Appendix C

MHC DEVELOPERS

Proposed Golf Club Residences and Hotel, 640 County Road 20

Traffic Impact Study

October 2018 — 18-8068

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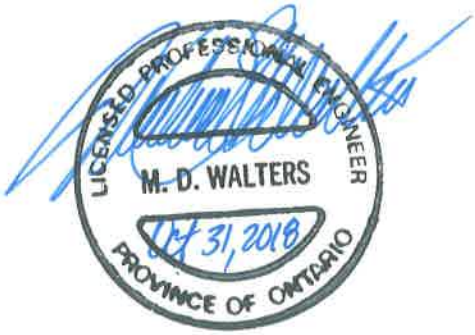


1.0 Introduction

1.1 Purpose

Dillon Consulting Limited ("Dillon") has been retained by MHC Developers to undertake a traffic impact study (TIS) assessing a proposed residential and motel development at 640 County Road 20, northeast of the intersection of County Road 20 and Cross Winds Boulevard / Conservation Boulevard in the Town of Kingsville. The Kingsville Golf and Country Club is situated north of the subject lands. The development application proposes two mid-rise condominium buildings and a motel constructed south of the golf course, near County Road 20. *Figure 1* illustrates the site location in the context of the built-up area.

This report documents the anticipated change to traffic volumes and intersection operations due to the proposed development; and provides an assessment of the proposed site plan and the appropriateness of the proposed changes to the existing driveway access and Cross Winds Boulevard (west of the driveway.

Figure 1: Site Location

1.2 Proposed Development

The proposed site plan is presented in *Appendix A*. The proposed development consists of two 48-unit condominium buildings and a 16-room "stay and play" motel. The condominium buildings and motel would be developed south of the golf course, along the north side of County Road 20. Access to the site is envisioned through connections to Cross Winds Boulevard and the existing golf course driveway.

1.3 Scope of Analyses

This report documents the following:

- Existing traffic volumes, and traffic projections for the study area driveways under background conditions and with development of the site;
- Intersection capacity analyses under existing conditions, future background conditions and total future conditions;
- Exclusive turn lane warrants at site access locations
- Comments on measures provided on-site which can support active transportation

Traffic data collection, traffic projections and operational analyses were completed at the following intersections:

- County Road 20 at Cross Winds Boulevard / Conservation Boulevard; and
- County Road 20 at the Kingsville Golf and Country Club driveway.

Traffic projections and intersection analyses were completed for the typical weekday AM and PM peak hours. The proposed development is anticipated to be fully built-out in 2022; the analysis horizon year is 2027 (five years following build-out).

2.0 Existing Conditions

2.1 Existing Transportation Network Characteristics

The following describes the existing road network in the immediate study area.

County Road 20 is a rural arterial road that is under the jurisdiction of the County of Essex within the study area. The main source of traffic on this roadway comes from the town of Kingsville, which is approximately 1.6 km east of the site. It provides access to the golf course as well as existing residential properties within the study area. It has a posted speed limit of 70 km/h. It has a basic two-lane rural cross-section with gravel shoulders. There are no sidewalks, although the Chrysler Greenway multi-use trail is located along the north side of the road for a 500-metre section within the study area.

Conservation Boulevard is a collector road that extends from County Road 20 southerly for 1.5 km through a residential subdivision to County Road 50 (Heritage Road). It has a pavement width of approximately 10 metres with no lane markings other than at the County Road 20 intersection. There are sidewalks on both sides of the street.

Cross Winds Boulevard is a private local street starting at the north side of County Road 20 and Conservation Boulevard intersection. It extends approximately 30 metres north of County Road 20 before turning to the west as the entrance to the 49-unit Cross Winds townhouse development. Prior to the development of the Cross Winds townhouses, this was the original location of the entrance to the Kingsville Golf and Country Club, extending northerly another 150 metres to the golf club parking lot entrance; when the townhomes were completed, this connection was severed and replaced by the golf club's current driveway 190 metres to the east, although the majority of the prior driveway still exists.

The intersection of County Road 20 and Cross Winds Boulevard operates under two-way stop control on the northbound and southbound approaches. There are left turn lanes in both directions on County Road 20, as well as an eastbound right turn lane. The eastbound left turn lane has a 27-metre storage length and 23-metre taper that transitions into a 50-metre westbound left turn lane serving two residential / farm driveways on the south side of County Road 20. There are no auxiliary lanes marked on the side street approaches, although the northbound approach lane on Conservation Boulevard is greater than 7 metres wide and therefore functions with separate left and right turn lanes.

The intersection of County Road 20 and the Kingsville Golf and Country Club access operates under two-way stop control on the southbound approach. There are no auxiliary turn lanes on any of the intersection approaches.

2.2 Existing Traffic Volumes

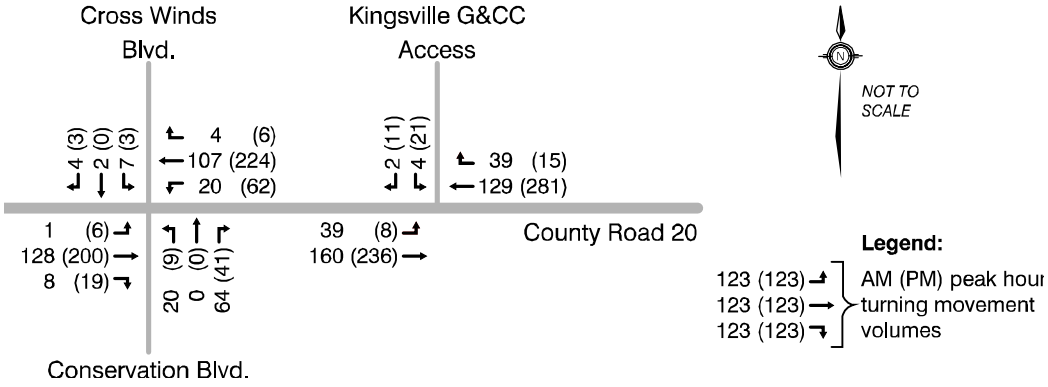
Turning movement count (TMC) traffic data were collected by Dillon at the following locations:

- County Road 20 at Cross Winds Boulevard / Conservation Boulevard; and
- County Road 20 at the Kingsville Golf and Country Club driveway.

Traffic volumes were collected on Thursday, August 30, 2018 between 7:00–9:00 AM and 4:00–6:00 PM.

Figure 2 illustrates the existing peak hour traffic volumes. Detailed count data are provided in *Appendix B*.

Figure 2: Existing Traffic Volumes



2.3 Existing Intersection Operations

Existing peak hour operations at the study area intersections were analyzed based on the methodology outlined in the *Highway Capacity Manual* (HCM), 2010 edition, facilitated using Synchro analysis software. The v/c ratio, level of service, average vehicle delay and 95th percentile queue length were noted for the stop-controlled approach and for the main street approach with a left turn movement. The analysis results are presented in *Table 1*. Analysis worksheets are provided in *Appendix D*.

Table 1: Existing Peak Hour Intersection Operations

County Road 20 at:	Peak hour	Individual movement(s)				
		Movement	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Cross Winds Boulevard / Conservation Boulevard	AM	EB left	0.00	A	7.5	0
		EB right	0.01	A	0.0	0
		WB left	0.02	A	7.6	1
		NB left	0.06	B	11.8	2
		NB right	0.09	A	9.5	2
		SB approach	0.02	B	11.7	1
	PM	EB left	0.01	A	7.7	0
		EB right	0.01	A	0.0	0
		WB left	0.07	A	7.9	2
		NB left	0.04	C	15.9	1
		NB right	0.06	A	9.6	2
		SB approach	0.03	B	12.7	1
Kingsville G&CC Driveway	AM	EB left	0.04	A	0.4	1
		SB approach	0.02	B	10.9	1
	PM	EB left	0.01	A	0.1	0
		SB approach	0.12	B	12.4	3

Both County Road 20 intersections currently operate at a very good level of service (LOS A) for the eastbound left turn movements, and a good level of service (LOS B) for the southbound stop-controlled approaches. The Cross Winds Boulevard / Conservation Boulevard intersection currently operates at a reasonable level of service (LOS B to C) for the stop-controlled northbound left turn movement. In addition, the westbound left and northbound right turning movements operate at a very good level of service (LOS A). Delays are 16 seconds or less and queues are calculated to be approximately one vehicle or less.

3.0 Future Background Conditions

3.1 Future Background Traffic Volumes

Future background traffic volumes reflect the volume of traffic that is anticipated to be on the road network during the 2027 horizon year without the subject development in place. Typically this is comprised of two factors:

- The application of a growth rate to reflect general background traffic growth on the road network; and
- The application of site-specific traffic volumes for any background developments in the immediate vicinity of the site.

After discussions with Town of Kingsville staff, it was determined that the following background residential developments would impact the proposed site development by the 2027 horizon year:

- Continuation of development along the south section of Conservation Boulevard ("Conservation Boulevard build-out");
- A future residential development east of Conservation Boulevard (the Valente subdivision).

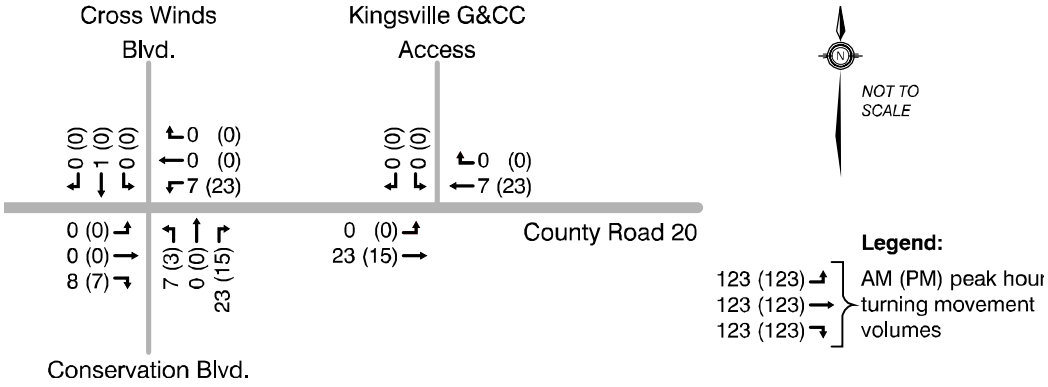
3.1.1 Additional Development on Conservation Boulevard

South of the subject site, Conservation Boulevard extends through an on-going residential development that began in the 1990s. The development was split into eight phases, of which the final phase was approved in 2015 (Phase 4B). Based on aerial images from 2017, there are 237 units completed and occupied out of the total 324 approved units, leaving another 87 units remaining to be completed. It is expected that these remaining units will be built and occupied by the 2027 study horizon. The completion of the remaining units reflects a 37% increase compared to the existing 237 units.

