr)		2	1			1
Heavy Vehicles (%)	12%	8%	0%	9%	8%	10%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	24.0	24.0		49.0	49.0	
Effective Green, g (s)	27.0	27.0		52.0	52.0	
Actuated g/C Ratio	0.32	0.32		0.61	0.61	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	1004	473		2943	2067	
v/s Ratio Prot	0.06			0.18	c0.40	
v/s Ratio Perm		c0.18				
v/c Ratio	0.20	0.57		0.29	0.65	
Uniform Delay, d1	21.1	24.2		7.8	10.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	5.0		0.2	1.6	
Delay (s)	21.6	29.2		8.0	12.3	
Level of Service	C	C		A	B	
Approach Delay (s)	26.2			8.0	12.3	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay		13.6		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.63				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		63.5%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

2016 Future Background AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

21: Bronte Rd & Burnhamthorpe Road

8/20/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	27	77	1356	72	193	1381
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt Protected	1.00	0.85	1.00	0.85	1.00	1.00
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1633	3650	1633	1825	3650
Satd. Flow (perm)	1825	1633	3650	1633	353	3650
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	77	1356	72	193	1381
RTOR Reduction (vph)	0	70	0	6	0	0
Lane Group Flow (vph)	27	7	1356	66	193	1381
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.0	8.0	98.0	98.0	98.0	98.0
Effective Green, g (s)	11.0	11.0	101.0	101.0	101.0	101.0
Actuated g/C Ratio	0.09	0.09	0.84	0.84	0.84	0.84
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	167	149	3072	1374	297	3072
v/s Ratio Prot	c0.01		0.37			0.38
v/s Ratio Perm		0.00		0.04	c0.55	
v/c Ratio	0.16	0.05	0.44	0.05	0.65	0.45
Uniform Delay, d1	50.2	49.7	2.4	1.6	3.3	2.4
Progression Factor	1.00	1.00	1.62	0.87	1.00	1.00
Incremental Delay, d2	0.5	0.1	0.3	0.0	10.5	0.5
Delay (s)	50.7	49.9	4.2	1.4	13.9	2.9
Level of Service	D	D	A	A	B	A
Approach Delay (s)	50.1		4.0			4.2
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			5.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			66.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Background AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	311	2307	748	60	265	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1754	3510	3349	1533	1755	1555
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	574	3510	3349	1533	1755	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	311	2307	748	60	265	271
RTOR Reduction (vph)	0	0	0	25	0	213
Lane Group Flow (vph)	311	2307	748	35	265	58
Confl. Peds. (#/hr)	2					
Heavy Vehicles (%)	4%	4%	9%	4%	4%	5%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	83.1	83.1	67.0	67.0	22.9	22.9
Effective Green, g (s)	86.1	86.1	70.0	70.0	25.9	25.9
Actuated g/C Ratio	0.72	0.72	0.58	0.58	0.22	0.22
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	560	2518	1953	894	378	335
v/s Ratio Prot	0.07	c0.66	0.22		c0.15	
v/s Ratio Perm	0.33			0.02		0.04
v/c Ratio	0.56	0.92	0.38	0.04	0.70	0.17
Uniform Delay, d1	6.7	14.0	13.4	10.7	43.5	38.3
Progression Factor	1.00	1.00	0.70	1.21	1.00	1.00
Incremental Delay, d2	1.2	6.6	0.5	0.1	5.8	0.2
Delay (s)	7.9	20.6	9.9	13.0	49.3	38.6
Level of Service	A	C	A	B	D	D
Approach Delay (s)	19.1		10.1		43.9	
Approach LOS	B		B		D	
Intersection Summary						
HCM 2000 Control Delay	20.6		HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.87					
Actuated Cycle Length (s)	120.0		Sum of lost time (s)		9.0	
Intersection Capacity Utilization	85.1%		ICU Level of Service		E	
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	20	2585	785	49	20	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	3650	3650	1633	3541	1633
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	603	3650	3650	1633	3541	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	2585	785	49	20	8
RTOR Reduction (vph)	0	0	0	18	0	6
Lane Group Flow (vph)	20	2585	785	31	20	2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm
Protected Phases	4		8		6	
Permitted Phases	4		8		6	
Actuated Green, G (s)	74.0	74.0	74.0	74.0	32.0	32.0
Effective Green, g (s)	77.0	77.0	77.0	77.0	35.0	35.0
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.29	0.29
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	386	2342	2342	1047	1032	476
v/s Ratio Prot	c0.71		0.22		c0.01	
v/s Ratio Perm	0.03			0.02		0.00
v/c Ratio	0.05	1.10	0.34	0.03	0.02	0.00
Uniform Delay, d1	8.0	21.5	9.8	7.9	30.3	30.1
Progression Factor	0.52	0.88	1.11	1.78	1.00	1.00
Incremental Delay, d2	0.0	50.2	0.1	0.0	0.0	0.0
Delay (s)	4.2	69.1	11.0	14.0	30.3	30.2
Level of Service	A	E	B	B	C	C
Approach Delay (s)	68.6		11.1		30.3	
Approach LOS	E		B		C	
Intersection Summary						
HCM 2000 Control Delay			54.5	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		8.0
Intersection Capacity Utilization			86.5%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

8/20/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	50	2516	39	54	776	68	57	0	150	7	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1690	3510	1633	1659	3349	1585	1674	1585	1601	1633	1633	1633
Flt Permitted	0.34	1.00	1.00	0.05	1.00	1.00	0.76	1.00	0.76	1.00	1.00	1.00
Satd. Flow (perm)	599	3510	1633	79	3349	1585	1333	1585	1276	1633	1633	1633
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)	50	2516	39	54	776	68	57	0	150	7	0	2
RTOR Reduction (vph)	0	0	10	0	0	18	0	0	87	0	2	0
Lane Group Flow (vph)	50	2516	29	54	776	50	57	0	63	7	0	0
Heavy Vehicles (%)	8%	4%	0%	10%	9%	3%	9%	0%	3%	14%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	Perm	Perm	NA	NA	NA
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	89.8	84.7	84.7	90.4	85.0	85.0	11.9	11.9	11.9	11.9	11.9	11.9
Effective Green, g (s)	95.8	87.7	87.7	96.4	88.0	88.0	14.9	14.9	14.9	14.9	14.9	14.9
Actuated g/C Ratio	0.80	0.73	0.73	0.80	0.73	0.73	0.12	0.12	0.12	0.12	0.12	0.12
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	551	2565	1193	174	2455	1162	165	196	158	202	202	202
v/s Ratio Prot	0.01	c0.72		c0.02	0.23					0.00		
v/s Ratio Perm	0.07		0.02	0.23		0.03	c0.04	0.04	0.01			
v/c Ratio	0.09	0.98	0.02	0.31	0.32	0.04	0.35	0.32	0.04	0.00		
Uniform Delay, d1	2.6	15.4	4.4	32.7	5.6	4.4	48.1	47.9	46.3	46.0		
Progression Factor	0.01	0.36	0.00	3.90	0.19	0.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.0	2.5	0.0	1.0	0.3	0.1	1.3	1.0	0.1	0.0		
Delay (s)	0.0	8.0	0.0	128.6	1.4	0.1	49.3	48.9	46.4	46.0		
Level of Service	A	A	A	F	A	A	D	D	D	D		
Approach Delay (s)		7.7			9.0		49.0			46.3		
Approach LOS		A			A		D			D		
Intersection Summary												
HCM 2000 Control Delay		10.4			HCM 2000 Level of Service		B					
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)		9.0					
Intersection Capacity Utilization		97.2%			ICU Level of Service		F					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

8/20/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	2651	44	23	879	27	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	1.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	1.00
Flt	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	5032	1825	4768	1755	1601	1601
Flt Permitted	1.00	0.04	1.00	0.95	1.00	1.00
Satd. Flow (perm)	5032		81	4768	1755	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2651	44	23	879	27	43
RTOR Reduction (vph)	1	0	0	0	0	39
Lane Group Flow (vph)	2694	0	23	879	27	4
Heavy Vehicles (%)	4%	2%	0%	10%	4%	2%
Turn Type	NA	pm+pt	NA	NA	Perm	Perm
Protected Phases	2	1	6	8		
Permitted Phases		6			8	
Actuated Green, G (s)	90.4	98.0	98.0	8.0	8.0	8.0
Effective Green, g (s)	93.4	101.0	101.0	11.0	11.0	11.0
Actuated g/C Ratio	0.78	0.84	0.84	0.09	0.09	0.09
Clearance Time (s)	7.0	4.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3916	164	4013	160	146	146
v/s Ratio Prot	c0.54	0.01	c0.18	c0.02		
v/s Ratio Perm		0.11			0.00	
v/c Ratio	0.69	0.14	0.22	0.17	0.03	
Uniform Delay, d1	6.3	6.0	1.8	50.3	49.6	
Progression Factor	0.13	4.96	1.01	1.00	1.00	
Incremental Delay, d2	0.4	0.4	0.1	0.5	0.1	
Delay (s)	1.2	30.0	2.0	50.8	49.7	
Level of Service	A	C	A	D	D	
Approach Delay (s)	1.2		2.7	50.1		
Approach LOS	A		A	D		
Intersection Summary						
HCM 2000 Control Delay		2.5			HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.61				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	9.0
Intersection Capacity Utilization		67.2%			ICU Level of Service	C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/20/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	320	1811	565	136	621	268	149	840	204	303	970	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	4.0	1.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5043	1570	1573	4577		3340	3411	1541	1630	3411	1458
Flt Permitted	0.21	1.00	1.00	0.10	1.00		0.95	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)	387	5043	1570	158	4577		3340	3411	1541	234	3411	1458
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)	320	1811	565	136	621	268	149	840	204	303	970	135
RTOR Reduction (vph)	0	0	157	0	64	0	0	0	98	0	0	90
Lane Group Flow (vph)	320	1811	408	136	825	0	149	840	106	303	970	45
Heavy Vehicles (%)	2%	4%	4%	16%	10%	8%	6%	7%	6%	12%	7%	12%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	55.4	44.9	44.9	45.4	38.9		10.0	35.6	35.6	47.6	36.6	36.6
Effective Green, g (s)	58.4	47.9	47.9	51.4	41.9		13.0	38.6	38.6	53.6	39.6	39.6
Actuated g/C Ratio	0.49	0.40	0.40	0.43	0.35		0.11	0.32	0.32	0.45	0.33	0.33
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	369	2012	626	179	1598		361	1097	495	267	1125	481
v/s Ratio Prot	c0.11	c0.36		0.06	0.18		0.04	0.25		c0.13	c0.28	
v/s Ratio Perm	0.31		0.26	0.26					0.07	0.37		0.03
v/c Ratio	0.87	0.90	0.65	0.76	0.52		0.41	0.77	0.21	1.13	0.86	0.09
Uniform Delay, d1	21.1	33.8	29.3	26.8	31.0		49.9	36.6	29.6	29.4	37.6	27.8
Progression Factor	0.73	0.57	0.45	1.00	1.00		1.00	1.00	1.00	0.90	0.95	1.99
Incremental Delay, d2	14.9	5.4	4.0	16.8	1.2		0.8	3.2	0.2	94.2	6.5	0.1
Delay (s)	30.3	24.7	17.1	43.6	32.2		50.7	39.9	29.9	120.7	42.3	55.5
Level of Service	C	C	B	D	C		D	D	C	F	D	E
Approach Delay (s)		23.8			33.7			39.5			60.5	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			36.5		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					10.0		
Intersection Capacity Utilization			95.9%		ICU Level of Service					F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/20/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	117	131	0	1297	1288	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3372	1516		5092	3544	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3372	1516		5092	3544	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	117	131	0	1297	1288	0
RTOR Reduction (vph)	0	75	0	0	0	0
Lane Group Flow (vph)	117	56	0	1297	1288	0
Confl. Peds. (#/hr)		3				
Heavy Vehicles (%)	5%	6%	0%	3%	3%	44%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0		57.0	57.0	
Effective Green, g (s)	19.0	19.0		60.0	60.0	
Actuated g/C Ratio	0.22	0.22		0.71	0.71	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	753	338		3594	2501	
v/s Ratio Prot	0.03			0.25	c0.36	
v/s Ratio Perm		c0.04				
v/c Ratio	0.16	0.16		0.36	0.51	
Uniform Delay, d1	26.5	26.6		4.9	5.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.0		0.3	0.8	
Delay (s)	27.0	27.7		5.2	6.5	
Level of Service	C	C		A	A	
Approach Delay (s)	27.3			5.2	6.5	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay		7.8		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.43				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)	6.0	
Intersection Capacity Utilization		50.7%		ICU Level of Service	A	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

21: Bronte Rd & Burnhamthorpe Road

8/20/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	67	179	1222	28	77	1313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.21	1.00
Satd. Flow (perm)	1789	1601	3579	1601	391	3579
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	179	1222	28	77	1313
RTOR Reduction (vph)	0	76	0	3	0	0
Lane Group Flow (vph)	67	103	1222	25	77	1313
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	12.8	12.8	93.2	93.2	93.2	93.2
Effective Green, g (s)	15.8	15.8	96.2	96.2	96.2	96.2
Actuated g/C Ratio	0.13	0.13	0.80	0.80	0.80	0.80
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	210	2869	1283	313	2869
v/s Ratio Prot	0.04		0.34			c0.37
v/s Ratio Perm		c0.06		0.02	0.20	
v/c Ratio	0.29	0.49	0.43	0.02	0.25	0.46
Uniform Delay, d1	47.0	48.4	3.6	2.4	2.9	3.7
Progression Factor	1.00	1.00	1.11	0.51	1.00	1.00
Incremental Delay, d2	0.7	1.8	0.3	0.0	1.9	0.5
Delay (s)	47.7	50.2	4.2	1.2	4.8	4.3
Level of Service	D	D	A	A	A	A
Approach Delay (s)	49.5		4.2			4.3
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.46			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			53.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	260	958	2418	186	81	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1755	3544	3544	1551	1807	1585
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	94	3544	3544	1551	1807	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	260	958	2418	186	81	317
RTOR Reduction (vph)	0	0	0	38	0	4
Lane Group Flow (vph)	260	958	2418	148	81	313
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	4%	3%	3%	3%	1%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	94.0	94.0	74.2	74.2	12.0	27.8
Effective Green, g (s)	97.0	97.0	77.2	77.2	15.0	33.8
Actuated g/C Ratio	0.81	0.81	0.64	0.64	0.12	0.28
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	336	2864	2279	997	225	446
v/s Ratio Prot	c0.12	0.27	c0.68		0.04	c0.11
v/s Ratio Perm	0.50			0.10		0.09
v/c Ratio	0.77	0.33	1.06	0.15	0.36	0.70
Uniform Delay, d1	40.6	3.0	21.4	8.4	48.1	38.6
Progression Factor	1.00	1.00	1.56	2.53	1.00	1.00
Incremental Delay, d2	10.6	0.3	28.6	0.0	1.0	5.0
Delay (s)	51.2	3.3	61.9	21.3	49.1	43.6
Level of Service	D	A	E	C	D	D
Approach Delay (s)		13.5	59.0		44.7	
Approach LOS		B	E		D	
Intersection Summary						
HCM 2000 Control Delay		44.5		HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio		0.95				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.0
Intersection Capacity Utilization		103.7%		ICU Level of Service		G
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	33	1015	2516	83	100	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	3471	1601
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	102	3579	3579	1601	3471	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	33	1015	2516	83	100	80
RTOR Reduction (vph)	0	0	0	16	0	2
Lane Group Flow (vph)	33	1015	2516	67	100	78
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	79.0	79.0	70.2	70.2	27.0	31.8
Effective Green, g (s)	82.0	82.0	73.2	73.2	30.0	37.8
Actuated g/C Ratio	0.68	0.68	0.61	0.61	0.25	0.31
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	2445	2183	976	867	504
v/s Ratio Prot	0.01	c0.28	c0.70		0.03	c0.01
v/s Ratio Perm	0.11			0.04		0.04
v/c Ratio	0.18	0.42	1.15	0.07	0.12	0.15
Uniform Delay, d1	27.0	8.4	23.4	9.5	34.8	29.6
Progression Factor	1.49	1.32	0.62	0.47	1.00	1.00
Incremental Delay, d2	0.5	0.5	71.8	0.1	0.3	0.1
Delay (s)	40.9	11.6	86.3	4.5	35.0	29.7
Level of Service	D	B	F	A	D	C
Approach Delay (s)		12.5	83.7		32.7	
Approach LOS		B	F		C	
Intersection Summary						
HCM 2000 Control Delay		61.8		HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio		0.83				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.0
Intersection Capacity Utilization		84.5%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

8/20/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	9	1024	82	118	2456	6	53	0	82	43	1	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1644	3544	1633	1825	3544	1228	1772	1585	1738	1604	1604	1604
Flt Permitted	0.05	1.00	1.00	0.24	1.00	1.00	0.62	1.00	0.76	1.00	1.00	0.76
Satd. Flow (perm)	80	3544	1633	468	3544	1228	1157	1585	1385	1604	1604	1604
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)	9	1024	82	118	2456	6	53	0	82	43	1	90
RTOR Reduction (vph)	0	0	23	0	0	1	0	0	72	0	79	0
Lane Group Flow (vph)	9	1024	59	118	2456	5	53	0	10	43	12	0
Heavy Vehicles (%)	11%	3%	0%	0%	3%	33%	3%	0%	3%	5%	0%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	Perm	Perm	Perm	NA	NA
Protected Phases	5	2	1	6	6	8	8	8	4	4	4	4
Permitted Phases	2	2	6	6	6	8	8	8	4	4	4	4
Actuated Green, G (s)	84.8	83.6	83.6	94.5	89.3	89.3	11.5	11.5	11.5	11.5	11.5	11.5
Effective Green, g (s)	90.8	86.6	86.6	97.5	92.3	92.3	14.5	14.5	14.5	14.5	14.5	14.5
Actuated g/C Ratio	0.76	0.72	0.72	0.81	0.77	0.77	0.12	0.12	0.12	0.12	0.12	0.12
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	115	2557	1178	492	2725	944	139	191	167	193	193	193
v/s Ratio Prot	0.00	0.29	0.02	c0.02	c0.69	0.00	c0.05	0.01	0.03	0.01	0.01	0.01
v/s Ratio Perm	0.06	0.04	0.04	0.17	0.00	c0.05	0.01	0.03	0.03	0.03	0.03	0.03
v/c Ratio	0.08	0.40	0.05	0.24	0.90	0.00	0.38	0.05	0.26	0.06	0.06	0.06
Uniform Delay, d1	19.5	6.5	4.8	2.9	10.4	3.2	48.6	46.7	47.9	46.7	46.7	46.7
Progression Factor	0.84	0.78	0.61	1.16	1.61	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	0.1	0.2	4.6	0.0	1.7	0.1	0.8	0.1	0.1	0.1
Delay (s)	16.7	5.6	3.0	3.6	21.4	3.2	50.4	46.8	48.7	46.9	46.9	46.9
Level of Service	B	A	A	A	C	A	D	D	D	D	D	D
Approach Delay (s)	5.5	20.5	48.2	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4
Approach LOS	A	C	D	D	D	D	D	D	D	D	D	D
Intersection Summary												
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B									
HCM 2000 Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0									
Intersection Capacity Utilization	92.5%	ICU Level of Service	F									
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

8/20/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	1131	22	53	2507	48	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	1.0	4.0	3.0	3.0	3.0
Lane Util. Factor	0.91	1.00	0.91	1.00	1.00	1.00
Flt	1.00	1.00	1.00	1.00	0.85	0.85
Flt Protected	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	5080	1706	5092	1789	1512	1512
Flt Permitted	1.00	0.22	1.00	0.95	1.00	1.00
Satd. Flow (perm)	5080	396	5092	1789	1512	1512
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1131	22	53	2507	48	38
RTOR Reduction (vph)	1	0	0	0	0	34
Lane Group Flow (vph)	1152	0	53	2507	48	4
Heavy Vehicles (%)	3%	0%	7%	3%	2%	8%
Turn Type	NA	pm+pt	NA	NA	Perm	Perm
Protected Phases	2	1	6	8	8	8
Permitted Phases	6	6	8	8	8	8
Actuated Green, G (s)	89.6	98.6	98.6	8.4	8.4	8.4
Effective Green, g (s)	92.6	101.6	101.6	11.4	11.4	11.4
Actuated g/C Ratio	0.77	0.85	0.85	0.10	0.10	0.10
Clearance Time (s)	7.0	4.0	7.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3920	422	4311	169	143	143
v/s Ratio Prot	0.23	0.01	c0.49	c0.03	0.00	0.00
v/s Ratio Perm	0.10	0.10	0.10	0.10	0.10	0.10
v/c Ratio	0.29	0.13	0.58	0.28	0.03	0.03
Uniform Delay, d1	4.0	1.6	2.8	50.5	49.3	49.3
Progression Factor	1.43	0.46	0.38	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.0	0.2	0.9	0.1	0.1
Delay (s)	6.0	0.8	1.3	51.4	49.3	49.3
Level of Service	A	A	A	D	D	D
Approach Delay (s)	6.0	1.3	50.5	50.5	50.5	50.5
Approach LOS	A	A	D	D	D	D
Intersection Summary						
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A			
HCM 2000 Volume to Capacity ratio	0.56					
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0			
Intersection Capacity Utilization	63.4%	ICU Level of Service	B			
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/20/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰		↰	↰↰↰	↰	↰	↰↰↰	↰
Volume (vph)	112	877	209	152	1726	260	469	878	128	270	809	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	4.0	1.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5092	1633	1755	5041		3506	3544	1526	1825	3544	1541
Flt Permitted	0.09	1.00	1.00	0.21	1.00		0.95	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	176	5092	1633	394	5041		3506	3544	1526	244	3544	1541
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)	112	877	209	152	1726	260	469	878	128	270	809	301
RTOR Reduction (vph)	0	0	135	0	16	0	0	0	87	0	0	82
Lane Group Flow (vph)	112	877	74	152	1970	0	469	878	41	270	809	219
Heavy Vehicles (%)	2%	3%	0%	4%	2%	2%	1%	3%	7%	0%	3%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	46.4	39.7	39.7	51.0	42.0		15.0	35.7	35.7	47.9	34.3	34.3
Effective Green, g (s)	52.4	42.7	42.7	55.7	45.0		18.0	38.7	38.7	53.9	37.3	37.3
Actuated g/C Ratio	0.44	0.36	0.36	0.46	0.38		0.15	0.32	0.32	0.45	0.31	0.31
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	1811	581	318	1890		525	1142	492	328	1101	478
v/s Ratio Prot	c0.04	0.17		c0.05	c0.39		c0.13	c0.25		0.11	0.23	
v/s Ratio Perm	0.19		0.05	0.17					0.03	0.26		0.14
v/c Ratio	0.54	0.48	0.13	0.48	1.04		0.89	0.77	0.08	0.82	0.73	0.46
Uniform Delay, d1	26.9	30.1	26.1	19.9	37.5		50.1	36.6	28.3	27.5	36.9	33.2
Progression Factor	1.92	0.94	1.66	1.00	1.00		1.00	1.00	1.00	0.86	0.96	1.00
Incremental Delay, d2	2.8	0.9	0.4	1.1	32.7		17.4	3.2	0.1	14.1	2.4	0.6
Delay (s)	54.5	29.3	43.9	21.1	70.2		67.4	39.8	28.4	37.9	37.6	33.7
Level of Service	D	C	D	C	E		E	D	C	D	D	C
Approach Delay (s)		34.2			66.7			47.6			36.8	
Approach LOS		C			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			49.2		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			97.9%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

2021
Future Background Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	200	476	0	1004	1803	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.91		0.91	*1.00	
Frt	0.92	0.85		1.00	0.99	
Flt Protected	0.98	1.00		1.00	1.00	
Satd. Flow (prot)	3240	1471		4995	3567	
Flt Permitted	0.98	1.00		1.00	1.00	
Satd. Flow (perm)	3240	1471		4995	3567	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	476	0	1004	1803	154
RTOR Reduction (vph)	16	16	0	0	8	0
Lane Group Flow (vph)	422	222	0	1004	1949	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	22.0	22.0		51.0	51.0	
Effective Green, g (s)	25.0	25.0		54.0	54.0	
Actuated g/C Ratio	0.29	0.29		0.64	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	952	432		3173	2266	
v/s Ratio Prot	0.13			0.20	c0.55	
v/s Ratio Perm		c0.15				
v/c Ratio	0.44	0.51		0.32	0.86	
Uniform Delay, d1	24.3	24.9		7.1	12.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	4.3		0.3	4.6	
Delay (s)	25.8	29.3		7.3	17.0	
Level of Service	C	C		A	B	
Approach Delay (s)	27.0			7.3	17.0	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay		16.2		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.75				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		81.1%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

8/29/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	46	60	389	242	223	546
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.7	3.7	3.7
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1566	1775		1789	1865
Flt Permitted	0.95	1.00	1.00		0.40	1.00
Satd. Flow (perm)	1750	1566	1775		749	1865
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	46	60	389	242	223	546
RTOR Reduction (vph)	0	55	15	0	0	0
Lane Group Flow (vph)	46	5	616	0	223	546
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	NA	custom	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Actuated Green, G (s)	6.5	6.5	61.5		61.5	61.5
Effective Green, g (s)	6.5	6.5	61.5		61.5	61.5
Actuated g/C Ratio	0.08	0.08	0.77		0.77	0.77
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	142	127	1364		575	1433
v/s Ratio Prot			c0.35			0.29
v/s Ratio Perm	c0.03	0.00			0.30	
v/c Ratio	0.32	0.04	0.45		0.39	0.38
Uniform Delay, d1	34.7	33.9	3.3		3.0	3.0
Progression Factor	0.97	1.79	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.1	1.1		2.0	0.8
Delay (s)	35.0	60.6	4.4		5.0	3.8
Level of Service	C	E	A		A	A
Approach Delay (s)	49.5		4.4			4.2
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			7.4	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.44			
Actuated Cycle Length (s)			80.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization			65.9%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
15: Avenue Two & Burnhamthorpe Road

8/29/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Volume (vph)	430	52	266	319	200	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.50	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	924	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	430	52	266	319	200	242
RTOR Reduction (vph)	0	18	0	0	0	198
Lane Group Flow (vph)	430	34	266	319	200	44
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2		6			
Permitted Phases	2		6		8	
Actuated Green, G (s)	51.6	51.6	51.6	51.6	14.4	14.4
Effective Green, g (s)	51.6	51.6	51.6	51.6	14.4	14.4
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2257	1010	595	2257	315	281
v/s Ratio Prot	0.12		0.09			
v/s Ratio Perm	0.02		c0.29		c0.11	
v/c Ratio	0.19	0.03	0.45	0.14	0.63	0.16
Uniform Delay, d1	5.7	5.2	7.1	5.5	30.4	27.7
Progression Factor	1.00	1.01	1.76	1.65	1.00	1.00
Incremental Delay, d2	0.2	0.1	2.3	0.1	4.1	0.3
Delay (s)	5.9	5.3	14.8	9.3	34.5	27.9
Level of Service	A	A	B	A	C	C
Approach Delay (s)	5.8		11.8		30.9	
Approach LOS	A		B		C	
Intersection Summary						
HCM 2000 Control Delay			15.5	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			80.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			55.2%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
17: Avenue Three & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	529	54	244	752	13	96	91	185	2	8	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3451		1750	3500	1566	1750	1842	1566	1750	1842	
Flt Permitted	0.33	1.00		0.42	1.00	1.00	0.75	1.00	1.00	0.70	1.00	
Satd. Flow (perm)	609	3451		776	3500	1566	1386	1842	1566	1286	1842	
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)	14	529	54	244	752	13	96	91	185	2	8	0
RTOR Reduction (vph)	0	10	0	0	0	6	0	0	127	0	0	0
Lane Group Flow (vph)	14	573	0	244	752	7	96	91	58	2	8	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	2			6		8		8		4		
Permitted Phases	2			6		8		8		4		
Actuated Green, G (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51	0.51	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	312	1768		397	1793	802	433	575	489	401	575	
v/s Ratio Prot	0.17			0.21		0.05		0.05		0.00		
v/s Ratio Perm	0.02			c0.31		0.00		c0.07		0.04		
v/c Ratio	0.04	0.32		0.61	0.42	0.01	0.22	0.16	0.12	0.00	0.01	
Uniform Delay, d1	9.7	11.4		13.9	12.1	9.5	20.3	19.9	19.6	18.9	19.0	
Progression Factor	1.46	1.32		1.26	1.14	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.5		6.6	0.7	0.0	1.2	0.6	0.5	0.0	0.0	
Delay (s)	14.5	15.6		24.0	14.5	9.6	21.5	20.5	20.1	19.0	19.0	
Level of Service	B	B		C	B	A	C	C	C	B	B	
Approach Delay (s)	15.6			16.8		20.6		20.6		19.0		
Approach LOS	B			B		C		C		B		
Intersection Summary												
HCM 2000 Control Delay	17.1		HCM 2000 Level of Service		B							
HCM 2000 Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	80.0		Sum of lost time (s)		14.0							
Intersection Capacity Utilization	59.3%		ICU Level of Service		B							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Avenue Four & Burnhamthorpe Road

