Lakefield South Subdivision
3358 Lakefield Road

Township of Selwyn

Traffic Study Report

Prepared by:
Tranplan Associates
PO Box 455
Lakefield, ON
K0L 2H0
www.tranplan.com

Prepared for:
Triple T Holdings Ltd.

March, 2020

March 30, 2020

Triple T Holdings Ltd.
P.O. Box 1079
Peterborough, ON K9J 7A9

Attn: Mr. William Turner

Dear Sir:

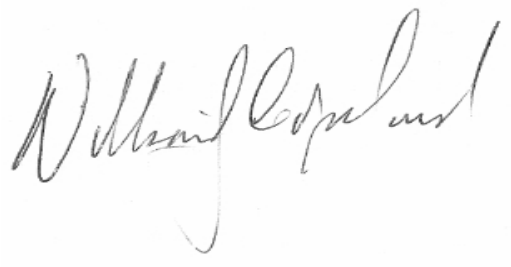
RE: Traffic Impact Study for the Triple T Lakefield South Subdivision, 3358 Lakefield Road in the former Village of Lakefield, Township of Selwyn

Tranplan Associates is pleased to present the results of a traffic study carried out to assess the potential traffic impacts of the proposed *Triple T Lakefield South Subdivision*. The subdivision, will be located on the southwest side of the former Village of Lakefield, now part of the Township of Selwyn, County of Peterborough.

The future traffic volumes forecasted to be generated by full build out of this proposed subdivision can be accommodated by 3 of the 5 existing study intersections now serving the immediate study area. No auxiliary turning lanes or other infrastructure improvements will be required at these 3 intersections. The 2 intersections requiring improvements are located on Peterborough County Road 29. By 2029 they are forecasted to warrant traffic signals. Two new intersections will provide access to/from the subdivision. These two new intersections plus the 5 existing intersections comprise the 7 study intersections. The 7th Line corridor of the former Smith Township will require improvements to support access to the south side of the subdivision. There is residual capacity in the existing (2018) road network to support some initial site development most likely along Water Tower Road

Tranplan Associates is pleased to have the opportunity to work with the *Triple T Study Team* on this project. If you should require further information on the study analyses or reporting, please contact me at your convenience.

Yours truly,



William Copeland, P.Eng.
Principal
Tranplan Associates

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1. BACKGROUND & PRINCIPAL FINDINGS

1.1 Background

Tranplan Associates is pleased to present the results of a traffic study to determine the impact of the proposed *Triple T Lakefield South Subdivision* (*Lakefield South Subdivision*) to be located in the southwestern portion of the former Village of Lakefield, now part of the Township of Selwyn (see *Exhibit 1 – Key Map*). The planned development will be bounded on the west and north by Peterborough County Road (CR) 29 as illustrated in *Exhibit 2 – Preliminary Site Plan*). The new *Triple T Subdivision* will be primarily a residential subdivision with a mix of housing supported with some neighbourhood commercial development. This commercial development will serve the immediate study area.

The preliminary site plan as illustrated in *Exhibit 2* shows the new internal local roadways that will provide direct access to the various residential uses located in the subdivision. It is expected that the commercial uses will be located along Water Tower Road as the main north-south collector corridor. Water Tower Road connecting to the South Collector Road will provide the main north-south access to the adjacent County and Township road network. A North Collector Road will provide east/west access, connecting to the Murray Street/Clementi corridor to provide access to the core areas of the Village. The location of each of these connecting streets and adjacent roads are illustrated in *Exhibit 3 - Site Access Context*.

This traffic study has been requested by the County of Peterborough and the Township of Selwyn as part of the planning approval process for full build out of the *Triple T Subdivision*. Discussions have been held with the study team, the County and the Township to establish the scope of study. Tranplan Associates staff have completed a number of site visits to assess existing travel patterns on adjacent streets and roads, collect peak hour traffic counts, observe intersection traffic operations, evaluate the existing road cross-sections and study intersection approaches. Information on adjacent land uses was also recorded.

A detailed study road network was developed through discussion with County and Township staff. Five existing intersections adjacent to the immediate study area form the study road network. The County supplied 2018 week day traffic counts for two of the five intersections. Tranplan Associates completed week day peak period traffic counts for two of the intersections in October, 2018 and supplied count data from their files for the fifth intersection.

The observed volumes were collated and “balanced” over the study road network to produce 2018 design hour volumes (DHV) as illustrated in *Exhibit 4 – 2018 Design Hour Volumes*. These DHV formed the base for the future road network traffic forecasts.

These forecasts were prepared for each study intersection and the adjoining road corridors for an 11 year planning horizon to 2029.

Intersection capacity analyses were completed for each intersection for representative weekday AM and PM peak hour periods. The total 2029 traffic volumes used for the analyses included growth in background traffic and future traffic from full build out of the *Lakefield South Subdivision*. These analyses provided detailed information on future traffic impacts and operations on study roads and intersections

The intent of this traffic report is to provide the County and the Township with a detailed summary of the traffic study findings and conclusions. It will also provide a solid base of data for developing future plans for intersection improvements to assure that study intersections and road corridors will meet County and Township operational standards and requirements. It is expected that as the development builds out, update studies will be carried out to provide more specific details on the timing and design of the necessary road infrastructure improvements.

1.2 Principal Findings

The principal findings derived from the study analyses include the following:

- The present study road network operates at good Level of Service (LoS)[1] during weekday peak hour periods. The road network has residual capacity to support some future growth in site and background traffic.
- Future improvements will be required to accommodate forecast 2029 total peak hour volumes at two intersections in the CR 29 corridor. These include the intersections at the 7th Line and at Water Tower Rd. The remaining study intersections will accommodate future site and background traffic. These other intersections will operate at acceptable LoS during 2029 weekday peak periods of travel demand.
- Road platform improvements will be required along the 7th Line corridor to support future site traffic from the new South Collector Road intersection to CR 29.
- The proposed road network as illustrated in *Exhibit 2*, combined with the recommended road network improvements will provide good overall access to new development within the subdivision. The new roads and intersections designed to current County and Township standards will provide safe and efficient access for future residents and businesses that will locate in the *Lakefield South Subdivision*.
- The study analyses have shown that a new east/west collector road connection from Lakefield South to CR 29, as proposed in a 2003 *Dillon Consulting Ltd.* traffic study[2], will not be required.

[1] See *Technical Appendix – Intersection Capacity Analysis* for definitions of Levels of Service.

[2] Lakefield South Development Area Traffic Impact Study Draft Final Report, June, 2003, Dillon Consulting Ltd.

- The proximity of the subdivision to adjacent schools and Village destinations supported with appropriate pedestrian and multiuse linkages will encourage non-auto travel to/from the new development.

The following *Sections* of this *Traffic Report* detail the data assembly program, the study process, the principal findings, the study conclusions and the recommendations for future transportation infrastructure.

2. EXISTING CONDITIONS

2.1 The Study Site

The *Triple T Lakefield South Subdivision* is being developed on the southwestern side of the former Village of Lakefield (see *Exhibit 3 – Site Access Context*). The study site is part of the overall *Lakefield South Planning Area*. This area has been reserved for some time for future residential development in this part of what is now the Township of Selwyn. The Township carried out planning studies for such future development in this part of the Municipality during the early 2000s. The immediate study site is on the southern fringe of current urban/commercial development in the Village. It is essentially a green-field site that was formerly in agricultural use. The current proposed layout of the full development of the *Triple T Subdivision* is illustrated in *Exhibit 2.* Additional specific development information for the study site is contained in related planning documentation that will be submitted with this traffic report for the necessary planning approvals.

2.2 Adjacent Land Uses

Lands surrounding the immediate study area contain a mix of established uses. To the west, the site is bounded by a mix of older residential development and wet lands along the CR 29 corridor. To the south of the site there is a single row of older rural residential homes along the north side of the 7th Line of the former Smith Township. The *Lakefield Fair Grounds* and an established residential subdivision (Coyle Crescent) are located on the northeast side of the study site. Further to the east, lands are undeveloped with some areas still in limited agricultural use.

The CR 29 corridor also bounds the northern part of the study site (see *Exhibit 3*). Some highway commercial development is located along this corridor combined with older residential homes and the *Lakefield District Public School*. South of CR 29 the *Ontario Speed Skating Oval* has been constructed on Water Tower Road in the north part of the study lands. Older residential development is located further to the northeast towards the William Street/Clementi Street corridors. This mix of existing development surrounding the study site is characteristic of older established communities in this part of the County.

2.3 The Study Road Network

The study road network was developed through discussions with the study team and County and Township staff. Tranplan Associates staff completed a set of field visits to review/observe the roads and intersections in the immediate study area. Observations included current operations at these intersections as well as evaluation of current intersection and road corridor geometrics. Based on this field work and discussions with staff, five existing intersections and their adjoining road corridors were confirmed as framework for the study analyses. Details of the corridors and intersections are provided in the following Sections.

2.3.1 *The Study Road Corridors*

The principal arterial road serving the study area will be Peterborough County Road (CR) 29. As illustrated in *Exhibit 1*, CR 29 is the main arterial corridor linking Lakefield and the study area to the City of Peterborough to the south. It also provides access to the Lakefield core for areas to the north and east. North of the Village, it connects to Kings Highway 28. This link provides connectivity to communities in northern and eastern areas of the County.

County Road 18 connects to CR 29 at a signalized intersection just west of the study site as illustrated in *Exhibit 3*. CR 18 is one of the main rural arterial roads in the County road network. It provides connectivity to west to the former Village of Bridgenorth. It also links to County Road 23 (Buckhorn Road) at an intersection just west of Lakefield. This provides connectivity to communities such as Buckhorn in the north central part of the County.

The former 7th Line of Smith Township runs westerly from the Otonabee River, intersecting CR 29, CR 23 and continuing west to Bridgenorth. The 7th Line is presently a local rural road under the jurisdiction of the Township of Selwyn. A new south connection to the 7th Line is planned for the subdivision (see *Exhibit 3*). It will provide the new subdivision with direct access to the 7th Line. This in turn will provide the subdivision with a south access route to CR 29 for traffic travelling south to Peterborough or west to Bridgenorth.

A new northeast connection is also planned for the subdivision to link to Murray/William Street (see *Exhibit 3).* This connection will provide the subdivision with access to the core of the Village via William Street to the Clementi Street corridor (see *Exhibit 3*). Murray /William Street and Clementi Street presently function primarily as residential collector streets. This access route also provides access to the *Lakefield Fairgrounds*. More detailed information on the study intersections and road corridors collected during the Tranplan Associates site visits is included in the *Technical Appendix – Summary of Road/Intersection Parameters*.

2.3.2 *The Study Intersections*

There are 5 existing intersections in the study road network. As illustrated in *Exhibit 3*, they are as follows:

- CR 29/7th Line – Two-Way Stop Control (TWSC)
- CR 29/CR 18 - signalized
- CR 29/Water Tower Road - TWSC
- CR 29/Clementi Street - signalized
- Clementi Street/William Street All-Way Stop Control (AWSC)

Two new intersections are also included in the study road network. These intersections will be constructed as part of the new subdivisions road network. These intersections are as follows:

- Water Tower Road/North Collector Road
- South Collector Road/7th Line

The Water Tower Road/North Collector Road intersection has been included in the analyses as it will be one of the main internal road intersections. It has been assessed as a surrogate intersection for the other intersections within the subdivision. As such, the results of its analyses should be representative of the other intersections within the subdivision. The South Collector/7th Line intersection is included since it will be the main subdivision south access point to the external road network.

2.4 The Field Data Collection Program

The County of Peterborough was able to supply the study team with 2018 weekday traffic data for the CR 29/CR 18 and the CR 29/Clementi intersections. In October, 2018 Tranplan Associates completed weekday peak period counts at the CR 29/7th Line and CR 29/Water Tower Road intersections.

Traffic data for the Clementi/William intersection were available from a traffic study completed by Tranplan Associates at an earlier date. The observed traffic volumes were entered into the traffic forecasting model. The sources for the existing peak hour volumes for the network were found to be in reasonable agreement. The road network volumes were then "balanced" to match adjacent intersection approaches to produce 2018 AM and PM Design Hour Volumes (DHV). These volumes are illustrated in *Exhibit 4* - 2018 Design Hour Volumes.

During the field data collection program Tranplan Associates staff also collected the details of the study intersections' approach geometrics. These data were later used as input to the intersection capacity analyses. The field data collection program also included observations of present traffic operations in order to identify any potential traffic operational issues. Additional details including a summary of intersection geometrics and controls are included in the *Technical Appendix – Summary of Road/Intersection Parameters*.

2.5 Current Traffic Operations

Detailed intersection capacity analyses were carried out to assess current intersection operations at 4 of the existing study intersections for each of the two peak hour periods. The analyses were based on the 2018 DHV as illustrated in *Exhibit 4*. Since its turning volumes are negligible, 2018 analysis of the CR 29/Water Tower Road intersection was not included in the 2018 analyses summaries.

As noted in *Section 2.3.2*, two of the study intersections are presently signalized. The remaining 3 existing intersections in the study road network are unsignalized. The

Clementi/Williams intersection has All-Ways Stop Control (AWSC). The remaining intersections have Two-Way Stop Control (TWSC) control with posted STOPs on the minor approaches. The capacity analyses were completed using Trafficware's *Synchro 10* software. *Table 1* following summarizes the results of the analyses.

Table 1: 2018 Capacity Analyses Summary

2018 Design Hour Volume Capacity Analyses – Critical Movement						
Intersection/Control	**Weekday AM Peak Hour**			**Weekday PM Peak Hour**		
	LoS (Delay)	**Vol/Cap**	**Queue**	**LoS (Delay)**	**Vol/Cap**	**Queue**
7th Line/CR 29 - TWSC*A*	WB LTR: **B/C** (14.3s)	0.09	0.3 veh	EB LTR: **C** (18.6s)	0.06	0.2 veh
CR 18/CR 29 - Signal*B*	EB Lt: **B/C** (20.6s)	0.35	60.9 m	EB Lt: **B/C** (19.s)	0.59	44.5 m
Clementi/CR 29 - Signal*B*	NB Lt: **C** (30.2s)	0.32	18.8 m	NB Lt: **C** (28.5s)	0.25	15.2 m
Clementi/William - AWSC*A*	SB LR: **A** (7.8s)	0.11	0.4 veh	EB LR: **A** (7.7s)	0.07	0.2 veh

A – Queue 95th percentile vehicle queue length measured in vehicles. B – 95th Percentile Queue measured in metres

The capacity analyses results for the 2018 analyses show that the critical traffic movements at each of the study intersections operate at LoS "C" or better. This indicates that drivers passing through these intersections now experience acceptable levels of delay. The poorest critical movement volume to capacity (v/c) ratio (CR 18/CR 29) is 0.35 or about one third of available capacity for the eastbound left movement. Note that this is based on the present signal timing. All other v/c ratios are 0.32 or less. There is now (2019) residual capacity at all the study intersections to accept some future growth in traffic. Detailed printouts from the 2018 *Synchro* analyses for the four intersections included in the 2018 analyses can be found in the *Technical Appendix – Intersection Capacity Analyses.*

3. THE DEVELOPMENT

3.1 Trip Generation Forecasts

The *Triple T Lakefield South Subdivision* will be a fully planned residential subdivision. It will also include some local neighbourhood commercial development that will focus on providing local services to residents of the subdivision. *Exhibit 2* illustrates the layout of the subdivision including the internal roads and connections to the existing adjacent road network.

For the purposes of computing the future site trip generation, the mix of housing has been grouped into three specific residential uses plus the neighbourhood commercial use. The land use types include:

- Single Family Dwellings
- Townhouses
- Apartments
- Neighbourhood Commercial

AM and PM peak hour trip generation were calculated for these uses applying forecasting relationships taken from the current Institute of Transportation Engineers (ITE) *Trip Generation Manual*. (*10th edition*). The current ITE *Trip Generation Manual* combines both *Single Family Dwellings* and *Townhouses* with a single set of trip generation parameters. The ITE trip generation categories used for the analyses were as follows:

- Single Family Dwellings & Townhouses – ITE LU 210
- Apartments – ITE LU 220
- Neighbourhood Commercial – ITE LU 820

Table 2 below summarizes the total site traffic forecasted to access the adjacent road network. At full build out, *the Triple T Lakefield South Subdivision*, during a representative weekday AM peak hour is expected to generate a total of 513 new trips with 117 inbound and 396 outbound from the new development. During the PM peak hour the new development is forecast to generate 715 new trips with 445 inbound and 270 outbound from the study site.

Table 2: Forecast Site Trip Generation (vph)

			AM Peak Hour			PM Peak Hour		
Use	**Source**	**Amount**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Singles & Towns	ITE LU 210	411 units	77	230	307	258	149	407
Apartments	ITE LU 220	566 units	39	165	204	183	117	300
Neigh Commercial*	ITE LU 820	10,000 sf	1	1	2	4	4	8
		Total	***117***	***396***	***513***	***445***	***270***	***715***

Note: Neighbourhood Commercial = external trips only

In reviewing *Table 2* it will be noted that future trip subtotals have been calculated for the residential and commercial traffic volumes. It has been assumed that the distribution of the commercial trips will be somewhat different than the residential uses. These separate totals allowed for the specific assignment to the study road network of each of these two land use groups. The general location of *the Triple T Lakefield South Subdivision* in the southwestern area of the former Village of Lakefield distances it somewhat from the commercial core area of the Village (see *Exhibit 3*). This separation should encourage more local travel within the new community to the new local commercial uses. This will likely result in some internal site trip capture within the subdivision itself. But as a worst case, all residential trips have been assigned to the external road network. However, there was a reduction in the commercial/retail external trip generation since it is expected that such development will have a local neighbourhood focus. Additional details of the trip generation/distribution forecasting process are contained in the *Technical Appendix – Site Trip Generation and Trip Distribution.*

3.2 Site Trip Distribution

Two sets of future site trip distributions were developed for the *Triple T Lakefield South Subdivision*. The first was for the distribution of the residential traffic. The second was for distribution of the commercial/retail traffic. The percentage distributions of these future site traffic volumes were developed for five "*Gateways*" to the study area as follows:

- CR 29 (Bridge Street) *East Gateway* – travel to east and the traditional core area of the Village
- Clementi Street *North* Gateway – travel to the recreational, commercial, and residential areas to the north of the CR 29 corridor.
- *CR 18 Northwest Gateway* – travel to the west towards Bridgenorth and north along the Buckhorn Road (CR 23) including travel to Buckhorn and Bobcaygeon area.
- *7th Line West* Gateway – travel to areas west of the study area, the Centre Line and eastern Bridgenorth area.
- *CR 29 South Gateway* – travel to destinations along the corridor itself and the City of Peterborough.

While there are some other minor access points to the study area, as a worst case all traffic was assigned to the five principal *Gateways*. Data used to develop the trip distribution percentages were taken from the location of most likely destinations beyond the immediate study area and observed traffic flows in the study road network. The resulting trip distributions are summarized in the *Table 3* following:

Table 3 – Site Trip Distribution

	AM Peak Hour		PM Peak Hour	
Gateway	*Residential*	*Commercial*	*Residential*	*Commercial*
CR 29 (Bridge St) East	22%	0%	22%	0%
Clementi St North	2%	0%	2%	0%
CR 18 West	18%	0%	18%	50%
7th Line West	8%	100%	8%	0%
CR 29 (Lakefield Rd) South	50%	0%	50%	50%
Total	100%	100%	100%	100%

In reviewing *Table 3* it will be noted that all the commercial/retail traffic has been assigned to the 7th Line West Gateway. The rational for this "all-or-nothing" assignment is based on 3 reasons:

- The level of commercial/retail uses anticipated for the study site will generate little external traffic.
- Competing commercial/retail uses will be available along all travel corridors approaching the study site except the 7th Line West
- Assigning this traffic to the 7th Line/CR 29 intersection represents a worst case scenario for potential impact of the commercial traffic on adjacent intersections.

3.3 Study Traffic Zones

The proposed *Triple T Lakefield South Subdivision* is a relatively large development that will cover about half of the full *Lakefield South Planning Area*. To properly assign future site traffic to the access points (intersections) into the adjacent Township/County road network, the *Traffic Forecasting Model* (TFM) was structured to be sensitive to the amount, type and location of the various land uses within the development. This was done by dividing the new subdivision into 6 "*traffic zones*". Traffic from each of the zones was then assigned to routes through the new road corridors within the subdivision to the nearest municipal road. A sketch illustrating the location of the zones within the subdivision is contained in the *Technical Appendix – Site Trip Distribution and Trip Distribution*. This section of the *Appendix* also contains a representative diagram of the *Traffic Forecasting Model* with the individual *zone* "hook-ups".

Specific trip generation volumes for each peak hour period were then calculated for each of the 6 traffic zones. Applying the TFM, these individual zone volumes were then each assigned to the study road network and "gateways" based on the trip distribution percentages as listed in *Table 2*.

4. FUTURE CONDITIONS

4.1 Future Background Traffic

Future background traffic forecasts were developed for an 11 year planning horizon spanning 2018 to 2029. The 11 year planning horizon will allow for planning approvals, future growth in background traffic and ongoing build out of the new subdivision. It is recognized that this future buildout will likely occur over period that will extend beyond 2029. However, the assumed site full build out analyses used in this study will identify the principal improvements that will be required in adjacent road infrastructure. As future site development proceeds along with other development in the Lakefield community, there will be updates to this traffic study. These update studies will provide more detailed traffic information that will used as input to the future design of specific new road infrastructure at the time that it will need to be constructed.

Future background traffic has been assumed to grow at the rate of 2% per year (compounded) from 2018 to 2029. This 2% annual traffic growth rate is commonly applied to background traffic forecasts for traffic studies in the County of Peterborough. While it tends to overstate the historic overall growth rates in County, it is considered appropriate for use in these traffic studies. The 2% per year (compounded) traffic growth factor was applied to the 2018 weekday DHV (see *Exhibits 4* & 5) to forecast 2029 weekday AM and PM Background peak hour volumes. The background traffic forecasts for the study road network were completed using the TFM.