To forecast the number of vehicle trips added by the remaining unbuilt Conservation Boulevard units, the existing left and right turn movements at County Road 20 and Conservation Boulevard were increased by 37% (i.e., according to the ratio of unbuilt units to existing units). This assumes that the directional distribution and access assignment for future residents will be the same as for existing residents. (This may be a conservative assumption, since the remaining unbuilt units are at the south end of the subdivision and those residents may be more likely to use the County Road 50 access to the south.)

Figure 3 illustrates the traffic volumes generated by the remaining unbuilt units on Conservation Boulevard.

Figure 3: Background Development Traffic Volumes (Additional Conservation Boulevard Development)



3.1.2 Valente Subdivision

The Valente Subdivision is a future development proposed in currently vacant lands south of County Road 20 and east of Conservation Boulevard. Two draft plans of subdivision were provided for reference by Town of Kingsville staff.

- A plan of subdivision has been approved consisting of 750 residential units to be developed over 15 phases.
- More recently, the developer has proposed a revised draft plan of subdivision consisting of 736 units that would also be divided into 15 phases, although the street network and phasing plan varies from the approved plan of subdivision.

It is understood that the final plan of subdivision is expected to resemble the more recent, revised version, although there are some minor adjustments that may be required to address servicing and/or phasing requirements.

The Valente subdivision is planned to have the following access points at full build-out:

- A collector road connection to County Road 20 (Street "A"), with an intersection approximately 750 metres east of Conservation Boulevard;
- Two east-west local streets connecting existing streets in the subdivisions immediately to the west and east:
  - One local street near the centre of the subdivision, connecting Creekview Boulevard with Essex Street; and
  - One local street at the south end of the subdivision, connecting Championship Way with Lake Drive.

The connection to County Road 20 is proposed to be constructed as part of Phase 6. Prior to then, access will be via the two east-west local streets connecting to existing residential streets to the west and east. Traffic will use Conservation Boulevard (via Creekview Boulevard or Championship Way) to access County Road 20.

Town staff estimated that five to six phases of the development could potentially be built out by the 2027 study horizon. For analysis purposes, it was assumed that Phase 6 of the Valente subdivision would be built out by that time. In the latest proposed plan of subdivision, Phases 1 through 6 would consist of 199 single-family detached and semi-detached units and 28 townhouse units, for a total of 227 residential units.

In the event that the development proceeds more slowly, there would be more traffic pressure at the County Road 20 and Conservation Boulevard intersection, since the direct access to County Road 20 would not yet be constructed. However, this would be partially offset by the reduced number of units that would be occupied if fewer phases have been completed. It is expected that the Valente development application would include an assessment of phasing and access requirements during interim phases when the connection to County Road 20 has not yet been completed.

The number of vehicle trips generated for Phases 1 to 6 of the Valente subdivision were estimated using trip generation rates and equations published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*, 10th edition. Trip generation data for ITE land use codes 210 (Single-Family Detached Housing) and 220 (Multi-Family Housing (Low-rise)) were applied. The generated trips are presented in *Table 2*.

Table 2: Trip Generation for Proposed Valente Subdivision

	Weekday AM peak hour			Weekday PM peak hour		
	In	Out	Total	In	Out	Total
Single-family detached / semi-detached (199 units)						
Trip generation rate (per unit)*; % in / out:	25%	75%	0.73	63%	37%	0.99
Trips generated:	37	109	146	124	73	197
Townhouse units (28 units)						
Trip generation rate (per unit)*; % in / out:	23%	77%	0.50	63%	37%	0.68
Trips generated:	3	11	14	12	7	19
Total trips (227 units)	40	120	160	136	80	216

**Equivalent rate derived from fitted curve equation*

Based on the turning movement count data presented in *Figure 2*, the existing 49-unit Cross Winds townhouse development has a trip generation rate of 0.37 trips per unit during both the AM and PM peak hours. As such, the ITE trip generation rates can be considered to be conservatively high compared to locally derived rates.

The following directional distribution was estimated based on the proportion of turning movements at the existing intersections of County Road 20 and Cross Winds Boulevard / Conservation Boulevard:

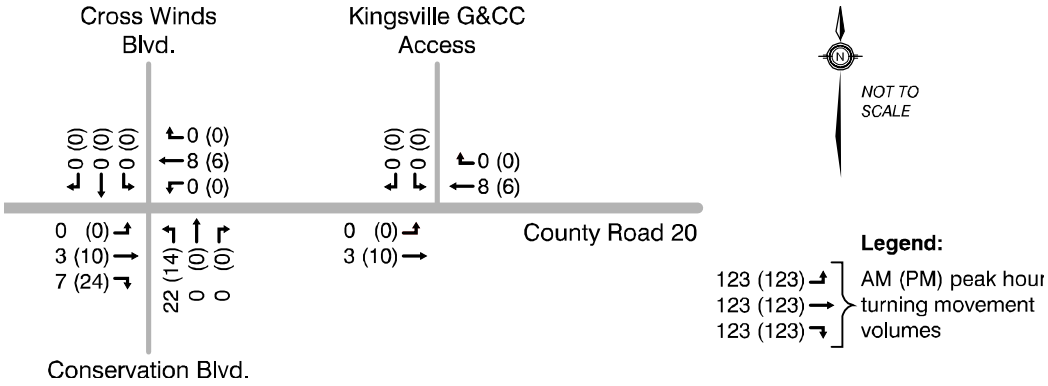
- 25% to/from the west; and
- 75% to/from the east.

Traffic was assigned to the five access routes (the proposed Street "A" access to County Road 20, and the four east-west local streets connecting to Conservation Boulevard and to other local streets). The assignment is based on the travel distance to the arterial network from different areas of the subdivision (e.g., residents in the southwest area of the subdivision may find it more direct to access westbound County Road 20 via Conservation Boulevard). The following assignment was applied:

- East-oriented traffic (75% of total):
  - 50% via Street "A"
  - 50% via Essex Street / Lake Drive connections
- West-oriented traffic (25% of total):
  - 72% via Conservation Boulevard
  - 28% via Street "A"

Figure 4 illustrates the projected traffic volumes generated by the Valente Subdivision at the 2027 horizon.

Figure 4: Background Development Traffic Volumes (Valente Subdivision)



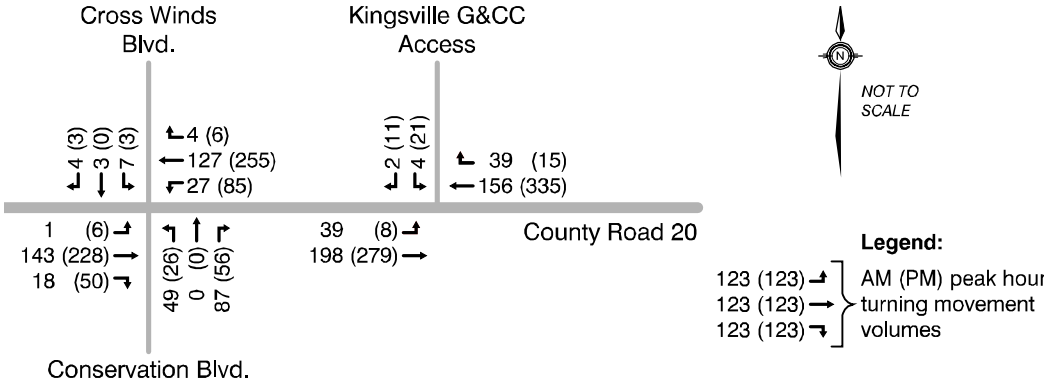
3.1.3 Background Growth Rate

In addition to the specific background developments outlined above, an annual background growth rate of 1% was applied to existing east-west through traffic along County Road 20. This background growth rate was derived by reviewing historical AADT traffic data available from the County of Essex. The growth rate is also generally comparable to the growth rate applied in the County Road 20 EA for the section of road between Kingsville and Leamington.

3.1.4 Future Background Traffic Volumes

Future background traffic volumes were calculated by applying the 1% background growth rate to through traffic on County Road 20, and adding site-specific traffic volumes from the Conservation Drive and Valente developments. The resulting future background traffic volumes are illustrated in *Figure 5*.

Figure 5: Future Background Traffic Volumes



3.2 Future Background Intersection Operations

Future background intersection operations were assessed using the same methodology as the existing conditions analyses. The analysis results are presented in *Table 3*.

Table 3: Future Background Peak Hour Intersection Operations

County Road 20 at:	Peak hour	Individual movement(s)				
		Movement	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Cross Winds Boulevard / Conservation Boulevard	AM	EB left	0.00	A	7.5	0
		EB right	0.02	A	0.0	0
		WB left	0.03	A	7.7	1
		NB left	0.17	B	13.6	5
		NB right	0.13	A	9.8	3
		SB approach	0.03	B	12.8	1
	PM	EB left	0.01	A	7.8	0
		EB right	0.03	A	0.0	0
		WB left	0.10	A	8.1	3
		NB left	0.13	C	20.2	4
		NB right	0.09	B	10.0	2
		SB approach	0.04	B	14.5	1
Kingsville G&CC Driveway	AM	EB left	0.04	A	0.4	1
		SB approach	0.02	B	11.4	1
	PM	EB left	0.01	A	0.1	0
		SB approach	0.13	B	13.5	4

Under future background conditions, both County Road 20 intersections are expected to continue to operate at a very good level of service (LOS A) for the eastbound left turn movements, and a good level

of service (LOS B) for the southbound stop-controlled approaches. The Cross Winds Boulevard / Conservation Boulevard site access is expected to continue operating at a reasonable level of service (LOS B to C) for the stop-controlled northbound left turn movement. The westbound left and northbound right turning movements will operate at a good level of service (LOS A to B). Delays are expected to be 20 seconds or less, and queues are calculated to be approximately one vehicle or less.

4.0 Site Traffic

4.1 Proposed Development

The proposed site plan is presented in *Appendix A*. The proposed development consists of two 48-unit condominium buildings and a 16-room "stay and play" motel. The condominium buildings and motel would be developed south of the golf course, along the north side of County Road 20. Access to the site is envisioned through connections to Cross Winds Boulevard and the existing golf course driveway.

4.2 Trip Generation

The number of vehicle trips generated by the proposed development was estimated using trip generation rates and equations published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*, 10th edition. Trip generation data for ITE land use codes 221 (Multi-family housing (mid-rise)) and 320 (motel) were applied with trips generation rates for the weekday AM and PM weekday hours.