8/29/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Volume (vph)	607	107	221	964	45	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.42	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	778	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	607	107	221	964	45	184
RTOR Reduction (vph)	0	29	0	0	0	166
Lane Group Flow (vph)	607	78	221	964	45	18
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2			6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	58.0	58.0	58.0	58.0	8.0	8.0
Effective Green, g (s)	58.0	58.0	58.0	58.0	8.0	8.0
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.10	0.10
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2537	1135	564	2537	175	156
v/s Ratio Prot	0.17			0.28		
v/s Ratio Perm		0.05	c0.28		c0.03	0.01
v/c Ratio	0.24	0.07	0.39	0.38	0.26	0.12
Uniform Delay, d1	3.7	3.2	4.2	4.2	33.3	32.8
Progression Factor	2.45	5.96	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	2.0	0.4	0.8	0.3
Delay (s)	9.2	19.1	6.3	4.6	34.0	33.1
Level of Service	A	B	A	A	C	C
Approach Delay (s)	10.7			4.9	33.3	
Approach LOS	B			A	C	
Intersection Summary						
HCM 2000 Control Delay			9.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			49.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
21: Bronte Rd & Burnhamthorpe Road

8/29/2013

	↖	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↑	↘	↑↑	↑	↘	↑↑	↑	↘	↑↑	↑
Volume (vph)	110	627	74	37	595	99	188	1394	109	405	1345	441
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3500	1566	1789	3579	1601	1789	3579	1601	1789	3579	1601
Flt Permitted	0.18	1.00	1.00	0.95	1.00	1.00	0.09	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	325	3500	1566	1789	3579	1601	177	3579	1601	138	3579	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	110	627	74	37	595	99	188	1394	109	405	1345	441
RTOR Reduction (vph)	0	0	49	0	0	42	0	0	38	0	0	54
Lane Group Flow (vph)	110	627	25	37	595	57	188	1394	71	405	1345	387
Turn Type	pm+pt	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases	4		4			8	2		2	6		6
Actuated Green, G (s)	31.8	25.8	40.0	6.0	25.8	49.3	64.9	50.7	56.7	78.2	60.0	60.0
Effective Green, g (s)	37.8	28.8	40.0	9.0	28.8	49.3	70.9	53.7	56.7	81.2	63.0	60.0
Actuated g/C Ratio	0.30	0.23	0.31	0.07	0.23	0.39	0.55	0.42	0.44	0.63	0.49	0.47
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	196	787	489	125	805	616	314	1501	709	429	1761	750
v/s Ratio Prot	c0.04	c0.18	0.01	0.02	0.17	0.02	0.08	c0.39	0.00	c0.20	0.38	
v/s Ratio Perm	0.13		0.01			0.02	0.25		0.04	0.40		0.24
v/c Ratio	0.56	0.80	0.05	0.30	0.74	0.09	0.60	0.93	0.10	0.94	0.76	0.52
Uniform Delay, d1	35.2	46.8	30.7	56.5	46.1	25.1	22.2	35.3	20.8	40.8	26.4	23.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6	5.6	0.0	1.3	3.6	0.1	3.1	11.5	0.1	29.5	3.2	2.5
Delay (s)	38.9	52.5	30.8	57.8	49.7	25.2	25.2	46.8	20.8	70.3	29.7	26.3
Level of Service	D	D	C	E	D	C	C	D	C	E	C	C
Approach Delay (s)		48.6			46.8			42.8			36.5	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.6		HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			128.0		Sum of lost time (s)			16.0				
Intersection Capacity Utilization			96.8%		ICU Level of Service			F				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	568	2571	809	63	262	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.20	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	366	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	568	2571	809	63	262	330
RTOR Reduction (vph)	0	0	0	39	0	13
Lane Group Flow (vph)	568	2571	809	24	262	317
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	83.7	83.7	45.7	45.7	22.3	56.3
Effective Green, g (s)	86.7	86.7	48.7	45.7	25.3	56.3
Actuated g/C Ratio	0.72	0.72	0.41	0.38	0.21	0.47
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	3.0
Lane Grp Cap (vph)	697	3002	1654	603	373	743
v/s Ratio Prot	0.25	c0.62	0.20		c0.15	0.12
v/s Ratio Perm	0.34			0.02		0.08
v/c Ratio	0.81	0.86	0.49	0.04	0.70	0.43
Uniform Delay, d1	20.3	12.1	26.4	23.4	43.9	21.1
Progression Factor	1.00	1.00	0.83	1.73	1.00	1.00
Incremental Delay, d2	7.3	3.4	1.0	0.1	5.5	0.4
Delay (s)	27.5	15.5	22.9	40.6	49.3	21.5
Level of Service	C	B	C	D	D	C
Approach Delay (s)		17.7	24.2		33.8	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			21.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.85			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			72.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	218	2615	813	366	44	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	7.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.23	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	436	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	218	2615	813	366	44	59
RTOR Reduction (vph)	0	0	0	186	0	43
Lane Group Flow (vph)	218	2615	813	180	44	16
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	74.0	74.0	58.9	58.9	32.0	32.0
Effective Green, g (s)	77.0	77.0	61.9	58.9	32.0	32.0
Actuated g/C Ratio	0.64	0.64	0.52	0.49	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	442	2666	2103	801	486	435
v/s Ratio Prot	0.06	c0.63	0.20		c0.02	
v/s Ratio Perm	0.26			0.11		0.01
v/c Ratio	0.49	0.98	0.39	0.22	0.09	0.04
Uniform Delay, d1	9.7	20.8	17.6	17.5	33.1	32.6
Progression Factor	1.39	1.23	0.99	2.95	1.00	1.00
Incremental Delay, d2	0.5	9.0	0.5	0.6	0.4	0.2
Delay (s)	14.0	34.5	18.0	52.2	33.4	32.7
Level of Service	B	C	B	D	C	C
Approach Delay (s)		32.9	28.6		33.0	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay			31.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  							
Volume (vph)	216	2429	47	51	1014	251	93	70	140	61	19	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	7.0	1.0	4.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.22	1.00	1.00	0.05	1.00	1.00	0.75	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	414	4156	1512	82	4078	1633	1313	1921	1585	1065	1921	1633
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)	216	2429	47	51	1014	251	93	70	140	61	19	57
RTOR Reduction (vph)	0	0	18	0	0	78	0	0	123	0	0	45
Lane Group Flow (vph)	216	2429	29	51	1014	173	93	70	17	61	19	12
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	2	2	1	6	6	8	8	7	4	4	4	4
Permitted Phases	2	2	6	6	8	8	8	4	4	4	4	4
Actuated Green, G (s)	73.1	73.1	73.1	82.7	82.7	82.7	14.5	14.5	14.5	24.3	24.3	24.3
Effective Green, g (s)	76.1	76.1	73.1	85.7	85.7	82.7	14.5	14.5	14.5	24.3	24.3	24.3
Actuated g/C Ratio	0.63	0.63	0.61	0.71	0.71	0.69	0.12	0.12	0.12	0.20	0.20	0.20
Clearance Time (s)	7.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	262	2635	921	160	2912	1125	158	232	191	244	389	330
v/s Ratio Prot		c0.58		0.02	c0.25			0.04		c0.01	0.01	
v/s Ratio Perm	0.52		0.02	0.20		0.11	c0.07		0.01	0.04		0.01
v/c Ratio	0.82	0.92	0.03	0.32	0.35	0.15	0.59	0.30	0.09	0.25	0.05	0.03
Uniform Delay, d1	16.8	19.3	9.3	23.6	6.5	6.5	49.9	48.1	46.9	39.6	38.5	38.4
Progression Factor	0.61	0.63	1.00	2.68	1.34	4.05	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	2.4	0.0	1.0	0.3	0.3	5.5	0.7	0.2	0.5	0.1	0.0
Delay (s)	19.4	14.6	9.4	64.4	9.0	26.6	55.4	48.9	47.1	40.1	38.6	38.5
Level of Service	B	B	A	E	A	C	E	D	D	D	D	D
Approach Delay (s)		14.9			14.5			50.1			39.2	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay	17.9			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.79											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	76.3%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↗↗↗		↵	↗↗↗	↗	↵	↗		↗↗	↗	
Volume (vph)	208	2389	56	23	1167	156	86	39	44	50	12	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		4.0	4.0	7.0	7.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	1.00		1.00	1.00	0.85	1.00	0.92		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4103		1362	4078	1601	1825	1752		3471	1642	
Flt Permitted	0.13	1.00		0.06	1.00	1.00	0.70	1.00		0.95	1.00	
Satd. Flow (perm)	253	4103		82	4078	1601	1352	1752		3471	1642	
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)	208	2389	56	23	1167	156	86	39	44	50	12	70
RTOR Reduction (vph)	0	1	0	0	0	48	0	26	0	0	57	0
Lane Group Flow (vph)	208	2444	0	23	1167	108	86	57	0	50	25	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		6	8					
Actuated Green, G (s)	83.7	83.7		67.1	67.1	67.1	13.5	13.5		4.8	22.3	
Effective Green, g (s)	86.7	86.7		70.1	70.1	67.1	13.5	13.5		4.8	22.3	
Actuated g/C Ratio	0.72	0.72		0.58	0.58	0.56	0.11	0.11		0.04	0.19	
Clearance Time (s)	4.0	7.0		7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	382	2964		47	2382	895	152	197		138	305	
v/s Ratio Prot	0.07	c0.60			0.29			0.03		c0.01	0.02	
v/s Ratio Perm	0.32			0.28		0.07	c0.06					
v/c Ratio	0.54	0.82		0.49	0.49	0.12	0.57	0.29		0.36	0.08	
Uniform Delay, d1	8.5	11.4		14.5	14.5	12.5	50.5	48.9		56.1	40.4	
Progression Factor	2.77	1.09		1.34	1.48	2.33	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.4		19.2	0.4	0.2	4.8	0.8		1.6	0.1	
Delay (s)	24.3	13.9		38.7	22.0	29.3	55.2	49.7		57.7	40.5	
Level of Service	C	B		D	C	C	E	D		E	D	
Approach Delay (s)		14.7			23.1			52.5			47.0	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay	19.8			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	88.0%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰↰	↰↰	↰	↰	↰↰↰	↰
Volume (vph)	311	1533	640	136	648	358	560	1022	257	249	1068	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75		*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	3899		3444	3730	1555	1755	3625	1512
Flt Permitted	0.10	1.00	1.00	0.10	1.00		0.95	1.00	1.00	0.12	1.00	1.00
Satd. Flow (perm)	182	4117	1601	167	3899		3444	3730	1555	227	3625	1512
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)	311	1533	640	136	648	358	560	1022	257	249	1068	139
RTOR Reduction (vph)	0	0	40	0	83	0	0	0	106	0	0	76
Lane Group Flow (vph)	311	1533	600	136	923	0	560	1022	151	249	1068	63
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	47.2	38.9	54.9	43.2	36.9		16.0	40.1	40.1	49.5	36.8	36.8
Effective Green, g (s)	52.2	41.9	54.9	49.2	39.9		19.0	43.1	40.1	55.5	39.8	36.8
Actuated g/C Ratio	0.44	0.35	0.46	0.41	0.33		0.16	0.36	0.33	0.46	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	228	1437	732	178	1296		545	1339	519	304	1202	463
v/s Ratio Prot	c0.13	c0.37	0.11	0.06	0.24		c0.16	0.27		0.11	c0.29	
v/s Ratio Perm	0.46		0.27	0.25					0.10	0.27		0.04
v/c Ratio	1.36	1.07	0.82	0.76	0.71		1.03	0.76	0.29	0.82	0.89	0.14
Uniform Delay, d1	31.9	39.0	28.3	28.7	35.0		50.5	33.9	29.5	26.4	38.0	30.1
Progression Factor	1.42	0.99	0.62	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	179.5	39.0	4.4	17.5	3.3		45.8	2.6	0.3	15.6	8.3	0.1
Delay (s)	224.9	77.5	21.9	46.2	38.4		96.3	36.6	29.8	42.1	46.3	30.2
Level of Service	F	E	C	D	D		F	D	C	D	D	C
Approach Delay (s)		81.7			39.3			53.8			44.0	
Approach LOS		F			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			59.4		HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				13.0			
Intersection Capacity Utilization			96.6%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/21/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↘	↑	↘	↑
Volume (veh/h)	0	0	8	0	0	118
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	8	0	0	118
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLT		TWLT			
Median storage (veh)	2		2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			0		16	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					16	
vCu, unblocked vol			0		16	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	89
cM capacity (veh/h)			1623		978	1085
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	0	0	8	0	0	118
Volume Left	0	0	8	0	0	0
Volume Right	0	0	0	0	0	118
cSH	1700	1700	1623	1700	1700	1085
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.11
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.0	2.8
Control Delay (s)	0.0	0.0	7.2	0.0	0.0	8.7
Lane LOS			A		A	A
Approach Delay (s)	0.0		7.2		8.7	
Approach LOS					A	
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			10.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/30/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	568	2571	809	63	262	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.20	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	379	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	568	2571	809	63	262	330
RTOR Reduction (vph)	0	0	0	38	0	0
Lane Group Flow (vph)	568	2571	809	25	262	330
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	83.7	83.7	48.1	48.1	22.3	120.0
Effective Green, g (s)	86.7	86.7	51.1	48.1	25.3	120.0
Actuated g/C Ratio	0.72	0.72	0.43	0.40	0.21	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	
Lane Grp Cap (vph)	675	3002	1736	635	373	1585
v/s Ratio Prot	0.24	c0.62	0.20		c0.15	
v/s Ratio Perm	0.36			0.02		0.21
v/c Ratio	0.84	0.86	0.47	0.04	0.70	0.21
Uniform Delay, d1	20.3	12.1	24.7	21.9	43.9	0.0
Progression Factor	1.00	1.00	0.90	1.91	1.00	1.00
Incremental Delay, d2	9.3	3.4	0.9	0.1	5.5	0.3
Delay (s)	29.6	15.5	23.1	42.0	49.3	0.3
Level of Service	C	B	C	D	D	A
Approach Delay (s)		18.1	24.5		22.0	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay		19.8		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.83				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	9.0	
Intersection Capacity Utilization		72.7%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/30/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	311	1533	640	136	648	358	560	1022	257	249	1068	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.25	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	473	4117	1601	159	4078	1585	3444	3730	1555	3510	3625	1512
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)	311	1533	640	136	648	358	560	1022	257	249	1068	139
RTOR Reduction (vph)	0	0	40	0	0	189	0	0	89	0	0	76
Lane Group Flow (vph)	311	1533	600	136	648	169	560	1022	168	249	1068	63
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	45.2	38.9	54.9	45.2	38.9	38.9	16.0	40.5	40.5	12.3	36.8	36.8
Effective Green, g (s)	51.2	41.9	54.9	51.2	41.9	38.9	19.0	43.5	40.5	15.3	39.8	36.8
Actuated g/C Ratio	0.43	0.35	0.46	0.43	0.35	0.32	0.16	0.36	0.34	0.13	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	302	1437	732	178	1423	513	545	1352	524	447	1202	463
v/s Ratio Prot	c0.08	c0.37	0.11	0.06	0.16		c0.16	0.27		0.07	c0.29	
v/s Ratio Perm	0.36		0.27	0.27		0.11			0.11			0.04
v/c Ratio	1.03	1.07	0.82	0.76	0.46	0.33	1.03	0.76	0.32	0.56	0.89	0.14
Uniform Delay, d1	30.4	39.0	28.3	28.1	30.2	30.7	50.5	33.6	29.5	49.2	38.0	30.1
Progression Factor	0.93	0.96	0.57	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.3	39.0	4.4	17.5	1.1	1.7	45.8	2.5	0.4	1.5	8.3	0.1
Delay (s)	75.6	76.4	20.5	45.6	31.3	32.4	96.3	36.0	29.9	50.7	46.3	30.2
Level of Service	E	E	C	D	C	C	F	D	C	D	D	C
Approach Delay (s)		61.9			33.3			53.5			45.5	
Approach LOS		E			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		51.5		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				13.0				
Intersection Capacity Utilization		96.0%		ICU Level of Service				F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

9/4/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	116	210	0	1820	1489	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		3.0	6.0	
Lane Util. Factor	0.97	0.91		0.91	0.95	
Frt	0.93	0.85		1.00	1.00	
Flt Protected	0.97	1.00		1.00	1.00	
Satd. Flow (prot)	3255	1471		4995	3405	
Flt Permitted	0.97	1.00		1.00	1.00	
Satd. Flow (perm)	3255	1471		4995	3405	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	116	210	0	1820	1489	32
RTOR Reduction (vph)	45	45	0	0	2	0
Lane Group Flow (vph)	176	60	0	1820	1519	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0		57.0	57.0	
Effective Green, g (s)	16.0	16.0		60.0	57.0	
Actuated g/C Ratio	0.19	0.19		0.71	0.67	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	612	276		3525	2283	
v/s Ratio Prot	c0.05			0.36	c0.45	
v/s Ratio Perm		0.04				
v/c Ratio	0.29	0.22		0.52	0.67	
Uniform Delay, d1	29.6	29.2		5.8	8.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	1.8		0.5	1.6	
Delay (s)	30.8	31.0		6.3	9.9	
Level of Service	C	C		A	A	
Approach Delay (s)	30.8			6.3	9.9	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay		10.0		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.58				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		60.8%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

9/4/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	326	211	454	36	86	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.7	3.7	3.7
Total Lost time (s)	4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1566	1848		1789	1865
Flt Permitted	0.95	1.00	1.00		0.42	1.00
Satd. Flow (perm)	1750	1566	1848		794	1865
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	326	211	454	36	86	413
RTOR Reduction (vph)	0	157	2	0	0	0
Lane Group Flow (vph)	326	54	488	0	86	413
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	NA	custom	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Actuated Green, G (s)	20.5	20.5	47.5		47.5	47.5
Effective Green, g (s)	22.5	20.5	47.5		47.5	47.5
Actuated g/C Ratio	0.28	0.26	0.59		0.59	0.59
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	492	401	1097		471	1107
v/s Ratio Prot			c0.26			0.22
v/s Ratio Perm	c0.19	0.03			0.11	
v/c Ratio	0.66	0.13	0.44		0.18	0.37
Uniform Delay, d1	25.4	22.9	9.0		7.4	8.5
Progression Factor	0.68	0.77	1.00		1.00	1.00
Incremental Delay, d2	3.3	0.2	1.3		0.9	1.0
Delay (s)	20.5	17.8	10.3		8.3	9.4
Level of Service	C	B	B		A	A
Approach Delay (s)	19.4		10.3			9.2
Approach LOS	B		B			A
Intersection Summary						
HCM 2000 Control Delay		13.2		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.53				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		65.8%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
15: Avenue Two & Burnhamthorpe Road

9/4/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Volume (vph)	316	231	375	538	104	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.56	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	1032	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	316	231	375	538	104	376
RTOR Reduction (vph)	0	72	0	0	0	325
Lane Group Flow (vph)	316	159	375	538	104	51
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2			6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	55.2	55.2	55.2	55.2	10.8	10.8
Effective Green, g (s)	55.2	55.2	55.2	55.2	10.8	10.8
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2415	1080	712	2415	236	211
v/s Ratio Prot	0.09			0.15		
v/s Ratio Perm		0.10	c0.36		c0.06	0.03
v/c Ratio	0.13	0.15	0.53	0.22	0.44	0.24
Uniform Delay, d1	4.2	4.3	6.0	4.5	31.8	30.9
Progression Factor	1.02	1.11	0.67	0.42	1.00	1.00
Incremental Delay, d2	0.1	0.3	2.5	0.2	1.3	0.6
Delay (s)	4.4	5.0	6.5	2.1	33.1	31.5
Level of Service	A	A	A	A	C	C
Approach Delay (s)	4.7			3.9	31.9	
Approach LOS	A			A	C	
Intersection Summary						
HCM 2000 Control Delay			11.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			52.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
17: Avenue Three & Burnhamthorpe Road

9/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↑↑	↑	↓	↑↑	↑	↓	↑	↓	↑	↑	↓
Volume (vph)	2	825	57	266	779	1	80	12	346	9	100	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		2.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3466		1750	3500	1566	1750	1842	1566	1750	1787	
Flt Permitted	0.36	1.00		0.15	1.00	1.00	0.68	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	657	3466		283	3500	1566	1247	1842	1566	1381	1787	
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)	2	825	57	266	779	1	80	12	346	9	100	25
RTOR Reduction (vph)	0	7	0	0	0	1	0	0	163	0	11	0
Lane Group Flow (vph)	2	875	0	266	779	0	80	12	183	9	114	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6		6	8		8	4		
Actuated Green, G (s)	22.0	22.0		33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	
Effective Green, g (s)	22.0	22.0		35.0	33.0	33.0	33.0	33.0	33.0	35.0	33.0	
Actuated g/C Ratio	0.28	0.28		0.44	0.41	0.41	0.41	0.41	0.41	0.44	0.41	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	180	953		288	1443	645	514	759	645	604	737	
v/s Ratio Prot		c0.25		c0.10	0.22			0.01			0.06	
v/s Ratio Perm	0.00			0.30		0.00	0.06		c0.12	0.01		
v/c Ratio	0.01	0.92		0.92	0.54	0.00	0.16	0.02	0.28	0.01	0.15	
Uniform Delay, d1	21.1	28.1		17.3	17.8	13.8	14.8	13.9	15.6	12.7	14.7	
Progression Factor	1.10	1.00		0.72	0.81	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	14.9		32.2	1.4	0.0	0.6	0.0	1.1	0.0	0.4	
Delay (s)	23.3	42.9		44.6	15.8	13.8	15.4	13.9	16.7	12.8	15.2	
Level of Service	C	D		D	B	B	B	B	B	B	B	
Approach Delay (s)		42.8			23.1			16.4			15.0	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay				28.5							C	
HCM 2000 Volume to Capacity ratio				0.58								
Actuated Cycle Length (s)				80.0							16.0	
Intersection Capacity Utilization				71.4%							C	
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Avenue Four & Burnhamthorpe Road

9/4/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1004	176	178	968	78	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	5.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.17	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	318	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1004	176	178	968	78	171
RTOR Reduction (vph)	0	45	0	0	0	143
Lane Group Flow (vph)	1004	131	178	968	78	28
Turn Type	NA	Perm	pm+pt	NA	NA	custom
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	39.0	39.0	57.1	57.1	8.9	8.9
Effective Green, g (s)	41.0	39.0	57.1	57.1	8.9	8.9
Actuated g/C Ratio	0.51	0.49	0.71	0.71	0.11	0.11
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1793	763	425	2498	194	174
v/s Ratio Prot	c0.29		0.06	c0.28		
v/s Ratio Perm		0.08	0.24		c0.04	0.02
v/c Ratio	0.56	0.17	0.42	0.39	0.40	0.16
Uniform Delay, d1	13.3	11.5	6.8	4.5	33.1	32.2
Progression Factor	0.46	0.64	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	0.7	0.5	1.4	0.4
Delay (s)	6.9	7.7	7.5	5.0	34.4	32.6
Level of Service	A	A	A	A	C	C
Approach Delay (s)	7.0			5.4	33.2	
Approach LOS	A			A	C	
Intersection Summary						
HCM 2000 Control Delay		8.8		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.53				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)	19.0	
Intersection Capacity Utilization		57.8%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
21: Bronte Rd & Burnhamthorpe Road

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	261	755	276	100	681	254	246	1391	39	150	1289	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	1.0	4.0	3.0	4.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3684	1566	1789	3767	1601	1789	3767	1601	1789	3767	1601
Flt Permitted	0.15	1.00	1.00	0.38	1.00	1.00	0.09	1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)	285	3684	1566	714	3767	1601	161	3767	1601	164	3767	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	261	755	276	100	681	254	246	1391	39	150	1289	231
RTOR Reduction (vph)	0	0	18	0	0	79	0	0	23	0	0	54
Lane Group Flow (vph)	261	755	258	100	681	175	246	1391	16	150	1289	177
Turn Type	pm+pt	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	7	4	5		8	1	5	2		1	6	7
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	47.4	47.4	59.2	25.6	25.6	32.5	58.6	47.7	47.7	49.7	42.8	60.6
Effective Green, g (s)	50.4	50.4	61.2	28.6	28.6	32.5	61.6	50.7	47.7	55.7	45.8	60.6
Actuated g/C Ratio	0.42	0.42	0.51	0.24	0.24	0.27	0.51	0.42	0.40	0.46	0.38	0.51
Clearance Time (s)	4.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	373	1547	798	170	897	433	283	1591	636	210	1437	808
v/s Ratio Prot	c0.12	0.20	0.03		c0.18	0.02	c0.11	c0.37		0.06	0.34	0.03
v/s Ratio Perm		0.17	0.13	0.14		0.09	0.34		0.01	0.27		0.08
v/c Ratio	0.70	0.49	0.32	0.59	0.76	0.40	0.87	0.87	0.02	0.71	0.90	0.22
Uniform Delay, d1	25.9	25.4	17.3	40.5	42.5	35.8	33.8	31.7	22.0	25.3	34.9	16.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.71	0.87	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.7	0.2	0.2	5.1	3.7	0.6	8.1	2.1	0.0	10.9	9.1	0.1
Delay (s)	31.5	25.6	17.5	45.6	46.2	36.4	32.1	29.7	22.0	36.2	44.0	16.7
Level of Service	C	C	B	D	D	D	C	C	C	D	D	B
Approach Delay (s)		25.1			43.8			29.9			39.5	
Approach LOS		C			D			C			D	
Intersection Summary												
HCM 2000 Control Delay		34.2		HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio		0.86										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				16.0				
Intersection Capacity Utilization		95.9%		ICU Level of Service				F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	309	1165	2613	181	81	658
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	109	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	1165	2613	181	81	658
RTOR Reduction (vph)	0	0	0	42	0	1
Lane Group Flow (vph)	309	1165	2613	139	81	657
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	96.3	96.3	64.6	64.6	9.7	37.4
Effective Green, g (s)	99.3	99.3	67.6	64.6	12.7	37.4
Actuated g/C Ratio	0.83	0.83	0.56	0.54	0.11	0.31
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	515	3439	2297	853	187	493
v/s Ratio Prot	0.15	0.28	c0.64		0.05	c0.31
v/s Ratio Perm	0.34			0.09		0.11
v/c Ratio	0.60	0.34	1.14	0.16	0.43	1.33
Uniform Delay, d1	32.4	2.5	26.2	14.0	50.3	41.3
Progression Factor	1.00	1.00	1.42	1.38	1.00	1.00
Incremental Delay, d2	1.9	0.3	63.8	0.1	1.6	162.8
Delay (s)	34.3	2.7	101.1	19.4	51.9	204.1
Level of Service	C	A	F	B	D	F
Approach Delay (s)		9.4	95.8		187.4	
Approach LOS		A	F		F	
Intersection Summary						
HCM 2000 Control Delay			83.9		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.17			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			97.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	189	1057	2280	367	466	514
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	113	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	189	1057	2280	367	466	514
RTOR Reduction (vph)	0	0	0	17	0	3
Lane Group Flow (vph)	189	1057	2280	350	466	511
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	NA	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Actuated Green, G (s)	74.0	74.0	64.0	96.0	32.0	38.0
Effective Green, g (s)	77.0	77.0	67.0	102.0	35.0	44.0
Actuated g/C Ratio	0.64	0.64	0.56	0.85	0.29	0.37
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	200	2666	2276	1442	532	598
v/s Ratio Prot	c0.07	0.25	c0.56	0.07	c0.26	0.06
v/s Ratio Perm	0.53			0.14		0.25
v/c Ratio	0.94	0.40	1.00	0.24	0.88	0.86
Uniform Delay, d1	38.5	10.3	26.5	1.7	40.4	35.1
Progression Factor	0.91	1.62	1.18	2.27	1.00	1.00
Incremental Delay, d2	46.7	0.1	13.7	0.0	18.1	11.5
Delay (s)	81.8	16.8	44.9	3.9	58.5	46.6
Level of Service	F	B	D	A	E	D
Approach Delay (s)		26.7	39.2		52.2	
Approach LOS		C	D		D	
Intersection Summary						
HCM 2000 Control Delay			38.6		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			90.3%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	1276	120	105	2254	156	70	22	88	167	72	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.06	1.00	1.00	0.11	1.00	1.00	0.80	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	109	4156	1512	181	4078	1633	1410	1921	1585	837	1921	1633
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)	136	1276	120	105	2254	156	70	22	88	167	72	315
RTOR Reduction (vph)	0	0	43	0	0	34	0	0	71	0	0	116
Lane Group Flow (vph)	136	1276	77	105	2254	122	70	22	17	167	72	199
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	77.5	67.8	76.7	77.1	67.6	83.3	13.9	5.0	14.5	24.7	11.8	21.5
Effective Green, g (s)	83.5	70.8	76.7	83.1	70.6	83.3	13.9	5.0	14.5	24.7	11.8	21.5
Actuated g/C Ratio	0.70	0.59	0.64	0.69	0.59	0.69	0.12	0.04	0.12	0.21	0.10	0.18
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	257	2452	966	263	2399	1133	182	80	191	296	188	292
v/s Ratio Prot	c0.06	0.31	0.01	0.04	c0.55	0.01	0.03	0.01	0.01	c0.07	0.04	c0.06
v/s Ratio Perm	0.31		0.04	0.23		0.06	0.02		0.00	0.04		0.07
v/c Ratio	0.53	0.52	0.08	0.40	0.94	0.11	0.38	0.28	0.09	0.56	0.38	0.68
Uniform Delay, d1	28.7	14.6	8.2	8.6	22.7	6.1	49.0	55.7	46.9	41.8	50.7	46.1
Progression Factor	0.87	1.50	2.12	2.75	1.41	2.31	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.7	0.0	0.5	4.7	0.0	1.4	1.9	0.2	2.5	1.3	6.4
Delay (s)	26.6	22.4	17.4	24.0	36.9	14.0	50.3	57.6	47.1	44.3	52.0	52.5
Level of Service	C	C	B	C	D	B	D	E	D	D	D	D
Approach Delay (s)	22.4			34.9			49.6			50.0		
Approach LOS	C			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	33.2			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					19.0			
Intersection Capacity Utilization	79.5%			ICU Level of Service					D			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