4.2 Assignment of Future Site Traffic

The next step in the forecasting process was to apply the traffic forecasting model (TFM) to assign the future site traffic volumes to the study road network. The site traffic volumes for each of the 6 traffic zones within the study site (see *Section 3.3*) were assigned individually to the road network using the trip distribution percentages listed in *Table 1* for each of the two land use categories.

Because the study road network has a basic grid structure, there are some potential route choices through the network that traffic could take to reach a given “Gateway”. As a worst case, all traffic from a specific zone was assigned via the shortest route through the local network to the nearest *Gateway*. Additional details of this assignment process are contained in the *Technical Appendix – Site Trip Generation and Trip Distribution* and study working papers.

4.3 Forecast Future Total Traffic

The 2029 total weekday AM and PM peak hour volumes for the study road network were computed by adding the new subdivision assigned traffic as described in *Section 4.2* to the 2029 background traffic. The resulting total peak hour volumes are illustrated in *Exhibit 5 - 2029 Total AM Peak Hour Volumes* and *Exhibit 6 - 2029 Total PM Peak Hour Volumes*. The exhibits illustrate the site traffic component of the total peak hour traffic in each movement at each of the study intersections.

4.4 The Impact of Future Traffic

Detailed intersection capacity analyses were carried out for each of the 7 study intersections for both the AM and PM peak hour (see *Exhibits 5 & 6).* The first step was to code the study road network into Trafficware's *Synchro 10* intersection analyses software. The parameters for each of the 5 existing intersections were coded into the *Synchro* network based on the existing intersection configurations, geometrics and control. The individual intersection turning movement volumes were taken directly from the TFM (see *Section 4.1 & 4.3*).

Three planning scenarios were analysed for the AM and PM peak hour periods:

- *2018 Design Hour Volumes*
- *2029 Background traffic volumes*
- *2029 Total traffic volumes.*

The three assignment scenarios allowed for a direct comparison of change in intersection performance over time. It also allowed for a detailed assessment of the impact of growth in background traffic and the impact of future site traffic.

The 5 existing intersections were analysed for the two peak hour periods for 3 planning scenarios for a total of 30 individual intersection evaluations. The results of the capacity analyses for current 2018, future 2029 Background traffic conditions and 2029 Total (site included) conditions are summarized in *Table 4* following. In reviewing this table it will be noted that all 5 of the existing study intersections are forecast to continue to operate at acceptable LoS during future 2029 background traffic conditions. There will be some residual capacity in all these intersections for additional growth in background traffic. However, with the addition of future site traffic, the critical intersection movements at the CR 29/7th Line and the CR 29/Water Tower Road intersections will operate at a poor LoS "F" with insufficient capacity to accommodate future traffic demand. Improvements will be required at these intersections. All other intersections are forecast to operate at acceptable LoS during 2029 Total traffic conditions. Detailed printouts from the *Synchro* analyses for each of the 30intersection evaluations are contained in the *Technical Appendix – Intersection Capacity Analyses.*

Table 4*: *Existing Intersections - Capacity Analyses Summaries

County Road 29 & The 7th Line						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(TWSC)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2018 DHV	WB LTR: **B/C** (14.3s)	0.09	0.3 veh	EB LTR: **B/C** (18.6s)	0.06	0.2 veh
2029 Backgrd Vol	WB LTR: **C** (17.2s)	0.14	0.5 veh	EB LTR: **C/D** (24.8s)	0.10	0.3 veh
2029 Total Vol	WB LTR: **F** (127.7s)	1.09	11.3 veh	WB LTR: F (318.7s)	1.48	12.8 veh

[A] - 95th Percentile Queue measured in vehicles

Table 4 Continued

County Road 29 & County Road 18						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(Signal)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2018 DHV	EB Lt: **B/C** (20.6s)	0.35	60.9 m	EB Lt: **B/C**(19.2s)	0.59	44.5 m
2029 Backgrd Vol	EB Lt: **C** (28.2s)	0.80	93.7 m	SB T: **C** (24.2s)	0.79	101.2 m
2029 Total Vol	EB Lt. **C** (31.5s)	0.83	99.4 m	SB T: **C** (29.1s)	0.85	111.4 m

[A] - 95th Percentile Queue measured in vehicles

County Road 29 & Water Tower Road						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(TWSC)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2018 DHV	*Low Minor Approach Vol*	NA	NA	*Low Minor Approach Vol*	NA	NA
2029 Backgrd Vol	*Low Minor Approach Vol*	NA	NA	*Low Minor Approach Vol*	NA	NA
2029 Total Vol	NB LTR **F** (396s)	1.674	15.7 veh	NB LTR: F (990s)	2.82	15.4 veh

[A] - 95th Percentile Queue measured in vehicles

County Road 29 & Clementi Street						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(Signal)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2018 DHV	NB Lt: **C** (30.2s)	0.32	18.8 m	NB Lt: **C** (28.5s)	0.25	15.2 m
2029 Backgrd Vol	NB Lt: **C** (31.9s)	0.39	22.4 m	NB Lt: **C** (29.9s)	0.31	18.1 m
2029 Total Vol	NB Lt: **C** (32.0s)	0.40	22.4 m	NB Lt: C (30.0s)	0.32	18.2 m

[A] - 95th Percentile Queue measured in metres

Clement Street & William Street						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(AWSC)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2018 DHV	SB LR: **A** (7.8s)	0.11	0.4 veh	EB LR: **A** (7.7s)	0.07	0.2 veh
2029 Backgrd Vol	SB LR: **A** (8.0s)	0.14	0.5 veh	EB LR: **A** (7.8s)	0.08	0.3 veh
2029 Total Vol	SB LR **A** (8.0s)	0.15	0.5 veh	EB LR: **A** (7.9s)	0.09	0.3 veh

[A] - 95th Percentile Queue measured in vehicles

5. FUTURE ROAD NETWORK IMPROVEMENTS

The intersection capacity analyses described in *Section 4* clearly identified the intersections that will require improvements to support full build out of the new subdivision. *Section 5* evaluates the operations of future new intersections and recommended improvements to existing intersections and road corridors.

5.1 Future New Subdivision Intersections

Two new intersections were included in the study analyses. The first was the South Collector Road intersection with the 7th Line. This intersection will be the main south entrance to the new subdivision. The second intersection was the intersection of the new North Collector Road with the extension of the existing Water Tower Road (see *Exhibits 2 &3*). This intersection was included as a representative surrogate for all the new internal intersections within the subdivision. Based on the capacity analyses (see *Section 4)*, these intersections, constructed to current County/Township standards, with single lane approaches and TWSC will operate at a good LoS during 2029 peak periods of travel demand. A summary of the capacity analyses for these future intersections is included in *Table 5* following:

Table 5*: *Future Subdivision Intersections - Capacity Analyses Summaries

Water Tower Road & North Collector						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(TWSC)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2029 Total Vol	EB LTR: **A/B** (9.4s)	0.04	0.1 veh	EB LTR: **A/B** (9.9s)	0.03	0.1 veh

[A] - 95th Percentile Queue measured in vehicles

7th Line & South Collector						
Control	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
(TWSC)	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
2029 Total Vol	SB LR: **A/B** (9.4s)	0.21	0.8 veh	SB LR: **C** (17.8s)	0.34	1.5 veh

[A] - 95th Percentile Queue measured in vehicles

Additional information on the forecast operations of these new intersections is contained in the detailed printouts from the *Synchro* analyses contained in the *Technical Appendix – Intersection Capacity Analyses.*

Because of the low approach and/or departure volumes at these intersections no auxiliary turning lanes will be required to support intersection turning movements.

5.2 The Intersection of County Road 29 & 7th Line

This intersection with its existing TWSC will not have sufficient capacity to accommodate 2029 total peak travel demand. The intersection was initially tested with All-Ways Stop Control (AWSC) and existing geometrics. It was found that upgrading the intersection control to AWSC will not provide sufficient future capacity. The capacity analyses results

for this scenario are summarized in *Table 6A* below. Using AWSC will create long delays for the northbound traffic stream on CR 29 during the PM peak hour.

A signal warrant analysis was then computed for the intersection based on *Transportation Association of Canada* (TAC) signal warrant procedures. Based on 6 hours of peak demand during 2029 total traffic conditions, there will be warrant for a signal at this intersection. A copy of the signal warrant sheet for this analysis is included in the *Technical Appendix – Signal Warrant Analyses*. HCM capacity analyses were then carried out for a future signalized CR 29/7th Line intersection. The results of the AWSC analysis and the signal analysis are summarized in *Table 6A* following:

Table 6A*: *Future Improved CR 29/7th LIne Intersection - Capacity Analyses Summaries

County Road 29 & 7th Line						
Future 2029 Total	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
Peak Hour Volume	**LoS (Delay)**	**Vol/Cap**	**Queue**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
AWSC	SB LTR **E** (43.7s)	0.91	11.6 veh	NB LTR: F (141.3s)	1.24	27.6 veh
Signals	WB LTR: **D** (52.1s)	0.85	74.7 m	WB LTR: D (40.5s)	0.72	43.2 m

A left turn lane warrant analysis was carried for 2018 DHV for this intersection with its present TWSC. It was found that during the current PM peak hour the DHV volumes fall on the warrant line for a left turn lane. Any increase in PM peak period volumes in the CR 29 corridor will likely drive a warrant for a southbound left turn lane. A copy of the warrant analysis sheet is included in the *Technical Appendix – Auxiliary Lane Warrant Analyses*.

There are about 200 vph northbound right turns on CR 29 forecasted to travel to the 7th Line during the 2029 PM peak hour. Based on a signalized intersection, this northbound movement is forecasted to operate at LoS "B". However, the 95th percentile northbound queue is forecasted to exceed 160 m. The future signalized intersection may have to be supported with a northbound right turn lane.

Future southbound left turning volumes from CR 29 to the 7th Line are forecasted to be relatively low at 39 vph (see *Exhibits* 5 & 6). Northbound left turn volumes are forecasted to be even lower at less than 5 vph. There may be no requirement for left turn lanes on CR 29. A detailed traffic analysis of the intersection should be carried out at the time of signals installation to define specific signal infrastructure, signal timing and to confirm what geometric improvements will be required.

5.3 The Intersection of County Road 29 (Bridge Street) & Water Tower Road

This intersection with its existing TWSC will not have sufficient capacity to accommodate 2029 peak travel demand. This intersection was also tested with AWSC and existing geometrics. The results are summarized in *Table 6B.* Reviewing the table, it can be

seen that converting to AWSC will not provide sufficient future capacity. The AWSC will create long delays in the CR 29 westbound traffic stream during the PM peak hour.

A signal warrant analysis was carried out applying the TAC warrant procedures. Based on 2029 total traffic conditions there will be a warrant for a signal at this intersection. A copy of the warrant analysis sheet is included in the *Technical Appendix – Signal Warrant Analyses.* An existing continuous Two Way Left Turn Lane (TWLTL) is presently available on this section of CR 29. It will accommodate future left-turning vehicles. There is a 55 m right turn taper on the CR 29 west approach to the intersection. This taper will accommodate eastbound right-turning vehicles accessing Water Tower Road. Based on the 2019 analyses the intersection will require only signalization with its supporting infrastructure. However, a detailed traffic analysis of the intersection should be carried out at the time of signals installation to define specific signal infrastructure, signal timing and to confirm that current geometrics will be sufficient.

*Table 6B b*elow summarizes the capacity analyses for 2029 total peak hour conditions for both AWSC control and signalized control.

Table 6B*: *Future Improved CR 29/Water Tower Rd Intersection - Capacity Analyses Summaries

County Road 29 & Water Tower Road						
Future 2029 Total	**Weekday AM Peak Hour – Critical Movement**			**Weekday PM Peak Hour – Critical Movement**		
Peak Hour Volume	**LoS (Delay)**	**Vol/Cap**	**Queue**	**LoS (Delay)**	**Vol/Cap**	**Queue[A]**
AWSC	EB TR: **F** (224.6s)	1.47	37.1 veh	WB TR: **F** (332.2s)	1.79	52.9 veh
Signals	NB LTR: **D** (47.8s)	0.81	56.4 m	NB LTR: C (34.3s)	0.65	32.4 m

5.4 Future Road Corridor Improvements

5.4.1 *New Subdivision Roads*

A logical set of new collector roads within the subdivision road network will provide for good connectivity to the external road network. The subdivision road network should be built with a core collector road framework. These collector roads by definition will carry a mix of “through” traffic traveling to the adjacent County/Municipal road network as well as traffic accessing adjacent local properties. The collector roads will also provide for efficient EMS access, potential future transit services as well connectivity for community active transportation links. They will aid in minimizing “through” traffic on streets that are intended to provide only local access. The new subdivision internal roads and intersections as illustrated in *Exhibit 2* should be designed to current Township/TAC standards for suburban residential local and collector roads.

Based on the study analyses, as illustrated in *Exhibit 2*, three new collector roads are proposed for the study subdivision: They are:

- The extension of *Water Tower Road* south into the new development
- A *North Collector Road* that will provide east/west access to the more northerly development in the subdivision. It will connect both to Water Tower Road and the Murray Street/William Street corridor. It will also provide for a potential extension easterly into future development in the eastern portions of the *Lakefield South* development area
- A *South Collector Road* that will provide for east/west connectivity in the southern portion of the development. It will connect with Water Tower Road for travel to the north and the 7th Line to the south providing access to the CR 29 corridor.

Auxiliary Lane Warrant evaluations were carried out to assess the need for auxiliary turning lanes at the new subdivision intersections. No warrants were found for these intersections based on forecasted 2029 total peak hour traffic volumes. These warrant evaluations are summarized in the *Technical Appendix –Auxiliary Lane Warrant Analyses*.

5.4.2 *County Road 29*

The traffic study analyses for CR 29 were based on a rural arterial corridor operating as a two-lane (single lane in each direction) highway. Based on Tranplan Associates October, 2018 traffic counts in the vicinity of the 7th Line, CR 29 is estimated to be carrying about 7,000 to 8,000 vehicles per day (vpd). Applying the growth assumptions used in the study analyses, this section of CR 29 will be carrying an estimated 2029 Total daily volume of about 10,000 vpd. This is still generally considered within the capacity of a two lane rural highway. Therefore, no particular "corridor" capacity improvements will be required for this section of CR 29 extending north to CR 18.

East of CR 18, within the Village, CR 29 will be carrying combined traffic volumes travelling to/from Lakefield from both the CR 18 and CR 29 corridors. East of CR 18, CR 29 has a three lane cross-section with a centre Two-Way Left Turn Lane (TWLTL). By 2029, this section of CR 29 is forecast to be carrying daily volumes of about 15,000 vpd. There are 2-lane roads in the County road network presently carrying these volumes under peak conditions. The present 3 lane cross-section eliminates left turns from the through travel lanes. This will assist in preserving "through" capacity in this section of CR 29. It is expected that any future expansion of this section of CR 29 will be addressed as part of the planned update to the current County *Transportation Master Plan* (TMP).

5.4.3 *The 7th Line*

The 7th Line presently functions as a two lane rural local road providing access to rural residential homes along the corridor as well as properties along the west side of the

Otonabee River. It is expected that the road platform/cross-section will have to be brought up to current Township standards for a two Lane (one lane each way) rural collector road. In support of the *Lakefield South Subdivision*, this improvement should run from CR 29 east to the new intersection with the South Collector Road. The improvement to this section of the 7th Line will not be required until the South Collector Road is connected to the 7th Line.

5.4.4 *The Clementi/William/Murray Street Corridor*

The study analyses have shown that the Clementi/William/Murray corridors, with their existing geometrics and cross-sections will support future forecast 2029 total traffic volumes. Future site traffic will not drive the need for any improvements to these corridors.

5.5 Future Plans for Active Transportation Links

The County of Peterborough's *Active Transportation Master Plan* (ATMP) stated goal is to promote the County as a healthy, prosperous and sustainable community. Active Transportation is a key component of a safe, accessible, integrated transportation system linking community centres where residents live, work and play. The purpose of the ATMP is to identify policy, programs, and projects that promote safe, non-motorized forms for travel throughout the County of Peterborough.

Historically *Triple T* developments have made use of walkways, and green trails to support traditional sidewalks in providing non-auto community connectivity as well as access to adjacent greenspace areas. These trails provide inviting pedestrian routes to activity centres within the development. This planning approach to non-auto travel will continue within the new *Lakefield South Subdivision*. It will support active transportation links within the subdivision as well as providing connectivity to adjacent municipal non-auto facilities. These links will include:

- Sidewalks as part of the street-scape along all collector roads in the subdivision.
- Along local streets residences will be provided with pathways and green trails along the rear of the lots. These pathways will provide connectivity to the main sidewalk system along the collector roads.
- Sidewalk connections to the north along Water Tower Road to connect to the existing sidewalk along the south side of CR 29. This will provide a direct pedestrian route to retail/commercial development along CR 29 as well as accommodating school trips to *Lakefield Elementary School.*
- Sidewalk connections to Murray Street that will provide pedestrian connectivity to the traditional core of the Village
- Marked bikeways to the 7th Line that in turn will link to the County bikeway along the 7th Line to areas around the Village of Bridgenorth
- Marked bikeways to the east to the Clementi corridor and CR 29 to connect to *Rotary Greenway Trail* links within the Village.

Local transit service is not presently available in Lakefield. However, the proposed collector road network within the *Lakefield South Subdivision* will provide a framework for logical routing options for such a service when it becomes available.

The mix of land uses planned for the *Triple T Lakefield South Subdivision* (see *Exhibit 2*) will encourage internal trip-making within the subdivision itself. The new residential areas will be served by neighbourhood retail/commercial facilities and greenspace areas. The street layout with supporting pedestrian and multi-use trails along with the planned recreational facilities will encourage non-auto travel within the new community.

6. OTHER PLANNING CONSIDERATIONS

The planned road network for a development on the scale of the *Lakefield South Subdivision* will have broader transportation implications for the future planning of adjacent road corridors and active transportation infrastructure. Some of these additional considerations related to development of this new subdivision are described in this *Section* following.

6.1 Future Development in the Eastern Lands

The planned *Triple T Lakefield South Subdivision* will be located on the western portion of the lands available for future development in this part of *South Lakefield*. It is expected that in the longer term, lands to the east will also be developed with similar land uses. Connectivity between the eastern and western components of *Lakefield South* will be provided by the North Collector Road as illustrated in *Exhibits 2 & 3*. An optional eastern extension to this road is illustrated in the exhibit. At this point all that is required in developing plans for the *Lakefield South Subdivision* is that an appropriate ROW be preserved at the current eastern boundary of North Collector Road. This will maintain the option to provide for future connectivity to lands to the east.

6.2 A New East/West Collector Road Connection to CR 29

The original transportation study for the *Lakefield South Secondary Plan* was completed by *Dillion Consulting Limited* in 2003[3]. The study report proposed an east/west collector road through the Lakefield South lands that would terminate in a "T" intersection with CR 29. This new intersection would be located partway between the 7th Line and CR 18. A copy of this proposed collector alignment taken from the 2003 study report is illustrated in *Exhibit 7*.

The *TTT Lakefield South Subdivision* will be primarily a residential development. The residential nature of the development and the planned internal road network will not require a mid-level collector road passing through the new subdivision between the North and South collector roads. During initial meetings with the County and Township, it was agreed, that based on study traffic analyses, if the 7th Line/CR 29 intersection could not provide sufficient future capacity then a mid-level East/West collector road connecting to CR 29 would be considered for inclusion in the new road network.

Subsequently, the study analyses determined that the 7th Line/CR 29 intersection can be developed to provide good access to the *Lakefield South* study area. If such a mid-level east/west collector road were constructed, it would require a new intersection to be inserted into the CR 29 corridor that would likely have to be signalized. Furthermore, this new intersection would probably be limited to a "T" configuration because of environmental constraints on the west side of the CR 29. Since there is no forecast east/west capacity shortfall in the proposed road network, the new connection to CR 29 as illustrated the 2003 traffic study will not be required.

[3] Lakefield South Development Area Traffic Impact Study Draft Final Report, June, 2003 completed by Dillon Consulting Limited.

6.3 A Future Otonabee River Bridge Crossing

There is presently only a single two lane bridge crossing over the Otonabee River/Trent Canal at Lakefield on CR 29 (Bridge Street). The closest alternative crossing is the Nassau Mills Road Bridge near Trent University. This crossing also has only 2 lanes. The need for additional new crossing capacity on the south side of Lakefield has been considered in the current County TMP. The conclusion in the current TMP is that a bridge crossing will be required sometime in a post-2031 period. It is expected that this need will be reviewed in the next revision to the TMP. While this future bridge crossing does not directly impact the *Lakefield South Subdivision*, it will affect adjacent road corridors.

There will be many constraints and trade-offs in selecting the exact location for the future bridge. However, what is of importance to *Lakefield South* is the routing of the west arterial road connecting to the west side of the bridge. Based on the transportation analyses completed for the *Lakefield South Subdivision*, the 7th Line corridor is a primary candidate to be developed as the principal travel corridor to connect to the west side of the new bridge. It is expected that the eastern end of the 7th Line corridor would be re-aligned to provide this connection through the eastern component of the *Lakefield South* lands. A detailed assessment of a 7th Line routing is beyond the scope of this traffic study. However, it is clear from the analyses completed for this traffic study that the 7th Line corridor should be considered for the future west connection to the bridge. Such a route would have the following advantages:

- The 7th Line is an established east/west travel corridor
- It connects to CR 29 through an existing intersection
- The 7th Line is a continuous corridor that runs westerly to the Bridgenorth community
- A 7th Line intersection with CR 23 (Buckhorn Road) would likely encourage traffic travelling on CR 23 to/from the north, to go directly to the 7th Line. This should reduce traffic travelling to/from the east that now passes through the present CR 18/CR29 intersection and then via the CR 29 (Bridge Street) river crossing through the core area of Lakefield.
- The 7th Line west to Bridgenorth is part of the County's *Active Transportation* network. This 7th Line routed combined with a new bridge crossing would provide a direct link to the *Rotary Greenway/Lakefield Trail* along the east side of the Otonabee River.