Table 4 documents the number of trips generated by the proposed development.

Table 4: Trip Generation

	Weekday AM peak hour			Weekday PM peak hour		
	In	Out	Total	In	Out	Total
Residential condominium (96 units)						
Trip generation rate (per unit)*; % in / out:	26%	74%	0.34	61%	39%	0.45
Trips generated:	9	24	33	26	17	43
Motel (16 rooms)						
Trip generation rate (per unit)*; % in / out:	37%	63%	0.38	54%	46%	0.38
Trips generated:	2	4	6	3	3	6
Total trips (227 units)	11	28	39	29	20	49

**Equivalent rate derived from fitted curve equation*

The proposed development is anticipated to generate approximately 39 trips during the weekday AM peak hour and 49 trips during the weekday PM peak hour.

Based on the turning movement count data presented in *Figure 2*, the existing 49-unit Cross Winds townhouse development has a trip generation rate of 0.37 trips per unit during both the AM and PM peak hours. Compared to locally derived rates, the ITE trip generation rates can be considered to be reasonably comparable during the AM peak hour, and conservatively high during the PM peak hour.

4.3 Trip Distribution and Assignment

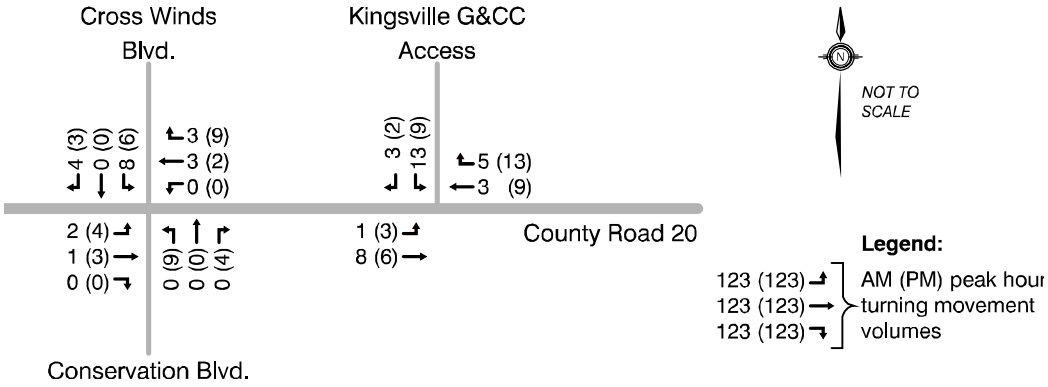
The directional distribution was estimated based on the proportion of turning movements at the existing intersection of County Road 20 and Cross Winds Boulevard / Conservation Boulevard:

- 25% to/from the west; and
- 75% to/from the east.

The two condominium buildings will have separate parking entrances, one accessed from the west driveway (Cross Winds Boulevard) and one accessed from the east driveway (the existing Kingsville G&CC driveway). Motorists accessing the site will have the option of either driveway; the driveway assignment was assumed to slightly favour the upstream driveway (i.e., 60% of west-oriented traffic would use the west driveway; 60% of east-oriented traffic would use the east driveway).

Figure 6 illustrates the intersection traffic volumes projected to be generated by the site.

Figure 6: Site Traffic Volumes



In addition to the traffic volumes generated by the proposed development, background traffic patterns are anticipated to change slightly. The proposed driveway modifications will result in an alternate access / egress route for existing Kingsville G&CC traffic traveling to/from the west. It is estimated that approximately 75% of west-oriented traffic would shift to the more direct connection via Cross Winds Boulevard. This corresponds to the following volumes of traffic shifting from the existing driveway to Cross Winds Boulevard:

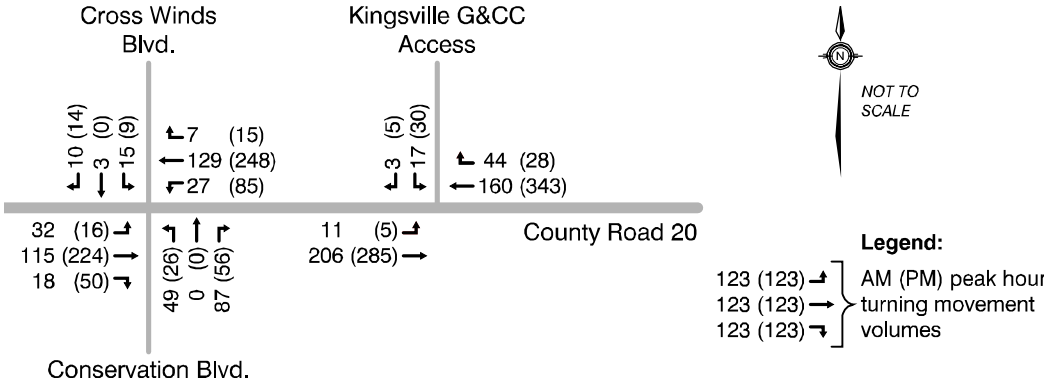
- Eastbound left turn:
  - AM peak hour: 29 vph
  - PM peak hour: 6 vph
- Southbound right turn:
  - AM peak hour: 2 vph
  - PM peak hour: 8 vph

5.0 Total Future Conditions

5.1 Total Future Traffic Volumes

Total future traffic volumes represent the level of traffic that would be anticipated with the development of the site, and were calculated by adding the site traffic volumes to the projected future background traffic volumes. The resulting total future traffic volumes are illustrated in *Figure 7*.

Figure 7: Total Future Traffic Volumes



5.2 Total Future Intersection Operations

Total future intersection operations were assessed using the same methodology as the existing and future background conditions analyses. The analysis results are summarized in *Table 5*.

Table 5: Total Future Peak Hour Intersection Operations

County Road 20 at:	Peak hour	Individual movement(s)				
		Movement	v/c	LOS	Delay *(s/veh)*	95th %ile queue *(m)*
Cross Winds Boulevard / Conservation Boulevard	AM	EB left	0.09	A	7.8	2
		EB right	0.02	A	0.0	0
		WB left	0.03	A	7.6	1
		NB left	0.26	C	19.5	8
		NB right	0.12	A	9.5	3
		SB approach	0.08	C	16.3	2
	PM	EB left	0.03	A	7.9	1
		EB right	0.03	A	0.0	0
		WB left	0.10	A	8.1	3
		NB left	0.15	C	23.1	4
		NB right	0.09	A	9.9	2
		SB approach	0.11	B	14.4	3
Kingsville G&CC Driveway	AM	EB left	0.01	A	0.1	0
		SB approach	0.07	B	11.7	2
	PM	EB left	0.01	A	0.1	0
		SB approach	0.15	B	14.9	4

The County Road 20 intersections are anticipated to operate at a very good level of service (LOS A) for movements on the main street approaches, and a reasonable level of service for the stop-controlled side street and driveway approaches (LOS B to C). Movements on the side street / driveway approaches are expected to have delays of 23 seconds or less, while all other movements will have delays of 8 seconds or less. It is expected that the northbound left turn from Conservation Boulevard will have a 95th percentile queue of approximately 2 vehicles; all other movements (including the southbound Cross Winds Boulevard approach to County Road 20) are expected to have 95th percentile queues of approximately 1 vehicle or less.

The southbound approach on Cross Winds Boulevard at County Road 20 can accommodate approximately three to four queued vehicles before extending through the existing 90-degree bend leading into the Cross Winds subdivision. The 95th percentile queue on this movement is not anticipated to exceed a single vehicle. As such, the southbound queue is not anticipated to impact the ability to access the Cross Winds subdivision.

5.3 Turn Lane Warrants

5.3.1 Left Turn Lane

The existing and projected future volumes at County Road 20 and the Kingsville Golf and Country Club access were reviewed to determine if an eastbound left turn lane is warranted or may be warranted in the future. (Eastbound and westbound left turn lanes already exist at Conservation Boulevard / Cross Winds Boulevard.) The left turn lane warrant analysis was undertaken using the warrant methodology published by the Ministry of Transportation of Ontario (MTO) in their design supplement to TAC's *Geometric Design Guide for Canadian Roads*. A design speed of 90 km/h was applied (20 km/h higher than the current posted speed limit).

Table 6 summarizes the analysis parameters and results. Left turn lane warrant nomographs are provided in *Appendix E*.

Table 6: Left Turn Lane Warrant Parameters and Results

	Existing		Future background		Total future	
	AM	PM	AM	PM	AM	PM
Movement	EB left	EB left	EB left	EB left	EB left	EB left
Design speed	90 km/h	90 km/h	90 km/h	90 km/h	90 km/h	90 km/h
Advancing volume, V_A *(vph)*	199	244	241	301	222	304
Left turn volume, V_{LT} *(vph)*	39	8	39	8	11	5
% left turns in V_A	20%	3%	16%	3%	5%	2%
Opposing volume, V_O *(vph)*	168	296	209	358	217	380
MTO nomograph	Exhibit 9A-19	Exhibit 9A-18	Exhibit 9A-19	Exhibit 9A-18	Exhibit 9A-18	Exhibit 9A-18
Left turn lane warranted?	No	No	No	No	No	No

The analyses found that a left turn lane is not currently warranted at the Kingsville Golf and Country Club access, and is not expected to be warranted under future background conditions or total future conditions.

5.3.2 Right Turn Lane

The need for a westbound right turn lane at the Cross Winds Boulevard intersection and/or the Kingsville Golf and Country Club access was reviewed. Two guidelines were considered:

- The TAC *Geometric Design Guide for Canadian Roads* suggests that a right turn lane be provided "when the volume of decelerating or accelerating vehicles compared with the through traffic volume causes undue hazard".
- The MTO's *Geometric Design Standards for Ontario Highways* (since superseded by the TAC guide) recommended that a right turn lane be provided "when the volume of right turning vehicles is such that it creates a hazard and reduces capacity at an intersection, or when the volumes approaches [60 vehicles per hour]".

The volume of right-turning traffic at both intersections is not considered to cause undue hazard. This is based on the following considerations:

- The volume of right-turning traffic is comparatively low, and below MTO thresholds for a right turn lane:
  - At Cross Winds Boulevard, the westbound right turn demand is projected to be 15 veh/h or less during the AM and PM peak hours.
  - At the Kingsville Golf and Country Club access, the westbound right turn demand is 45 veh/h during the AM peak hour and 30 veh/h during the PM peak hour.
  - The subject site will not substantially change westbound right turn volumes at the Kingsville Golf and Country Club access (5 vehicles added during the AM peak hour; 13 vehicles added during the PM peak hour).
- The volume of through traffic that would be affected by right-turning traffic is also relatively low (estimated at 160 veh/h during the AM peak hour and 343 veh/h during the PM peak hour).
- The surrounding environment gives motorists contextual indications that they may need to slow for right-turning traffic (i.e., westbound motorists approaching the site will have just exited the main built-up area of Kingsville, and will still be driving through a section with numerous driveways).
- The posted speed limit is 70 km/h (i.e., slower than the 80 km/h typically posted in rural conditions).