9/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	1347	74	54	2197	103	76	16	38	279	51	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		1.0	4.0	4.0	7.0	7.0		1.0	4.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00	1.00		0.97	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.89		1.00	0.88	
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4037		1362	4078	1601	1825	1708		3471	1654	
Fit Permitted	0.06	1.00		0.09	1.00	1.00	0.59	1.00		0.95	1.00	
Satd. Flow (perm)	110	4037		127	4078	1601	1140	1708		3471	1654	
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)	115	1347	74	54	2197	103	76	16	38	279	51	218
RTOR Reduction (vph)	0	3	0	0	0	26	0	34	0	0	84	0
Lane Group Flow (vph)	115	1418	0	54	2197	77	76	20	0	279	185	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6	7		8		7	4	
Permitted Phases	2			6		6		8				
Actuated Green, G (s)	75.7	66.9		70.5	64.3	77.3	11.9	11.9		13.0	28.9	
Effective Green, g (s)	80.1	69.9		76.5	67.3	77.3	11.9	11.9		16.0	31.9	
Actuated g/C Ratio	0.67	0.58		0.64	0.56	0.64	0.10	0.10		0.13	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	238	2351		175	2287	1031	113	169		462	439	
v/s Ratio Prot	c0.05	0.35		0.02	c0.54	0.01		0.01		c0.08	0.11	
v/s Ratio Perm	0.27			0.17		0.04	c0.07					
v/c Ratio	0.48	0.60		0.31	0.96	0.07	0.67	0.12		0.60	0.42	
Uniform Delay, d1	25.1	16.1		10.7	25.1	8.0	52.2	49.3		49.0	36.4	
Progression Factor	2.29	0.35		1.94	0.72	0.47	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	1.0		0.1	1.6	0.0	14.6	0.3		2.2	0.7	
Delay (s)	59.0	6.6		20.8	19.7	3.8	66.8	49.6		51.2	37.1	
Level of Service	E	A		C	B	A	E	D		D	D	
Approach Delay (s)	10.6			19.0			59.7			44.3		
Approach LOS	B			B			E			D		
Intersection Summary												
HCM 2000 Control Delay	20.4			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.83											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					16.0			
Intersection Capacity Utilization	89.1%			ICU Level of Service					E			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰	↰↰	↰	↰	↰↰	↰
Volume (vph)	203	949	541	152	1487	360	524	1113	143	298	1090	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75		*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	3981		3444	3730	1555	1755	3625	1512
Flt Permitted	0.10	1.00	1.00	0.12	1.00		0.95	1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	177	4117	1601	207	3981		3444	3730	1555	182	3625	1512
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)	203	949	541	152	1487	360	524	1113	143	298	1090	277
RTOR Reduction (vph)	0	0	41	0	23	0	0	0	84	0	0	46
Lane Group Flow (vph)	203	949	500	152	1824	0	524	1113	59	298	1090	231
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	46.5	39.1	53.1	46.3	39.0		14.0	37.6	37.6	51.6	37.6	45.0
Effective Green, g (s)	52.5	42.1	53.1	52.3	42.0		17.0	40.6	37.6	57.6	40.6	45.0
Actuated g/C Ratio	0.44	0.35	0.44	0.44	0.35		0.14	0.34	0.31	0.48	0.34	0.38
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	1444	708	208	1393		487	1261	487	310	1226	567
v/s Ratio Prot	c0.08	0.23	0.08	0.06	c0.46		c0.15	0.30		0.14	c0.30	0.03
v/s Ratio Perm	0.33		0.23	0.25					0.04	0.33		0.13
v/c Ratio	0.94	0.66	0.71	0.73	1.31		1.08	0.88	0.12	0.96	0.89	0.41
Uniform Delay, d1	31.6	32.9	27.1	23.8	39.0		51.5	37.5	29.4	35.6	37.6	27.7
Progression Factor	1.70	0.96	0.60	1.00	1.00		1.00	1.00	1.00	0.50	0.93	1.11
Incremental Delay, d2	40.6	2.0	2.7	12.4	144.4		62.7	7.6	0.1	29.9	5.2	0.3
Delay (s)	94.2	33.7	19.0	36.2	183.4		114.2	45.0	29.5	47.7	40.0	30.9
Level of Service	F	C	B	D	F		F	D	C	D	D	C
Approach Delay (s)		36.2			172.2			64.2			39.9	
Approach LOS		D			F			E			D	
Intersection Summary												
HCM 2000 Control Delay			82.1		HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				16.0			
Intersection Capacity Utilization			108.6%		ICU Level of Service				G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/20/2013

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	 			 		 		
Volume (veh/h)	0	0	134	0	0	15		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly flow rate (vph)	0	0	134	0	0	15		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	TWLTL		TWLTL					
Median storage (veh)	2		2					
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume			0	268		0		
vC1, stage 1 conf vol					0			
vC2, stage 2 conf vol					268			
vCu, unblocked vol			0	268		0		
tC, single (s)			4.1	6.8		6.9		
tC, 2 stage (s)					5.8			
tF (s)			2.2	3.5		3.3		
p0 queue free %			92	100		99		
cM capacity (veh/h)			1622	673		1084		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	0	0	0	134	0	0	0	15
Volume Left	0	0	0	134	0	0	0	0
Volume Right	0	0	0	0	0	0	0	15
cSH	1700	1700	1700	1622	1700	1700	1700	1084
Volume to Capacity	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	7.4	0.0	0.0	0.0	8.4
Lane LOS				A				A
Approach Delay (s)	0.0			7.4		8.4		
Approach LOS						A		
Intersection Summary								
Average Delay	7.5							
Intersection Capacity Utilization	10.8%			ICU Level of Service				A
Analysis Period (min)	15							

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	309	1165	2613	181	81	658
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	107	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	309	1165	2613	181	81	658
RTOR Reduction (vph)	0	0	0	43	0	0
Lane Group Flow (vph)	309	1165	2613	138	81	658
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	96.3	96.3	65.6	65.6	9.7	120.0
Effective Green, g (s)	99.3	99.3	68.6	65.6	12.7	120.0
Actuated g/C Ratio	0.83	0.83	0.57	0.55	0.11	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	500	3439	2331	866	187	1585
v/s Ratio Prot	c0.15	0.28	c0.64		0.05	
v/s Ratio Perm	0.36			0.09		c0.42
v/c Ratio	0.62	0.34	1.12	0.16	0.43	0.42
Uniform Delay, d1	33.3	2.5	25.7	13.5	50.3	0.0
Progression Factor	1.00	1.00	1.46	1.43	1.00	1.00
Incremental Delay, d2	2.3	0.3	56.5	0.1	1.6	0.8
Delay (s)	35.5	2.7	94.2	19.5	51.9	0.8
Level of Service	D	A	F	B	D	A
Approach Delay (s)		9.6	89.3		6.4	
Approach LOS		A	F		A	
Intersection Summary						
HCM 2000 Control Delay			53.6		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			85.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	949	541	152	1487	360	524	1113	143	298	1090	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.09	1.00	1.00	0.12	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	177	4117	1601	209	4078	1585	3444	3730	1555	3510	3625	1512
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)	203	949	541	152	1487	360	524	1113	143	298	1090	277
RTOR Reduction (vph)	0	0	41	0	0	190	0	0	83	0	0	46
Lane Group Flow (vph)	203	949	500	152	1487	170	524	1113	60	298	1090	231
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	46.7	39.2	53.2	46.3	39.0	39.0	14.0	38.1	38.1	13.4	37.5	45.0
Effective Green, g (s)	52.7	42.2	53.2	52.3	42.0	39.0	17.0	41.1	38.1	16.4	40.5	45.0
Actuated g/C Ratio	0.44	0.35	0.44	0.44	0.35	0.32	0.14	0.34	0.32	0.14	0.34	0.38
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	1447	709	209	1427	515	487	1277	493	479	1223	567
v/s Ratio Prot	c0.08	0.23	0.08	0.06	c0.36		c0.15	0.30		0.08	c0.30	0.03
v/s Ratio Perm	0.33		0.23	0.25		0.11			0.04			0.13
v/c Ratio	0.94	0.66	0.71	0.73	1.04	0.33	1.08	0.87	0.12	0.62	0.89	0.41
Uniform Delay, d1	31.6	32.8	27.1	23.7	39.0	30.6	51.5	37.0	29.1	48.9	37.7	27.7
Progression Factor	1.69	0.97	0.59	1.00	1.00	1.00	1.00	1.00	1.00	0.66	0.93	1.11
Incremental Delay, d2	38.2	1.9	2.7	11.9	35.6	1.7	62.7	6.8	0.1	1.5	5.4	0.3
Delay (s)	91.8	33.7	18.6	35.6	74.6	32.3	114.2	43.8	29.2	33.6	40.3	30.9
Level of Service	F	C	B	D	E	C	F	D	C	C	D	C
Approach Delay (s)		35.8			64.0			63.3			37.5	
Approach LOS		D			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			51.0		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					16.0		
Intersection Capacity Utilization			98.4%		ICU Level of Service					F		
Analysis Period (min)			15									
c Critical Lane Group												

APPENDIX D

Capacity Analyses

Future Total Traffic Operations

2016
Future Total Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/20/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	201	352	0	870	1420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Flt Protected	1.00	0.99		1.00	1.00	
Flt Permitted	1.00	1.00		1.00	1.00	
Satd. Flow (prot)	3161	1491		4812	3380	
Satd. Flow (perm)	3161	1491		4812	3380	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	201	352	0	870	1420	0
RTOR Reduction (vph)	0	33	0	0	0	0
Lane Group Flow (vph)	201	319	0	870	1420	0
Confl. Peds. (#/hr)		2	1			1
Heavy Vehicles (%)	12%	8%	0%	9%	8%	10%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	24.0	24.0		49.0	49.0	
Effective Green, g (s)	27.0	27.0		52.0	52.0	
Actuated g/C Ratio	0.32	0.32		0.61	0.61	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	1004	473		2943	2067	
v/s Ratio Prot	0.06			0.18	c0.42	
v/s Ratio Perm		c0.21				
v/c Ratio	0.20	0.67		0.30	0.69	
Uniform Delay, d1	21.1	25.2		7.8	11.0	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	7.5		0.3	1.9	
Delay (s)	21.6	32.7		8.1	12.9	
Level of Service	C	C		A	B	
Approach Delay (s)	28.7			8.1	12.9	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay		14.5		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.68				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		67.9%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

2016 Future Total AM Peak Hour

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HCM Signalized Intersection Capacity Analysis

21: Bronte Rd & Burnhamthorpe Road

8/20/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	27	77	1380	72	193	1491
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt Protected	1.00	0.85	1.00	0.85	1.00	1.00
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	1633	3650	1633	1825	3650
Satd. Flow (perm)	1825	1633	3650	1633	343	3650
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	77	1380	72	193	1491
RTOR Reduction (vph)	0	67	0	6	0	0
Lane Group Flow (vph)	27	10	1380	66	193	1491
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.1	8.1	97.9	97.9	97.9	97.9
Effective Green, g (s)	11.1	11.1	100.9	100.9	100.9	100.9
Actuated g/C Ratio	0.09	0.09	0.84	0.84	0.84	0.84
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	168	151	3069	1373	288	3069
v/s Ratio Prot	c0.01		0.38			0.41
v/s Ratio Perm		0.01		0.04	c0.56	
v/c Ratio	0.16	0.07	0.45	0.05	0.67	0.49
Uniform Delay, d1	50.2	49.7	2.4	1.6	3.5	2.6
Progression Factor	1.00	1.00	1.55	0.84	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.3	0.0	11.8	0.6
Delay (s)	50.6	49.9	4.1	1.4	15.2	3.1
Level of Service	D	D	A	A	B	A
Approach Delay (s)	50.1		3.9			4.5
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			5.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			67.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Total AM Peak Hour

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HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	311	2517	796	66	290	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1754	3510	3349	1533	1755	1555
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	531	3510	3349	1533	1755	1555
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	311	2517	796	66	290	271
RTOR Reduction (vph)	0	0	0	28	0	210
Lane Group Flow (vph)	311	2517	796	38	290	61
Confl. Peds. (#/hr)	2		2			
Heavy Vehicles (%)	4%	4%	9%	4%	4%	5%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	81.9	81.9	65.6	65.6	24.1	24.1
Effective Green, g (s)	84.9	84.9	68.6	68.6	27.1	27.1
Actuated g/C Ratio	0.71	0.71	0.57	0.57	0.23	0.23
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	531	2483	1914	876	396	351
v/s Ratio Prot	0.07	c0.72	0.24		c0.17	
v/s Ratio Perm	0.34			0.02		0.04
v/c Ratio	0.59	1.01	0.42	0.04	0.73	0.17
Uniform Delay, d1	7.5	17.5	14.4	11.3	43.1	37.4
Progression Factor	1.00	1.00	0.49	0.73	1.00	1.00
Incremental Delay, d2	1.7	21.5	0.6	0.1	6.8	0.2
Delay (s)	9.2	39.1	7.7	8.4	49.9	37.7
Level of Service	A	D	A	A	D	D
Approach Delay (s)		35.8	7.8		44.0	
Approach LOS		D	A		D	
Intersection Summary						
HCM 2000 Control Delay			31.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.95			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			92.3%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Total AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	141	2699	805	110	102	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	3650	3650	1633	3541	1633
Flt Permitted	0.31	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	588	3650	3650	1633	3541	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	141	2699	805	110	102	42
RTOR Reduction (vph)	0	0	0	39	0	30
Lane Group Flow (vph)	141	2699	805	71	102	12
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	NA	Perm	NA	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	74.0	74.0	74.0	74.0	32.0	32.0
Effective Green, g (s)	77.0	77.0	77.0	77.0	35.0	35.0
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.29	0.29
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	377	2342	2342	1047	1032	476
v/s Ratio Prot		c0.74	0.22		c0.03	
v/s Ratio Perm	0.24			0.04		0.01
v/c Ratio	0.37	1.15	0.34	0.07	0.10	0.03
Uniform Delay, d1	10.1	21.5	9.9	8.1	31.0	30.3
Progression Factor	0.52	0.81	1.30	1.90	1.00	1.00
Incremental Delay, d2	0.2	70.3	0.1	0.0	0.2	0.1
Delay (s)	5.5	87.8	12.9	15.3	31.2	30.4
Level of Service	A	F	B	B	C	C
Approach Delay (s)		83.7	13.2		31.0	
Approach LOS		F	B		C	
Intersection Summary						
HCM 2000 Control Delay			65.2		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			89.6%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Total AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

8/20/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Volume (vph)	164	2598	39	54	837	595	57	17	150	57	3	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1690	3510	1633	1659	3349	1585	1674	1921	1585	1601	1668	1668
Flt Permitted	0.30	1.00	1.00	0.05	1.00	1.00	0.74	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	542	3510	1633	82	3349	1585	1306	1921	1585	1258	1668	1668
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)	164	2598	39	54	837	595	57	17	150	57	3	22
RTOR Reduction (vph)	0	0	11	0	0	173	0	0	87	0	19	0
Lane Group Flow (vph)	164	2598	28	54	837	422	57	17	63	57	6	0
Heavy Vehicles (%)	8%	4%	0%	10%	9%	3%	0%	0%	3%	14%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	92.4	84.6	84.6	87.6	82.2	82.2	12.0	12.0	12.0	12.0	12.0	12.0
Effective Green, g (s)	97.0	87.6	87.6	93.6	85.2	85.2	15.0	15.0	15.0	15.0	15.0	15.0
Actuated g/C Ratio	0.81	0.73	0.73	0.78	0.71	0.71	0.12	0.12	0.12	0.12	0.12	0.12
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	541	2562	1192	174	2377	1125	163	240	198	157	208	208
v/s Ratio Prot	c0.03	c0.74		c0.02	0.25			0.01			0.00	
v/s Ratio Perm	0.22		0.02	0.22		0.27	0.04		0.04	c0.05		
v/c Ratio	0.30	1.01	0.02	0.31	0.35	0.38	0.35	0.07	0.32	0.36	0.03	0.03
Uniform Delay, d1	2.8	16.2	4.5	31.4	6.7	6.9	48.0	46.3	47.9	48.1	46.1	46.1
Progression Factor	0.25	0.31	0.00	2.86	0.14	1.15	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	9.4	0.0	1.0	0.4	0.9	1.3	0.1	0.9	1.4	0.1	0.1
Delay (s)	0.7	14.4	0.0	90.6	1.4	8.9	49.3	46.5	48.8	49.6	46.2	46.2
Level of Service	A	B	A	F	A	A	D	D	D	D	D	D
Approach Delay (s)		13.4			7.6			48.8			48.5	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		13.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.87										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		99.4%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

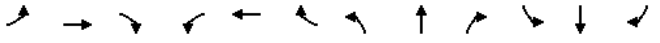
8/20/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱	↱	↰	↱	↰	↱
Volume (vph)	2783	44	23	1467	27	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		1.0	4.0	4.0	4.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Flt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5033		1825	4768	1755	1601
Flt Permitted	1.00		0.04	1.00	0.95	1.00
Satd. Flow (perm)	5033		81	4768	1755	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2783	44	23	1467	27	43
RTOR Reduction (vph)	1	0	0	0	0	39
Lane Group Flow (vph)	2826	0	23	1467	27	4
Heavy Vehicles (%)	4%	2%	0%	10%	4%	2%
Turn Type	NA	pm+pt	NA	NA	Perm	NA
Protected Phases	2		1	6	8	
Permitted Phases		6				8
Actuated Green, G (s)	90.4		98.0	98.0	8.0	8.0
Effective Green, g (s)	93.4		101.0	101.0	11.0	11.0
Actuated g/C Ratio	0.78		0.84	0.84	0.09	0.09
Clearance Time (s)	7.0		4.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3917		164	4013	160	146
v/s Ratio Prot	c0.56		0.01	c0.31	c0.02	
v/s Ratio Perm			0.11			0.00
v/c Ratio	0.72		0.14	0.37	0.17	0.03
Uniform Delay, d1	6.7		7.1	2.2	50.3	49.6
Progression Factor	0.15		2.40	1.17	1.00	1.00
Incremental Delay, d2	0.4		0.3	0.2	0.5	0.1
Delay (s)	1.4		17.3	2.7	50.8	49.7
Level of Service	A		B	A	D	D
Approach Delay (s)	1.4			2.9	50.1	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		2.7			HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.64				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	9.0
Intersection Capacity Utilization		69.7%			ICU Level of Service	C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/20/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰	↰	↰↰	↰↰	↰	↰	↰↰	↰
Volume (vph)	344	1864	620	136	856	268	392	840	204	303	970	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	4.0	1.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5043	1570	1573	4617		3340	3411	1541	1630	3411	1458
Flt Permitted	0.12	1.00	1.00	0.10	1.00		0.95	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	233	5043	1570	162	4617		3340	3411	1541	251	3411	1458
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)	344	1864	620	136	856	268	392	840	204	303	970	245
RTOR Reduction (vph)	0	0	159	0	47	0	0	0	97	0	0	110
Lane Group Flow (vph)	344	1864	461	136	1077	0	392	840	107	303	970	135
Heavy Vehicles (%)	2%	4%	4%	16%	10%	8%	6%	7%	6%	12%	7%	12%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	54.6	44.1	44.1	44.5	38.0		11.0	36.4	36.4	47.4	36.4	36.4
Effective Green, g (s)	57.6	47.1	47.1	50.5	41.0		14.0	39.4	39.4	53.4	39.4	39.4
Actuated g/C Ratio	0.48	0.39	0.39	0.42	0.34		0.12	0.33	0.33	0.44	0.33	0.33
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	1979	616	179	1577		389	1119	505	272	1119	478
v/s Ratio Prot	c0.14	c0.37		0.06	0.23		0.12	0.25		c0.13	c0.28	
v/s Ratio Perm	0.38		0.29	0.26					0.07	0.37		0.09
v/c Ratio	1.10	0.94	0.75	0.76	0.68		1.01	0.75	0.21	1.11	0.87	0.28
Uniform Delay, d1	31.1	35.1	31.4	27.7	33.9		53.0	35.9	29.1	28.1	37.8	29.8
Progression Factor	1.06	0.63	0.48	1.00	1.00		1.00	1.00	1.00	0.88	0.95	1.13
Incremental Delay, d2	71.5	8.1	6.0	16.8	2.4		47.6	2.9	0.2	86.0	6.6	0.3
Delay (s)	104.5	30.2	20.9	44.5	36.3		100.6	38.8	29.3	110.8	42.5	34.0
Level of Service	F	C	C	D	D		F	D	C	F	D	C
Approach Delay (s)		37.2			37.2			54.3			54.7	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			44.5		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			96.9%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/20/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	117	150	0	1372	1318	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3372	1516		5092	3544	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3372	1516		5092	3544	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	117	150	0	1372	1318	0
RTOR Reduction (vph)	0	71	0	0	0	0
Lane Group Flow (vph)	117	79	0	1372	1318	0
Confl. Peds. (#/hr)		3				
Heavy Vehicles (%)	5%	6%	0%	3%	3%	44%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0		57.0	57.0	
Effective Green, g (s)	19.0	19.0		60.0	60.0	
Actuated g/C Ratio	0.22	0.22		0.71	0.71	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	753	338		3594	2501	
v/s Ratio Prot	0.03			0.27	c0.37	
v/s Ratio Perm		c0.05				
v/c Ratio	0.16	0.23		0.38	0.53	
Uniform Delay, d1	26.5	27.0		5.0	5.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.6		0.3	0.8	
Delay (s)	27.0	28.7		5.3	6.7	
Level of Service	C	C		A	A	
Approach Delay (s)	27.9			5.3	6.7	
Approach LOS	C			A	A	
Intersection Summary						
HCM 2000 Control Delay			8.0	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.46			
Actuated Cycle Length (s)			85.0	Sum of lost time (s)		6.0
Intersection Capacity Utilization			52.7%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Total PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

21: Bronte Rd & Burnhamthorpe Road

8/20/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	67	179	1329	28	77	1362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	1601	3579	1601	1789	3579
Flt Permitted	0.95	1.00	1.00	1.00	0.18	1.00
Satd. Flow (perm)	1789	1601	3579	1601	340	3579
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	179	1329	28	77	1362
RTOR Reduction (vph)	0	59	0	3	0	0
Lane Group Flow (vph)	67	120	1329	25	77	1362
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	14.0	14.0	92.0	92.0	92.0	92.0
Effective Green, g (s)	17.0	17.0	95.0	95.0	95.0	95.0
Actuated g/C Ratio	0.14	0.14	0.79	0.79	0.79	0.79
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	253	226	2833	1267	269	2833
v/s Ratio Prot	0.04		0.37			c0.38
v/s Ratio Perm		c0.07		0.02	0.23	
v/c Ratio	0.26	0.53	0.47	0.02	0.29	0.48
Uniform Delay, d1	45.9	47.8	4.1	2.6	3.4	4.2
Progression Factor	1.00	1.00	1.05	0.50	1.00	1.00
Incremental Delay, d2	0.6	2.2	0.3	0.0	2.7	0.6
Delay (s)	46.5	50.0	4.6	1.3	6.0	4.8
Level of Service	D	D	A	A	A	A
Approach Delay (s)	49.1		4.6			4.9
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.3	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		8.0
Intersection Capacity Utilization			56.7%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

2016 Future Total PM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	260	1051	2626	211	93	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1755	3544	3544	1551	1807	1585
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	92	3544	3544	1551	1807	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	260	1051	2626	211	93	317
RTOR Reduction (vph)	0	0	0	41	0	3
Lane Group Flow (vph)	260	1051	2626	170	93	314
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	4%	3%	3%	3%	1%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	90.8	90.8	76.0	76.0	15.2	26.0
Effective Green, g (s)	93.8	93.8	79.0	79.0	18.2	32.0
Actuated g/C Ratio	0.78	0.78	0.66	0.66	0.15	0.27
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	263	2770	2333	1021	274	422
v/s Ratio Prot	c0.11	0.30	c0.74		0.05	c0.09
v/s Ratio Perm	0.66			0.11		0.11
v/c Ratio	0.99	0.38	1.13	0.17	0.34	0.74
Uniform Delay, d1	44.7	4.1	20.5	7.9	45.5	40.3
Progression Factor	1.00	1.00	0.67	0.16	1.00	1.00
Incremental Delay, d2	51.8	0.4	57.1	0.0	0.7	7.0
Delay (s)	96.5	4.5	71.0	1.3	46.3	47.2
Level of Service	F	A	E	A	D	D
Approach Delay (s)		22.7	65.8		47.0	
Approach LOS		C	E		D	
Intersection Summary						
HCM 2000 Control Delay		51.7		HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio		1.03				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.0
Intersection Capacity Utilization		109.5%		ICU Level of Service		H
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/20/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	145	1008	2504	226	481	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1789	3579	3579	1601	3471	1601
Flt Permitted	0.05	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	103	3579	3579	1601	3471	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	145	1008	2504	226	481	325
RTOR Reduction (vph)	0	0	0	46	0	2
Lane Group Flow (vph)	145	1008	2504	180	481	323
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	79.0	79.0	69.0	69.0	27.0	33.0
Effective Green, g (s)	82.0	82.0	72.0	72.0	30.0	39.0
Actuated g/C Ratio	0.68	0.68	0.60	0.60	0.25	0.32
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	196	2445	2147	960	867	520
v/s Ratio Prot	c0.06	0.28	c0.70		0.14	c0.05
v/s Ratio Perm	0.45			0.11		0.16
v/c Ratio	0.74	0.41	1.17	0.19	0.55	0.62
Uniform Delay, d1	35.3	8.4	24.0	10.8	39.2	34.3
Progression Factor	1.15	0.89	0.47	0.51	1.00	1.00
Incremental Delay, d2	13.0	0.5	75.4	0.0	2.6	2.3
Delay (s)	53.4	8.0	86.7	5.6	41.7	36.6
Level of Service	D	A	F	A	D	D
Approach Delay (s)		13.7	80.0		39.7	
Approach LOS		B	E		D	
Intersection Summary						
HCM 2000 Control Delay		56.7		HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio		0.97				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.0
Intersection Capacity Utilization		101.0%		ICU Level of Service		G
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Private Driveway & Dundas St W