Based on these considerations sufficient ROW should be protected along the 7th Line corridor and at the 7th Line/CR 29 intersection to provide the space required to develop a future east/west arterial road that will eventually connect to a new bridge crossing over the Otonabee River.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Study Conclusions

The new *Lakefield South Subdivision* is planned to contain approximately 977 residential units based on the current preliminary site plan. These 977 units will be combined with some potential neighbourhood retail and commercial development. The overall layout of the subdivision and its access are illustrated in *Exhibit 2.* In support of this new residential development, the traffic study analyses described in this report have provided a detailed examination of the anticipated impacts of future background and site-generated traffic. The following conclusions have been drawn from the study field observations, background data sources and the study traffic analyses. They are as follows:

- The proposed subdivision road network as illustrated in *Exhibits 2 & 3* will provide good access to development throughout the subdivision. The planned collector road network will provide good connectivity for local streets providing them with logical routes to adjacent municipal roads.
- The current study road network has residual capacity that will accommodate some initial development in the new *Lakefield South Subdivision*. Utilization of this residual road capacity will be developed as part of the detailed planning for the first phase of site development.
- The following existing intersections will support future 2029 total traffic at full build out of the *Lakefield South Subdivision*:
  - The County Road 18 and County Road 29 signalized intersection
  - The County Road 29 (Bridge Street)/Clementi Street signalized intersection
  - The Clementi Street/William Street intersection (AWSC)
- As the subdivision builds out, two existing intersections will require future signalization to accommodate forecasted 2029 total peak hour volumes. The intersections are:
  - County Road 29/7th Line intersection
  - The County Road 29 (Bridge Street)/Water Tower Road
- Timing of these two signalizations will depend on the phasing and rate of development within the new subdivision.
- The new South Collector Road intersection with the 7th Line constructed with single lane approaches and STOP control on the minor approach will accommodate future 2029 total peak period traffic demand. No auxiliary turning lanes will be required at this intersection.
- New subdivision collector road and local road intersections with single lane approaches, and STOP control on the minor approaches will accommodate future internal traffic volumes within the new subdivision. These intersections will not require auxiliary turning lanes
- A new mid-level east/west collector road described in the 2003 *Dillon* report that would connect CR 29 to the new subdivision *will not be required*. The present 7th

Line corridor will provide sufficient road capacity to accommodate the new subdivision and future (2029) background traffic.

- The mix of residential and local retail/commercial uses combined with planned greenspace supported with sidewalks and appropriate pedestrian/multiuse linkages will encourage non-auto travel within the new development.

7.2 Study Recommendations

The study recommendations have been developed based on detailed traffic forecasts, analyses of future intersection operations, signal warrant analyses and the auxiliary lane warrant evaluations that have been completed for this study. The study recommendations are as follows:

- Some initial site development can commence utilizing available residual capacity in the existing road network. The scale of this development will be defined by the amount of residual road capacity available at the time of initial construction.
- The 7th Line/CR 29 and the CR 29 (Bridge Street)/Water Tower Road intersections will require signalization to support full development of the *Lakefield South Subdivision.* The timing, design and construction of these intersection improvements will be determined as part of the subdivision staging/phasing analyses and the growth in external background traffic.
- Some intersection geometric improvements will likely be required to support the signalization of the CR 29/7th Line. More detailed intersection operational analyses should be carried out at the time plans for the installation of the signals are implemented.
- Improvements to the CR 29/Water Tower Road intersection will likely be required to support signalization. Some improvements may be required at the commercial entrance that forms the north approach to the intersection. A traffic operational review of the intersection at the time of signalization will define/confirm any improvements that maybe required.
- In the later stages of subdivision development the South Collector Road will be connected to the 7th Line. At that time the present 7th Line road platform should be re-constructed to meet current Township standards for a suburban collector/arterial road. This improvement will be required from the South Collector Road intersection, westerly to CR 29.
- Internal subdivision roads and intersections should be constructed to current Township of Selwyn standards for suburban local and collector roads. Current TAC standards[4] can be used as guide to the design of these roads and intersections.
- Internal subdivision collector road cross-sections should include sidewalks. Appropriate bikeways and walkways should connect the residential areas to greenspace and County cycling lanes. Given the proximity of the *Lakefield South*

[4] See *Geometric Design Guide for Canadian Roads,* TAC publication June, 2017.

Subdivision to adjacent schools and Village of Lakefield destinations, these multiuse linkages will encourage non-auto travel within the new development.

7.3 Phasing Future Development

It is expected that development of the subdivision will take place over time and that this development will be constructed in logical components or phases. The staging of this development will depend on a number of considerations including market demands, available existing municipal infrastructure as well as other related planning and development considerations. An initial phase of development constructed along the north end of the Water Tower Road is a potential starting point. Not only is this an existing road with virtually no development, it is also in close proximity to *Lakefield Elementary School* as well as retail and commercial uses located along the adjacent section of CR 29 (Bridge Street).

In support of the development of each phase of the subdivision it is expected that the 2019 traffic study analyses will be updated. These updates will account for growth in background traffic, other new development along the CR 29 corridor and any other future development that might take place in the adjacent *Lakefield South* lands. As described above, the timing of these future traffic studies will depend primarily on the future rate of subdivision build out.

7.4 Summary

In summary, the proposed road network as illustrated in *Exhibits 2 & 3*, combined with the proposed road network improvements will provide good overall access to the new *Triple T Lakefield South Subdivision*. The proposed roads and intersections as described in this report, designed to current County and Township standards will provide safe and efficient access for the new residents and businesses that will locate in the *Lakefield South Subdivision.*

Tranplan Associates is pleased to have the opportunity to work with the *Triple T* study team to prepare this traffic report. Additional background information on the study process is available in study working papers. Such information, upon client approval can be supplied upon request.

REPORT EXHIBITS

Exhibit 1
Key Map

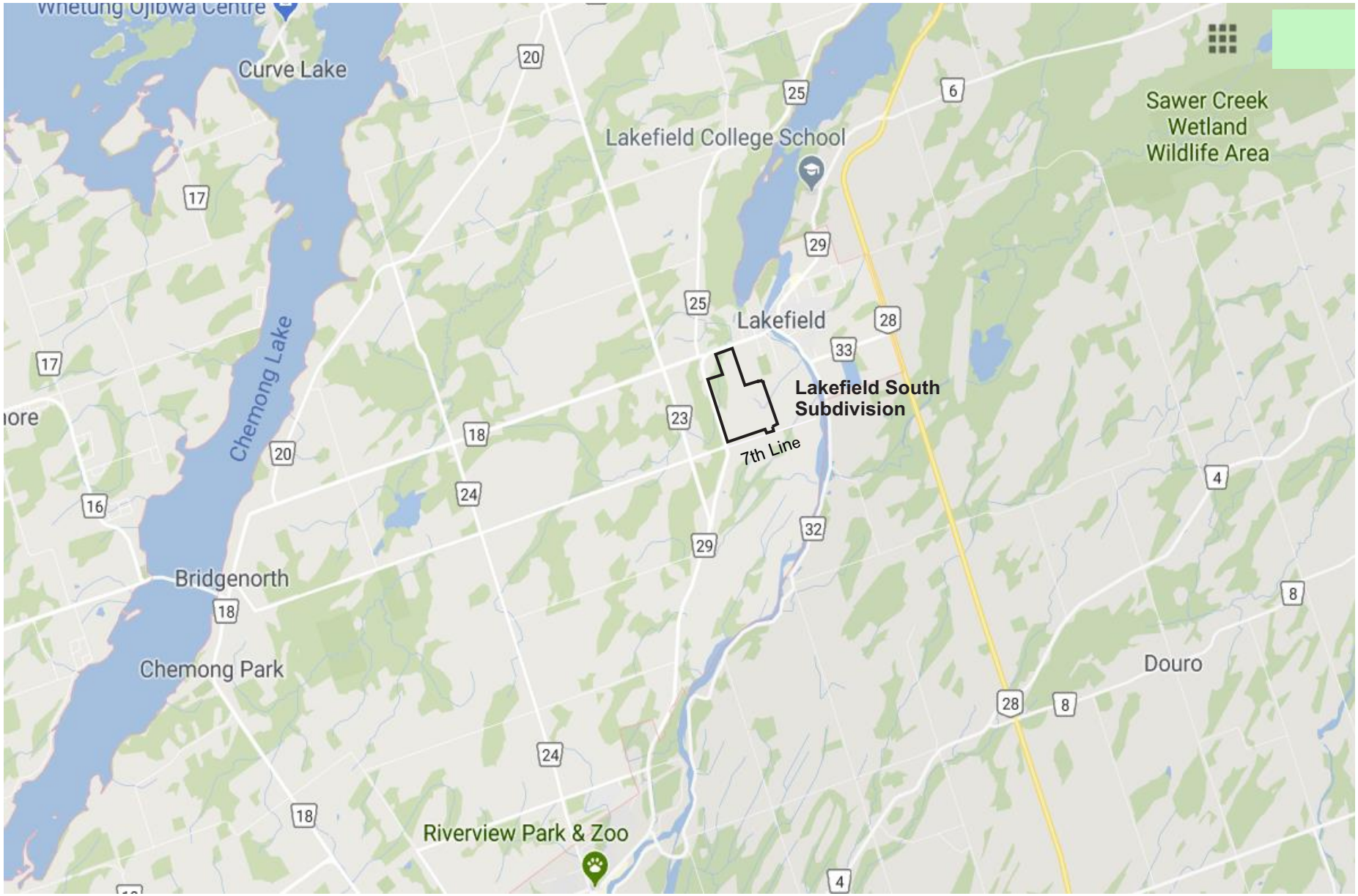
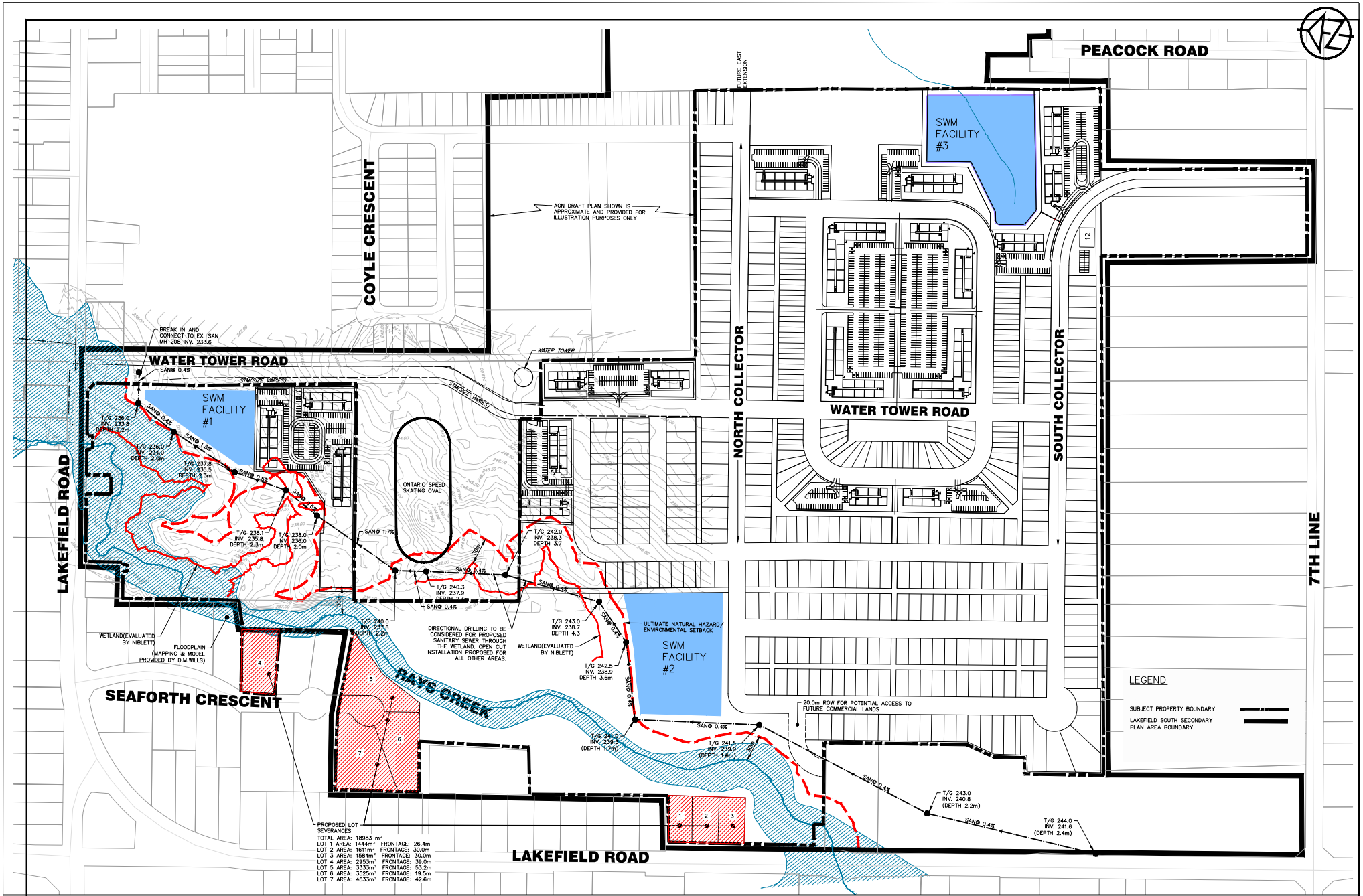