Given the above, westbound right turn lanes are not considered to be warranted at the Cross Winds Boulevard intersection or at the Kingsville Golf and Country Club access.

6.0 Site Design and Traffic Circulation

6.1 Cross Winds Boulevard Traffic Control

Cross Winds Boulevard currently consists of a short north-south section extending approximately 30 metres north from County Road 20, followed by a 90-degree bend as it turns to the west to enter the Cross Winds subdivision. North of the 90-degree bend is a berm that severs the former golf course driveway. The berm is proposed for removal so that the former driveway can be restored. Cross Winds Boulevard would then form a "T" intersection with this north-south driveway. *Figure 8* illustrates the existing intersection configuration and the effect of removing the berm to restore the former driveway connection to the north.

Figure 8: Cross Winds Boulevard Driveway Intersection

This "T" intersection was reviewed from two perspectives:

- The most appropriate form of traffic control for this "T" intersection; and
- Whether the intersection can operate at an acceptable level without impacting County Road 20.

It is recommended that the new "T" intersection operate under two-way stop control (i.e., a stop sign to be installed facing eastbound traffic on Cross Winds Boulevard). The northbound approach will be uncontrolled so that northbound traffic is free-flowing as it travels away from County Road 20.

Table 7 summarizes the peak hour volumes on each of the three intersection approaches.

Table 7: Cross Winds Boulevard Traffic Volumes

	AM peak hour		PM peak hour	
	SB	NB	SB	NB
Cross Winds subdivision (west leg)	13	5	6	12
Site; golf course reassignment (north leg)	15	34	17	19
Total (south leg)	28	39	23	31

The volume of peak hour traffic on all legs of the internal Cross Winds Boulevard intersection is low (approximately one vehicle per minute or less on all intersection approaches). The volume of traffic turning left into the Cross Winds subdivision is very low (12 vehicles per hour or less). The southbound queues at County Road 20 are not anticipated to exceed a single vehicle (see *Section 5.2*) and would therefore not block access to the west leg of the intersection. Given the low volume of traffic and the short southbound queues, most vehicles turning into the Cross Winds subdivision would be able to turn immediately without having to wait for oncoming traffic. As such, the proposed Cross Winds Boulevard reconfiguration will operate at an acceptable level under two-way stop control and will not impact operations on County Road 20.

6.2 On-Site Vehicular Circulation

Traffic will enter the site via either Cross Winds Boulevard or the golf course driveway. Both of these driveways will have an access to underground resident parking, followed by an access to at-grade visitor parking and a drop-off area in front of the condominium lobby. Access to the parking for the motel will be via the Cross Winds Boulevard access. This configuration is clear and intuitive, and will operate at an acceptable level given the relatively low volumes anticipated to use the driveway.

At the northwest corner of the site, where the north-south driveway leading to Cross Winds Boulevard intersects the new golf course driveway, a stop sign should be installed on the northbound approach.

6.3 Active Transportation

The majority of active trips generated by the site are expected to use the Chrysler Greenway, an existing loose-surface multi-use trail that generally follows the alignment of a former rail corridor, but diverts south to County Road 20 along the south side of the subject site. This trail serves as an active transportation link into Kingsville, as well as a route for longer-distance recreational travel.

The proposed site plan includes the following connections to the trail:

- A path is proposed along the west side of the existing Kingsville Golf and Country Club driveway and will link the trail with the proposed motel and the existing golf course.
- A walkway is proposed, extending south from the lobby between the two condominium buildings and leading to the trail.

These proposed connections are illustrated on the site plan presented in *Appendix A*.

7.0 Summary

Dillon Consulting Limited has been retained by MHC Developers to undertake a traffic impact study (TIS) assessing a proposed residential and motel development at 640 County Road 20, northeast of the intersection of County Road 20 and Cross Winds Boulevard / Conservation Boulevard in the Town of Kingsville. The Kingsville Golf and Country Club is situated north of the subject lands. The development application proposes two mid-rise condominium buildings and a motel constructed south of the golf course, near County Road 20.

The site plan proposes two access routes from County Road 20:

- An east access via the current golf club driveway; and
- A west access via Cross Winds Boulevard, restoring the former golf club driveway that existed prior to the development of the Cross Winds subdivision.

The proposed site is anticipated to generate 39 trips during the AM peak hour, and 49 trips during the PM peak hour. The motel will generate 6 trips during both peak hours; the remainder will be generated by the proposed condominium buildings.

The intersection of County Road 20 and Cross Winds Boulevard / Conservation Boulevard currently operates at a good level of service (LOS B to C for all stop-controlled movements). With background traffic growth and development of the site, the stop-controlled approaches are anticipated to continue operating at good levels of service (LOS B to C). All movements are anticipated to operate well within capacity. The northbound left turn from Conservation Boulevard is anticipated to have a 95th percentile queue of up to two vehicles during the AM peak hour; all other queues are not anticipated to exceed a single vehicle.

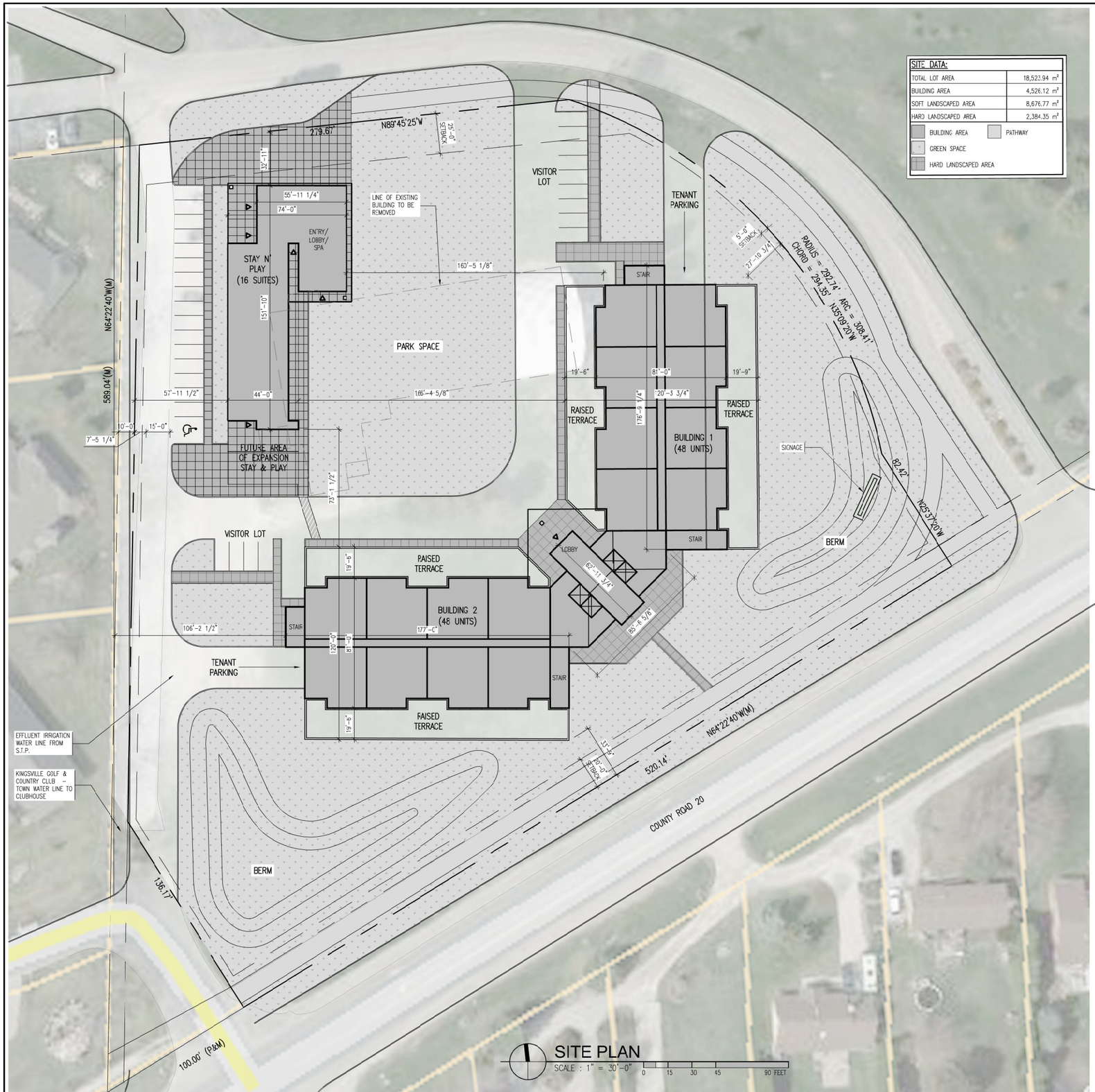
The intersection of County Road 20 and the golf club driveway currently operates at a good level of service (LOS B for the stop-controlled southbound approach). All movements are anticipated to operate well within capacity. The 95th percentile queue on the southbound approach is not anticipated to exceed a single vehicle.

The need for additional auxiliary lanes on County Road 20 was reviewed (westbound right turn lanes at the golf club driveway and at Cross Winds Boulevard; eastbound left turn lane at the golf club driveway). Additional auxiliary left or right turn lanes were not found to be warranted at these locations.

As proposed on the site plan, traffic circulation within the site is clear and straightforward. A stop sign should be installed on the east-west portion of Cross Winds Boulevard at the new "T" intersection with the County Road 20 access, and on the north-south site driveway (leading to Cross Winds Boulevard) where it intersects with the new golf course driveway at the northwest corner of the site.