8/20/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	1364	82	118	2491	232	53	7	82	282	18	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1644	3544	1633	1825	3544	1228	1772	1921	1585	1738	1629	1629
Flt Permitted	0.06	1.00	1.00	0.11	1.00	1.00	0.49	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	100	3544	1633	215	3544	1228	909	1921	1585	1378	1629	1629
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)	43	1364	82	118	2491	232	53	7	82	282	18	186
RTOR Reduction (vph)	0	0	34	0	0	52	0	0	60	0	73	0
Lane Group Flow (vph)	43	1364	48	118	2491	180	53	7	22	282	131	0
Heavy Vehicles (%)	11%	3%	0%	0%	3%	33%	3%	0%	3%	5%	0%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	71.2	66.2	66.2	74.8	68.0	68.0	29.0	29.0	29.0	29.0	29.0	29.0
Effective Green, g (s)	77.2	69.2	69.2	80.0	71.0	71.0	32.0	32.0	32.0	32.0	32.0	32.0
Actuated g/C Ratio	0.64	0.58	0.58	0.67	0.59	0.59	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	167	2043	941	274	2096	726	242	512	422	367	434	434
v/s Ratio Prot	0.02	0.38		c0.04	c0.70			0.00			0.08	
v/s Ratio Perm	0.15		0.03	0.25		0.15	0.06		0.01	c0.20		
v/c Ratio	0.26	0.67	0.05	0.43	1.19	0.25	0.22	0.01	0.05	0.77	0.30	0.30
Uniform Delay, d1	26.0	17.5	11.1	12.8	24.5	11.7	34.3	32.4	32.7	40.6	35.1	35.1
Progression Factor	1.12	0.69	0.96	1.85	0.69	0.79	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.6	0.1	0.9	88.9	0.6	0.5	0.0	0.1	9.3	0.4	0.4
Delay (s)	29.8	13.7	10.8	24.5	105.8	9.9	34.7	32.4	32.8	49.9	35.5	35.5
Level of Service	C	B	B	C	F	A	C	C	C	D	D	D
Approach Delay (s)		14.0			94.6			33.5			43.9	
Approach LOS		B			F			C			D	
Intersection Summary												
HCM 2000 Control Delay		63.7			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.01										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			9.0				
Intersection Capacity Utilization		111.1%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

28: Valleyridge Dr & Dundas St W

8/20/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1710	22	53	2768	48	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		1.0	4.0	3.0	3.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Flt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5084		1706	5092	1789	1512
Flt Permitted	1.00		0.11	1.00	0.95	1.00
Satd. Flow (perm)	5084		198	5092	1789	1512
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1710	22	53	2768	48	38
RTOR Reduction (vph)	0	0	0	0	0	34
Lane Group Flow (vph)	1732	0	53	2768	48	4
Heavy Vehicles (%)	3%	0%	7%	3%	2%	8%
Turn Type	NA		pm+pt	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Actuated Green, G (s)	89.6		98.6	98.6	8.4	8.4
Effective Green, g (s)	92.6		101.6	101.6	11.4	11.4
Actuated g/C Ratio	0.77		0.85	0.85	0.10	0.10
Clearance Time (s)	7.0		4.0	7.0	6.0	6.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3923		268	4311	169	143
v/s Ratio Prot	0.34		0.01	c0.54	c0.03	
v/s Ratio Perm			0.15			0.00
v/c Ratio	0.44		0.20	0.64	0.28	0.03
Uniform Delay, d1	4.7		2.2	3.1	50.5	49.3
Progression Factor	1.33		0.46	0.48	1.00	1.00
Incremental Delay, d2	0.3		0.0	0.1	0.9	0.1
Delay (s)	6.6		1.1	1.5	51.4	49.3
Level of Service	A		A	A	D	D
Approach Delay (s)	6.6			1.5	50.5	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			4.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.61			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			68.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/20/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	219	1109	449	152	1831	260	576	878	128	270	809	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	4.0	1.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5092	1633	1755	5046		3506	3544	1526	1825	3544	1541
Flt Permitted	0.09	1.00	1.00	0.14	1.00		0.95	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	176	5092	1633	254	5046		3506	3544	1526	244	3544	1541
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)	219	1109	449	152	1831	260	576	878	128	270	809	350
RTOR Reduction (vph)	0	0	211	0	15	0	0	0	87	0	0	81
Lane Group Flow (vph)	219	1109	238	152	2076	0	576	878	41	270	809	269
Heavy Vehicles (%)	2%	3%	0%	4%	2%	2%	1%	3%	7%	0%	3%	6%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	48.4	39.7	39.7	49.0	40.0		15.0	35.7	35.7	47.9	34.3	34.3
Effective Green, g (s)	54.4	42.7	42.7	55.0	43.0		18.0	38.7	38.7	53.9	37.3	37.3
Actuated g/C Ratio	0.45	0.36	0.36	0.46	0.36		0.15	0.32	0.32	0.45	0.31	0.31
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	1811	581	266	1808		525	1142	492	328	1101	478
v/s Ratio Prot	c0.09	0.22		c0.06	c0.41		c0.16	c0.25		0.11	0.23	
v/s Ratio Perm	0.33		0.15	0.20					0.03	0.26		0.17
v/c Ratio	0.92	0.61	0.41	0.57	1.15		1.10	0.77	0.08	0.82	0.73	0.56
Uniform Delay, d1	32.7	31.8	29.2	21.5	38.5		51.0	36.6	28.3	27.5	36.9	34.5
Progression Factor	1.53	0.79	1.05	1.00	1.00		1.00	1.00	1.00	0.84	0.94	0.95
Incremental Delay, d2	36.2	1.4	2.0	3.0	73.6		68.4	3.2	0.1	13.9	2.3	1.4
Delay (s)	86.4	26.5	32.5	24.4	112.1		119.4	39.8	28.4	37.0	37.0	34.1
Level of Service	F	C	C	C	F		F	D	C	D	D	C
Approach Delay (s)		35.4			106.2			67.9			36.3	
Approach LOS		D			F			E			D	
Intersection Summary												
HCM 2000 Control Delay		65.5			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		0.97										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		105.9%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

2021
Future Total Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	200	584	0	1026	1882	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	*1.00	
Flt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3340	1617		4995	3591	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3340	1617		4995	3591	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	584	0	1026	1882	0
RTOR Reduction (vph)	0	6	0	0	0	0
Lane Group Flow (vph)	200	578	0	1026	1882	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	29.0	29.0		44.0	44.0	
Effective Green, g (s)	32.0	32.0		47.0	47.0	
Actuated g/C Ratio	0.38	0.38		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	1257	608		2761	1985	
v/s Ratio Prot	0.06			0.21	c0.52	
v/s Ratio Perm		c0.36				
v/c Ratio	0.16	0.95		0.37	0.95	
Uniform Delay, d1	17.6	25.7		10.7	17.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	26.1		0.4	11.2	
Delay (s)	17.8	51.8		11.1	29.1	
Level of Service	B	D		B	C	
Approach Delay (s)	43.2			11.1	29.1	
Approach LOS	D			B	C	
Intersection Summary						
HCM 2000 Control Delay		27.1		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.95				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		94.9%		ICU Level of Service		F
Analysis Period (min)		15				
c Critical Lane Group						

2021 Future Total AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

8/29/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	53	64	389	298	252	546
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.7	3.7	3.7
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Flt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1566	1763		1789	1865
Flt Permitted	0.95	1.00	1.00		0.37	1.00
Satd. Flow (perm)	1750	1566	1763		691	1865
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	53	64	389	298	252	546
RTOR Reduction (vph)	0	59	19	0	0	0
Lane Group Flow (vph)	53	5	668	0	252	546
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	NA	custom	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Actuated Green, G (s)	6.8	6.8	61.2		61.2	61.2
Effective Green, g (s)	6.8	6.8	61.2		61.2	61.2
Actuated g/C Ratio	0.08	0.08	0.77		0.77	0.77
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	148	133	1348		528	1426
v/s Ratio Prot			c0.38			0.29
v/s Ratio Perm	c0.03	0.00			0.36	
v/c Ratio	0.36	0.04	0.50		0.48	0.38
Uniform Delay, d1	34.5	33.6	3.6		3.5	3.1
Progression Factor	0.97	1.79	1.00		1.00	1.00
Incremental Delay, d2	1.5	0.1	1.3		3.1	0.8
Delay (s)	35.0	60.3	4.9		6.6	3.9
Level of Service	D	E	A		A	A
Approach Delay (s)	48.9		4.9			4.7
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			8.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.48			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			71.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

2021 Future Total AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

15: Avenue Two & Burnhamthorpe Road

8/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Volume (vph)	515	52	289	330	200	393
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	851	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	515	52	289	330	200	393
RTOR Reduction (vph)	0	19	0	0	0	241
Lane Group Flow (vph)	515	33	289	330	200	153
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2			6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	51.0	51.0	51.0	51.0	15.0	15.0
Effective Green, g (s)	51.0	51.0	51.0	51.0	15.0	15.0
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.19	0.19
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2231	998	542	2231	328	293
v/s Ratio Prot	0.15			0.09		
v/s Ratio Perm		0.02	c0.34		c0.11	0.10
v/c Ratio	0.23	0.03	0.53	0.15	0.61	0.52
Uniform Delay, d1	6.2	5.4	8.0	5.8	29.8	29.3
Progression Factor	1.06	1.26	1.94	1.88	1.00	1.00
Incremental Delay, d2	0.2	0.1	3.5	0.1	3.2	1.7
Delay (s)	6.7	6.8	19.0	11.0	33.0	30.9
Level of Service	A	A	B	B	C	C
Approach Delay (s)	6.8			14.7	31.6	
Approach LOS	A			B	C	
Intersection Summary						
HCM 2000 Control Delay		17.8		HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio		0.55				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)	14.0	
Intersection Capacity Utilization		58.8%		ICU Level of Service	B	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

17: Avenue Three & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↑↑	↑	↓	↑↑	↑	↓	↑	↓	↓	↓	↓
Volume (vph)	203	529	54	244	752	708	96	143	185	102	20	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3451		1750	3500	1566	1750	1842	1566	1750	1683	
Flt Permitted	0.33	1.00		0.42	1.00	1.00	0.73	1.00	1.00	0.67	1.00	
Satd. Flow (perm)	609	3451		776	3500	1566	1338	1842	1566	1226	1683	
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)	203	529	54	244	752	708	96	143	185	102	20	27
RTOR Reduction (vph)	0	10	0	0	0	292	0	0	127	0	19	0
Lane Group Flow (vph)	203	573	0	244	752	416	96	143	58	102	28	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8		8	4		
Actuated Green, G (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51	0.51	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	312	1768		397	1793	802	418	575	489	383	525	
v/s Ratio Prot		0.17			0.21			0.08			0.02	
v/s Ratio Perm	c0.33			0.31		0.27	0.07		0.04	c0.08		
v/c Ratio	0.65	0.32		0.61	0.42	0.52	0.23	0.25	0.12	0.27	0.05	
Uniform Delay, d1	14.3	11.4		13.9	12.1	12.9	20.4	20.5	19.6	20.6	19.2	
Progression Factor	1.23	1.17		1.57	1.57	4.01	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.6	0.5		5.5	0.6	1.9	1.3	1.0	0.5	1.7	0.2	
Delay (s)	27.1	13.8		27.3	19.6	53.8	21.6	21.5	20.1	22.3	19.4	
Level of Service	C	B		C	B	D	C	C	C	C	B	
Approach Delay (s)		17.3			34.9			20.9			21.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		27.8		HCM 2000 Level of Service	C							
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		80.0		Sum of lost time (s)	14.0							
Intersection Capacity Utilization		80.1%		ICU Level of Service	D							
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Avenue Four & Burnhamthorpe Road

8/29/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	700	114	221	1575	129	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.39	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	710	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	700	114	221	1575	129	184
RTOR Reduction (vph)	0	33	0	0	0	157
Lane Group Flow (vph)	700	81	221	1575	129	27
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2			6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	54.8	54.8	54.8	54.8	11.2	11.2
Effective Green, g (s)	54.8	54.8	54.8	54.8	11.2	11.2
Actuated g/C Ratio	0.68	0.68	0.68	0.68	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2397	1072	486	2397	245	219
v/s Ratio Prot	0.20			c0.45		
v/s Ratio Perm		0.05	0.31		c0.07	0.02
v/c Ratio	0.29	0.08	0.45	0.66	0.53	0.13
Uniform Delay, d1	5.0	4.2	5.8	7.2	31.9	30.1
Progression Factor	1.87	3.80	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	3.1	1.4	2.0	0.3
Delay (s)	9.6	16.1	8.8	8.6	34.0	30.4
Level of Service	A	B	A	A	C	C
Approach Delay (s)	10.5			8.7	31.9	
Approach LOS	B			A	C	
Intersection Summary						
HCM 2000 Control Delay		11.6		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.63				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)	14.0	
Intersection Capacity Utilization		62.4%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
21: Bronte Rd & Burnhamthorpe Road

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	653	113	37	773	99	434	1394	109	405	1345	628
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3500	1566	1789	3579	1601	1789	3579	1601	1789	3579	1601
Flt Permitted	0.13	1.00	1.00	0.14	1.00	1.00	0.08	1.00	1.00	0.08	1.00	1.00
Satd. Flow (perm)	246	3500	1566	270	3579	1601	142	3579	1601	145	3579	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	653	113	37	773	99	434	1394	109	405	1345	628
RTOR Reduction (vph)	0	0	67	0	0	42	0	0	38	0	0	74
Lane Group Flow (vph)	138	653	46	37	773	57	434	1394	71	405	1345	554
Turn Type	pm+pt	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	7	4	5		8	1	5	2	3	1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	33.0	27.0	52.0	27.0	27.0	50.0	76.0	51.0	57.0	72.0	49.0	49.0
Effective Green, g (s)	39.0	30.0	52.0	30.0	30.0	50.0	81.0	54.0	57.0	78.0	52.0	49.0
Actuated g/C Ratio	0.30	0.23	0.40	0.23	0.23	0.39	0.63	0.42	0.44	0.60	0.40	0.38
Clearance Time (s)	4.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	813	631	62	832	620	446	1498	707	419	1442	608
v/s Ratio Prot	c0.05	0.19	0.01		c0.22	0.02	c0.21	0.39	0.00	0.19	0.38	
v/s Ratio Perm	0.18		0.02	0.14		0.02	0.40		0.04	c0.39		0.35
v/c Ratio	0.77	0.80	0.07	0.60	0.93	0.09	0.97	0.93	0.10	0.97	0.93	0.91
Uniform Delay, d1	36.7	46.7	23.7	44.1	48.5	25.1	41.4	35.7	21.0	41.4	36.8	37.9
Progression 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
Incremental Delay, d2	18.3	5.8	0.0	14.5	16.3	0.1	35.4	11.7	0.1	35.0	12.3	20.2
Delay (s)	55.1	52.5	23.7	58.6	64.8	25.2	76.8	47.4	21.1	76.4	49.1	58.2
Level of Service	E	D	C	E	E	C	E	D	C	E	D	E
Approach Delay (s)		49.3			60.2			52.5			56.2	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		54.6		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.97										
Actuated Cycle Length (s)		129.0		Sum of lost time (s)				16.0				
Intersection Capacity Utilization		103.6%		ICU Level of Service				G				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	624	2702	830	63	262	337
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.17	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	326	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	624	2702	830	63	262	337
RTOR Reduction (vph)	0	0	0	40	0	11
Lane Group Flow (vph)	624	2702	830	23	262	326
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	83.7	83.7	41.7	41.7	22.3	60.3
Effective Green, g (s)	86.7	86.7	44.7	41.7	25.3	60.3
Actuated g/C Ratio	0.72	0.72	0.37	0.35	0.21	0.50
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	3.0
Lane Grp Cap (vph)	729	3002	1519	550	373	796
v/s Ratio Prot	0.29	c0.65	0.20		c0.15	0.13
v/s Ratio Perm	0.33			0.01		0.08
v/c Ratio	0.86	0.90	0.55	0.04	0.70	0.41
Uniform Delay, d1	23.4	13.2	29.7	25.9	43.9	18.7
Progression Factor	1.00	1.00	0.73	1.31	1.00	1.00
Incremental Delay, d2	9.7	4.9	1.3	0.1	5.5	0.3
Delay (s)	33.1	18.1	22.9	34.0	49.3	19.0
Level of Service	C	B	C	C	D	B
Approach Delay (s)		20.9	23.7		32.3	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay			22.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			75.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	349	2615	813	386	46	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	7.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	408	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	349	2615	813	386	46	80
RTOR Reduction (vph)	0	0	0	218	0	59
Lane Group Flow (vph)	349	2615	813	168	46	21
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	74.0	74.0	52.2	52.2	32.0	32.0
Effective Green, g (s)	77.0	77.0	55.2	52.2	32.0	32.0
Actuated g/C Ratio	0.64	0.64	0.46	0.44	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	507	2666	1875	710	486	435
v/s Ratio Prot	0.12	c0.63	0.20		c0.03	
v/s Ratio Perm	0.32			0.10		0.01
v/c Ratio	0.69	0.98	0.43	0.24	0.09	0.05
Uniform Delay, d1	11.6	20.8	21.9	21.3	33.1	32.7
Progression Factor	1.57	1.26	0.99	2.48	1.00	1.00
Incremental Delay, d2	1.8	8.2	0.7	0.8	0.4	0.2
Delay (s)	20.2	34.4	22.4	53.7	33.5	32.9
Level of Service	C	C	C	D	C	C
Approach Delay (s)		32.7	32.5		33.1	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay			32.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	216	2430	48	51	1024	274	103	99	140	69	23	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	7.0	1.0	4.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.21	1.00	1.00	0.05	1.00	1.00	0.74	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	409	4156	1512	83	4078	1633	1308	1921	1585	1048	1921	1633
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)	216	2430	48	51	1024	274	103	99	140	69	23	57
RTOR Reduction (vph)	0	0	19	0	0	87	0	0	122	0	0	45
Lane Group Flow (vph)	216	2430	29	51	1024	187	103	99	18	69	23	12
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	2	2	1	6	6	8	8	7	4	4	4	4
Permitted Phases	2	2	6	6	8	8	8	4	4	4	4	4
Actuated Green, G (s)	72.3	72.3	72.3	81.9	81.9	81.9	15.3	15.3	15.3	25.1	25.1	25.1
Effective Green, g (s)	75.3	75.3	72.3	84.9	84.9	81.9	15.3	15.3	15.3	25.1	25.1	25.1
Actuated g/C Ratio	0.63	0.63	0.60	0.71	0.71	0.68	0.13	0.13	0.13	0.21	0.21	0.21
Clearance Time (s)	7.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	2607	910	160	2885	1114	166	244	202	248	401	341
v/s Ratio Prot		c0.58		0.02	c0.25		0.05		c0.01	0.01		
v/s Ratio Perm	0.53		0.02	0.20		0.11	c0.08		0.01	0.05		0.01
v/c Ratio	0.84	0.93	0.03	0.32	0.35	0.17	0.62	0.41	0.09	0.28	0.06	0.03
Uniform Delay, d1	17.7	20.1	9.7	24.3	6.9	6.8	49.6	48.2	46.2	39.1	38.0	37.8
Progression Factor	0.63	0.65	1.00	2.62	1.33	3.99	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.5	2.8	0.0	1.0	0.3	0.3	7.0	1.1	0.2	0.6	0.1	0.0
Delay (s)	21.6	15.8	9.7	64.7	9.4	27.6	56.6	49.3	46.4	39.7	38.0	37.8
Level of Service	C	B	A	E	A	C	E	D	D	D	D	D
Approach Delay (s)	16.1				15.2			50.3			38.7	
Approach LOS	B				B			D			D	
Intersection Summary												
HCM 2000 Control Delay		19.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		76.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	208	2395	59	23	1190	211	96	68	44	54	15	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		4.0	4.0	7.0	7.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00			0.97	1.00	
Flt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4100		1362	4078	1601	1825	1786		3471	1651	
Flt Permitted	0.13	1.00		0.06	1.00	1.00	0.70	1.00		0.95	1.00	
Satd. Flow (perm)	239	4100		83	4078	1601	1348	1786		3471	1651	
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)	208	2395	59	23	1190	211	96	68	44	54	15	70
RTOR Reduction (vph)	0	1	0	0	0	49	0	23	0	0	57	0
Lane Group Flow (vph)	208	2453	0	23	1190	162	96	89	0	54	28	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		6	6	8	8	7		4		
Permitted Phases	2			6	6	8						
Actuated Green, G (s)	82.9	82.9		65.7	65.7	65.7	14.3	14.3		4.8	23.1	
Effective Green, g (s)	85.9	85.9		68.7	68.7	65.7	14.3	14.3		4.8	23.1	
Actuated g/C Ratio	0.72	0.72		0.57	0.57	0.55	0.12	0.12		0.04	0.19	
Clearance Time (s)	4.0	7.0		7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	380	2934		47	2334	876	160	212		138	317	
v/s Ratio Prot	0.07	c0.60			0.29		0.05			c0.02	0.02	
v/s Ratio Perm	0.32			0.28		0.10	c0.07					
v/c Ratio	0.55	0.84		0.49	0.51	0.18	0.60	0.42		0.39	0.09	
Uniform Delay, d1	9.4	12.1		15.2	15.5	13.7	50.1	49.0		56.2	39.8	
Progression Factor	2.59	1.10		1.34	1.48	1.97	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.5		17.1	0.4	0.2	5.9	1.3		1.8	0.1	
Delay (s)	25.1	14.8		37.5	23.4	27.2	56.1	50.4		58.0	39.9	
Level of Service	C	B		D	C	C	E	D		E	D	
Approach Delay (s)	15.6			24.2			53.0			47.0		
Approach LOS	B			C			D			D		
Intersection Summary												
HCM 2000 Control Delay		21.1			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.79										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		88.7%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰		↰	↰↰	↰	↰	↰↰	↰
Volume (vph)	311	1533	650	136	658	446	628	1180	257	264	1092	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75		*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	3875		3444	3730	1555	1755	3625	1512
Flt Permitted	0.10	1.00	1.00	0.10	1.00		0.95	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	187	4117	1601	167	3875		3444	3730	1555	232	3625	1512
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)	311	1533	650	136	658	446	628	1180	257	264	1092	139
RTOR Reduction (vph)	0	0	40	0	102	0	0	0	87	0	0	96
Lane Group Flow (vph)	311	1533	610	136	1002	0	628	1180	170	264	1092	43
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	43.1	37.0	55.0	43.1	37.0		18.0	46.9	46.9	44.9	36.9	36.9
Effective Green, g (s)	49.1	40.0	55.0	49.1	40.0		21.0	49.9	46.9	50.9	39.9	36.9
Actuated g/C Ratio	0.41	0.33	0.46	0.41	0.33		0.18	0.42	0.39	0.42	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	196	1372	733	176	1291		602	1551	607	238	1205	464
v/s Ratio Prot	c0.12	c0.37	0.12	0.06	0.26		c0.18	0.32		c0.10	0.30	
v/s Ratio Perm	0.53		0.26	0.26					0.11	c0.37		0.03
v/c Ratio	1.59	1.12	0.83	0.77	0.90dr		1.04	0.76	0.28	1.11	0.91	0.09
Uniform Delay, d1	29.3	40.0	28.5	28.8	36.0		49.5	30.0	25.0	27.1	38.3	29.6
Progression Factor	1.51	0.99	0.56	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	277.4	59.1	4.7	18.7	4.6		48.4	2.3	0.3	90.8	9.8	0.1
Delay (s)	321.5	98.5	20.7	47.5	40.6		97.9	32.2	25.3	117.9	48.1	29.7
Level of Service	F	F	C	D	D		F	C	C	F	D	C
Approach Delay (s)		106.0			41.4			51.3			58.7	
Approach LOS		F			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			69.9			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			13.0			
Intersection Capacity Utilization			101.4%			ICU Level of Service			G			
Analysis Period (min)			15									
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/20/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↘	↑	↘	↑
Volume (veh/h)	0	139	8	0	936	118
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	139	8	0	936	118
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLT		TWLT			
Median storage (veh)	2		2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			139		16	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					16	
vCu, unblocked vol			139		16	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		4	89
cM capacity (veh/h)			1445		977	1085
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	0	139	8	0	936	118
Volume Left	0	0	8	0	936	0
Volume Right	0	139	0	0	0	118
cSH	1700	1700	1445	1700	977	1085
Volume to Capacity	0.00	0.08	0.01	0.00	0.96	0.11
Queue Length 95th (m)	0.0	0.0	0.1	0.0	124.1	2.8
Control Delay (s)	0.0	0.0	7.5	0.0	40.1	8.7
Lane LOS			A		E	A
Approach Delay (s)	0.0		7.5		36.6	
Approach LOS					E	
Intersection Summary						
Average Delay			32.2			
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/30/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	624	2702	830	63	262	337
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.17	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	326	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	624	2702	830	63	262	337
RTOR Reduction (vph)	0	0	0	40	0	11
Lane Group Flow (vph)	624	2702	830	23	262	326
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	83.7	83.7	41.7	41.7	22.3	60.3
Effective Green, g (s)	86.7	86.7	44.7	41.7	25.3	60.3
Actuated g/C Ratio	0.72	0.72	0.37	0.35	0.21	0.50
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	3.0
Lane Grp Cap (vph)	729	3002	1519	550	373	796
v/s Ratio Prot	0.29	c0.65	0.20		c0.15	0.13
v/s Ratio Perm	0.33			0.01		0.08
v/c Ratio	0.86	0.90	0.55	0.04	0.70	0.41
Uniform Delay, d1	23.4	13.2	29.7	25.9	43.9	18.7
Progression Factor	1.00	1.00	0.71	1.27	1.00	1.00
Incremental Delay, d2	9.7	4.9	1.3	0.1	5.5	0.3
Delay (s)	33.1	18.1	22.3	33.1	49.3	19.0
Level of Service	C	B	C	C	D	B
Approach Delay (s)		20.9	23.1		32.3	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay		22.7		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.89				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	12.0	
Intersection Capacity Utilization		75.8%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/30/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	311	1533	650	136	658	446	628	1180	257	264	1092	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.24	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	456	4117	1601	163	4078	1585	3444	3730	1555	3510	3625	1512
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)	311	1533	650	136	658	446	628	1180	257	264	1092	139
RTOR Reduction (vph)	0	0	40	0	0	124	0	0	81	0	0	96
Lane Group Flow (vph)	311	1533	610	136	658	322	628	1180	176	264	1092	43
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	44.1	38.0	55.0	44.1	38.0	38.0	17.0	45.9	45.9	8.0	36.9	36.9
Effective Green, g (s)	50.1	41.0	55.0	50.1	41.0	38.0	20.0	48.9	45.9	11.0	39.9	36.9
Actuated g/C Ratio	0.42	0.34	0.46	0.42	0.34	0.32	0.17	0.41	0.38	0.09	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	290	1406	733	176	1393	501	574	1519	594	321	1205	464
v/s Ratio Prot	c0.08	c0.37	0.12	0.06	0.16		c0.18	0.32		0.08	c0.30	
v/s Ratio Perm	0.37		0.26	0.26		0.20			0.11			0.03
v/c Ratio	1.07	1.09	0.83	0.77	0.47	0.64	1.09	0.78	0.30	0.82	0.91	0.09
Uniform Delay, d1	30.9	39.5	28.5	28.5	31.0	35.2	50.0	30.8	25.8	53.5	38.3	29.6
Progression Factor	0.95	0.97	0.56	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.5	48.0	4.7	18.7	1.2	6.2	65.8	2.6	0.3	15.5	9.8	0.1
Delay (s)	89.7	86.4	20.7	47.2	32.2	41.4	115.8	33.4	26.1	69.0	48.1	29.7
Level of Service	F	F	C	D	C	D	F	C	C	E	D	C
Approach Delay (s)		69.7			37.1			57.5			50.1	
Approach LOS		E			D			E			D	
Intersection Summary												
HCM 2000 Control Delay		56.7		HCM 2000 Level of Service				E				
HCM 2000 Volume to Capacity ratio		1.02										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				13.0				
Intersection Capacity Utilization		98.6%		ICU Level of Service				F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