Exhibit 2
Preliminary Site Plan



LEGEND

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

TBM INFORMATION

NO.	REVISIONS	DATE	INITIAL

APPROVED

FOR DISCUSSION PURPOSES

3358 LAKEFIELD ROAD
COUNTY OF PETERBOROUGH

CONCEPTUAL SITE PLAN

TATHAM ENGINEERING

SCALE: 1:2000		JOB NO.	517651
DESIGN: JA/HY	CHECKED: JA	DWG.	SP-1
DRAWN: HY	DATE: JUNE, 2019		

Exhibit 3
Site Access Context

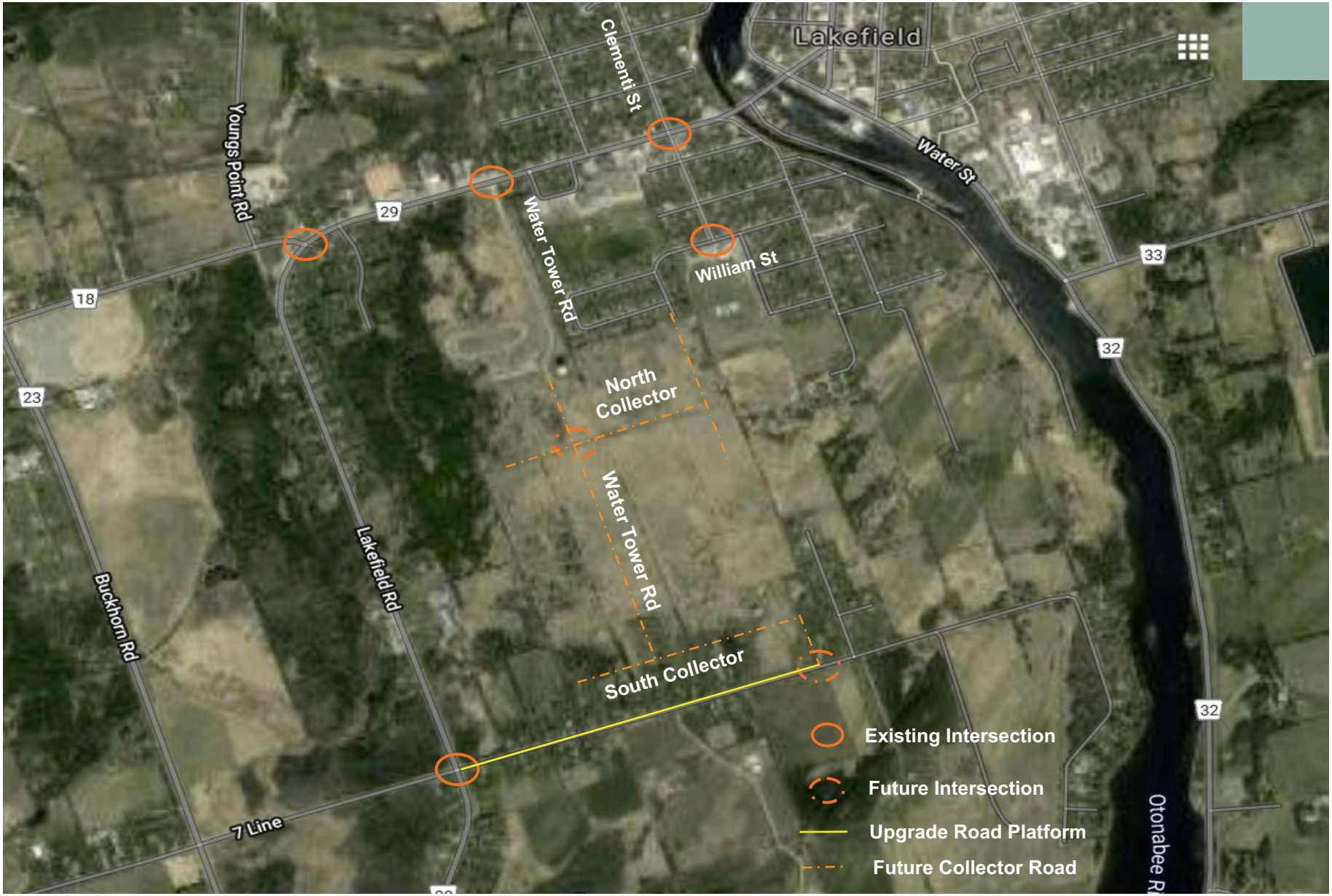


Exhibit 4
2018 Design Hour Volumes

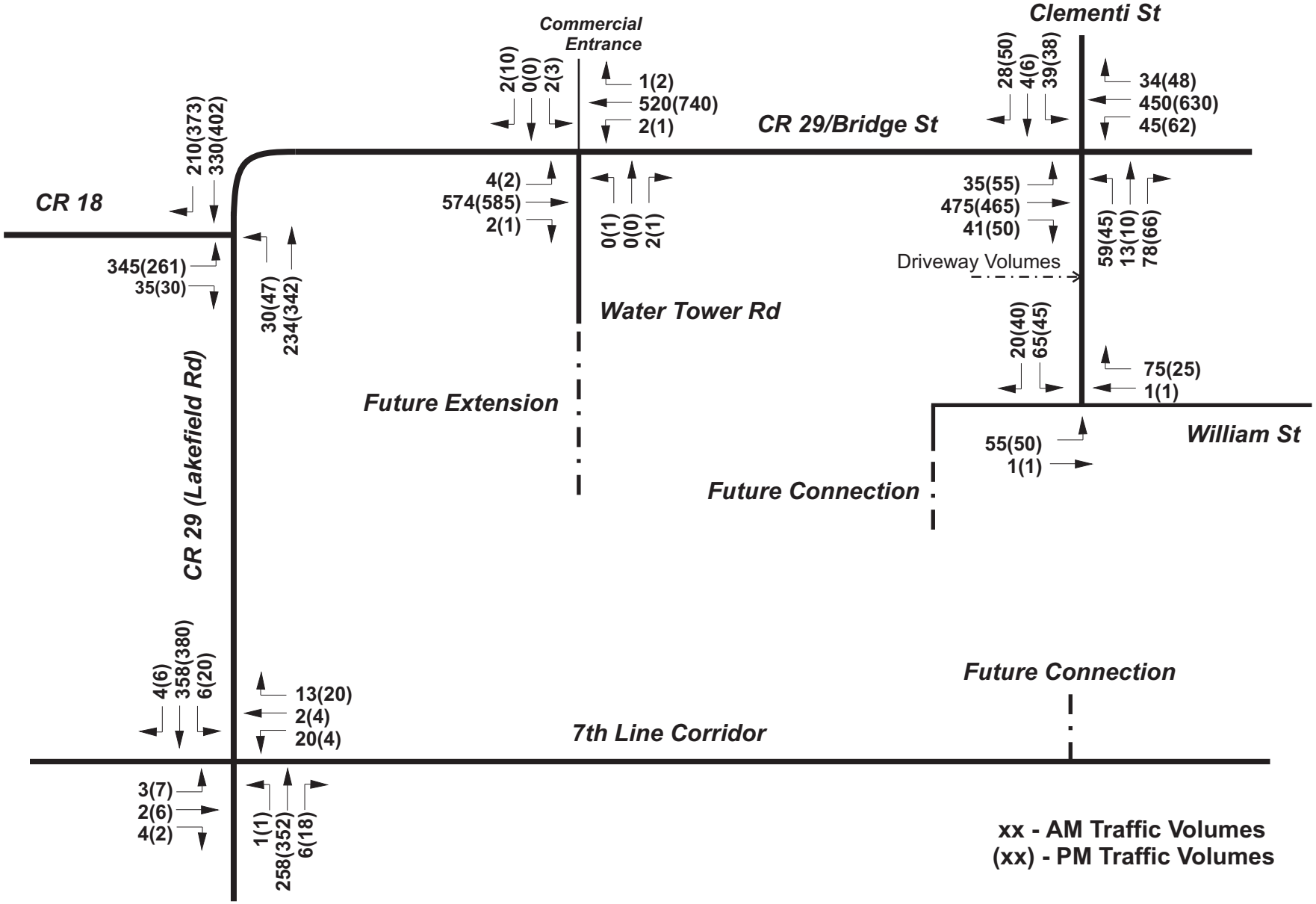


Exhibit 5
2029 Total AM Peak Hr Volumes

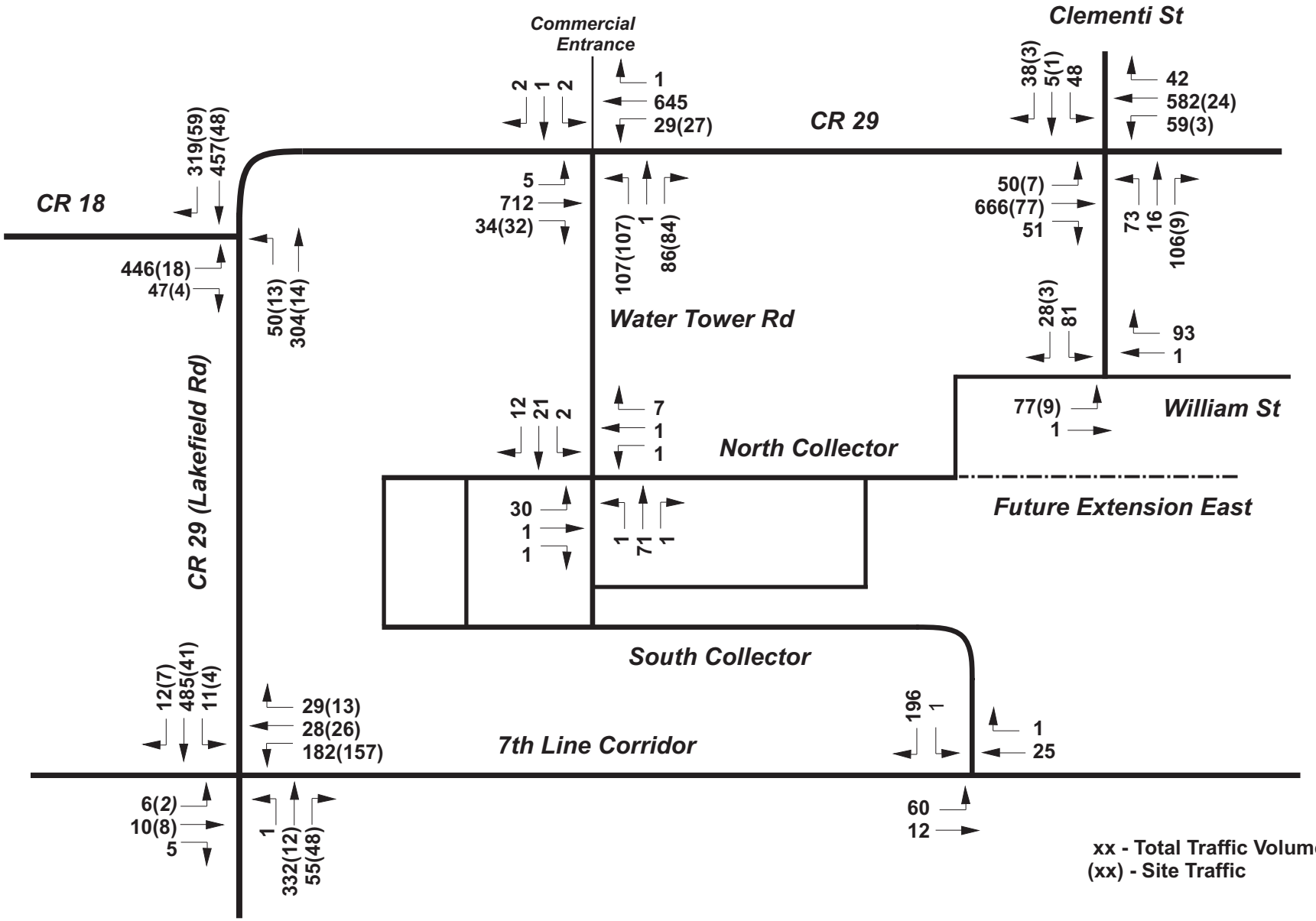


Exhibit 6
2029 Total PM Peak Hr Volumes

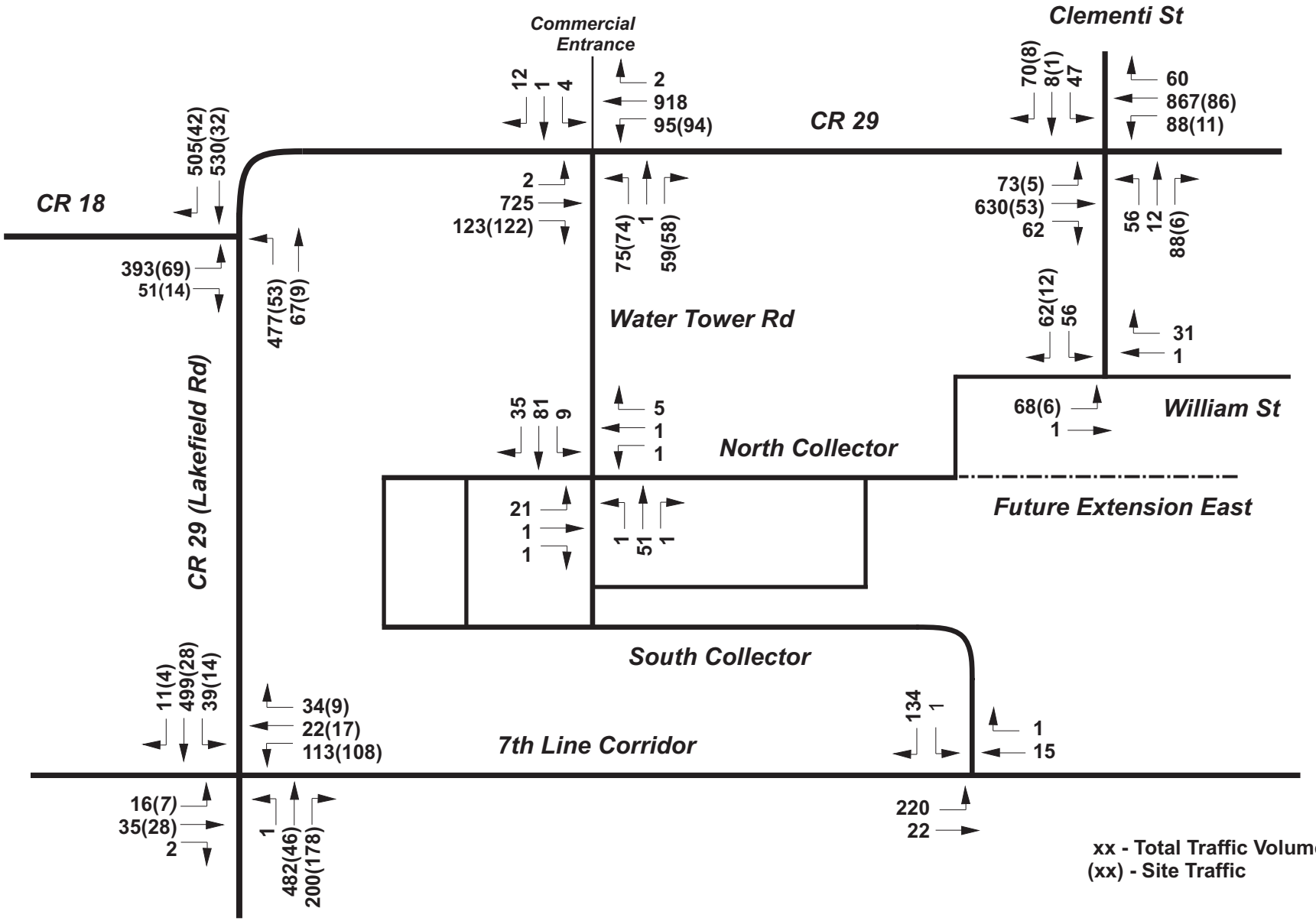
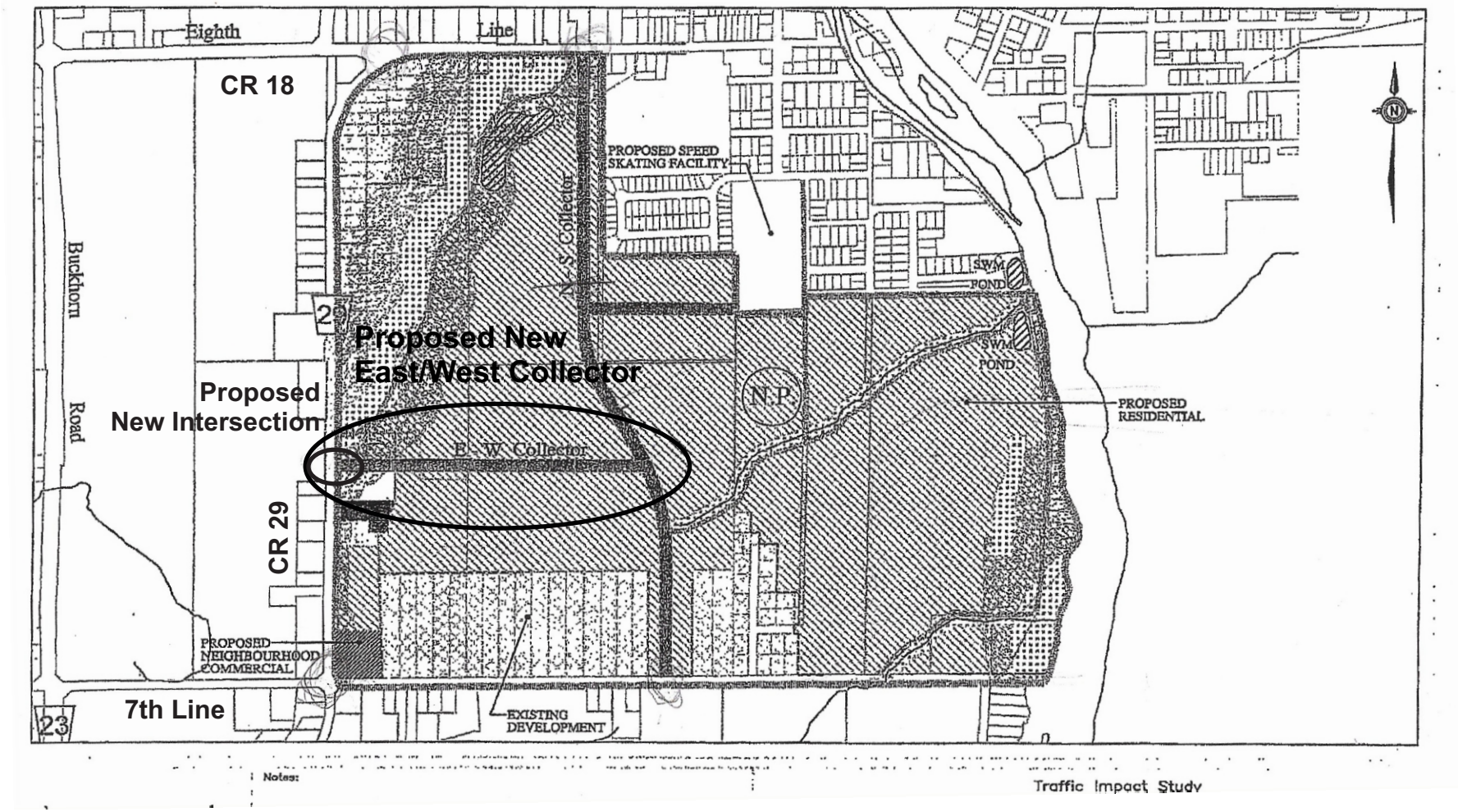


Exhibit 7
2003 Study Road Network
Dillion Consulting Ltd.



TECHNICAL APPENDIX

Intersection Capacity Analyses

DEFINITION OF LEVELS OF SERVICE
Automobile Mode

UNSIGNALIZED INTERSECTIONS

Analysis of the Level of Service for unsignalized intersections is based on the ***Highway Capacity Manual*** *(HCM 2010)* procedures using current software for unsignalized intersections. The Level of Service for intersections is based on *Control Delay*. At two way stop controlled intersections (TWSC), *Control Delay* is the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The *Control Delay* includes the time required to decelerate to a stop and to accelerate to the free-flow speed.

The analysis of individual movements at TWSC intersections can also include the estimate of the ratio of volume or demand to available capacity for the movements. This is commonly know as the (v/c) ratio. The v/c ratio provides some indication of how well these individual intersection movements will function during peak hour periods.

Level of Service definitions for unsignalized intersections as defined by the ***Highway Capacity Manual*** are summarized in the table below.

Definition of Level of Service for Unsignalized Intersections
(see Exhibit 19-1, Highway Capacity Manual 2010)

Level of Service	Average Delay (seconds)
A	0 - 10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	More than 50s and/or v/c > 1

Level of Service (LoS) for a TWSC intersection is determined by the computed or measured *Control Delay* and is defined for each minor movement at the intersection. LoS is not defined for the major street approaches or the intersection as a whole. LoS "F" is considered to be undesirable for design or planning purposes. However, many individual turning movements at TWSC intersections and commercial entrances along urban arterial corridors operate at LoS "F" during peak hour periods.

DEFINITION OF LEVELS OF SERVICE
Automobile Mode

UNSIGNALIZED INTERSECTIONS
(All-Way Stop Control)

Analysis of the Level of Service for unsignalized intersections is based on the ***Highway Capacity Manual*** *(HCM 2010)* procedures using current software for unsignalized intersections. The Level of Service for intersections is based on *Control Delay*. At an All-Way Stop Controlled intersections (AWSC), *Control Delay* is the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The *Control Delay* also includes the time required to decelerate from a stop and to accelerate to the free-flow speed.

The analysis of individual movements at AWSC intersections can also include the estimate of the ratio of volume or demand to available capacity for the movements. This is commonly know as the (v/c) ratio. The v/c ratio provides some indication of how well these individual intersection movements will function during peak hour periods.

Level of Service definitions for unsignalized intersections as defined by the ***Highway Capacity Manual*** are summarized in the table below.

Definition of Level of Service for Unsignalized Intersections
(see Exhibit 20-2, Highway Capacity Manual 2010)

Level of Service	Average Delay (seconds)
A	0 - 10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	More than 50s and/or v/c > 1

Level of Service (LoS) for a AWSC intersection is determined by the computed or measured *Control Delay* and is defined for each minor movement at the intersection. LoS “F” is considered to be undesirable for design or planning purposes. However, many individual turning movements at AWSC intersections and commercial entrances along urban arterial corridors operate at LoS “F” during peak hour periods.

DEFINITION OF LEVELS OF SERVICE
Automobile Mode

SIGNALIZED INTERSECTIONS

Analysis of the Level of Service for signalized intersections is based on the ***Highway Capacity Manual*** *(HCM 2010)* procedures using current software for signalized intersections. The Level of Service for intersections is based on *Control Delay* and *Volume to Capacity Ration (v/c)*. At signalized intersections, *Control Delay* is the total delay attributed to traffic signal operation at a signalized intersection. *Control Delay* includes initial deceleration delay, queue move-up time, stopped delay and final acceleration delay. The analysis of individual movements at signalized intersections also includes the ratio of volume or demand to available capacity for the movements. This is commonly know as the (v/c) ratio. The v/c ratio provides some indication of how well these individual intersection movements will function during peak hour periods.

Level of Service definitions for signalized intersections as defined by the ***Highway Capacity Manual*** are summarized in the table below.

Definition of Level of Service for Signalized Intersections

Level of Service	Average Delay (seconds)	Volume/Capacity Ratio > 1.0*
A	Less than 10	F
B	>10 - 20	F
C	>20 - 35	F
D	>35 - 55	F
E	>55 - 80	F
F	More than 80	F

* *Note: For approach-based and intersectionwide assessments, LoS is determined solelyby Control Delay HCM 2010 Manual, Exhibit 18-4.*

Level of Service (LoS) for a signalized intersection is determined by the computed or measured *Control Delay* and is defined for each lane/movement at the intersection. LoS is also defined for the intersection as a whole. LoS “F” is considered to be undesirable for design or planning purposes with LoS “E” the upper limit of acceptable service. However, many individual turning movements at signalized intersections along urban arterial corridors in larger urban areas operate at LoS “E” and “F” during peak hour periods.

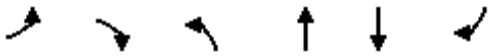
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	3	2	4	20	2	13	1	258	6	6	358	4
Future Vol, veh/h	3	2	4	20	2	13	1	258	6	6	358	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	3	2	4	22	2	14	1	280	7	7	389	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	699	694	391	694	693	284	393	0	0	287	0	0
Stage 1	405	405	-	286	286	-	-	-	-	-	-	-
Stage 2	294	289	-	408	407	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	344	356	640	347	357	736	1098	-	-	1204	-	-
Stage 1	607	585	-	704	661	-	-	-	-	-	-	-
Stage 2	697	659	-	605	584	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	334	353	640	341	354	736	1098	-	-	1204	-	-
Mov Cap-2 Maneuver	334	353	-	341	354	-	-	-	-	-	-	-
Stage 1	606	581	-	703	660	-	-	-	-	-	-	-
Stage 2	681	658	-	594	580	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.5	14.3	0	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1098	-	-	431	427	1204	-	-
HCM Lane V/C Ratio	0.001	-	-	0.023	0.089	0.005	-	-
HCM Control Delay (s)	8.3	0	-	13.5	14.3	8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0	-	-

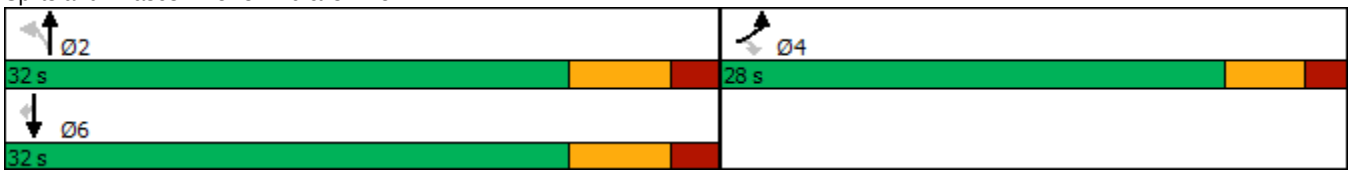


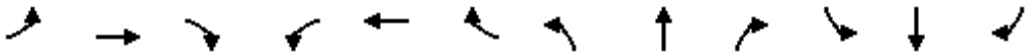
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	345	35	30	234	330	210
Future Volume (vph)	345	35	30	234	330	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.98			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.541			
Satd. Flow (perm)	1488	1292	875	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		38				228
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	375	38	33	254	359	228
Shared Lane Traffic (%)						
Lane Group Flow (vph)	375	38	33	254	359	228
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	22.5	22.5	25.2	25.2	25.2	25.2
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	5	5	5	5	5	5
Act Effct Green (s)	15.7	15.7	15.8	15.8	15.8	15.8

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.35	0.35	0.36	0.36	0.36	0.36
v/c Ratio	0.69	0.08	0.11	0.43	0.61	0.37
Control Delay	20.6	5.2	11.3	14.0	17.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	5.2	11.3	14.0	17.4	4.0
LOS	C	A	B	B	B	A
Approach Delay	19.2			13.7	12.2	
Approach LOS	B			B	B	
Queue Length 50th (m)	23.0	0.0	1.6	14.3	22.0	0.0
Queue Length 95th (m)	60.9	4.9	6.8	35.1	51.5	10.9
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	824	706	522	986	986	876
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.05	0.06	0.26	0.36	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 44.4			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 14.8		Intersection LOS: B	
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: CR 29 & CR 18





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	475	41	45	450	34	59	13	78	39	4	28
Future Volume (vph)	35	475	41	45	450	34	59	13	78	39	4	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.99		0.98	0.99		0.94	0.91		0.95	0.91	
Frt		0.988			0.989			0.871			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1621	0	1570	1624	0	1487	1238	0	1487	1231	0
Flt Permitted	0.469			0.370			0.735			0.693		
Satd. Flow (perm)	754	1621	0	601	1624	0	1085	1238	0	1028	1231	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			9			85			30	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	38	516	45	49	489	37	64	14	85	42	4	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	561	0	49	526	0	64	99	0	42	34	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Maximum Green (s)	39.6	39.6		8.0	49.6		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0			14.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	20	20			20		20	20		20	20	
Act Effct Green (s)	49.9	49.9		57.1	55.0		13.8	13.8		13.8	13.8	
Actuated g/C Ratio	0.67	0.67		0.76	0.74		0.18	0.18		0.18	0.18	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.08	0.52		0.09	0.44		0.32	0.33		0.22	0.14	
Control Delay	9.7	12.8		4.5	7.6		30.2	11.1		27.9	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.7	12.8		4.5	7.6		30.2	11.1		27.9	11.6	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		12.6			7.3			18.6			20.6	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.0	42.1		1.3	24.3		8.2	1.7		5.3	0.5	
Queue Length 95th (m)	8.2	101.3		5.8	65.8		18.8	13.5		13.7	7.3	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	503	1083		562	1195		291	394		276	352	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.52		0.09	0.44		0.22	0.25		0.15	0.10	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.8
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Clementi & CR 29

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	1	1	75	65	20
Future Vol, veh/h	55	1	1	75	65	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	1	1	82	71	22
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.8	6.9	7.8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	98%	0%	76%
Vol Thru, %	2%	1%	0%
Vol Right, %	0%	99%	24%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	56	76	85
LT Vol	55	0	65
Through Vol	1	1	0
RT Vol	0	75	20
Lane Flow Rate	61	83	92
Geometry Grp	1	1	1
Degree of Util (X)	0.074	0.081	0.108
Departure Headway (Hd)	4.356	3.549	4.191
Convergence, Y/N	Yes	Yes	Yes
Cap	816	996	849
Service Time	2.415	1.618	2.245
HCM Lane V/C Ratio	0.075	0.083	0.108
HCM Control Delay	7.8	6.9	7.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.3	0.4

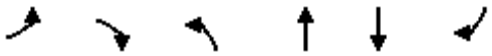
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	7	6	2	4	4	20	1	352	18	20	380	6
Future Vol, veh/h	7	6	2	4	4	20	1	352	18	20	380	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	8	7	2	4	4	22	1	383	20	22	413	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	869	866	417	860	859	393	420	0	0	403	0	0
Stage 1	461	461	-	395	395	-	-	-	-	-	-	-
Stage 2	408	405	-	465	464	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	264	283	619	267	285	639	1073	-	-	1089	-	-
Stage 1	565	552	-	614	591	-	-	-	-	-	-	-
Stage 2	605	585	-	563	550	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	247	275	619	256	277	639	1073	-	-	1089	-	-
Mov Cap-2 Maneuver	247	275	-	256	277	-	-	-	-	-	-	-
Stage 1	564	538	-	613	590	-	-	-	-	-	-	-
Stage 2	580	584	-	540	536	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.6	13.5	0	0.4
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1073	-	-	281	456	1089	-	-
HCM Lane V/C Ratio	0.001	-	-	0.058	0.067	0.02	-	-
HCM Control Delay (s)	8.4	0	-	18.6	13.5	8.4	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.1	-	-