Appendix A

Proposed Site Plan



SITE PLAN
SCALE : 1" = 30'-0" 0 15 30 45 90 FEET

	XXXXXXXXXXX
XX/XX/XX	XXXXXXXXXXX
date (mm/dd/yy):	issued for:

general notes:

1. THIS PRINT IS AN INSTRUMENT OF SERVICE ONLY AND IS THE PROPERTY OF THE ARCHITECT.
2. DRAWINGS SHALL NOT BE SCALED.
3. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.
4. ATTENTION IS DIRECTED TO PROVISIONS IN THE GENERAL CONDITIONS REGARDING CONTRACTOR'S RESPONSIBILITIES IN REGARD TC SUBMISSION OF SHOP DRAWINGS.
5. IN THE EVENT THE ARCHITECT IS RETAINED TO REVIEW SHOP DRAWINGS, SUCH REVIEW IS ONLY TO CHECK FOR CONFORMANCE WITH DESIGN CONCEPT AND WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS.
6. CONTRACTORS SHALL PROMPTLY NOTIFY THE ARCHITECT IN WRITING OF THE EXISTENCE OF ANY OBSERVED VARIATIONS BETWEEN THE CONTRACT DOCUMENTS AND ANY APPLICABLE CODES OR BY-LAWS.
7. THE ARCHITECT IS NOT RESPONSIBLE FOR THE CONTRACTOR'S MEANS, METHODS AND OR TECHNIQUES IN THE CONSTRUCTION OF THIS FACILITY.

stamp:

architectural design associates inc. architect
1670 mercer street
windsor ontario canada n8x 3p7
ph 519.254.3430 fax 519.254.3642
email - info@ada-architect.ca www.ada-architecc.ca

project:
KINGSVILLE GOLF CLUB RESIDENCES & HOTEL

client:
KINGSVILLE GOLF AND COUNTRY CLUB

title:
SITE PLAN

scale:	AS SHOWN
drawn by:	ID/NLB
checked by:	JBK
date:	DECEMBER 2017
comm. no.:	2016-038
sheet no.:	A1.0

Appendix B

Traffic Volume Data

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name
Kingsville Golf and Curling Club
Location
County Road 20 @ Crosswinds Boulevard / Conservation Boulevard
Performed By
Bill Marshall
Date
August 30, 2018

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
399	
% Bank 1	**% Bank 2**
98.2%	0.0%
% Bank 3	**% Bank 4**
0.0%	1.8%
Pedestrians Volume	
15	

Peak Hour Data

Time Period	Eastbound County Road 20							Westbound County Road 20							Northbound Conservation Boulevard							Southbound Crosswinds Boulevard							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
8:00 AM	0	0	42	2	0	1	44	0	4	29	0	0	1	33	0	9	0	17	0	0	26	0	1	0	1	1	2	2	105	5
8:15 AM	0	0	34	4	0	3	38	0	1	34	1	0	0	36	0	1	0	14	0	0	15	0	2	0	1	0	0	3	92	3
8:30 AM	0	0	34	1	1	0	35	0	8	19	0	0	2	27	0	6	0	13	0	0	19	0	2	1	1	1	1	4	85	5
8:45 AM	0	1	52	1	0	0	54	0	7	25	3	0	2	35	0	4	0	20	0	0	24	0	2	1	1	0	0	4	117	2

Vehicle Movement Summary

Movement / Details	Eastbound County Road 20							Westbound County Road 20							Northbound Conservation Boulevard							Southbound Crosswinds Boulevard							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	1	162	8	1	4	171	0	20	107	4	0	5	131	0	20	0	64	0	0	84	0	7	2	4	2	3	13	399	15
PHF	-	0.25	0.78	0.50	0.25	0.33	0.79	-	0.63	0.79	0.33	-	0.63	0.91	-	0.56	-	0.80	-	-	0.81	-	0.88	0.50	1.00	0.50	0.38	0.81	0.85	0.75
% Bank 1	0.0%	100.0%	96.3%	100.0%				0.0%	100.0%	99.1%	100.0%				0.0%	100.0%	0.0%	100.0%				0.0%	100.0%	100.0%	100.0%					
% Bank 2	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	3.7%	0.0%				0.0%	0.0%	0.9%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%					

Passenger Car Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20				Northbound Conservation Boulevard				Southbound Crosswinds Boulevard			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
7:00 AM	0	0	19	0	0	1	13	0	0	7	0	11	0	0	0	0
7:15 AM	0	0	21	0	0	5	20	1	0	3	0	10	0	0	0	0
7:30 AM	0	0	34	0	0	5	28	0	0	2	0	17	0	1	0	3
7:45 AM	0	0	29	2	0	6	32	0	0	6	0	15	0	1	0	2
8:00 AM	0	0	40	2	0	4	29	0	0	9	0	17	0	1	0	1
8:15 AM	0	0	33	4	0	1	34	1	0	1	0	14	0	2	0	1
8:30 AM	0	0	32	1	0	8	18	0	0	6	0	13	0	2	1	1
8:45 AM	0	1	51	1	0	7	25	3	0	4	0	20	0	2	1	1
9:00 AM	0	0	1	0	0	1	1	0	0	0	0	1	0	1	0	0

Truck Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20				Northbound Conservation Boulevard				Southbound Crosswinds Boulevard			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
7:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name
Kingsville Golf and Curling Club
Location
County Road 20 @ Crosswinds Boulevard/ Conservation Boulevard
Performed By
Kayla McDonald
Date
August 30, 2018

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
564	
% Bank 1	**% Bank 2**
99.1%	0.0%
% Bank 3	**% Bank 4**
0.0%	0.9%
Pedestrians Volume	
10	

Peak Hour Data

Time Period	Eastbound County Road 20							Westbound County Road 20							Northbound Conservation Boulevard							Southbound Crosswinds Boulevard							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
4:00 PM	0	2	51	5	0	0	58	0	23	56	2	0	0	81	0	3	0	7	0	0	10	0	0	0	3	0	1	3	152	1
4:15 PM	0	1	52	5	0	0	58	0	14	61	3	0	1	78	0	2	0	13	0	0	15	0	0	0	0	1	2	0	151	4
4:30 PM	0	0	41	5	0	0	46	0	13	48	0	1	0	61	0	2	0	11	0	0	13	0	2	0	0	2	0	2	122	3
4:45 PM	0	3	47	4	0	0	54	0	12	59	1	0	0	72	0	2	0	10	0	0	12	0	1	0	0	1	1	1	139	2

Vehicle Movement Summary

Movement / Details	Eastbound County Road 20							Westbound County Road 20							Northbound Conservation Boulevard							Southbound Crosswinds Boulevard							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	6	191	19	0	0	216	0	62	224	6	1	1	292	0	9	0	41	0	0	50	0	3	0	3	4	4	6	564	10
PHF	-	0.50	0.92	0.95	-	-	0.93	-	0.67	0.92	0.50	0.25	0.25	0.90	-	0.75	-	0.79	-	-	0.83	-	0.38	-	0.25	0.50	0.50	0.50	0.93	0.63
% Bank 1	0.0%	100.0%	98.4%	100.0%				0.0%	100.0%	99.1%	100.0%				0.0%	100.0%	0.0%	100.0%				0.0%	100.0%	0.0%	100.0%					
% Bank 2	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	1.6%	0.0%				0.0%	0.0%	0.9%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%					

Passenger Car Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20				Northbound Conservation Boulevard				Southbound Crosswinds Boulevard			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
4:00 PM	0	2	51	5	0	23	56	2	0	3	0	7	0	0	0	3
4:15 PM	0	1	51	5	0	14	60	3	0	2	0	13	0	0	0	0
4:30 PM	0	0	40	5	0	13	48	0	0	2	0	11	0	2	0	0
4:45 PM	0	3	46	4	0	12	58	1	0	2	0	10	0	1	0	0
5:00 PM	0	1	56	7	0	13	42	5	0	4	0	8	0	2	0	0
5:15 PM	0	0	41	4	0	20	50	1	0	5	1	10	0	1	0	0
5:30 PM	0	1	47	4	0	18	56	1	0	3	0	9	0	1	0	2
5:45 PM	0	0	53	4	0	16	48	1	0	1	0	9	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Truck Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20				Northbound Conservation Boulevard				Southbound Crosswinds Boulevard			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name
Kingsville Golf and Curling Club
Location
County Road 20 @ Kingsville Golf Course Driveway
Performed By
Liam McDonald
Date
August 30, 2018

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
382	
% Bank 1	**% Bank 2**
96.6%	0.0%
% Bank 3	**% Bank 4**
0.0%	3.4%
Pedestrians Volume	
5	

Peak Hour Data

Time Period	Eastbound County Road 20							Westbound County Road 20																			Driveway (Southbound)							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
7:30 AM	0	10	41	0	0	0	51	0	0	37	12	0	0	49	0	0	0	0	0	0	0	0	1	0	1	0	0	2	102	0
7:45 AM	0	14	35	0	0	0	49	0	0	33	4	0	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0
8:00 AM	0	10	43	0	0	0	53	0	0	35	5	0	0	40	0	0	0	0	0	0	0	0	2	0	1	2	2	3	96	4
8:15 AM	0	5	41	0	0	0	46	0	0	32	18	0	0	50	0	0	0	0	0	0	0	0	1	1	0	0	1	2	98	1

Vehicle Movement Summary

Movement / Details	Eastbound County Road 20							Westbound County Road 20																			Driveway (Southbound)							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	39	160	0	0	0	199	0	0	137	39	0	0	176	0	0	0	0	0	0	0	0	4	1	2	2	3	7	382	5
PHF	-	0.70	0.93	-	-	-	0.94	-	-	0.93	0.54	-	-	0.88	-	-	-	-	-	-	-	-	0.50	0.25	0.50	0.25	0.38	0.58	0.94	0.31
% Bank 1	0.0%	100.0%	98.1%	0.0%				0.0%	0.0%	94.7%	100.0%				0.0%	0.0%	0.0%	0.0%				0.0%	66.7%	0.0%	0.0%					
% Bank 2	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	1.9%	0.0%				0.0%	0.0%	5.3%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	33.3%	0.0%	0.0%					

Passenger Car Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20								Driveway (Southbound)			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
7:00 AM	0	7	24	0	0	0	12	6	0	0	0	0	0	0	0	0
7:15 AM	0	4	27	0	0	0	24	6	0	0	0	0	0	2	0	0
7:30 AM	0	10	40	0	0	0	35	12	0	0	0	0	0	1	0	1
7:45 AM	0	14	33	0	0	0	31	4	0	0	0	0	0	0	0	0
8:00 AM	0	10	41	0	0	0	35	5	0	0	0	0	0	2	0	1
8:15 AM	0	5	41	0	0	0	32	18	0	0	0	0	0	1	1	0
8:30 AM	0	4	51	0	0	0	25	10	0	0	0	0	0	3	0	2
8:45 AM	0	0	58	0	0	0	25	4	0	0	0	0	0	1	0	1
9:00 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0

Truck Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20								Driveway (Southbound)			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
7:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0
7:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name	Location	Performed By	Date
Kingsville Golf and Curling Club	County Road 20 @ Kingsville Golf Course Driveway	Liam McDonald	August 30, 2018