9/4/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	116	233	0	1949	1506	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		3.0	6.0	
Lane Util. Factor	0.97	0.91		0.91	0.95	
Flt	0.92	0.85		1.00	1.00	
Flt Protected	0.98	1.00		1.00	1.00	
Satd. Flow (prot)	3249	1471		4995	3405	
Flt Permitted	0.98	1.00		1.00	1.00	
Satd. Flow (perm)	3249	1471		4995	3405	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	116	233	0	1949	1506	32
RTOR Reduction (vph)	44	44	0	0	2	0
Lane Group Flow (vph)	189	72	0	1949	1536	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0		57.0	57.0	
Effective Green, g (s)	16.0	16.0		60.0	57.0	
Actuated g/C Ratio	0.19	0.19		0.71	0.67	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	611	276		3525	2283	
v/s Ratio Prot	c0.06			0.39	c0.45	
v/s Ratio Perm		0.05				
v/c Ratio	0.31	0.26		0.55	0.67	
Uniform Delay, d1	29.7	29.5		6.0	8.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	2.3		0.6	1.6	
Delay (s)	31.1	31.7		6.7	10.0	
Level of Service	C	C		A	B	
Approach Delay (s)	31.3			6.7	10.0	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay		10.2		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.59				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)	12.0	
Intersection Capacity Utilization		62.3%		ICU Level of Service	B	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

9/4/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	490	237	454	40	93	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.7	3.7	3.7
Total Lost time (s)	4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Flt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1566	1846		1789	1865
Flt Permitted	0.95	1.00	1.00		0.38	1.00
Satd. Flow (perm)	1750	1566	1846		717	1865
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	490	237	454	40	93	413
RTOR Reduction (vph)	0	157	3	0	0	0
Lane Group Flow (vph)	490	80	491	0	93	413
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	NA	custom	NA		Perm	NA
Protected Phases			2			6
Permitted Phases	8	8			6	
Actuated Green, G (s)	26.9	26.9	41.1		41.1	41.1
Effective Green, g (s)	28.9	26.9	41.1		41.1	41.1
Actuated g/C Ratio	0.36	0.34	0.51		0.51	0.51
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	632	526	948		368	958
v/s Ratio Prot			c0.27			0.22
v/s Ratio Perm	c0.28	0.05			0.13	
v/c Ratio	0.78	0.15	0.52		0.25	0.43
Uniform Delay, d1	22.7	18.6	12.9		10.9	12.1
Progression Factor	1.23	3.33	1.00		1.00	1.00
Incremental Delay, d2	5.8	0.1	2.0		1.6	1.4
Delay (s)	33.7	62.0	14.9		12.5	13.6
Level of Service	C	E	B		B	B
Approach Delay (s)	42.9		14.9			13.4
Approach LOS	D		B			B
Intersection Summary						
HCM 2000 Control Delay		26.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.64				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)	12.0	
Intersection Capacity Utilization		75.1%		ICU Level of Service	D	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
15: Avenue Two & Burnhamthorpe Road

9/4/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Volume (vph)	327	231	393	728	104	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.55	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	1021	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	327	231	393	728	104	379
RTOR Reduction (vph)	0	72	0	0	0	328
Lane Group Flow (vph)	327	159	393	728	104	51
Turn Type	NA	Perm	Perm	NA	NA	custom
Protected Phases	2			6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	55.2	55.2	55.2	55.2	10.8	10.8
Effective Green, g (s)	55.2	55.2	55.2	55.2	10.8	10.8
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2415	1080	704	2415	236	211
v/s Ratio Prot	0.09			0.21		
v/s Ratio Perm		0.10	c0.39		c0.06	0.03
v/c Ratio	0.14	0.15	0.56	0.30	0.44	0.24
Uniform Delay, d1	4.2	4.3	6.3	4.9	31.8	30.9
Progression Factor	1.13	1.64	2.34	2.35	1.00	1.00
Incremental Delay, d2	0.1	0.3	2.8	0.3	1.3	0.6
Delay (s)	4.9	7.3	17.4	11.7	33.1	31.5
Level of Service	A	A	B	B	C	C
Approach Delay (s)	5.9			13.7	31.9	
Approach LOS	A			B	C	
Intersection Summary						
HCM 2000 Control Delay			15.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			54.1%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
17: Avenue Three & Burnhamthorpe Road

9/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↓	↑↑	↑	↓	↑↑	↑	↓	↑	↑	↓	↓	↓
Volume (vph)	16	825	57	266	779	156	80	55	346	561	202	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		2.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3466		1750	3500	1566	1750	1842	1566	1750	1694	
Flt Permitted	0.36	1.00		0.15	1.00	1.00	0.39	1.00	1.00	0.72	1.00	
Satd. Flow (perm)	657	3466		283	3500	1566	712	1842	1566	1328	1694	
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)	16	825	57	266	779	156	80	55	346	561	202	233
RTOR Reduction (vph)	0	7	0	0	0	62	0	0	163	0	52	0
Lane Group Flow (vph)	16	875	0	266	779	94	80	55	183	561	383	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases				6		6	8		8	4		
Actuated Green, G (s)	22.0	22.0		33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	
Effective Green, g (s)	22.0	22.0		35.0	33.0	33.0	33.0	33.0	33.0	35.0	33.0	
Actuated g/C Ratio	0.28	0.28		0.44	0.41	0.41	0.41	0.41	0.41	0.44	0.41	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	180	953		288	1443	645	293	759	645	581	698	
v/s Ratio Prot		c0.25		c0.10	0.22			0.03			0.23	
v/s Ratio Perm	0.02			0.30		0.06	0.11		0.12	c0.42		
v/c Ratio	0.09	0.92		0.92	0.54	0.15	0.27	0.07	0.28	0.97	0.55	
Uniform Delay, d1	21.6	28.1		17.3	17.8	14.7	15.6	14.2	15.6	21.9	17.8	
Progression Factor	1.08	1.06		1.91	1.58	2.63	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	14.8		31.6	1.3	0.4	2.3	0.2	1.1	29.8	3.1	
Delay (s)	24.3	44.6		64.5	29.3	39.1	17.8	14.4	16.7	51.7	20.9	
Level of Service	C	D		E	C	D	B	B	B	D	C	
Approach Delay (s)		44.3			38.4			16.7			38.2	
Approach LOS		D			D			B			D	
Intersection Summary												
HCM 2000 Control Delay				36.9							D	
HCM 2000 Volume to Capacity ratio				0.97								
Actuated Cycle Length (s)				80.0						16.0		
Intersection Capacity Utilization				93.0%						F		
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Avenue Four & Burnhamthorpe Road

9/4/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Volume (vph)	1483	249	178	1117	84	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	5.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1566	1750	3500	1750	1566
Flt Permitted	1.00	1.00	0.09	1.00	0.95	1.00
Satd. Flow (perm)	3500	1566	164	3500	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1483	249	178	1117	84	171
RTOR Reduction (vph)	0	44	0	0	0	118
Lane Group Flow (vph)	1483	205	178	1117	84	53
Turn Type	NA	Perm	pm+pt	NA	NA	custom
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	37.8	37.8	56.6	56.6	9.4	9.4
Effective Green, g (s)	39.8	37.8	56.6	56.6	9.4	9.4
Actuated g/C Ratio	0.50	0.47	0.71	0.71	0.12	0.12
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1741	739	349	2476	205	184
v/s Ratio Prot	c0.42		0.08	c0.32		
v/s Ratio Perm		0.13	0.28		c0.05	0.03
v/c Ratio	0.85	0.28	0.51	0.45	0.41	0.29
Uniform Delay, d1	17.5	12.8	14.4	5.0	32.7	32.2
Progression Factor	0.96	0.89	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.5	1.3	0.6	1.3	0.9
Delay (s)	19.8	11.9	15.6	5.6	34.1	33.1
Level of Service	B	B	B	A	C	C
Approach Delay (s)	18.7			7.0	33.4	
Approach LOS	B			A	C	
Intersection Summary						
HCM 2000 Control Delay		15.2		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.74				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)		19.0
Intersection Capacity Utilization		71.3%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
21: Bronte Rd & Burnhamthorpe Road

9/4/2013

	↖	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↑	↘	↑↑	↑	↘	↑↑	↑	↘	↑↑	↑
Volume (vph)	425	910	436	100	720	254	316	1391	39	150	1289	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	3.0	4.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3767	1601	1789	3767	1601	1789	3767	1601	1789	3767	1601
Flt Permitted	0.14	1.00	1.00	0.33	1.00	1.00	0.10	1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	256	3767	1601	617	3767	1601	188	3767	1601	193	3767	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	425	910	436	100	720	254	316	1391	39	150	1289	271
RTOR Reduction (vph)	0	0	16	0	0	79	0	0	25	0	0	56
Lane Group Flow (vph)	425	910	420	100	720	175	316	1391	14	150	1289	215
Turn Type	pm+pt	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	7	4	5		8	1	5	2		1	6	7
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	52.2	52.2	66.0	26.2	26.2	32.6	53.8	43.4	43.4	42.4	36.0	58.0
Effective Green, g (s)	55.2	55.2	68.0	29.2	29.2	32.6	56.8	46.4	43.4	48.4	39.0	58.0
Actuated g/C Ratio	0.46	0.46	0.57	0.24	0.24	0.27	0.47	0.39	0.36	0.40	0.32	0.48
Clearance Time (s)	4.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	437	1732	907	150	916	434	313	1456	579	202	1224	773
v/s Ratio Prot	c0.20	0.24	0.06		c0.19	0.02	c0.14	0.37		0.06	c0.34	0.05
v/s Ratio Perm		0.24	0.21	0.16		0.09	0.34		0.01	0.24		0.08
v/c Ratio	0.97	0.53	0.46	0.67	0.79	0.40	1.01	0.96	0.02	0.74	1.05	0.28
Uniform Delay, d1	34.6	23.1	15.3	41.0	42.5	35.7	36.8	35.8	24.7	28.9	40.5	18.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.7	0.3	0.4	10.7	4.5	0.6	27.2	5.0	0.0	13.7	40.9	0.2
Delay (s)	70.3	23.4	15.7	51.7	47.0	36.3	50.6	36.4	24.7	42.6	81.4	18.7
Level of Service	E	C	B	D	D	D	D	D	C	D	F	B
Approach Delay (s)		32.7			44.9			38.7			68.1	
Approach LOS		C			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		46.0		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.98										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				16.0				
Intersection Capacity Utilization		109.9%		ICU Level of Service				H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	313	1201	2613	181	81	822
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	109	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	313	1201	2613	181	81	822
RTOR Reduction (vph)	0	0	0	42	0	1
Lane Group Flow (vph)	313	1201	2613	139	81	821
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	96.3	96.3	64.6	64.6	9.7	37.4
Effective Green, g (s)	99.3	99.3	67.6	64.6	12.7	37.4
Actuated g/C Ratio	0.83	0.83	0.56	0.54	0.11	0.31
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	515	3439	2297	853	187	493
v/s Ratio Prot	0.16	0.29	c0.64		0.05	c0.38
v/s Ratio Perm	0.35			0.09		0.13
v/c Ratio	0.61	0.35	1.14	0.16	0.43	1.66
Uniform Delay, d1	32.5	2.5	26.2	14.0	50.3	41.3
Progression Factor	1.00	1.00	1.42	1.37	1.00	1.00
Incremental Delay, d2	2.0	0.3	63.8	0.1	1.6	307.9
Delay (s)	34.6	2.8	101.1	19.4	51.9	349.2
Level of Service	C	A	F	B	D	F
Approach Delay (s)		9.4	95.8		322.6	
Approach LOS		A	F		F	
Intersection Summary						
HCM 2000 Control Delay			110.0		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.29			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			108.1%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	189	1093	2280	370	484	514
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	4.0	4.0	1.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	113	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	189	1093	2280	370	484	514
RTOR Reduction (vph)	0	0	0	17	0	3
Lane Group Flow (vph)	189	1093	2280	353	484	511
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	NA	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Actuated Green, G (s)	74.0	74.0	64.0	96.0	32.0	38.0
Effective Green, g (s)	77.0	77.0	67.0	102.0	35.0	44.0
Actuated g/C Ratio	0.64	0.64	0.56	0.85	0.29	0.37
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	200	2666	2276	1442	532	598
v/s Ratio Prot	c0.07	0.26	c0.56	0.07	c0.27	0.06
v/s Ratio Perm	0.53			0.14		0.25
v/c Ratio	0.94	0.41	1.00	0.24	0.91	0.86
Uniform Delay, d1	38.5	10.5	26.5	1.7	41.0	35.1
Progression Factor	0.91	1.62	0.95	2.42	1.00	1.00
Incremental Delay, d2	46.6	0.1	13.0	0.0	22.1	11.5
Delay (s)	81.7	17.1	38.3	4.2	63.1	46.6
Level of Service	F	B	D	A	E	D
Approach Delay (s)		26.6	33.5		54.6	
Approach LOS		C	C		D	
Intersection Summary						
HCM 2000 Control Delay			36.0		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.95			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			91.3%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	1285	129	105	2255	157	72	28	88	243	98	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.06	1.00	1.00	0.11	1.00	1.00	0.69	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	111	4156	1512	182	4078	1633	1222	1921	1585	932	1921	1633
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)	172	1285	129	105	2255	157	72	28	88	243	98	315
RTOR Reduction (vph)	0	0	50	0	0	39	0	0	62	0	0	68
Lane Group Flow (vph)	172	1285	79	105	2255	118	72	28	26	243	98	247
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	79.3	67.5	73.5	74.9	65.3	78.1	14.1	8.1	17.7	24.9	14.9	26.7
Effective Green, g (s)	84.1	70.5	73.5	80.9	68.3	78.1	14.1	8.1	17.7	24.9	14.9	26.7
Actuated g/C Ratio	0.70	0.59	0.61	0.67	0.57	0.65	0.12	0.07	0.15	0.21	0.12	0.22
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	289	2441	926	261	2321	1062	166	129	233	284	238	363
v/s Ratio Prot	c0.07	0.31	0.00	0.04	c0.55	0.01	0.02	0.01	0.01	c0.09	0.05	c0.07
v/s Ratio Perm	0.34		0.05	0.23		0.06	0.03		0.01	c0.09		0.08
v/c Ratio	0.60	0.53	0.09	0.40	0.97	0.11	0.43	0.22	0.11	0.86	0.41	0.68
Uniform Delay, d1	33.0	14.8	9.5	8.9	24.9	7.9	48.8	52.9	44.3	44.3	48.5	42.8
Progression Factor	0.58	1.49	2.35	2.60	1.20	2.09	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.7	0.0	0.5	7.7	0.0	1.8	0.8	0.2	21.5	1.2	5.2
Delay (s)	21.7	22.8	22.4	23.7	37.7	16.5	50.6	53.8	44.5	65.7	49.7	48.0
Level of Service	C	C	C	C	D	B	D	D	D	E	D	D
Approach Delay (s)	22.6			35.8			48.3			54.8		
Approach LOS	C			D			D			D		
Intersection Summary												
HCM 2000 Control Delay	34.6			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.95											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					19.0			
Intersection Capacity Utilization	85.7%			ICU Level of Service					E			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

9/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↕↕↕		↰	↕↕↕	↰	↰	↕		↰↰	↕	
Volume (vph)	115	1415	91	54	2197	103	78	22	38	335	68	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		1.0	4.0	4.0	7.0	7.0		1.0	4.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	0.91		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4018		1362	4078	1601	1825	1726		3471	1668	
Flt Permitted	0.06	1.00		0.07	1.00	1.00	0.58	1.00		0.95	1.00	
Satd. Flow (perm)	111	4018		107	4078	1601	1123	1726		3471	1668	
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)	115	1415	91	54	2197	103	78	22	38	335	68	218
RTOR Reduction (vph)	0	4	0	0	0	26	0	34	0	0	83	0
Lane Group Flow (vph)	115	1502	0	54	2197	77	78	26	0	335	203	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6	7		8		7	4	
Permitted Phases	2			6		6	8					
Actuated Green, G (s)	75.3	66.5		70.3	64.0	77.0	12.2	12.2		13.0	29.2	
Effective Green, g (s)	79.8	69.5		76.3	67.0	77.0	12.2	12.2		16.0	32.2	
Actuated g/C Ratio	0.66	0.58		0.64	0.56	0.64	0.10	0.10		0.13	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	238	2327		165	2276	1027	114	175		462	447	
v/s Ratio Prot	c0.05	0.37		0.03	c0.54	0.01		0.01		c0.10	0.12	
v/s Ratio Perm	0.27			0.18		0.04	c0.07					
v/c Ratio	0.48	0.65		0.33	0.97	0.07	0.68	0.15		0.73	0.45	
Uniform Delay, d1	25.1	17.0		11.7	25.4	8.1	52.0	49.2		49.9	36.6	
Progression Factor	2.01	0.43		1.97	0.79	0.25	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	1.2		0.1	1.8	0.0	15.7	0.4		5.6	0.7	
Delay (s)	51.8	8.5		23.1	21.9	2.1	67.7	49.6		55.5	37.3	
Level of Service	D	A		C	C	A	E	D		E	D	
Approach Delay (s)	11.5			21.1			59.8			47.1		
Approach LOS	B			C			E			D		
Intersection Summary												
HCM 2000 Control Delay	22.3			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	90.0%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	1014	600	152	1487	381	524	1162	143	319	1229	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0		1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75		*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	3976		3444	3730	1555	1755	3625	1512
Flt Permitted	0.09	1.00	1.00	0.11	1.00		0.95	1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	170	4117	1601	180	3976		3444	3730	1555	185	3625	1512
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)	203	1014	600	152	1487	381	524	1162	143	319	1229	277
RTOR Reduction (vph)	0	0	63	0	25	0	0	0	99	0	0	70
Lane Group Flow (vph)	203	1014	537	152	1843	0	524	1162	44	319	1229	207
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases	2		2	6					8	4		4
Actuated Green, G (s)	46.8	40.8	50.8	55.0	45.0		10.0	37.0	37.0	47.0	37.0	43.0
Effective Green, g (s)	52.8	43.8	50.8	58.0	48.0		13.0	40.0	37.0	53.0	40.0	43.0
Actuated g/C Ratio	0.44	0.36	0.42	0.48	0.40		0.11	0.33	0.31	0.44	0.33	0.36
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0		4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	1502	677	241	1590		373	1243	479	251	1208	541
v/s Ratio Prot	c0.08	0.25	0.07	c0.07	c0.46		c0.15	0.31		0.14	c0.34	0.02
v/s Ratio Perm	0.38		0.27	0.24					0.03	0.42		0.12
v/c Ratio	1.05	0.68	0.79	0.63	1.16		1.40	0.93	0.09	1.27	1.02	0.38
Uniform Delay, d1	31.9	32.1	30.0	21.3	36.0		53.5	38.7	29.5	34.7	40.0	28.6
Progression Factor	1.53	0.94	0.65	1.00	1.00		1.00	1.00	1.00	0.49	0.87	0.97
Incremental Delay, d2	69.8	1.9	5.0	5.3	79.0		197.6	12.8	0.1	135.3	21.7	0.2
Delay (s)	118.6	32.2	24.7	26.6	115.0		251.1	51.6	29.6	152.5	56.7	28.1
Level of Service	F	C	C	C	F		F	D	C	F	E	C
Approach Delay (s)		39.4			108.4			107.0			69.1	
Approach LOS		D			F			F			E	
Intersection Summary												
HCM 2000 Control Delay			81.7							F		
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			120.0							16.0		
Intersection Capacity Utilization			111.6%							H		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/20/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↘	↑	↘	↑
Volume (veh/h)	0	862	134	0	212	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	862	134	0	212	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLT			TWLT		
Median storage (veh)	2			2		
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			862		268	0
vC1, stage 1 conf vol					0	
vC2, stage 2 conf vol					268	
vCu, unblocked vol			862		268	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			83		66	99
cM capacity (veh/h)			780		628	1085
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	0	862	134	0	212	15
Volume Left	0	0	134	0	212	0
Volume Right	0	862	0	0	0	15
cSH	1700	1700	780	1700	628	1085
Volume to Capacity	0.00	0.51	0.17	0.00	0.34	0.01
Queue Length 95th (m)	0.0	0.0	4.7	0.0	11.3	0.3
Control Delay (s)	0.0	0.0	10.6	0.0	13.6	8.4
Lane LOS			B		B	A
Approach Delay (s)	0.0		10.6		13.3	
Approach LOS					B	
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			67.5%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

9/4/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	313	1201	2613	181	81	822
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	107	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	313	1201	2613	181	81	822
RTOR Reduction (vph)	0	0	0	43	0	0
Lane Group Flow (vph)	313	1201	2613	138	81	822
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	96.3	96.3	65.6	65.6	9.7	120.0
Effective Green, g (s)	99.3	99.3	68.6	65.6	12.7	120.0
Actuated g/C Ratio	0.83	0.83	0.57	0.55	0.11	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	500	3439	2331	866	187	1585
v/s Ratio Prot	c0.15	0.29	c0.64		0.05	
v/s Ratio Perm	0.36			0.09		c0.52
v/c Ratio	0.63	0.35	1.12	0.16	0.43	0.52
Uniform Delay, d1	33.4	2.5	25.7	13.5	50.3	0.0
Progression Factor	1.00	1.00	1.46	1.43	1.00	1.00
Incremental Delay, d2	2.4	0.3	56.5	0.1	1.6	1.2
Delay (s)	35.9	2.8	94.1	19.5	51.9	1.2
Level of Service	D	A	F	B	D	A
Approach Delay (s)		9.6	89.3		5.8	
Approach LOS		A	F		A	
Intersection Summary						
HCM 2000 Control Delay			51.7		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			86.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

9/4/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	1014	600	152	1487	381	524	1162	143	319	1229	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.09	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	174	4117	1601	178	4078	1585	3444	3730	1555	3510	3625	1512
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)	203	1014	600	152	1487	381	524	1162	143	319	1229	277
RTOR Reduction (vph)	0	0	40	0	0	149	0	0	80	0	0	70
Lane Group Flow (vph)	203	1014	560	152	1487	232	524	1162	63	319	1229	207
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	3	1	6		3	8		7	4	5
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	46.0	40.0	55.0	46.0	40.0	40.0	15.0	42.0	42.0	10.0	37.0	43.0
Effective Green, g (s)	52.0	43.0	55.0	52.0	43.0	40.0	18.0	45.0	42.0	13.0	40.0	43.0
Actuated g/C Ratio	0.43	0.36	0.46	0.43	0.36	0.33	0.15	0.38	0.35	0.11	0.33	0.36
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	195	1475	733	182	1461	528	516	1398	544	380	1208	541
v/s Ratio Prot	c0.08	0.25	0.10	0.06	c0.36		c0.15	0.31		0.09	c0.34	0.02
v/s Ratio Perm	0.37		0.25	0.30		0.15			0.04			0.12
v/c Ratio	1.04	0.69	0.76	0.84	1.02	0.44	1.02	0.83	0.12	0.84	1.02	0.38
Uniform Delay, d1	31.7	32.8	27.1	24.7	38.5	31.2	51.0	34.1	26.4	52.5	40.0	28.6
Progression Factor	1.74	0.94	0.60	1.00	1.00	1.00	1.00	1.00	1.00	0.70	0.93	1.17
Incremental Delay, d2	68.0	2.1	3.8	26.8	28.1	2.6	43.6	4.4	0.1	7.2	21.7	0.2
Delay (s)	123.2	33.0	19.9	51.5	66.6	33.9	94.6	38.4	26.5	43.8	59.0	33.6
Level of Service	F	C	B	D	E	C	F	D	C	D	E	C
Approach Delay (s)		38.7			59.3			53.6			52.5	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay				51.3		HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio				1.05								
Actuated Cycle Length (s)				120.0		Sum of lost time (s)				16.0		
Intersection Capacity Utilization				102.2%		ICU Level of Service				G		
Analysis Period (min)				15								
c Critical Lane Group												

2031
Future Total Traffic Operations

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	200	825	0	1110	2093	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.91		0.91	*1.00	
Frt	0.90	0.85		1.00	1.00	
Flt Protected	0.98	1.00		1.00	1.00	
Satd. Flow (prot)	3212	1471		4995	3591	
Flt Permitted	0.98	1.00		1.00	1.00	
Satd. Flow (perm)	3212	1471		4995	3591	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	825	0	1110	2093	0
RTOR Reduction (vph)	8	8	0	0	0	0
Lane Group Flow (vph)	605	404	0	1110	2093	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	22.0	22.0		51.0	51.0	
Effective Green, g (s)	25.0	25.0		54.0	54.0	
Actuated g/C Ratio	0.29	0.29		0.64	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	944	432		3173	2281	
v/s Ratio Prot	0.19			0.22	c0.58	
v/s Ratio Perm		c0.27				
v/c Ratio	0.85dr	0.93		0.35	0.92	
Uniform Delay, d1	26.1	29.2		7.3	13.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	29.6		0.3	7.3	
Delay (s)	29.4	58.8		7.6	20.9	
Level of Service	C	E		A	C	
Approach Delay (s)	41.2			7.6	20.9	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

2031 Future Total AM Peak Hour

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

4: Tremaine Rd & Avenue One

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	34	12	24	43	17	18	495	155	157	739	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1810		1789	1803		1789	1816		1789	1883	
Flt Permitted	0.72	1.00		0.73	1.00		0.34	1.00		0.39	1.00	
Satd. Flow (perm)	1352	1810		1369	1803		642	1816		731	1883	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	34	12	24	43	17	18	495	155	157	739	2
RTOR Reduction (vph)	0	11	0	0	16	0	0	8	0	0	0	0
Lane Group Flow (vph)	3	35	0	24	44	0	18	642	0	157	741	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	6.4	6.4		6.4	6.4		61.6	61.6		61.6	61.6	
Effective Green, g (s)	6.4	6.4		6.4	6.4		61.6	61.6		61.6	61.6	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.77	0.77		0.77	0.77	
Clearance Time (s)	6.0	6.0		6.0	6.0		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)	108	144		109	144		494	1398		562	1449	
v/s Ratio Prot		0.02			c0.02			0.35			c0.39	
v/s Ratio Perm	0.00			0.02			0.03			0.21		
v/c Ratio	0.03	0.24		0.22	0.31		0.04	0.46		0.28	0.51	
Uniform Delay, d1	33.9	34.5		34.5	34.7		2.2	3.3		2.7	3.5	
Progression Factor	1.00	1.00		1.28	1.40		1.12	0.92		1.00	1.00	
Incremental Delay, d2	0.1	0.9		1.0	1.2		0.1	0.9		1.2	1.3	
Delay (s)	34.0	35.4		45.1	49.9		2.6	3.9		3.9	4.8	
Level of Service	C	D		D	D		A	A		A	A	
Approach Delay (s)		35.3			48.5			3.9			4.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