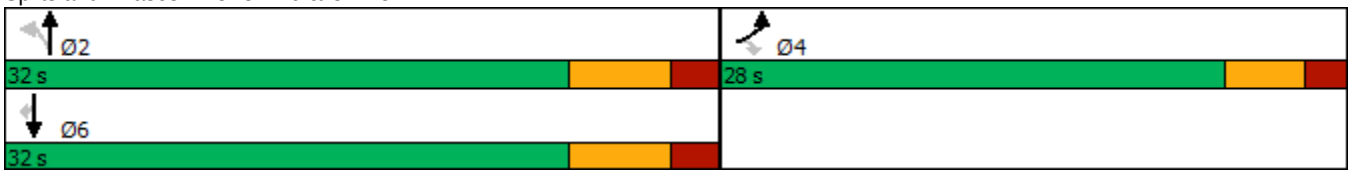


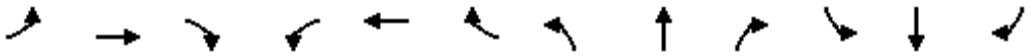
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	261	30	47	342	402	373
Future Volume (vph)	261	30	47	342	402	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.98			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.462			
Satd. Flow (perm)	1488	1292	750	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		33				405
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	284	33	51	372	437	405
Shared Lane Traffic (%)						
Lane Group Flow (vph)	284	33	51	372	437	405
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	22.5	22.5	25.2	25.2	25.2	25.2
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	5	5	5	5	5	5
Act Effct Green (s)	14.2	14.2	18.4	18.4	18.4	18.4

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.31	0.31	0.41	0.41	0.41	0.41
v/c Ratio	0.59	0.08	0.17	0.56	0.65	0.52
Control Delay	19.2	5.8	11.3	14.8	17.1	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	5.8	11.3	14.8	17.1	4.2
LOS	B	A	B	B	B	A
Approach Delay	17.8			14.4	10.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	18.0	0.0	2.4	21.0	26.0	0.0
Queue Length 95th (m)	44.5	4.7	9.7	52.7	64.7	14.1
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	795	680	432	952	952	928
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.05	0.12	0.39	0.46	0.44

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 45.4			
Natural Cycle: 55			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 13.2		Intersection LOS: B	
Intersection Capacity Utilization 59.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: CR 29 & CR 18





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	465	50	62	630	48	45	10	66	38	6	50
Future Volume (vph)	55	465	50	62	630	48	45	10	66	38	6	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.98	0.99		0.94	0.91		0.95	0.91	
Frt		0.986			0.989			0.870			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1615	0	1570	1624	0	1487	1236	0	1487	1229	0
Flt Permitted	0.353			0.370			0.717			0.703		
Satd. Flow (perm)	573	1615	0	601	1624	0	1058	1236	0	1042	1229	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			9			72			54	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	60	505	54	67	685	52	49	11	72	41	7	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	559	0	67	737	0	49	83	0	41	61	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Maximum Green (s)	39.6	39.6		8.0	49.6		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0			14.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	20	20			20		20	20		20	20	
Act Effct Green (s)	49.6	49.6		57.0	54.9		13.8	13.8		13.8	13.8	
Actuated g/C Ratio	0.66	0.66		0.76	0.73		0.18	0.18		0.18	0.18	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.16	0.52		0.12	0.62		0.25	0.29		0.21	0.23	
Control Delay	11.1	13.0		4.6	10.6		28.5	11.0		27.7	10.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	11.1	13.0		4.6	10.6		28.5	11.0		27.7	10.9	
LOS	B	B		A	B		C	B		C	B	
Approach Delay		12.8			10.1			17.5			17.6	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	3.4	42.1		1.8	42.6		6.2	1.3		5.1	0.9	
Queue Length 95th (m)	13.0	102.3		7.3	117.7		15.2	12.2		13.4	10.0	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	380	1076		562	1195		284	384		279	369	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.52		0.12	0.62		0.17	0.22		0.15	0.17	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.7
Natural Cycle: 65
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 12.2 Intersection LOS: B
Intersection Capacity Utilization 74.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Clementi & CR 29

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	1	1	25	45	40
Future Vol, veh/h	50	1	1	25	45	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	1	1	27	49	43
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.7	6.7	7.4
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	98%	0%	53%
Vol Thru, %	2%	4%	0%
Vol Right, %	0%	96%	47%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	51	26	85
LT Vol	50	0	45
Through Vol	1	1	0
RT Vol	0	25	40
Lane Flow Rate	55	28	92
Geometry Grp	1	1	1
Degree of Util (X)	0.066	0.028	0.1
Departure Headway (Hd)	4.314	3.56	3.901
Convergence, Y/N	Yes	Yes	Yes
Cap	828	997	915
Service Time	2.352	1.611	1.94
HCM Lane V/C Ratio	0.066	0.028	0.101
HCM Control Delay	7.7	6.7	7.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.1	0.3

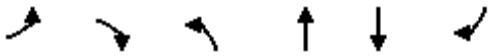
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	2	5	25	2	16	1	320	7	7	444	5
Future Vol, veh/h	4	2	5	25	2	16	1	320	7	7	444	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	4	2	5	27	2	17	1	348	8	8	483	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	866	860	486	859	858	352	488	0	0	356	0	0
Stage 1	502	502	-	354	354	-	-	-	-	-	-	-
Stage 2	364	358	-	505	504	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	265	285	565	268	286	674	1011	-	-	1134	-	-
Stage 1	537	529	-	647	616	-	-	-	-	-	-	-
Stage 2	639	614	-	535	528	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	254	282	565	262	283	674	1011	-	-	1134	-	-
Mov Cap-2 Maneuver	254	282	-	262	283	-	-	-	-	-	-	-
Stage 1	536	524	-	646	615	-	-	-	-	-	-	-
Stage 2	620	613	-	522	523	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.7	17.2	0	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1011	-	-	347	341	1134	-	-
HCM Lane V/C Ratio	0.001	-	-	0.034	0.137	0.007	-	-
HCM Control Delay (s)	8.6	0	-	15.7	17.2	8.2	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.5	0	-	-



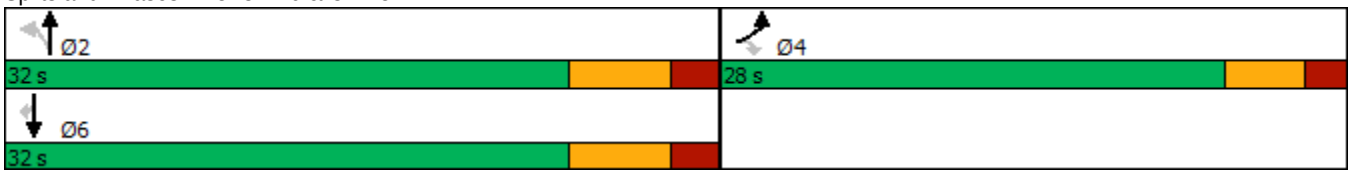
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	428	43	37	290	409	260
Future Volume (vph)	428	43	37	290	409	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.98			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.411			
Satd. Flow (perm)	1488	1292	667	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		47				283
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	465	47	40	315	445	283
Shared Lane Traffic (%)						
Lane Group Flow (vph)	465	47	40	315	445	283
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	22.5	22.5	25.2	25.2	25.2	25.2
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	5	5	5	5	5	5
Act Effct Green (s)	18.9	18.9	18.5	18.5	18.5	18.5

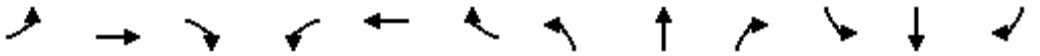
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.38	0.38	0.37	0.37	0.37	0.37
v/c Ratio	0.80	0.09	0.16	0.52	0.73	0.43
Control Delay	28.2	5.0	13.0	16.2	22.1	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	5.0	13.0	16.2	22.1	4.0
LOS	C	A	B	B	C	A
Approach Delay	26.1			15.8	15.1	
Approach LOS	C			B	B	
Queue Length 50th (m)	39.2	0.0	2.7	24.4	38.2	0.0
Queue Length 95th (m)	#93.7	5.5	8.4	44.2	67.4	12.0
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	723	629	349	865	865	822
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.07	0.11	0.36	0.51	0.34

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 50.3			
Natural Cycle: 55			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 18.8		Intersection LOS: B	
Intersection Capacity Utilization 64.7%		ICU Level of Service C	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: CR 29 & CR 18





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	589	51	56	558	42	73	16	97	48	5	35
Future Volume (vph)	43	589	51	56	558	42	73	16	97	48	5	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99			0.99		0.94	0.91		0.95	0.91	
Frt		0.988			0.989			0.871			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1621	0	1570	1624	0	1487	1238	0	1487	1229	0
Flt Permitted	0.405			0.284			0.729			0.679		
Satd. Flow (perm)	654	1621	0	469	1624	0	1077	1238	0	1009	1229	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			9			105			38	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	47	640	55	61	607	46	79	17	105	52	5	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	695	0	61	653	0	79	122	0	52	43	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Maximum Green (s)	39.6	39.6		8.0	49.6		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0			14.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	20	20			20		20	20		20	20	
Act Effct Green (s)	48.9	48.9		56.2	54.1		13.8	13.8		13.8	13.8	
Actuated g/C Ratio	0.66	0.66		0.76	0.73		0.19	0.19		0.19	0.19	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.11	0.65		0.14	0.55		0.39	0.39		0.28	0.17	
Control Delay	10.3	16.7		4.8	9.3		31.9	11.1		29.1	11.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.3	16.7		4.8	9.3		31.9	11.1		29.1	11.2	
LOS	B	B		A	A		C	B		C	B	
Approach Delay		16.3			8.9			19.3			21.0	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.6	61.5		1.7	35.2		10.2	2.1		6.6	0.6	
Queue Length 95th (m)	10.2	#163.2		6.8	93.6		22.4	15.2		16.2	8.4	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	432	1074		475	1189		292	412		273	361	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.65		0.13	0.55		0.27	0.30		0.19	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 13.9 Intersection LOS: B
Intersection Capacity Utilization 69.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

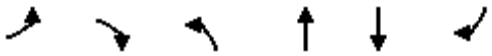
Splits and Phases: 1: Clementi & CR 29

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	68	1	1	93	81	25
Future Vol, veh/h	68	1	1	93	81	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	1	1	101	88	27
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.9	7.1	8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	99%	0%	76%
Vol Thru, %	1%	1%	0%
Vol Right, %	0%	99%	24%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	69	94	106
LT Vol	68	0	81
Through Vol	1	1	0
RT Vol	0	93	25
Lane Flow Rate	75	102	115
Geometry Grp	1	1	1
Degree of Util (X)	0.092	0.102	0.136
Departure Headway (Hd)	4.413	3.599	4.25
Convergence, Y/N	Yes	Yes	Yes
Cap	802	978	835
Service Time	2.491	1.689	2.318
HCM Lane V/C Ratio	0.094	0.104	0.138
HCM Control Delay	7.9	7.1	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.3	0.5

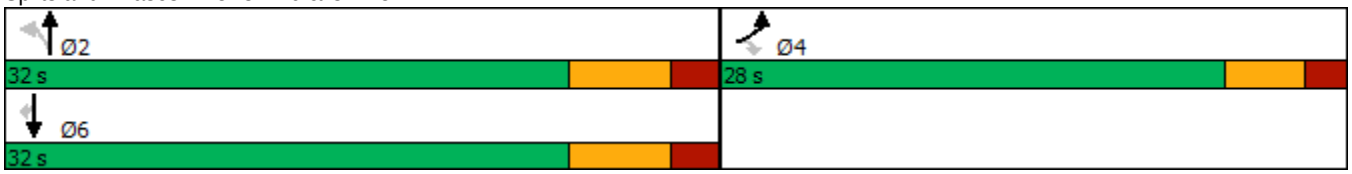


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	324	37	58	424	498	463
Future Volume (vph)	324	37	58	424	498	463
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.99			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.338			
Satd. Flow (perm)	1488	1292	551	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		40				503
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	352	40	63	461	541	503
Shared Lane Traffic (%)						
Lane Group Flow (vph)	352	40	63	461	541	503
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	22.5	22.5	25.2	25.2	25.2	25.2
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	5	5	5	5	5	5
Act Effct Green (s)	16.5	16.5	20.7	20.7	20.7	20.7

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.33	0.33	0.41	0.41	0.41	0.41
v/c Ratio	0.69	0.09	0.28	0.67	0.79	0.60
Control Delay	23.3	5.4	14.6	18.4	24.2	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.3	5.4	14.6	18.4	24.2	4.8
LOS	C	A	B	B	C	A
Approach Delay	21.5			18.0	14.9	
Approach LOS	C			B	B	
Queue Length 50th (m)	30.9	0.0	3.7	33.5	42.0	0.0
Queue Length 95th (m)	56.8	5.1	13.0	70.7	#101.2	15.8
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	726	628	290	869	869	929
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.06	0.22	0.53	0.62	0.54

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 50			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 17.0		Intersection LOS: B	
Intersection Capacity Utilization 68.4%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: CR 29 & CR 18



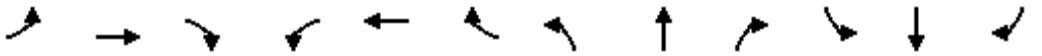
Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	9	7	2	5	5	25	1	436	22	25	471	7
Future Vol, veh/h	9	7	2	5	5	25	1	436	22	25	471	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	10	8	2	5	5	27	1	474	24	27	512	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1074	1070	516	1063	1062	486	520	0	0	498	0	0
Stage 1	570	570	-	488	488	-	-	-	-	-	-	-
Stage 2	504	500	-	575	574	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	191	214	543	194	216	565	983	-	-	1002	-	-
Stage 1	493	493	-	547	537	-	-	-	-	-	-	-
Stage 2	536	530	-	489	491	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	173	206	543	182	208	565	983	-	-	1002	-	-
Mov Cap-2 Maneuver	173	206	-	182	208	-	-	-	-	-	-	-
Stage 1	493	474	-	546	536	-	-	-	-	-	-	-
Stage 2	505	529	-	461	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.8	16	0	0.4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	983	-	-	201	366	1002	-	-
HCM Lane V/C Ratio	0.001	-	-	0.097	0.104	0.027	-	-
HCM Control Delay (s)	8.7	0	-	24.8	16	8.7	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.3	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	577	62	77	781	60	56	12	82	47	7	62
Future Volume (vph)	68	577	62	77	781	60	56	12	82	47	7	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99			0.99		0.94	0.91		0.95	0.90	
Frt		0.986			0.989			0.869			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1615	0	1570	1624	0	1487	1234	0	1487	1226	0
Flt Permitted	0.255			0.274			0.708			0.691		
Satd. Flow (perm)	417	1615	0	453	1624	0	1046	1234	0	1025	1226	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			9			89			67	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	74	627	67	84	849	65	61	13	89	51	8	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	694	0	84	914	0	61	102	0	51	75	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Maximum Green (s)	39.6	39.6		8.0	49.6		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0			14.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	20	20			20		20	20		20	20	
Act Effct Green (s)	47.2	47.2		56.2	54.1		13.7	13.7		13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.76	0.73		0.19	0.19		0.19	0.19	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.28	0.67		0.19	0.77		0.31	0.34		0.27	0.27	
Control Delay	14.8	18.0		5.1	16.1		29.9	10.9		28.9	10.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.8	18.0		5.1	16.1		29.9	10.9		28.9	10.6	
LOS	B	B		A	B		C	B		C	B	
Approach Delay		17.7			15.2			18.0			18.0	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	4.6	60.7		2.2	66.3		7.8	1.6		6.5	1.0	
Queue Length 95th (m)	18.3	#163.7		8.8	#209.2		18.1	13.5		15.9	11.3	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	265	1032		465	1190		283	400		278	381	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.28	0.67		0.18	0.77		0.22	0.26		0.18	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 16.5 Intersection LOS: B
Intersection Capacity Utilization 86.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

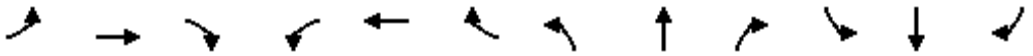
Splits and Phases: 1: Clementi & CR 29

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	62	1	1	31	56	50
Future Vol, veh/h	62	1	1	31	56	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	1	1	34	61	54
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.8	6.8	7.6
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	98%	0%	53%
Vol Thru, %	2%	3%	0%
Vol Right, %	0%	97%	47%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	63	32	106
LT Vol	62	0	56
Through Vol	1	1	0
RT Vol	0	31	50
Lane Flow Rate	68	35	115
Geometry Grp	1	1	1
Degree of Util (X)	0.083	0.035	0.126
Departure Headway (Hd)	4.36	3.606	3.935
Convergence, Y/N	Yes	Yes	Yes
Cap	817	981	906
Service Time	2.411	1.673	1.985
HCM Lane V/C Ratio	0.083	0.036	0.127
HCM Control Delay	7.8	6.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.1	0.4

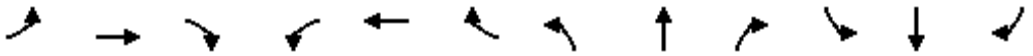


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	666	51	59	582	42	73	16	106	48	5	38
Future Volume (vph)	50	666	51	59	582	42	73	16	106	48	5	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99			0.99		0.94	0.91		0.95	0.90	
Frt		0.989			0.990			0.869			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1624	0	1570	1626	0	1487	1234	0	1487	1227	0
Flt Permitted	0.388			0.235			0.727			0.673		
Satd. Flow (perm)	628	1624	0	388	1626	0	1074	1234	0	1001	1227	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			9			115			41	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	54	724	55	64	633	46	79	17	115	52	5	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	779	0	64	679	0	79	132	0	52	46	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	Max	Max		None	Max		None	None		None	None	
Act Effct Green (s)	48.9	48.9		56.2	54.1		13.8	13.8		13.8	13.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.66	0.66		0.76	0.73		0.19	0.19		0.19	0.19	
v/c Ratio	0.13	0.72		0.16	0.57		0.40	0.41		0.28	0.18	
Control Delay	10.7	19.7		5.0	9.7		32.0	11.0		29.2	11.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.7	19.7		5.0	9.7		32.0	11.0		29.2	11.0	
LOS	B	B		A	A		C	B		C	B	
Approach Delay		19.1			9.3			18.9			20.6	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	3.0	75.8		1.7	37.8		10.2	2.1		6.6	0.6	
Queue Length 95th (m)	11.6	#195.0		7.1	100.4		22.4	15.7		16.2	8.6	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	414	1075		422	1190		291	418		271	362	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.72		0.15	0.57		0.27	0.32		0.19	0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 74			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 15.3		Intersection LOS: B	
Intersection Capacity Utilization 84.6%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Clementi & CR 29

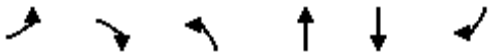


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	712	34	29	645	1	107	1	86	2	1	2
Future Volume (vph)	5	712	34	29	645	1	107	1	86	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1600	1600	1600
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	300.0		0.0	200.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	1.00			1.00			0.91			0.95	
Frt		0.993						0.940			0.946	
Flt Protected	0.950			0.950				0.973			0.980	
Satd. Flow (prot)	1570	1633	0	1570	1652	0	0	1420	0	0	1297	0
Flt Permitted	0.312			0.248				0.826			0.888	
Satd. Flow (perm)	507	1633	0	410	1652	0	0	1161	0	0	1163	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6						46			2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		113.3			319.2			166.2			51.2	
Travel Time (s)		8.2			23.0			12.0			3.7	
Confl. Peds. (#/hr)	30		30	30		30	30		30	20		20
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	10%	10%	10%	10%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	774	37	32	701	1	116	1	93	2	1	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	811	0	32	702	0	0	210	0	0	5	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	56.0	56.0		56.0	56.0		24.0	24.0		24.0	24.0	
Total Split (s)	56.0	56.0		56.0	56.0		24.0	24.0		24.0	24.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)	53.3	53.3		53.3	53.3			15.5			15.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.66	0.66		0.66	0.66			0.19			0.19	
v/c Ratio	0.01	0.75		0.12	0.65			0.81			0.02	
Control Delay	5.8	16.0		7.3	12.4			47.8			21.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.8	16.0		7.3	12.4			47.8			21.0	
LOS	A	B		A	B			D			C	
Approach Delay		15.9			12.2			47.8			21.0	
Approach LOS		B			B			D			C	
Queue Length 50th (m)	0.3	83.0		1.8	63.6			24.2			0.4	
Queue Length 95th (m)	1.5	141.5		5.7	104.3			#56.4			3.2	
Internal Link Dist (m)		89.3			295.2			142.2			27.2	
Turn Bay Length (m)	300.0			200.0								
Base Capacity (vph)	334	1078		270	1088			294			261	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.01	0.75		0.12	0.65			0.71			0.02	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80.8			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 18.2		Intersection LOS: B	
Intersection Capacity Utilization 68.5%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Water Tower Road & CR 29