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
558	
% Bank 1	**% Bank 2**
98.9%	0.0%
% Bank 3	**% Bank 4**
0.0%	1.1%
Pedestrians Volume	
11	

Peak Hour Data

Time Period	Eastbound County Road 20							Westbound County Road 20													Driveway (Southbound)							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
5:00 PM	0	4	64	1	0	0	69	0	0	65	5	0	0	70	0	0	0	0	0	0	0	0	7	0	1	2	3	8	147	5
5:15 PM	0	1	51	1	0	0	53	0	0	67	3	0	0	70	0	0	0	0	0	0	0	0	9	0	3	3	1	12	135	4
5:30 PM	0	1	65	0	0	0	66	0	0	61	3	0	0	64	0	0	0	0	0	0	0	0	4	0	7	1	0	11	141	1
5:45 PM	0	2	56	1	0	0	59	0	0	71	4	0	0	75	0	0	0	0	0	0	0	0	1	0	0	0	1	1	135	1

Vehicle Movement Summary

Movement / Details	Eastbound County Road 20							Westbound County Road 20													Driveway (Southbound)							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	8	236	3	0	0	247	0	0	264	15	0	0	279	0	0	0	0	0	0	0	0	21	0	11	6	5	32	558	11
PHF	-	0.50	0.91	0.75	-	-	0.89	-	-	0.93	0.75	-	-	0.93	-	-	-	-	-	-	-	-	0.58	-	0.39	0.50	0.42	0.67	0.95	0.55
% Bank 1	0.0%	100.0%	98.3%	100.0%				0.0%	0.0%	99.2%	100.0%				0.0%	0.0%	0.0%	0.0%				0.0%	100.0%	0.0%	100.0%					
% Bank 2	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	1.7%	0.0%				0.0%	0.0%	0.8%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%					

Passenger Car Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20								Driveway (Southbound)			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
4:00 PM	0	3	59	0	0	0	67	7	0	0	0	0	0	3	1	5
4:15 PM	0	5	56	0	0	0	77	4	0	0	0	0	0	5	0	2
4:30 PM	0	7	49	0	0	0	62	3	0	0	0	0	0	2	0	1
4:45 PM	0	2	44	0	0	0	55	3	0	0	0	1	0	6	0	4
5:00 PM	0	4	63	1	0	0	65	5	0	0	0	0	0	7	0	1
5:15 PM	0	1	50	1	0	0	66	3	0	0	0	0	0	9	0	3
5:30 PM	0	1	64	0	0	0	61	3	0	0	0	0	0	4	0	7
5:45 PM	0	2	55	1	0	0	70	4	0	0	0	0	0	1	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Truck Counts																
Time Period	Eastbound County Road 20				Westbound County Road 20								Driveway (Southbound)			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix C

Level of Service Definitions

LEVEL OF SERVICE[1]

Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. This concept was introduced in the 1965 *Highway Capacity Manual* as a criteria for interrupted flow conditions. The 2000 *Highway Capacity Manual* changed the basis for measuring Level of Service at intersections to control delay[2].

Six Levels of Service are defined with LOS A representing the best operating conditions, and LOS F the worst (briefly described below). It should be noted that there is often significant variability in the amount of delay experienced by individual drivers.

LOS A: This Level of Service describes the highest quality of traffic flow and is referred to as free flow. The approach appears open, turning movements are easily made and drivers have freedom of operation. Control delay is less than 10 seconds/vehicle.

LOS B: This Level of Service is referred to as a stable flow. Drivers feel somewhat restricted and occasionally may have to wait to complete the minor movement. Control delay is 10-15 seconds/vehicle for unsignalized intersections and 10-20 seconds/vehicle for signalized intersections.

LOS C: At this level, the operation is stable. Drivers feel more restricted and may have to wait, with queues developing for short periods. Control delay is 15-25 seconds/vehicle at unsignalized intersections and 20-35 seconds/vehicle at signalized intersections.

LOS D: At this level, traffic is approaching unstable flow. The motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough gaps to lower demand to permit occasional clearance of developing queues and prevent excessive back-ups. Control delay is 25-35 seconds/vehicle at unsignalized intersections and 35-55 seconds/vehicle at signalized intersections.

LOS E: At this level capacity occurs. Long queues of vehicles exist and delays to vehicles may extend. Control delay is 35-50 seconds/vehicle at unsignalized intersections and 55-80 seconds/vehicle at signalized intersections.

LOS F: At this Level of Service, the intersection has failed. Capacity of the intersection has been exceeded. Control delay exceeds 50 seconds/vehicle at unsignalized intersections and exceeds 80 seconds/vehicle at signalized intersections.

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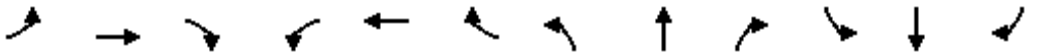
[1] *Transportation Research Board: Highway Capacity Manual 1965, 2000*

[2] *Control delay is defined as the component of delay that results when a control signal causes a lane group to reduce speed or to stop; it is measured by comparison with the uncontrolled condition.*

Appendix D

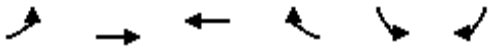
Synchro Analysis Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	128	8	20	107	4	20	0	64	7	2	4
Future Volume (Veh/h)	1	128	8	20	107	4	20	0	64	7	2	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.78	0.50	0.63	0.79	0.33	0.56	0.92	0.80	0.88	0.50	1.00
Hourly flow rate (vph)	4	164	16	32	135	12	36	0	80	8	4	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	147			180			375	383	164	457	393	141
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	147			180			375	383	164	457	393	141
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			94	100	91	98	99	100
cM capacity (veh/h)	1447			1408			569	539	886	461	532	912

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	4	164	16	32	147	36	80	16
Volume Left	4	0	0	32	0	36	0	8
Volume Right	0	0	16	0	12	0	80	4
cSH	1447	1700	1700	1408	1700	569	886	647
Volume to Capacity	0.00	0.10	0.01	0.02	0.09	0.06	0.09	0.02
Queue Length 95th (m)	0.1	0.0	0.0	0.6	0.0	1.6	2.4	0.6
Control Delay (s)	7.5	0.0	0.0	7.6	0.0	11.8	9.5	11.7
Lane LOS	A			A		B	A	B
Approach Delay (s)	0.2			1.4		10.2		11.7
Approach LOS						B		B

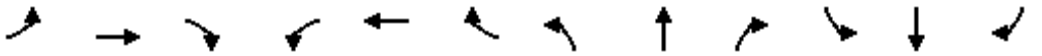
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	27.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	39	160	129	39	4	2
Future Volume (Veh/h)	39	160	129	39	4	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.70	0.93	0.93	0.54	0.50	0.50
Hourly flow rate (vph)	56	172	139	72	8	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	211				459	175
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	211				459	175
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				99	100
cM capacity (veh/h)	1372				541	874

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	228	211	12
Volume Left	56	0	8
Volume Right	0	72	4
cSH	1372	1700	619
Volume to Capacity	0.04	0.12	0.02
Queue Length 95th (m)	1.0	0.0	0.5
Control Delay (s)	2.2	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	2.2	0.0	10.9
Approach LOS			B

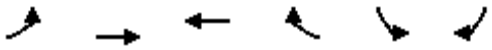
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	200	19	62	224	6	9	0	41	3	0	3
Future Volume (Veh/h)	6	200	19	62	224	6	9	0	41	3	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.92	0.95	0.67	0.92	0.50	0.75	0.92	0.79	0.38	0.92	0.25
Hourly flow rate (vph)	12	217	20	93	243	12	12	0	52	8	0	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	255			237			676	682	217	728	696	249
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	255			237			676	682	217	728	696	249
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			93			96	100	94	97	100	98
cM capacity (veh/h)	1322			1342			343	346	828	301	339	795

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	12	217	20	93	255	12	52	20
Volume Left	12	0	0	93	0	12	0	8
Volume Right	0	0	20	0	12	0	52	12
cSH	1322	1700	1700	1342	1700	343	828	752
Volume to Capacity	0.01	0.13	0.01	0.07	0.15	0.04	0.06	0.03
Queue Length 95th (m)	0.2	0.0	0.0	1.8	0.0	0.9	1.6	0.7
Control Delay (s)	7.7	0.0	0.0	7.9	0.0	15.9	9.6	12.7
Lane LOS	A			A		C	A	B
Approach Delay (s)	0.4			2.1		10.8		12.7
Approach LOS						B		B

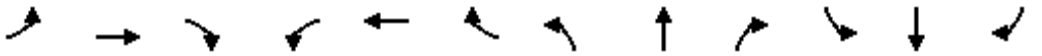
Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	32.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	236	281	15	21	11
Future Volume (Veh/h)	8	236	281	15	21	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.91	0.93	0.75	0.58	0.39
Hourly flow rate (vph)	16	259	302	20	36	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	322				603	312
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	322				603	312
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				92	96
cM capacity (veh/h)	1249				459	733

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	275	322	64
Volume Left	16	0	36
Volume Right	0	20	28
cSH	1249	1700	549
Volume to Capacity	0.01	0.19	0.12
Queue Length 95th (m)	0.3	0.0	3.1
Control Delay (s)	0.6	0.0	12.4
Lane LOS	A		B
Approach Delay (s)	0.6	0.0	12.4
Approach LOS			B

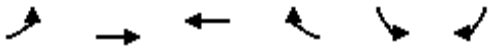
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	143	18	27	127	4	49	0	87	7	3	4
Future Volume (Veh/h)	1	143	18	27	127	4	49	0	87	7	3	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.78	0.50	0.63	0.79	0.33	0.56	0.92	0.80	0.88	0.50	1.00
Hourly flow rate (vph)	4	183	36	43	161	12	88	0	109	8	6	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	173			219			443	450	183	553	480	167
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	173			219			443	450	183	553	480	167
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			83	100	87	98	99	100
cM capacity (veh/h)	1416			1362			507	490	865	380	471	882

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	4	183	36	43	173	88	109	18
Volume Left	4	0	0	43	0	88	0	8
Volume Right	0	0	36	0	12	0	109	4
cSH	1416	1700	1700	1362	1700	507	865	539
Volume to Capacity	0.00	0.11	0.02	0.03	0.10	0.17	0.13	0.03
Queue Length 95th (m)	0.1	0.0	0.0	0.8	0.0	5.0	3.4	0.8
Control Delay (s)	7.5	0.0	0.0	7.7	0.0	13.6	9.8	12.8
Lane LOS	A			A		B	A	B
Approach Delay (s)	0.1			1.5		11.5		12.8
Approach LOS						B		B