2031 Future Total AM Peak Hour

Synchro 8 Report
Page 2

HCM Signalized Intersection Capacity Analysis

6: Avenue Two & Avenue One

8/29/2013

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖		↗	↖	↗	↖
Volume (vph)	282	56	219	147	4	394
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0		7.0	7.0	7.0	7.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1801		1750	1842	1750	1566
Flt Permitted	1.00		0.56	1.00	0.95	1.00
Satd. Flow (perm)	1801		1027	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	282	56	219	147	4	394
RTOR Reduction (vph)	4	0	0	0	0	276
Lane Group Flow (vph)	334	0	219	147	4	118
Turn Type	NA		Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	54.5		54.5	54.5	11.5	11.5
Effective Green, g (s)	54.5		54.5	54.5	11.5	11.5
Actuated g/C Ratio	0.68		0.68	0.68	0.14	0.14
Clearance Time (s)	7.0		7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1226		699	1254	251	225
v/s Ratio Prot	0.19			0.08	0.00	
v/s Ratio Perm			c0.21			c0.08
v/c Ratio	0.27		0.31	0.12	0.02	0.53
Uniform Delay, d1	5.0		5.2	4.4	29.4	31.7
Progression Factor	1.15		0.58	0.64	0.89	2.04
Incremental Delay, d2	0.5		0.7	0.1	0.0	2.0
Delay (s)	6.3		3.7	2.9	26.1	66.8
Level of Service	A		A	A	C	E
Approach Delay (s)	6.3			3.4	66.4	
Approach LOS	A			A	E	
Intersection Summary						
HCM 2000 Control Delay			27.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.35			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			54.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/29/2013

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Volume (vph)	281	107	178	989	236	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1842	1566	1750	1842	1750	1566
Flt Permitted	1.00	1.00	0.59	1.00	0.95	1.00
Satd. Flow (perm)	1842	1566	1082	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	281	107	178	989	236	159
RTOR Reduction (vph)	0	40	0	0	0	127
Lane Group Flow (vph)	281	67	178	989	236	32
Turn Type	NA	Perm	Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	50.0	50.0	50.0	50.0	16.0	16.0
Effective Green, g (s)	50.0	50.0	50.0	50.0	16.0	16.0
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.20	0.20
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1151	978	676	1151	350	313
v/s Ratio Prot	0.15			c0.54	c0.13	
v/s Ratio Perm		0.04	0.16			0.02
v/c Ratio	0.24	0.07	0.26	0.86	0.67	0.10
Uniform Delay, d1	6.6	5.9	6.7	12.1	29.6	26.1
Progression Factor	0.82	1.13	1.30	1.05	1.64	4.50
Incremental Delay, d2	0.5	0.1	0.6	5.5	4.8	0.1
Delay (s)	5.9	6.8	9.4	18.2	53.3	117.6
Level of Service	A	A	A	B	D	F
Approach Delay (s)	6.2			16.9	79.2	
Approach LOS	A			B	E	
Intersection Summary						
HCM 2000 Control Delay			27.4		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.81			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			76.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
10: Avenue Four & Avenue One

8/29/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↘	↗	↘	↗
Volume (vph)	305	25	249	1132	35	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0		7.0	7.0	7.0	7.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Flt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1823		1750	1842	1750	1566
Flt Permitted	1.00		0.56	1.00	0.95	1.00
Satd. Flow (perm)	1823		1034	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	305	25	249	1132	35	48
RTOR Reduction (vph)	2	0	0	0	0	44
Lane Group Flow (vph)	328	0	249	1132	35	4
Turn Type	NA		Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	59.9		59.9	59.9	6.1	6.1
Effective Green, g (s)	59.9		59.9	59.9	6.1	6.1
Actuated g/C Ratio	0.75		0.75	0.75	0.08	0.08
Clearance Time (s)	7.0		7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1364		774	1379	133	119
v/s Ratio Prot	0.18			c0.61	c0.02	
v/s Ratio Perm			0.24			0.00
v/c Ratio	0.24		0.32	0.82	0.26	0.03
Uniform Delay, d1	3.1		3.3	6.6	34.8	34.2
Progression Factor	1.09		1.00	1.00	0.98	1.33
Incremental Delay, d2	0.4		1.1	5.6	1.0	0.1
Delay (s)	3.8		4.4	12.1	35.1	45.7
Level of Service	A		A	B	D	D
Approach Delay (s)	3.8			10.8	41.2	
Approach LOS	A			B	D	
Intersection Summary						
HCM 2000 Control Delay			10.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			74.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
12: Bronte Rd & Avenue One

8/29/2013

	↖	↘	↙	↑	↓	↗
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↘	↙	↑↑	↑↑	↗
Volume (vph)	161	75	796	1571	1882	950
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	4.0	1.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	*1.00	*1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1789	1601	1789	3767	3767	1601
Flt Permitted	0.95	1.00	0.08	1.00	1.00	1.00
Satd. Flow (perm)	1789	1601	142	3767	3767	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	161	75	796	1571	1882	950
RTOR Reduction (vph)	0	1	0	0	0	312
Lane Group Flow (vph)	161	74	796	1571	1882	638
Turn Type	NA	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	16.1	55.0	91.9	91.9	49.0	49.0
Effective Green, g (s)	16.1	55.0	94.9	94.9	52.0	52.0
Actuated g/C Ratio	0.13	0.46	0.79	0.79	0.43	0.43
Clearance Time (s)	6.0	4.0	4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	733	687	2979	1632	693
v/s Ratio Prot	c0.09	0.03	c0.40	0.42	c0.50	
v/s Ratio Perm		0.01	0.51			0.40
v/c Ratio	0.67	0.10	1.16	0.53	1.15	0.92
Uniform Delay, d1	49.4	18.5	34.6	4.5	34.0	32.1
Progression Factor	1.00	1.00	1.12	1.95	1.00	1.00
Incremental Delay, d2	7.2	0.1	73.1	0.1	76.4	19.6
Delay (s)	56.6	18.5	111.8	8.9	110.4	51.6
Level of Service	E	B	F	A	F	D
Approach Delay (s)	44.5			43.5	90.7	
Approach LOS	D			D	F	
Intersection Summary						
HCM 2000 Control Delay			68.1		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.10			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			116.7%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Volume (vph)	0	59	16	72	22	65	5	603	266	183	590	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)		6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.89		1.00	0.95		1.00	1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1783		1750	1636		1789	1785		1789	1865	
Flt Permitted		1.00		0.71	1.00		0.41	1.00		0.26	1.00	
Satd. Flow (perm)		1783		1305	1636		775	1785		497	1865	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	59	16	72	22	65	5	603	266	183	590	0
RTOR Reduction (vph)	0	14	0	0	58	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	61	0	72	29	0	5	857	0	183	590	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.7		8.7	8.7		59.3	59.3		59.3	59.3	
Effective Green, g (s)		8.7		8.7	8.7		59.3	59.3		59.3	59.3	
Actuated g/C Ratio	0.11			0.11	0.11		0.74	0.74		0.74	0.74	
Clearance Time (s)	6.0			6.0	6.0		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	
Lane Grp Cap (vph)	193			141	177		574	1323		368	1382	
v/s Ratio Prot	0.03				0.02			c0.48			0.32	
v/s Ratio Perm				c0.06			0.01			0.37		
v/c Ratio	0.31			0.51	0.16		0.01	0.65		0.50	0.43	
Uniform Delay, d1	32.9			33.6	32.4		2.7	5.2		4.2	3.9	
Progression Factor	1.00			1.06	1.54		1.00	1.00		0.67	0.75	
Incremental Delay, d2	0.9			3.0	0.4		0.0	2.5		4.3	0.9	
Delay (s)	33.8			38.6	50.4		2.7	7.6		7.1	3.8	
Level of Service	C			D	D		A	A		A	A	
Approach Delay (s)	33.8				45.1			7.6			4.6	
Approach LOS	C				D			A			A	
Intersection Summary												
HCM 2000 Control Delay		10.6										
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		80.0							12.0			
Intersection Capacity Utilization		83.7%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

15: Avenue Two & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Volume (vph)	35	461	36	183	271	364	179	361	295	93	116	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3500	1566	1750	3500	1566	1750	1842	1566	1750	1810	
Flt Permitted	0.58	1.00	1.00	0.49	1.00	1.00	0.67	1.00	1.00	0.37	1.00	
Satd. Flow (perm)	1077	3500	1566	897	3500	1566	1240	1842	1566	676	1810	
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)	35	461	36	183	271	364	179	361	295	93	116	15
RTOR Reduction (vph)	0	0	16	0	0	137	0	0	177	0	6	0
Lane Group Flow (vph)	35	461	20	183	271	361	179	361	118	93	125	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	43.4	43.4	43.4	43.4	43.4	43.4	22.6	22.6	22.6	22.6	22.6	
Effective Green, g (s)	43.4	43.4	43.4	43.4	43.4	43.4	22.6	22.6	22.6	22.6	22.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	584	1898	849	486	1898	849	350	520	442	190	511	
v/s Ratio Prot		0.13			0.08			c0.20			0.07	
v/s Ratio Perm	0.03		0.01	c0.20		0.15	0.14		0.08	0.14		
v/c Ratio	0.06	0.24	0.02	0.38	0.14	0.27	0.51	0.69	0.27	0.49	0.24	
Uniform Delay, d1	8.7	9.6	8.5	10.5	9.1	9.8	24.1	25.6	22.3	23.9	22.1	
Progression Factor	1.31	1.26	2.32	1.56	1.50	4.44	1.00	1.00	1.00	1.34	1.35	
Incremental Delay, d2	0.2	0.3	0.0	2.0	0.1	0.7	1.3	4.0	0.3	1.9	0.2	
Delay (s)	11.5	12.4	19.7	18.4	13.8	44.2	25.3	29.6	22.6	34.0	30.0	
Level of Service	B	B	B	B	B	D	C	C	C	C	C	
Approach Delay (s)		12.9			28.3			26.2			31.7	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		24.5										
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		80.0							14.0			
Intersection Capacity Utilization		70.4%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

17: Avenue Three & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱
Volume (vph)	14	692	47	177	854	125	120	269	203	76	120	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3467		1750	3500	1566	1750	1842	1566	1750	1762	
Flt Permitted	0.28	1.00		0.34	1.00	1.00	0.65	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	521	3467		621	3500	1566	1198	1842	1566	977	1762	
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)	14	692	47	177	854	125	120	269	203	76	120	49
RTOR Reduction (vph)	0	6	0	0	0	45	0	0	123	0	19	0
Lane Group Flow (vph)	14	733	0	177	854	80	120	269	80	76	150	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8		8	4		
Actuated Green, G (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Actuated g/C Ratio	0.51	0.51		0.51	0.51	0.51	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	267	1776		318	1793	802	374	575	489	305	550	
v/s Ratio Prot		0.21			0.24			c0.15			0.09	
v/s Ratio Perm	0.03			c0.29		0.05	0.10		0.05	0.08		
v/c Ratio	0.05	0.41		0.56	0.48	0.10	0.32	0.47	0.16	0.25	0.27	
Uniform Delay, d1	9.8	12.1		13.3	12.6	10.0	21.0	22.1	19.9	20.5	20.7	
Progression Factor	1.43	1.38		1.78	1.82	3.14	1.00	1.00	1.00	1.02	1.05	
Incremental Delay, d2	0.4	0.7		5.4	0.7	0.2	2.3	2.7	0.7	1.9	1.2	
Delay (s)	14.3	17.4		29.1	23.6	31.6	23.3	24.9	20.6	22.9	22.9	
Level of Service	B	B		C	C	C	C	C	C	C	C	
Approach Delay (s)		17.3			25.3			23.1			22.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		22.4			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.52										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		72.1%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

19: Avenue Four & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱	↰	↰↱	↱
Volume (vph)	58	795	105	168	1071	112	103	109	225	47	126	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.5	3.5	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3500	1566	1750	3450		1750	1883	1566	1789	1883	1601
Flt Permitted	0.16	1.00	1.00	0.31	1.00		0.68	1.00	1.00	0.69	1.00	1.00
Satd. Flow (perm)	300	3500	1566	571	3450		1246	1883	1566	1293	1883	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	795	105	168	1071	112	103	109	225	47	126	10
RTOR Reduction (vph)	0	0	41	0	10	0	0	0	97	0	0	7
Lane Group Flow (vph)	58	795	64	168	1173	0	103	109	128	47	126	3
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	41.0	41.0	41.0	41.0	41.0		25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)	41.0	41.0	41.0	41.0	41.0		25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.31	0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	153	1793	802	292	1768		389	588	489	404	588	500
v/s Ratio Prot		0.23			c0.34			0.06			0.07	
v/s Ratio Perm	0.19		0.04	0.29			c0.08		0.08	0.04		0.00
v/c Ratio	0.38	0.44	0.08	0.58	0.66		0.26	0.19	0.26	0.12	0.21	0.01
Uniform Delay, d1	11.8	12.3	9.9	13.5	14.4		20.6	20.1	20.6	19.6	20.3	18.9
Progression Factor	1.74	1.78	3.36	1.00	1.00		1.00	1.00	1.00	1.11	1.12	1.00
Incremental Delay, d2	6.6	0.7	0.2	2.7	1.0		1.7	0.7	1.3	0.6	0.8	0.0
Delay (s)	27.1	22.6	33.5	16.2	15.4		22.3	20.8	21.9	22.4	23.4	19.0
Level of Service	C	C	C	B	B		C	C	C	C	C	B
Approach Delay (s)		24.1			15.5			21.7			22.9	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay		19.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		72.2%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

21: Bronte Rd & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰	↰	↰	↰↰	↰	↰	↰↰	↰	↰	↰↰	↰
Volume (vph)	69	847	133	42	953	352	444	1946	129	423	1446	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3500	1566	1789	3579	1601	1789	3579	1601	1789	3579	1601
Flt Permitted	0.13	1.00	1.00	0.13	1.00	1.00	0.07	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	238	3500	1566	243	3579	1601	135	3579	1601	137	3579	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	847	133	42	953	352	444	1946	129	423	1446	87
RTOR Reduction (vph)	0	0	21	0	0	22	0	0	39	0	0	41
Lane Group Flow (vph)	69	847	112	42	953	330	444	1946	90	423	1446	46
Turn Type	Perm	NA	pm+ov	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4	5		8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.0	28.0	50.0	28.0	28.0	46.0	78.0	56.0	56.0	70.0	52.0	52.0
Effective Green, g (s)	31.0	31.0	50.0	31.0	31.0	46.0	81.0	59.0	56.0	76.0	55.0	52.0
Actuated g/C Ratio	0.26	0.26	0.42	0.26	0.26	0.38	0.68	0.49	0.47	0.63	0.46	0.43
Clearance Time (s)	7.0	7.0	4.0	7.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	61	904	652	62	924	613	435	1759	747	375	1640	693
v/s Ratio Prot		0.24	0.03		0.27	0.08	c0.21	c0.54		c0.20	0.40	
v/s Ratio Perm	c0.29		0.04	0.17		0.13	0.48		0.06	0.52		0.03
v/c Ratio	1.13	0.94	0.17	0.68	1.03	0.54	1.02	1.11	0.12	1.13	0.88	0.07
Uniform Delay, d1	44.5	43.5	22.0	40.0	44.5	28.7	39.2	30.5	18.1	40.0	29.5	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.83	0.99	0.77	1.30	0.99	2.24	
Incremental Delay, d2	155.6	16.6	0.1	25.5	37.9	0.9	26.4	50.3	0.1	61.2	0.7	0.0
Delay (s)	200.1	60.1	22.1	65.5	82.4	29.7	58.9	80.4	14.0	113.3	30.0	44.4
Level of Service	F	E	C	E	F	C	E	F	B	F	C	D
Approach Delay (s)		64.5			68.1			73.2			48.6	
Approach LOS		E			E			E			D	
Intersection Summary												
HCM 2000 Control Delay		63.9			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.15										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		120.7%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/29/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰↰	↰↰	↰	↰	↰
Volume (vph)	785	3027	880	89	287	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Flt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.11	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	207	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	785	3027	880	89	287	391
RTOR Reduction (vph)	0	0	0	61	0	0
Lane Group Flow (vph)	785	3027	880	28	287	391
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	82.5	82.5	32.0	32.0	23.5	120.0
Effective Green, g (s)	85.5	85.5	35.0	32.0	26.5	120.0
Actuated g/C Ratio	0.71	0.71	0.29	0.27	0.22	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	
Lane Grp Cap (vph)	793	2961	1189	422	391	1585
v/s Ratio Prot	0.41	c0.73	0.22		c0.16	
v/s Ratio Perm	0.30			0.02		0.25
v/c Ratio	0.99	1.02	0.74	0.07	0.73	0.25
Uniform Delay, d1	29.7	17.2	38.4	32.9	43.5	0.0
Progression Factor	1.00	1.00	0.49	0.63	1.00	1.00
Incremental Delay, d2	29.1	22.5	3.3	0.2	6.6	0.4
Delay (s)	58.8	39.7	22.1	20.9	50.1	0.4
Level of Service	E	D	C	C	D	A
Approach Delay (s)		43.7	22.0		21.4	
Approach LOS		D	C		C	
Intersection Summary						
HCM 2000 Control Delay		37.0			HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio		0.96				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	9.0
Intersection Capacity Utilization		86.4%			ICU Level of Service	E
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	600	2714	882	414	45	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	7.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.14	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	260	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	600	2714	882	414	45	87
RTOR Reduction (vph)	0	0	0	286	0	64
Lane Group Flow (vph)	600	2714	882	128	45	23
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	74.0	74.0	37.1	37.1	32.0	32.0
Effective Green, g (s)	77.0	77.0	40.1	37.1	32.0	32.0
Actuated g/C Ratio	0.64	0.64	0.33	0.31	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	635	2666	1362	504	486	435
v/s Ratio Prot	0.28	c0.65	0.22		c0.02	
v/s Ratio Perm	0.32			0.08		0.01
v/c Ratio	0.94	1.02	0.65	0.25	0.09	0.05
Uniform Delay, d1	30.4	21.5	33.9	31.1	33.1	32.7
Progression Factor	1.07	1.32	0.68	2.14	1.00	1.00
Incremental Delay, d2	8.3	13.7	2.2	1.1	0.4	0.2
Delay (s)	40.9	42.1	25.2	67.8	33.5	33.0
Level of Service	D	D	C	E	C	C
Approach Delay (s)		41.9	38.8		33.1	
Approach LOS		D	D		C	
Intersection Summary						
HCM 2000 Control Delay			40.8		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			71.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	233	2511	48	50	1108	318	108	169	141	71	34	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	7.0	1.0	4.0	7.0	7.0	7.0	4.0	6.0	6.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.16	1.00	1.00	0.05	1.00	1.00	0.73	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	308	4156	1512	81	4078	1633	1295	1921	1585	953	1921	1633
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)	233	2511	48	50	1108	318	108	169	141	71	34	65
RTOR Reduction (vph)	0	0	16	0	0	119	0	0	59	0	0	35
Lane Group Flow (vph)	233	2511	32	50	1108	199	108	169	82	71	34	30
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	90.0	79.2	79.2	82.0	75.2	75.2	16.0	16.0	22.8	17.0	17.0	27.8
Effective Green, g (s)	93.0	82.2	79.2	88.0	78.2	75.2	16.0	16.0	22.8	17.0	17.0	27.8
Actuated g/C Ratio	0.78	0.69	0.66	0.73	0.65	0.63	0.13	0.13	0.19	0.14	0.14	0.23
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	413	2846	997	175	2657	1023	172	256	301	135	272	378
v/s Ratio Prot	c0.06	c0.60		0.02	0.27			c0.09	0.02		0.02	0.01
v/s Ratio Perm	0.37		0.02	0.18		0.12	0.08		0.04	0.07		0.01
v/c Ratio	0.56	0.88	0.03	0.29	0.42	0.19	0.63	0.66	0.27	0.53	0.12	0.08
Uniform Delay, d1	5.3	15.0	7.1	19.3	10.0	9.5	49.2	49.4	41.5	47.8	45.0	36.1
Progression Factor	1.76	0.58	0.58	1.88	1.19	4.16	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.1	0.0	0.7	0.4	0.3	7.0	6.2	0.5	3.7	0.2	0.1
Delay (s)	9.8	9.9	4.2	37.0	12.3	40.0	56.2	55.7	42.0	51.4	45.2	36.2
Level of Service	A	A	A	D	B	D	E	E	D	D	D	D
Approach Delay (s)		9.8			19.1			51.2			44.4	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			17.4		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				15.0			
Intersection Capacity Utilization			88.2%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	260	2425	61	23	1278	200	113	124	44	85	24	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		4.0	4.0	4.0	7.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4099		1362	4078	1601	1825	1819		3471	1659	
Flt Permitted	0.09	1.00		0.07	1.00	1.00	0.68	1.00		0.95	1.00	
Satd. Flow (perm)	161	4099		100	4078	1601	1311	1819		3471	1659	
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)	260	2425	61	23	1278	200	113	124	44	85	24	92
RTOR Reduction (vph)	0	1	0	0	0	51	0	11	0	0	72	0
Lane Group Flow (vph)	260	2485	0	23	1278	149	113	157	0	85	44	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA	Prot	NA	Perm
Protected Phases	5	2		6	7		8	7		4		
Permitted Phases	2			6		8						4
Actuated Green, G (s)	80.0	80.0		54.4	54.4	60.4	16.0	16.0		6.0	26.0	
Effective Green, g (s)	83.0	83.0		57.4	57.4	60.4	16.0	16.0		6.0	26.0	
Actuated g/C Ratio	0.69	0.69		0.48	0.48	0.50	0.13	0.13		0.05	0.22	
Clearance Time (s)	4.0	7.0		7.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	445	2835		47	1950	805	174	242		173	359	
v/s Ratio Prot	0.12	c0.61			0.31	0.01		0.09		c0.02	0.03	
v/s Ratio Perm	0.28			0.23		0.08	c0.09					
v/c Ratio	0.58	0.88		0.49	0.66	0.18	0.65	0.65		0.49	0.12	
Uniform Delay, d1	24.3	14.5		21.3	23.8	16.3	49.3	49.3		55.5	37.8	
Progression Factor	1.70	0.77		1.30	1.26	1.32	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	2.3		21.4	1.1	0.1	8.1	5.9		2.2	0.2	
Delay (s)	42.3	13.4		49.1	31.1	21.6	57.4	55.2		57.7	38.0	
Level of Service	D	B		D	C	C	E	E		E	D	
Approach Delay (s)	16.1			30.1			56.1			46.3		
Approach LOS	B			C			E			D		
Intersection Summary												
HCM 2000 Control Delay		24.2							C			
HCM 2000 Volume to Capacity ratio		0.83										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)		16.0					
Intersection Capacity Utilization		99.9%			ICU Level of Service		F					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: Bronte Rd & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	299	1560	695	136	732	601	655	1619	284	382	1126	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.20	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	379	4117	1601	167	4078	1585	3444	3730	1555	3510	3625	1512
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)	299	1560	695	136	732	601	655	1619	284	382	1126	114
RTOR Reduction (vph)	0	0	40	0	0	68	0	0	79	0	0	79
Lane Group Flow (vph)	299	1560	655	136	732	533	655	1619	205	382	1126	35
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	43.0	37.0	55.0	43.0	37.0	45.0	18.0	47.0	47.0	8.0	37.0	37.0
Effective Green, g (s)	49.0	40.0	55.0	49.0	40.0	45.0	21.0	50.0	47.0	11.0	40.0	37.0
Actuated g/C Ratio	0.41	0.33	0.46	0.41	0.33	0.38	0.18	0.42	0.39	0.09	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	259	1372	733	174	1359	594	602	1554	609	321	1208	466
v/s Ratio Prot	c0.09	c0.38	0.13	0.06	0.18	0.06	c0.19	c0.43		c0.11	0.31	
v/s Ratio Perm	0.38		0.28	0.26		0.28			0.13			0.02
v/c Ratio	1.15	1.14	0.89	0.78	0.54	0.90	1.09	1.04	0.34	1.19	0.93	0.08
Uniform Delay, d1	30.7	40.0	29.8	28.9	32.5	35.3	49.5	35.0	25.6	54.5	38.7	29.4
Progression Factor	1.00	0.96	0.53	1.00	1.00	1.00	1.00	1.00	1.00	1.05	0.76	2.63
Incremental Delay, d2	89.3	66.6	7.3	20.0	1.5	16.1	62.9	34.5	0.3	101.7	7.9	0.0
Delay (s)	120.0	105.0	23.0	48.9	34.0	51.5	112.4	69.5	25.9	159.2	37.3	77.3
Level of Service	F	F	C	D	C	D	F	E	C	F	D	E
Approach Delay (s)		84.4			42.5			75.7			68.8	
Approach LOS		F			D			E			E	
Intersection Summary												
HCM 2000 Control Delay		71.1							E			
HCM 2000 Volume to Capacity ratio		1.13										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			13.0				
Intersection Capacity Utilization		108.5%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↱	↱		↰↱↰↱	↰↱	
Volume (vph)	200	825	0	1110	2093	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	1.00		0.91	*1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3340	1617		4995	3591	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3340	1617		4995	3591	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	825	0	1110	2093	0
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	200	823	0	1110	2093	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	31.0	31.0		42.0	42.0	
Effective Green, g (s)	34.0	34.0		45.0	45.0	
Actuated g/C Ratio	0.40	0.40		0.53	0.53	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	1336	646		2644	1901	
v/s Ratio Prot	0.06			0.22	c0.58	
v/s Ratio Perm		c0.51				
v/c Ratio	0.15	1.27		0.42	1.10	
Uniform Delay, d1	16.3	25.5		12.1	20.0	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	134.9		0.5	54.1	
Delay (s)	16.5	160.4		12.6	74.1	
Level of Service	B	F		B	E	
Approach Delay (s)	132.3			12.6	74.1	
Approach LOS	F			B	E	
Intersection Summary						
HCM 2000 Control Delay		72.1		HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio		1.17				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)	6.0	
Intersection Capacity Utilization		115.6%		ICU Level of Service	H	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	785	3027	880	89	287	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	*1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	3694	3625	1585	1772	1585
Flt Permitted	0.11	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	207	3694	3625	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	785	3027	880	89	287	391
RTOR Reduction (vph)	0	0	0	54	0	0
Lane Group Flow (vph)	785	3027	880	35	287	391
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	82.5	82.5	32.0	32.0	23.5	120.0
Effective Green, g (s)	85.5	85.5	35.0	32.0	26.5	120.0
Actuated g/C Ratio	0.71	0.71	0.29	0.27	0.22	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	5.5	5.5	5.5	2.5	
Lane Grp Cap (vph)	793	2631	1057	422	391	1585
v/s Ratio Prot	0.41	c0.82	0.24		c0.16	
v/s Ratio Perm	0.30			0.02		0.25
v/c Ratio	0.99	1.15	0.83	0.08	0.73	0.25
Uniform Delay, d1	29.9	17.2	39.8	33.0	43.5	0.0
Progression Factor	1.00	1.00	0.48	0.44	1.00	1.00
Incremental Delay, d2	29.1	72.6	5.8	0.3	6.6	0.4
Delay (s)	59.0	89.9	25.0	14.8	50.1	0.4
Level of Service	E	F	C	B	D	A
Approach Delay (s)		83.5	24.1		21.4	
Approach LOS		F	C		C	
Intersection Summary						
HCM 2000 Control Delay			65.2		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			1.06			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			106.2%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	600	2714	882	414	45	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	7.0
Lane Util. Factor	1.00	*1.00	*1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	3694	3625	1633	1825	1633
Flt Permitted	0.16	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	299	3694	3625	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	600	2714	882	414	45	87
RTOR Reduction (vph)	0	0	0	283	0	64
Lane Group Flow (vph)	600	2714	882	131	45	23
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	74.0	74.0	38.1	38.1	32.0	32.0
Effective Green, g (s)	77.0	77.0	41.1	38.1	32.0	32.0
Actuated g/C Ratio	0.64	0.64	0.34	0.32	0.27	0.27
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	635	2370	1241	518	486	435
v/s Ratio Prot	0.27	c0.73	0.24		c0.02	
v/s Ratio Perm	0.33			0.08		0.01
v/c Ratio	0.94	1.15	0.71	0.25	0.09	0.05
Uniform Delay, d1	29.3	21.5	34.3	30.4	33.1	32.7
Progression Factor	1.10	1.29	0.76	2.45	1.00	1.00
Incremental Delay, d2	3.5	65.9	3.2	1.1	0.4	0.2
Delay (s)	35.7	93.7	29.2	75.6	33.5	33.0
Level of Service	D	F	C	E	C	C
Approach Delay (s)		83.2	44.0		33.1	
Approach LOS		F	D		C	
Intersection Summary						
HCM 2000 Control Delay			71.1		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			92.5%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	233	2511	48	50	1108	318	108	169	141	71	34	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	7.0	1.0	4.0	7.0	7.0	7.0	4.0	6.0	6.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3694	1512	1508	3625	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.22	1.00	1.00	0.05	1.00	1.00	0.73	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	424	3694	1512	80	3625	1633	1295	1921	1585	953	1921	1633
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)	233	2511	48	50	1108	318	108	169	141	71	34	65
RTOR Reduction (vph)	0	0	16	0	0	116	0	0	59	0	0	35
Lane Group Flow (vph)	233	2511	32	50	1108	202	108	169	82	71	34	30
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	88.9	79.2	79.2	83.1	76.3	76.3	16.0	16.0	22.8	17.0	17.0	26.7
Effective Green, g (s)	93.0	82.2	79.2	89.1	79.3	76.3	16.0	16.0	22.8	17.0	17.0	26.7
Actuated g/C Ratio	0.78	0.69	0.66	0.74	0.66	0.64	0.13	0.13	0.19	0.14	0.14	0.22
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	4.0	6.0	6.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	476	2530	997	176	2395	1038	172	256	301	135	272	363
v/s Ratio Prot	c0.05	c0.68		0.02	0.31			c0.09	0.02		0.02	0.01
v/s Ratio Perm	0.33		0.02	0.19		0.12	0.08		0.04	0.07		0.01
v/c Ratio	0.49	0.99	0.03	0.28	0.46	0.19	0.63	0.66	0.27	0.53	0.12	0.08
Uniform Delay, d1	5.2	18.6	7.1	28.5	9.9	9.1	49.2	49.4	41.5	47.8	45.0	37.0
Progression Factor	0.43	0.57	0.52	1.81	1.32	4.90	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	3.9	0.0	0.7	0.5	0.3	7.0	6.2	0.5	3.7	0.2	0.1
Delay (s)	2.3	14.6	3.7	52.4	13.6	44.8	56.2	55.7	42.0	51.4	45.2	37.0
Level of Service	A	B	A	D	B	D	E	E	D	D	D	D
Approach Delay (s)	13.4			21.7			51.2			44.7		
Approach LOS	B			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	20.3			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.93											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			15.0					
Intersection Capacity Utilization	109.1%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