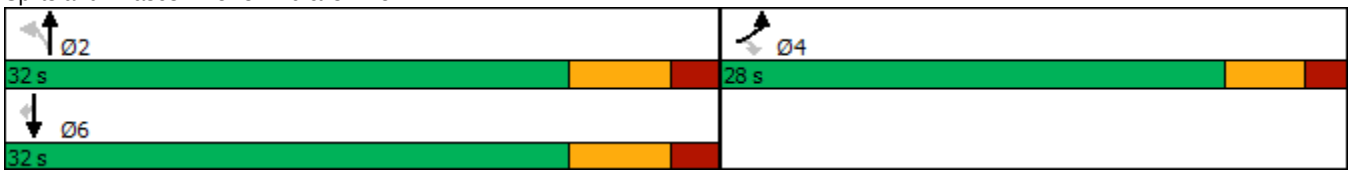


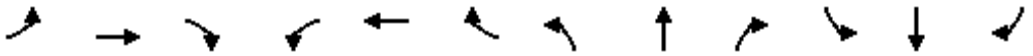
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	446	47	50	304	457	319
Future Volume (vph)	446	47	50	304	457	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.99			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.352			
Satd. Flow (perm)	1488	1292	573	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		51				347
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	485	51	54	330	497	347
Shared Lane Traffic (%)						
Lane Group Flow (vph)	485	51	54	330	497	347
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	19.8	19.8	20.2	20.2	20.2	20.2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38
v/c Ratio	0.83	0.10	0.25	0.52	0.79	0.48
Control Delay	31.5	4.9	14.8	16.2	25.1	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	4.9	14.8	16.2	25.1	4.2
LOS	C	A	B	B	C	A
Approach Delay	29.0			16.0	16.5	
Approach LOS	C			B	B	
Queue Length 50th (m)	45.8	0.0	3.8	26.4	45.6	0.0
Queue Length 95th (m)	#99.4	5.7	11.1	46.6	#80.3	13.3
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	682	598	283	816	816	824
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.09	0.19	0.40	0.61	0.42

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 52.7			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 73.0%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: CR 29 & CR 18





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	10	5	182	28	29	1	332	55	11	485	12
Future Volume (vph)	6	10	5	182	28	29	1	332	55	11	485	12
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			-2%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.96			0.99			1.00	
Frt		0.971			0.983			0.981			0.997	
Flt Protected		0.985			0.963						0.999	
Satd. Flow (prot)	0	1454	0	0	1464	0	0	1605	0	0	1643	0
Flt Permitted		0.898			0.762			0.999			0.989	
Satd. Flow (perm)	0	1315	0	0	1120	0	0	1603	0	0	1626	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			9			17			2	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		284.6			347.2			74.9			271.1	
Travel Time (s)		20.5			25.0			3.9			13.9	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	7	11	5	198	30	32	1	361	60	12	527	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	23	0	0	260	0	0	422	0	0	552	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		50.0	50.0		50.0	50.0	
Total Split (s)	30.0	30.0		30.0	30.0		50.0	50.0		50.0	50.0	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%		62.5%	62.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)		20.9			20.9			45.4			45.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.27			0.27			0.58			0.58	
v/c Ratio		0.06			0.85			0.45			0.59	
Control Delay		17.6			52.1			11.6			14.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		17.6			52.1			11.6			14.5	
LOS		B			D			B			B	
Approach Delay		17.6			52.1			11.6			14.5	
Approach LOS		B			D			B			B	
Queue Length 50th (m)		2.0			36.2			36.1			55.2	
Queue Length 95th (m)		7.4			#74.7			59.2			88.2	
Internal Link Dist (m)		260.6			323.2			50.9			247.1	
Turn Bay Length (m)												
Base Capacity (vph)		406			349			936			943	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.06			0.74			0.45			0.59	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 78.3			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 66.3%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 4: 7th Line & CR 29

Intersection	
Intersection Delay, s/veh	30.7
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	10	5	182	28	29	1	332	55	11	485	12
Future Vol, veh/h	6	10	5	182	28	29	1	332	55	11	485	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	7	11	5	198	30	32	1	361	60	12	527	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.2	16.9	23.2	43.7
HCM LOS	B	C	C	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	29%	76%	2%
Vol Thru, %	86%	48%	12%	95%
Vol Right, %	14%	24%	12%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	388	21	239	508
LT Vol	1	6	182	11
Through Vol	332	10	28	485
RT Vol	55	5	29	12
Lane Flow Rate	422	23	260	552
Geometry Grp	1	1	1	1
Degree of Util (X)	0.718	0.049	0.503	0.918
Departure Headway (Hd)	6.129	7.756	6.969	5.987
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	590	460	517	607
Service Time	4.146	5.834	5.015	4.003
HCM Lane V/C Ratio	0.715	0.05	0.503	0.909
HCM Control Delay	23.2	11.2	16.9	43.7
HCM Lane LOS	C	B	C	E
HCM 95th-tile Q	5.9	0.2	2.8	11.6

Intersection	
Intersection Delay, s/veh	163.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	712	34	29	645	1	107	1	86	2	1	2
Future Vol, veh/h	5	712	34	29	645	1	107	1	86	2	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	15	15	15	15	15	15	10	10	10	10	10	10
Mvmt Flow	5	774	37	32	701	1	116	1	93	2	1	2
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	223.2	140.1	16.4	12.6
HCM LOS	F	F	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	55%	100%	0%	100%	0%	40%
Vol Thru, %	1%	0%	95%	0%	100%	20%
Vol Right, %	44%	0%	5%	0%	0%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	194	5	746	29	646	5
LT Vol	107	5	0	29	0	2
Through Vol	1	0	712	0	645	1
RT Vol	86	0	34	0	1	2
Lane Flow Rate	211	5	811	32	702	5
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.412	0.01	1.434	0.06	1.241	0.012
Departure Headway (Hd)	7.967	7.204	6.661	7.331	6.818	9.443
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	455	500	551	491	541	381
Service Time	5.967	4.904	4.361	5.031	4.518	7.443
HCM Lane V/C Ratio	0.464	0.01	1.472	0.065	1.298	0.013
HCM Control Delay	16.4	10	224.6	10.5	145.9	12.6
HCM Lane LOS	C	A	F	B	F	B
HCM 95th-tile Q	2	0	37.1	0.2	25.5	0

Intersection	
Int Delay, s/veh	26.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	10	5	182	28	29	1	332	55	11	485	12
Future Vol, veh/h	6	10	5	182	28	29	1	332	55	11	485	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	7	11	5	198	30	32	1	361	60	12	527	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	982	981	534	959	957	391	540	0	0	421	0	0
Stage 1	558	558	-	393	393	-	-	-	-	-	-	-
Stage 2	424	423	-	566	564	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	221	242	531	229	250	640	966	-	-	1072	-	-
Stage 1	500	499	-	616	592	-	-	-	-	-	-	-
Stage 2	592	574	-	495	496	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	188	238	531	216	246	640	966	-	-	1072	-	-
Mov Cap-2 Maneuver	188	238	-	216	246	-	-	-	-	-	-	-
Stage 1	500	491	-	615	591	-	-	-	-	-	-	-
Stage 2	533	573	-	471	488	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.7	127.7	0	0.2
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	966	-	-	252	239	1072	-	-
HCM Lane V/C Ratio	0.001	-	-	0.091	1.087	0.011	-	-
HCM Control Delay (s)	8.7	0	-	20.7	127.7	8.4	0	-
HCM Lane LOS	A	A	-	C	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	11.3	0	-	-

Intersection	
Int Delay, s/veh	47.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	712	34	29	645	1	107	1	86	2	1	2
Future Vol, veh/h	5	712	34	29	645	1	107	1	86	2	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	10	10	10	10	10	10
Mvmt Flow	5	774	37	32	701	1	116	1	93	2	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	702	0	0	811	0	0	1570	1569	793	1616	1587	702
Stage 1	-	-	-	-	-	-	803	803	-	766	766	-
Stage 2	-	-	-	-	-	-	767	766	-	850	821	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.2	6.6	6.3	7.2	6.6	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.6	-	6.2	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.6	-	6.2	5.6	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.59	4.09	3.39	3.59	4.09	3.39
Pot Cap-1 Maneuver	838	-	-	761	-	-	~ 86	106	376	80	104	425
Stage 1	-	-	-	-	-	-	366	385	-	383	400	-
Stage 2	-	-	-	-	-	-	383	400	-	344	377	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	838	-	-	761	-	-	~ 82	101	376	57	99	425
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 82	101	-	57	99	-
Stage 1	-	-	-	-	-	-	364	383	-	381	383	-
Stage 2	-	-	-	-	-	-	364	383	-	256	375	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	$ 396	43.1
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	126	838	-	-	761	-	-	100
HCM Lane V/C Ratio	1.674	0.006	-	-	0.041	-	-	0.054
HCM Control Delay (s)	$ 396	9.3	-	-	9.9	-	-	43.1
HCM Lane LOS	F	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	15.7	0	-	-	0.1	-	-	0.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	30	1	1	1	1	7	1	71	1	2	21	12
Future Vol, veh/h	30	1	1	1	1	7	1	71	1	2	21	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	10	10	10	10	10	10
Mvmt Flow	33	1	1	1	1	8	1	77	1	2	23	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	118	114	30	115	120	78	36	0	0	78	0	0
Stage 1	34	34	-	80	80	-	-	-	-	-	-	-
Stage 2	84	80	-	35	40	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	851	771	1036	855	765	974	1525	-	-	1471	-	-
Stage 1	974	861	-	921	823	-	-	-	-	-	-	-
Stage 2	917	823	-	973	856	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	842	769	1036	852	763	974	1525	-	-	1471	-	-
Mov Cap-2 Maneuver	842	769	-	852	763	-	-	-	-	-	-	-
Stage 1	973	860	-	920	822	-	-	-	-	-	-	-
Stage 2	908	822	-	970	855	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.4	8.9	0.1	0.4
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1525	-	-	844	931	1471	-	-
HCM Lane V/C Ratio	0.001	-	-	0.041	0.011	0.001	-	-
HCM Control Delay (s)	7.4	0	-	9.4	8.9	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	12	25	1	1	196
Future Vol, veh/h	60	12	25	1	1	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	65	13	27	1	1	213

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	28	0	-	0	171	28
Stage 1	-	-	-	-	28	-
Stage 2	-	-	-	-	143	-
Critical Hdwy	4.2	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.29	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1535	-	-	-	801	1025
Stage 1	-	-	-	-	974	-
Stage 2	-	-	-	-	865	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1535	-	-	-	767	1025
Mov Cap-2 Maneuver	-	-	-	-	767	-
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	865	-

Approach	EB	WB	SB
HCM Control Delay, s	6.2	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1535	-	-	-	1023
HCM Lane V/C Ratio	0.042	-	-	-	0.209
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	77	1	1	93	81	31
Future Vol, veh/h	77	1	1	93	81	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	84	1	1	101	88	34
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	8	7.1	8
HCM LOS	A	A	A

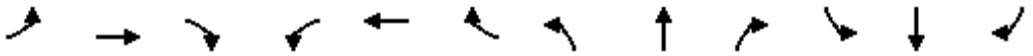
Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	99%	0%	72%
Vol Thru, %	1%	1%	0%
Vol Right, %	0%	99%	28%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	78	94	112
LT Vol	77	0	81
Through Vol	1	1	0
RT Vol	0	93	31
Lane Flow Rate	85	102	122
Geometry Grp	1	1	1
Degree of Util (X)	0.104	0.103	0.143
Departure Headway (Hd)	4.425	3.618	4.232
Convergence, Y/N	Yes	Yes	Yes
Cap	800	971	838
Service Time	2.506	1.713	2.31
HCM Lane V/C Ratio	0.106	0.105	0.146
HCM Control Delay	8	7.1	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.3	0.5

Intersection	
Intersection Delay, s/veh	94
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	35	2	113	22	34	1	482	200	39	499	11
Future Vol, veh/h	16	35	2	113	22	34	1	482	200	39	499	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	17	38	2	123	24	37	1	524	217	42	542	12
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.1	15.9	141.3	66.9
HCM LOS	B	C	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	30%	67%	7%
Vol Thru, %	71%	66%	13%	91%
Vol Right, %	29%	4%	20%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	683	53	169	549
LT Vol	1	16	113	39
Through Vol	482	35	22	499
RT Vol	200	2	34	11
Lane Flow Rate	742	58	184	597
Geometry Grp	1	1	1	1
Degree of Util (X)	1.237	0.13	0.382	1.013
Departure Headway (Hd)	5.999	8.813	8.027	6.498
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	601	410	452	561
Service Time	4.069	6.813	6.027	4.498
HCM Lane V/C Ratio	1.235	0.141	0.407	1.064
HCM Control Delay	141.3	13.1	15.9	66.9
HCM Lane LOS	F	B	C	F
HCM 95th-tile Q	27.6	0.4	1.8	15



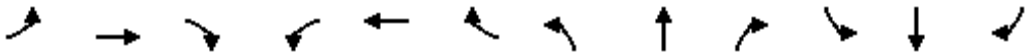
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	630	62	88	867	60	56	12	88	47	8	70
Future Volume (vph)	73	630	62	88	867	60	56	12	88	47	8	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	100.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.95	0.91		0.95	0.90	
Frt		0.987			0.990			0.868			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1570	1618	0	1570	1626	0	1487	1231	0	1487	1226	0
Flt Permitted	0.200			0.237			0.702			0.687		
Satd. Flow (perm)	330	1618	0	392	1626	0	1040	1231	0	1020	1226	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			8			96			76	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		319.2			136.6			120.3			55.1	
Travel Time (s)		23.0			9.8			8.7			4.0	
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	79	685	67	96	942	65	61	13	96	51	9	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	752	0	96	1007	0	61	109	0	51	85	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		5.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	26.2	26.2		10.0	26.2		25.2	25.2		25.2	25.2	
Total Split (s)	44.8	44.8		10.0	54.8		25.2	25.2		25.2	25.2	
Total Split (%)	56.0%	56.0%		12.5%	68.5%		31.5%	31.5%		31.5%	31.5%	
Maximum Green (s)	39.6	39.6		8.0	49.6		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.3	3.3		2.0	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.9	1.9		0.0	1.9		1.9	1.9		1.9	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	5.2		2.0	5.2		5.2	5.2		5.2	5.2	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None		None	None	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0			14.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	20	20			20		20	20		20	20	
Act Effct Green (s)	47.1	47.1		56.2	54.1		13.7	13.7		13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.76	0.73		0.19	0.19		0.19	0.19	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.38	0.73		0.24	0.85		0.32	0.36		0.27	0.29	
Control Delay	19.2	20.3		5.5	20.8		30.0	10.8		28.9	10.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.2	20.3		5.5	20.8		30.0	10.8		28.9	10.6	
LOS	B	C		A	C		C	B		C	B	
Approach Delay		20.2			19.4			17.7			17.5	
Approach LOS		C			B			B			B	
Queue Length 50th (m)	5.3	70.7		2.6	83.9		7.8	1.6		6.5	1.1	
Queue Length 95th (m)	23.5	#185.4		9.8	#243.1		18.2	13.9		15.9	12.0	
Internal Link Dist (m)		295.2			112.6			96.3			31.1	
Turn Bay Length (m)	150.0			100.0			50.0			50.0		
Base Capacity (vph)	210	1032		425	1191		282	404		277	388	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.38	0.73		0.23	0.85		0.22	0.27		0.18	0.22	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 19.5 Intersection LOS: B
Intersection Capacity Utilization 93.3% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Clementi & CR 29



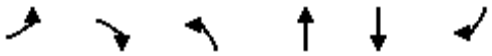
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	725	123	95	918	2	75	1	59	4	1	12
Future Volume (vph)	2	725	123	95	918	2	75	1	59	4	1	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1800	1800	1800	1600	1600	1600
Storage Length (m)	300.0		0.0	200.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.92			0.92	
Frt		0.978						0.941			0.902	
Flt Protected	0.950			0.950				0.973			0.989	
Satd. Flow (prot)	1570	1593	0	1570	1652	0	0	1423	0	0	1209	0
Flt Permitted	0.162			0.204				0.817			0.926	
Satd. Flow (perm)	268	1593	0	337	1652	0	0	1151	0	0	1123	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20						45			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		113.3			319.2			166.2			51.2	
Travel Time (s)		8.2			23.0			12.0			3.7	
Confl. Peds. (#/hr)	30		30	30		30	30		30	20		20
Confl. Bikes (#/hr)			20			20			20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	2	788	134	103	998	2	82	1	64	4	1	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	922	0	103	1000	0	0	147	0	0	18	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	56.0	56.0		56.0	56.0		24.0	24.0		24.0	24.0	
Total Split (s)	56.0	56.0		56.0	56.0		24.0	24.0		24.0	24.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	50.0	50.0		50.0	50.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	55.0	55.0		55.0	55.0			13.2			13.2	
Actuated g/C Ratio	0.69	0.69		0.69	0.69			0.16			0.16	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.01	0.84		0.45	0.88			0.65			0.09	
Control Delay	5.5	19.6		14.7	23.3			34.3			16.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.5	19.6		14.7	23.3			34.3			16.4	
LOS	A	B		B	C			C			B	
Approach Delay		19.6			22.5			34.3			16.4	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	0.1	85.5		6.0	102.1			14.3			0.6	
Queue Length 95th (m)	0.9	#212.6		24.4	#235.8			32.4			6.0	
Internal Link Dist (m)		89.3			295.2			142.2			27.2	
Turn Bay Length (m)	300.0			200.0								
Base Capacity (vph)	183	1099		231	1133			293			262	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.01	0.84		0.45	0.88			0.50			0.07	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80.2
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 22.0 Intersection LOS: C
Intersection Capacity Utilization 87.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Water Tower Road & CR 29

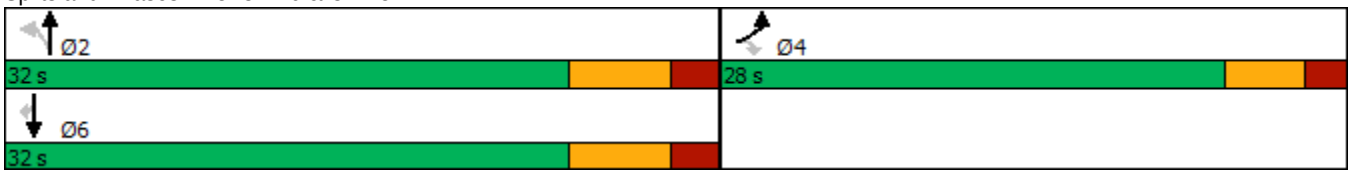


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	393	51	67	477	530	505
Future Volume (vph)	393	51	67	477	530	505
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	3%			0%	0%	
Storage Length (m)	0.0	100.0	100.0			200.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93	0.99			0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1546	1383	1570	1652	1652	1404
Flt Permitted	0.950		0.289			
Satd. Flow (perm)	1488	1292	472	1652	1652	1313
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		55				549
Link Speed (k/h)	60			60	60	
Link Distance (m)	292.0			271.1	88.7	
Travel Time (s)	17.5			16.3	5.3	
Confl. Peds. (#/hr)	20	20	20			20
Confl. Bikes (#/hr)		10				10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	427	55	73	518	576	549
Shared Lane Traffic (%)						
Lane Group Flow (vph)	427	55	73	518	576	549
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.5	21.5	23.2	23.2	23.2	23.2
Total Split (s)	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	22.5	22.5	25.2	25.2	25.2	25.2
Yellow Time (s)	3.5	3.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	5	5	5	5	5	5
Act Effct Green (s)	18.7	18.7	22.0	22.0	22.0	22.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Actuated g/C Ratio	0.35	0.35	0.41	0.41	0.41	0.41
v/c Ratio	0.79	0.11	0.38	0.76	0.85	0.64
Control Delay	28.8	4.9	18.7	23.2	29.1	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	4.9	18.7	23.2	29.1	5.2
LOS	C	A	B	C	C	A
Approach Delay	26.1			22.7	17.5	
Approach LOS	C			C	B	
Queue Length 50th (m)	41.3	0.0	5.3	46.4	54.5	0.0
Queue Length 95th (m)	#82.5	5.9	16.1	#94.7	#111.4	16.4
Internal Link Dist (m)	268.0			247.1	64.7	
Turn Bay Length (m)		100.0	100.0			200.0
Base Capacity (vph)	671	592	229	804	804	920
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.09	0.32	0.64	0.72	0.60

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 53.4			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 73.9%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: CR 29 & CR 18



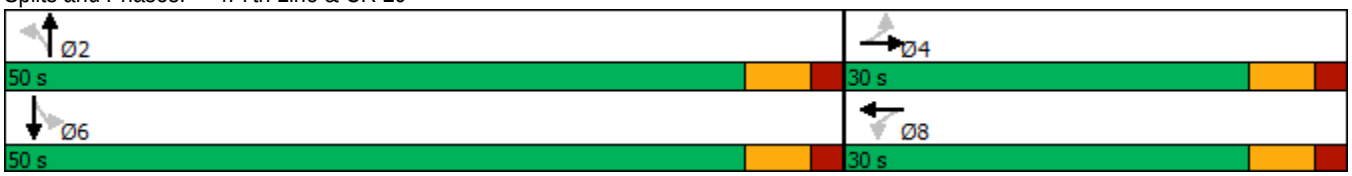
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	35	2	113	22	34	1	482	200	39	499	11
Future Volume (vph)	16	35	2	113	22	34	1	482	200	39	499	11
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1900	1900	1900	1900	1900	1900
Grade (%)		0%			-2%			0%			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
Ped Bike Factor		0.99			0.96			0.98			1.00	
Frt		0.995			0.973			0.961			0.997	
Flt Protected		0.985			0.968						0.996	
Satd. Flow (prot)	0	1511	0	0	1448	0	0	1555	0	0	1638	0
Flt Permitted		0.884			0.764						0.920	
Satd. Flow (perm)	0	1343	0	0	1111	0	0	1555	0	0	1512	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			16			41			2	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		284.6			347.2			74.9			271.1	
Travel Time (s)		20.5			25.0			3.9			13.9	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
Adj. Flow (vph)	17	38	2	123	24	37	1	524	217	42	542	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	57	0	0	184	0	0	742	0	0	596	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		50.0	50.0		50.0	50.0	
Total Split (s)	30.0	30.0		30.0	30.0		50.0	50.0		50.0	50.0	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%		62.5%	62.5%	
Maximum Green (s)	24.0	24.0		24.0	24.0		44.0	44.0		44.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)		16.5			16.5			47.2			47.2	
Actuated g/C Ratio		0.22			0.22			0.62			0.62	
v/c Ratio		0.19			0.72			0.75			0.63	
Control Delay		23.0			40.5			17.8			14.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		23.0			40.5			17.8			14.1	
LOS		C			D			B			B	
Approach Delay		23.0			40.5			17.8			14.1	
Approach LOS		C			D			B			B	
Queue Length 50th (m)		6.4			22.1			65.0			48.2	
Queue Length 95th (m)		15.2			43.2			#167.0			106.9	
Internal Link Dist (m)		260.6			323.2			50.9			247.1	
Turn Bay Length (m)												
Base Capacity (vph)		428			363			983			942	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.13			0.51			0.75			0.63	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 75.8
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 85.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: 7th Line & CR 29



Intersection	
Int Delay, s/veh	39.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	16	35	2	113	22	34	1	482	200	39	499	11
Future Vol, veh/h	16	35	2	113	22	34	1	482	200	39	499	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10	15	15	15	15	15	15
Mvmt Flow	17	38	2	123	24	37	1	524	217	42	542	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1297	1375	548	1287	1273	633	554	0	0	741	0	0
Stage 1	632	632	-	635	635	-	-	-	-	-	-	-
Stage 2	665	743	-	652	638	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.25	-	-	4.25	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.335	-	-	2.335	-	-
Pot Cap-1 Maneuver	134	140	521	136	161	466	954	-	-	810	-	-
Stage 1	455	462	-	453	460	-	-	-	-	-	-	-
Stage 2	436	410	-	444	459	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	102	129	521	~ 99	149	466	954	-	-	810	-	-
Mov Cap-2 Maneuver	102	129	-	~ 99	149	-	-	-	-	-	-	-
Stage 1	454	427	-	452	459	-	-	-	-	-	-	-
Stage 2	380	409	-	373	425	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	57.7	$ 318.7	0	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	954	-	-	123	124	810	-	-
HCM Lane V/C Ratio	0.001	-	-	0.468	1.481	0.052	-	-
HCM Control Delay (s)	8.8	0	-	57.7	$ 318.7	9.7	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.1	12.8	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	67.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	725	123	95	918	2	75	1	59	4	1	12
Future Vol, veh/h	2	725	123	95	918	2	75	1	59	4	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	15	15	15	15	15	15	10	10	10	10	10	10
Mvmt Flow	2	788	134	103	998	2	82	1	64	4	1	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1000	0	0	922	0	0	2071	2065	855	2097	2131	999
Stage 1	-	-	-	-	-	-	859	859	-	1205	1205	-
Stage 2	-	-	-	-	-	-	1212	1206	-	892	926	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.2	6.6	6.3	7.2	6.6	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.6	-	6.2	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.6	-	6.2	5.6	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.59	4.09	3.39	3.59	4.09	3.39
Pot Cap-1 Maneuver	644	-	-	690	-	-	~ 38	52	346	36	47	285
Stage 1	-	-	-	-	-	-	340	362	-	216	248	-
Stage 2	-	-	-	-	-	-	214	248	-	326	337	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	644	-	-	690	-	-	~ 31	44	346	25	40	285
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 31	44	-	25	40	-
Stage 1	-	-	-	-	-	-	339	361	-	215	211	-
Stage 2	-	-	-	-	-	-	173	211	-	264	336	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1	$ 990.1	68
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	52	644	-	-	690	-	-	75
HCM Lane V/C Ratio	2.822	0.003	-	-	0.15	-	-	0.246
HCM Control Delay (s)	$ 990.1	10.6	-	-	11.1	-	-	68
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	15.4	0	-	-	0.5	-	-	0.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	21	1	1	1	1	5	1	51	1	9	81	35
Future Vol, veh/h	21	1	1	1	1	5	1	51	1	9	81	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	10	10	10	10	10	10
Mvmt Flow	23	1	1	1	1	5	1	55	1	10	88	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	188	185	107	186	204	56	126	0	0	56	0	0
Stage 1	127	127	-	58	58	-	-	-	-	-	-	-
Stage 2	61	58	-	128	146	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.15	6.55	6.25	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.545	4.045	3.345	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	766	704	939	768	687	1002	1412	-	-	1499	-	-
Stage 1	870	785	-	946	841	-	-	-	-	-	-	-
Stage 2	943	841	-	869	770	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	756	698	939	762	682	1002	1412	-	-	1499	-	-
Mov Cap-2 Maneuver	756	698	-	762	682	-	-	-	-	-	-	-
Stage 1	869	780	-	945	840	-	-	-	-	-	-	-
Stage 2	936	840	-	861	765	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	9	0.1	0.5
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1412	-	-	760	901	1499	-	-
HCM Lane V/C Ratio	0.001	-	-	0.033	0.008	0.007	-	-
HCM Control Delay (s)	7.6	0	-	9.9	9	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	10.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	220	22	15	1	134	1
Future Vol, veh/h	220	22	15	1	134	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	239	24	16	1	146	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	17	0	-	0	519	17
Stage 1	-	-	-	-	17	-
Stage 2	-	-	-	-	502	-
Critical Hdwy	4.2	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.29	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1550	-	-	-	503	1039
Stage 1	-	-	-	-	985	-
Stage 2	-	-	-	-	592	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1550	-	-	-	425	1039
Mov Cap-2 Maneuver	-	-	-	-	425	-
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	592	-

Approach	EB	WB	SB
HCM Control Delay, s	7	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1550	-	-	-	427
HCM Lane V/C Ratio	0.154	-	-	-	0.344
HCM Control Delay (s)	7.7	0	-	-	17.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	1.5

Intersection	
Intersection Delay, s/veh	271.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	725	123	95	918	2	75	1	59	4	1	12
Future Vol, veh/h	2	725	123	95	918	2	75	1	59	4	1	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	15	15	15	15	15	15	10	10	10	10	10	10
Mvmt Flow	2	788	134	103	998	2	82	1	64	4	1	13
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	280.7	302.2	15	12.9
HCM LOS	F	F	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	56%	100%	0%	100%	0%	24%
Vol Thru, %	1%	0%	85%	0%	100%	6%
Vol Right, %	44%	0%	15%	0%	0%	71%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	2	848	95	920	17
LT Vol	75	2	0	95	0	4
Through Vol	1	0	725	0	918	1
RT Vol	59	0	123	0	2	12
Lane Flow Rate	147	2	922	103	1000	18
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.289	0.004	1.565	0.188	1.683	0.039
Departure Headway (Hd)	8.575	7.395	6.781	7.128	6.616	9.47
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	423	487	544	507	560	380
Service Time	6.575	5.095	4.481	4.828	4.316	7.47
HCM Lane V/C Ratio	0.348	0.004	1.695	0.203	1.786	0.047
HCM Control Delay	15	10.1	281.3	11.5	332.2	12.9
HCM Lane LOS	B	B	F	B	F	B
HCM 95th-tile Q	1.2	0	44.5	0.7	52.9	0.1

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	68	1	1	31	56	62
Future Vol, veh/h	68	1	1	31	56	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	1	1	34	61	67
Number of Lanes	0	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.9	6.8	7.6
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	99%	0%	47%
Vol Thru, %	1%	3%	0%
Vol Right, %	0%	97%	53%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	69	32	118
LT Vol	68	0	56
Through Vol	1	1	0
RT Vol	0	31	62
Lane Flow Rate	75	35	128
Geometry Grp	1	1	1
Degree of Util (X)	0.091	0.035	0.139
Departure Headway (Hd)	4.384	3.635	3.903
Convergence, Y/N	Yes	Yes	Yes
Cap	812	972	912
Service Time	2.437	1.706	1.957
HCM Lane V/C Ratio	0.092	0.036	0.14
HCM Control Delay	7.9	6.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.1	0.5

Summary of Road/Intersection Parameters

Project: Lakefield South Subdivision

Date: Nov 29, 2019

Major Street: County Rd. 29

Minor Street: 7th Line of Smith

Control: TWSC on 7th Line as minor approach

GEOMETRICS

No. Of Approaches 4 X 3 ____

East Approach

Urban ___ Rural X Grade to Intersection -3 % Post Spd 40 kph

No. Of Through Lanes 2 Total Width of Platform 6.25 m

Auxiliary Lanes

Rt Turn Taper N Length ___ m Rt Turn Lane N Length ___ m

Lt Turn Taper N Length ___ m Lt Turn Lane N Length ___ m

West Approach

Urban ___ Rural X Grade to Intersection 0 % Post Spd Not Post kph

No. Of Through Lanes 2 Total Width of Platform 6.25 m

Auxiliary Lanes

Rt Turn Taper N Length ___ m Rt Turn Lane N Length ___ m

Lt Turn Taper N Length ___ m Lt Turn Lane N Length ___ m

North Approach

Urban ___ Rural X Grade to Intersection 0 % Post Spd 70 kph

No. Of Through Lanes 2 Total Width of Platform 7.7 m

Auxiliary Lanes

Rt Turn Taper N Length ___ m Rt Turn Lane N Length ___ m

Lt Turn Taper N Length ___ m Lt Turn Lane N Length ___ m

South Approach

Urban ___ Rural X Grade to Intersection 0 % Post Spd 70 kph

No. Of Through Lanes 2 Total Width of Platform 7.5 m

Auxiliary Lanes

Rt Turn Taper Y Length 20 m Rt Turn Lane Y Length 35 m

Lt Turn Taper N Length ___ m Lt Turn Lane N Length ___ m

Project: Lakefield South Subdivision

Date: Nov 12, 2019

Major Street: County Rd 29

Minor Street: County Rd 18

Control: Signal

GEOMETRICS

No. Of Approaches 4____ 3 X

East Approach

Urban X Rural____ Grade to Intersection 2 % Post Spd 60 kph

No. Of Through Lanes 2 Total Width of Platform 6.6 m

Auxiliary Lanes

Rt Turn Taper Y Length 30 m Rt Turn Lane N Length / m

Lt Turn Taper N Length / m Lt Turn Lane N Length / m

West Approach

Urban____ Rural____ Grade to Intersection _____% Post Spd _____kph

No. Of Through Lanes____ Total Width of Platform_____ m

Auxiliary Lanes

Rt Turn Taper_____ Length_____m Rt Turn Lane_____ Length_____m

Lt Turn Taper_____ Length_____m Lt Turn Lane_____ Length_____m

North Approach

Urban X Rural____ Grade to Intersection +3 % Post Spd 60 kph

No. Of Through Lanes 2 Total Width of Platform 10.7 m

Auxiliary Lanes

Rt Turn Taper Y Length 40 m Rt Turn Lane Y Length 85 m

Lt Turn Taper N Length / m Lt Turn Lane N Length / m

South Approach

Urban X Rural____ Grade to Intersection -2 % Post Spd 60 kph

No. Of Through Lanes 2 Total Width of Platform 10.5 m

Auxiliary Lanes

Rt Turn Taper N Length / m Rt Turn Lane N Length / m

Lt Turn Taper Y Length 135 m Lt Turn Lane Y Length 60 m

Project: Lakefield South Subdivision

Date: Nov 12, 2019

Major Street: County Rd. 29 (Bridge Street)

Minor Street: Water Tower Road

Control: STOP on Water Tower Road

GEOMETRICS

No. Of Approaches 4 ___ 3 X plus North Commercial Entrance

East Approach

Urban X Rural ___ Grade to Intersection -2 % Post Spd 60 kph
No. Of Through Lanes 2 Total Width of Platform 9.8 m
Auxiliary Lanes
Rt Turn Taper N Length / m Rt Turn Lane N Length ✓ m
Lt Turn Taper NA Length / m Lt Turn Lane TWLTL Length Continuous

West Approach

Urban X Rural ___ Grade to Intersection -2 % Post Spd 60 kph
No. Of Through Lanes ___ Total Width of Platform 10.0 m
Auxiliary Lanes
Rt Turn Taper Y Length 55 m Rt Turn Lane N Length / m
Lt Turn Taper NA Length / m Lt Turn Lane TWLTL Length Continuous

North Approach – Commercial Entrance

Urban X Rural ___ Grade to Intersection 0 % Post Spd Not Post kph
No. Of Through Lanes 2 Total Width of Platform 10 m
Auxiliary Lanes
Rt Turn Taper N Length / m Rt Turn Lane N Length / m
Lt Turn Taper N Length / m Lt Turn Lane N Length / m

South Approach

Urban X Rural ___ Grade to Intersection ___ % Post Spd No Post kph
No. Of Through Lanes 2 Total Width of Platform 10.3 m
Auxiliary Lanes
Rt Turn Taper N Length / m Rt Turn Lane N Length / m
Lt Turn Taper N Length / m Lt Turn Lane N Length / m

Project: Lakefield South Subdivision

Date: Nov 12, 2019

Major Street: County Road 29 (Bridge St)

Minor Street: Clementi Street

Control: Signal

GEOMETRICS

No. Of Approaches 4 X 3 ___

East Approach

Urban X Rural ___ Grade to Intersection +2 % Post Spd Assume 50 kph

No. Of Through Lanes 2 Total Width of Platform 12.5 m

Auxiliary Lanes

Rt Turn Taper N Length / m Rt Turn Lane N Length / m

Lt Turn Taper Y Length 25 m Lt Turn Lane Y Length 40 m

West Approach

Urban X Rural ___ Grade to Intersection −2 % Post Spd Assume 50 kph

No. Of Through Lanes 2 Total Width of Platform 13.2 m

Auxiliary Lanes

Rt Turn Taper N Length / m Rt Turn Lane N Length / m

Lt Turn Taper Y Length 15 m Lt Turn Lane Y Length 20 m

North Approach

Urban X Rural ___ Grade to Intersection +2 % Post Spd 40 kph

No. Of Through Lanes 2 Total Width of Platform 10.5 m

Auxiliary Lanes

Rt Turn Taper N Length / m Rt Turn Lane N Length / m

Lt Turn Taper Y Length 15 m Lt Turn Lane Y Length 25 m

South Approach

Urban X Rural ___ Grade to Intersection −3 % Post Spd Assume 50 kph

No. Of Through Lanes 2 Total Width of Platform 11.5 m

Auxiliary Lanes

Rt Turn Taper N Length / m Rt Turn Lane N Length / m

Lt Turn Taper Y Length 15 m Lt Turn Lane Y Length 20 m

Project: Lakefield South Subdivision

Date: Nov 12, 2019

Major Street: Clementi St.

Minor Street: William St.

Control: AWSC – Stops posted on all 3 approaches.

GEOMETRICS
No. Of Approaches 4____ 3 X

East Approach
Urban___ Rural X Grade to Intersection +2 % Post Spd No Post kph
No. Of Through Lanes 2 Total Width of Platform 5.4 m
Auxiliary Lanes
Rt Turn Taper Y Length 30 m Rt Turn Lane N Length / m
Lt Turn Taper N Length / m Lt Turn Lane N Length / m

West Approach
Urban X Rural____ Grade to Intersection 0 % Post Spd No Post kph
No. Of Through Lanes 2 Total Width of Platform 6.9 m
Auxiliary Lanes
Rt Turn Taper N Length / m Rt Turn Lane N Length / m
Lt Turn Taper N Length / m Lt Turn Lane N Length / m

North Approach
Urban X Rural____ Grade to Intersection +2 % Post Spd No Post kph
No. Of Through Lanes 2 Total Width of Platform 8.1 m
Auxiliary Lanes
Rt Turn Taper N Length / m Rt Turn Lane N Length / m
Lt Turn Taper N Length / m Lt Turn Lane N Length / m

South Approach – Entrance to Lakefield Fair Ground
Urban___ Rural X Grade to Intersection 0 % Post Spd NA kph
No. Of Through Lanes 2 Total Width of Platform 10 m
Auxiliary Lanes
Rt Turn Taper_____ Length_____m Rt Turn Lane_____ Length_____m
Lt Turn Taper_____ Length_____m Lt Turn Lane_____ Length_____m

Trip Generation & Trip Distribution

Lakefield South Subdivision Trip Generation

AM Peak Hour

LU	Description	Rate	% In	% Out
210	Single Family Unit	0.74	25%	75%
210	Townhomes	0.74	25%	75%
220	Apartments	0.36	19%	81%
820	Neighbourhood Com	0.94	62%	38%

Commerical Uses

Pass-by Trips	80%
New Trips	20%

Single Family Units

Traffic Zn	LU 210	In	Out	Total
1	53	10	29	39
2	132	25	74	98
3	39	7	22	29
4	0	0	0	0
5	0	0	0	0
6	82	15	46	61
Total	**306**	**57**	**171**	**227**

Townhouse Units

Traffic Zn	LU 210	In	Out	Total
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	105	20	59	78
5	0	0	0	0
6	0	0	0	0
Total	**105**	**20**	**59**	**78**

Apartments

Traffic Zn	LU 210	In	Out	Total
1	182	13	53	66
2	0	0	0	0
3	0	0	0	0
4	236	16	69	85
5	64	4	19	23
6	84	6	24	30
Total	**566**	**39**	**165**	**204**

Neighbourhood Commercial

				Total		New Trips	
Traffic Zn	LU 820	In	Out	Total	In	Out	Total
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	10	6	3	9	1	1	2
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
Total	**10**	**6**	**3**	**9**	**1**	**1**	**2**

Total Residential Trips

Traffic Zn	In	Out	Total
1	23	82	105
2	25	74	98
3	7	22	29
4	36	128	163
5	4	19	23
6	21	70	91
Total Trps	116	395	509

New Commercial Trips

Traffic Zn	In	Out	Total
1	0	0	0
2	0	0	0
3	0	0	0
4	**1**	**1**	**2**
5	0	0	0
6	0	0	0
Total	**1**	**1**	**2**

AM Trip Distribution

Residential

Gateway	%
Bridge St East	22%
Clementi St Nrth	2%
CR 18 West	18%
7th Line West	8%
CR 29 South	50%
Total	100%

Commercial

Gateway	%
Bridge St East	0%
Clementi St Nrth	0%
CR 18 West	0%
7th Line West	100%
CR 29 South	0%
Total	100%

Lakefield South Subdivision Trip Generation & Trip Distribution

PM Peak Hour

LU	Description	Rate	% In	% Out
210	Single Family Unit	0.99	63%	37%
210	Townhomes	0.99	63%	37%
220	Apartments	0.53	61%	39%
820	Neighbourhood Com	3.81	48%	52%

Commerical Uses

Pass-by Trips	80%
New Trips	20%

Single Family Units

Traffic Zn	LU 210	In	Out	Total
1	53	33	19	52
2	132	83	48	131
3	39	25	14	39
4	0	0	0	0
5	0	0	0	0
6	82	51	30	81
Total	**306**	**192**	**111**	**303**

Townhouse Units

Traffic Zn	LU 210	In	Out	Total
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	105	66	38	104
5	0	0	0	0
6	0	0	0	0
Total	**105**	**66**	**38**	**104**

Apartments

Traffic Zn	LU 210	In	Out	Total
1	182	59	37	96
2	0	0	0	0
3	0	0	0	0
4	236	76	49	125
5	64	21	13	34
6	84	27	18	45
Total	**566**	**183**	**117**	**300**

Neighbourhood Commercial

Traffic Zn	LU 820	In	Total Out	Total	New Trips In	Out	Total
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	10	18	20	38	4	4	8
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
Total	**10**	**18**	**20**	**38**	**4**	**4**	**8**

Total Residential Trips

Traffic Zn	In	Out	Total
1	92	56	148
2	83	48	131
3	25	14	39
4	142	87	229
5	21	13	34
6	78	48	126
Total Trps	441	266	707

New Commercial Trips

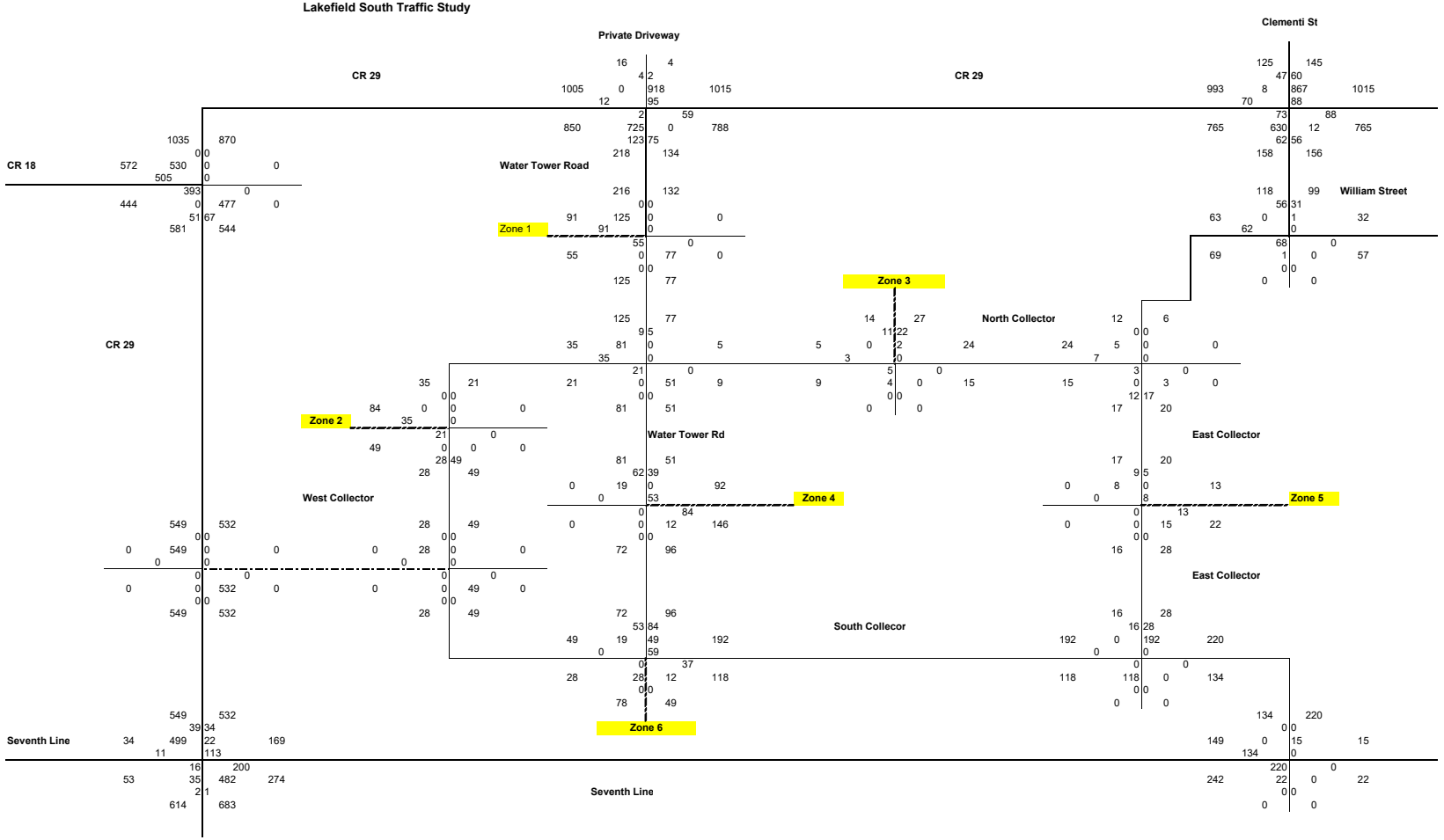
Traffic Zn	In	Out	Total
1	0	0	0
2	0	0	0
3	0	0	0
4	**4**	**4**	8
5	0	0	0
6	0	0	0
Total	**4**	**4**	**8**

PM Trip Distribution

Residential Gateway	%
Bridge St East	22%
Clementi St Nrth	2%
CR 18 West	18%
7th Line West	8%
CR 29 South	50%
Total	100%

Commercial Gateway	%
Bridge St East	0%
Clementi St Nrth	0%
CR 18 West	50%
7th Line West	0%
CR 29 South	50%
Total	100%

Lakefield South Traffic Study



Signal Warrant Analyses

TT Lakefield South Subdivsion

2029 Volume Profile for Signal Warrant Analyses

(Based on 2017 Volume Data for CR 18/CR 29)

Time	Period	Total 19	Total 29	G Fact	Hr Fact
8-9	1	1020	1623	1.59	1.00
9-10	2	989	1473	1.49	0.97
12-1	3	1126	1677	1.49	1.10
1-2	4	1101	1641	1.49	0.76
4-5	5	1455	2023	1.39	1.00
5-6	6	1092	1627	1.49	0.75

Copied in from orignal vol data sheet

Time	Period	Total 17	Total 29
8-9	1	1020	1623
9-10	2	989	1473
12-1	3	1126	1677
1-2	4	1101	1641
4-5	5	1455	2023
5-6	6	1092	1627

CR 29/Water Tower Rd

	Eastbound			Westbound			Northbound			Southbound				
time	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**		
8-9	5	712	34	29	645	1	107	1	86	2	1	2	1625	1.00
9-10	5	691	33	28	626	1	104	1	83	2	1	2	1577	0.97
12-1	6	783	37	32	710	1	118	1	95	2	1	2	1788	1.10
1-2	2	551	93	72	698	2	57	1	37	3	1	9	1526	0.76
4-5	2	725	123	95	918	2	75	1	49	4	1	12	2007	1.00
5-6	2	544	92	71	689	2	56	1	37	3	1	9	1507	0.75

CR 29/7th Line

	Eastbound			Westbound			Northbound			Southbound				
time	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**		
8-9	6	10	5	182	28	29	1	332	55	11	485	12	1156	1.00
9-10	6	10	5	177	27	28	1	322	53	11	470	12	1122	0.97
12-1	7	11	6	200	31	32	1	365	61	12	534	13	1273	1.10
1-2	12	27	2	86	17	26	1	366	152	30	379	8	1106	0.76
4-5	16	35	2	113	22	34	1	482	200	39	499	11	1454	1.00
5-6	12	26	2	85	17	26	1	362	150	29	374	8	1092	0.75

County of Peterborough - Traffic Signal Warrant Analysis

Main Street (name)	CR 29	Direction (EW or NS)	NS
Side Street (name)	7th Line	Direction (EW or NS)	EW
Quadrant / Int #		Comments	TT Lakefield South Subdivision 2029 Weekday Ver 2 Dec 27, 2019
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	County of Peterborough
City:	Township of Selwyn
Analysis Date:	2019 Dec 27, Fri
Count Date:	2029 Jul 20, Fri
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
CR 29	NB				1			3,000	1
CR 29	SB				1			1,500	1
7th Line	WB				1				
7th Line	EB				1				
Are the 7th Line WB right turns significantly impeded by through movements? (y/n)							y		
Are the 7th Line EB right turns significantly impeded by through movements? (y/n)							n		

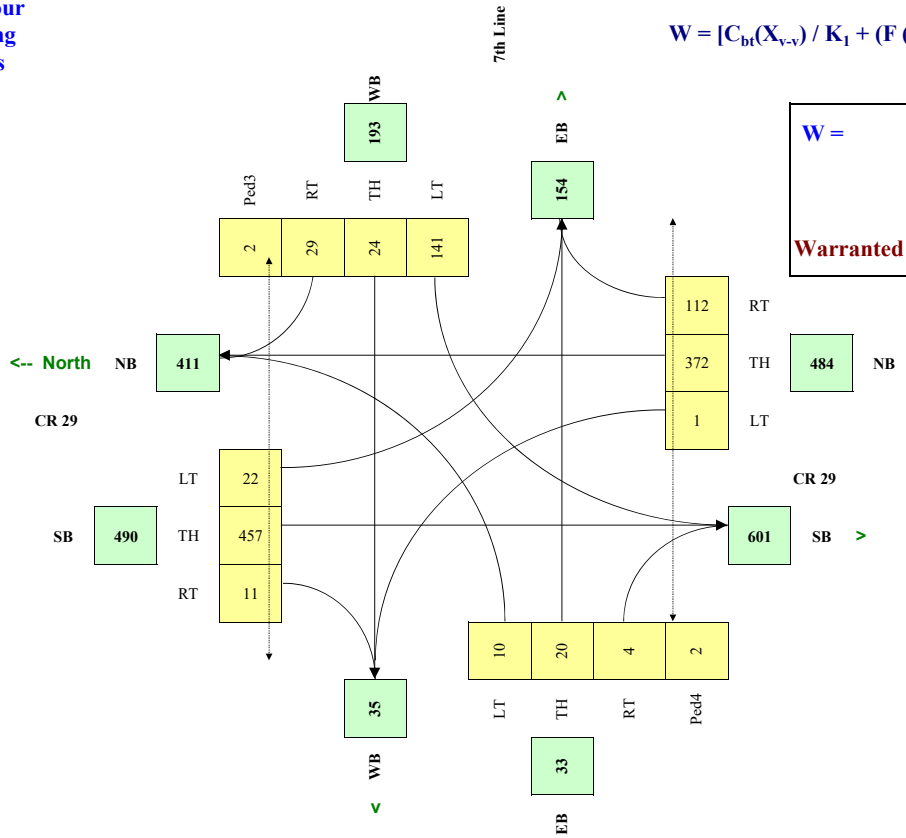
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	3,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
CR 29	NS	70	15.0%	n	
7th Line	EW	50	10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS	NS	EW	EW
													W Side	E Side	N Side	S Side
8:00 - 9:00	1	332	55	11	485	12	182	28	29	6	10	5	2	2	2	2
9:00 - 10:00	1	322	53	11	470	12	177	27	28	6	10	5	2	2	2	2
12:00 - 13:00	1	365	61	12	534	13	200	31	32	7	11	6	2	2	2	2
13:00 - 14:00	1	366	152	30	379	8	86	17	26	12	27	2	2	2	2	2
16:00 - 17:00	1	482	200	39	499	11	113	22	34	16	35	2	2	2	2	2
17:00 - 18:00	1	362	150	29	374	8	85	17	26	12	26	2	2	2	2	2
Total (6-hour peak)	**6**	**2,229**	**671**	**132**	**2,741**	**64**	**843**	**142**	**175**	**59**	**119**	**22**	**12**	**12**	**12**	**12**
Average (6-hour peak)	**1**	**372**	**112**	**22**	**457**	**11**	**141**	**24**	**29**	**10**	**20**	**4**	**2**	**2**	**2**	**2**

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F(X_{v\text{-}p})\,L) / K_2] \times C_i$$

W =	169	163	6
		Veh	*Ped*

Warranted

RESET SHEET

County of Peterborough - Traffic Signal Warrant Analysis

Main Street (name)	CR 29	Direction (EW or NS)	EW	Road Authority:	County of Peterborough
Side Street (name)	Tower Rd/Commercial En	Direction (EW or NS)	NS	City:	Village of Lakefield
Quadrant / Int #		Comments	TT Lakefield South Subdivision 2029 Weekday Ver 2 Dec 27, 2019	Analysis Date:	2019 Dec 27, Fri
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2029 Jul 20, Fri
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
CR 29	WB	1				1		420	1
CR 29	EB	1				1		450	1
er Tower Rd/Commercial Entr	NB				1				
er Tower Rd/Commercial Entr	SB				1				
ower Rd/Commercial Entrance NB right turns significantly impeded by through movements? (y/n)							y		
ower Rd/Commercial Entrance SB right turns significantly impeded by through movements? (y/n)							n		

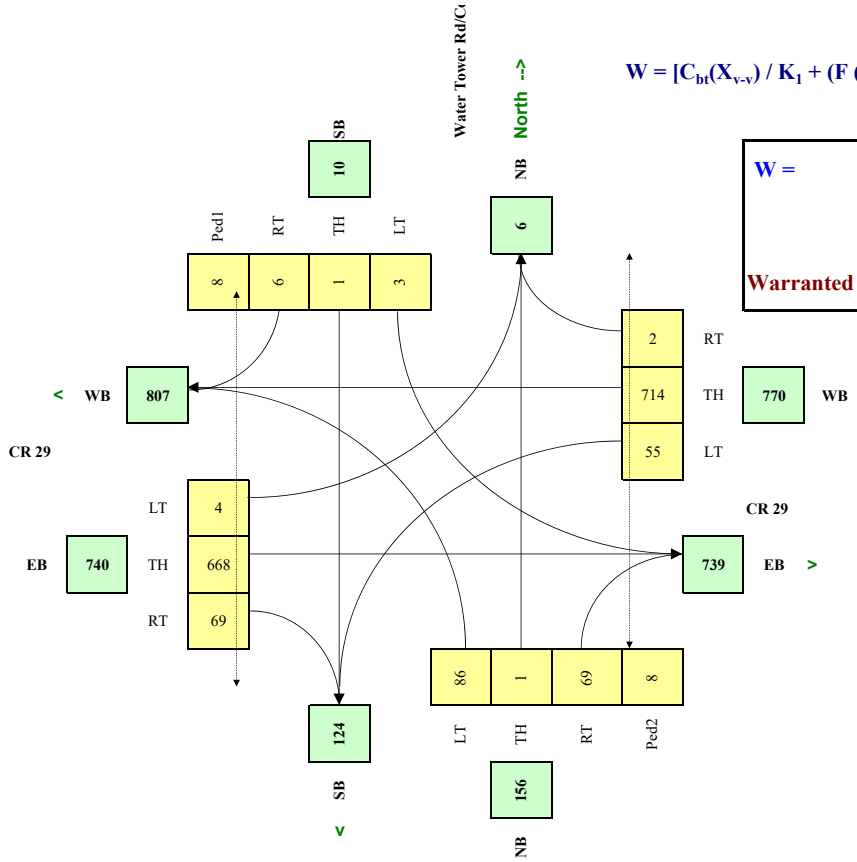
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	3,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
CR 29	EW	60	15.0%	n	
er Tower Rd/Commercial Entr	NS	50	10.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
8:00 - 9:00	107	1	86	2	1	2	29	645	1	5	712	34	5	5	5	20
9:00 - 10:00	104	1	83	2	1	2	28	626	1	5	691	33	5	5	5	20
12:00 - 13:00	118	1	95	2	1	2	32	710	1	6	783	37	5	5	5	10
13:00 - 14:00	57	1	45	3	1	9	72	698	2	2	551	93	10	10	10	10
16:00 - 17:00	75	1	59	4	1	12	95	918	2	2	725	123	10	10	10	20
17:00 - 18:00	56	1	44	3	1	9	71	689	2	2	544	92	10	10	10	10
Total (6-hour peak)	**517**	**6**	**412**	**16**	**6**	**36**	**327**	**4,286**	**9**	**22**	**4,006**	**412**	**45**	**45**	**45**	**90**
Average (6-hour peak)	**86**	**1**	**69**	**3**	**1**	**6**	**55**	**714**	**2**	**4**	**668**	**69**	**8**	**8**	**8**	**15**

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F(X_{v\text{-}p}) L) / K_2] \times C_i$$

W =	191	158	33
		Veh	*Ped*

Warranted

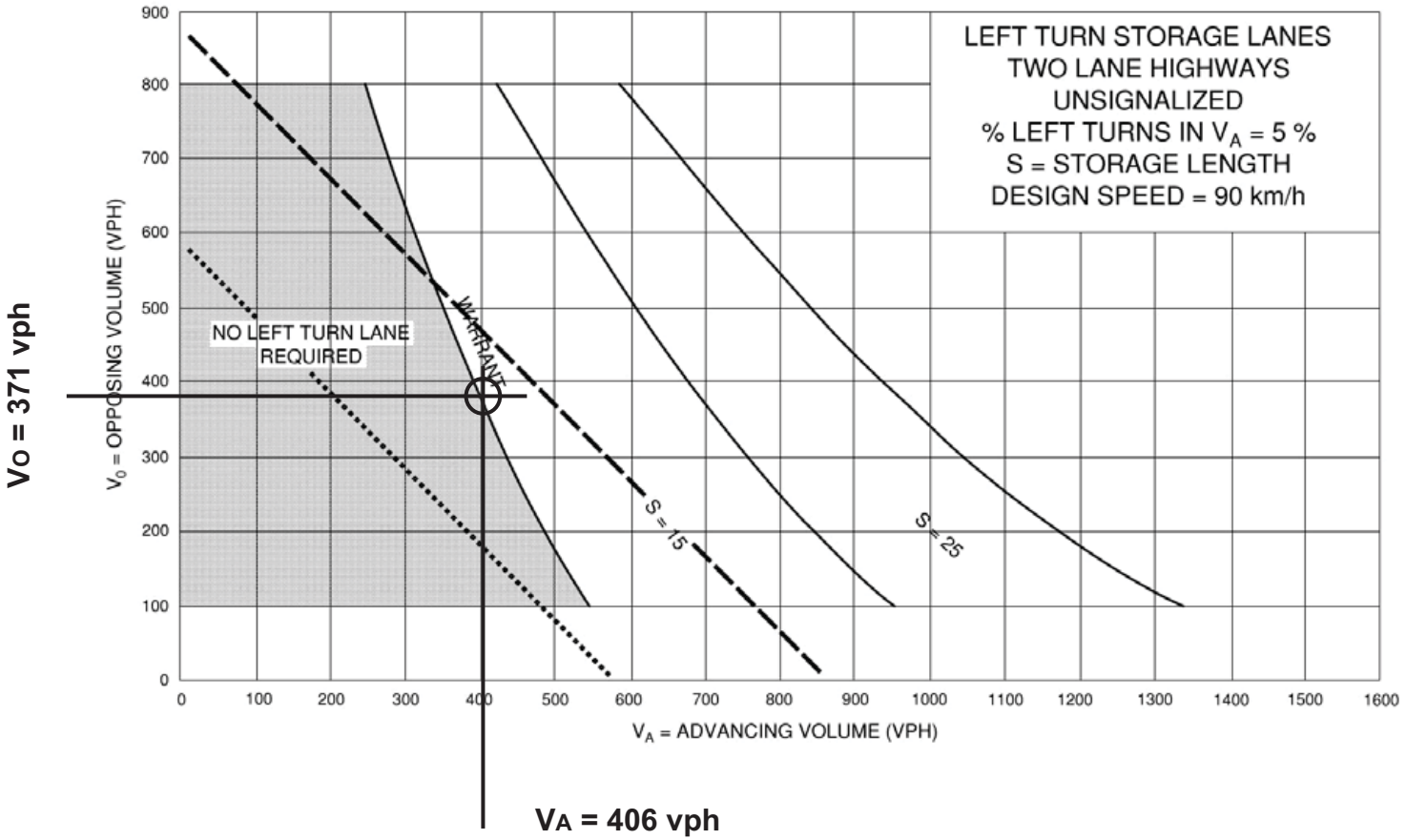
RESET SHEET

Auxiliary Lane Warrant Analyses

Left Turn Warrant Analysis
Southbound CR 29 @ 7th Line
2018 PM Design Hour Volumes

TAC Geometric Design Guide for Canadian Roads, June 2017 MTO Design Supplement

Exhibit 9A-18



Vo = 371 vph

VA = 406 vph

VL = 20 vph ~ 5% LT

Lakefield South Subdivision

Auxiliary Lane Warrant Evaluation Based on 2029 Total Peak Hour Volumes

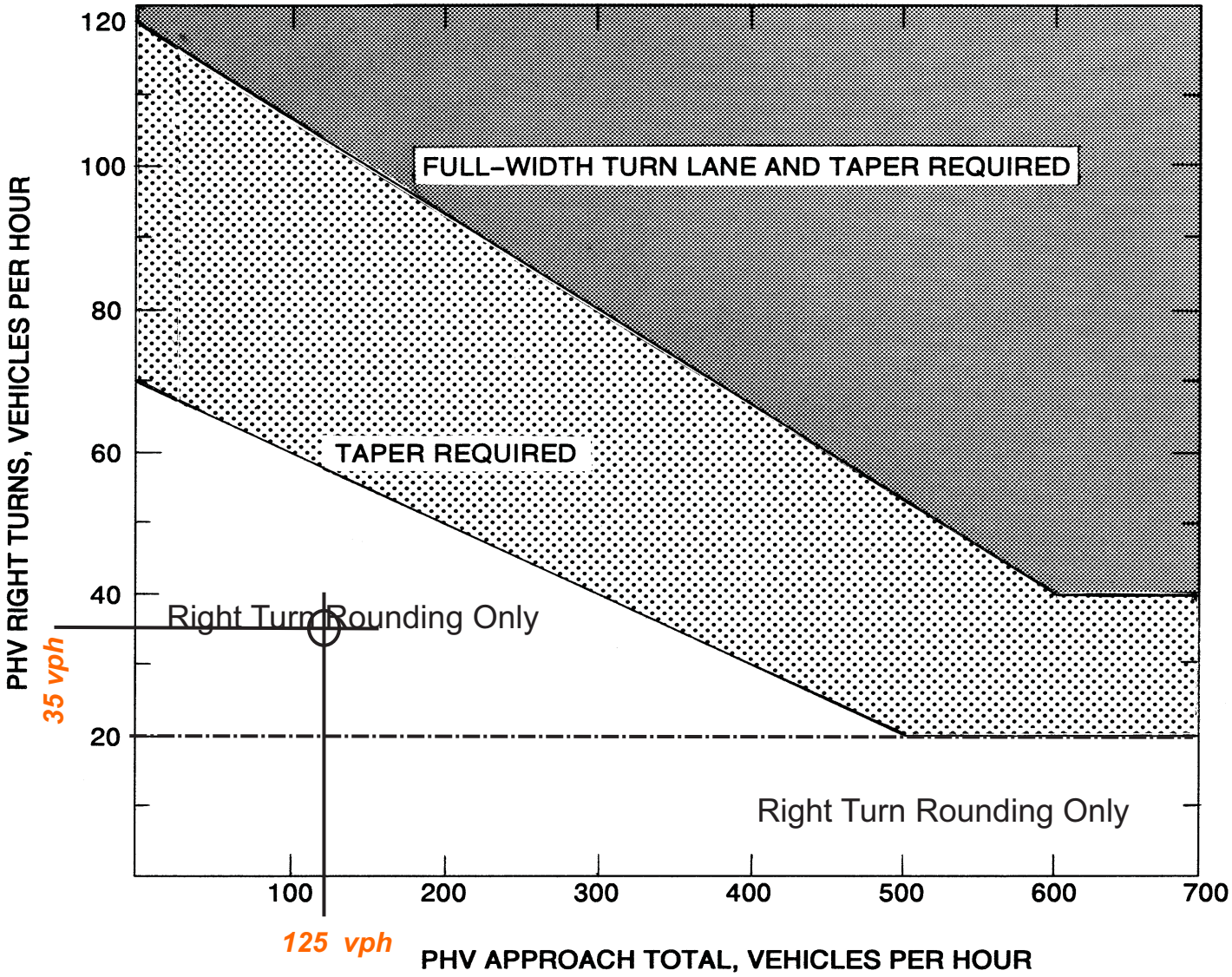
1. South Collector Road/7th Line Intersection – PM Eastbound Peak Hour Left Turns
   V_A = 242 vph
   V_L = 220 vph
   V_O = 15 vph
   No real warrant for a left turn lane since opposing volumes are only forecasted to be 15 vph or about 1 vehicle every 4 minutes.
   AM peak hour Left-turning volumes will be considerably lower.

2. South Collector Road /7th Line Intersection AM Peak Southbound Right Turns
   V_T = 196-8 vph
   V_R = 196 vph
   Since virtually all southbound traffic is turning right to travel west on the 7th Line there is no requirement for a separate southbound right turn lane. An appropriate radiused "rounding" will accommodate these future right turns.

3. North Collector/Water Tower Road – Representative Intersection
   AM Peak Hour
   All approach volumes are less than 75 vph – no auxiliary turning lanes required

   PM Peak Hour
   Peak approach volume is 125 vph with 35 vph turning right. Based on VDOT right turn lane warrant sheet a "rounding" only is all that is required. A copy of this warrant nomograph is attached following.
   All other approach volumes will be less than 55 vph. No auxiliary turning lanes will be required.

Southbound Right Turn Lane Warrant Analyses
Water Tower Rd @ North Collector
2029 Total Peak Hour Volumes



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

NOTE 1 - All Westbound Right Turn approach volumes on CR 18
at the Polish Perfection Entrance are less than 20 vph
For the 2029 Total PM peak hour

VDOT Guidelines for Right Turn Treatment
Two Lane Highway