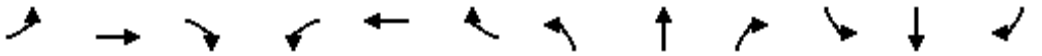
Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	30.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	39	198	156	39	4	2
Future Volume (Veh/h)	39	198	156	39	4	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.70	0.93	0.93	0.54	0.50	0.50
Hourly flow rate (vph)	56	213	168	72	8	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	240				529	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240				529	204
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				98	100
cM capacity (veh/h)	1339				492	842

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	269	240	12
Volume Left	56	0	8
Volume Right	0	72	4
cSH	1339	1700	571
Volume to Capacity	0.04	0.14	0.02
Queue Length 95th (m)	1.0	0.0	0.5
Control Delay (s)	1.9	0.0	11.4
Lane LOS	A		B
Approach Delay (s)	1.9	0.0	11.4
Approach LOS			B

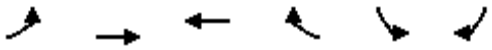
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	228	50	85	255	6	26	0	56	3	0	3
Future Volume (Veh/h)	6	228	50	85	255	6	26	0	56	3	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.92	0.95	0.67	0.92	0.50	0.75	0.92	0.79	0.38	0.92	0.25
Hourly flow rate (vph)	12	248	53	127	277	12	35	0	71	8	0	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	289			301			809	815	248	880	862	283
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289			301			809	815	248	880	862	283
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			90			87	100	91	96	100	98
cM capacity (veh/h)	1284			1272			272	280	796	225	263	761

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	12	248	53	127	289	35	71	20
Volume Left	12	0	0	127	0	35	0	8
Volume Right	0	0	53	0	12	0	71	12
cSH	1284	1700	1700	1272	1700	272	796	563
Volume to Capacity	0.01	0.15	0.03	0.10	0.17	0.13	0.09	0.04
Queue Length 95th (m)	0.2	0.0	0.0	2.7	0.0	3.5	2.3	0.9
Control Delay (s)	7.8	0.0	0.0	8.1	0.0	20.2	10.0	14.5
Lane LOS	A			A		C	A	B
Approach Delay (s)	0.3			2.5		13.3		14.5
Approach LOS						B		B

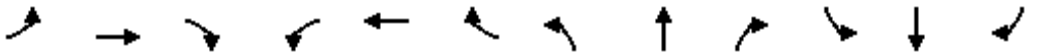
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	35.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	279	335	15	21	11
Future Volume (Veh/h)	8	279	335	15	21	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.91	0.93	0.75	0.58	0.39
Hourly flow rate (vph)	16	307	360	20	36	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	380				709	370
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380				709	370
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				91	96
cM capacity (veh/h)	1190				398	680

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	323	380	64
Volume Left	16	0	36
Volume Right	0	20	28
cSH	1190	1700	486
Volume to Capacity	0.01	0.22	0.13
Queue Length 95th (m)	0.3	0.0	3.6
Control Delay (s)	0.5	0.0	13.5
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	13.5
Approach LOS			B

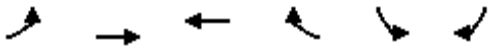
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	115	18	27	129	7	49	0	87	15	3	10
Future Volume (Veh/h)	32	115	18	27	129	7	49	0	87	15	3	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.78	0.50	0.63	0.79	0.33	0.56	0.92	0.80	0.88	0.50	1.00
Hourly flow rate (vph)	128	147	36	43	163	21	88	0	109	17	6	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	184			183			660	673	147	772	698	174
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			183			660	673	147	772	698	174
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			97			74	100	88	93	98	99
cM capacity (veh/h)	1403			1404			336	334	905	255	323	875

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	128	147	36	43	184	88	109	33
Volume Left	128	0	0	43	0	88	0	17
Volume Right	0	0	36	0	21	0	109	10
cSH	1403	1700	1700	1404	1700	336	905	392
Volume to Capacity	0.09	0.09	0.02	0.03	0.11	0.26	0.12	0.08
Queue Length 95th (m)	2.4	0.0	0.0	0.8	0.0	8.2	3.3	2.2
Control Delay (s)	7.8	0.0	0.0	7.6	0.0	19.5	9.5	16.3
Lane LOS	A			A		C	A	C
Approach Delay (s)	3.2			1.4		14.0		16.3
Approach LOS						B		C

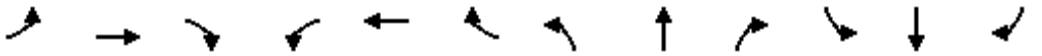
Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	29.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	206	160	44	17	3
Future Volume (Veh/h)	11	206	160	44	17	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.70	0.93	0.93	0.54	0.50	0.50
Hourly flow rate (vph)	16	222	172	81	34	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	253				466	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	253				466	212
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				94	99
cM capacity (veh/h)	1324				552	833

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	238	253	40
Volume Left	16	0	34
Volume Right	0	81	6
cSH	1324	1700	581
Volume to Capacity	0.01	0.15	0.07
Queue Length 95th (m)	0.3	0.0	1.8
Control Delay (s)	0.6	0.0	11.7
Lane LOS	A		B
Approach Delay (s)	0.6	0.0	11.7
Approach LOS			B

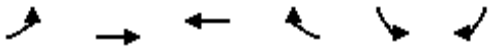
Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		29.8%	ICU Level of Service
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	224	50	85	248	15	26	0	56	9	0	14
Future Volume (Veh/h)	16	224	50	85	248	15	26	0	56	9	0	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.92	0.95	0.67	0.92	0.50	0.75	0.92	0.79	0.38	0.92	0.25
Hourly flow rate (vph)	32	243	53	127	270	30	35	0	71	24	0	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	300			296			859	861	243	917	899	285
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	300			296			859	861	243	917	899	285
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			90			85	100	91	89	100	93
cM capacity (veh/h)	1273			1277			234	259	801	210	246	759

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	32	243	53	127	300	35	71	80
Volume Left	32	0	0	127	0	35	0	24
Volume Right	0	0	53	0	30	0	71	56
cSH	1273	1700	1700	1277	1700	234	801	701
Volume to Capacity	0.03	0.14	0.03	0.10	0.18	0.15	0.09	0.11
Queue Length 95th (m)	0.6	0.0	0.0	2.6	0.0	4.1	2.3	3.1
Control Delay (s)	7.9	0.0	0.0	8.1	0.0	23.1	9.9	14.4
Lane LOS	A			A		C	A	B
Approach Delay (s)	0.8			2.4		14.3		14.4
Approach LOS						B		B

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	285	343	28	30	5
Future Volume (Veh/h)	5	285	343	28	30	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.91	0.93	0.75	0.58	0.39
Hourly flow rate (vph)	10	313	369	37	52	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	406				720	388
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				720	388
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				87	98
cM capacity (veh/h)	1164				394	665

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	323	406	65
Volume Left	10	0	52
Volume Right	0	37	13
cSH	1164	1700	429
Volume to Capacity	0.01	0.24	0.15
Queue Length 95th (m)	0.2	0.0	4.2
Control Delay (s)	0.3	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	14.9
Approach LOS			B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E