2031 Future Total AM Peak Hour (Scenario 2: BRT Lanes)

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	260	2425	61	23	1278	200	113	124	44	85	24	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	7.0	4.0	4.0	4.0	7.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3694	1111	1362	3625	1601	1825	1819		3471	1659	
Flt Permitted	0.12	1.00	1.00	0.07	1.00	1.00	0.68	1.00		0.95	1.00	
Satd. Flow (perm)	218	3694	1111	96	3625	1601	1311	1819		3471	1659	
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)	260	2425	61	23	1278	200	113	124	44	85	24	92
RTOR Reduction (vph)	0	0	20	0	0	44	0	11	0	0	72	0
Lane Group Flow (vph)	260	2425	41	23	1278	156	113	157	0	85	44	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases	5	2			6	7		8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	80.0	80.0	80.0	56.5	56.5	62.5	16.0	16.0		6.0	26.0	
Effective Green, g (s)	83.0	83.0	80.0	59.5	59.5	62.5	16.0	16.0		6.0	26.0	
Actuated g/C Ratio	0.69	0.69	0.67	0.50	0.50	0.52	0.13	0.13		0.05	0.22	
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	445	2555	740	47	1797	833	174	242		173	359	
v/s Ratio Prot	0.11	c0.66			0.35	0.01	0.09			c0.02	0.03	
v/s Ratio Perm	0.29		0.04	0.24		0.09	c0.09					
v/c Ratio	0.58	0.95	0.05	0.49	0.71	0.19	0.65	0.65		0.49	0.12	
Uniform Delay, d1	19.2	16.6	6.9	20.1	23.6	15.3	49.3	49.3		55.5	37.8	
Progression Factor	1.80	0.82	2.56	1.29	1.26	1.30	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	4.0	0.1	20.1	1.4	0.1	8.1	5.9		2.2	0.2	
Delay (s)	35.3	17.6	17.8	46.0	31.1	19.9	57.4	55.2		57.7	38.0	
Level of Service	D	B	B	D	C	B	E	E		E	D	
Approach Delay (s)	19.3			29.9			56.1			46.3		
Approach LOS	B			C			E			D		
Intersection Summary												
HCM 2000 Control Delay	26.0			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.89											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	118.7%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

2031 Future Total AM Peak Hour (Scenario 2: BRT Lanes)

Synchro 8 Report
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HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	299	1560	695	136	732	601	655	1619	284	382	1126	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	7.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	3659	1601	1587	3625	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.23	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	426	3659	1601	167	3625	1585	3444	3730	1555	3510	3625	1512
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)	299	1560	695	136	732	601	655	1619	284	382	1126	114
RTOR Reduction (vph)	0	0	40	0	0	68	0	0	79	0	0	79
Lane Group Flow (vph)	299	1560	655	136	732	533	655	1619	205	382	1126	35
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	43.0	37.0	55.0	43.0	37.0	45.0	18.0	47.0	47.0	8.0	37.0	37.0
Effective Green, g (s)	49.0	40.0	55.0	49.0	40.0	45.0	21.0	50.0	47.0	11.0	40.0	37.0
Actuated g/C Ratio	0.41	0.33	0.46	0.41	0.33	0.38	0.18	0.42	0.39	0.09	0.33	0.31
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	274	1219	733	174	1208	594	602	1554	609	321	1208	466
v/s Ratio Prot	c0.08	c0.43	0.13	0.06	0.20	0.06	c0.19	c0.43		c0.11	0.31	
v/s Ratio Perm	0.36		0.28	0.26		0.28			0.13			0.02
v/c Ratio	1.09	1.28	0.89	0.78	0.61	0.90	1.09	1.04	0.34	1.19	0.93	0.08
Uniform Delay, d1	32.3	40.0	29.8	28.9	33.4	35.3	49.5	35.0	25.6	54.5	38.7	29.4
Progression Factor	0.89	0.94	0.52	1.00	1.00	1.00	1.00	1.00	1.00	1.05	0.76	2.63
Incremental Delay, d2	60.9	128.4	5.7	20.0	2.3	16.1	62.9	34.5	0.3	101.7	7.9	0.0
Delay (s)	89.6	166.0	21.3	48.9	35.7	51.5	112.4	69.5	25.9	159.2	37.3	77.3
Level of Service	F	F	C	D	D	D	F	E	C	F	D	E
Approach Delay (s)	117.7			43.4			75.7			68.8		
Approach LOS	F			D			E			E		
Intersection Summary												
HCM 2000 Control Delay	81.6			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.18											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					13.0			
Intersection Capacity Utilization	119.6%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	116	309	0	2275	1566	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		3.0	6.0	
Lane Util. Factor	0.97	0.91		0.91	0.95	
Frt	0.91	0.85		1.00	1.00	
Flt Protected	0.98	1.00		1.00	1.00	
Satd. Flow (prot)	3234	1471		4995	3411	
Flt Permitted	0.98	1.00		1.00	1.00	
Satd. Flow (perm)	3234	1471		4995	3411	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	116	309	0	2275	1566	0
RTOR Reduction (vph)	38	38	0	0	0	0
Lane Group Flow (vph)	233	116	0	2275	1566	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0		57.0	57.0	
Effective Green, g (s)	16.0	16.0		60.0	57.0	
Actuated g/C Ratio	0.19	0.19		0.71	0.67	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	608	276		3525	2287	
v/s Ratio Prot	0.07			0.46	0.46	
v/s Ratio Perm		0.08				
v/c Ratio	0.38	0.42		0.65	0.68	
Uniform Delay, d1	30.2	30.4		6.8	8.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	4.6		0.9	1.7	
Delay (s)	32.0	35.0		7.7	10.2	
Level of Service	C	D		A	B	
Approach Delay (s)	33.1			7.7	10.2	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay		11.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.63				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		66.0%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

4: Tremaine Rd & Avenue One

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	45	45	370	45	154	71	618	7	53	533	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.88		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1742		1789	1665		1789	1880		1789	1880	
Flt Permitted	0.61	1.00		0.70	1.00		0.35	1.00		0.29	1.00	
Satd. Flow (perm)	1156	1742		1316	1665		665	1880		541	1880	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	45	45	370	45	154	71	618	7	53	533	7
RTOR Reduction (vph)	0	31	0	0	105	0	0	0	0	0	0	0
Lane Group Flow (vph)	6	59	0	370	94	0	71	625	0	53	540	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.5	25.5		25.5	25.5		42.5	42.5		42.5	42.5	
Effective Green, g (s)	25.5	25.5		25.5	25.5		42.5	42.5		42.5	42.5	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.53	0.53		0.53	0.53	
Clearance Time (s)	6.0	6.0		6.0	6.0		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)	368	555		419	530		353	998		287	998	
v/s Ratio Prot		0.03			0.06			0.33			0.29	
v/s Ratio Perm	0.01			0.28			0.11			0.10		
v/c Ratio	0.02	0.11		0.88	0.18		0.20	0.63		0.18	0.54	
Uniform Delay, d1	18.7	19.2		25.8	19.7		9.8	13.2		9.7	12.3	
Progression Factor	1.00	1.00		1.22	2.19		0.72	0.61		1.00	1.00	
Incremental Delay, d2	0.0	0.1		18.4	0.2		1.2	2.7		1.4	2.1	
Delay (s)	18.7	19.3		49.8	43.2		8.2	10.7		11.2	14.4	
Level of Service	B	B		D	D		A	B		B	B	
Approach Delay (s)		19.3			47.5			10.5			14.1	
Approach LOS		B			D			B			B	
Intersection Summary												
HCM 2000 Control Delay				22.8			HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio				0.72								
Actuated Cycle Length (s)				80.0			Sum of lost time (s)			12.0		
Intersection Capacity Utilization				78.4%			ICU Level of Service			D		
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Avenue Two & Avenue One

8/29/2013

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖		↖	↖	↖	↖
Volume (vph)	105	15	148	534	55	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0		7.0	7.0	7.0	7.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1811		1750	1842	1750	1566
Flt Permitted	1.00		0.68	1.00	0.95	1.00
Satd. Flow (perm)	1811		1252	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	105	15	148	534	55	147
RTOR Reduction (vph)	4	0	0	0	0	132
Lane Group Flow (vph)	116	0	148	534	55	15
Turn Type	NA		Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	57.9		57.9	57.9	8.1	8.1
Effective Green, g (s)	57.9		57.9	57.9	8.1	8.1
Actuated g/C Ratio	0.72		0.72	0.72	0.10	0.10
Clearance Time (s)	7.0		7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1310		906	1333	177	158
v/s Ratio Prot	0.06			c0.29	c0.03	
v/s Ratio Perm			0.12			0.01
v/c Ratio	0.09		0.16	0.40	0.31	0.09
Uniform Delay, d1	3.3		3.5	4.3	33.4	32.6
Progression Factor	0.81		0.97	1.01	0.94	1.39
Incremental Delay, d2	0.1		0.4	0.9	1.0	0.3
Delay (s)	2.8		3.7	5.2	32.4	45.7
Level of Service	A		A	A	C	D
Approach Delay (s)	2.8			4.9	42.1	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			12.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			43.1%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

8: Avenue Three & Avenue One

8/29/2013

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖	↖	↖	↖	↖	↖
Volume (vph)	591	485	229	458	188	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1842	1566	1750	1842	1750	1566
Flt Permitted	1.00	1.00	0.39	1.00	0.95	1.00
Satd. Flow (perm)	1842	1566	710	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	591	485	229	458	188	123
RTOR Reduction (vph)	0	116	0	0	0	102
Lane Group Flow (vph)	591	369	229	458	188	21
Turn Type	NA	Perm	Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	52.1	52.1	52.1	52.1	13.9	13.9
Effective Green, g (s)	52.1	52.1	52.1	52.1	13.9	13.9
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.17	0.17
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1199	1019	462	1199	304	272
v/s Ratio Prot	0.32			0.25	c0.11	
v/s Ratio Perm		0.24	c0.32			0.01
v/c Ratio	0.49	0.36	0.50	0.38	0.62	0.08
Uniform Delay, d1	7.2	6.4	7.2	6.5	30.6	27.7
Progression Factor	1.00	1.03	0.88	0.94	1.23	2.09
Incremental Delay, d2	1.4	1.0	3.7	0.9	3.7	0.1
Delay (s)	8.6	7.6	10.0	7.0	41.3	57.9
Level of Service	A	A	B	A	D	E
Approach Delay (s)	8.1			8.0	47.9	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			14.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.52			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			71.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
10: Avenue Four & Avenue One

8/29/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	646	59	188	545	14	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0		7.0	7.0	7.0	7.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1821		1750	1842	1750	1566
Flt Permitted	1.00		0.36	1.00	0.95	1.00
Satd. Flow (perm)	1821		661	1842	1750	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	646	59	188	545	14	114
RTOR Reduction (vph)	2	0	0	0	0	106
Lane Group Flow (vph)	703	0	188	545	14	8
Turn Type	NA		Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	60.1		60.1	60.1	5.9	5.9
Effective Green, g (s)	60.1		60.1	60.1	5.9	5.9
Actuated g/C Ratio	0.75		0.75	0.75	0.07	0.07
Clearance Time (s)	7.0		7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1368		496	1383	129	115
v/s Ratio Prot	c0.39			0.30	c0.01	
v/s Ratio Perm			0.28			0.01
v/c Ratio	0.51		0.38	0.39	0.11	0.07
Uniform Delay, d1	4.0		3.5	3.5	34.6	34.5
Progression Factor	1.51		1.00	1.00	1.44	2.85
Incremental Delay, d2	1.3		2.2	0.8	0.4	0.3
Delay (s)	7.4		5.7	4.4	50.1	98.8
Level of Service	A		A	A	D	F
Approach Delay (s)	7.4			4.7	93.4	
Approach LOS	A			A	F	
Intersection Summary						
HCM 2000 Control Delay			13.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.48			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			68.8%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
12: Bronte Rd & Avenue One

8/29/2013

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	662	333	198	1928	1492	358
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.7	3.7	3.7
Total Lost time (s)	3.0	6.0	3.0	3.0	3.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1750	1566	1789	3579	3579	1601
Flt Permitted	0.95	1.00	0.07	1.00	1.00	1.00
Satd. Flow (perm)	1750	1566	132	3579	3579	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	662	333	198	1928	1492	358
RTOR Reduction (vph)	0	90	0	0	0	206
Lane Group Flow (vph)	662	243	198	1928	1492	152
Turn Type	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	44.0	44.0	64.0	64.0	51.0	51.0
Effective Green, g (s)	47.0	44.0	67.0	67.0	54.0	51.0
Actuated g/C Ratio	0.39	0.37	0.56	0.56	0.45	0.42
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	685	574	211	1998	1610	680
v/s Ratio Prot	c0.38		0.08	c0.54	0.42	
v/s Ratio Perm		0.16	0.44			0.10
v/c Ratio	0.97	0.42	0.94	0.96	0.93	0.22
Uniform Delay, d1	35.7	28.5	35.4	25.4	31.1	21.9
Progression Factor	1.00	1.00	1.48	0.98	1.00	1.00
Incremental Delay, d2	26.0	0.5	24.9	7.0	10.7	0.8
Delay (s)	61.7	29.0	77.1	31.9	41.8	22.7
Level of Service	E	C	E	C	D	C
Approach Delay (s)	50.8			36.1	38.1	
Approach LOS	D			D	D	
Intersection Summary						
HCM 2000 Control Delay			39.8		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			98.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

13: Tremaine Rd & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Volume (vph)	3	91	19	372	67	165	22	532	45	62	885	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.0	6.0		2.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt	1.00	0.97		1.00	0.89		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1794		1750	1646		1789	1845		1789	1865	
Flt Permitted	0.61	1.00		0.58	1.00		0.16	1.00		0.36	1.00	
Satd. Flow (perm)	1131	1794		1069	1646		300	1845		680	1865	
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)	3	91	19	372	67	165	22	532	45	62	885	0
RTOR Reduction (vph)	0	12	0	0	123	0	0	3	0	0	0	0
Lane Group Flow (vph)	3	98	0	372	109	0	22	574	0	62	885	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.0	9.0		20.2	20.2		47.8	47.8		47.8	47.8	
Effective Green, g (s)	9.0	9.0		22.2	20.2		47.8	47.8		47.8	47.8	
Actuated g/C Ratio	0.11	0.11		0.28	0.25		0.60	0.60		0.60	0.60	
Clearance Time (s)	6.0	6.0		4.0	6.0		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)	127	201		374	415		179	1102		406	1114	
v/s Ratio Prot		0.05		c0.11	0.07			0.31			c0.47	
v/s Ratio Perm	0.00			0.16			0.07			0.09		
v/c Ratio	0.02	0.49		0.99	0.26		0.12	0.52		0.15	0.79	
Uniform Delay, d1	31.6	33.3		27.9	23.9		7.0	9.4		7.1	12.3	
Progression Factor	1.00	1.00		1.84	3.52		1.00	1.00		0.77	0.69	
Incremental Delay, d2	0.1	1.9		44.1	0.3		1.4	1.8		0.6	4.6	
Delay (s)	31.7	35.2		95.3	84.5		8.4	11.2		6.1	13.2	
Level of Service	C	D		F	F		A	B		A	B	
Approach Delay (s)		35.1			91.1			11.1			12.7	
Approach LOS		D			F			B			B	
Intersection Summary												
HCM 2000 Control Delay		34.3			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.83										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		88.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

15: Avenue Two & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Volume (vph)	4	367	202	325	574	73	85	83	337	209	155	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3500	1566	1750	3500	1566	1750	1842	1566	1750	1798	1798
Flt Permitted	0.43	1.00	1.00	0.53	1.00	1.00	0.64	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	786	3500	1566	982	3500	1566	1182	1842	1566	1295	1798	1798
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)	4	367	202	325	574	73	85	83	337	209	155	29
RTOR Reduction (vph)	0	0	98	0	0	36	0	0	232	0	8	0
Lane Group Flow (vph)	4	367	104	325	574	37	85	83	105	209	176	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	41.0	41.0	41.0	41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)	41.0	41.0	41.0	41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51	0.51	0.31	0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	402	1793	802	503	1793	802	369	575	489	404	561	561
v/s Ratio Prot		0.10			0.16			0.05			0.10	
v/s Ratio Perm	0.01		0.07	c0.33		0.02	0.07		0.07	c0.16		
v/c Ratio	0.01	0.20	0.13	0.65	0.32	0.05	0.23	0.14	0.22	0.52	0.31	
Uniform Delay, d1	9.6	10.6	10.2	14.2	11.4	9.7	20.4	19.8	20.3	22.6	21.0	
Progression Factor	1.26	1.24	2.28	2.00	2.05	4.01	1.00	1.00	1.00	0.95	0.94	
Incremental Delay, d2	0.0	0.3	0.3	5.7	0.4	0.1	1.5	0.5	1.0	4.7	1.5	
Delay (s)	12.1	13.4	23.6	34.1	23.7	39.1	21.8	20.3	21.3	26.2	21.3	
Level of Service	B	B	C	C	C	D	C	C	C	C	C	
Approach Delay (s)		17.0			28.3			21.2			23.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		23.5			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		67.4%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
17: Avenue Three & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Volume (vph)	58	970	72	307	849	125	73	115	246	361	318	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3464		1750	3500	1566	1750	1842	1566	1750	1813	
Flt Permitted	0.33	1.00		0.13	1.00	1.00	0.40	1.00	1.00	0.68	1.00	
Satd. Flow (perm)	613	3464		246	3500	1566	745	1842	1566	1258	1813	
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	970	72	307	849	125	73	115	246	361	318	38
RTOR Reduction (vph)	0	7	0	0	0	46	0	0	169	0	6	0
Lane Group Flow (vph)	58	1035	0	307	849	79	73	115	77	361	351	0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	2			1	6			8			4	
Permitted Phases	2			6		6	8		8	4		
Actuated Green, G (s)	26.0	26.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Effective Green, g (s)	26.0	26.0		41.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
Actuated g/C Ratio	0.32	0.32		0.51	0.51	0.51	0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	7.0	7.0		4.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	199	1125		332	1793	802	232	575	489	393	566	
v/s Ratio Prot		0.30		c0.13	0.24			0.06			0.19	
v/s Ratio Perm	0.09			c0.35		0.05	0.10		0.05	c0.29		
v/c Ratio	0.29	0.92		0.92	0.47	0.10	0.31	0.20	0.16	0.92	0.62	
Uniform Delay, d1	20.1	26.0		19.3	12.6	10.0	21.0	20.2	19.9	26.5	23.4	
Progression Factor	1.01	1.01		2.03	0.42	0.13	1.00	1.00	1.00	0.95	0.95	
Incremental Delay, d2	3.6	13.1		26.5	0.7	0.2	3.5	0.8	0.7	27.1	4.6	
Delay (s)	23.9	39.3		65.7	6.0	1.5	24.5	20.9	20.6	52.2	26.9	
Level of Service	C	D		E	A	A	C	C	C	D	C	
Approach Delay (s)		38.5			19.9			21.3			39.6	
Approach LOS		D			B			C			D	
Intersection Summary												
HCM 2000 Control Delay		29.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.96										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		93.0%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Avenue Four & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Volume (vph)	7	1378	218	186	1117	48	71	78	174	147	215	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.5	3.5	3.5	3.5	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	7.0	5.0	7.0	4.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	3500	1566	1750	3478		1750	1883	1566	1789	1883	1601
Flt Permitted	0.21	1.00	1.00	0.11	1.00		0.61	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	398	3500	1566	205	3478		1128	1883	1566	1330	1883	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	7	1378	218	186	1117	48	71	78	174	147	215	73
RTOR Reduction (vph)	0	0	65	0	4	0	0	0	109	0	0	50
Lane Group Flow (vph)	7	1378	153	186	1161	0	71	78	65	147	215	23
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases		2		6			8		8	4		4
Actuated Green, G (s)	32.0	32.0	32.0	41.0	41.0		25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)	32.0	34.0	32.0	41.0	41.0		25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.40	0.42	0.40	0.51	0.51		0.31	0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	4.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	159	1487	626	201	1782		352	588	489	415	588	500
v/s Ratio Prot		0.39		c0.06	0.33			0.04			c0.11	
v/s Ratio Perm	0.02		0.10	c0.42			0.06		0.04	0.11		0.01
v/c Ratio	0.04	0.93	0.24	0.93	0.65		0.20	0.13	0.13	0.35	0.37	0.05
Uniform Delay, d1	14.7	21.8	16.0	17.3	14.3		20.2	19.7	19.7	21.3	21.3	19.2
Progression Factor	1.02	0.64	0.86	1.00	1.00		1.00	1.00	1.00	0.87	0.88	1.58
Incremental Delay, d2	0.3	6.9	0.5	42.7	0.9		1.3	0.5	0.6	2.3	1.7	0.2
Delay (s)	15.3	20.9	14.3	59.9	15.1		21.5	20.2	20.3	20.9	20.4	30.5
Level of Service	B	C	B	E	B		C	C	C	C	C	C
Approach Delay (s)		20.0			21.3			20.5			22.3	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		20.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		80.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		82.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
21: Bronte Rd & Burnhamthorpe Road

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Volume (vph)	255	1051	559	117	912	365	341	1493	45	354	1434	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	1.0	4.0	3.0	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	3684	1566	1789	3767	1601	1789	3767	1601	1789	3767	1601
Flt Permitted	0.13	1.00	1.00	0.13	1.00	1.00	0.08	1.00	1.00	0.08	1.00	1.00
Satd. Flow (perm)	238	3684	1566	251	3767	1601	157	3767	1601	157	3767	1601
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	255	1051	559	117	912	365	341	1493	45	354	1434	36
RTOR Reduction (vph)	0	0	43	0	0	47	0	0	26	0	0	20
Lane Group Flow (vph)	255	1051	516	117	912	318	341	1493	19	354	1434	17
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	41.0	31.0	47.0	33.0	27.0	43.0	61.0	45.0	51.0	61.0	45.0	55.0
Effective Green, g (s)	44.0	34.0	49.0	39.0	30.0	43.0	67.0	48.0	51.0	67.0	48.0	55.0
Actuated g/C Ratio	0.37	0.28	0.41	0.32	0.25	0.36	0.56	0.40	0.42	0.56	0.40	0.46
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	1043	639	196	941	573	346	1506	680	346	1506	733
v/s Ratio Prot	c0.11	c0.29	0.11	0.04	0.24	0.07	0.16	c0.40	0.00	c0.16	0.38	0.00
v/s Ratio Perm	0.26		0.22	0.15		0.12	0.39		0.01	0.41		0.01
v/c Ratio	1.02	1.01	0.81	0.60	0.97	0.56	0.99	0.99	0.03	1.02	0.95	0.02
Uniform Delay, d1	32.8	43.0	31.3	32.3	44.5	30.8	38.5	35.8	20.1	38.8	34.9	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.70	0.88	2.55	1.39	1.15	5.47	
Incremental Delay, d2	61.0	29.8	7.4	4.8	21.9	1.2	31.3	15.0	0.0	40.2	8.5	0.0
Delay (s)	93.8	72.8	38.7	37.1	66.4	32.0	58.1	46.4	51.3	94.2	48.6	97.4
Level of Service	F	E	D	D	E	C	E	D	D	F	D	F
Approach Delay (s)		65.4			54.9			48.7			58.4	
Approach LOS		E			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		57.0			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.06										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		113.6%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
22: Dundas St W & Tremaine Rd

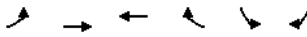
8/29/2013

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰
Volume (vph)	384	1316	2742	215	147	1152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	4156	4078	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	107	4156	4078	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	384	1316	2742	215	147	1152
RTOR Reduction (vph)	0	0	0	47	0	0
Lane Group Flow (vph)	384	1316	2742	168	147	1152
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	90.6	90.6	66.0	66.0	15.4	120.0
Effective Green, g (s)	93.6	93.6	69.0	66.0	18.4	120.0
Actuated g/C Ratio	0.78	0.78	0.58	0.55	0.15	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	410	3241	2344	871	271	1585
v/s Ratio Prot	c0.18	0.32	c0.67		0.08	
v/s Ratio Perm	0.55			0.11		c0.73
v/c Ratio	0.94	0.41	1.17	0.19	0.54	0.73
Uniform Delay, d1	41.0	4.3	25.5	13.6	46.9	0.0
Progression Factor	1.00	1.00	1.34	1.26	1.00	1.00
Incremental Delay, d2	28.7	0.4	76.9	0.0	2.2	3.0
Delay (s)	69.7	4.6	111.2	17.2	49.1	3.0
Level of Service	E	A	F	B	D	A
Approach Delay (s)		19.3	104.3		8.2	
Approach LOS		B	F		A	
Intersection Summary						
HCM 2000 Control Delay		59.1			HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio		1.06				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	9.0
Intersection Capacity Utilization		92.6%			ICU Level of Service	F
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔↔	↔↔↔	↔	↔	↔
Volume (vph)	234	1229	2396	368	490	561
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	4.0
Lane Util. Factor	1.00	*0.75	*0.75	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	4078	1633	1825	1633
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	116	4156	4078	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	234	1229	2396	368	490	561
RTOR Reduction (vph)	0	0	0	17	0	1
Lane Group Flow (vph)	234	1229	2396	351	490	560
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	NA	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4		8		6	
Actuated Green, G (s)	73.0	73.0	62.0	95.0	33.0	40.0
Effective Green, g (s)	76.0	76.0	65.0	95.0	33.0	40.0
Actuated g/C Ratio	0.63	0.63	0.54	0.79	0.28	0.33
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	2632	2208	1388	501	544
v/s Ratio Prot	c0.09	0.30	c0.59	0.07	0.27	c0.06
v/s Ratio Perm	0.59			0.15		0.28
v/c Ratio	1.09	0.47	1.09	0.25	0.98	1.03
Uniform Delay, d1	39.8	11.5	27.5	3.3	43.1	40.0
Progression Factor	0.90	1.59	1.01	2.54	1.00	1.00
Incremental Delay, d2	84.9	0.1	40.9	0.0	35.1	46.2
Delay (s)	120.6	18.3	68.8	8.3	78.3	86.2
Level of Service	F	B	E	A	E	F
Approach Delay (s)		34.7	60.7		82.5	
Approach LOS		C	E		F	
Intersection Summary						
HCM 2000 Control Delay		57.8		HCM 2000 Level of Service		E
HCM 2000 Volume to Capacity ratio		1.08				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	15.0	
Intersection Capacity Utilization		98.9%		ICU Level of Service		F
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	177	1419	133	104	2312	157	72	57	75	354	159	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1825	4156	1512	1508	4078	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.06	1.00	1.00	0.08	1.00	1.00	0.66	1.00	1.00	0.54	1.00	1.00
Satd. Flow (perm)	121	4156	1512	130	4078	1633	1157	1921	1585	1025	1921	1633
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)	177	1419	133	104	2312	157	72	57	75	354	159	372
RTOR Reduction (vph)	0	0	53	0	0	43	0	0	60	0	0	126
Lane Group Flow (vph)	177	1419	80	104	2312	114	72	57	15	354	159	246
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	75.0	62.6	71.8	69.2	59.7	73.2	21.6	12.4	21.9	29.9	16.7	29.1
Effective Green, g (s)	79.1	65.6	71.8	75.2	62.7	73.2	21.6	12.4	21.9	29.9	16.7	29.1
Actuated g/C Ratio	0.66	0.55	0.60	0.63	0.52	0.61	0.18	0.10	0.18	0.25	0.14	0.24
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	2271	904	225	2130	996	247	198	289	341	267	396
v/s Ratio Prot	c0.08	0.34	0.01	0.05	c0.57	0.01	0.02	0.03	0.00	c0.12	0.08	c0.06
v/s Ratio Perm	0.32		0.05	0.24		0.06	0.03		0.01	c0.14		0.09
v/c Ratio	0.59	0.62	0.09	0.46	1.09	0.11	0.29	0.29	0.05	1.04	0.60	0.62
Uniform Delay, d1	31.7	18.7	10.2	13.3	28.6	9.8	42.2	49.7	40.5	43.8	48.5	40.5
Progression Factor	0.67	1.35	1.84	1.61	1.41	2.14	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	1.0	0.0	0.4	41.1	0.0	0.7	0.8	0.1	59.0	3.5	3.0
Delay (s)	23.8	26.4	18.8	21.7	81.3	21.0	42.8	50.5	40.6	102.8	52.0	43.6
Level of Service	C	C	B	C	F	C	D	D	D	F	D	D
Approach Delay (s)		25.5			75.3			44.1			68.8	
Approach LOS		C			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		57.1			HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio		1.06										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				19.0			
Intersection Capacity Utilization		98.3%			ICU Level of Service				F			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	166	1583	103	54	2239	106	82	35	38	459	116	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		1.0	4.0	4.0	7.0	7.0		1.0	4.0	
Lane Util. Factor	1.00	*0.75		1.00	*0.75	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	0.99		1.00	1.00	0.85	1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	4017		1362	4078	1601	1825	1754		3471	1697	
Flt Permitted	0.06	1.00		0.06	1.00	1.00	0.56	1.00		0.95	1.00	
Satd. Flow (perm)	120	4017		93	4078	1601	1067	1754		3471	1697	
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)	166	1583	103	54	2239	106	82	35	38	459	116	226
RTOR Reduction (vph)	0	4	0	0	0	29	0	33	0	0	68	0
Lane Group Flow (vph)	166	1682	0	54	2239	77	82	40	0	459	274	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6	7		8		7	4	
Permitted Phases	2			6		6	8					
Actuated Green, G (s)	74.0	63.7		65.0	58.7	71.7	15.0	15.0		13.0	32.0	
Effective Green, g (s)	77.0	66.7		71.0	61.7	71.7	15.0	15.0		16.0	35.0	
Actuated g/C Ratio	0.64	0.56		0.59	0.51	0.60	0.12	0.12		0.13	0.29	
Clearance Time (s)	4.0	7.0		4.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	2232		153	2096	956	133	219		462	494	
v/s Ratio Prot	c0.07	0.42		0.03	c0.55	0.01		0.02		c0.13	c0.16	
v/s Ratio Perm	0.31			0.18		0.04	0.08					
v/c Ratio	0.60	0.75		0.35	1.07	0.08	0.62	0.18		0.99	0.55	
Uniform Delay, d1	31.1	20.4		15.5	29.1	10.2	49.8	47.0		51.9	35.9	
Progression Factor	1.66	0.55		2.03	0.66	0.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	1.8		0.4	34.5	0.0	8.2	0.4		40.0	1.4	
Delay (s)	54.3	13.0		31.9	53.8	3.7	58.0	47.4		91.9	37.3	
Level of Service	D	B		C	D	A	E	D		F	D	
Approach Delay (s)		16.7			51.1			53.0			68.6	
Approach LOS		B			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		41.6			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.95										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		96.6%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: Bronte Rd & Dundas St W

8/29/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	156	1124	828	152	1527	452	535	1271	152	433	1407	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*0.75	1.00	1.00	*0.75	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4117	1601	1587	4078	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.10	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	178	4117	1601	155	4078	1585	3444	3730	1555	3510	3625	1512
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)	156	1124	828	152	1527	452	535	1271	152	433	1407	270
RTOR Reduction (vph)	0	0	41	0	0	42	0	0	78	0	0	46
Lane Group Flow (vph)	156	1124	787	152	1527	410	535	1271	74	433	1407	224
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	45.0	39.0	53.0	47.0	40.0	51.0	14.0	41.0	41.0	11.0	38.0	44.0
Effective Green, g (s)	51.0	42.0	53.0	53.0	43.0	51.0	17.0	44.0	41.0	14.0	41.0	44.0
Actuated g/C Ratio	0.42	0.35	0.44	0.44	0.36	0.42	0.14	0.37	0.34	0.12	0.34	0.37
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	195	1440	707	187	1461	673	487	1367	531	409	1238	554
v/s Ratio Prot	0.06	0.27	c0.13	c0.07	c0.37	0.06	c0.16	0.34		0.12	c0.39	0.02
v/s Ratio Perm	0.28		0.36	0.29		0.20			0.05			0.13
v/c Ratio	0.80	0.78	1.11	0.81	1.05	0.61	1.10	0.93	0.14	1.06	1.14	0.40
Uniform Delay, d1	28.3	34.9	33.5	25.5	38.5	26.8	51.5	36.5	27.3	53.0	39.5	28.3
Progression Factor	1.55	1.00	0.69	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.90	0.91
Incremental Delay, d2	13.2	2.6	63.2	22.9	36.3	1.6	70.3	11.2	0.1	46.9	66.5	0.2
Delay (s)	57.0	37.3	86.3	48.3	74.8	28.3	121.8	47.7	27.4	93.3	102.0	26.0
Level of Service	E	D	F	D	E	C	F	D	C	F	F	C
Approach Delay (s)		58.0			63.1			66.4			90.5	
Approach LOS		E			E			E			F	
Intersection Summary												
HCM 2000 Control Delay		69.5			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.11										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		108.6%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Bronte Rd & 407 Off Ramp

8/29/2013

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	116	309	0	2275	1566	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		3.0	6.0	
Lane Util. Factor	0.97	1.00		0.91	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3340	1617		4995	3411	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3340	1617		4995	3411	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	116	309	0	2275	1566	0
RTOR Reduction (vph)	0	22	0	0	0	0
Lane Group Flow (vph)	116	287	0	2275	1566	0
Heavy Vehicles (%)	6%	1%	0%	5%	7%	0%
Turn Type	NA	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	23.0	23.0		50.0	50.0	
Effective Green, g (s)	23.0	23.0		53.0	50.0	
Actuated g/C Ratio	0.27	0.27		0.62	0.59	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	903	437		3114	2006	
v/s Ratio Prot	0.03			0.46	c0.46	
v/s Ratio Perm		c0.18				
v/c Ratio	0.13	0.66		0.73	0.78	
Uniform Delay, d1	23.4	27.5		11.1	13.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	7.5		1.5	3.1	
Delay (s)	23.7	35.0		12.6	16.4	
Level of Service	C	D		B	B	
Approach Delay (s)	31.9			12.6	16.4	
Approach LOS	C			B	B	
Intersection Summary						
HCM 2000 Control Delay		15.9		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.74				
Actuated Cycle Length (s)		85.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		72.4%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

22: Dundas St W & Tremaine Rd

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	384	1316	2742	215	147	1152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	*1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1772	3694	3625	1585	1772	1585
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	107	3694	3625	1585	1772	1585
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	384	1316	2742	215	147	1152
RTOR Reduction (vph)	0	0	0	42	0	0
Lane Group Flow (vph)	384	1316	2742	173	147	1152
Heavy Vehicles (%)	3%	4%	6%	3%	3%	3%
Turn Type	pm+pt	NA	NA	Perm	NA	Free
Protected Phases	5	2	6		4	
Permitted Phases	2			6		Free
Actuated Green, G (s)	90.6	90.6	66.0	66.0	15.4	120.0
Effective Green, g (s)	93.6	93.6	69.0	66.0	18.4	120.0
Actuated g/C Ratio	0.78	0.78	0.58	0.55	0.15	1.00
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	410	2881	2084	871	271	1585
v/s Ratio Prot	c0.18	0.36	c0.76		0.08	
v/s Ratio Perm	0.55			0.11		c0.73
v/c Ratio	0.94	0.46	1.32	0.20	0.54	0.73
Uniform Delay, d1	41.0	4.5	25.5	13.6	46.9	0.0
Progression Factor	1.00	1.00	1.34	1.23	1.00	1.00
Incremental Delay, d2	28.7	0.5	142.4	0.0	2.2	3.0
Delay (s)	69.7	5.0	176.6	16.8	49.1	3.0
Level of Service	E	A	F	B	D	A
Approach Delay (s)		19.6	165.0		8.2	
Approach LOS		B	F		A	
Intersection Summary						
HCM 2000 Control Delay			89.3		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.15			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			115.4%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

2031 Future Total PM Peak Hour (Scenario 2: BRT Lanes)

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HCM Signalized Intersection Capacity Analysis

24: Dundas St W & Avenue Two

8/29/2013

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	234	1229	2396	368	490	561
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	7.0	7.0	4.0
Lane Util. Factor	1.00	*1.00	*1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1825	3694	3625	1633	1825	1633
Flt Permitted	0.06	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	115	3694	3625	1633	1825	1633
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	234	1229	2396	368	490	561
RTOR Reduction (vph)	0	0	0	13	0	1
Lane Group Flow (vph)	234	1229	2396	355	490	560
Heavy Vehicles (%)	0%	4%	6%	0%	0%	0%
Turn Type	pm+pt	NA	NA	custom	NA	pm+ov
Protected Phases	5	2	6	7	4	5
Permitted Phases	2			6		4
Actuated Green, G (s)	73.0	73.0	63.0	96.0	33.0	39.0
Effective Green, g (s)	76.0	76.0	66.0	96.0	33.0	39.0
Actuated g/C Ratio	0.63	0.63	0.55	0.80	0.28	0.32
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	2339	1993	1401	501	530
v/s Ratio Prot	c0.09	0.33	c0.66	0.07	0.27	c0.05
v/s Ratio Perm	0.65			0.15		0.29
v/c Ratio	1.16	0.53	1.20	0.25	0.98	1.06
Uniform Delay, d1	39.4	12.1	27.0	3.0	43.1	40.5
Progression Factor	0.88	1.58	0.99	2.40	1.00	1.00
Incremental Delay, d2	112.1	0.8	91.5	0.0	35.1	54.7
Delay (s)	146.7	19.9	118.3	7.3	78.3	95.2
Level of Service	F	B	F	A	E	F
Approach Delay (s)		40.2	103.5		87.3	
Approach LOS		D	F		F	
Intersection Summary						
HCM 2000 Control Delay			82.7		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.17			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			118.8%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

2031 Future Total PM Peak Hour (Scenario 2: BRT Lanes)

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HCM Signalized Intersection Capacity Analysis
26: Colonel William Pkwy/Avenue Three & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	177	1419	133	104	2312	157	72	57	75	354	159	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3694	1512	1508	3625	1633	1674	1921	1585	1789	1921	1633
Flt Permitted	0.06	1.00	1.00	0.11	1.00	1.00	0.66	1.00	1.00	0.54	1.00	1.00
Satd. Flow (perm)	121	3694	1512	175	3625	1633	1157	1921	1585	1025	1921	1633
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)	177	1419	133	104	2312	157	72	57	75	354	159	372
RTOR Reduction (vph)	0	0	50	0	0	38	0	0	60	0	0	126
Lane Group Flow (vph)	177	1419	83	104	2312	119	72	57	15	354	159	246
Heavy Vehicles (%)	0%	4%	8%	21%	6%	0%	9%	0%	3%	2%	0%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	75.0	62.6	71.8	69.2	59.7	73.2	21.6	12.4	21.9	29.9	16.7	29.1
Effective Green, g (s)	79.1	65.6	71.8	75.2	62.7	73.2	21.6	12.4	21.9	29.9	16.7	29.1
Actuated g/C Ratio	0.66	0.55	0.60	0.63	0.52	0.61	0.18	0.10	0.18	0.25	0.14	0.24
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	2019	904	248	1894	996	247	198	289	341	267	396
v/s Ratio Prot	c0.08	0.38	0.01	0.04	c0.64	0.01	0.02	0.03	0.00	c0.12	0.08	c0.06
v/s Ratio Perm	0.32		0.05	0.22		0.06	0.03		0.01	c0.14		0.09
v/c Ratio	0.59	0.70	0.09	0.42	1.22	0.12	0.29	0.29	0.05	1.04	0.60	0.62
Uniform Delay, d1	31.7	20.0	10.2	14.0	28.6	9.8	42.2	49.7	40.5	43.8	48.5	40.5
Progression Factor	0.84	1.32	1.41	2.08	1.36	1.99	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	1.6	0.0	0.1	99.8	0.0	0.7	0.8	0.1	59.0	3.5	3.0
Delay (s)	29.0	28.0	14.5	29.1	138.7	19.6	42.8	50.5	40.6	102.8	52.0	43.6
Level of Service	C	C	B	C	F	B	D	D	D	F	D	D
Approach Delay (s)	27.1			127.0			44.1			68.8		
Approach LOS	C			F			D			E		
Intersection Summary												
HCM 2000 Control Delay	82.3			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	1.14											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			19.0					
Intersection Capacity Utilization	117.5%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

2031 Future Total PM Peak Hour (Scenario 2: BRT Lanes)

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HCM Signalized Intersection Capacity Analysis
28: Valleyridge Dr/Avenue Four & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	166	1583	103	54	2239	106	82	35	38	459	116	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	7.0	1.0	4.0	4.0	7.0	7.0		1.0	4.0	
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	1.00	1.00		0.97	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3694	1111	1362	3625	1601	1825	1754		3471	1697	
Flt Permitted	0.06	1.00	1.00	0.08	1.00	1.00	0.56	1.00		0.95	1.00	
Satd. Flow (perm)	120	3694	1111	116	3625	1601	1067	1754		3471	1697	
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)	166	1583	103	54	2239	106	82	35	38	459	116	226
RTOR Reduction (vph)	0	0	48	0	0	29	0	33	0	0	68	0
Lane Group Flow (vph)	166	1583	55	54	2239	77	82	40	0	459	274	0
Heavy Vehicles (%)	2%	4%	47%	34%	6%	2%	0%	2%	0%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6	7		8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	74.0	63.7	63.7	65.0	58.7	71.7	15.0	15.0		13.0	32.0	
Effective Green, g (s)	77.0	66.7	63.7	71.0	61.7	71.7	15.0	15.0		16.0	35.0	
Actuated g/C Ratio	0.64	0.56	0.53	0.59	0.51	0.60	0.12	0.12		0.13	0.29	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	4.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	2053	589	165	1863	956	133	219		462	494	
v/s Ratio Prot	c0.07	0.43		0.03	c0.62	0.01		0.02		c0.13	c0.16	
v/s Ratio Perm	0.31		0.05	0.17		0.04	0.08					
v/c Ratio	0.60	0.77	0.09	0.33	1.20	0.08	0.62	0.18		0.99	0.55	
Uniform Delay, d1	31.1	20.7	13.9	16.2	29.1	10.2	49.8	47.0		51.9	35.9	
Progression Factor	1.58	0.64	1.54	2.11	0.67	0.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	1.9	0.2	0.1	91.3	0.0	8.2	0.4		40.0	1.4	
Delay (s)	51.5	15.2	21.6	34.3	110.8	3.7	58.0	47.4		91.9	37.3	
Level of Service	D	B	C	C	F	A	E	D		F	D	
Approach Delay (s)	18.8			104.3			53.0			68.6		
Approach LOS	B			F			D			E		
Intersection Summary												
HCM 2000 Control Delay	66.9			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.03											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	115.2%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

2031 Future Total PM Peak Hour (Scenario 2: BRT Lanes)

Synchro 8 Report
Page 4

HCM Signalized Intersection Capacity Analysis

30: Bronte Rd & Dundas St W

8/29/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	1124	828	152	1527	452	535	1271	152	433	1407	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0	4.0	1.0	4.0	4.0	1.0	4.0	7.0	1.0	4.0	4.0
Lane Util. Factor	1.00	*1.00	1.00	1.00	*1.00	1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	3659	1601	1587	3625	1585	3444	3730	1555	3510	3625	1512
Flt Permitted	0.10	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	178	3659	1601	155	3625	1585	3444	3730	1555	3510	3625	1512
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)	156	1124	828	152	1527	452	535	1271	152	433	1407	270
RTOR Reduction (vph)	0	0	41	0	0	42	0	0	78	0	0	46
Lane Group Flow (vph)	156	1124	787	152	1527	410	535	1271	74	433	1407	224
Heavy Vehicles (%)	3%	5%	2%	15%	6%	3%	6%	3%	5%	4%	6%	8%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)	45.0	39.0	53.0	47.0	40.0	51.0	14.0	41.0	41.0	11.0	38.0	44.0
Effective Green, g (s)	51.0	42.0	53.0	53.0	43.0	51.0	17.0	44.0	41.0	14.0	41.0	44.0
Actuated g/C Ratio	0.42	0.35	0.44	0.44	0.36	0.42	0.14	0.37	0.34	0.12	0.34	0.37
Clearance Time (s)	4.0	7.0	4.0	4.0	7.0	4.0	4.0	7.0	7.0	4.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	195	1280	707	187	1298	673	487	1367	531	409	1238	554
v/s Ratio Prot	0.06	0.31	c0.13	c0.07	c0.42	0.06	c0.16	0.34		0.12	c0.39	0.02
v/s Ratio Perm	0.28		0.36	0.29		0.20			0.05			0.13
v/c Ratio	0.80	0.88	1.11	0.81	1.18	0.61	1.10	0.93	0.14	1.06	1.14	0.40
Uniform Delay, d1	28.3	36.6	33.5	26.5	38.5	26.8	51.5	36.5	27.3	53.0	39.5	28.3
Progression Factor	1.54	0.99	0.72	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.90	0.91
Incremental Delay, d2	12.9	5.4	62.9	22.9	87.8	1.6	70.3	11.2	0.1	46.9	66.5	0.2
Delay (s)	56.5	41.6	87.2	49.3	126.3	28.3	121.8	47.7	27.4	93.3	102.0	26.0
Level of Service	E	D	F	D	F	C	F	D	C	F	F	C
Approach Delay (s)	60.6			100.0			66.4			90.5		
Approach LOS	E			F			E			F		
Intersection Summary												
HCM 2000 Control Delay	79.7			HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio	1.17											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					16.0			
Intersection Capacity Utilization	118.3%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

APPENDIX E

Signal Warrants



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013
 Major Street: Burnhamthorpe Road
 Minor Street: Avenue Two
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 2 or More
 Three or four legged intersection (3 or 4) 4
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	2409	2443	1205	1222	1350
Percent Compliance	-	-	89%	90%	-
Sectional Percentage					90%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1059	898	530	449	255
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 1 Percentage					90%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1350	1545	675	773	1350
Percent Compliance	-	-	50%	57%	-
Sectional Percentage					54%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	633	449	317	225	113
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 2 Percentage					54%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Burnhamthorpe Road /Avenue Two? NO



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Burnhamthorpe Road
 Minor Street: Avenue Three
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 2 or More
 Three or four legged intersection (3 or 4) 4
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	2746	3532	1373	1766	1350
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	837	1151	419	576	255
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 1 Percentage					100%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1909	2381	955	1191	1350
Percent Compliance	-	-	71%	88%	-
Sectional Percentage					79%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	554	840.5	277	420	113
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 2 Percentage					79%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Burnhamthorpe Road /Avenue Three? YES



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Burnhamthorpe Road
 Minor Street: Avenue Four
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 2 or More
 Three or four legged intersection (3 or 4) 4
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	2929	3712	1465	1856	1350
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	620	758	310	379	255
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 1 Percentage					100%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	2309	2954	1155	1477	1350
Percent Compliance	-	-	86%	100%	-
Sectional Percentage					93%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	360	517	180	259	113
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 2 Percentage					93%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Burnhamthorpe Road /Avenue Four? YES



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Avenue One
 Minor Street: Avenue Two
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 1
 Three or four legged intersection (3 or 4) 3
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1102	1004	551	502	1080
Percent Compliance	-	-	51%	46%	-
Sectional Percentage					49%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	398	202	199	101	383
Percent Compliance	-	-	52%	26%	-
Sectional Percentage					39%
Entire Justification 1 Percentage					39%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	704	802	352	401	1080
Percent Compliance	-	-	33%	37%	-
Sectional Percentage					35%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	4	55	2	28	113
Percent Compliance	-	-	2%	24%	-
Sectional Percentage					13%
Entire Justification 2 Percentage					13%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Avenue One/Avenue Two? NO



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Avenue One
 Minor Street: Avenue Three
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 1
 Three or four legged intersection (3 or 4) 3
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1950	2074	975	1037	1080
Percent Compliance	-	-	90%	96%	-
Sectional Percentage					93%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	395	311	198	156	383
Percent Compliance	-	-	52%	41%	-
Sectional Percentage					46%
Entire Justification 1 Percentage					46%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1555	1763	778	882	1080
Percent Compliance	-	-	72%	82%	-
Sectional Percentage					77%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	236	277	118	139	113
Percent Compliance	-	-	100%	100%	-
Sectional Percentage					100%
Entire Justification 2 Percentage					77%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Avenue One/Avenue Three? NO



Traffic Signal Warrant Analysis

Based on the Ontario Traffic Manual Book 12

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Avenue One
 Minor Street: Avenue Four
 Comments: Phase 3

Free Flow - Rural (FF) or Restricted Flow - Urban (Res) RES
 Major Street Approach Lanes (Per Direction): 1
 Three or four legged intersection (3 or 4) 3
 Future Condition (YES or NO): Yes
 New Intersection (YES or NO): Yes

Justification 1 (Minimum Vehicle Volume)*

A (All Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1794	1566	897	783	1080
Percent Compliance	-	-	83%	73%	-
Sectional Percentage					78%

B (Minor Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	83	128	42	64	383
Percent Compliance	-	-	11%	17%	-
Sectional Percentage					14%
Entire Justification 1 Percentage					14%

Justification 2 (Delay Cross Traffic)*

A (Major Street Both Approaches)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	1711	1438	856	719	1080
Percent Compliance	-	-	79%	67%	-
Sectional Percentage					73%

B (Traffic Crossing Major Street)

	AM PHV	PM PHV	AM AHV	PM AHV	Threshold
Volume	35	138.5	18	69	113
Percent Compliance	-	-	16%	62%	-
Sectional Percentage					39%
Entire Justification 2 Percentage					39%

* Includes Justification 3 and 7

Are signals warranted at the intersection of Avenue One/Avenue Four? NO

APPENDIX F

Turn Lane Warrants



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Burnhamthorpe Road
 Minor Street: Avenue Two
 Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Burnhamthorpe Road
 Major Street Approach Lanes (Per Direction): 2

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Turning Volume	Opposing Volume	Warranted?	Turning Volume	Opposing Volume	Warranted?	
EB-L	35	818	YES	4	972	NO	YES
WB-L	183	532	YES	325	573	YES	YES

Minor Street: Avenue Two
 Major Street Approach Lanes (Per Direction): 1
 Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
NB-L	21%	835	224	EA-3	YES	17%	505	393	EA-3	YES	YES
SB-L	42%	224	835	EA-5	YES	53%	393	505	EA-5	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	
EB-R	36	7%	NO	202	35%	YES	YES
WB-R	364	44%	YES	73	8%	NO	YES
NB-R	295	35%	YES	337	67%	YES	YES
SB-R	15	7%	NO	29	7%	NO	NO



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
Project Number.: 14-09222-001
Analyst: Peter Y
Date: Wednesday, July 10, 2013

Major Street: Burnhamthorpe Road
Minor Street: Avenue Three
Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Burnhamthorpe Road
Major Street Approach Lanes (Per Direction): 2

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Turning Volume	Opposing Volume	Warranted?	Turning Volume	Opposing Volume	Warranted?	
EB-L	14	1156	NO	58	1281	YES	YES
WB-L	177	753	YES	307	1100	YES	YES

Minor Street: Avenue Three
Major Street Approach Lanes (Per Direction): 1
Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
NB-L	20%	592	245	EA-3	YES	17%	434	717	EA-2	YES	YES
SB-L	31%	245	592	EA-4	YES	50%	717	434	EA-5	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	
EB-R	47	6%	NO	72	7%	NO	NO
WB-R	125	11%	YES	125	10%	NO	YES
NB-R	203	34%	YES	246	57%	YES	YES
SB-R	49	20%	NO	38	5%	NO	NO



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Burnhamthorpe Road
 Minor Street: Avenue Four
 Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Burnhamthorpe Road
 Major Street Approach Lanes (Per Direction): 2

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Turning Volume	Opposing Volume	Warranted?	Turning Volume	Opposing Volume	Warranted?	
EB-L	58	1351	YES	7	1351	NO	YES
WB-L	168	958	YES	186	1603	YES	YES

Minor Street: Avenue Four
 Major Street Approach Lanes (Per Direction): 1
 Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
NB-L	24%	437	183	EA-4	YES	22%	323	435	EA-3	YES	YES
SB-L	26%	183	437	EA-4	NO	34%	435	323	EA-5	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	
EB-R	105	11%	YES	218	14%	YES	YES
WB-R	112	8%	NO	48	4%	NO	NO
NB-R	225	51%	YES	174	54%	YES	YES
SB-R	10	5%	NO	73	17%	YES	YES



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
Project Number.: 14-09222-001
Analyst: Peter Y
Date: Wednesday, July 10, 2013

Major Street: Avenue One
Minor Street: Avenue Two
Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Avenue Two
Major Street Approach Lanes (Per Direction): 1
Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
WB-L	60%	366	338	EA-5	YES	22%	682	120	EA-3	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	
EB-R	56	17%	NO	15	13%	NO	NO
NB-R	394	99%	YES	147	73%	YES	YES



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
 Project Number.: 14-09222-001
 Analyst: Peter Y
 Date: Wednesday, July 10, 2013

Major Street: Avenue One
 Minor Street: Avenue Three
 Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Avenue One
 Major Street Approach Lanes (Per Direction): 1
 Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
WB-L	15%	1167	388	EA-3	YES	33%	687	1076	EA-5	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/ Approaching Volume%	Warranted?	
EB-R	107	28%	YES	485	45%	YES	YES
NB-R	159	40%	YES	123	40%	YES	YES



Turn-Lane Warrant Analysis

Project Name: 407 West Employment Area
Project Number.: 14-09222-001
Analyst: Peter Y
Date: Wednesday, July 10, 2013

Major Street: Avenue One
Minor Street: Avenue Four
Comments: Phase 3

Left-Turn Lane Warrant

Major Street: Avenue One
Major Street Approach Lanes (Per Direction): 1
Design Speed: 50 km/h

Movement	Weekday AM Peak Hour					Weekday PM Peak Hour					Turn Lane Warranted?
	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	Left-Turn %	Advancing Volume	Opposing Volume	FIGURE	Warranted?	
WB-L	18%	1381	330	EA-3	YES	26%	733	705	EA-4	YES	YES

Right-Turn Lane Warrant

Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Turn Lane Warranted?
	Right-Turn Volume	Right-Turn/Approaching Volume%	Warranted?	Right-Turn Volume	Right-Turn/Approaching Volume%	Warranted?	
EB-R	25	8%	NO	59	8%	NO	NO
NB-R	48	58%	YES	114	89%	YES	YES