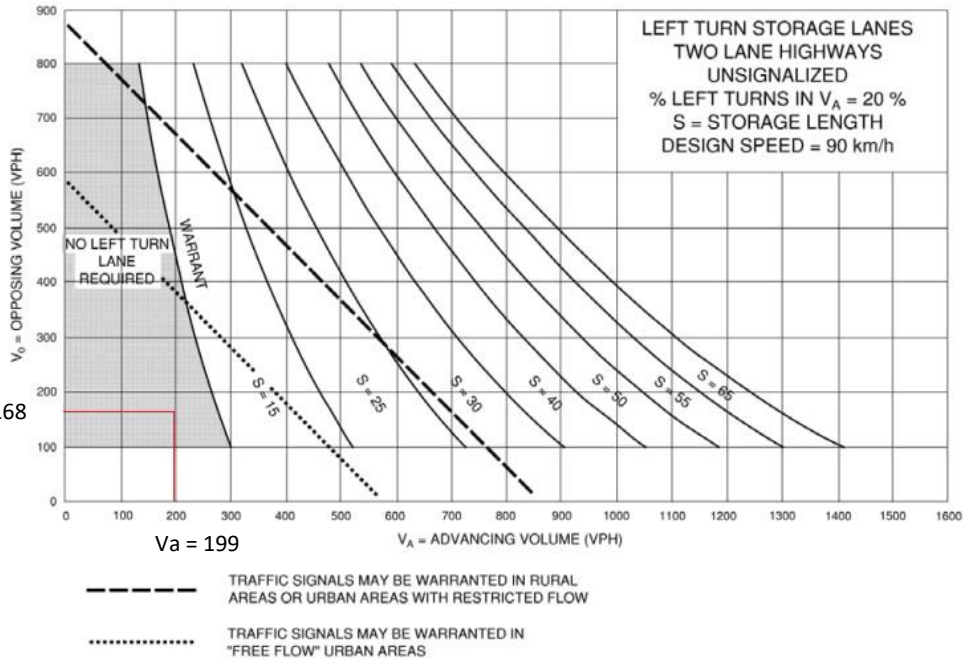
Left Turn Lane Warrant Nomographs

Left Turn Lane Warrant

EBL Kingsville G&CC Access

Existing Traffic Volumes

Weekday AM Peak Hour



Vo = 168

Va = 199

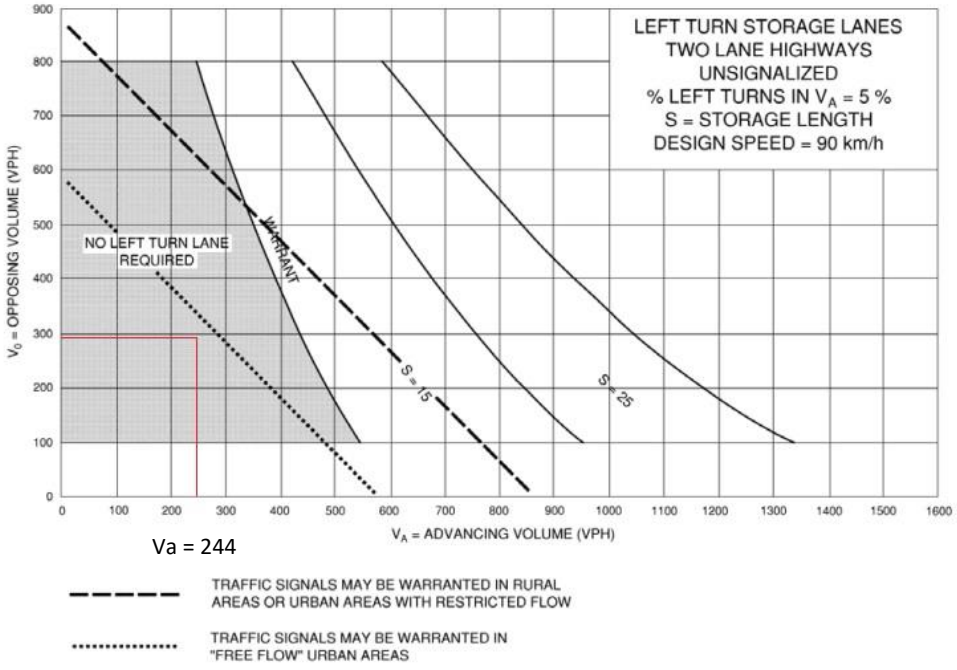
Left Turn Lane Warrant

EBL Kingsville G&CC Access

Existing Traffic Volumes

Weekday PM Peak Hour

Vo = 296



Va = 244

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

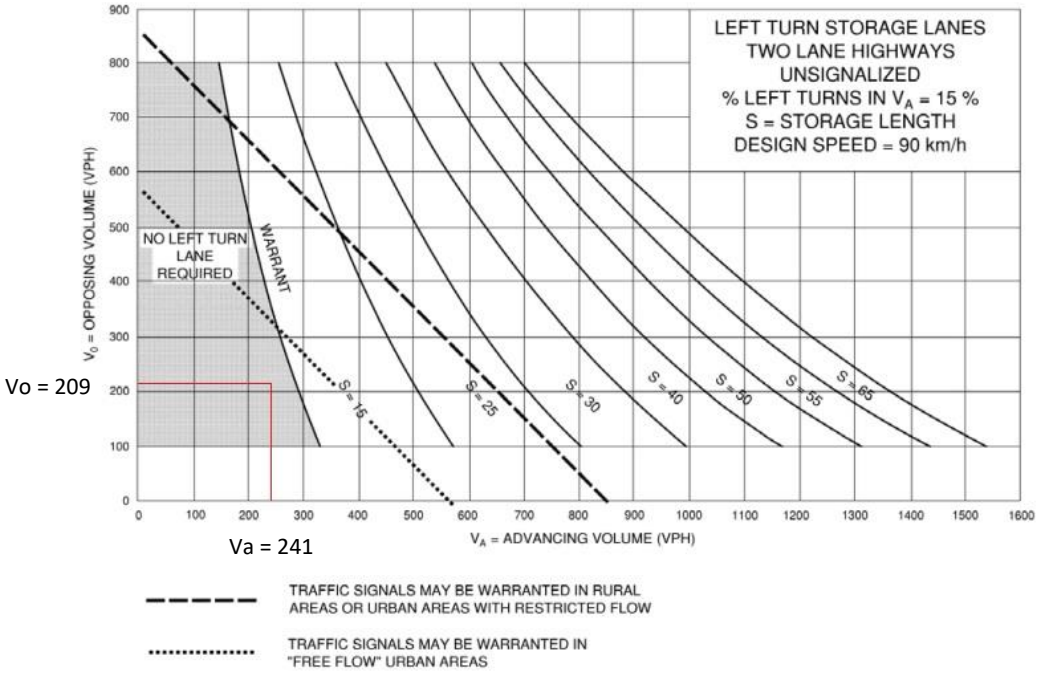
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Left Turn Lane Warrant

EBL Kingsville G&CC Access

Future Background Traffic Volumes

Weekday AM Peak Hour



Vo = 209

Va = 241

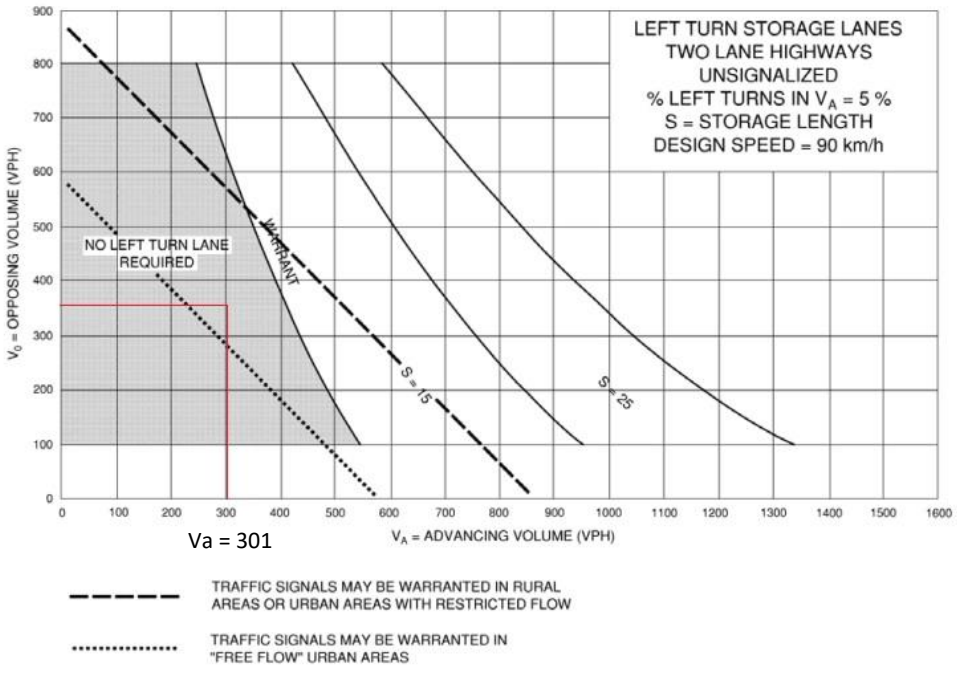
Left Turn Lane Warrant

EBL Kingsville G&CC Access

Future Background Traffic Volumes

Weekday PM Peak Hour

Vo = 358



Va = 301

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

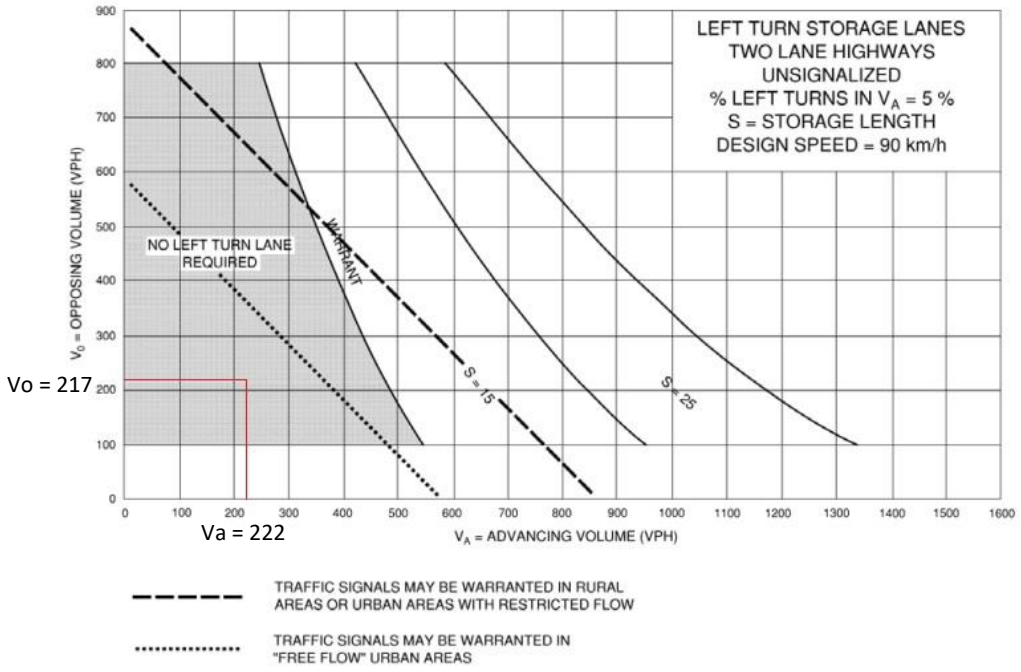
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Left Turn Lane Warrant

EBL Kingsville G&CC Access

Total Future Traffic Volumes

Weekday AM Peak Hour



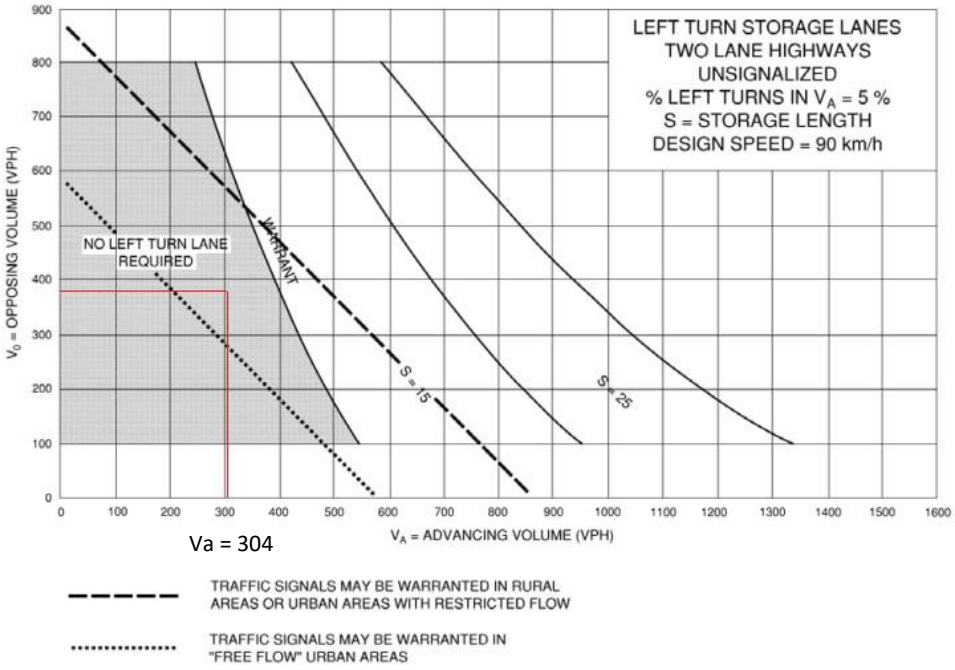
Left Turn Lane Warrant

EBL Kingsville G&CC Access

Total Future Traffic Volumes

Weekday PM Peak Hour

Vo = 380



Va = 304

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS