



BURNSIDE

Collingwood Transportation Study Update

**Town of Collingwood
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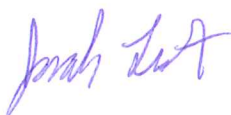
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Executive Summary

A multitude of developments varying in size and complexity are proposed in the Town of Collingwood (Town) over the next few decades. The Town has retained R.J. Burnside & Associates Limited (Burnside) to estimate the total traffic volumes to be generated by the proposed developments and the corresponding impacts on the Town's road network over the medium-term (2031) and long-term (2041). A total of 20 primary intersections in the Town were assessed.

This Transportation Study Update (TSU) is an update to the *Town of Collingwood Transportation Study*, completed by C.C. Tatham & Associates Ltd. (Tatham) in July 2012. The Study completed by Tatham assessed a total of 16 intersections in the Town, of which 14 are also considered in this TSU. Tatham's Study considered traffic impacts in future horizon years 2020 and 2030.

The impacts from increased development traffic on the Town's road network were subsequently used to determine any infrastructure improvements that may be required at Town intersections and road segments in horizon years 2031 and 2041, to accommodate total forecast traffic volumes. Burnside has provided preliminary cost estimates for each of the forecasted required improvements, in order to assist the Town in determining future development charge rates for roads and related infrastructure.

Traffic impacts were assessed under existing, 2031/2041 background, and 2031/2041 total traffic conditions. Turning movement traffic volume data was obtained at the 20 intersections studied in December 2018, with the traffic volumes increased marginally by a seasonal factor for use in this TSU. Background traffic volumes were estimated by applying a general annual growth rate to the existing traffic volumes, to account for non-development related traffic growth occurring in the Town as well as traffic growth originating in areas beyond the Town's boundaries and that may impact volumes in the Town. Total traffic consists of the background traffic volumes plus the traffic volumes forecasted to be generated by the developments which are anticipated for completion within the time horizons considered.

Based on the volumes of future traffic forecasted, as well as network connectivity and land use considerations, the following roads have been identified for potential classification upgrade, within the time horizons considered:

- Old Mountain Road – may warrant upgrading from a local road to a collector road classification by 2031.
- Cranberry Trail East and West – may warrant upgrading from a local road to a collector road by 2041.
- Tenth Line – may warrant upgrading from a collector road to an arterial road by 2031.

- Cambridge Street – may warrant upgrading from a local road to a collector road by 2031.
- Campbell Street – may warrant upgrading from a local road to a collector road by 2031.

Based on the analysis completed, the short-term, medium-term, and long-term improvement recommendations are summarized below in Table (i), Table (ii), and Table (iii), respectively. The recommended intersection improvements in the medium-term (2031) and long-term (2041) are also illustrated below in Figure (i) and Figure (ii), respectively.

Table (i): Existing Recommendations (2019)

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
All movements at all intersections in the Study Area operate with sufficient capacity and a LOS E or better. Therefore, no intersection improvements are required in the short term.			
Road Segments			
The capacity of all road segments studied adequately supports existing traffic volumes. Therefore, no road segment improvements are required under existing conditions.			

Table (ii): Medium-Term Recommendations (By Horizon Year 2031)

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
Highway 26 & Cranberry Trail E/Gun Club Road	- Addition of traffic signals. - Addition of westbound left-turn lane. - Addition of eastbound left-turn lane.	\$500,000	A+
First Street & High Street / Balsam Street	- Addition of southbound left-turn lane. - Addition of eastbound right-turn lane.	\$500,000	A+
Tenth Line & Mountain Road	- Addition of a dedicated left-turn lane to all four approaches. - Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane. - Addition of a northbound right-turn lane.	\$1.3M	A+
	<i>Option #2 ¹:</i> Construct two-lane roundabout.	\$1.2M	A+
Mountain Road & Old Mountain Road/Cambridge Street	- Addition of a northbound right-turn lane. - Addition of a southbound right-turn lane. - Convert existing westbound right-turn into a shared westbound through/right-turn lane.	\$550,000	A+
High Street & Third Street/Cambridge Street	- Addition of traffic signals. - Addition of a dedicated left-turn lane to all four approaches.	\$1.2M	A+
High Street & Campbell Street ²	<i>Option #1:</i> - Addition of traffic signals. - Addition of westbound left-turn lane. - Addition of northbound right-turn lane.	\$500,000	A+
	<i>Option #2:</i> Construct two-lane roundabout.	\$1M	A+
Tenth Line & Sixth Street (Simcoe County Jurisdiction)	<i>Option #1:</i> - Addition of traffic signals. - Addition of a dedicated left-turn lane to all four approaches.	\$1M	A+
	<i>Option #2 ¹:</i>	\$1M	A+

	Construct single lane roundabout.		
Raglan Street & Poplar Sideroad (Simcoe County Jurisdiction)	Addition of a southbound left-turn lane.	\$150,000	A+
Road Segments			
Mountain Road (Tenth Line to Cambridge Street)	- Widen to include two travel lanes per direction plus a centre two-way left-turn lane (TWLTL). - Widen the bridge structure approximately 150 metres west of Cambridge Street. - Urban cross section.	\$8.3M	C

1. A roundabout alternative has been recommended in the *Tenth Line and Mountain Road Improvements Class EA* (Ainley Group, April 2019).

2. Further detailed studies and cost-benefit analyses required to determine preferred option.

Table (iii): Long-Term Recommendations (By Horizon Year 2041)

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
Balsam Street/Harbour Street W & Highway 26	- Addition of a northbound left-turn lane (on Highway 26). - Addition of a southbound left-turn lane (on Highway 26).	\$600,000	A+
First Street & High Street/Balsam Street	Addition of northbound right-turn lane.	\$250,000	A+
Tenth Line & Mountain Road	<i>If Option #1 were selected in Medium Term:</i> - Addition of an eastbound through lane. - Addition of a westbound through lane.	\$600,000	A+
Mountain Road & Old Mountain Road/Cambridge Street	Addition of an eastbound right-turn lane.	\$250,000	A+
High Street & Sixth Street	- Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane.	\$500,000	A+
Tenth Line & Sixth Street (Simcoe County Jurisdiction)	<i>If Option #1 were selected in Medium Term:</i> Addition of a southbound left-turn lane.	\$250,000	A+
Raglan Street & Poplar Sideroad ¹ (Simcoe County Jurisdiction)	<i>Option #1:</i> - Addition of traffic signals. - Addition of an eastbound left-turn lane. - Addition of a westbound right-turn lane.	\$600,000	A+
	<i>Option #2:</i> Construct two-lane roundabout.	\$1M	A+
Poplar Sideroad & Concession 10	Addition of a southbound left-turn lane.	\$250,000	A+

(Simcoe County Jurisdiction)			
Road Segments			
Highway 26 (Harbour Street West to Grey Road 21) ²	- Widen to include two travel lanes per direction plus a centre TWLTL.³ - Rural cross section.	\$11.7M	C
High Street (Tenth Street to Poplar Sideroad)	- Widen to include two travel lanes per direction. - Urban cross section.	\$3.5M	C

1. Further detailed studies and cost-benefit analyses required to determine preferred option.
2. For the purposes of this study, it is assumed that the widening of Highway 26 would extend from Harbour Street West to Grey Road 21 (i.e., the boundary road between Collingwood and The Blue Mountains).
3. The recommendation to widen Highway 26 to a five-lane cross section assumes that the Highway 26 Bypass around Collingwood is not constructed prior to horizon year 2041.

Even with the recommended improvements noted above, the traffic forecasts indicate that there will still be a need for additional east/west capacity through Collingwood in the medium to long-term (First Street is forecast to have a volume to capacity ratio of 1.0 by 2031) as the First Street corridor and First Street / High Street intersection reach their practical limits for expansion. Acting as an alternative route into and around Collingwood, Poplar Sideroad (County Road 32) is also expected to reach its practical capacity in the long-term. Therefore, it is recommended that the Town encourage the Ministry of Transportation of Ontario (MTO) to advance their planning for a new highway around Collingwood (i.e. Collingwood Bypass).

Figure (i): 2031 Intersection Lane Configuration and Traffic Control Recommendations

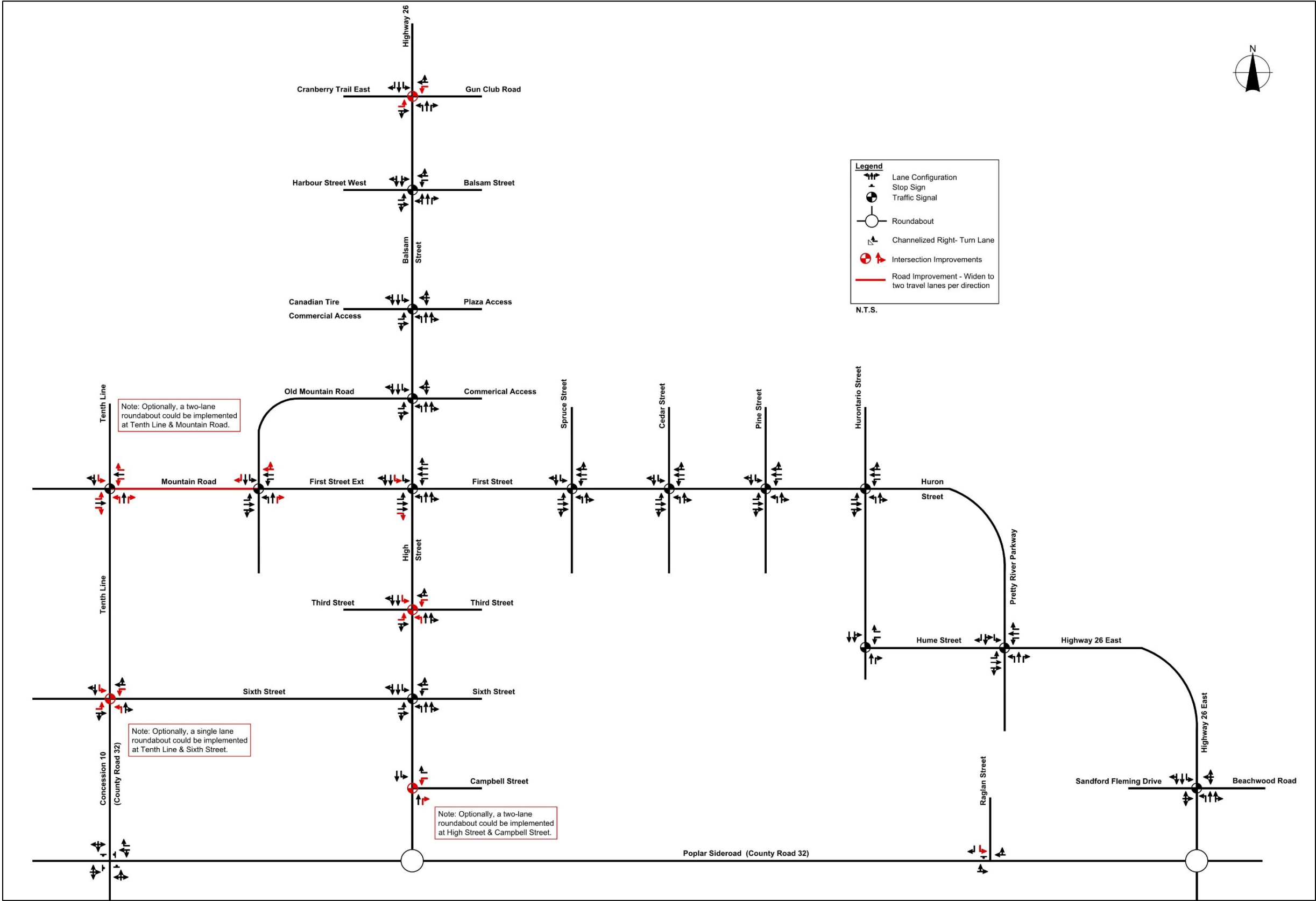


Figure (ii): 2041 Intersection Lane Configuration and Traffic Control Recommendations

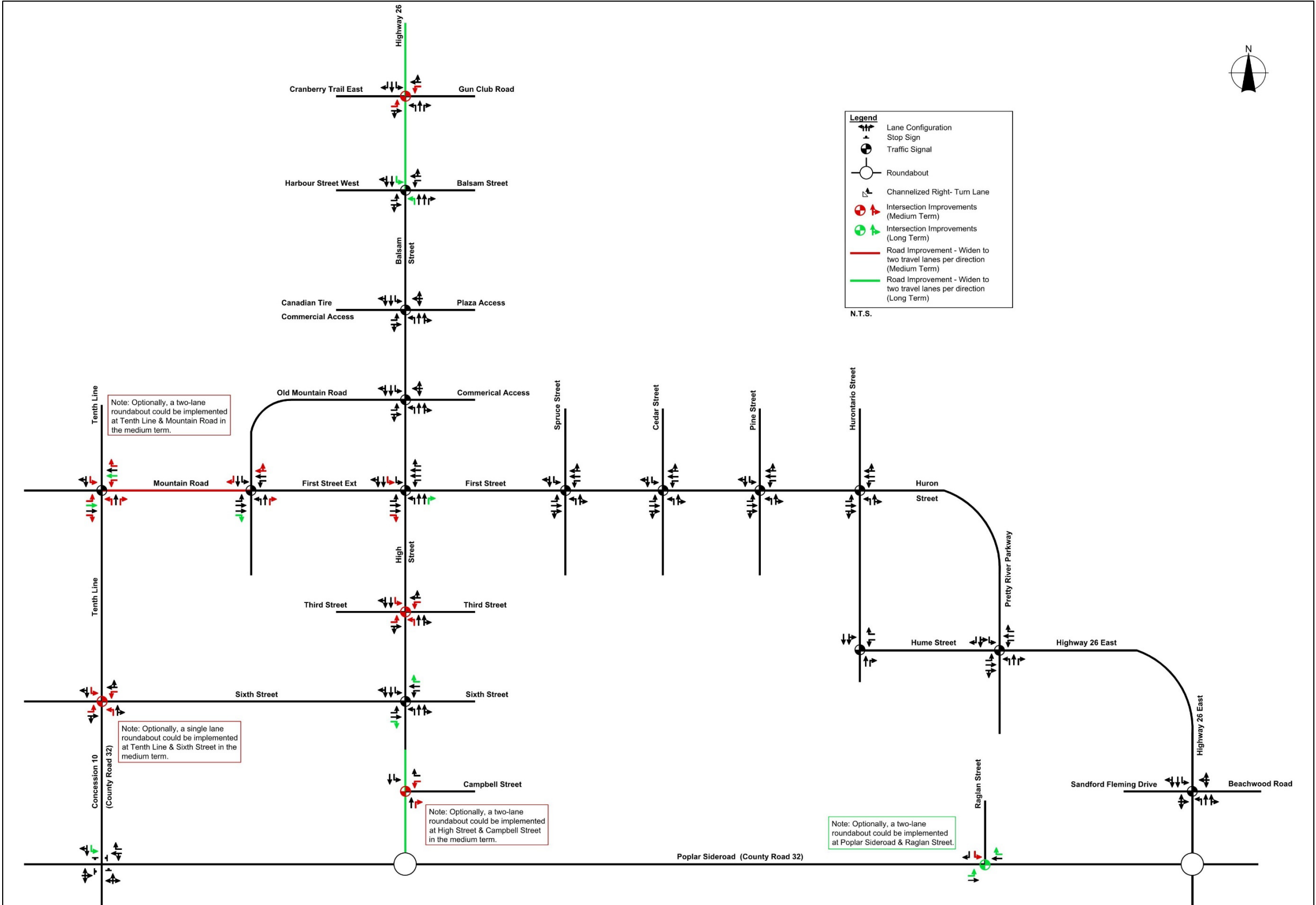


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1.0 Introduction

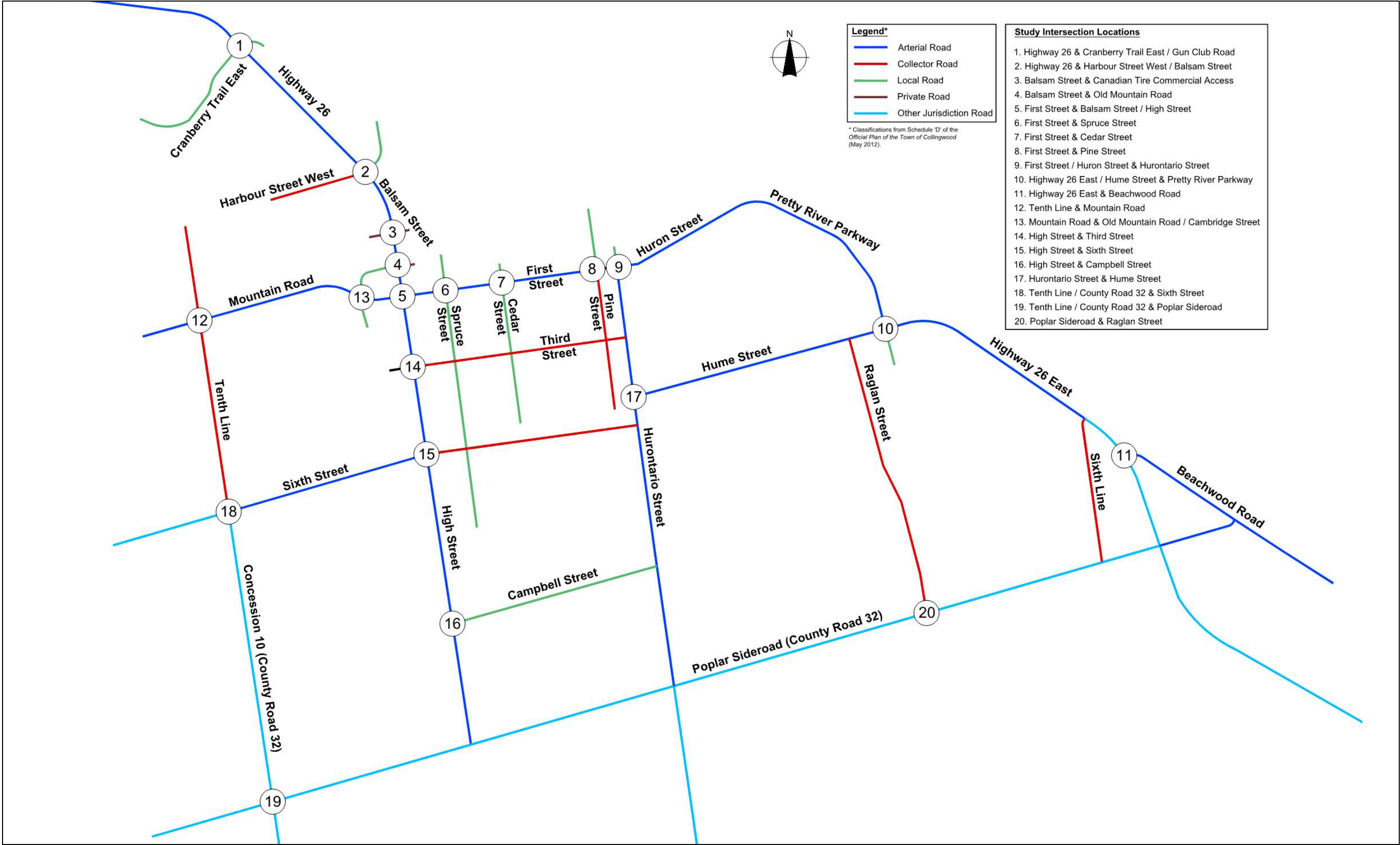
1.1 Project Background

A multitude of developments in and around the Town of Collingwood (Town) are anticipated over the next 20 years. R.J. Burnside & Associates Limited (Burnside) has been retained by the Town to conduct a Transportation Study Update (TSU) which reviews the impacts that future traffic growth will have on the Town's road network and transportation infrastructure needs through horizon year 2041.

This TSU is an update to the *Town of Collingwood Transportation Study* submitted by C.C. Tatham & Associates Ltd. on July 9, 2012, which is herein referred to as the *2012 Transportation Study*. A total of 20 intersections in the Town are reviewed in this TSU, with the intersection locations illustrated in Figure 1.

Similar to the *2012 Transportation Study*, it is noted that the focus of this TSU is on existing and future vehicular traffic operations within Collingwood and the related infrastructure. While other modes of travel such as transit, cycling, and walking are important components of the overall transportation system, the assessment of their needs is not included in the TSU scope.

Figure 1: Study Intersection Locations



1.2 *Town of Collingwood Transportation Study, C.C. Tatham & Associates Ltd., July 9, 2012*

The *Town of Collingwood Transportation Study*, published by C.C. Tatham & Associates Ltd. on July 9, 2012, consisted of a comprehensive review of a total of 16 intersections in the Town, in addition to various road segment needs. A list of short-term (0-5 years), medium-term (5-10 years), and long-term (10+ years) recommendations were presented in the *2012 Transportation Study*. The primary conclusions and recommendations made in this previous study are paraphrased as follows, along with the current status of these potential improvements shown in brackets after each improvement identified:

Short-Term Recommendations

- All key intersections studied provide acceptable service under existing (i.e., 2010) conditions. No intersection improvements are required.
- Available road capacities of the road segments studied can adequately support existing traffic volumes. No road segment improvements are required to increase capacity.

Medium Term Recommendations (2020)

- At the intersection of High Street and The Home Depot Access, remove the signals and convert the access to a right-in/right-out while creating an additional full-moves access onto Third Street or Cambridge Street extension (Option 1), or close the existing access and create a full-moves access on Third Street or Cambridge Street extension. (status: works planned in 2019)
- At the intersection of High Street and Third Street, install traffic signals in addition to an exclusive eastbound right-turn lane. (status: signalization and turning lanes planned in 2019)
- At the intersection of High Street and First Street:
 - construct an exclusive eastbound right-turn lane, thus creating two eastbound through lanes.
 - convert shared southbound through/left-turn lane into exclusive left-turn lane.
 - construct a shared southbound through/right-turn lane to maintain two southbound through lanes.
 - re-optimize signal timings, including a permitted and overlap phase for the eastbound right movement.
 - (status: not completed)
- At the intersection of Mountain Road and Tenth Line, install traffic signals (status: temporary signals have been installed at the intersection in 2012, currently controlled via semi-actuated signals, with detectors on Tenth Line).
- At the intersection of Sixth Street and Tenth Line, either install traffic signals (Option 1), construct a two-lane roundabout (Option 2), or implement an all-way stop plus an

- exclusive westbound right-turn lane (Option 3). (status: County installed all-way stop in 2015; intersection is now under Simcoe County jurisdiction)
- Available road capacities of the road segments studied can adequately support the forecast 2020 traffic volumes. No road segment improvements are required to increase capacity. (status: Hume Street has been widened in 2015/2016 to include a centre left turn lane throughout its length; Highway 26 has been widened in 2018 to include two lanes in each direction, plus a centre left turn lane, between Pretty River Parkway and Marine View Drive; Improvements were made to the Poplar Sideroad corridor and to the 10th Line corridor in 2012, including providing EB/WB left turn lanes at Hurontario Street and a roundabout at Poplar Sideroad / High Street; EB/WB left turn lanes were added to the intersection of First Street / Huron Street / Hurontario Street in 2014; Two-way left-turn lane and right turn tapers were added at all intersections along Highway 26 in 2015 between Keith Avenue and Princeton Shores Boulevard)

Long-Term Recommendations (2030)

- At the intersection of Highway 26 and Balsam Street / Harbour Street West, construct an exclusive eastbound right-turn lane, an exclusive northbound left-turn lane, and an exclusive southbound left-turn lane. (status: an eastbound left-turn lane was added to Harbour Street West in 2018)
- At the Mountain Road and Cambridge Street intersection, convert westbound right-turn lane into a shared through/right-turn lane, construct exclusive northbound and southbound right-turn lanes, and implement permitted and protected phase for the eastbound left-turn. (status: not completed)
- At the High Street and Third Street intersection, construct exclusive northbound and southbound left-turn lanes with permitted and protected phasing, in addition to constructing an exclusive westbound right-turn lane. (status: signalization and turning lanes planned in 2019).
- At the High Street and Sixth Street intersection, construct an exclusive southbound right-turn lane, thus creating two exclusive southbound through lanes, in addition to implementing exclusive permitted and protected phases for the eastbound left-turn. (status: not completed)
- At the High Street and First Street intersection, construct exclusive northbound and southbound right-turn lanes in addition to revising the signal timing plans to include permitted and protected phasing for the eastbound left-turn. (status: not completed)
- At the Mountain Road and Tenth Line intersection, assuming signal control, construct an exclusive westbound left-turn lane (with permitted/protected phase), construct an exclusive eastbound left-turn lane, and construct a northbound right-turn lane (thus creating a shared northbound through/left-turn lane. (status: not completed)
- At the Sixth Street and Tenth Line intersection, implement signals or a two-lane roundabout if the intersection is unsignalized as of 2020. (status: not completed; intersection is now under Simcoe County jurisdiction)

- Widen Mountain Road from west of Tenth Line to Cambridge Street (approximately one kilometre) to include two travel lanes per direction. (status: not completed)
- At the intersection of Hurontario Street and Hume Street, replace the southbound shared through/left-turn lane with an exclusive left-turn lane. (status: not completed)
- At the intersection of Hume Street and Pretty River Parkway, convert the southbound shared through/left-turn lane into an exclusive left, convert the existing southbound exclusive right into a shared through/right-turn lane, and implement protected phasing for the southbound and northbound left-turns. (status: added SB right turn lane, northbound left turn lane and eastbound through lane in 2018)
- At the intersection of Poplar Sideroad and Raglan Street, do nothing (Option 1) or implement a roundabout (Option 2). (status: added eastbound left slip lane at Raglan in 2012; intersection is now under Simcoe County jurisdiction)
- At the intersection of Poplar Sideroad and Sixth Line, implement traffic signals (Option 1) or a roundabout (Option 2). (status: not completed; intersection is now under Simcoe County jurisdiction)

In addition to the above recommendations, a traffic diversion scenario was evaluated in the *2012 Transportation Study* which concluded that promoting an alternative route for east-west traffic through Collingwood, such as along Poplar Sideroad and Tenth Line, could be a potential strategy to improving traffic operations along the First Street corridor.

1.3 Scope of Work

The following scope and methodology was confirmed with the Town.

Analysis Scenarios	• Existing (2019) traffic conditions • 2031 background traffic conditions (background traffic growth) • 2031 total traffic conditions (background traffic growth plus development traffic) • 2041 background traffic conditions • 2041 total traffic conditions
Analysis Time Periods	• Weekday Morning Peak Period (7:00 – 9:00 AM) • Weekday Afternoon Peak Period (3:00 – 6:00 PM)
Analysis Intersections ("Study Area")	• Highway 26 & Cranberry Trail East / Gun Club Road • Highway 26 & Harbour Street West / Balsam Street • Balsam Street & Canadian Tire Commercial Access • Balsam Street & Old Mountain Road • First Street & Balsam Street / High Street • First Street & Spruce Street • First Street & Cedar Street • First Street & Pine Street • First Street & Huron Street & Hurontario Street • Highway 26 East / Hume Street & Pretty River Parkway • Highway 26 & Beachwood Road / Sandford Fleming Drive • Tenth Line & Mountain Road • Mountain Road & Old Mountain Road / Cambridge Street • High Street & Third Street • High Street & Sixth Street • High Street & Campbell Street • Hurontario Street & Hume Street • Tenth Line & Sixth Street (now under the jurisdiction of the County of Simcoe) • Concession 10 & Poplar Sideroad (now under the jurisdiction of the County of Simcoe) • Poplar Sideroad & Raglan Street (now under the jurisdiction of the County of Simcoe)

It is noted that although some of the studied intersections are now under the jurisdiction of the County of Simcoe, they have been included in the TSU analysis for comparison with the previous study and consideration of alternate routes through Collingwood.

1.4 Intersection Analysis Methodology

Non-roundabout intersection operations were assessed for intersections in the Study Area using the software program Synchro 9, which employs methodology from the *Highway Capacity Manual (HCM 2000 and HCM 2010)*, published by the Transportation Research Board National Research Council. Synchro 9 can analyze both signalized and unsignalized intersections in a road corridor or network, accounting for the spacing, interaction, queues and operations between intersections. The analysis has utilized the HCM 2000 methodology.

The signalized intersection analysis considers two separate measures of performance:

- The capacity of all intersection movements, which is based on a volume to capacity ratio (v/c ratio) that measures the degree of capacity utilized.
- The Level of Service (LOS) for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and for the overall intersection. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between A and F, with F being the longest delay. The link between LOS and delay (in seconds) for signalized intersections is summarized in Table 1.

Table 1: Level of Service (LOS) Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (s)
A	≤10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

The two-way unsignalized intersection analysis considers two separate measures of performance:

- The capacity of the intersection's critical movements, which is based on a v/c ratio.
- The level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection. The link between LOS and delay (in seconds) for unsignalized intersections is summarized in Table 2.

Table 2: Level of Service Criteria (LOS) for Unsignalized Intersections

Level of Service	Control Delay per Vehicle (s)
A	0 – 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

Roundabout intersection operations were assessed using the software program ARCADY. As the capacity analysis of the software is based on British research and driving habits, certain parameters require adjustments for local conditions. The adjustments recognize that North American drivers are not accustomed to roundabouts and therefore full capacity potential is not yet being reached; however, as drivers become more familiar with roundabouts over time, capacity will approach normalized levels. Therefore, for the 2031 and 2041 horizon periods, a 10% reduction was applied to the y-intercept of the capacity equation in the roundabout analysis.

The geometric configuration of a roundabout has a significant impact on capacity and operations. The key geometric parameters assumed in the analysis are shown in Table 3.

Table 3: Roundabouts – Key Geometric Parameters

Geometric Parameter	Single Lane Roundabout Analysis Value (meters)	Two-Lane Roundabout Analysis Value (meters)
Approach Road Half-width (V)	3.50 – 3.75	3.75 - 7.00
Entry Width (E)	4.50	8.00
Effect Flare Length (L)	30	30 - 50
Entry Radius (R)	20	20
Inscribed Circle Diameter (D)	40	55
Entry Angle (phi) in degrees	25°	25°

It is noted that although any potential roundabout design would likely have entry widths larger than those specified in Table 3, larger entry widths are not used in the analysis because ARCADY will start to overestimate capacity because it assumes there is sufficient width for vehicles to start forming an additional line.

Similar to unsignalized intersections, ARCADY was used to determine the following measures of performance:

- The capacity of the critical intersection movements, which is based on a volume to capacity ratio.
- The level of service for all critical movements, which is based on the average control delay per vehicle for the various movements through the intersection.

The level of service for roundabout intersections is categorized as a letter grade depending on average control delay, following the same criteria as stop controlled intersections (as outlined in Table 2 above).

2.0 Existing Conditions

2.1 Population

The population of the Town between 2001 and 2016 is highlighted in Table 4. Between 2011 and 2016 the Town's population increased by 13.3%, which translates to an average annual compounded growth rate of approximately 2.52%. Between 2001 and 2016 the Town's population grew by an average annual compounded growth rate of approximately 2.06%.

Table 4: Town of Collingwood Population¹

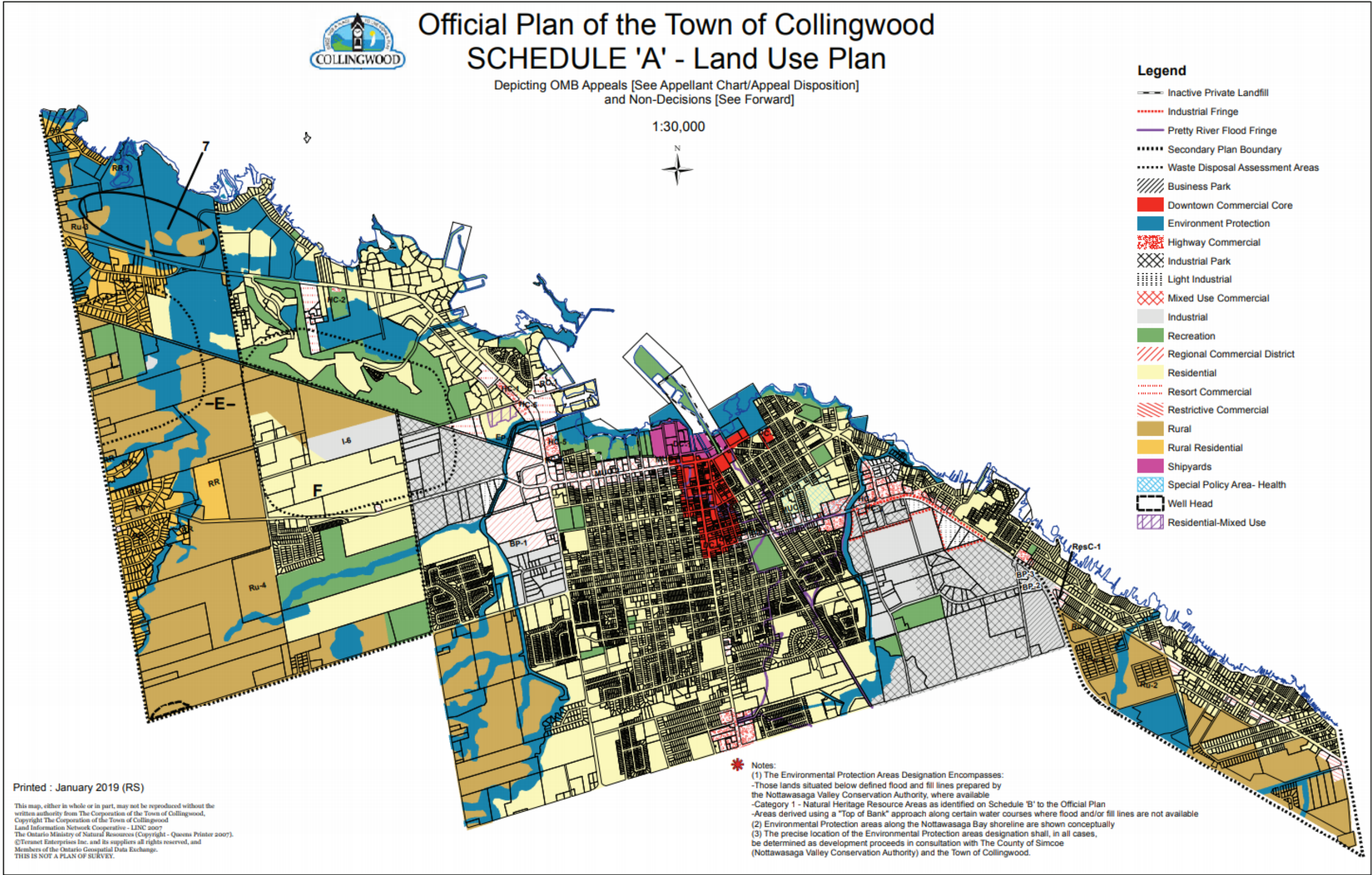
Year	Population	
	Persons	Percent Change
2016	21,793	13.3%
2011	19,241	9.9%
2006	17,503	9.1%
2001	16,039	-

2.2 Land Use

The existing land use designations within the Town are illustrated in Figure 2, as established in the Town's Official Plan.

¹ 2016, 2011, and 2006 Census Profile, Statistics Canada.

Figure 2: Land Use Plan (Schedule 'A' of the *Official Plan of the Town of Collingwood*, January 2019)



2.3 Existing Road Network

The Town's existing road network (i.e., Study Area) is described below.

Highway 26	Highway 26 is a provincial highway under the jurisdiction of the Ministry of Transportation Ontario (MTO). Highway 26 is assumed by the MTO from the eastern municipal boundary to Beachwood Road. Highway 26 has a posted speed limit of 60 km/h between Harbour Street West and Silver Glen Boulevard and 70 km/h southeast of Poplar Sideroad (and 90 km/h farther east). The MTO classifies Highway 26 to the east of Beachwood Road as a "Class III – Special Controlled Highway." The segment of Highway 26 running through the Town between Beachwood Road and Grey County Road 21 is unassumed by the MTO and is classified as a "Connecting Link." Highway 26 consists of portions of two- and three-lane undivided cross sections northwest of Balsam Street and a five-lane undivided cross section between Pretty River Parkway and Poplar Sideroad.
First Street	First Street is a five-lane arterial road running east-west (part of Highway 26 Connecting Link). It is under the jurisdiction of the Town and has an urban cross section. The posted speed limit is 50 km/h and sidewalks exist on both sides of the road.
Balsam Street	Balsam Street is a four-lane arterial road (part of Highway 26 Connecting Link) extending from First Street to Highway 26. It is under the jurisdiction of the Town and has an urban cross section and a posted speed limit of 50 km/h. Sidewalks exist on the west side of the road and portions of the east side of the road. Balsam Street also extends to the northeast of the Highway 26 and Harbour Street West intersection as a two-lane local road.
Huron Street	Huron Street is an arterial road (part of Highway 26 Connecting Link) running east-west. It is five-lanes between Hurontario Street and Rodney Street, and reduces to four-lanes between Rodney Street and Albert Street. It is under the jurisdiction of the Town and has an

urban cross section and a posted speed limit of 50 km/h. Sidewalks exist on both sides of the road.

Pretty River Parkway

Pretty River Parkway is a four-lane arterial road (part of Highway 26 Connecting Link) extending from Albert Street to Hume Street. Segments of the road are divided. It is under the jurisdiction of the Town and has an urban cross section and a posted speed limit of 50 km/h. Sidewalks exist on the west side of the road in addition to a sidewalk segment on the east side of the road between Ronell Crescent and Highway 26.

Mountain Road

Mountain Road is a two-lane arterial road running east-west. It is under the jurisdiction of the Town and has a rural cross section. The posted speed limit is 50 km/h between Cambridge Street and approximately 400 metres west of Cambridge Street. To the west of 400 metres west of Cambridge Street the posted speed limit is 60 km/h. A separated gravel sidewalk exists on the south side of Mountain Road.

High Street

High Street is an arterial road running north-south between First Street and Poplar Sideroad. Between Poplar Sideroad and Chamberlain Crescent the road consists of a two-lane rural cross section, and between Chamberlain Crescent and First Street the road consists of a four-lane urban cross section. It is under the jurisdiction of the Town and has a posted speed limit of 50 km/h. Sidewalks exist on both sides of the road to the north of Chamberlain Crescent.

Hume Street

Hume Street is a three-lane arterial road running east-west between Pretty River Parkway and Hurontario Street. It is under the jurisdiction of the Town and has an urban cross section and a posted speed limit of 50 km/h. Sidewalks exist on both sides of the road. Bicycle lanes also exist on both sides of the road.

Hurontario Street

Hurontario Street is an arterial road running north-south. It has a three-lane cross section between Poplar Sideroad and Fair Street, a two-lane cross section between Fair Street and Fourth Street, and a two-lane

cross section plus parking lanes on both sides of the road between Fourth Street and First Street. It is under the jurisdiction of the Town and has an urban cross section and a posted speed limit of 50 km/h. Sidewalks exist on the west side of the road in addition to a sidewalk segment on the east side of the road between Lockhart Road and Huron Street.

Sixth Street

Sixth Street runs east-west between Tenth Line and Hurontario Street. Between Tenth Line and High Street, Sixth Street is an arterial road with a two-lane rural cross section. Between High Street and Hurontario Street, Sixth Street is a collector road with a two-lane urban cross section. The posted speed limit is 60 km/h between Tenth Line and High Street and is 50 km/h between High Street and Hurontario Street. A sidewalk exists along the north side of Sixth Street between High Street and Hurontario Street.

Beachwood Road

Beachwood Road is a two-lane arterial road running northwest-southeast from its connection with Highway 26 on the east side of the Town. This road formed part of Highway 26 before the highway was rerouted in this area. Beachwood Road is under the jurisdiction of the MTO and has a rural cross section and a posted speed limit of 80 km/h.

Third Street

Third Street is a two-lane collector road running east-west between High Street and Hurontario Street. It is under jurisdiction of the Town and has an urban cross section and a 50 km/h speed limit (reduced to 40 km/h in the area of Mountain View Elementary School). Sidewalks exist on both sides of the road between Hurontario Street and Cedar Street, and a sidewalk exists on the south side of the road between Cedar Street and High Street. Parking lanes exist on both sides of the road between Pine Street and Hurontario Street.

Pine Street

Pine Street is a two-lane collector road running north-south between First Street and Fifth Street. It is under the jurisdiction of the Town and has an urban cross section and an assumed unposted speed limit of 50

	km/h. Sidewalks exist on both sides of the road. Parking lanes exist on both sides of the road between First Street and Third Street.
Raglan Street	Raglan Street is a two-lane collector road running north-south between Hume Street and Poplar Sideroad. It is under the jurisdiction of the Town and has a semi-urban cross section and a posted speed limit of 50 km/h.
Harbour Street West	Harbour Street West is a two-lane collector road running east-west to the west of Highway 26. It is under the jurisdiction of the Town and has a semi-urban cross section and a posted speed limit of 40 km/h.
Tenth Line	Tenth Line is a two-lane collector road running north-south to the north of Sixth Street. It is under jurisdiction of the Town and has a rural cross section and a posted speed limit of 50 km/h.
Concession 10 North Nottawasaga Road (County Road 32)	Concession 10 North Nottawasaga Road (referred to herein as Concession 10) is a two-lane primary arterial road which runs north-south. Between Poplar Sideroad and Sixth Street, it is under the jurisdiction of the County of Simcoe (County Road 32) and has a rural cross section with a posted speed limit of 70 km/h.
Poplar Sideroad (County Road 32)	Poplar Sideroad is a two-lane primary arterial road which runs east-west. Between Highway 26 and Concession 10, it is under the jurisdiction of the County of Simcoe (County Road 32) and has a rural cross section. The posted speed limit is 60 km/h between Concession 10 and approximately 300 metres east of Raglan Street. From approximately 300 metres east of Raglan Street to Highway 26 the posted speed limit is 80 km/h.
Cranberry Trail East	Cranberry Trail East is a two-lane local road running east-west to the west of Highway 26. It is under jurisdiction of the Town and has a rural cross section and a posted speed limit of 50 km/h.

Old Mountain Road	Old Mountain Road is a three-lane local road between Balsam Street and Mountain Road. It is under jurisdiction of the Town and has an urban cross section and an assumed unposted speed limit of 50 km/h. Sidewalks exist along both sides of the road.
Cambridge Street	Cambridge Street is a three-lane local road running north-south to the south of Mountain Road. It is under the jurisdiction of the Town and has an urban cross section and an assumed unposted speed limit of 50 km/h. A sidewalk exists along the west side of the road.
Spruce Street	Spruce Street is a two-lane local road running north-south to the south of First Street. It is under jurisdiction of the Town and has a semi-urban cross section and a posted speed limit of 40 km/h. A sidewalk exists along the west side of the road.
Cedar Street	Cedar Street is a two-lane local road running north-south between First Street and Fifth Street. It is under jurisdiction of the Town and has an urban cross section and an assumed unposted speed limit of 50 km/h. Sidewalks exist along both sides of the road.
Campbell Street	Campbell Street is a two-lane local road running east-west between High Street and Hurontario Street. It is under jurisdiction of the Town and has a semi-urban cross section and an assumed unposted speed limit of 50 km/h. One sidewalk exists along the length of the road (alternating at different locations between the south and north sides of the road).

The intersection of Highway 26/Beachwood Road is under the jurisdiction of the Ministry of Transportation Ontario (MTO). The intersections of Poplar Sideroad/Raglan Street, Poplar Sideroad/Concession 10, and Tenth Line/Sixth Street are under the jurisdiction of the County of Simcoe (County). The other 16 Study Area intersections are under the jurisdiction of the Town.

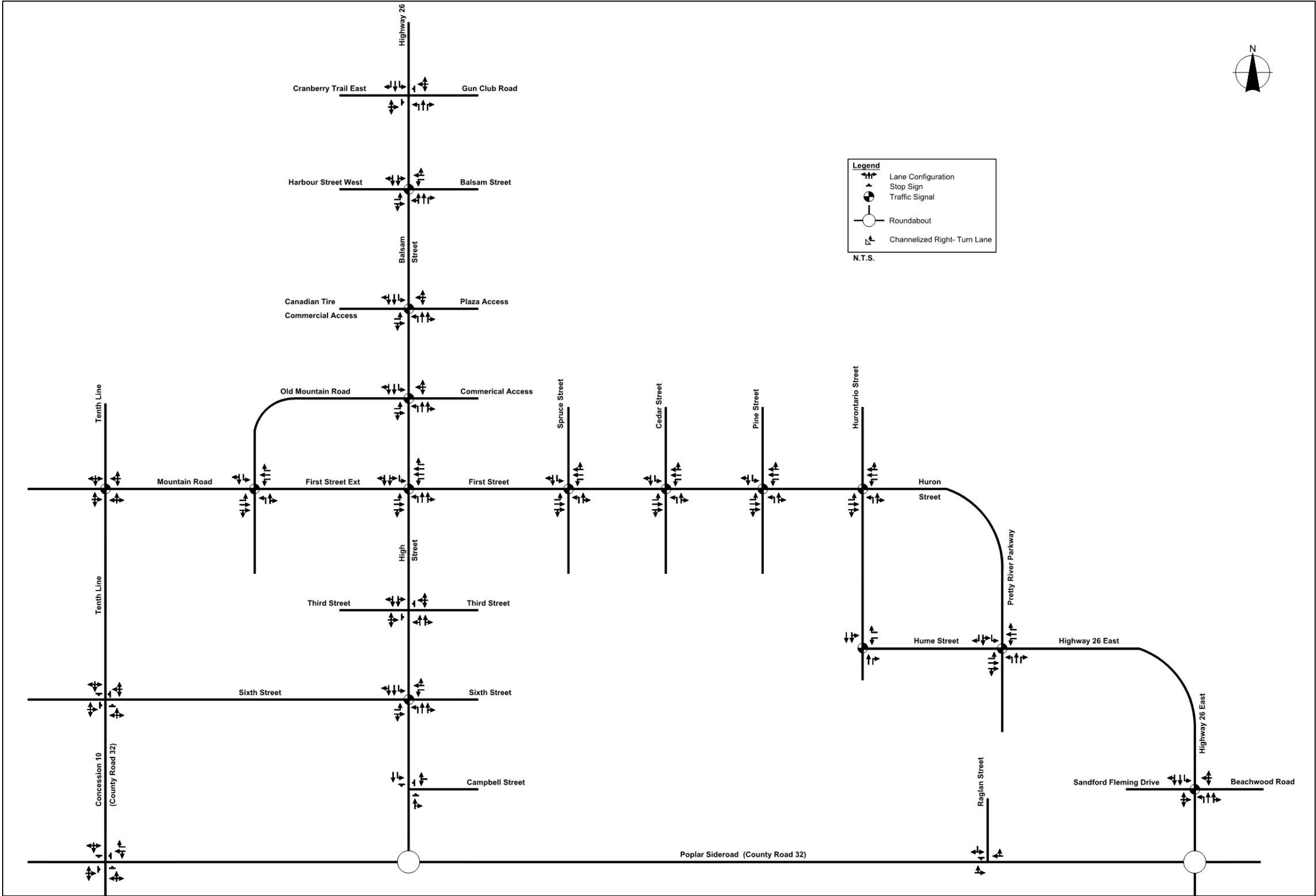
The following intersection improvements have been implemented since the publication of the *2012 Transportation Study*:

- The intersection of Mountain Road and Tenth Line was signalized in 2012.

- Poplar Sideroad and Concession 10 were reconstructed in 2012 along with the construction of a roundabout at the Poplar Sideroad and High Street intersection.
- The Highway 26 realignment between Collingwood and Wasaga Beach was completed in 2012, with a roundabout at Poplar Sideroad.
- First Street and Huron Street at Hurontario Street were widened to provide eastbound and westbound left-turn lanes at the intersection in 2014
- Hume Street was reconstructed with a three-lane cross-section in 2015.
- Highway 26 West was reconstructed from Keith Avenue to Princeton Shores Boulevard in 2015, adding a two-way left-turn lane and right-turn tapes at all intersections.
- An eastbound left-turn lane was added to the Harbour Street West and Balsam Street intersection in 2018.
- Highway 26 East was widened to a five-lane cross-section between Pretty River Parkway and Marine View Drive in 2018.

It is noted that the extension of Sandford Fleming Drive to the Highway 26/Beachwood Drive intersection is currently under construction, which includes the signalization of the intersection, therefore this new connection/control has been assumed to be in place as an existing condition for the purpose of this study. In conjunction with these improvements, the existing Sixth Line access at Highway 26 will be closed. Figure 3 illustrates the existing traffic controls and lane configurations in the Study Area.

Figure 3: Existing Lane Configurations and Traffic Controls



2.4 Existing Traffic Volumes

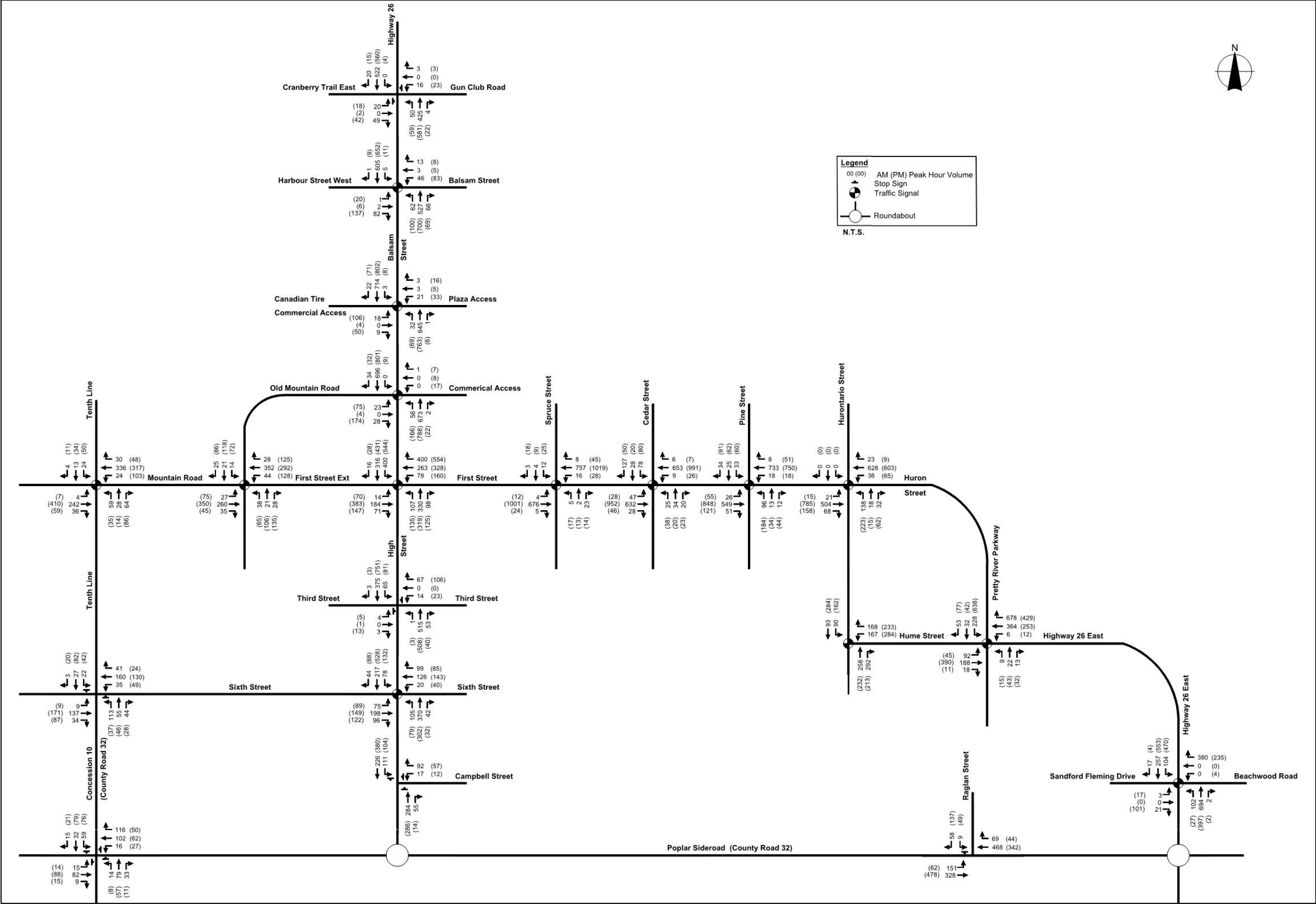
Turning Movement Counts (TMCs) were conducted on behalf of Burnside by Ontario Traffic Inc. (OTI) at the 20 key intersections in the Study Area on Wednesday, December 12, 2018. Data was collected at each intersection between 7:00 AM to 9:00 AM, 11:00 AM to 2:00 PM, and 3:00 PM to 6:00 PM. The TMC data for the AM and PM peak periods is provided in Appendix A (data for the 11:00 AM to 2:00 PM period will be provided to the Town digitally).

Since the proposed Sandford Fleming Drive connection to the Beachwood Road/Highway 26 intersection has been included as an existing condition, minor turning volumes were added to the Sandford Fleming Drive leg of the intersection based on assumed traffic generation and distribution for the surrounding land uses.

The weekday AM and PM peak periods were selected for analysis purposes as these time periods represent the typical peak periods throughout the Town's road network. Often, for tourist/recreational locations such as Collingwood, traffic volumes are highest in the summer months. Since the TMCs for this study were collected on December 12, the data was compared with historic summer and winter traffic counts from various sources (e.g. Town, County, traffic studies from other consultants) to determine what overall seasonal adjustment factor should be applied. The results of our comparisons indicated that the application of a 5.0% adjustment factor would be most reasonable, therefore the TMC volumes were increased by 5.0% to represent existing summer weekday conditions.

The existing traffic volumes, which include the application of the seasonal adjustment factor outlined above, are illustrated in Figure 4.

Figure 4: Existing Traffic Volumes



2.4.1 Alternate Route and Traffic Diversion

The *2012 Transportation Study* identified potential diversion of through traffic to use Poplar Sideroad as an alternate route through Collingwood, providing relief to critical locations along Highway 26, such as the First Street and High Street intersection. As noted in the previous section, Poplar Sideroad and Concession 10 were upgraded in 2012 and transferred to Simcoe County as County Road 32 in 2014. With the opening of the Highway 26 realignment in 2012, destination signs now direct traffic to The Blue Mountains to follow Poplar Sideroad in order to promote the use of this alternate route. Historical traffic volumes were reviewed to provide insight into the extent of use of County Road 32 as an alternate route through Collingwood. These volumes are summarized in Table 5 for various sections of County Road 32.

Table 5: Historical Traffic Volumes on County Road 32

Segment of County Road 32	Summer Average Daily Traffic			
	2008	2013	2015	2018 ¹
Poplar Sideroad Highway 26 to Hurontario Street	2600	6000	7800	9000
Poplar Sideroad Hurontario Street to High Street	5400	7000	7500 ²	NA
Poplar Sideroad High Street to Concession 10	NA	NA	3200	4250
Concession 10 Poplar Sideroad to Sixth Street	1600	3200	3500	4400

1. It is noted that Highway 26 was being reconstructed between Poplar Sideroad and Pretty River Parkway during the summer of 2018, which could have increased traffic along County Road 32.

2. Estimated based on 2014 traffic volume

NA – Not Available

Although the historical data is somewhat limited, it shows that there was a significant increase in traffic on County Road 32 between 2008 and 2013, after the road was upgraded. Considerable growth continues until 2018, however, it is noted that there was construction on Highway 26 north of Poplar Sideroad during the summer of 2018, therefore, the 2018 volumes could have been influenced by traffic temporarily detouring along County Road 32. In general, this traffic growth seems to indicate that County Road 32 has started to take on a role as an alternate route into and around Collingwood and it stands to reason that this role will become increasingly important as traffic grows throughout the Town.

2.5 Existing Traffic Operations

2.5.1 Intersection Operations

Existing traffic operations were assessed at the 20 Study Area intersections based on the lane configurations shown in Figure 3 and the traffic volumes shown in Figure 4.

Existing signal timings were applied in the analysis. The existing Synchro analyses are included in Appendix B, and the traffic operations are summarized in Table 6 and Table 7 for signalized and unsignalized intersections, respectively. Figure 5 provides a visual representation of the existing level of service at the study area intersections.

For the purposes of this study, movements at signalized intersections shown in the traffic operations summary tables throughout this report are individual movements with a v/c ratio at or above 0.85 and/or a LOS F.

Table 6: Existing (2019) Signalized Intersection Operations

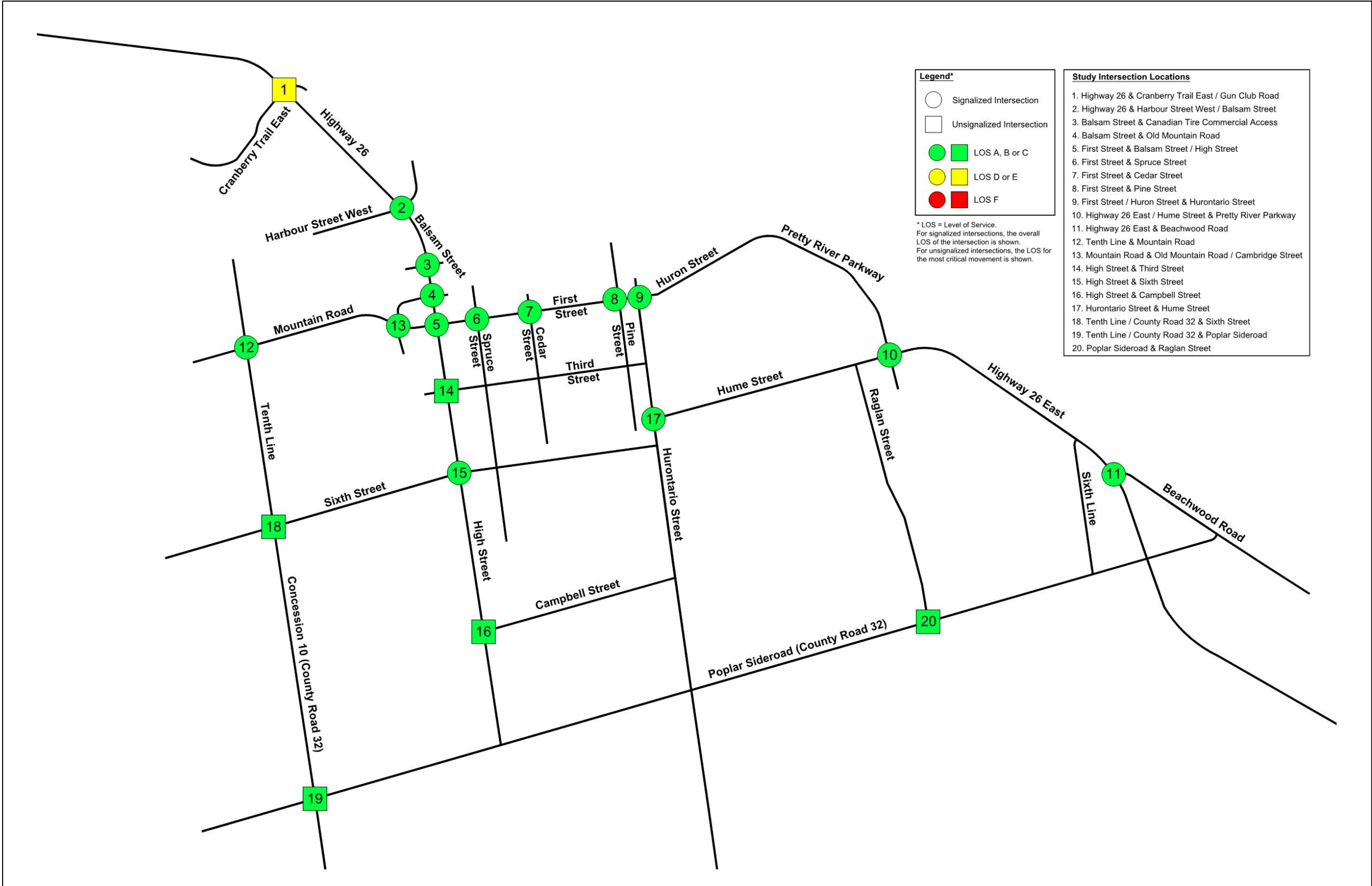
Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Balsam Street/Harbour Street W & Highway 26	Overall	10	A	0.39	12	B	0.47
Balsam Street & CT Entrance/Plaza Access	Overall	6	A	0.35	11	B	0.44
Balsam Street & Old Mountain Road/Commercial Access	Overall	5	A	0.37	11	B	0.44
First Street & Balsam Street/High Street	Overall	31	C	0.59	35	C	0.70
First Street & Spruce Street	Overall	5	A	0.32	7	A	0.39
First Street & Cedar Street	Overall	12	B	0.35	9	A	0.43
First Street & Pine Street	Overall	13	B	0.42	17	B	0.58
First Street/Huron Street & Hurontario Street	Overall	10	A	0.37	11	B	0.50
Hume Street/Highway 26 E & Pretty River Parkway	Overall	17	B	0.50	36	C	0.56
Highway 26 E & Beachwood Road/Sandford Fleming Drive	Overall	16	B	0.53	13	B	0.71
Tenth Line & Mountain Road	Overall	10	A	0.44	10	A	0.51
Mountain Road & Old Mountain Road/Cambridge Street	Overall	13	B	0.36	21	C	0.44
High Street & Sixth Street	Overall	18	B	0.48	16	B	0.46
Hurontario Street & Hume Street	Overall	16	B	0.40	16	B	0.45

Table 7: Existing (2019) Unsignalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Highway 26 & Cranberry Trail E/Gun Club Road	EBLTR	21	C	0.26	24	C	0.26
	WBLTR	34	D	0.14	47	E	0.24
High Street & Third Street	EBLTR	21	C	0.03	24	C	0.10
	WBLTR	15	C	0.21	19	C	0.36
High Street & Campbell Street	WBLR	10	A	0.21	9	A	0.10
	NBTR	15	B	0.59	11	B	0.40
	SBL	10	B	0.24	8	B	0.16
	SBT	12	B	0.44	12	B	0.54
Tenth Line & Sixth Street	EBLTR	11	B	0.32	11	B	0.38
	WBLTR	12	B	0.42	10	B	0.30
	NBLTR	12	B	0.40	10	A	0.18
	SBLTR	10	A	0.11	10	A	0.23
Concession 10 & Poplar Sideroad	EBLTR	10	A	0.19	10	A	0.19
	WLT	9	A	0.22	9	A	0.17
	WBR	8	A	0.18	7	A	0.08
	NBLTR	10	A	0.21	9	A	0.12
	SBLTR	9	A	0.18	10	A	0.27
Poplar Sideroad & Raglan Street	SBLR	15	C	0.17	21	C	0.49

As shown in Table 6 and Table 7, all movements at all intersections in the Study Area are operating with sufficient capacity and LOS E or better. Therefore, no improvements are warranted at any of the Study Area intersections under existing conditions.

Figure 5: Existing Level of Service



2.5.2 Road Segment Operations

Specific road segments in the Town have been reviewed to determine how the observed traffic volumes on such roads relate to their assumed road capacities. The following typical road capacities were applied in this study according to the road classifications outlined in the Town's *Official Plan* (Consolidated January 2019), and which are consistent with the capacities applied in the *2012 Transportation Study* prepared by C.C. Tatham & Associates:

- arterial road – 900 vehicles per hour per lane (vphpl)
- collector road – 700 vphpl
- local road – 500 vphpl.

While the consideration of lane capacities provides a useful comparator for establishing traffic mobility along road segments, and hence the number of through lanes required, it should be noted that other factors will also be considerations in establishing whether any particular road can adequately accommodate the traffic volumes forecasted. The capacities of urban roads are often dictated by the operations of the intersections along these corridors. In addition, the traffic volumes on local roads or collector roads should be consistent with the access requirements and land-use compatibility needs (e.g., traffic calming for residential areas).

To compare existing/future traffic volumes to the above road capacities, the PM peak hour volumes were utilized since these volumes are usually higher than the AM peak hour volumes. The existing v/c ratios for the select road sections are outlined in Table 8, based on the PM peak hour volumes. Road segments with a v/c ratio at or exceeding 1.0 indicates a section where the traffic volume exceeds the capacity.

Table 8: Existing (2019) Road Segment Operations

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Highway 26	N of Harbour Street West	1	900	728	672	0.81	0.75
	E of Pretty River Parkway	2	1800	1060	694	0.59	0.39
Balsam Street	Harbour Street West to First Street	2	1800	976	1003	0.54	0.56
First Street	High Street to Hurontario Street	2	1800	1055	1092	0.59	0.61
Huron Street	E of Hurontario Street	2	1800	847	677	0.47	0.38
Mountain Road	W of Tenth Line	1	900	476	363	0.53	0.40

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/ EB	SB/ WB	NB/ EB	SB/ WB
	W of Cambridge Street	1	900	546	468	0.61	0.52
First Street Ext.	W of Balsam Street	2	1800	600	545	0.33	0.30
High Street	First Street to Tenth Street	2	1800	619	835	0.34	0.46
	Tenth Street to Poplar Sideroad	1	900	343	484	0.38	0.54
Hume Street	Hurontario Street to Pretty River Parkway	1	900	446	517	0.50	0.57
Beachwood Road	E of Highway 26	1	900	472	239	0.52	0.27
Pretty River Parkway	N of Hume Street	2	1800	517	757	0.29	0.42
Hurontario Street	First Street to Hume Street	1	900	465	446	0.52	0.50
	Hume Street to Sixth Street	2	1800	445	568	0.25	0.32
Old Mountain Road	Mountain Road to Balsam Street	1	500	306	276	0.61	0.55
Harbour Street West	W of Highway 26	1	700	163	114	0.23	0.16
Cranberry Trail East	W of Highway 26	1	500	62	74	0.12	0.15
Raglan Street	N of Poplar Sideroad	1	700	106	186	0.15	0.27
Tenth Line	N of Mountain Road	1	700	69	95	0.10	0.14
	S of Mountain Road	1	700	135	218	0.19	0.31
Cambridge Street	S of Mountain Road	1	500	306	291	0.61	0.58
Third Street	E of High Street	1	700	122	129	0.17	0.18
Sixth Street	E of High Street	1	700	313	268	0.45	0.38
	W of High Street	1	900	360	310	0.40	0.34
Campbell Street	E of High Street	1	500	118	69	0.24	0.14

As shown in Table 8, all road segments reviewed are operating at less than 81% of the assumed road capacity. Therefore, the number of lanes on the road segments outlined in Table 8 are operationally acceptable, from a link capacity perspective, under existing traffic conditions.

3.0 Future Background Traffic Conditions

For the purposes of this study, future background traffic consists of existing traffic volumes plus the addition of a background traffic growth rate(s). 2031 and 2041 have been selected for future traffic projections and analysis in this study, to consider the medium and long-term traffic operation impacts of proposed developments throughout the Town. This analysis will be used to identify potential road and intersection improvement requirements in the Town resulting from background traffic volumes (i.e., excluding traffic from developments in the Town but including general traffic growth on the Town's roads that may result from other areas).

3.1 Road Network

The road network considered under the future background traffic conditions is essentially the same as the existing road network, as described in Section 2.3. No planned or potential improvements within or surrounding Collingwood have been accounted for in the modelled road network.

- The Ministry of Transportation of Ontario (MTO) has been assessing the potential need for a Highway 26 bypass around Collingwood for many years. Most recently, the MTO published the Highway 26 Transportation Study Needs Assessment Report (AECOM, 2015), which identified the need for a new four-lane highway around Collingwood (Collingwood Bypass) by 2031 and recommended the initiation of a Route Planning Class EA. The Collingwood Bypass would have the potential to significantly reduce traffic volumes on Highway 26, however, given the uncertainty regarding the status and timing of this new route, it has been assumed that the Bypass will not be implemented within the 2031 or 2041 horizon periods in this study.

3.2 Background Traffic Growth Rate

Historical Annual Average Daily Traffic (AADT) data on Highway 26, immediately west of the boundary between the Town of Collingwood and the Town of The Blue Mountains (i.e., west of Grey Road 21), was reviewed to estimate historical traffic growth on the corridor. Between 2000 and 2016, the AADT on Highway 26 between Grey Road 21 and Grey Road 19 increased by approximately 9.43%, or an average of 0.57% per annum.

As indicated previously, the population of the Town grew by approximately 13.3% between 2011 and 2016 (Statistics Canada). This represents an average annual growth rate of approximately 2.53%.

In the *Growth Plan for the Greater Golden Horseshoe* (Government of Ontario, May 2017), Collingwood has a population allocation of 33,400 for horizon year 2031. The population of the Town in 2016 was 21,793 (Statistics Canada). Therefore, this represents a projected annual increase in population of 2.89% per annum.

Based on the above, an overall population growth rate in the Town in the neighbourhood of 2.5% to 3.0% per annum appears to be reasonable to apply for future traffic projections. However, traffic to be generated by individual developments in the Town will be included in the total traffic scenarios, whereas the Background Traffic scenarios will consider only general traffic volume growth in the Town that results from increases in traffic which are not generated by developments in the Town. In other words, the Background Traffic scenarios in this study will review the traffic impacts resulting from growth in traffic due to developments occurring outside of the Town (e.g., in adjacent municipalities such as The Blue Mountains, Stayner, and Wasaga Beach) as well as existing local traffic growth in the Town (i.e., residents and children of existing residential properties in the Town who will begin driving prior to or during horizon year 2031 or 2041).

The *2012 Transportation Study* estimated that about 25% of the traffic on the major routes in Collingwood can be considered as through traffic (based on the *Highway 26 Transportation Study – Summer Origin-Destination Survey Results* prepared by Paradigm Transportation Solutions Ltd. in June 2010) and that it could be assumed that such through traffic will grow at 2% per annum. Therefore, to capture external and existing local traffic growth in the Town, a 0.5% annual growth rate (compounded) has been applied to the entire road network (i.e., $2\% \times 25\%$). For context, this translates into overall background traffic growth rates for each individual movement of approximately 6.2% and 11.6% from 2019 to horizon years 2031 and 2041, respectively.

3.3 Background Traffic Volumes

Background traffic volumes have been calculated through the application of the 0.5% traffic growth rate to all existing traffic volumes (up to horizon years 2031 and 2041). The background traffic volumes in horizon years 2031 and 2041 are illustrated in Figure 6 and Figure 7, respectively.

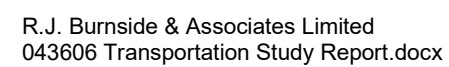
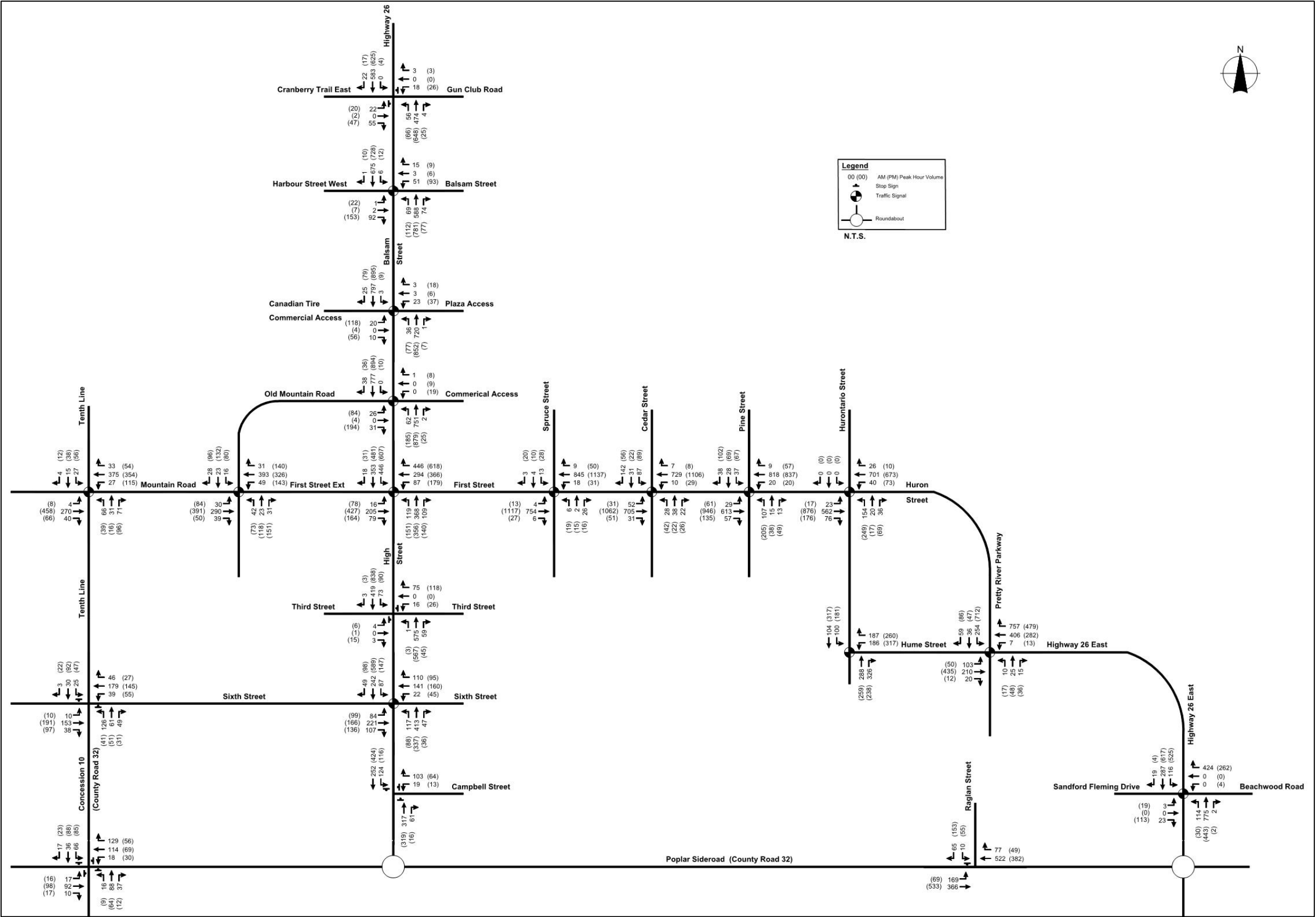


Figure 7: 2041 Background Traffic Volumes



4.0 Background Traffic Operations

This section reviews background traffic operations in the Study Area in horizon years 2031 and 2041. Background traffic volumes in each horizon year consist of a 0.5% compound annual growth rate applied to the existing traffic volumes shown in Figure 4.

4.1 2031 Background Traffic Operations

4.1.1 Intersection Operations

Forecasted background traffic volumes at intersections in the Study Area in horizon year 2031 were analyzed using Synchro software, based on the traffic volumes shown in Figure 6 and the lane configurations and traffic controls shown in Figure 3. The signal timings at the Highway 26 East/Pretty River Parkway intersection were optimized, however the applied signal timings at all other intersections in the Study Area remained the same as in existing conditions.

The 2031 background traffic operations are summarized in Table 9 and Table 10 for signalized and unsignalized intersections in the Study Area, respectively and also illustrated in Figure 8. Detailed Synchro reports for the 2031 background traffic conditions are provided in Appendix C.

Table 9: 2031 Background Signalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Balsam Street/Harbour Street W & Highway 26	Overall	10	A	0.41	12	B	0.51
Balsam Street & CT Entrance/Plaza Access	Overall	6	A	0.37	11	B	0.47
Balsam Street & Old Mountain Road/Commercial Access	Overall	6	A	0.40	11	B	0.47
First Street & Balsam Street/High Street	Overall	32	C	0.63	37	D	0.74
First Street & Spruce Street	Overall	5	A	0.34	8	A	0.42
First Street & Cedar Street	Overall	12	B	0.37	10	A	0.46
First Street & Pine Street	Overall	13	B	0.45	18	B	0.62
First Street/Huron Street & Hurontario Street	Overall	10	A	0.40	12	B	0.53
Hume Street/Highway 26 E & Pretty River Parkway ¹	Overall	17	B	0.53	24	C	0.59
Highway 26 E & Beachwood Road/Sandford Fleming Drive	Overall	17	B	0.58	14	B	0.76
	SBL	9	A	0.37	18	B	0.86
Tenth Line & Mountain Road	Overall	10	B	0.48	10	B	0.55
Mountain Road & Old Mountain Road/Cambridge Street	Overall	13	B	0.38	21	C	0.46
High Street & Sixth Street	Overall	19	B	0.51	17	B	0.49
Hurontario Street & Hume Street	Overall	16	B	0.42	17	B	0.48

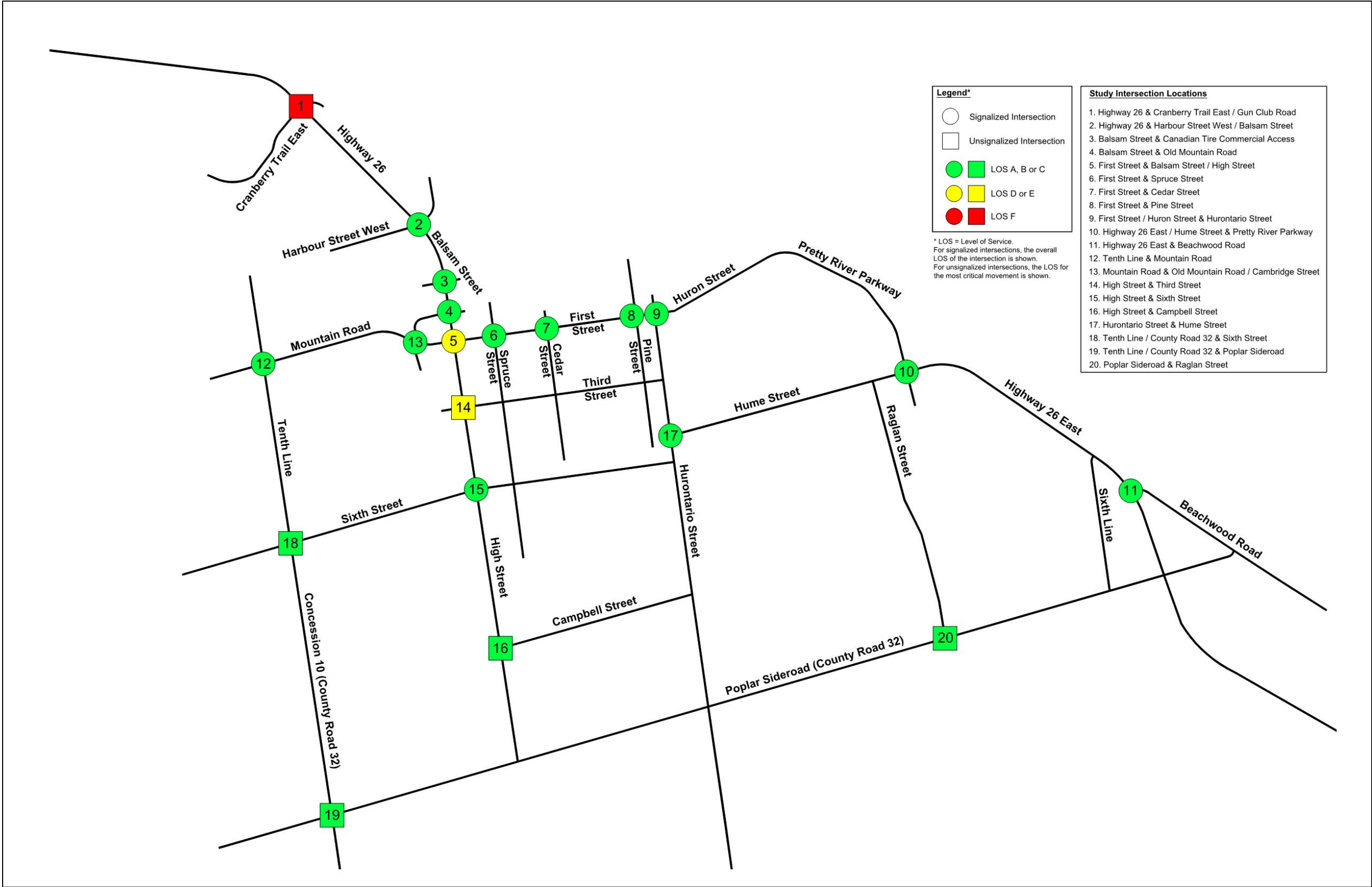
1. Signal timings improved in both the AM and PM peak hour scenarios.

Table 10: 2031 Background Unsignalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Highway 26 & Cranberry Trail E/Gun Club Road	EBLTR	23	C	0.30	28	D	0.31
	WBLTR	40	E	0.17	58	F	0.30
High Street & Third Street	EBLTR	23	C	0.04	26	D	0.11
	WBLTR	16	C	0.24	22	C	0.41
High Street & Campbell Street	WBLR	10	B	0.23	9	A	0.11
	NBTR	16	C	0.64	11	B	0.43
	SBL	10	B	0.25	9	B	0.17
	SBT	12	B	0.48	13	B	0.57
Tenth Line & Sixth Street	EBLTR	11	B	0.35	11	B	0.41
	WBLTR	13	B	0.46	11	B	0.33
	NBLTR	13	B	0.43	10	A	0.19
	SBLTR	10	A	0.12	10	B	0.25
Concession 10 & Poplar Sideroad	EBLTR	10	A	0.20	10	A	0.21
	WLT	9	A	0.24	9	A	0.18
	WBR	8	A	0.20	7	A	0.08
	NBLTR	10	A	0.23	9	A	0.13
	SBLTR	10	A	0.20	10	B	0.30
Poplar Sideroad & Raglan Street	SBLR	17	C	0.20	24	C	0.55

As shown in Table 9 and Table 10, all movements at all intersections in the Study Area are forecast to operate with sufficient capacity and a LOS E of better, except for the westbound left-through-right movement at the Highway 26 / Gun Club Road intersection. This movement operates with a LOS F in the PM peak hour; however, the delay is tolerable (58 seconds) and there is significant excess capacity (i.e., the v/c ratio is only 0.30). Therefore, no intersection improvements (beyond optimizing signal timings) are forecast to be required under 2031 background traffic conditions.

Figure 8: 2031 Background Conditions Level of Service



4.1.2 Road Segment Operations

The capacity of road segments in the Study Area have been assessed under 2031 background traffic conditions. The PM peak hour is considered the critical peak hour and thus the PM traffic volumes have been used in this analysis. The 2031 background v/c ratios for the select road segments are outlined in Table 11, based on the PM peak hour volumes. Road segments with a v/c ratio at or exceeding 1.0 indicates a segment where the traffic volume exceeds the capacity.

Table 11: 2031 Background Road Segment Operations

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Highway 26	N of Harbour Street West	1	900	772	714	0.86	0.79
	E of Pretty River Parkway	2	1800	1125	737	0.63	0.41
Balsam Street	Harbour Street West to First Street	2	1800	1036	1066	0.58	0.59
First Street	High Street to Hurontario Street	2	1800	1120	1160	0.62	0.64
Huron Street	E of Hurontario Street	2	1800	899	719	0.50	0.40
Mountain Road	W of Tenth Line	1	900	505	386	0.56	0.43
	W of Cambridge Street	1	900	579	497	0.64	0.55
First Street Ext.	W of Balsam Street	2	1800	637	579	0.35	0.32
High Street	First Street to Tenth Street	2	1800	657	886	0.37	0.49
	Tenth Street to Poplar Sideroad	1	900	365	513	0.41	0.57
Hume Street	Hurontario Street to Pretty River Parkway	1	900	474	549	0.53	0.61
Beachwood Road	E of Highway 26	1	900	501	253	0.56	0.28
Pretty River Parkway	N of Hume Street	2	1800	549	804	0.31	0.45
Hurontario Street	First Street to Hume Street	1	900	493	474	0.55	0.53
	Hume Street to Sixth Street	2	1800	472	604	0.26	0.34
Old Mountain Road	Mountain Road to Balsam Street	1	500	326	292	0.65	0.58
Harbour Street West	W of Highway 26	1	700	172	121	0.25	0.17
Cranberry Trail East	W of Highway 26	1	500	66	79	0.13	0.16
Raglan Street	N of Poplar Sideroad	1	700	113	197	0.16	0.28
Tenth Line	N of Mountain Road	1	700	73	101	0.10	0.14
	S of Mountain Road	1	700	143	231	0.20	0.33

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Cambridge Street	S of Mountain Road	1	500	325	309	0.65	0.62
	W of High Street	1	500	20	6	0.04	0.01
Third Street	E of High Street	1	700	129	137	0.18	0.20
Sixth Street	E of High Street	1	700	332	284	0.47	0.41
	W of High Street	1	900	382	329	0.42	0.37
Campbell Street	E of High Street	1	500	125	74	0.25	0.15

As shown in Table 11, all road segments reviewed are operating at less than 86% of the assumed road capacity. Therefore, the number of lanes on the road segments outlined in Table 11 are operationally acceptable under 2031 background traffic conditions, from a link capacity perspective, under these traffic conditions.

4.2 2041 Background Traffic Operations

4.2.1 Intersection Operations

Forecast background traffic volumes at intersections in the Study Area in horizon year 2041 were analyzed using Synchro software, based on the traffic volumes shown in Figure 7 and the existing lane configurations and traffic controls shown in Figure 3. The signal timings at the Highway 26 East/Pretty River Parkway intersection were optimized, however the applied signal timings at all other intersections in the Study Area remained the same as in existing conditions.

The 2041 background traffic operations are summarized in Table 12 and Table 13 for signalized and unsignalized intersections in the Study Area, respectively, and also illustrated in Figure 9. Detailed Synchro reports for the 2041 background traffic conditions are provided in Appendix D.

Table 12: 2041 Background Signalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Balsam Street/Harbour Street W & Highway 26	Overall	10	A	0.44	13	B	0.55
Balsam Street & CT Entrance/Plaza Access	Overall	6	A	0.39	12	B	0.50
Balsam Street & Old Mountain Road/Commercial Access	Overall	6	A	0.42	12	B	0.49
First Street & Balsam Street/High Street	Overall	34	C	0.67	39	D	0.79
	SBL	41	D	0.75	55	E	0.87
	SBLTR	38	D	0.75	46	D	0.86
First Street & Spruce Street	Overall	5	A	0.35	8	A	0.44
First Street & Cedar Street	Overall	12	B	0.39	10	B	0.48
First Street & Pine Street	Overall	13	B	0.47	18	B	0.66
First Street/Huron Street & Hurontario Street	Overall	10	B	0.42	12	B	0.56
Hume Street/Highway 26 E & Pretty River Parkway ¹	Overall	18	B	0.57	27	C	0.62
Highway 26 E & Beachwood Road/Sandford Fleming Drive	Overall	18	B	0.62	17	B	0.82
	SBL	10	A	0.41	27	C	0.92
Tenth Line & Mountain Road	Overall	11	B	0.50	11	B	0.59
Mountain Road & Old Mountain Road/Cambridge Street	Overall	13	B	0.40	22	C	0.49
High Street & Sixth Street	Overall	20	C	0.53	18	B	0.51
Hurontario Street & Hume Street	Overall	16	B	0.44	17	B	0.51

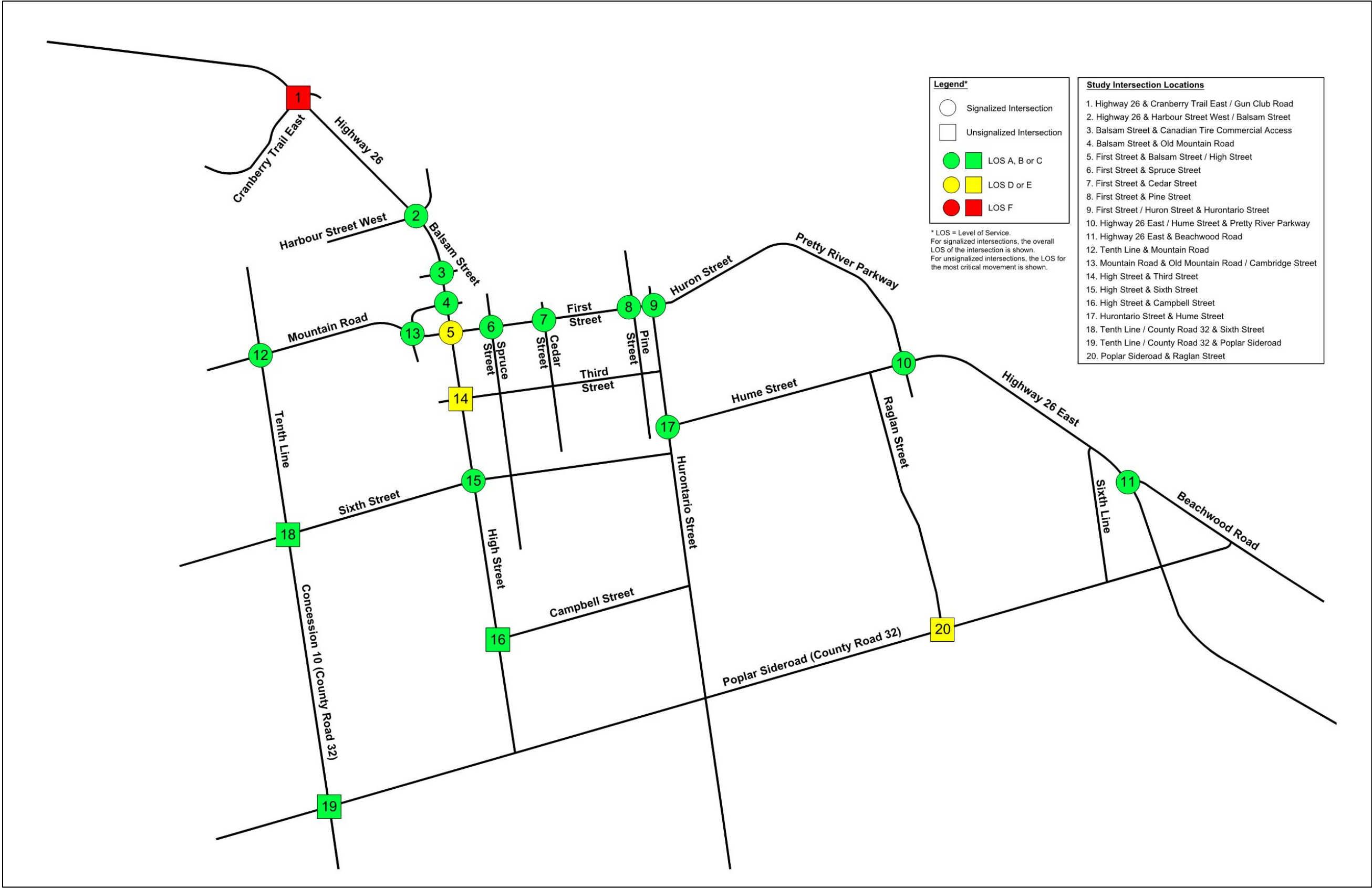
1. Signal timings improved in both the AM and PM peak hour scenarios.

Table 13: 2041 Background Unsignalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Highway 26 & Cranberry Trail E/Gun Club Road	EBLTR	26	D	0.34	32	D	0.35
	WBLTR	46	E	0.21	72	F	0.37
High Street & Third Street	EBLTR	25	C	0.04	31	D	0.14
	WBLTR	18	C	0.27	25	D	0.47
High Street & Campbell Street	WBLR	11	B	0.25	9	A	0.12
	NBTR	18	C	0.68	12	B	0.46
	SBL	10	B	0.27	13	B	0.18
	SBT	13	B	0.51	14	B	0.61
Tenth Line & Sixth Street	EBLTR	12	B	0.38	12	B	0.44
	WBLTR	14	B	0.49	11	B	0.35
	NBLTR	14	B	0.46	10	B	0.21
	SBLTR	10	B	0.13	11	B	0.27
Concession 10 & Poplar Sideroad	EBLTR	10	B	0.22	10	A	0.23
	WLT	10	A	0.26	9	A	0.19
	WBR	8	A	0.21	7	A	0.09
	NBLTR	10	B	0.25	9	A	0.14
	SBLTR	10	A	0.22	10	B	0.31
Poplar Sideroad & Raglan Street	SBLR	5	A	0.20	29	D	0.62

As shown in Table 15 and Table 16, all movements at all intersections in the Study Area are forecast to operate with sufficient capacity and a LOS E or better, except for the westbound left-through-right movement at the Highway 26/Gun Club Road intersection. This movement operates with a LOS F in the PM peak hour; however, the delay is tolerable (72 seconds) and there is significant excess capacity (i.e., the v/c ratio is only 0.37). Therefore, no intersection improvements (beyond optimizing signal timings) are forecast to be required under 2041 background traffic conditions.

Figure 9: 2041 Background Conditions Level of Service



4.2.2 Road Segment Operations

The capacity of road segments in the Study Area have been assessed under 2041 background traffic conditions. The PM peak hour is considered the critical peak hour and thus the PM traffic volumes have been used in this analysis. The 2041 background v/c ratios for the select road segments are outlined in Table 14, based on the PM peak hour volumes. Road segments with a v/c ratio at or exceeding 1.0 indicates segment where the traffic volume exceeds the capacity.

Table 14: 2041 Background Road Segment Operations

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Highway 26	N of Harbour Street West	1	900	812	750	0.90	0.83
	E of Pretty River Parkway	2	1800	1183	774	0.66	0.43
Balsam Street	Harbour Street West to First Street	2	1800	1089	1119	0.61	0.62
First Street	High Street to Hurontario Street	2	1800	1177	1218	0.65	0.68
Huron Street	E of Hurontario Street	2	1800	945	756	0.53	0.42
Mountain Road	W of Tenth Line	1	900	532	405	0.59	0.45
	W of Cambridge Street	1	900	610	523	0.68	0.58
First Street Ext.	W of Balsam Street	2	1800	669	609	0.37	0.34
High Street	First Street to Tenth Street	2	1800	691	931	0.38	0.52
	Tenth Street to Poplar Sideroad	1	900	383	540	0.43	0.60
Hume Street	Hurontario Street to Pretty River Parkway	1	900	497	577	0.55	0.64
Beachwood Road	E of Highway 26	1	900	527	266	0.59	0.30
Pretty River Parkway	N of Hume Street	2	1800	577	845	0.32	0.47
Hurontario Street	First Street to Hume Street	1	900	519	498	0.58	0.55
	Hume Street to Sixth Street	2	1800	497	634	0.28	0.35

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/ EB	NB/ EB	SB/ WB	NB/ EB	SB/ WB
Old Mountain Road	Mountain Road to Balsam Street	1	500	342	308	0.68	0.62
Harbour Street West	W of Highway 26	1	700	182	128	0.26	0.18
Cranberry Trail East	W of Highway 26	1	500	69	83	0.14	0.17
Raglan Street	N of Poplar Sideroad	1	700	118	208	0.17	0.30
Tenth Line	N of Mountain Road	1	700	78	106	0.11	0.15
	S of Mountain Road	1	700	151	244	0.22	0.35
Cambridge Street	S of Mountain Road	1	500	342	325	0.68	0.65
	W of High Street	1	500	22	6	0.04	0.01
Third Street	E of High Street	1	700	136	144	0.19	0.21
Sixth Street	E of High Street	1	700	349	300	0.50	0.43
	W of High Street	1	900	401	346	0.45	0.38
Campbell Street	E of High Street	1	500	132	77	0.26	0.15

As shown in Table 14, all road segments reviewed are operating at less than 90% of the assumed road capacity. Since northbound traffic on Highway 26 (north of Harbour Street West) is at 90% of the assumed road capacity, this indicates that congestion may occur, however there is still some capacity remaining. Therefore, the number of lanes on the road segments outlined in Table 14 are operationally acceptable under 2041 background traffic conditions.

5.0 Town of Collingwood Future Developments

5.1 Proposed Development Details

To more precisely estimate traffic growth in specific locations in the Town, the type, size, location, status, and phasing of various developments have been considered. A map of the future development locations, prepared by Cole Engineering, is illustrated in Figure 10.

Developments anticipated to be completed and occupied by horizon years 2031 and 2041 were considered in this study. The assumed percentage occupancy of each development within the 2031 and 2041 time periods was estimated by Burnside based on the most recent information available and confirmed by Town staff. Details on all developments considered in the traffic volume projections and analysis in this study, including the assumed percentage occupancy and corresponding numerical identifiers in relation to the map in Figure 10, have been summarized in Table 15 and Table 16 for horizon years 2031 and 2041, respectively.

Figure 10: Town of Collingwood Future Development Map (Cole Engineering)

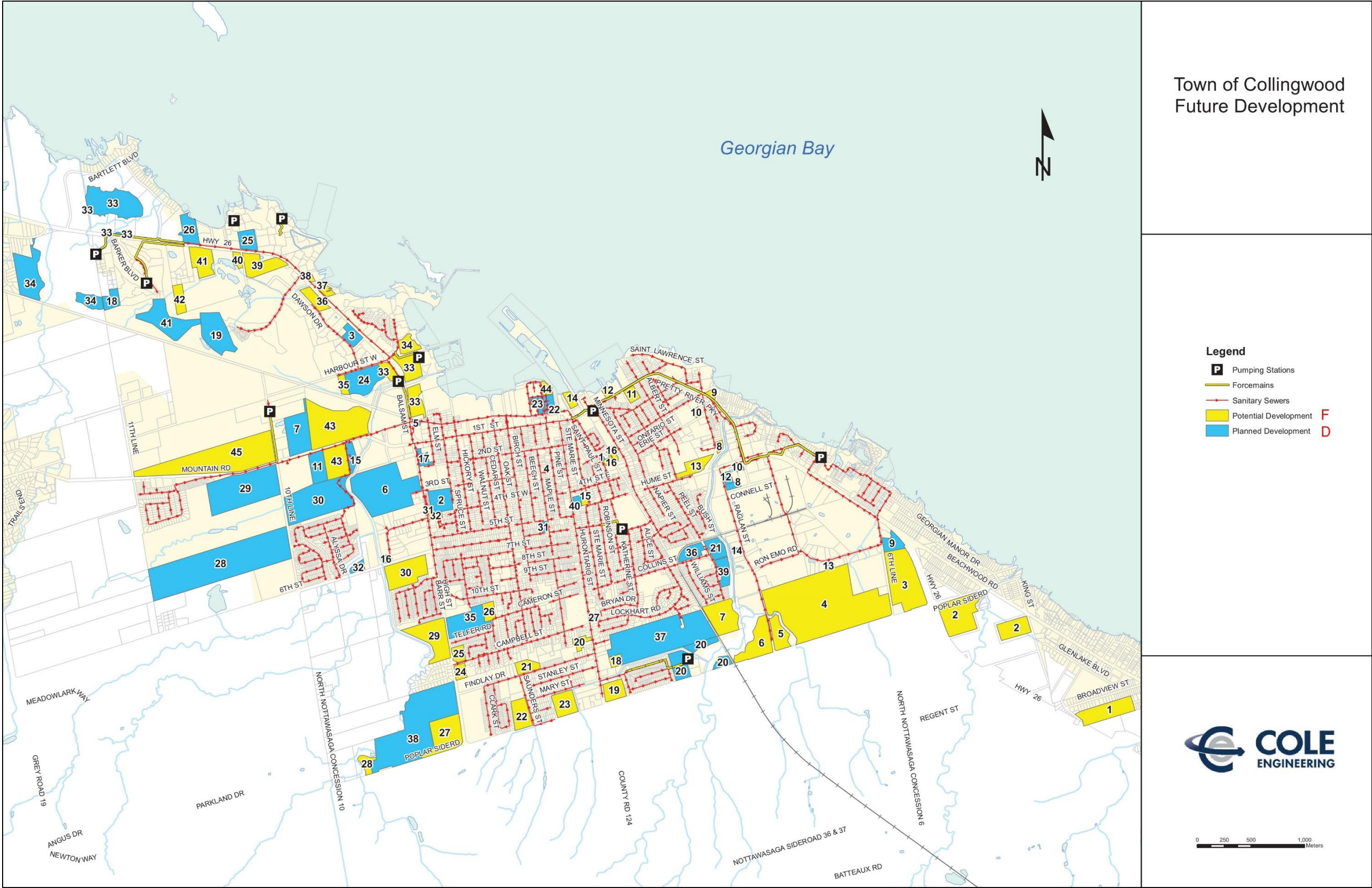


Table 15: Town of Collingwood Medium-Term Developments (Horizon Year 2031)

ID	Name	Land Use	Area (HA)	Number of Residential Units	ICI Development	Estimated Residential Population	Estimated Occupancy 2018	Forecasted Occupancy 2031	Forecasted Occupancy 2041
7F	King (452 Raglan)	Residential	7.44	57 - singles, 205 townhouses		657		100%	
11F	Parkridge	Office	1.40		40,000 sq.ft. commercial			100%	
14F	Duncap Waterfront Hotel	Residential and Hotel	1.15	80 apartments	40 hotel rooms	152		100%	
20F	Blackmoor Gate Property	Residential	1.35	34 - singles and semis		99		100%	
30F	580 Sixth Street and adjacent property	Residential	8.42	114 - townhouses, 128 apartments		517		50%	100%
39F	Silvercreek Development	Residential	5.57	267 apartments		507		100%	
43F	Mountain Street Industrial Property	Commercial / Industrial	24.16		9,097 sq.m. commercial / industrial			100%	
44F	Huronic Village	Residential		13 - townhouses		31		100%	
45F-A	Panorama North	Residential	20.10	122 - singles, 580 - townhouses, 219 - apartments		2162		50%	100%
1D	Ambulance Station	Community Services	0.15					100%	
2D	Mountainview Public School	Community Services	4.11					100%	
3D	Cranberry Inn extension	Commercial	2.20					100%	
4D	Third Street	Commercial	0.06					100%	
5D	10 Balsam Commercial Plaza	Commercial	0.40					100%	
6D	Regional Commercial District	Commercial	21.07					100%	
7D	Van Dolder's	Industrial	8.09		12,806 sq.m commercial / industrial		20%	100%	
8D	Ace Cabs	Industrial	0.78					100%	
9D	BMC Automotive	Industrial	2.50					100%	
10D	Collingwood Service Station	Industrial	0.38					100%	
11D	Georgian Bay Biomed	Industrial	4.00		8,700 sq.m. marijuana grow-op			100%	
12D	Dunn Hotel	Industrial	0.88					100%	
13D	Isowater	Industrial	0.41					100%	
14D	360 Raglan	Industrial	0.40					100%	
15D	100 Mountain Road	Commercial / Industrial	2.12		1,784 sq.m. commercial / industrial			100%	
16D	Stewart Road Reservoir	Other	0.50					100%	
17D	Affordable Housing Project	Residential	1.32	147 - apartments		279		100%	
18D	Silver Glen	Residential	2.27	50 - townhouses		120		100%	
19D	Blue Fairways	Residential	8.49	262 - townhouses		629	80%	100%	
20D	Pretty River Estates Phase 2	Residential	7.19	21 - singles and semis, 152 - townhouses		426		100%	
21D	Riverside Midrise	Residential	2.85	156 - townhouses		374		100%	
22D	Shipyards Condo E	Residential	1.48	28 - townhouses		67		100%	
23D	Mackinaw Village	Residential	1.21	28 - townhouses		67	15%	100%	
24D	Balmoral	Residential and Commercial	6.95	54 - semis, 199 townhouses	2,800 sq.m.	624	50%	100%	
28D	Linksvew	Residential and School	40.68	439 - singles, 8 - townhouses, 190 - apartments	School	1653		80%	100%
29D	Mair Mills Village	Residential	19.70	127 - singles, 192 - apartments	1,130 sq.m. commercial	733		100%	
30D	Red Maple (Consar Development)	Residential	17.89	131 - singles and semis, 147 - townhouses		733		100%	
33D	The Preserve at Georgian Bay (Bridgewater)	Residential	37.16	539 - townhouses, 116 - apartments		1514		100%	
36D	Riverside Townhomes	Residential	2.54	57 - townhouses		137		100%	
37D	Eden Oak McNabb	Residential	27.00	256 - singles and semis, 120 - townhouses		1,030		100%	
38D	Summitview Phases 1 and 2	Residential	31.58	233 - singles and semis, 173 - townhouses		1,091		100%	
39D	Harmony Living	Residential	2.45	80 - townhouses		192		100%	
40D	Monaco	Residential and Commercial	0.76	260 - condo apartments	2,600 sq.m.	494		100%	
42D	Mountaincroft Residential (Final Phase)	Residential		69 singles		200		100%	
43D	410 Raglan Street	Industrial	2.21		6,689 sq.m. warehouse			100%	
*	Windfall Medium Density	Residential		242 condo units				100%	
*	Windfall	Residential		571 - singles and townhouse units				100%	
*	Second Nature	Residential		236 - singles and townhouse units				100%	
*	Nederand Development	Residential		121 - singles				100%	

* Known Town of The Blue Mountains developments in close proximity to Collingwood that were specifically considered in the traffic projections and analysis in this study.

Table 16: Town of Collingwood Long-Term Developments (Horizon Year 2041)

ID	Name	Land Use	Area (HA)	Number of Residential Units	ICI Development	Estimated Residential Population	Estimated Occupancy 2018	Forecasted Occupancy 2031	Forecasted Occupancy 2041
1F	Braeside	Residential	7.26	15 - singles		44		0%	100%
2F	Batteaux Creek Subdivision (Beachwood Estates)	Residential	15.28	20 - singles		58		0%	100%
3F	2906 Sixth Street and 7026 Poplar Sideroad	Industrial	14.99					0%	100%
4F	Eden Oaks Industrial	Industrial	50.73					0%	100%
6F	Poplar and Raglan	Industrial	7.29					0%	100%
8F	Memory Care Facility	Hospital	0.61			72		0%	100%
9F	500 Ontario Street	Residential	0.64	60 - townhouses		144		0%	100%
10F	Legion Redevelopment	Residential	0.44			70		0%	100%
12F	Courthouse	Residential	0.57	68 - townhouses		163		0%	100%
13F	Hospital	Hospital	3.00					0%	100%
15F	282 Ste. Marie Street	Residential and Commercial	0.48	69 - condominiums	929 sq.m commercial	168		0%	100%
16F	Reinhart Warehouse	Residential	1.19	23 - singles and semis		67		0%	100%
18F	Church Severance	Residential	1.16	44 - singles and semis		128		0%	100%
19F	Poplar and Hurontario	Highway Commercial	3.26					0%	100%
21F	Findlay Property	Residential	2.20	22 - singles and semis		64		0%	100%
22F	50 Saunders Drive	Residential	4.17	74 - singles and semis		215		0%	100%
23F	Old Organic Farm	Residential	4.32	76 - singles and semis		221		0%	100%
24F	Collingwood Nursing Home	Residential	1.41	47 - singles and semis		136		0%	100%
25F	197 Campbell Street	Residential	1.62	32 - singles and semis		93		0%	100%
26F	Property adjacent to Helen Court Homes	Residential	1.84	59 - singles and semis		171		0%	100%
27F	Northwest corner of Poplar and High Street (Summitview Phase 3)	Residential	8.94	340 - singles and semis		986		0%	100%
28F	8070 Poplar Sideroad	Residential	1.56	30 - singles and semis		87		0%	100%
29F	Fumo property located on the west side of High Street	Residential	8.86	300 - singles and semis		870		0%	100%
31F	115 High Street	Residential	0.21	15 - townhouses		36		0%	100%
32F	121 High Street	Residential	0.75	6 - townhouses		15		0%	100%
33F	Commercial / hotel development	Commercial	9.63						
34F	Living Waters	Hotel	2.34	253 - hotel units (apartments)		481		0%	100%
35F	16 Harbour Street or Law property	Residential	1.18	23 - singles and semis		67		0%	100%
36F	Dawson Drive East property	Residential	2.46	48 - singles and semis		139		0%	100%
37F	White Street property	Residential	1.02	20 - singles and semis		58		0%	100%
38F	#38F - Gunn Club Road	Residential	0.49	10 - singles and semis		29		0%	100%
40F	Griffith's property	Residential	1.02	30 - singles and semis		87		0%	100%
41F	Greentree property	Residential	4.93	88 - singles and semis		255		0%	100%
42F	Georgian Manor Resorts	Residential	2.49	150 apartments		285		0%	100%
45F-B	Remainder of Mair Mills North	Residential	7.00	Assume same density as Panorama North development		750		0%	50%
25D	Harhay	Residential	2.81	154 - townhouses		370		0%	100%
27D	655 Hurontario Street Apartments	Residential	0.42	32 - apartments		77		0%	100%
31D	Victoria Annex	Residential	0.60	19 - townhouses		46		0%	100%
32D	Georgian Meadows	Residential	1.01	25 - townhouses		60		0%	100%
34D	Huntingwood	Residential	11.82	92 - singles and semis, 62 - townhouses		416		0%	100%
35D	Helen Court Homes	Residential	7.56	66 - singles and semis, 189 - townhouses		645		0%	100%
41D	Cranberry	Residential	9.14	314 - townhouses		754		0%	100%

5.2 Development Traffic Generation

The Town provided numerous transportation impact study (TIS) reports for various proposed developments. Where available, Burnside applied traffic generation and distribution projections from available reports in the total traffic scenarios in this study. Where TIS reports were not available, the size (for industrial, commercial, and institutional developments) or number of units (for residential developments) were used, in conjunction with trip rate information contained in the *Trip Generation Manual 10th Edition* (Institute of Transportation Engineers [ITE], September 2017), in order to estimate the volume of vehicles travelling to/from each development during the AM and PM peak hours. Estimated trip generation volumes for each development were distributed based on existing travel patterns and origin/destination considerations.

Table 17 below provides a summary of the trip generation volumes applied for each development, in addition to the source of the trip generation estimates (i.e., either from TIS reports received from the Town or ITE trip generation rates) and the percentage of the development traffic applied in the 2031 and/or 2041 total traffic scenarios. The total development traffic volumes that were applied in the 2031 and 2041 total traffic scenarios are summarized at the bottom of Table 17.

Table 17: Proposed Development Trip Generations Estimates

Map ID	Development Name	TIS or ITE	AM Peak Hour			PM Peak Hour			Assumed Occupancy	
			In	Out	Tot.	In	Out	Tot.	2031	2041
7F	King (452 Raglan)	TIS	33	106	139	108	63	171	100%	
11F	Parkridge	TIS	80	10	90	14	82	96	100%	
14F	Duncap Waterfront Hotel	ITE	19	29	48	34	26	60	100%	
20F	Blackmoor Gate Property	TIS	9	26	35	25	14	39	100%	
30F	580 Sixth Street and adjacent property	TIS	37	115	152	114	70	184	50%	100%
39F	Silvercreek Development	ITE	25	71	96	71	46	117	100%	
43F	Mountain Street Industrial Property	ITE	45	21	66	94	113	207	100%	
44F	Huronic Village	ITE	2	5	7	6	4	10	100%	
45F-A	Panorama North	TIS	144	453	597	431	286	717	50%	100%
2D	Mountainview Public School	ITE	36	31	67	8	9	17	100%	
3D	Cranberry Inn extension	ITE	5	4	9	6	6	12	100%	
6D	Regional Commercial District	TIS	213	130	343	685	742	1427	100%	
7D	Van Dolder's	TIS	97	15	112	16	102	119	100%	
8D	Ace Cabs	TIS	163	77	240	98	165	263	100%	
10D	Collingwood Service Station									
12D	Dunn Hotel									
9D	BMC Automotive	ITE	57	12	69	17	62	79	100%	
11D	Georgian Bay Biomed	TIS	23	13	36	14	24	38	100%	
13D	Isowater	ITE	14	3	17	5	17	22	100%	
14D	360 Raglan	ITE	14	3	17	4	17	21	100%	
15D	100 Mountain Road	ITE	9	4	13	19	22	41	100%	
17D	Affordable Housing Project	TIS	31	34	65	37	40	77	100%	

Collingwood Transportation Study Update
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Map ID	Development Name	TIS or ITE	AM Peak Hour			PM Peak Hour			Assumed Occupancy	
			In	Out	Tot.	In	Out	Tot.	2031	2041
18D	Silver Glen	ITE	6	19	25	20	12	32	100%	
19D	Blue Fairways	ITE	28	93	121	93	54	147	100%	
20D	Pretty River Estates Phase 2	ITE	18	62	80	61	36	97	100%	
21D	Riverside Midrise	TIS	12	35	47	37	24	61	100%	
22D	Shipyards Condo E	ITE	3	11	14	12	7	19	100%	
23D	Mackinaw Village	ITE	3	11	14	12	7	19	100%	
24D	Balmoral	TIS	78	147	225	151	118	269	100%	
28D	Linksvie	TIS	104	391	495	404	217	621	80%	100%
29D	Mair Mills Village	TIS	40	144	184	150	84	234	100%	
30D	Red Maple (Consar Development)	TIS	37	130	167	137	75	212	100%	
33D	The Preserve at Georgian Bay (Bridgewater)	TIS	64	212	276	198	118	316	100%	
36D	Riverside Townhomes	ITE	6	22	28	23	13	36	100%	
37D	Eden Oak McNabb	TIS	68	208	276	218	133	351	100%	
38D	Summitview Phases 1 and 2	TIS	67	201	268	216	132	348	100%	
39D	Hamony Living	ITE	9	30	39	30	18	48	100%	
40D	Monaco	TIS	30	70	100	75	65	140	100%	
42D	Mountaincroft Residential (Final Phase)	TIS	71	209	280	243	135	378	100%	
43D	410 Raglan Street	TIS	26	8	34	10	27	37	100%	
*	Windfall Medium Density	TIS	27	5	32	12	25	37	100%	
*	Windfall	TIS	96	32	128	64	109	173	100%	
*	Second Nature	TIS	27	9	36	18	31	49	100%	
*	Nederand Development	TIS	35	11	46	21	38	59	100%	
1F	Braeside	ITE	4	11	15	10	6	16	0%	100%
2F	Batteaux Creek Subdivision (Beachwood Estates)	ITE	5	14	19	14	8	22	0%	100%
3F	2906 Sixth Street and 7026 Poplar Sideroad	ITE	233	48	281	60	227	287	0%	100%
4F	Eden Oaks Industrial	ITE	603	124	727	145	546	691	0%	100%
6F	Poplar and Raglan	ITE	133	27	160	36	135	171	0%	100%
8F	Memory Care Facility	ITE	6	2	8	2	6	8	0%	100%
9F	500 Ontario Street	ITE	6	16	22	16	11	27	0%	100%
10F	Legion Redevelopment	ITE	3	8	11	9	5	14	0%	100%
12F	Courthouse	ITE	6	18	24	19	12	31	0%	100%
13F	Hospital	ITE	20	7	27	8	20	28	0%	100%
15F	282 Ste. Marie Street	TIS	17	38	55	42	36	78	0%	100%
18F	Church Severance	ITE	9	27	36	29	17	46	0%	100%
19F	Poplar and Hurontario	ITE	43	39	82	49	46	95	0%	100%
21F	Findlay Property	ITE	5	15	20	15	9	24	0%	100%
22F	50 Saunders Drive	ITE	14	43	57	48	28	76	0%	100%
23F	Old Organic Farm	ITE	15	44	59	49	29	78	0%	100%
24F	Collingwood Nursing Home	ITE	10	28	38	31	18	49	0%	100%
25F	197 Campbell Street	ITE	7	21	28	21	13	34	0%	100%
26F	Property adjacent to Helen Court Homes	ITE	12	35	47	38	23	61	0%	100%
27F	Northwest corner of Poplar and High Street (Summitview Phase 3)	ITE	63	189	252	212	125	337	0%	100%
28F	8070 Poplar Sideroad	ITE	7	19	26	20	12	32	0%	100%

Collingwood Transportation Study Update
August 2019

Map ID	Development Name	TIS or ITE	AM Peak Hour			PM Peak Hour			Assumed Occupancy	
			In	Out	Tot.	In	Out	Tot.	2031	2041
29F	Fumo property located on the west side of High Street	ITE	56	166	222	187	110	297	0%	100%
31F	115 High Street	ITE	2	6	8	7	4	11	0%	100%
32F	121 High Street	ITE	1	2	3	3	2	5	0%	100%
33F	Commercial / hotel development	ITE	76	46	122	153	173	326	0%	100%
34F	Living Waters	ITE	71	50	121	62	59	121	0%	100%
35F	16 Harbour Street or Law property	ITE	5	16	21	16	9	25	0%	100%
36F	Dawson Drive East property	ITE	10	29	39	32	18	50	0%	100%
37F	White Street property	ITE	5	14	19	14	8	22	0%	100%
38F	#38F - Gunn Club Road	ITE	3	9	12	7	4	11	0%	100%
40F	Griffith's property	ITE	7	19	26	20	12	32	0%	100%
41F	Greentree property	ITE	17	50	67	57	33	90	0%	100%
42F	Georgian Manor Resorts	ITE	14	40	54	40	26	66	0%	100%
45F-B	Remainder of Mair Mills North	TIS	72	227	299	216	143	359	0%	100%
25D	Harhay	ITE	14	41	55	41	27	68	0%	100%
27D	655 Hurontario Street Apartments	ITE	3	9	12	9	6	15	0%	100%
31D	Victoria Annex	ITE	2	5	7	5	3	8	0%	100%
32D	Georgian Meadows	ITE	3	10	13	11	6	17	0%	100%
34D	Huntingwood	ITE	25	74	99	84	49	133	0%	100%
35D	Helen Court Homes	ITE	33	106	139	110	64	174	0%	100%
41D	Cranberry	ITE	33	111	144	111	65	176	0%	100%
-			AM Peak Hour			PM Peak Hour				
			In	Out	Tot.	In	Out	Tot.		
2031 Total Development Traffic**			1,800	2,861	4,661	3,658	3,167	6,825		
2041 Total Development Traffic**			3,584	5,025	8,609	6,069	5,541	11,610		

* Town of The Blue Mountains developments in close proximity to Collingwood that were specifically considered in the traffic projections and analysis in this study.

** Includes 2031 Total Development Traffic amounts.

As shown in Table 17, planned developments in the Town of Collingwood are forecast to generate a total of 4,661 and 6,825 trips during the 2031 weekday AM and PM peak hours, respectively, assuming the occupancy percentages outlined in Table 17 are realized by horizon year 2031. By horizon year 2041, assuming full occupancy of all developments outlined in Table 17, the total number of trips to be generated are 8,609 and 11,610 trips during the 2041 weekday AM and PM peak hours, respectively.

Note that the turning movement counts (TMCs) conducted in December 2018 have captured traffic from some of the developments outlined in Table 17 that have already been partially built-out and occupied at the time the TMCs were conducted. Any developments that were partially occupied and captured in the December 2018 TMCs were adjusted accordingly for analysis purposes (e.g., if a specific development was 40% occupied in December 2018, then 60% of the traffic volume amounts shown in Table 17 were applied in the total traffic scenarios in this study).

For developments that TIS reports were not available, traffic volumes were distributed amongst the Study Area intersections according to the logical routing of vehicles to/from various locations within and outside of the Town (e.g., Stayner). Traffic volumes were primarily distributed on arterial and collector roads near a proposed development, with some traffic being distributed to local/collector roads not reviewed in this study. In general, traffic volumes were reduced as distances increased between the traffic generator and any particular intersection, due to overall dispersal of traffic throughout the network.

The total development traffic, that was added to the road network in the total traffic scenarios considered later in this study, are illustrated in Figure 11 and Figure 12 for the medium-term (2031) and long-term (2041) horizons, respectively.

Figure 11: Medium-Term (2031) Development Traffic Volumes

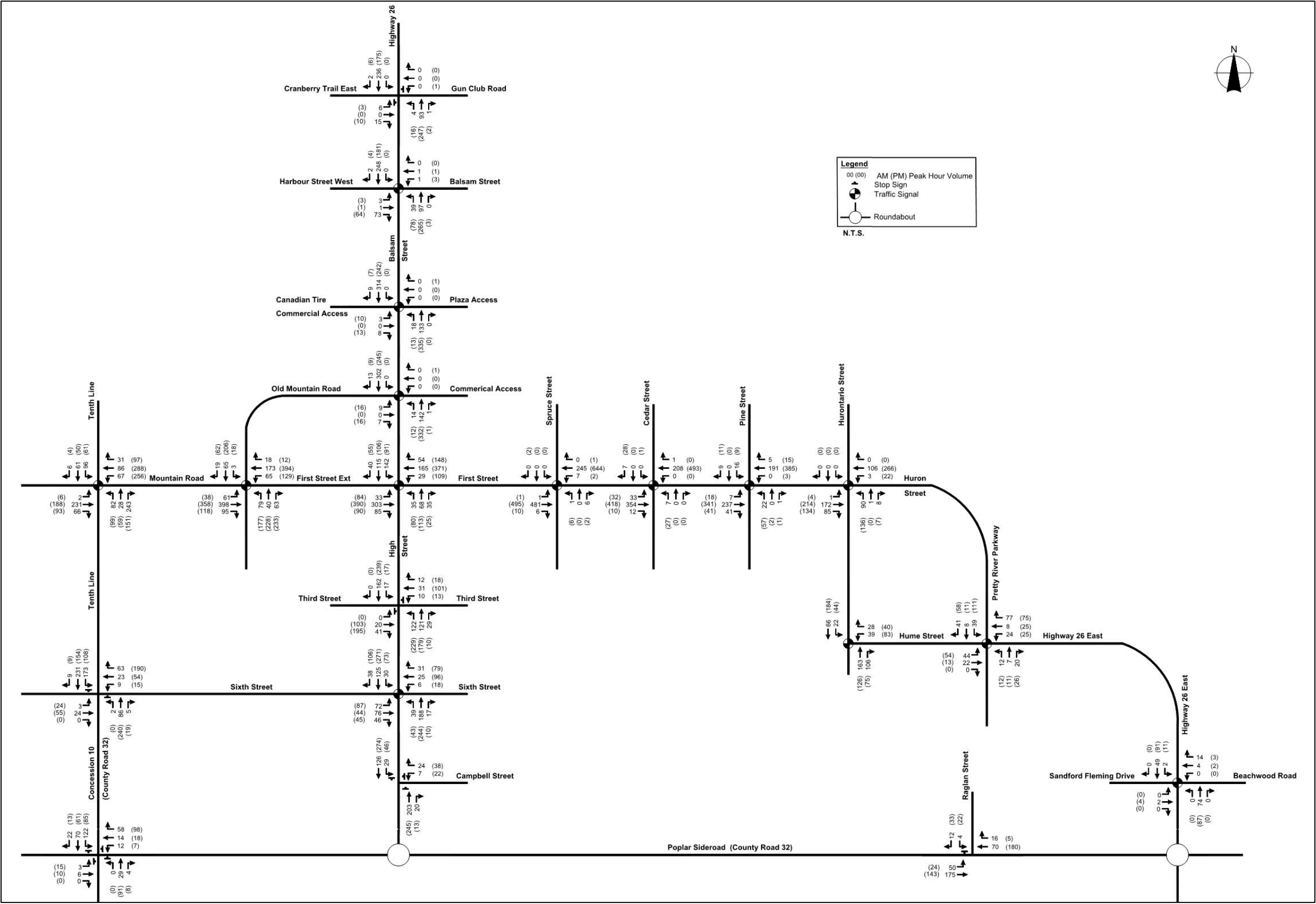
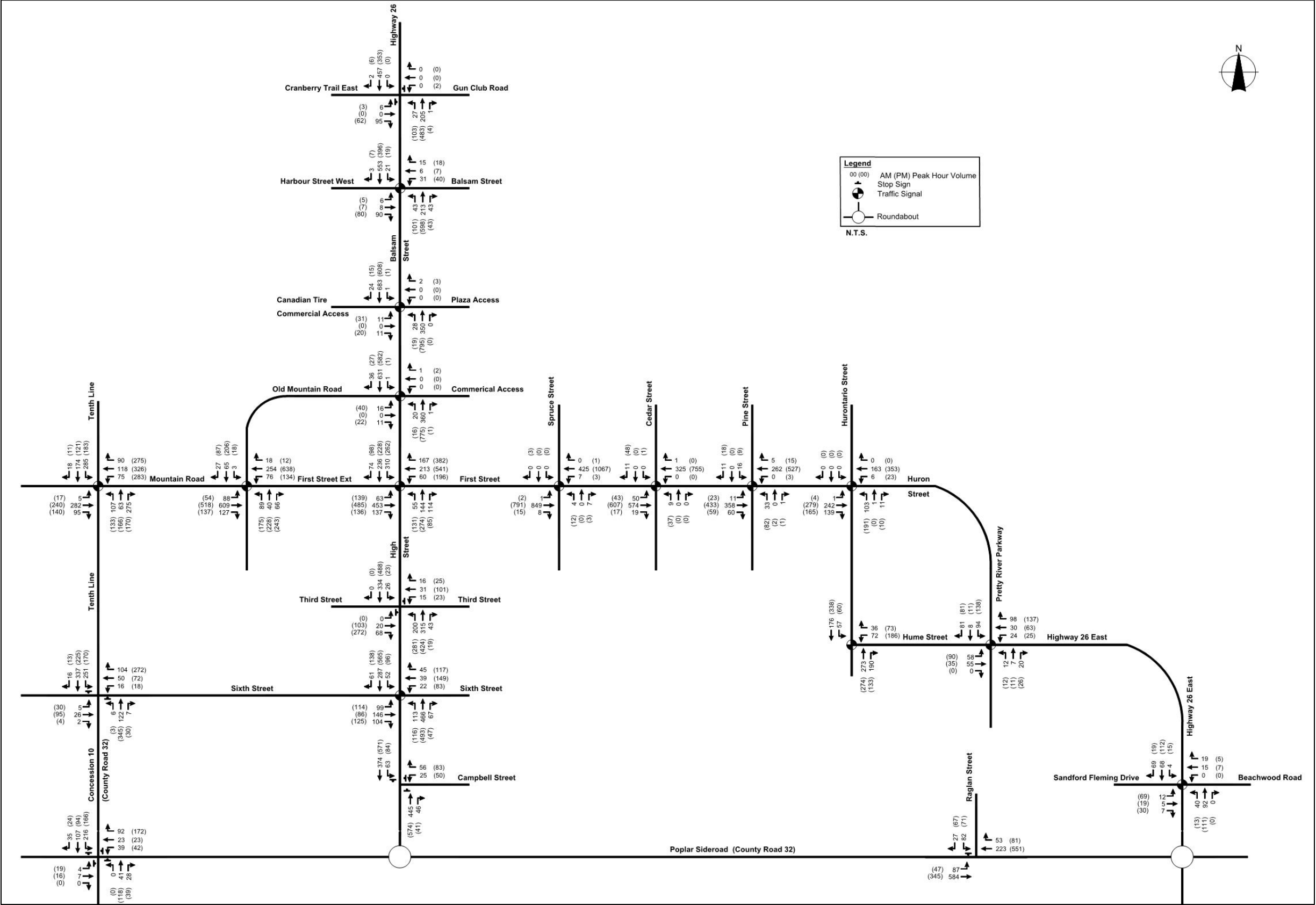


Figure 12: Long-Term (2041) Development Traffic Volumes



6.0 Future Total Traffic Conditions

Future total traffic consists of background traffic volumes plus the addition of the corresponding development traffic that has been forecasted for each horizon year (i.e., 2031 to represent medium term impacts and 2041 to represent long term impacts). This analysis will be used to identify potential road and intersection improvement requirements in the Town resulting from total traffic volumes (i.e., including general traffic growth on the Town's roads in addition to traffic from all identified proposed developments in the Town, as indicated in Figure 10 above).

6.1 Road Network

For the analysis of the future total traffic conditions, there are certain development-related network and intersection improvements that have been assumed to be in place, including the following:

- Tracey Lane will be realigned and connected to Dey Drive and Portland Street via the Eden Oak subdivision (prior to 2031).
- Findlay Drive and Hurontario Street intersection to be signalized after the Eden Oak development is built-out and Tracey Lane is realigned (prior to 2031).
- Findlay Drive will be extended to intersect High Street in 2019.
- Cambridge Street will be extended to the High Street and Third Street intersection. In conjunction with this improvement, the existing traffic signals at the Home Depot Access on High Street will be moved to the new Cambridge Street/Third Street/High Street intersection (prior to 2031).
- Cranberry Trail East and Cranberry Trail West are proposed to be connected, at which point traffic signals will be installed at the Highway 26 and Cranberry Trail East intersection, including the construction of left-turn lanes on the minor street approaches (prior to 2031).

The Town recently completed a Schedule 'C' Municipal Class Environmental Assessment (EA) to review various improvement options on Mountain Road between Cambridge Street and Tenth Line and on Tenth Line between Mountain Road and Sixth Street. Mountain Road currently consists of a two-lane cross section. The Environmental Study Report (ESR) for the *Tenth Line and Mountain Road Improvements Class EA* (Ainley Group, April 2019) recommends that the subject section of Mountain Road be widened to a five-lane cross section (i.e., a centre two-way left-turn lane plus two travel lanes in each direction). The EA considered both signals and roundabout options for the Tenth Line / Mountain Road and Tenth Line / Sixth Street intersections, with roundabouts being the preferred alternative in both cases. The ESR recommends a two-lane roundabout for Tenth Line / Mountain Road and a single lane roundabout for Tenth Line / Sixth Street. These recommended improvements from the EA have not been assumed to be in place in the future road network, but have been analyzed as potential

future improvements. Since this study was substantially completed prior the completion of the EA (i.e. prior to the recommendation for roundabouts), both signalized and roundabout intersection improvements have been considered for the Tenth Line / Mountain Road and Tenth Line / Sixth Street intersections.

6.2 Total Traffic Volumes

The development traffic forecasts in horizon years 2031 and 2041, as outlined in Figure 11 and Figure 12, respectively, are added to the background traffic volumes in 2031 and 2041, as outlined in Figure 6 and Figure 7, respectively, in order to obtain the forecasted total turning movement traffic volumes in 2031 and 2041. The forecasted 2031 and 2041 total traffic volumes are summarized in Figure 13 and Figure 14, respectively.

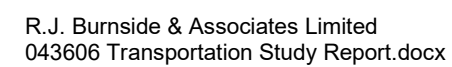
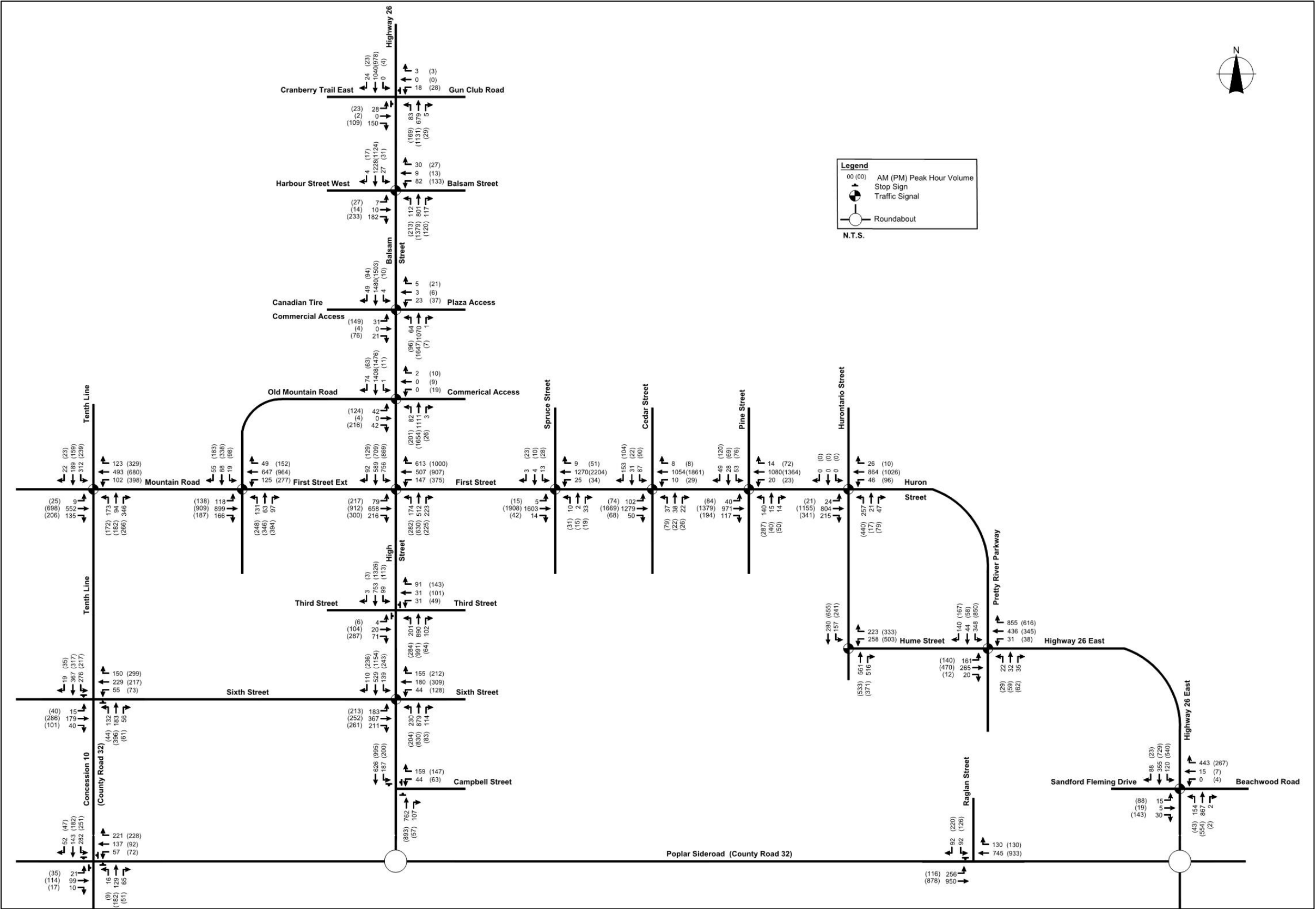


Figure 14: 2041 Total Traffic Volumes



7.0 Total Traffic Operations

This section reviews total traffic operations in the Study Area in horizon years 2031 and 2041. Total traffic volumes in each horizon year consist of the addition of the 2031/2041 development traffic forecasts to the 2031/2041 background traffic volumes.

7.1 2031 Total Traffic Operations

7.1.1 Intersection Operations

Forecasted total traffic volumes at intersections in the Study Area in horizon year 2031 were analyzed using Synchro software, based on the traffic volumes shown in Figure 13. Optimized signal timings were applied at the signalized intersections in the Study Area to ensure that traffic operations were optimized.

The 2031 total traffic operations are summarized in Table 18 and Table 19 for signalized and unsignalized intersections in the Study Area, respectively, and also displayed in Figure 15. Detailed Synchro reports for the 2031 total traffic conditions are provided in Appendix E.

Table 18: 2031 Total Signalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Highway 26 & Cranberry Trail E/Gun Club Road	Overall	10	B	0.65	9	A	0.62
Balsam Street/Harbour Street W & Highway 26	Overall	13	B	0.58	17	B	0.82
Balsam Street & CT Entrance/Plaza Access	Overall	8	A	0.53	12	B	0.58
Balsam Street & Old Mountain Road/Commercial Access	Overall	8	A	0.55	13	B	0.61
First Street & Balsam Street/High Street	Overall	53	D	0.92	80	E	1.12
	EBTR	57	E	0.91	104	F	1.09
	WBL	46	D	0.74	137	F	1.14
	NBTR	68	E	0.94	107	F	1.05
	SBL	74	E	0.96	109	F	1.06
	SBLTR	64	E	0.96	87	F	1.03
First Street & Spruce Street	Overall	6	A	0.49	10	A	0.64
First Street & Cedar Street	Overall	11	B	0.51	11	B	0.64
First Street & Pine Street	Overall	13	B	0.54	22	C	0.85
First Street/Huron Street & Hurontario Street	Overall	13	B	0.54	17	B	0.77
	NBL	49	D	0.78	56	E	0.89
Hume Street/Highway 26 E & Pretty River Parkway	Overall	22	C	0.66	27	C	0.70
Highway 26 E & Beachwood Road/Sandford Fleming Drive	Overall	18	B	0.64	18	B	0.84
	SBL	10	A	0.42	32	C	0.94
Tenth Line & Mountain Road	Overall	69	E	1.07	256	F	1.77
	WBLTR	47	D	0.98	386	F	1.80
	NBLTR	145	F	1.22	355	F	1.65
	SBLTR	79	E	0.99	262	F	1.41
Mountain Road & Old Mountain Road/Cambridge Street	Overall	19	B	0.59	76	E	1.16
	EBTR	21	C	0.63	78	E	1.02
	WBL	14	B	0.40	132	F	1.14
	NBL	26	C	0.48	76	E	0.95
	NBTR	25	C	0.27	72	F	1.12
	SBTR	36	D	0.56	67	E	0.95
High Street & Third Street/Cambridge Street	Overall	11	B	0.37	19	B	0.72
High Street & Sixth Street	Overall	27	C	0.73	31	C	0.89
	EBL	37	D	0.77	79	E	0.96
	EBTR	39	D	0.88	23	C	0.59
	SBTR	23	C	0.49	37	D	0.90
Hurontario Street & Hume Street	Overall	18	B	0.61	20	B	0.69

Table 19: 2031 Total Unsignalized Intersection Operations

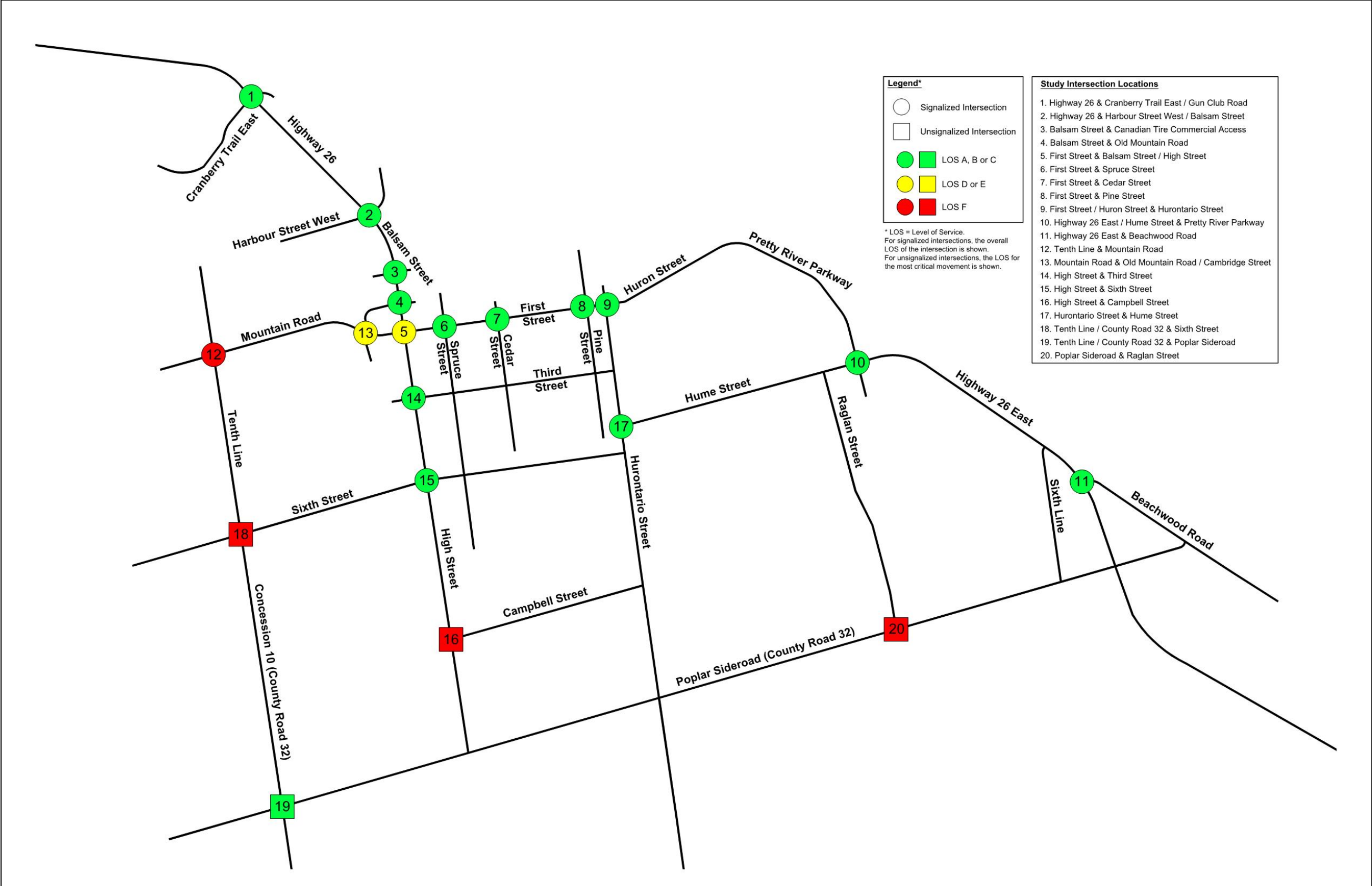
Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
High Street & Campbell Street	WBLR	13	B	0.34	12	B	0.25
	NBTR	104	F	1.15	34	D	0.88
	SBL	12	B	0.34	10	B	0.27
	SBT	27	C	0.79	84	F	1.09
Tenth Line & Sixth Street	EBLTR	32	D	0.71	82	F	1.02
	WBLTR	82	F	1.03	184	F	1.31
	NBLTR	68	F	0.97	98	F	1.07
	SBLTR	233	F	1.43	146	F	1.21
Concession 10 & Poplar Sideroad	EBLTR	13	B	0.28	13	B	0.32
	WLT	13	B	0.35	12	B	0.28
	WBR	11	B	0.36	11	B	0.30
	NBLTR	13	B	0.35	13	B	0.36
	SBLTR	20	C	0.65	20	C	0.66
Poplar Sideroad & Raglan Street	SBLR	27	D	0.36	167	F	1.20

As shown in Table 18 and Table 19, all movements at all intersections in the Study Area are forecast to operate with sufficient capacity and a LOS E of better, except for certain movements at the following intersections:

- First Street and High Street/Balsam Street.
- Tenth Line and Mountain Road.
- Mountain Road and Old Mountain Road/Cambridge Street.
- High Street and Campbell Street.
- Tenth Line and Sixth Street.
- Poplar Sideroad and Raglan Street.

Intersection improvements scenarios have been assessed to determine the improvements required to remediate traffic operations under 2031 total traffic volumes, with the results discussed in Section 7.1.2.

Figure 15: 2031 Total Conditions Level of Service



7.1.2 Recommended Intersection Improvements

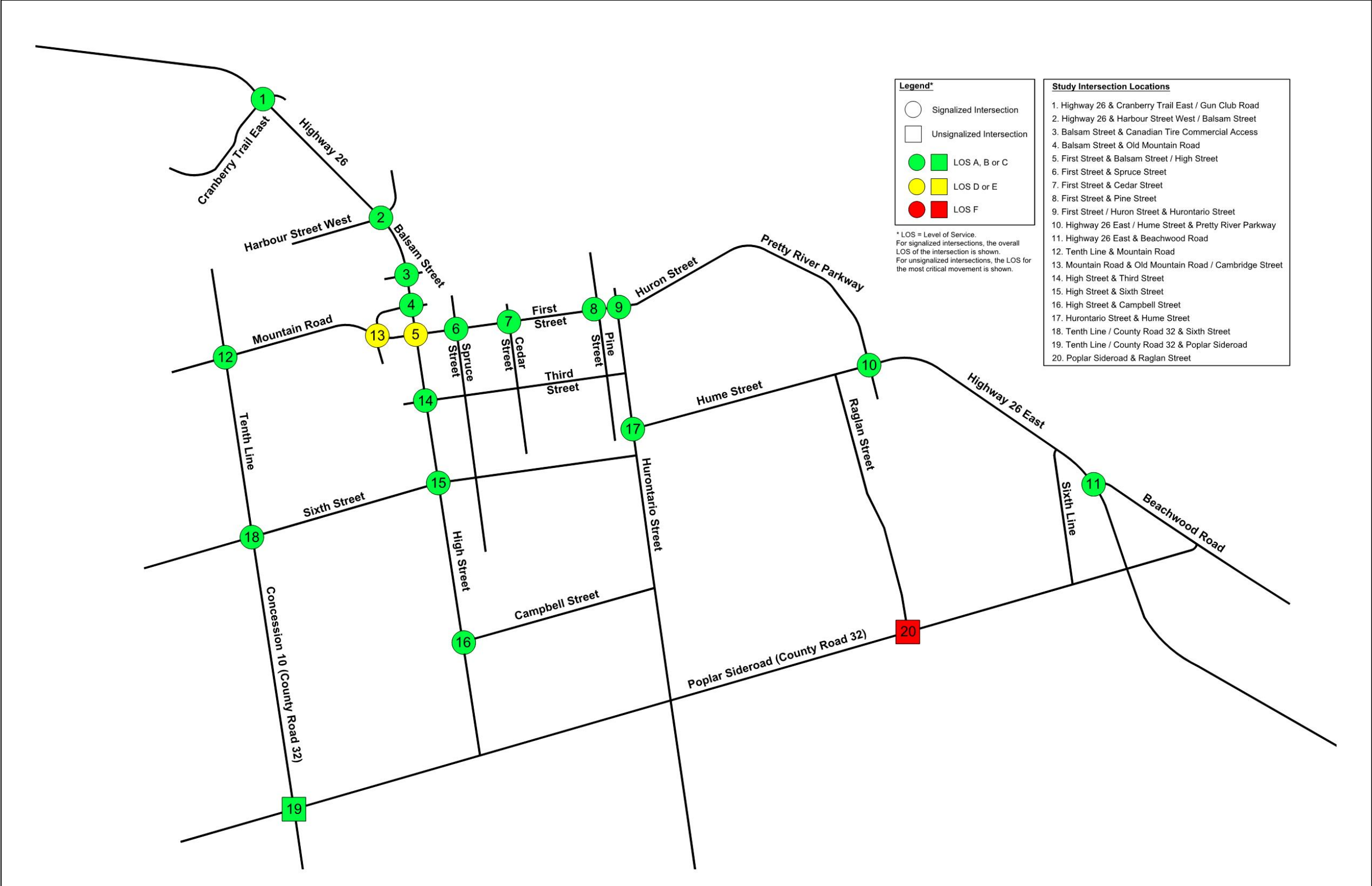
Various intersection improvements were modelled using Synchro software, to determine specific improvements required to address operational deficiencies associated with 2031 total traffic volumes, as outlined in Section 7.1.1. The results that the modelled intersection improvements had on various Study Area intersections is summarized in Table 20 and displayed in Figure 16. Detailed Synchro reports for the 2031 total traffic conditions including improvements are provided in Appendix F. Roundabouts were considered as alternative improvements for certain intersections, which are discussed in Section 7.3.

Table 20: 2031 Total Intersection Operations with Improvements

Intersection	Modelled Improvements	Movement	Weekday AM Peak Hour						Weekday PM Peak Hour					
			Without Improvements			With Improvements			Without Improvements			With Improvements		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
First Street & High Street / Balsam Street	- Addition of a southbound left-turn lane. - Addition of an eastbound right-turn lane.	Overall	53	D	0.92	35	D	0.80	80	E	1.12	47	D	0.97
		EBT	-	-	-	42	D	0.80	-	-	-	57	E	0.93
		EBR	-	-	-	31	C	0.13	-	-	-	34	C	0.28
		EBTR	57	E	0.91	-	-	-	104	F	1.09	-	-	-
		WBL	46	D	0.74	31	C	0.61	137	F	1.14	71	E	0.96
		NBTR	68	E	0.94	45	D	0.84	107	F	1.05	64	E	0.93
		SBL	74	E	0.96	42	D	0.83	109	F	1.06	56	E	0.90
		SBTR	-	-	-	36	C	0.57	-	-	-	40	D	0.73
		SBLTR	64	E	0.96	-	-	-	87	F	1.03	-	-	-
Tenth Line & Mountain Road	- Addition of a dedicated left-turn lane to all four approaches. - Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane. - Addition of a northbound right-turn lane.	Overall	69	E	1.07	22	C	0.65	257	F	1.77	32	C	0.86
		WBL	-	-	-	12	B	0.35	-	-	-	47	D	0.90
		WBT	-	-	-	13	B	0.52	-	-	-	11	B	0.57
		WBR	-	-	-	8	A	0.05	-	-	-	7	A	0.10
		WBLTR	47	D	0.98	-	-	-	386	F	1.80	-	-	-
		NBL	-	-	-	23	C	0.46	-	-	-	31	C	0.53
		NBT	-	-	-	30	C	0.23	-	-	-	39	D	0.45
		NBR	-	-	-	31	C	0.39	-	-	-	36	D	0.17
		NBLTR	145	F	1.22	-	-	-	355	F	1.65	-	-	-
		SBL	-	-	-	30	C	0.51	-	-	-	36	D	0.53
		SBTR	-	-	-	39	D	0.58	-	-	-	56	E	0.72
		SBLTR	79	E	0.99	-	-	-	262	F	1.41	-	-	-
Mountain Road & Old Mountain Road/Cambridge Street	- Addition of a northbound right-turn lane. - Addition of a southbound right-turn lane. - Convert existing westbound right-turn lane into a shared westbound through/right-turn lane.	Overall	19	B	0.59	20	C	0.56	76	E	1.16	44	D	0.98
		EBTR	21	C	0.63	20	B	0.60	78	E	1.02	42	D	0.82
		WBL	14	B	0.40	12	B	0.37	132	F	1.14	64	E	0.92
		NBL	26	C	0.48	28	C	0.47	76	E	0.95	71	E	0.95
		NBT	-	-	-	31	C	0.23	-	-	-	40	D	0.68
		NBR	-	-	-	30	C	0.07	-	-	-	35	C	0.45
		NBTR	25	C	0.27	-	-	-	73	F	1.12	-	-	-
		SBT	-	-	-	39	D	0.52	-	-	-	74	E	0.93
		SBR	-	-	-	35	C	0.04	-	-	-	38	D	0.11
		SBTR	36	D	0.56	-	-	-	67	E	0.95	-	-	-
High Street & Campbell Street	- Addition of traffic signals (semi-actuated with detectors on Campbell Street). - Addition of a westbound left-turn lane. - Addition of a northbound right-turn lane.	Overall				14	B	0.59				11	B	0.53
		WBL	-	-	-	23	C	0.15	-	-	-	24	C	0.16
		WBR	-	-	-	23	C	0.10	-	-	-	23	C	0.06
		WBLR	13	B	0.34	-	-	-	12	B	0.25	-	-	-
		NBT	-	-	-	19	B	0.75	-	-	-	14	B	0.59
		NBR	-	-	-	9	A	0.06	-	-	-	8	A	0.02
		NBTR	104	F	1.15	-	-	-	34	D	0.88	-	-	-
		SBL	12	B	0.34	8	A	0.44	10	B	0.27	5	A	0.32
		SBT	27	C	0.79	6	A	0.40	84	F	1.09	7	A	0.55
Tenth Line & Sixth Street	Addition of traffic signals (actuated-uncoordinated).	Overall				11	B	0.58				11	B	0.58
		EBL	-	-	-	10	A	0.05	-	-	-	9	A	0.14
		EBTR	-	-	-	11	B	0.39	-	-	-	11	B	0.52
		EBLTR	32	D	0.71	-	-	-	82	F	1.02	-	-	-

Intersection	Modelled Improvements	Movement	Weekday AM Peak Hour						Weekday PM Peak Hour					
			Without Improvements			With Improvements			Without Improvements			With Improvements		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
	Addition of a dedicated left-turn lane to all four approaches.	WBL	-	-	-	10	B	0.16	-	-	-	10	A	0.20
		WBTR	-	-	-	13	B	0.59	-	-	-	13	B	0.60
		WBLTR	82	F	1.03	-	-	-	184	F	1.31	-	-	-
		NBL	-	-	-	10	B	0.39	-	-	-	9	A	0.11
		NBTR	-	-	-	10	A	0.33	-	-	-	12	B	0.55
		NBLTR	68	F	0.97	-	-	-	98	F	1.07	-	-	-
		SBL	-	-	-	12	B	0.57	-	-	-	11	B	0.47
		SBTR	-	-	-	11	B	0.50	-	-	-	10	B	0.43
		SBLTR	233	F	1.43	-	-	-	146	F	1.21	-	-	-
Poplar Sideroad & Raglan Street	Addition of a southbound left-turn lane.	SBL	-	-	-	62	F	0.19	-	-	-	109	F	0.78
		SBR	-	-	-	14	B	0.17	-	-	-	18	C	0.42
		SBLR	27	D	0.36	-	-	-	167	F	1.20	-	-	-

Figure 16: 2031 Total Conditions With Intersection Improvements Level of Service



First Street & High Street/Balsam Street

All movements, during the weekday AM peak hour, operate with sufficient capacity and a LOS E or better. However, during the weekday PM peak hour several movements at the intersection operate with a LOS F and v/c ratios exceeding 1.0.

To improve the operations of individual movements and the overall intersection, the following improvements were modelled:

- Addition of a southbound left-turn lane.
- Addition of an eastbound right-turn lane.
- Optimization of signal timings.

As shown in Table 20, the modelled improvements result in all movements operating with sufficient capacity (i.e., v/c ratios below 1.0) and a LOS E or better during the 2031 total AM and PM peak hours.

Tenth Line & Mountain Road

Several movements, during the 2031 total AM and PM peak hours, are forecasted to operate with a LOS F and v/c ratios exceeding 1.0.

The following improvements were modelled to remediate traffic operations:

- Addition of a dedicated left-turn lane to all four approaches.
- Addition of an eastbound right-turn lane.
- Addition of a westbound right-turn lane.
- Addition of a northbound right-turn lane.
- Optimization of signal timings.

As shown in Table 20, the modelled improvements results in all movements operating with sufficient capacity and a LOS E or better during the 2031 total AM and PM peak hours.

A roundabout alternative is discussed in Section 7.3.

Mountain Road & Old Mountain Road/Cambridge Street

All movements, during the AM peak hour, operate with sufficient capacity and a LOS D or better. However, during the PM peak hour several movements at the intersection operate with a LOS F and v/c ratios exceeding 1.0.

The following improvements were modelled to remediate traffic operations:

- Addition of a northbound right-turn lane.
- Addition of a southbound right-turn lane.

- Convert existing westbound right-turn lane into a shared westbound through/right-turn lane.
- Optimization of signal timings.

As shown in Table 20, the modelled improvements results in all movements operating with sufficient capacity and a LOS E or better during the 2031 total AM and PM peak hours.

High Street & Campbell Street

During the AM peak hour, the northbound through-right movement is forecasted to operate with a LOS F and a v/c ratio of 1.15. During the PM peak hour, the southbound through movement at the intersection is forecasted to operate with a LOS F and a v/c ratio of 1.09. All other movements during the AM and PM peak hours are forecasted to operate with sufficient capacity and a LOS D or better.

The following improvements were modelled to remediate traffic operations:

- Addition of traffic signals (semi-actuated with detectors on Campbell Street).
- Addition of a westbound left-turn lane.
- Addition of a northbound right-turn lane.

Signal warrant criteria contained in the *Ontario Traffic Manual Book 12: Traffic Signals* (Government of Ontario, March 2012) were reviewed to determine if signals were warranted at the High Street and Campbell Street intersection according to the criteria for “Justification 7 – Projected Volumes”. The results of the signal warrant analysis at the intersection are contained in Appendix G. To summarize, neither the “Minimum Vehicular Volume” or “Delay to Cross Traffic” warrants are met at the High Street and Campbell Street intersection under 2031 total traffic conditions. Although it was determined that this intersection could operate acceptably under 2031 total traffic conditions by simply removing the stop sign controls on High Street (i.e., stop-controlled at the Campbell Street approach only), this is not ideal due to poor sightlines to the north because of the vertical curve on High Street. Thus, removal of the stop signs at the intersection’s High Street approaches would only be recommended if High Street is reconstructed, in the vicinity of the intersection, so that the minimum sightline criteria contained in the *Geometric Design Guide for Canadian Roads* (Transportation Association of Canada, 2017) are met. It is recommended that the Town monitor traffic at this intersection to determine when traffic signals are justified.

As shown in Table 20, the modelled improvements results in all movements operating with sufficient capacity and a LOS C or better during the 2031 total AM and PM peak hours.

A roundabout alternative is discussed in Section 7.3.

Tenth Line & Sixth Street (now County jurisdiction)

Several movements during the AM and PM peak hours are forecasted to operate with a LOS F and v/c ratios exceeding 1.0.

The following improvements were modelled to remediate traffic operations:

- Addition of traffic signals (actuated-uncoordinated).
- Addition of a dedicated left-turn lane to all four approaches.

Signal warrant criteria contained in the *Ontario Traffic Manual Book 12: Traffic Signals* (Government of Ontario, March 2012) were reviewed to determine if signals are warranted at the Tenth Line and Sixth Street intersection according to the criteria for “Justification 7 – Projected Volumes”. The results of the signal warrant analysis at the intersection is contained in Appendix G. To summarize, the “Minimum Vehicular Volume” warrant is met at the Tenth Line and Sixth Street intersection under 2031 total traffic conditions. It is recommended that the County monitor traffic at this intersection to determine when traffic signals are justified.

As shown in Table 20, the modelled improvements results in all movements operating with sufficient capacity and a LOS B or better during the 2031 total AM and PM peak hours.

A roundabout alternative is discussed in Section 7.3.

Raglan Street & Poplar Sideroad (now County jurisdiction)

The southbound left-right movement at the intersection is forecast to operate with a LOS F and v/c ratio of 1.20 during the PM peak hour. To improve traffic operations at this intersection, a dedicated southbound left-turn lane was added. Thus, the existing southbound left/right-turn lane was converted to separate southbound right-turn lane and left-turn lane.

The addition of the southbound left-turn lane reduced the v/c ratio of the southbound left movement during the 2031 total PM peak hour from 1.20 to 0.78. The delay also reduced from 167 seconds to 109 seconds. Although the southbound left-turn movement still operates with a LOS F after the addition of a southbound left-turn lane, the movement will have sufficient capacity, and a delay of 109 seconds during short periods of the weekday PM peak hour is also considered acceptable.

A roundabout alternative is discussed in Section 7.3.

7.1.3 Road Segment Operations

The capacity of road segments in the Study Area have been assessed under 2031 total traffic conditions. The 2031 total v/c ratios for the select road segments are outlined in

Table 21, based on the PM peak hour volumes. Road segments with a v/c ratio at or exceeding 1.0 indicates a segment where the traffic volume exceeds the capacity.

Table 21: 2031 Total Road Segment Operations

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/ EB	NB/ EB	SB/ WB	NB/ EB	SB/ WB
Highway 26	N of Harbour Street West	1	900	1040	899	1.16	1.00
	E of Pretty River Parkway	2	1800	1275	862	0.71	0.48
Balsam Street	Harbour Street West to First Street	2	1800	1381	1318	0.77	0.73
First Street	High Street to Huron Street	2	1800	1624	1807	0.90	1.00
Huron Street	E of Hurontario Street	2	1800	1120	1007	0.62	0.56
Mountain Road	W of Tenth Line	1	900	792	777	0.88	0.86
	W of Cambridge Street	1	900	1014	1138	1.13	1.26
First Street Ext.	W of Balsam Street	2	1800	1201	1114	0.67	0.62
High Street	First Street to Tenth Street	2	1800	1002	1282	0.56	0.71
	Tenth Street to Poplar Sideroad	1	900	648	833	0.72	0.93
Hume Street	Hurontario Street to Pretty River Parkway	1	900	541	672	0.60	0.75
Beachwood Road	E of Highway 26	1	900	516	258	0.57	0.29
Pretty River Parkway	N of Hume Street	2	1800	689	984	0.38	0.55
Hurontario Street	First Street to Hume Street	1	900	659	702	0.73	0.78
	Hume Street to Sixth Street	2	1800	673	871	0.37	0.48
Old Mountain Road	Mountain Road to Balsam Street	1	500	604	578	1.21	1.16
Harbour Street West	W of Highway 26	1	700	240	204	0.34	0.29
Cranberry Trail East	W of Highway 26	1	500	79	101	0.16	0.20

Road	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/ EB	NB/ EB	SB/ WB	NB/ EB	SB/ WB
Raglan Street	N of Poplar Sideroad	1	700	142	252	0.20	0.36
Tenth Line	N of Mountain Road	1	700	235	216	0.34	0.31
	S of Mountain Road	1	700	538	607	0.77	0.87
Cambridge Street ¹	S of Mountain Road	1	700	963	762	1.37	1.09
	W of High Street	1	700	318	336	0.45	0.48
Third Street	E of High Street	1	700	259	269	0.37	0.38
Sixth Street	E of High Street	1	700	459	477	0.66	0.68
	W of High Street	1	900	558	574	0.62	0.64
Campbell Street	E of High Street	1	500	184	134	0.37	0.27

1. It is assumed that Cambridge Street will be upgraded to a collector road after full build-out and occupancy of the RCD development and after it is extended to Third Street. Thus, the assumed capacity will increase from the existing amount of 500 vph to 700 vph (per direction).

As shown in Table 21, the following road segments are operating at or above 100% of their assumed capacity:

- Highway 26 (north of Harbour Street West)
- First Street (High Street to Hurontario Street)
- Mountain Road (Tenth Line to Cambridge Street)
- Old Mountain Road (Mountain Road to Balsam Street)
- Cambridge Street (south of Mountain Road).

Note that the road segments outlined above exceed their *assumed* road capacities, based on their road classification. The actual capacity of a specific roadway may differ from the assumed road classification capacity outlined in Table 21, based on various factors. Upgrading of road classifications (i.e., for local and collector roads), together with upgrading of their designs to meet the new classifications, will improve the capacities along these corridors. The construction of potential alternative routes in and around the Town would also reduce traffic volumes on some Town roads.

Highway 26 (North of Harbour Street West)

The v/c ratio on the segment of Highway 26 north of Harbour Street West exceeds 1.0 in both the northbound and southbound directions. It is assumed that there will remain one travel lane per direction in horizon year 2031. However, a centre two-way left-turn lane (TWLTL) exists on this segment of Highway 26 to the north of Trott Boulevard (i.e., extending beyond the Study Area). It has been found that an average capacity of

increase of 25% occurs on roads with a centre turn lane². Therefore, at an assumed road capacity of 1,125 vph in each direction (i.e., 900 vph multiplied by 1.25), the v/c ratio in both directions on Highway 26 reduces to below 0.93. Therefore, traffic capacity on Highway 26 (north of Harbour Street West) is considered reasonable under 2031 total traffic conditions. It is recommended that the Town continue to monitor the traffic on this segment to determine if, or when, expansion options may need to be considered.

First Street (High Street to Hurontario Street)

The v/c ratio in the westbound direction reaches 1.00 under 2031 total traffic conditions. First Street currently has two travel lanes per direction, in addition to a centre TWLTL which extends along its entire length. As noted above, a centre TWLTL has been found to increase, on average, the capacity of a road by 25%. Using an assumed road capacity of 2,250 vph per direction (i.e., 1,800 multiplied by 1.25), the v/c ratio reduces to less than 0.81 in the westbound direction. Therefore, the capacity of First Street is considered sufficient to accommodate 2031 total traffic volumes.

Mountain Road (Tenth Line to Cambridge Street)

The v/c ratio on Mountain Road, between Tenth Line and Cambridge Street under 2031 total traffic conditions, is forecasted to be 1.13 and 1.26 in the eastbound and westbound directions, respectively. Thus, the volumes on this segment of Mountain Road suggest that additional roadway capacity may be required prior to horizon year 2031.

The recently completed *Tenth Line and Mountain Road Improvements Class EA* recommended that a five-lane cross section (i.e., a centre left turn lane plus two travel lanes in each direction) be implemented in the future on Mountain Road. It is recommended that the Town monitor the traffic on this segment of Mountain Road to confirm when upgrading to a five-lane cross section is justified (i.e., subject to the progression of developments in the area). If Mountain Road were upgraded to a five-lane cross section, based on the 2031 total traffic volumes the v/c ratio in the eastbound and westbound directions would be reduced to 0.56 and 0.63, respectively.

Old Mountain Road (Mountain Road to Balsam Street)

The v/c ratio on Old Mountain Road under 2031 total traffic conditions is forecasted to be 1.21 and 1.16 in the northbound and southbound directions, respectively. However, the volume of commercial accesses on Old Mountain Road is relatively high and a centre two-way left-turn (TWLTL) lane exists, which can increase the capacity of Old Mountain Road to an extent. By increasing the assumed road capacity by 25% to account for the centre TWLTL, the v/c ratio decreases to 0.97 and 0.92 in the northbound and southbound directions, respectively. Also, Old Mountain Road is currently classified as a

² S/K Transportation Consultants, Inc., April 2000, *National Highway Institute Course Number 133078: Access Management, Location, and Design*.

local road and may be reclassified as a collector or arterial road in the future, which would increase the roads assumed capacity, if road designs support such classifications. Therefore, the capacity of Old Mountain Road is considered sufficient to accommodate 2031 total traffic volumes.

Cambridge Street (South of Mountain Road)

The v/c ratio on Cambridge Street, south of Mountain Road under 2031 total traffic conditions, is forecasted to be 1.37 and 1.09 in the northbound and southbound directions, respectively, assuming that Cambridge Street is reclassified as a collector road by 2031 and assuming that road designs support such a reclassification.

Localized traffic volumes on Cambridge Street, immediately south of Mountain Road, are forecasted to be significantly higher than the volumes on Cambridge Street immediately west of High Street, due to the location of developments and commercial driveways on Cambridge Street. Given that the v/c ratio on Cambridge Street immediately west of High Street is only 0.45 and 0.48 in the eastbound and westbound directions, respectively, it is probable that volumes may only exceed the assumed capacity near the Mountain Road intersection. A northbound right-turn lane has been recommended under 2031 total traffic conditions at the Mountain Road and Cambridge Street intersection, in addition to the existing northbound through and northbound left-turn lanes, which is considered sufficient to accommodate the increased northbound traffic at this location. Also, a centre TWLTL currently extends along the length of Cambridge Street, further increasing the assumed road capacity. Therefore, the capacity of Cambridge Street is considered sufficient to accommodate 2031 total traffic volumes.

7.2 2041 Total Traffic Operations

7.2.1 Intersection Operations

Forecast total traffic volumes at intersections in the Study Area in horizon year 2041 were analyzed using Synchro software, based on the traffic volumes shown in Figure 14. Optimized signal timings were applied at the signalized intersections in the Study Area to ensure that traffic operations were optimized.

The 2041 total traffic operations are summarized in Table 22 and Table 23 for signalized and unsignalized intersections in the Study Area, respectively, and also displayed in Figure 17. Detailed Synchro reports for the 2041 total traffic conditions are provided in Appendix H.

Table 22: 2041 Total Signalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Highway 26 & Cranberry Trail E/Gun Club Road	Overall	19	B	0.85	16	B	0.81
	SBT	25	C	0.93	18	B	0.84
Balsam Street/Harbour Street W & Highway 26	Overall	18	B	0.80	52	D	1.14
	EBTR	143	F	1.00	56	E	1.00
	WBL	135	F	1.03	135	F	1.03
	NBLT	63	E	1.08	63	E	1.08
Balsam Street & CT Entrance/Plaza Access	Overall	11	B	0.74	19	B	0.79
	SBTR	12	B	0.81	20	C	0.86
Balsam Street & Old Mountain Road/Commercial Access	Overall	11	B	0.75	19	B	0.83
	SBTR	15	B	0.81	23	C	0.88
First Street & Balsam Street/High Street	Overall	119	F	1.20	174	F	1.47
	EBL	34	C	0.46	121	F	1.08
	EBTR	137	F	1.17	218	F	1.36
	WBL	156	F	1.14	295	F	1.53
	WBT	46	D	0.68	55	E	0.90
	WBR	31	C	0.83	114	F	1.16
	NBL	49	D	0.58	79	E	0.90
	NBTR	175	F	1.25	229	F	1.37
	SBL	162	F	1.22	226	F	1.36
	SBLTR	149	F	1.21	201	F	1.32
First Street & Spruce Street	Overall	8	A	0.65	14	B	0.81
	WBTR	5	A	0.55	14	B	0.88
First Street & Cedar Street	Overall	13	B	0.62	14	B	0.77
First Street & Pine Street	Overall	13	B	0.61	27	C	0.96
	EBTR	9	A	0.63	20	C	0.93
	WBTR	10	B	0.64	23	C	0.89
	NBL	41	D	0.60	34	C	0.94
First Street/Huron Street & Hurontario Street	Overall	14	B	0.62	21	C	0.87
	EBTR	5	A	0.60	12	B	0.88
	NBL	50	D	0.81	60	E	0.93
Hume Street/Highway 26 E & Pretty River Parkway	Overall	24	C	0.74	32	C	0.78
	SBL	29	C	0.53	45	D	0.90
	SBTL	29	C	0.52	48	D	0.91
Highway 26 E & Beachwood Road/Sandford Fleming Drive	Overall	20	B	0.70	27	C	0.91
	EBLTR	19	B	0.15	64	E	0.90
	SBL	12	B	0.50	25	C	0.86
Tenth Line & Mountain Road	Overall	257	F	1.80	533	F	2.68
	EBLTR	57	E	0.99	56	E	1.02
	WBLTR	285	F	1.55	921	F	2.98
	NBLTR	207	F	1.36	358	F	1.68

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
	SBLTR	543	F	2.10	546	F	2.09
Mountain Road & Old Mountain Road/Cambridge Street	Overall	20	B	0.73	104	F	1.31
	EBL	18	B	0.43	101	F	0.99
	EBTR	20	C	0.73	96	F	1.09
	WBL	29	C	0.69	184	F	1.27
	WBTR	10	A	0.38	51	D	0.94
	NBL	33	C	0.61	113	F	1.08
	NBTR	27	C	0.30	170	F	1.26
High Street & Third Street/Cambridge Street	SBTR	39	D	0.59	107	F	1.08
	Overall	12	B	0.50	28	C	0.95
	NBL	5	A	0.47	61	E	0.95
High Street & Sixth Street	SBTR	10	B	0.43	26	C	0.85
	Overall	64	E	1.05	74	E	1.09
	EBL	31	C	0.71	117	F	1.08
	EBTR	93	F	1.07	71	E	0.96
	WBL	35	D	0.51	72	E	0.87
	WBTR	43	D	0.75	113	F	1.09
	NBL	60	E	0.91	90	F	0.99
	NBTR	71	E	1.02	38	D	0.76
	SBL	72	E	0.91	42	D	0.83
Hurontario Street & Hume Street	SBTR	50	D	0.84	82	F	1.07
	Overall	22	C	0.77	29	C	0.91
	WBL	29	C	0.70	52	D	0.94
	NBT	33	C	0.88	28	C	0.73
	SBTL	10	B	0.87	24	C	0.94

Table 23: 2041 Total Unsignalized Intersection Operations

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
High Street & Campbell Street	WBLR	16	C	0.48	14	B	0.40
	NBTR	400	F	1.84	265	F	1.54
	SBL	14	B	0.46	12	B	0.37
	SBT	225	F	1.44	343	F	1.71
Tenth Line & Sixth Street	EBLTR	38	E	0.76	141	F	1.20
	WBLTR	187	F	1.32	316	F	1.62
	NBLTR	122	F	1.15	232	F	1.42
	SBLTR	514	F	2.08	316	F	1.62
Concession 10 & Poplar Sideroad	EBLTR	15	C	0.35	18	C	0.44
	WLT	18	C	0.51	16	C	0.44
	WBR	16	C	0.51	17	C	0.53

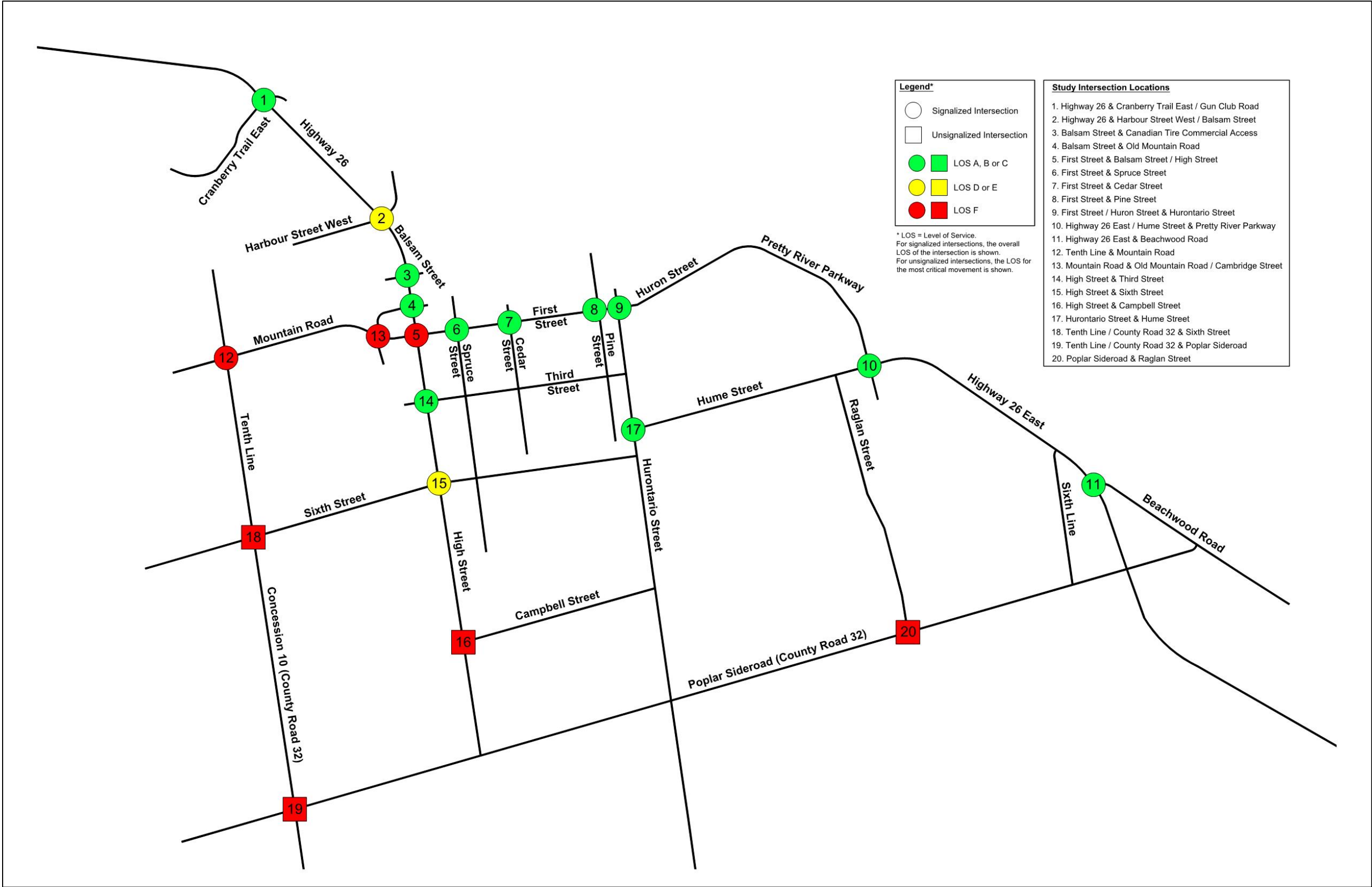
Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
	NBLTR	17	C	0.50	20	C	0.57
	SBLTR	85	F	1.07	88	F	1.08
Poplar Sideroad & Raglan Street	SBLR	>1000	F	4.77	>1000	F	5.96

As shown in Table 22 and Table 23, all movements at all intersections in the Study Area are forecast to operate with sufficient capacity and a LOS E of better, except for certain movements at the following intersections:

- Highway 26 and Balsam Street/Harbour Street West.
- First Street and High Street/Balsam Street.
- Tenth Line and Mountain Road.
- Mountain Road and Old Mountain Road/Cambridge Street.
- High Street and Sixth Street.
- High Street and Campbell Street.
- Tenth Line and Sixth Street.
- Poplar Sideroad and Concession 10 (now under County of Simcoe jurisdiction).
- Poplar Sideroad and Raglan Street (now under County of Simcoe jurisdiction).

Intersection improvements scenarios have been assessed to determine the improvements required to remediate traffic operations under 2041 total traffic volumes, with the results discussed in Section 7.2.2.

Figure 17: 2041 Total Conditions Level of Service



7.2.2 Recommended Intersection Improvements

Various intersection improvements were modelled using Synchro software in order to determine specific improvements required to address operational deficiencies associated with 2041 total traffic volumes, as outlined in Section 7.2.1. The results that the modelled intersection improvements had on various Study Area intersections is summarized in Table 24 and displayed in Figure 18. Detailed Synchro reports for the 2041 total traffic conditions including improvements are provided in Appendix I.

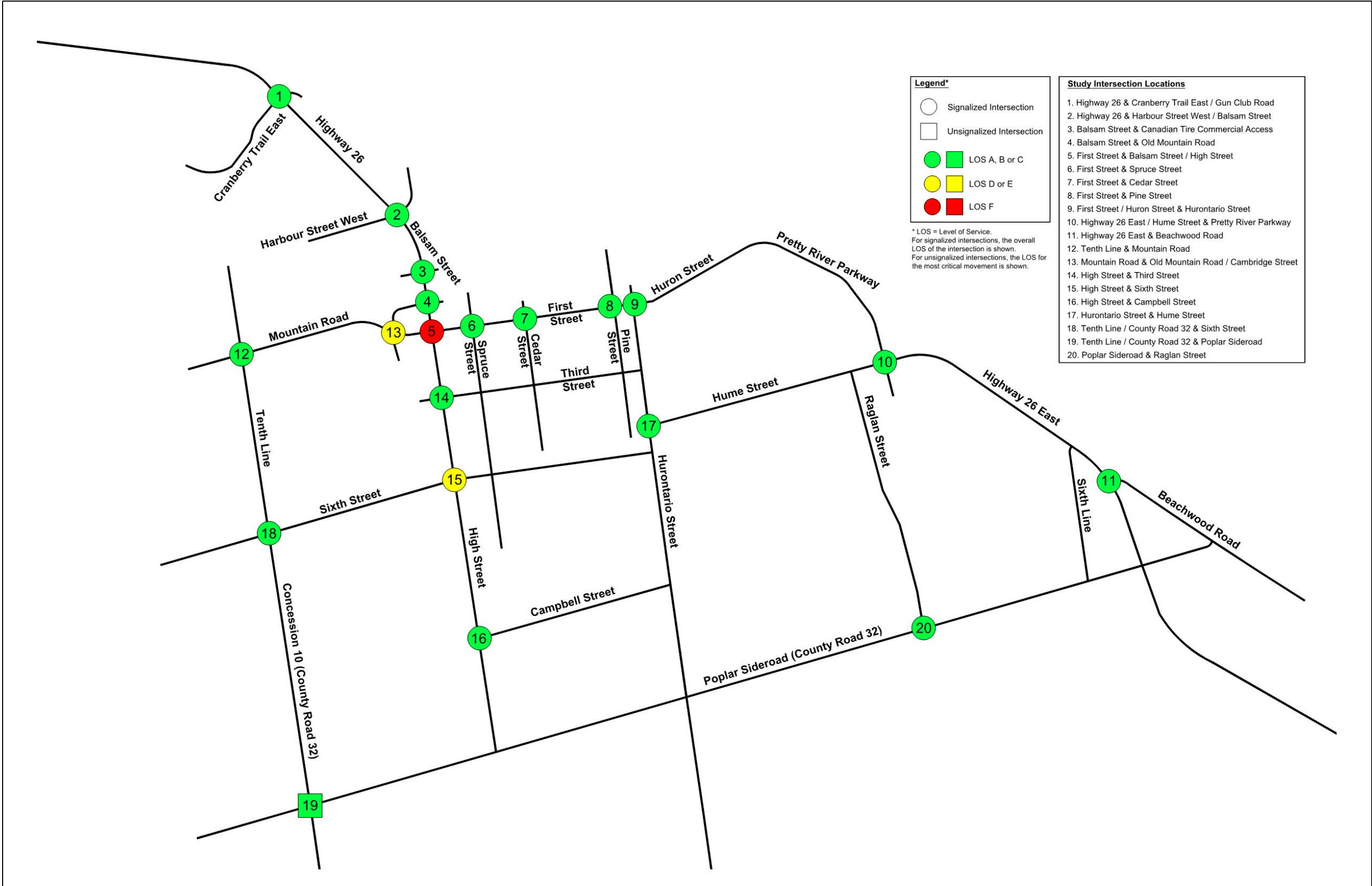
Table 24: 2041 Total Intersection Operations with Improvements

Intersection	Modelled Improvements	Movement	Weekday AM Peak Hour						Weekday PM Peak Hour					
			Without Improvements			With Improvements			Without Improvements			With Improvements		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Balsam Street/Harbour Street W & Highway 26	2041 Improvements: • Addition of northbound left-turn lane (on Highway 26). • Addition of southbound left-turn lane (on Highway 26). • Optimized signal timings and cycle length.	Overall	18	B	0.80	15	B	0.71	52	D	1.14	18	B	0.78
		EBL	31	C	0.04	31	C	0.04	56	E	0.33	37	D	0.21
		EBTR	34	C	0.37	33	C	0.30	143	F	1.00	39	D	0.42
		WBL	63	E	0.79	57	E	0.76	135	F	1.03	38	D	0.68
		WBTR	32	C	0.07	31	C	0.07	45	D	0.08	28	C	0.06
		NBL				17	B	0.50				26	C	0.73
		NBLT	12	B	0.75				63	E	1.08			
		NBT				6	A	0.38				11	B	0.63
		NBR	4	A	0.11	4	A	0.11	4	A	0.09	6	A	0.09
		SBL				9	A	0.10				16	B	0.22
		SBTR				17	B	0.73				19	B	0.69
First Street & High Street / Balsam Street	2031 Improvements: • Addition of a southbound left-turn lane. • Addition of an eastbound right-turn lane. 2041 Improvements: • Addition of northbound right-turn lane. • Optimized signal timings and cycle length.	Overall	119	F	1.20	48	D	0.93	174	F	1.47	84	F	1.25
		EBL	34	C	0.46	34	C	0.44	122	F	1.08	122	F	1.08
		EBT	-	-	-	58	E	0.90	-	-	-	88	F	1.04
		EBR	-	-	-	40	D	0.34	-	-	-	41	D	0.39
		EBTR	137	F	1.17	-	-	-	218	F	1.36	-	-	-
		WBL	158	F	1.14	85	F	0.95	295	F	1.53	204	F	1.32
		WBT	46	D	0.68	44	D	0.67	55	E	0.90	50	D	0.85
		WBR	31	C	0.83	30	C	0.82	114	F	1.16	95	F	1.11
		NBL	49	D	0.58	37	D	0.61	79	E	0.90	75	E	0.94
		NBT				65	E	0.90				138	F	1.14
		NBR				46	D	0.42				48	D	0.22
		NBTR	175	F	1.25				229	F	1.37			
		SBL	162	F	1.22	56	E	0.91	226	F	1.36	66	E	0.96
		SBLTR	149	F	1.21	35	C	0.65	201	F	1.32	48	D	0.82
Tenth Line & Mountain Road	2031 Improvements: • Addition of a dedicated left-turn lane to all four approaches. • Addition of an eastbound right-turn lane. • Addition of a westbound right-turn lane. • Addition of a northbound right-turn lane. 2041 Improvements: • Addition of an eastbound through lane. • Addition of a westbound through lane.	Overall	257	F	1.80	26	C	0.66	533	F	2.68	30	C	0.91
		EBL	-	-	-	17	B	0.04	-	-	-	29	C	0.18
		EBT	-	-	-	21	C	0.49	-	-	-	36	D	0.74
		EBR	-	-	-	18	B	0.12	-	-	-	27	C	0.19
		EBLTR	57	E	0.99	-	-	-	56	E	1.02	-	-	-
		WBL	-	-	-	12	B	0.34	-	-	-	40	D	0.88
		WBT	-	-	-	13	B	0.33	-	-	-	13	B	0.37
		WBR	-	-	-	11	B	0.09	-	-	-	12	B	0.23
		WBLTR	285	F	1.55	-	-	-	921	F	2.98	-	-	-
		NBL	-	-	-	31	C	0.65	-	-	-	35	C	0.61
		NBT	-	-	-	31	C	0.34	-	-	-	56	E	0.80
		NBR	-	-	-	45	D	0.77	-	-	-	36	D	0.19
		NBLTR	207	F	1.36	-	-	-	358	F	1.68	-	-	-
		SBL	-	-	-	39	D	0.85	-	-	-	40	D	0.80
		SBTR	-	-	-	39	D	0.73	-	-	-	37	D	0.56
		SBLTR	543	F	2.10	-	-	-	546	F	2.09	-	-	-

Intersection	Modelled Improvements	Movement	Weekday AM Peak Hour						Weekday PM Peak Hour					
			Without Improvements			With Improvements			Without Improvements			With Improvements		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
Mountain Road & Old Mountain Road/Cambridge Street	2031 Improvements: - Addition of a northbound right-turn lane. - Addition of a southbound right-turn lane. Convert existing westbound right-turn lane into a shared westbound through/right-turn lane. 2041 Improvements: - Addition of an eastbound right-turn lane.	Overall	20	B	0.73	17	B	0.60	104	F	1.31	47	D	1.02
		EBL	18	B	0.43	16	B	0.39	101	F	0.99	62	E	0.88
		EBT				15	B	0.56				42	D	0.82
		EBR				11	B	0.13				28	C	0.17
		EBTR	20	C	0.73				96	F	1.09			
		WBL	29	C	0.69	13	B	0.47	184	F	1.27	79	E	0.98
		WBTR	10	A	0.38	8	A	0.35	51	D	0.94	36	D	0.82
		NBL	33	C	0.61	38	D	0.64	113	F	1.08	75	E	0.96
		NBT				31	C	0.20				40	D	0.68
		NBR				30	C	0.07				36	D	0.52
		NBTR	27	C	0.30				170	F	1.26			
		SBL	33	C	0.14	39	D	0.19	58	E	0.79	38	D	0.47
		SBT				46	D	0.60				76	E	0.94
		SBR				38	D	0.04				39	D	0.17
		SBTR	39	D	0.59				107	F	1.08			
High Street & Campbell Street	2031 Improvements: - Addition of traffic signals (semi-actuated with detectors on Campbell Street). - Addition of a westbound left-turn lane. - Addition of a northbound right-turn lane. 2041 Improvements: - Optimized signal timings and cycle length.	Overall				18	B	0.78				16	B	0.73
		WBL	-	-	-	39	D	0.35	-	-	-	37	D	0.33
		WBR	-	-	-	37	D	0.13	-	-	-	35	D	0.10
		WBLR	16	C	0.48	-	-	-	14	B	0.40	-	-	-
		NBT	-	-	-	21	C	0.84	-	-	-	18	B	0.79
		NBR	-	-	-	7	A	0.09	-	-	-	7	A	0.04
		NBTR	400	F	1.84	-	-	-	265	F	1.54	-	-	-
		SBL	14	B	0.46	35	D	0.81	12	B	0.37	16	B	0.62
		SBT	225	F	1.44	6	A	0.59	343	F	1.71	10	A	0.73
High Street & Sixth Street	- Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane.	Overall	64	E	1.05	36	D	0.90	74	E	1.09	44	D	0.97
		EBL	31	C	0.71	26	C	0.60	117	F	1.08	93	F	0.99
		EBT	-	-	-	48	D	0.87	-	-	-	44	D	0.61
		EBR	-	-	-	27	C	0.23	-	-	-	38	D	0.23
		EBTR	93	F	1.07	-	-	-	71	E	0.96	-	-	-
		WBL	35	D	0.51	30	C	0.37	72	E	0.87	40	D	0.53
		WBT	-	-	-	36	D	0.56	-	-	-	78	E	0.93
		WBR	-	-	-	30	C	0.13	-	-	-	42	D	0.25
		WBTR	43	D	0.75	-	-	-	113	F	1.09	-	-	-
		NBL	60	E	0.91	27	C	0.78	90	F	0.99	66	E	0.90
		NBTR	71	E	1.02	38	D	0.90	38	D	0.76	28	C	0.62
		SBL	72	E	0.91	48	D	0.84	42	D	0.83	22	C	0.69
		SBTR	50	D	0.84	34	C	0.74	82	F	1.07	41	D	0.92
Tenth Line & Sixth Street	2031 Improvements: - Addition of traffic signals (actuated-uncoordinated). - Addition of a dedicated left-turn lane to all four approaches. 2041 Improvements:	Overall				25	C	0.70				28	C	0.76
		EBL	-	-	-	24	C	0.16	-	-	-	29	C	0.50
		EBTR	-	-	-	27	C	0.47	-	-	-	29	C	0.66
		EBLTR	38	E	0.76	-	-	-	141	F	1.20	-	-	-
		WBL	-	-	-	25	C	0.26	-	-	-	25	C	0.39
		WBTR	-	-	-	43	D	0.86	-	-	-	41	D	0.86
		WBLTR	187	F	1.32	-	-	-	316	F	1.62	-	-	-

Intersection	Modelled Improvements	Movement	Weekday AM Peak Hour						Weekday PM Peak Hour					
			Without Improvements			With Improvements			Without Improvements			With Improvements		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
	Optimized signal timings and cycle length.	NBL	-	-	-	27	C	0.49	-	-	-	19	B	0.13
		NBTR	-	-	-	24	C	0.44	-	-	-	30	C	0.71
		NBLTR	122	F	1.15	-	-	-	232	F	1.42	-	-	-
		SBL	-	-	-	13	B	0.58	-	-	-	17	B	0.59
		SBTR	-	-	-	14	B	0.48	-	-	-	14	B	0.38
		SBLTR	514	F	2.08	-	-	-	316	F	1.62	-	-	-
Raglan Street & Poplar Sideroad	2031 Improvements: - Addition of a southbound left-turn lane. 2041 Improvements: - Addition of traffic signals (semi-actuated with detectors on Raglan Street). - Addition of an eastbound left-turn lane. - Addition of a westbound right-turn lane.	Overall	-	-	-	15	B	0.76	-	-	-	21	C	0.83
		SBL	-	-	-	36	D	0.44	-	-	-	44	D	0.60
		SBR	-	-	-	33	C	0.07	-	-	-	39	D	0.30
		SBLR	>1000	F	4.77	-	-	-	>1000	F	5.96	-	-	-
Concession 10 & Poplar Sideroad	Addition of a southbound left-turn lane.	EBLTR	15	C	0.35	16	C	0.36	18	C	0.44	19	C	0.46
		WLT	17	C	0.51	18	C	0.51	16	C	0.44	16	C	0.44
		WBR	15	C	0.51	16	C	0.51	17	C	0.53	17	C	0.52
		NBLTR	17	C	0.50	20	C	0.54	20	C	0.57	22	C	0.60
		SBL	-	-	-	29	C	0.74	-	-	-	24	C	0.65
		SBTR	-	-	-	15	C	0.46	-	-	-	18	C	0.54
		SBLTR	85	F	1.07	-	-	-	88	F	1.08	-	-	-

Figure 18: 2041 Total Conditions With Intersection Improvements Level of Service



Balsam Street/Harbour Street W & Highway 26

Several movements at the Balsam Street/Harbour Street W and Highway 26 intersection operate with a LOS F and v/c ratios exceeding 1.0 under 2041 total PM traffic conditions.

To improve the operations of individual movements and the overall intersection, the following improvements were modelled:

- Addition of a northbound left-turn lane.
- Addition of a southbound left-turn lane.
- Optimization of signal timings.

As shown in Table 24, the modelled improvements result in all movement operating with sufficient capacity and a LOS E or better during the 2041 AM and PM peak hours.

First Street & High Street/Balsam Street

Several movements at the First Street and High Street/Balsam Street intersection operate with a LOS F and v/c ratios exceeding 1.0 under 2041 total AM and PM traffic conditions.

To reiterate, the following improvements were modelled at the intersection under 2031 traffic conditions:

- Addition of a southbound left-turn lane.
- Addition of an eastbound right-turn lane.
- Optimization of signal timings.

The following additional improvements were added for the 2041 traffic conditions:

- Addition of a northbound right-turn lane.
- Optimization of signal timings.

As shown in Table 24, although the intersection improvements significantly reduce the delay and v/c ratio of various movements, several movements continue to operate with a LOS F and v/c ratios exceeding 1.0. In theory, additional improvements such as an additional westbound left-turn lane could be modelled at the intersection, however such an improvement is not considered practical to implement at the intersection due to geometric and property constraints (i.e., available right-of-way). In other words, the intersection is essentially exhausted of additional potential improvements. Thus, this leads to the conclusion that an alternative route may be required within the 2031 to 2041 time horizon in order to divert traffic away from this intersection and alleviate traffic congestion.

As part of the proposed Regional Commercial District (RCD) development, located southwest of the First Street and High Street intersection, Cambridge Street will be

extended to the High Street and Third Street intersection. The new connection alleviates some of the traffic congestion at the First Street and High Street/Balsam Street intersection, especially for certain movements (for instance, traffic from the south on High Street will be able to make a northbound left-turn at the High Street and Cambridge Street intersection rather than at the High Street and First Street intersection). However, the traffic diversion expected to occur as a result of the new connection has already been accounted for in the 2041 total traffic volumes.

In the *2012 Transportation Study*, a traffic diversion scenario was assessed to determine what effect the diversion of some Highway 26 traffic to Poplar Sideroad could have on the operations of the High Street and First Street intersection. As noted in Section 2.4.1, Poplar Sideroad and Concession 10 have since been upgraded and transferred to the County of Simcoe as County Road 32, and existing traffic data indicates that some amount of diversion has already taken place. The total traffic volume forecasts in this study have assumed that Poplar Sideroad continues to be an attractive route for development traffic, thereby incorporating a certain level of future diversion directly into the traffic forecasts. Furthermore, by 2041, the peak hour traffic on Poplar Sideroad will be reaching the typical capacity for a two-lane road (i.e., volumes over 1,000 vehicles per hour per lane). Based on these factors, additional diversion of Highway 26 traffic away from the High Street and First Street intersection is no longer considered an option, under the current interim bypass network.

Another option that has been contemplated in recent years is the potential connection of High Street to Tenth Line via the RCD and Red Maple developments (to the south of Mountain Road). The property required to construct this connection would be secured through draft plans for the aforementioned developments. While this connection has some potential to reduce traffic volumes at the First Street and High Street intersection, it also could introduce less desirable changes to local traffic patterns, such as increasing traffic on Third Street, therefore this option has not been considered further in this study. We suggest it would be prudent for the Town to continue to secure land for this potential future connection and initiate an Environmental Assessment within the medium term to fully investigate the associated opportunities and impacts it might have on the local area.

With limited local options for traffic diversion in the long-term, we recommend that the Town encourage MTO to advance a new route around Collingwood (i.e. Collingwood Bypass) to provide additional east-west capacity through the area.

Tenth Line & Mountain Road

Several movements, during the 2041 total traffic AM and PM peak hours, are forecast to operate with a LOS F and v/c ratios exceeding 1.0.

To reiterate, the following improvements were modelled at the intersection under 2031 traffic conditions:

- Conversion of the temporary signalization to permanent signalization.
- Addition of a dedicated left-turn lane to all four approaches.
- Addition of an eastbound right-turn lane.
- Addition of a westbound right-turn lane.
- Addition of a northbound right-turn lane.

The following additional improvements were modelled under 2041 traffic conditions:

- Addition of an eastbound through lane.
- Addition of a westbound through lane.
- Optimization of signal timings.

As shown in Table 24, the modelled improvements results in all movements operating with sufficient capacity and a LOS E or better during the 2041 total AM and PM peak hours.

Mountain Road & Old Mountain Road/Cambridge Street

Several movements during the 2041 total traffic PM peak hour are forecast to operate with a LOS F and v/c ratios exceeding 1.0.

To reiterate, the following improvements were modelled at the intersection under 2031 traffic conditions:

- Addition of a northbound right-turn lane.
- Addition of a southbound right-turn lane.
- Convert existing westbound right-turn lane into a shared westbound through/right-turn lane.

It is noted that to fully utilize the additional capacity of the converted westbound through/right-turn lane, the bridge over Black Ash Creek (west of the intersection) would need to be widened to provide a second westbound lane. The widening of the bridge to a five lane cross-section was a recommendation in the *Tenth Line and Mountain Road Improvements Class EA*.

The following additional improvements were modelled under 2041 traffic conditions:

- Addition of an eastbound right-turn lane.
- Optimization of signal timings.

As shown in Table 24, the modelled improvements results in all movements operating with sufficient capacity and a LOS E or better during the 2041 total AM and PM peak hours.

High Street & Campbell Street

Several movements during the 2041 total traffic AM and PM peak hours are forecast to operate with a LOS F and v/c ratios exceeding 1.0.

To reiterate, the following improvements were modelled at the intersection under 2031 traffic conditions:

- Addition of traffic signals (semi-actuated with detectors on Campbell Street).
- Addition of a westbound left-turn lane.
- Addition of a northbound right-turn lane.

No further improvements were required, but signal timings were optimized according to the 2041 total traffic volumes.

As shown in Table 24, the modelled improvements result in all movements operating with sufficient capacity and a LOS D or better during the 2041 total traffic AM and PM peak hours.

High Street & Sixth Street

Several movements during the 2041 total traffic AM and PM peak hours are forecast to operate with a LOS F and v/c ratios exceeding 1.0.

The following improvements were modelled to remediate traffic operations:

- Addition of an eastbound right-turn lane.
- Addition of a westbound right-turn lane.
- Optimization of signal timings.

As shown in Table 24, the modelled improvements results in all movements operating with sufficient capacity and a LOS E or better during the 2041 total AM and PM peak hours.

Tenth Line & Sixth Street (now under County of Simcoe jurisdiction)

Several movements during the 2041 total traffic AM and PM peak hours are forecast to operate with a LOS F and v/c ratios exceeding 1.0.

To reiterate, the following improvements were modelled at the intersection under 2031 traffic conditions:

- Addition of traffic signals (actuated-uncoordinated).
- Addition of a dedicated left-turn lane to all four approaches.

As indicated in Section 7.1.2, signal warrant criterion contained in the *Ontario Traffic Manual Book 12: Traffic Signals* is met at the intersection under 2031 total traffic conditions.

Signal timings were subsequently optimized according to the 2041 total traffic volumes.

As shown in Table 24, the modelled improvements result in all movements operating with sufficient capacity and a LOS D or better during the 2041 total traffic AM and PM peak hours.

Poplar Sideroad & Raglan Street (now under the County of Simcoe jurisdiction)

Under 2041 total traffic conditions, the shared southbound left/right-turn movement at the Poplar Sideroad and Raglan Street intersection is forecast to operate with very high delays and v/c ratios exceeding 1.0.

To reiterate, a southbound left-turn lane was modelled in the 2031 total traffic improvement scenario, which was sufficient to maintain acceptable traffic operations under 2031 total traffic volumes. However, due to the large amount of development assumed to occur during the 2031 to 2041 timeframe in the vicinity of the Poplar Sideroad and Raglan Street intersection, traffic volumes are forecast increase significantly and result in excessive delays and reduced capacity.

The following additional improvements were modelled under 2041 traffic conditions:

- Addition of traffic signals (semi-actuated with detectors on Raglan Street).
- Addition of an eastbound left-turn lane.
- Addition of a westbound right-turn lane.

Signal warrant criterion contained in the *Ontario Traffic Manual Book 12: Traffic Signals* was reviewed to determine if signals were warranted at the Poplar Sideroad and Raglan Street intersection according to the criteria for “Justification 7 – Projected Volumes”. The results of the signal warrant analysis at the intersection is contained in Appendix G. To summarize, the “Delay to Cross Traffic” warrant is met at the intersection under 2041 total traffic conditions.

As shown in Table 24, the modelled improvements result in both the southbound left-turn and southbound right-turn movements operating with sufficient capacity and a LOS D or better during the 2041 total traffic AM and PM peak hours. The overall intersection is forecast to operate with sufficient capacity and a LOS B and C in the AM and PM peak hour, respectively.

Poplar Sideroad & Concession 10 (now under County of Simcoe jurisdiction)

The shared southbound left/through/right-turn lane is forecast to operate with a v/c ratio over 1.0 and LOS F during the 2041 total traffic AM and PM peak hours.

A dedicated southbound left-turn lane is added to the intersection in the 2041 total traffic improvement scenario. Thus, the existing southbound lane was converted to a shared southbound through/right-turn lane.

As a result of the addition of a southbound left-turn lane, all movements at the intersection are forecast to operate with sufficient capacity and a LOS C or better.

7.2.3 Road Segment Operations

The capacity of road segments in the Study Area have been assessed under 2041 total traffic conditions. The 2041 total v/c ratios for the select road segments are outlined in Table 25, based on the PM peak hour volumes. Road segments with a v/c ratio at or exceeding 1.0 indicates a segment where the traffic volume exceeds the capacity.

Table 25: 2041 Total Road Segment Operations

Road Segment	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Highway 26	N of Harbour Street West	1	900	1433	1172	1.59	1.30
	E of Pretty River Parkway	2	1800	1382	999	0.77	0.56
Balsam Street	Harbour Street West to First Street	2	1800	1881	1711	1.05	0.95
First Street	High Street to Hurontario Street	2	1800	2006	2289	1.11	1.27
Huron Street	E of Hurontario Street	2	1800	1234	1132	0.69	0.63
Mountain Road	W of Tenth Line	1	900	929	875	1.03	0.97
	W of Cambridge Street	1	900	1234	1407	1.37	1.56
First Street Ext.	W of Balsam Street	2	1800	1429	1393	0.79	0.77
High Street	First Street to Tenth Street	2	1800	1339	1662	0.74	0.92
	Tenth Street to Poplar Sideroad	1	900	1040	1195	1.16	1.33
Hume Street	Hurontario Street to Pretty River Parkway	1	900	622	836	0.69	0.93

Road Segment	Location	Lanes per Direction	Capacity (vph)	Traffic Volumes		Volume to Capacity (v/c)	
			NB/EB	NB/EB	SB/WB	NB/EB	SB/WB
Beachwood Road	E of Highway 26	1	900	561	278	0.62	0.31
Pretty River Parkway	N of Hume Street	2	1800	815	1075	0.45	0.60
Hurontario Street	First Street to Hume Street	1	900	866	896	0.96	1.00
	Hume Street to Sixth Street	2	1800	904	1158	0.50	0.64
Old Mountain Road	Mountain Road to Balsam Street	1	500	636	619	1.27	1.24
Harbour Street West	W of Highway 26	1	700	274	243	0.39	0.35
Cranberry Trail East	W of Highway 26	1	500	134	192	0.27	0.38
Raglan Street	N of Poplar Sideroad	1	700	246	346	0.35	0.49
Tenth Line	N of Mountain Road	1	700	536	421	0.77	0.60
	S of Mountain Road	1	700	735	763	1.05	1.09
Cambridge Street	S of Mountain Road	1	700	988	802	1.41	1.15
	W of High Street	1	700	397	388	0.57	0.55
Third Street	E of High Street	1	700	281	293	0.40	0.42
Sixth Street	E of High Street	1	700	578	649	0.83	0.93
	W of High Street	1	900	726	749	0.81	0.83
Campbell Street	E of High Street	1	500	257	210	0.51	0.42

1. It is assumed that Cambridge Street will be upgraded to a collector road after full build-out and occupancy of the RCD development and after it is extended to Third Street. Thus, the assumed capacity will increase from the existing amount of 500 vph to 700 vph (per direction).

As shown in Table 25, the following road segments are operating at or above 100% of their assumed capacity under 2041 total traffic:

- Highway 26 (north of Harbour Street West)
- Balsam Street (Harbour Street West to First Street)
- First Street (High Street to Hurontario Street)
- Mountain Road (west of Tenth Line)
- Mountain Road (Tenth Line to Cambridge Street)
- High Street (Tenth Street to Poplar Sideroad)
- Hurontario Street (First Street to Hume Street)
- Old Mountain Road (Mountain Road to Balsam Street)

- Tenth Line (south of Mountain Road)
- Cambridge Street (south of Mountain Road)

Highway 26 (north of Harbour Street West)

Under 2041 total traffic conditions, the v/c ratios, on the segment of Highway 26 north of Harbour Street West, are forecasted to be 1.59 and 1.30 in the northbound and southbound directions, respectively. A centre two-way left-turn lane (TWLTL) currently exists along this segment of Highway 26, however the current three-lane cross section will not be able to accommodate the projected 2041 total traffic volumes. Based on the projected 2041 total traffic volumes, a five-lane cross section would reduce the v/c ratios on this segment of Highway 26 to 0.80 and 0.65 in the northbound and southbound directions, respectively. Therefore, it is recommended that the Town monitor Highway 26 north of Harbour Street West beyond horizon year 2031 to determine when expanding to a five-lane cross section (i.e., a centre TWLTL plus two travel lanes per direction) is justified. Note that construction of the potential Collingwood Bypass between Stayner and west of Collingwood could significantly reduce traffic volumes on this segment of Highway 26, potentially reducing the need to upgrade the road to five lanes.

Balsam Street (Harbour Street West to First Street)

Under 2041 total traffic conditions, the v/c ratio, on Balsam Street in the northbound direction, is forecast to be 1.05. The existing cross section consists of five lanes, one of which is a centre TWLTL. Balsam Street is classified as an arterial road.

In the northbound direction, Balsam Street is essentially exhausted of potential lane additions due to limited available right-of-way. As noted previously, the 2041 traffic volume projections are subject to the actual progression of various developments throughout the Town. However, assuming that the forecasted 2041 traffic volumes on Balsam Street are realized in 2041, an alternate route to accommodate Highway 26 through traffic, such as a Collingwood Bypass, is likely the only solution, to address the capacity issue on Balsam Street.

First Street (High Street to Hurontario Street)

Under 2041 total traffic conditions, the v/c ratios, on First Street in the eastbound and westbound directions, are forecasted to be 1.11 and 1.27, respectively. The existing cross section consists of five lanes, one of which is a centre TWLTL. First Street is classified as an arterial road.

First Street has essentially exhausted the number of lanes it can accommodate within the available right-of-way, due to significant commercial density along both sides of this street. As noted for Balsam Street, the 2041 traffic volume projections are subject to the actual progression of various developments throughout the Town, but assuming that the

forecasted 2041 traffic volumes on First Street are realized in 2041, an alternate route to accommodate Highway 26 traffic is likely the only solution, to address the capacity issue on First Street. Therefore, it is recommended that the Town encourage MTO to progress the necessary study work for the Collingwood Bypass.

Mountain Road (Tenth Line to Cambridge Street)

The v/c ratio on Mountain Road between Tenth Line and Cambridge Street, under 2041 total traffic conditions, is forecast to be 1.37 and 1.56 in the eastbound and westbound directions, respectively, increasing from 1.13 and 1.26 under 2031 total traffic conditions. As was concluded in Section 7.1.3, the volumes on this segment of Mountain Road suggest that additional roadway capacity may be required prior to horizon year 2031, and that the recent EA on Mountain Road recommends the implementation of a five-lane cross section (i.e., a centre left turn lane plus two travel lanes in each direction). If Mountain Road were upgraded to a five-lane cross section, based on the 2041 total traffic volumes the v/c ratio in the eastbound and westbound directions would be reduced to 0.69 and 0.78, respectively. Therefore, it is recommended that the Town monitor this segment of Mountain Road to confirm when upgrading to a five-lane cross section is justified (i.e., subject to the progression of developments in the area).

Mountain Road (west of Tenth Line)

The v/c ratio on Mountain Road, west of Tenth Line, is forecast to be 1.03 in the eastbound direction under 2041 total traffic conditions.

As identified in Section 7.2.2, an eastbound through lane, eastbound right-turn lane, and eastbound left-turn lane are recommended at the Tenth Line and Mountain Road intersection by horizon year 2041. Therefore, assuming implementation of an eastbound through lane on the approach to the Mountain Road and Tenth Line intersection, Mountain Road immediately west of Tenth Line is considered to operate within its capacity.

High Street (Tenth Street to Poplar Sideroad)

Under 2041 total traffic conditions, the v/c ratio on High Street, between Tenth Street and Poplar Sideroad, is forecast to be 1.16 and 1.33 in the northbound and southbound directions, respectively. This segment of High Street is currently a two-lane cross section. The existing four-lane cross section on High Street begins at First Street and terminates at approximately Tenth Street. Thus, subject to development progression, it is recommended that the Town monitor traffic volumes on High Street between Tenth Street and Poplar Sideroad in the 2031 to 2041 timeframe to confirm if, or when, widening the cross section to four lanes (i.e., two lanes per direction) is justified.

Hurontario Street (First Street to Hume Street)

Under 2041 total traffic conditions, the v/c ratio on Hurontario Street, between First Street and Hume Street, is forecasted to reach 1.00 in the southbound direction. Parking lanes extend along both sides of the road for the majority of this segment of Hurontario Street. It is anticipated that traffic volumes on Hurontario Street will become congested during only short periods of the weekday PM peak hour, and that during such short periods of congestion some traffic will divert to parallel and adjacent roadways in the network. To reiterate, traffic volumes in horizon year 2041 are also subject to the progression of developments in the Town and the construction of alternate routes in the Town. Therefore, the capacity of Hurontario Street is considered sufficient to accommodate 2041 total traffic volumes.

Old Mountain Road (Mountain Road to Balsam Street)

Under 2041 total traffic conditions, the v/c ratios on Old Mountain Road are forecast to be 1.27 and 1.24 in the northbound and southbound directions, respectively.

It should be noted that a centre TWLTL exists on this segment of Old Mountain Road, and given the relatively high volume of commercial driveways, it is likely that the TWLTL will provide some additional capacity. Also, Old Mountain Road is currently classified as a local road, however it is likely that it will be reclassified as either a collector or arterial road prior to horizon year 2041. Using the forecast 2041 total traffic volumes, if Old Mountain Road were reclassified as a collector road, and the designs are consistent with this reclassification, the v/c ratio in the northbound and southbound direction would be reduced to 0.91 and 0.88, respectively (not accounting for the existing centre TWLTL). Therefore, the capacity of Old Mountain Road is considered sufficient to accommodate 2041 total traffic volumes

Tenth Line (south of Mountain Road)

Under 2041 total traffic conditions, the v/c ratio, on Tenth Line south of Mountain Road, are forecasted to be 1.05 and 1.09 in the northbound and southbound directions, respectively.

The segment of Tenth Line, between Mountain Road and Sixth Street was reviewed in the *Tenth Line and Mountain Road Improvement Class EA*. It was recommended that Tenth Line be urbanized to a local collector with curbs, sidewalks, and bicycle lanes. Widening of Tenth Line was not recommended through horizon year 2037.

It is probable that congestion on Tenth Line will occur only for short periods during the peak hours by 2041. Also, if Tenth Line were to be reclassified as an arterial road by 2041, and that the designs can accommodate such a reclassification, the theoretical assumed capacity of the road would increase from 700 vehicles per hour per lane (vphpl) to 900 vphpl, which would reduce the v/c ratios in the northbound and

southbound directions to 0.82 and 0.85, respectively. Therefore, the capacity of Tenth Line is considered sufficient to accommodate 2041 total traffic volumes.

Cambridge Street (south of Mountain Road)

The v/c ratio, on Cambridge Street south of Mountain Road under 2041 total traffic conditions, is forecast to be 1.41 and 1.15 in the northbound and southbound directions, respectively, assuming that Cambridge Street is reclassified as a collector road by 2041, and that the designs can accommodate such a reclassification.

As noted in Section 7.1.3, localized traffic volumes, on Cambridge Street immediately south of Mountain Road, are forecast to be significantly higher than the volumes on Cambridge Street immediately west of High Street, due to the location of developments and commercial driveways on Cambridge Street. Given that the v/c ratio on Cambridge Street immediately west of High Street is only 0.57 and 0.55 in the eastbound and westbound directions, respectively, it is probable that volumes may only exceed the assumed capacity near the Mountain Road intersection. A northbound right-turn lane has been recommended under 2031 total traffic conditions at the Mountain Road and Cambridge Street intersection, in addition to the existing northbound through and northbound left-turn lanes, which is considered sufficient to accommodate the increased northbound traffic at this location. Also, a centre TWLTL currently extends along the length of Cambridge Street, further increasing the assumed road capacity. Therefore, the capacity of Cambridge Street is considered sufficient to accommodate 2041 total traffic volumes.

7.3 Roundabout Alternatives

The intersections of Mountain Road and Tenth Line, High Street and Campbell Street, Raglan Street and Poplar Sideroad, and Tenth Line and Sixth Street have been further analyzed assuming roundabout control, in order to compare to traffic signal operations.

Mountain Road & Tenth Line

The intersection of Mountain Road and Tenth Line is currently signalized, with one lane per approach. However, as was identified in the analysis conducted in previous sections, several physical improvements are forecasted to be required at the intersection in both horizon years 2031 and 2041 in order to alleviate traffic congestion and maintain acceptable operations. Since the *Tenth Line and Mountain Road Improvements Class EA*, as mentioned in Section 3.1, recommended a two-lane roundabout, both roundabout and traffic signal options were assessed to compare traffic operations under the two intersection controls. The results are summarized in Table 26 and the detailed Arcady analysis reports are provided in Appendix J.

Table 26: Traffic Signals versus Roundabout – Mountain Road & Tenth Line

Horizon Year & Scenario	Intersection Control	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
2031 Total Traffic Conditions	Traffic Signals	EB	22	C	0.72	42	D	0.94
		WB	12	B	0.52	22	C	0.90
		NB	29	C	0.46	35	D	0.53
		SB	34	C	0.58	46	D	0.72
		Overall	22	C	0.65	33	C	0.86
	Two-Lane Roundabout	EB	4	A	0.38	6	A	0.58
		WB	3	A	0.33	5	A	0.62
		NB	4	A	0.38	4	A	0.36
		SB	3	A	0.16	5	A	0.21
		Overall	4	A	-	5	A	-
2041 Total Traffic Conditions	Traffic Signals	EB	21	C	0.49	34	C	0.74
		WB	13	B	0.34	20	C	0.88
		NB	39	D	0.77	41	D	0.80
		SB	39	D	0.85	39	D	0.80
		Overall	27	C	0.66	30	C	0.91
	Two-Lane Roundabout	EB	5	A	0.52	12	B	0.76
		WB	3	A	0.40	11	B	0.82
		NB	6	A	0.52	7	A	0.55
		SB	5	A	0.42	7	A	0.45
		Overall	5	A	-	10	A	-

Overall v/c ratio is not provided for roundabout analysis.

As shown in Table 26, the roundabout alternative provides excellent operations throughout the 2031 and 2041 horizons, with better levels of service and lower v/c ratios than the signalized intersection. From an operations perspective, the roundabout is the recommended solution.

High Street and Campbell Street

Previously, we identified the need for improvements to the High Street and Campbell Street intersection to accommodate the forecasted traffic volumes. Traffic signals and additional turn lanes were modelled, which provided sufficient operations.

In 2008, a Schedule C Class Environmental Assessment was completed for the High Street corridor between Third Street and Poplar Sideroad, providing recommendations for future road widening and intersection improvements. The High Street EA recommended the implementation of a roundabout at the High Street and Campbell Street intersection to accommodate the long-term traffic growth.

The High Street and Campbell Street intersection was re-assessed under roundabout control to compare with the signalized operations. Since this segment of High Street currently has one lane in each direction, both single lane and two-lane roundabout configurations were analyzed. The results are summarized in Table 27 and the detailed Arcady analysis reports are provided in Appendix J.

Table 27: Traffic Signals versus Roundabout – High Street & Campbell Street

Horizon Year & Scenario	Intersection Control	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
2031 Total Traffic Conditions	Traffic Signals	WB	23	C	0.15	23	C	0.16
		NB	18	B	0.75	13	B	0.59
		SB	6	A	0.44	7	A	0.55
		Overall	14	B	0.59	11	B	0.53
	Single Lane Roundabout	WB	5	A	0.18	5	A	0.17
		NB	8	A	0.57	8	A	0.57
		SB	6	A	0.47	13	B	0.77
		Overall	7	A	-	11	B	-
	Two-Lane Roundabout	WB	5	A	0.18	5	A	0.16
		NB	3	A	0.35	3	A	0.34
		SB	3	A	0.29	4	A	0.47
		Overall	3	A	-	4	A	-
2041 Total Traffic Conditions	Traffic Signals	WB	38	D	0.35	36	D	0.33
		NB	19	B	0.84	18	B	0.79
		SB	13	B	0.81	11	B	0.73
		Overall	19	B	0.78	16	B	0.73
	Single Lane Roundabout	WB	7	A	0.30	9	A	0.35
		NB	25	C	0.87	46	E	0.95
		SB	13	B	0.75	212	F	1.12
		Overall	18	C	-	127	F	-
	Two-Lane Roundabout	WB	7	A	0.29	8	A	0.33
		NB	5	A	0.53	5	A	0.58
		SB	4	A	0.46	6	A	0.69
		Overall	5	A	-	6	A	-

Overall v/c ratio is not provided for roundabout analysis.

As shown in Table 27, the single lane roundabout operates well through 2031, but in 2041, the southbound approach experiences a LOS F and is over capacity (v/c ratio of 1.12) during the PM peak hour. The two-lane roundabout option provides sufficient capacity and excellent operations through 2041, with lower delays than the signalized option.

Raglan Street and Poplar Sideroad (now under the jurisdiction of the County of Simcoe)

Earlier analysis identified that the intersection of Raglan Street and Poplar Sideroad will have a need for an additional southbound turn lane by 2031, and a need for traffic signals with eastbound and westbound turn lanes by 2041. As an alternative to these improvements, a roundabout could be considered. The 2031 and 2041 total traffic volumes were re-analyzed under both single-lane and two-lane roundabout options and the results are summarized in Table 28 with the detailed Arcady analysis reports provided in Appendix J.

Table 28: Traffic Signals versus Roundabout – Raglan Street & Poplar Sideroad

Horizon Year & Scenario	Intersection Control	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
2031 Total Traffic Conditions	Unsignalized	EB	6	A	0.26	3	A	0.12
		WB	0	A	0.41	0	A	0.39
		SB	22	C	0.19	45	E	0.78
		Overall	4	-	-	9	-	-
	Single-Lane Roundabout	EB	9	A	0.67	11	B	0.70
		WB	10	B	0.67	8	A	0.57
		SB	5	A	0.11	6	A	0.32
		Overall	10	A	-	9	A	-
	Two-Lane Roundabout	EB	4	A	0.41	4	A	0.43
		WB	4	A	0.40	3	A	0.35
		SB	5	A	0.11	6	A	0.31
		Overall	4	A	-	4	A	-
2041 Total Traffic Conditions	Traffic Signals	EB	13	B	0.77	13	B	0.72
		WB	15	B	0.71	22	C	0.88
		SB	35	C	0.44	41	D	0.60
		Overall	16	B	0.76	21	C	0.83
	Single-Lane Roundabout	EB	269	F	1.14	52	F	0.96
		WB	30	D	0.89	94	F	1.02
		SB	7	A	0.27	14	B	0.58
		Overall	155	F	-	65	F	-
	Two-Lane Roundabout	EB	7	A	0.70	5	A	0.59
		WB	5	A	0.54	6	A	0.62
		SB	7	A	0.26	12	B	0.56
		Overall	6	A	-	6	A	-

Overall v/c ratio is not provided for unsignalized or roundabout analysis.

As shown in Table 28, the single-lane roundabout provides good operations under 2031 conditions, but by 2041 it is over capacity in the eastbound and westbound directions during the AM and PM peak hours, respectively (v/c ratios of 1.14 and 1.02). This

indicates the need for a two-lane roundabout prior to 2041, which would provide excellent intersection operations in 2041 and beyond.

Tenth Line and Sixth Street (now under the jurisdiction of the County of Simcoe)

The Tenth Line and Sixth Street intersection was also assessed as part of the *Tenth Line and Mountain Road Improvements Class EA*, in which roundabout control was the recommended improvement. Our previous analysis indicated that the intersection would require signalization with the addition of left-turn lanes on all approaches to accommodate 2031 and 2041 total traffic conditions. A single-lane roundabout has been modelled to compare traffic operations under the two intersection control alternatives and the results are summarized in Table 29 with the detailed Arcady analysis reports provided in Appendix J.

Table 29: Traffic Signals versus Roundabout – Tenth Line & Sixth Street

Horizon Year & Scenario	Intersection Control	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
			Delay (s)	LOS	v/c ratio	Delay (s)	LOS	v/c ratio
2031 Total Traffic Conditions	Traffic Signals	EB	11	B	0.39	11	B	0.52
		WB	13	B	0.59	12	B	0.60
		NB	10	A	0.39	12	B	0.55
		SB	12	B	0.57	11	B	0.47
		Overall	12	B	0.58	12	B	0.58
	Single-Lane Roundabout	EB	6	A	0.27	7	A	0.43
		WB	6	A	0.37	8	A	0.53
		NB	6	A	0.36	7	A	0.44
		SB	8	A	0.52	7	A	0.45
		Overall	7	A	-	7	A	-
2041 Total Traffic Conditions	Traffic Signals	EB	27	C	0.47	29	C	0.66
		WB	41	D	0.86	40	D	0.86
		NB	25	C	0.49	30	C	0.71
		SB	14	B	0.58	15	B	0.59
		Overall	25	C	0.70	28	C	0.76
	Single-Lane Roundabout	EB	7	A	0.33	10	A	0.56
		WB	7	A	0.47	14	B	0.71
		NB	7	A	0.44	12	B	0.63
		SB	16	C	0.76	10	A	0.62
		Overall	11	B	-	12	B	-

Overall v/c ratio is not provided for roundabout analysis.

The results show that the roundabout alternative can provide good operations throughout the long-term horizon, with LOS and v/c ratios that are slightly better than the signalized intersection.

8.0 Road Classifications in the Study Area

The Town currently applies local, collector, and arterial road classifications to roads under their jurisdiction. The road classifications contained within the Town's *Official Plan* (January 2019 Consolidation) have been shown previously on Figure 1 of this report.

The *Geometric Design Guide for Canadian Road (GDGCR)* (Transportation Association of Canada, June 2017) provides several criteria that may be considered when classifying rural and urban roads. Table 30 and Table 31 contain the criteria from the *GDGCR* that pertain to various rural and urban road classifications, respectively.

Table 30: Characteristics of Rural Roads (*Geometric Design Guide for Canadian Roads*, Transportation Association of Canada, 2017)

	Rural Locals	Rural Collectors	Rural Arterials	Rural Freeways
service function	traffic movement secondary consideration	traffic movement and land access of equal importance	traffic movement primary consideration	optimum mobility
land service	land access consideration	traffic movement and land access of equal importance	land access secondary consideration	no access primary
traffic volume vehicles per day (typically)	<1000 AADT	<5000 AADT	<12 000 AADT	>8000 AADT
flow characteristics	interrupted flow	interrupted flow	uninterrupted flow except at signals	free flow (grade separated) major intersections
design speed (km/h)	50 - 110	60 - 110	80 - 130	100 - 130
average running speed (km/h) (free flow conditions)	50 - 90	50 - 90	60 - 100	70 - 110
vehicle type	predominantly passenger cars, light to medium trucks and occasional heavy trucks	all types, up to 30% trucks in the 3 t to 5 t range	all types, up to 20% trucks	all types, up to 20% heavy trucks
normal connections	locals collectors	locals collectors arterials	collectors arterials freeways	arterials freeways

Table 31: Characteristics of Urban Roads (*Geometric Design Guide for Canadian Roads*, Transportation Association of Canada, 2017)

	Public Lanes		Locals		Collectors		Arterials		Expressways	Freeways
	Residential	Commercial	Residential	Industrial / Commercial	Residential	Industrial / Commercial	Minor	Major		
traffic service function	traffic movement not a consideration		traffic movement secondary consideration		traffic movement and land access of equal importance		traffic movement major	traffic movement primary consideration	traffic movement primary consideration	optimum mobility
land service / access	land access only function		land access primary function		traffic movement and land access of equal importance		some access control	rigid access control	no access	no access
traffic volume (veh/day) (typical)	<500	<1,000	<1,000	<3,000	<8,000	1,000 – 12,000	5,000 – 20,000	10,000 – 30,000	>10,000	>20,000
flow characteristics	interrupted flow		interrupted flow		interrupted flow		uninterrupted flow except at signals and crosswalks		uninterrupted flow except at signals	free-flow (grade separated)
design speed (km/h)	30 – 40		30 – 50		50 – 80		50 – 70	60 – 100	80 – 110	80 – 120
average running speeds (km/h) (off-peak)	20– 30		20 – 40		30 – 70		40 – 60	50 – 90	60 – 90	70 – 110
vehicle type	passenger and service vehicles	all types	passenger and service vehicles	all types	passenger and service vehicles	all types	all types	all types up to 20% trucks	all types up to 20% trucks	all types up to 20% trucks
desirable connections	public lanes, locals		public lanes, locals, collectors		locals, collectors, arterials		collectors, arterials, expressways, freeways		arterials, expressways, freeways	arterials, expressways, freeways
transit service	not permitted		generally avoided		permitted		express and local buses permitted		express buses only	express buses only
accommodation of cyclists	no restrictions or special facilities		no restrictions or special facilities		special facilities considered		No restrictions; special facilities considered		prohibited	prohibited
accommodation of pedestrians	pedestrians permitted, no special facilities		sidewalks normally on one or both sides	sidewalks provided where required	sidewalks provided both sides	sidewalks provided where required	sidewalks may be provided, separation for traffic lanes preferred		pedestrians prohibited	pedestrians prohibited
parking (typically)	some restrictions		no restrictions or restrictions one side only		few restrictions other than peak hour		peak hour restrictions	prohibited or peak hour restrictions	prohibited	prohibited
min. intersection spacing (m) ¹	as needed		60		60		200	400	800	1,600 (between interchanges)
right-of-way width (m) (typically)	6 – 10		15 – 22		20 – 24		20 ² – 45 ³		>45 ³	>60 ³

Notes: 1 More information about intersection spacing is provided in Chapter 9 – Intersections.

2 Rights-of-way 20 m in width applicable to retrofit conditions only.

3 Wider rights-of-way are often required to accommodate other facilities such as utilities, noise mitigation implications, bikeways and landscaping. For new streets, the immediate provision of wider rights-of-way may be considered to accommodate such facilities.

The criteria in Table 30 and Table 31 have been considered to determine recommended 2031 and 2041 road classifications within this study. However, it should be noted that some of the data/information listed in Table 30 and Table 31 may not be available at the macro-level in this planning study and therefore further detailed study may be required prior to any future reclassifications within the Official Plan.

Daily traffic volume forecasts are considered one of the primary factors in determining recommended road classifications, along with connectivity and access considerations. To estimate daily traffic volumes on Study Area roads, it is assumed that the combined AM and PM peak hour volume for arterial and collector roads represents 15% of the Average Daily Traffic (ADT) volume; for local roads, it is assumed that the combined AM and PM peak hour volume represents 20% of the ADT volume.

The existing road classifications, assumed roadside environments, estimated 2031/2041 ADT's, and recommended 2031/2041 road classifications (according to the *GDGCR* criteria outlined in Table 30 and Table 31 above) are summarized in Table 32.

Table 32: Existing and Recommended Future Road Classifications

Road	Land Use	2019 ADT (vpd)	2031 ADT (vpd)	2041 ADT (vpd)	Existing Road Classification	Recommended Road Classification		
						2019 Traffic	2031 Traffic	2041 Traffic
Highway 26 (N of Harbour Street West)	Rural Arterial	17,013	23,413	31,347	Arterial	Arterial	Arterial	Arterial
Highway 26 (E of Pretty River Parkway)	Industrial / Commercial	21,733	26,033	29,027	Arterial	Arterial	Arterial	Arterial
Balsam Street	Commercial	23,113	31,707	42,193	Arterial	Arterial	Arterial	Arterial
First Street	Commercial	24,933	38,740	48,320	Arterial	Arterial	Arterial	Arterial
Huron Street	Commercial	18,313	24,760	27,687	Arterial	Arterial	Arterial	Arterial

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Road	Land Use	2019 ADT (vpd)	2031 ADT (vpd)	2041 ADT (vpd)	Existing Road Classification	Recommended Road Classification		
						2019 Traffic	2031 Traffic	2041 Traffic
Mountain Road	Industrial	11,727	25,227	31,227	Arterial	Arterial	Arterial	Arterial
First Street Ext.	Commercial	12,473	25,380	31,053	Arterial	Arterial	Arterial	Arterial
High Street	Industrial / Commercial	16,700	25,880	34,507	Arterial	Arterial	Arterial	Arterial
Hume Street	Commercial	11,807	15,067	18,193	Arterial	Arterial	Arterial	Arterial
Beachwood Road	Rural Arterial	7,980	8,740	9,493	Arterial	Arterial	Arterial	Arterial
Pretty River Parkway	Commercial	15,860	20,413	23,133	Arterial	Arterial	Arterial	Arterial
Hurontario Street	Commercial	12,153	18,520	24,513	Arterial	Arterial	Arterial	Arterial
Old Mountain Road	Commercial	3,740	7,665	8,235	Local	Local	Collector	Collector
Harbour Street West	Residential	2,853	4,820	5,607	Collector	Collector	Collector	Collector
Cranberry Trail East	Residential	1,375	1,770	3,055	Local	Local	Local	Collector
Raglan Street	Rural Collector	3,860	5,207	7,747	Collector	Collector	Collector	Collector
Tenth Line	Rural Collector	4,473	14,180	18,487	Collector	Collector	Arterial	Arterial

Road	Land Use	2019 ADT (vpd)	2031 ADT (vpd)	2041 ADT (vpd)	Existing Road Classification	Recommended Road Classification		
						2019 Traffic	2031 Traffic	2041 Traffic
Cambridge Street	Commercial	3,920	11,650	12,300	Local	Local	Collector	Collector
Third Street	Residential	3,000	5,720	6,320	Collector	Collector	Collector	Collector
Sixth Street (East of High Street)	Residential	7,627	11,460	14,840	Collector	Collector	Collector	Collector
Sixth Street (West of High Street)	Industrial / Commercial	8,760	14,080	18,373	Arterial	Arterial	Arterial	Arterial
Campbell Street	Residential	2,310	3,450	4,820	Local	Local	Collector	Collector
Gun Club Road	Residential	385	420	460	Local	Local	Local	Local
Spruce Street	Residential	800	1,045	1,195	Local	Local	Local	Local
Cedar Street (North of First Street)	Commercial	2,625	3,295	3,695	Local	Local	Local	Local
Cedar Street (South of First Street)	Residential	1,585	1,965	2,170	Local	Local	Local	Local
Pine Street	Commercial	4,520	5,920	6,647	Collector	Collector	Collector	Collector

For roads that are located within areas of ongoing development growth, opportunity exists to design such roads to be consistent with their functional classifications.

However, in mature neighbourhoods that may be experiencing additional pressures from through traffic, it is recommended that further traffic calming measures be considered to address any inconsistencies that may result from increased traffic volumes through such areas. The segments of Sixth Street that is located to the east of High Street is currently classified as a collector road and is an example of such a neighbourhood. The forecasted increases in traffic volumes on such a road will challenge its operation as a collector road, however upgrading of the classification to arterial road is not consistent with the functional requirement to facilitate both through traffic mobility and local access for the existing development along the corridor. Therefore, it is recommended that this road continue to be classified as a collector road within the Town's road network.

It is noted that although Findlay Drive was not analyzed as part of this study, it's recent connection to High Street makes it a new east/west route between Hurontario Street and High Street, which could warrant monitoring and consideration of re-classification in the future.

9.0 Recommendations and Implementation

This section of the report summarizes the recommended infrastructure improvements in the Study Area and capital cost estimates for such improvements. The ultimate intersection improvement recommendations for horizon years 2031 and 2041 are summarized in Figure 19 and Figure 20, respectively.

Figure 19: 2031 Intersection Lane Configuration and Traffic Control Recommendations

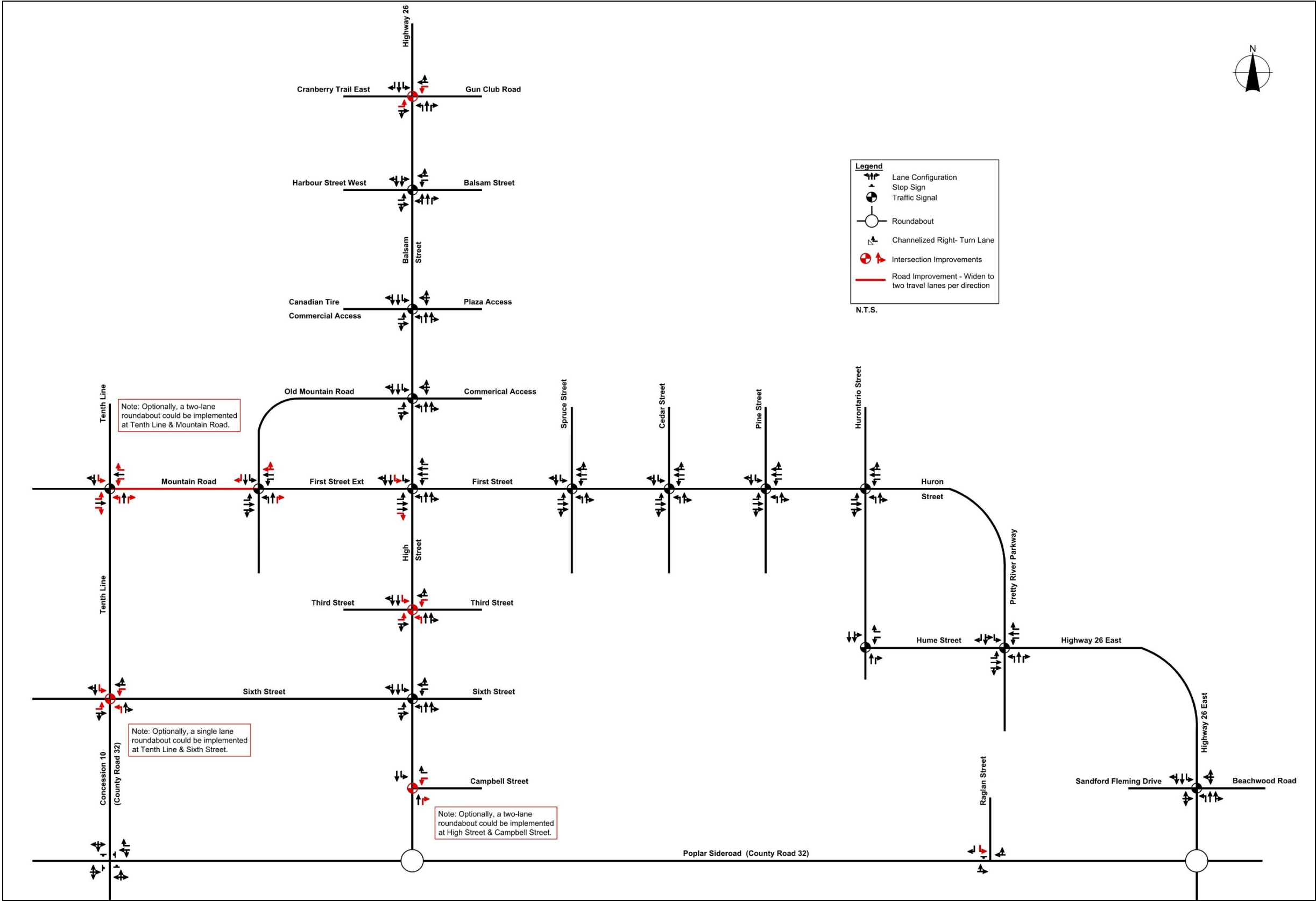
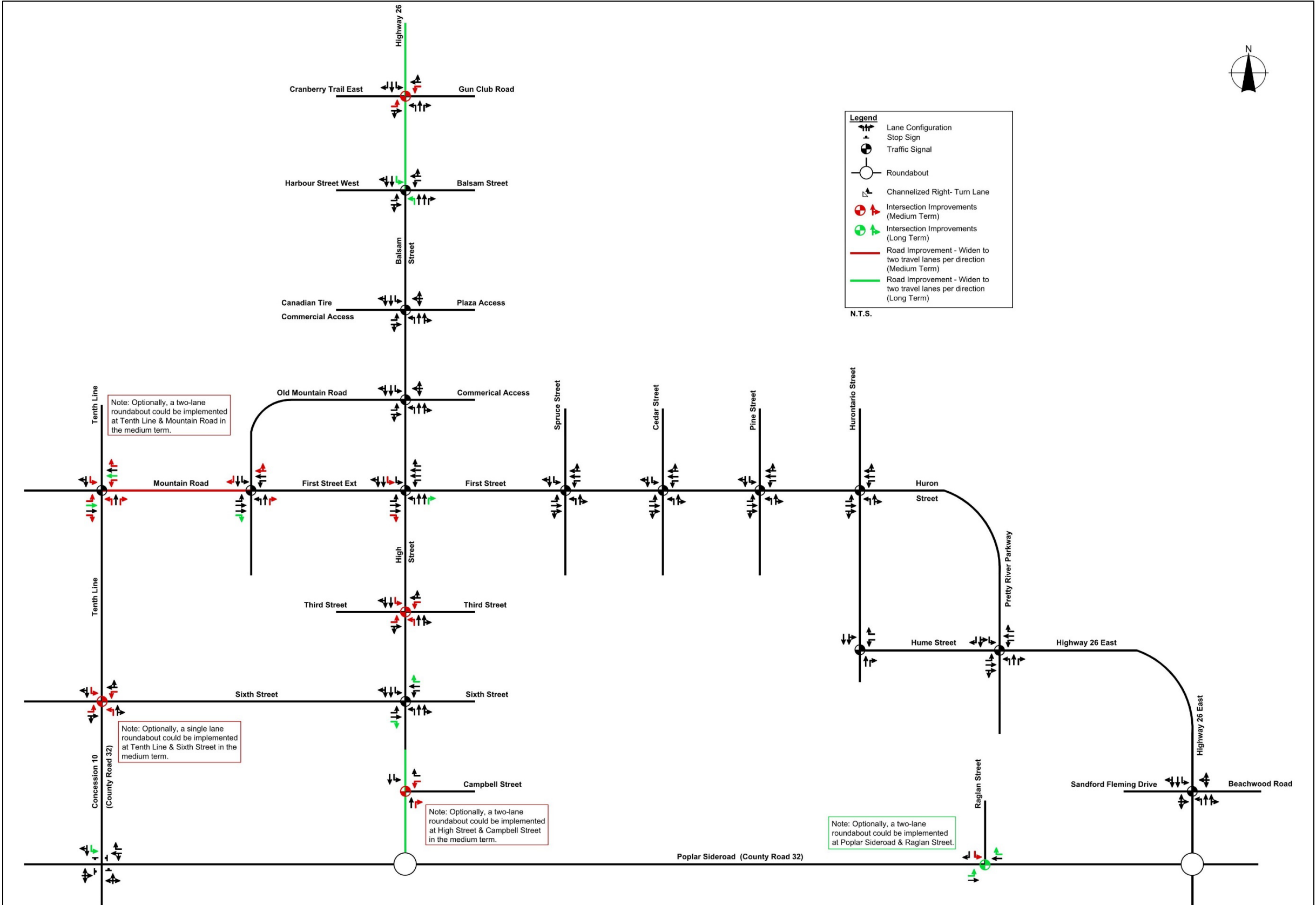


Figure 20: 2041 Intersection Lane Configuration and Traffic Control Recommendations



9.1 Works Schedule

Improvement requirements have been forecasted for the existing (2019), medium-term (2031), and long-term (2041) horizons. Note that all improvement requirements outlined assume the build-out and occupancy status of numerous proposed developments in the Town, and that improvement requirements may differ due to the timing and status of various developments.

The improvements forecasted to be required in the existing, medium-term, and long-term horizons, along with the associated cost estimates and applicable Municipal Class Environmental Assessment (EA) Schedule, are summarized below in Table 33, Table 34, and Table 35, respectively. Note that the cost estimates shown are high-level and consider only estimated construction costs (i.e., utility relocation or land acquisition costs are excluded).

Table 33: Existing Recommendations

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
All movements at all intersections in the Study Area operate with sufficient capacity and a LOS E or better. Therefore, no intersection improvements are required in the short term.			
Road Segments			
The capacity of all road segments studied adequately supports existing traffic volumes. Therefore, no road segment improvements are required under existing conditions.			

Table 34: Medium-Term Recommendations

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
Highway 26 & Cranberry Trail E/Gun Club Road	- Addition of traffic signals. - Addition of westbound left-turn lane. - Addition of eastbound left-turn lane.	\$500,000	A+
First Street & High Street/Balsam Street	- Addition of southbound left-turn lane. - Addition of eastbound right-turn lane.	\$500,000	A+
Tenth Line & Mountain Road	<i>Option #1:</i> - Addition of a dedicated left-turn lane to all four approaches. - Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane. - Addition of a northbound right-turn lane.	\$1.3M	A+
	<i>Option #2 ¹:</i> Construct two-lane roundabout.	\$1.2M	A+

Mountain Road & Old Mountain Road/Cambridge Street	- Addition of a northbound right-turn lane. - Addition of a southbound right-turn lane. - Convert existing westbound right-turn into a shared westbound through/right-turn lane.	\$550,000	A+
High Street & Third Street/Cambridge Street	- Addition of traffic signals. - Addition of a dedicated left-turn lane to all four approaches.	\$1.2M	A+
High Street & Campbell Street ²	Option #1: - Addition of traffic signals. - Addition of westbound left-turn lane. - Addition of northbound right-turn lane.	\$500,000	A+
	Option #2: Construct two-lane roundabout.	\$1M	A+
Tenth Line & Sixth Street (County of Simcoe Jurisdiction)	Option #1: - Addition of traffic signals. - Addition of a dedicated left-turn lane to all four approaches.	\$1M	A+
	Option #2 ¹: Construct single lane roundabout.	\$1M	A+
Raglan Street & Poplar Sideroad (County of Simcoe Jurisdiction)	Addition of a southbound left-turn lane.	\$150,000	A+
Road Segments			
Mountain Road (Tenth Line to Cambridge Street)	- Widen to include two travel lanes per direction plus a centre two-way left-turn lane (TWLTL). - Widen the bridge structure approximately 150 metres west of Cambridge Street. - Urban cross section.	\$8.3M	C

1. A roundabout alternative has been recommended in the *Tenth Line and Mountain Road Improvements Class EA* (Ainley Group, April 2019).

2. Further detailed studies and cost-benefit analyses required to determine preferred option.

Table 35: Long-Term Recommendations

Intersection / Road Segment	Recommended Improvement(s)	Cost Estimate	EA
Intersections			
Balsam Street/Harbour Street W & Highway 26	- Addition of a northbound left-turn lane (on Highway 26). - Addition of a southbound left-turn lane (on Highway 26).	\$600,000	A+
First Street & High Street/Balsam Street	Addition of northbound right-turn lane.	\$250,000	A+

Tenth Line & Mountain Road	<i>If Option #1 were selected in Medium Term:</i> - Addition of an eastbound through lane. - Addition of a westbound through lane.	\$600,000	A+
Mountain Road & Old Mountain Road/Cambridge Street	Addition of an eastbound right-turn lane.	\$250,000	A+
High Street & Sixth Street	- Addition of an eastbound right-turn lane. - Addition of a westbound right-turn lane.	\$500,000	A+
Tenth Line & Sixth Street (County of Simcoe Jurisdiction)	<i>If Option #1 were selected in Medium Term:</i> Addition of a southbound left-turn lane.	\$250,000	A+
Raglan Street & Poplar Sideroad ¹ (County of Simcoe Jurisdiction)	<i>Option #1:</i> - Addition of traffic signals. - Addition of an eastbound left-turn lane. - Addition of a westbound right-turn lane.	\$600,000	A+
	<i>Option #2:</i> Construct two-lane roundabout.	\$1M	A+
Poplar Sideroad & Concession 10 (County of Simcoe Jurisdiction)	Addition of a southbound left-turn lane.	\$250,000	A+
Road Segments			
Highway 26 (Harbour Street West to Grey Road 21) ²	- Widen to include two travel lanes per direction plus a centre TWLTL.³ - Urban cross section.	\$11.7M	C
High Street (Tenth Street to Poplar Sideroad)	- Widen to include two travel lanes per direction. - Urban cross section.	\$3.5M	C

1. Further detailed studies and cost-benefit analyses required to determine preferred option.
2. For the purposes of this study, it is assumed that the widening of Highway 26 would extend from Harbour Street West to Grey Road 21 (i.e., the boundary road between Collingwood and The Blue Mountains).
3. The recommendation to widen Highway 26 to a five-lane cross section assumes that the Highway 26 Bypass around Collingwood is not constructed prior to horizon year 2041.

9.2 Future Studies

It is recommended that the Town regularly review and update this TSU to account for any changes to the assumptions that formed the basis of this study. In particular, it is recommended that the Town regularly review the following:

- The actual status and phasing of all proposed developments in comparison to the forecasts outlined in Table 15 (2031) and Table 16 (2041).
- Future development proposals.

- Future population/employment forecasts.
- Confirmation of improvement requirements by obtaining current traffic volume data and/or conducting detailed studies of improvement options at specific intersection or road segment locations.



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]



Appendix A

Turning Movement Count (TMC) Data

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000001

Intersection: Hwy 26 W & Cranberry Trail E-Gun

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hwy 26 W runs N/S

North Leg Total: 943

North Entering: 516

North Peds: 0

Peds Cross: 0

Heavys	3	3	0	6
Trucks	7	12	0	19
Cars	9	482	0	491
Totals	19	497	0	



Heavys 3

Trucks 14

Cars 410

Totals 427

East Leg Total: 22

East Entering: 18

East Peds: 0

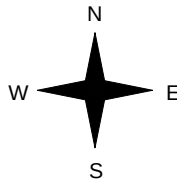
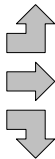
Peds Cross: 0

Heavys	Trucks	Cars	Totals
3	9	55	67



Cranberry Trail E

Heavys	Trucks	Cars	Totals
0	0	19	19
0	0	0	0
1	2	44	47
1	2	63	



Cars	Trucks	Heavys	Totals
3	0	0	3
0	0	0	0
15	0	0	15
18	0	0	

Gun Club Rd



Cars	Trucks	Heavys	Totals
4	0	0	4

Peds Cross: 0

West Peds: 0

West Entering: 66

West Leg Total: 133

Cars	541	Cars	46	388	4	438
Trucks	14	Trucks	2	14	0	16
Heavys	4	Heavys	0	3	0	3
Totals	559	Totals	48	405	4	



Peds Cross: 0

South Peds: 0

South Entering: 457

South Leg Total: 1016

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000001

Intersection: Hwy 26 W & Cranberry Trail E-Gun

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hwy 26 W runs N/S

North Leg Total: 1124

North Entering: 551

North Peds: 2

Peds Cross: $\bowtie$

Heavys	2	2	0	4
Trucks	0	20	0	20
Cars	12	511	4	527
Totals	14	533	4	



Heavys 1

Trucks 13

Cars 559

Totals 573

East Leg Total: 52

East Entering: 25

East Peds: 0

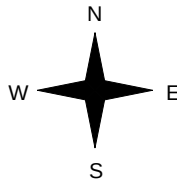
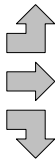
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
2	0	68	70



Cranberry Trail E

Heavys	Trucks	Cars	Totals
0	0	17	17
0	0	2	2
1	1	38	40
1	1	57	



Hwy 26 W



Cars	Trucks	Heavys	Totals
3	0	0	3
0	0	0	0
22	0	0	22
25	0	0	

Gun Club Rd



Cars	Trucks	Heavys	Totals
27	0	0	27

Peds Cross: $\bowtie$

West Peds: 0

West Entering: 59

West Leg Total: 129

Cars	571	Cars	56	539	21	616
Trucks	21	Trucks	0	13	0	13
Heavys	3	Heavys	0	1	0	1
Totals	595	Totals	56	553	21	



Peds Cross: $\bowtie$

South Peds: 0

South Entering: 630

South Leg Total: 1225

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000002

Intersection: Hwy 26 W & Harbour St W-Balsam

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 26 W runs N/S

North Leg Total: 1097

North Entering: 582

North Peds: 0

Peds Cross: 0

Heavys	0	6	0	6
Trucks	0	12	0	12
Cars	1	558	5	564
Totals	1	576	5	

Heavys 4

Trucks 15

Cars 496

Totals 515

East Leg Total: 129

East Entering: 59

East Peds: 0

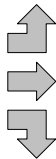
Peds Cross: 0

Heavys	Trucks	Cars	Totals
2	2	59	63

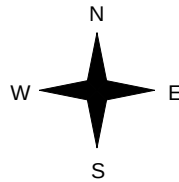


Balsam St

Heavys	Trucks	Cars	Totals
0	0	1	1
0	0	2	2
2	1	75	78
2	1	78	



Hwy 26 W



Cars	Trucks	Heavys	Totals
12	0	0	12
2	0	1	3
43	0	1	44
57	0	2	

Harbour St W



Cars	Trucks	Heavys	Totals
70	0	0	70

Peds Cross: 0

West Peds: 0

West Entering: 81

West Leg Total: 144

Cars	676	Cars	56	483	63	602
Trucks	13	Trucks	2	15	0	17
Heavys	9	Heavys	1	4	0	5
Totals	698	Totals	59	502	63	



Peds Cross: 0

South Peds: 1

South Entering: 624

South Leg Total: 1322

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000002

Intersection: Hwy 26 W & Harbour St W-Balsam

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 26 W runs N/S

North Leg Total: 1334

North Entering: 640

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	3	0	3
Trucks	0	17	0	17
Cars	9	601	10	620
Totals	9	621	10	



Heavys 1

Trucks 10

Cars 683

Totals 694

East Leg Total: 174

East Entering: 92

East Peds: 0

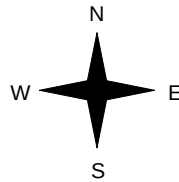
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
1	0	108	109



Balsam St

Heavys	Trucks	Cars	Totals
0	1	18	19
0	0	6	6
1	0	129	130
1	1	153	



Hwy 26 W



Cars	Trucks	Heavys	Totals
8	0	0	8
4	0	1	5
79	0	0	79
91	0	1	

Harbour St W



Cars	Trucks	Heavys	Totals
82	0	0	82

Peds Cross: $\nlessgtr$

West Peds: 2

West Entering: 155

West Leg Total: 264

Cars	809	Cars	95	657	66	818
Trucks	17	Trucks	0	9	0	9
Heavys	4	Heavys	0	1	0	1
Totals	830	Totals	95	667	66	



Peds Cross: $\nlessgtr$

South Peds: 5

South Entering: 828

South Leg Total: 1658

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000003

Intersection: Balsam St & Canadian Tire Comm

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Balsam St runs N/S

North Leg Total: 1338

North Entering: 704

North Peds: 0

Peds Cross: $\times$

Heavys	1	8	0	9
Trucks	1	15	0	16
Cars	19	657	3	679
Totals	21	680	3	



Heavys	4
Trucks	22
Cars	608
Totals	634

East Leg Total: 30

East Entering: 26

East Peds: 1

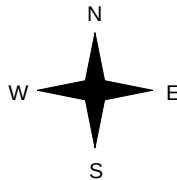
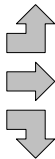
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	2	49	54



Canadian Tire Commercial Access

Heavys	Trucks	Cars	Totals
0	2	15	17
0	0	0	0
0	0	9	9
0	2	24	



Balsam St

Cars	Trucks	Heavys	Totals
2	1	0	3
2	1	0	3
19	1	0	20
23	3	0	

Plaza Access



Cars	Trucks	Heavys	Totals
4	0	0	4

Peds Cross: $\times$

West Peds: 5

West Entering: 26

West Leg Total: 80

Cars	685	Cars	28	591	1	620
Trucks	16	Trucks	0	19	0	19
Heavys	8	Heavys	2	4	0	6
Totals	709	Totals	30	614	1	



Peds Cross: $\times$

South Peds: 0

South Entering: 645

South Leg Total: 1354

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000003

Intersection: Balsam St & Canadian Tire Comm

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Balsam St runs N/S

North Leg Total: 1683

North Entering: 840

North Peds: 1

Peds Cross: $\times$

Heavys	1	3	0	4
Trucks	0	15	0	15
Cars	67	746	8	821
Totals	68	764	8	



Heavys	1
Trucks	12
Cars	830
Totals	843

East Leg Total: 69

East Entering: 51

East Peds: 0

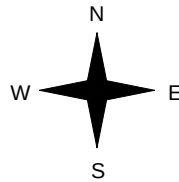
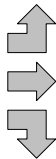
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	0	136	139



Canadian Tire Commercial Access

Heavys	Trucks	Cars	Totals
0	0	101	101
0	0	4	4
0	0	48	48
0	0	153	



Balsam St

Cars	Trucks	Heavys	Totals
15	0	0	15
5	0	0	5
31	0	0	31
51	0	0	

Plaza Access



Cars	Trucks	Heavys	Totals
18	0	0	18

Peds Cross: $\times$

West Peds: 2

West Entering: 153

West Leg Total: 292

Cars	825	Cars	64	714	6	784
Trucks	15	Trucks	0	12	0	12
Heavys	3	Heavys	2	1	0	3
Totals	843	Totals	66	727	6	



Peds Cross: $\times$

South Peds: 0

South Entering: 799

South Leg Total: 1642

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000004

Intersection: Balsam St (Hwy 26) & Old Mountain

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Balsam St (Hwy 26) runs N/S

North Leg Total: 1359

North Entering: 695

North Peds: 2

Peds Cross: $\times$

Heavys	0	8	0	8
Trucks	1	14	0	15
Cars	31	641	0	672
Totals	32	663	0	



Heavys	7
Trucks	25
Cars	632
Totals	664

East Leg Total: 3

East Entering: 1

East Peds: 0

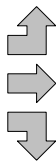
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	3	81	85

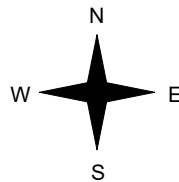


Old Mountain Rd

Heavys	Trucks	Cars	Totals
0	1	21	22
0	0	0	0
0	0	27	27
0	1	48	



Balsam St (Hwy 26)



Cars	Trucks	Heavys	Totals
0	1	0	1
0	0	0	0
0	0	0	0
0	1	0	

Commercial Access



Cars	Trucks	Heavys	Totals
1	1	0	2

Peds Cross: $\times$

West Peds: 6

West Entering: 49

West Leg Total: 134

Cars	668	Cars	50	611	1	662
Trucks	14	Trucks	2	23	1	26
Heavys	8	Heavys	1	7	0	8
Totals	690	Totals	53	641	2	



Peds Cross: $\times$

South Peds: 1

South Entering: 696

South Leg Total: 1386

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Collingwood

Site #: 1842000004

Intersection: Balsam St (Hwy 26) & Old Mountain

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Balsam St (Hwy 26) runs N/S

North Leg Total: 1630

North Entering: 802

North Peds: 3

Peds Cross: $\times$

Heavys	0	1	0	1
Trucks	0	13	1	14
Cars	30	749	8	787
Totals	30	763	9	



Heavys	3
Trucks	13
Cars	812
Totals	828

East Leg Total: 65

East Entering: 31

East Peds: 2

Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	2	193	196

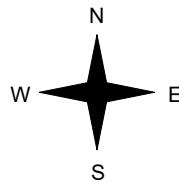


Old Mountain Rd

Heavys	Trucks	Cars	Totals
1	0	70	71
0	0	4	4
0	3	163	166
1	3	237	



Balsam St (Hwy 26)



Balsam St (Hwy 26)



Cars	Trucks	Heavys	Totals
7	0	0	7
8	0	0	8
16	0	0	16
31	0	0	

Commercial Access



Cars	Trucks	Heavys	Totals
33	1	0	34

Peds Cross: $\times$

West Peds: 12

West Entering: 241

West Leg Total: 437

Cars	928	Cars	155	735	21	911
Trucks	16	Trucks	2	13	0	15
Heavys	1	Heavys	1	2	0	3
Totals	945	Totals	158	750	21	



Peds Cross: $\times$

South Peds: 1

South Entering: 929

South Leg Total: 1874

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000005

Intersection: High St-Balsam St (Hwy 26) & First

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: High St-Balsam St (Hwy 26) runs N

North Leg Total: 1405

North Entering: 697

North Peds: 5

Peds Cross: $\bowtie$

Heavys	0	7	2	9
Trucks	0	8	8	16
Cars	15	286	371	672
Totals	15	301	381	



Heavys	6
Trucks	27
Cars	675
Totals	708

East Leg Total: 1354

East Entering: 705

East Peds: 1

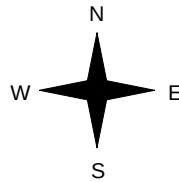
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
0	9	358	367



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	1	12	13
0	6	169	175
0	2	66	68
0	9	247	



Balsam St (Hwy 26)



Cars	Trucks	Heavys	Totals
358	21	2	381
242	8	0	250
74	0	0	74
674	29	2	

First St (Hwy 26)



High St



Cars	Trucks	Heavys	Totals
631	15	3	649

Peds Cross: $\bowtie$

West Peds: 4

West Entering: 256

West Leg Total: 623

Cars	426
Trucks	10
Heavys	7
Totals	443



Cars	101	305	91	497
Trucks	1	5	1	7
Heavys	0	4	1	5
Totals	102	314	93	

Peds Cross: $\bowtie$

South Peds: 4

South Entering: 509

South Leg Total: 952

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000005

Intersection: High St-Balsam St (Hwy 26) & First

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: High St-Balsam St (Hwy 26) runs N

North Leg Total: 1854

North Entering: 955

North Peds: 4

Peds Cross: $\times$

Heavys	0	1	2	3
Trucks	0	5	15	20
Cars	27	404	501	932
Totals	27	410	518	



Heavys	3
Trucks	17
Cars	879
Totals	899

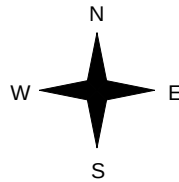
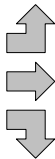
East Leg Total:	1994
East Entering:	992
East Peds:	2
Peds Cross:	$\times$

Heavys	Trucks	Cars	Totals
0	3	465	468



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	2	65	67
1	6	358	365
0	0	140	140
1	8	563	



Balsam St (Hwy 26)



Cars	Trucks	Heavys	Totals
513	14	1	528
311	1	0	312
150	2	0	152
974	17	1	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
977	21	4	1002

Peds Cross: $\times$
West Peds: 9
West Entering: 572
West Leg Total: 1040

Cars	694
Trucks	7
Heavys	1
Totals	702



Cars	127	301	118	546
Trucks	2	1	0	3
Heavys	0	2	1	3
Totals	129	304	119	

Peds Cross: $\times$
South Peds: 12
South Entering: 552
South Leg Total: 1254

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000006

Intersection: First St (Hwy 26) & Spruce St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 32

North Entering: 18

North Peds: 5

Peds Cross: $\bowtie$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	3	4	11	18
Totals	3	4	11	



Heavys 0

Trucks 0

Cars 14

Totals 14

East Leg Total: 1421

East Entering: 744

East Peds: 5

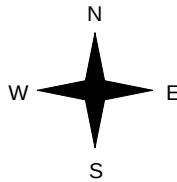
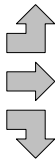
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
2	28	699	729



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	0	4	4
2	14	628	644
1	0	4	5
3	14	636	



Spruce St

Spruce St

Cars	Trucks	Heavys	Totals
8	0	0	8
691	28	2	721
15	0	0	15
714	28	2	



First St (Hwy 26)



Cars	Trucks	Heavys	Totals
660	15	2	677

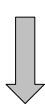
Peds Cross: $\bowtie$

West Peds: 1

West Entering: 653

West Leg Total: 1382

Cars	23
Trucks	0
Heavys	1
Totals	24



Cars	5	2	21	28
Trucks	0	0	1	1
Heavys	0	0	0	0
Totals	5	2	22	

Peds Cross: $\bowtie$

South Peds: 3

South Entering: 29

South Leg Total: 53

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Collingwood

Site #: 1842000006

Intersection: First St (Hwy 26) & Spruce St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 116

North Entering: 50

North Peds: 15

Peds Cross: $\times$

	Heavys	Trucks	Cars	Totals
North	0	0	0	0
East	0	1	0	1
South	17	8	24	49
Totals	17	9	24	



	Heavys	Trucks	Cars	Totals
North	0	1	65	66
East	0	1	65	66
South	17	8	24	49
Totals	17	9	24	

East Leg Total: 2030

East Entering: 1040

East Peds: 7

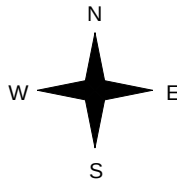
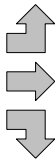
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	14	988	1003



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	0	11	11
3	16	934	953
0	0	23	23
3	16	968	



Spruce St



Cars	Trucks	Heavys	Totals
42	1	0	43
955	14	1	970
27	0	0	27
1024	15	1	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
970	17	3	990

Peds Cross: $\times$

West Peds: 5

West Entering: 987

West Leg Total: 1990

	Cars	Trucks	Heavys	Totals
West	58	1	0	59
East	16	0	0	16
South	12	0	0	12
Totals	16	12	13	



	Cars	Trucks	Heavys	Totals
West	16	0	0	16
East	12	0	0	12
South	12	1	0	13
Totals	16	12	13	

Peds Cross: $\times$

South Peds: 11

South Entering: 41

South Leg Total: 100

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000007

Intersection: First St (Hwy 26) & Cedar St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 305

North Entering: 222

North Peds: 11

Peds Cross: $\bowtie$

Heavys	0	0	0	0
Trucks	5	0	1	6
Cars	116	27	73	216
Totals	121	27	74	



Heavys 0

Trucks 2

Cars 81

Totals 83

East Leg Total: 1332

East Entering: 637

East Peds: 9

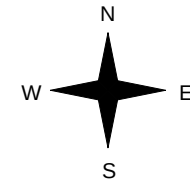
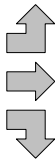
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
2	26	739	767



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	0	45	45
1	15	586	602
0	0	27	27
1	15	658	



Cedar St



Cars	Trucks	Heavys	Totals
5	1	0	6
600	20	2	622
9	0	0	9
614	21	2	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
678	16	1	695

Peds Cross: $\bowtie$

West Peds: 1

West Entering: 674

West Leg Total: 1441

Cars	63	Cars	23	31	19	73
Trucks	0	Trucks	1	1	0	2
Heavys	0	Heavys	0	0	0	0
Totals	63	Totals	24	32	19	



Peds Cross: $\bowtie$

South Peds: 1

South Entering: 75

South Leg Total: 138

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000007

Intersection: First St (Hwy 26) & Cedar St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 196

North Entering: 143

North Peds: 12

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	1	0	1	2
Cars	47	19	75	141
Totals	48	19	76	



Heavys 0

Trucks 1

Cars 52

Totals 53

East Leg Total: 1981

East Entering: 976

East Peds: 6

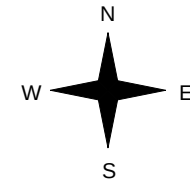
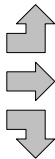
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
1	17	1010	1028



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	1	26	27
2	21	884	907
1	0	43	44
3	22	953	



Cedar St



Cars	Trucks	Heavys	Totals
7	0	0	7
928	15	1	944
24	1	0	25
959	16	1	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
981	22	2	1005

Peds Cross: $\times$

West Peds: 2

West Entering: 978

West Leg Total: 2006

Cars	86
Trucks	1
Heavys	1
Totals	88



Cars	35	19	22	76
Trucks	1	0	0	1
Heavys	0	0	0	0
Totals	36	19	22	

Peds Cross: $\times$

South Peds: 8

South Entering: 77

South Leg Total: 165

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000008

Intersection: First St & Pine St-N Pine St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St runs W/E

North Leg Total: 132

North Entering: 87

North Peds: 17

Peds Cross: $\bowtie$

Heavys	0	0	0	0
Trucks	0	0	2	2
Cars	32	24	29	85
Totals	32	24	31	



Heavys	0
Trucks	0
Cars	45
Totals	45

East Leg Total: 1288

East Entering: 723

East Peds: 4

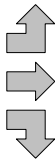
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
2	32	787	821

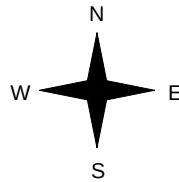


First St

Heavys	Trucks	Cars	Totals
0	0	25	25
0	15	508	523
0	3	46	49
0	18	579	



N Pine St



Pine St



Cars	Trucks	Heavys	Totals
8	0	0	8
669	28	1	698
15	2	0	17
692	30	1	

First St



Cars	Trucks	Heavys	Totals
547	18	0	565

Peds Cross: $\bowtie$

West Peds: 3

West Entering: 597

West Leg Total: 1418

Cars	85	Cars	86	12	10	108
Trucks	5	Trucks	4	0	1	5
Heavys	0	Heavys	1	0	0	1
Totals	90	Totals	91	12	11	



Peds Cross: $\bowtie$

South Peds: 1

South Entering: 114

South Leg Total: 204

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000008

Intersection: First St & Pine St-N Pine St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St runs W/E

North Leg Total: 336

North Entering: 203

North Peds: 11

Peds Cross: $\bowtie$

Heavys	0	0	0	0
Trucks	0	0	2	2
Cars	87	59	55	201
Totals	87	59	57	



Heavys	0
Trucks	1
Cars	132
Totals	133

East Leg Total: 1687

East Entering: 780

East Peds: 7

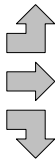
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
1	17	958	976

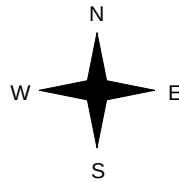


First St

Heavys	Trucks	Cars	Totals
0	0	52	52
1	18	789	808
0	3	112	115
1	21	953	



N Pine St



Pine St



Cars	Trucks	Heavys	Totals
49	0	0	49
699	15	0	714
17	0	0	17
765	15	0	



First St



Cars	Trucks	Heavys	Totals
885	21	1	907

Peds Cross: $\bowtie$

West Peds: 7

West Entering: 975

West Leg Total: 1951

Cars	188
Trucks	3
Heavys	0
Totals	191



Cars	172	31	41	244
Trucks	2	1	1	4
Heavys	1	0	0	1
Totals	175	32	42	

Peds Cross: $\bowtie$

South Peds: 8

South Entering: 249

South Leg Total: 440

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000009

Intersection: First St (Hwy 26) & Hurontario St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 59

North Entering: 0

North Peds: 3

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	0	0	0	0
Totals	0	0	0	0



Heavys	0
Trucks	3
Cars	56
Totals	59

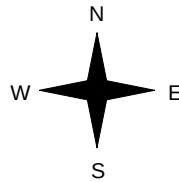
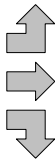
East Leg Total:	1164
East Entering:	654
East Peds:	5
Peds Cross:	$\times$

Heavys	Trucks	Cars	Totals
1	20	708	729



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	3	17	20
0	15	465	480
0	0	65	65
0	18	547	



Hurontario St

Hurontario St

Cars	Trucks	Heavys	Totals
22	0	0	22
578	19	1	598
34	0	0	34
634	19	1	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
495	15	0	510

Peds Cross: $\times$

West Peds: 4

West Entering: 565

West Leg Total: 1294

Cars	99
Trucks	0
Heavys	0
Totals	99



Cars	130	17	30	177
Trucks	1	0	0	1
Heavys	0	0	0	0
Totals	131	17	30	

Peds Cross: $\times$

South Peds: 6

South Entering: 178

South Leg Total: 277

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000009

Intersection: First St (Hwy 26) & Hurontario St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St (Hwy 26) runs W/E

North Leg Total: 37

North Entering: 0

North Peds: 16

Peds Cross: $\times$

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	0	0	0	0
Totals	0	0	0	0



Heavys 0

Trucks 2

Cars 35

Totals 37

East Leg Total: 1452

East Entering: 645

East Peds: 11

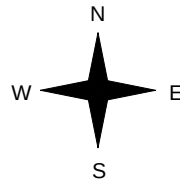
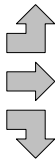
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
0	14	772	786



First St (Hwy 26)

Heavys	Trucks	Cars	Totals
0	1	13	14
1	17	730	748
0	1	149	150
1	19	892	



Hurontario St

Hurontario St



Cars	Trucks	Heavys	Totals
9	0	0	9
561	13	0	574
62	0	0	62
632	13	0	

First St (Hwy 26)



Cars	Trucks	Heavys	Totals
789	17	1	807

Peds Cross: $\times$

West Peds: 12

West Entering: 912

West Leg Total: 1698

Cars	211
Trucks	1
Heavys	0
Totals	212



Cars	211	13	59	283
Trucks	1	1	0	2
Heavys	0	0	0	0
Totals	212	14	59	

Peds Cross: $\times$

South Peds: 11

South Entering: 285

South Leg Total: 497

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000010

Intersection: Hume St-Hwy 26 E & Pretty River F

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hume St-Hwy 26 E runs W/E

North Leg Total: 1052

North Entering: 297

North Peds: 1

Peds Cross: $\times$

Heavys	1	0	0	1
Trucks	3	0	11	14
Cars	46	30	206	282
Totals	50	30	217	



Heavys	2
Trucks	18
Cars	735
Totals	755

East Leg Total: 1407

East Entering: 999

East Peds: 1

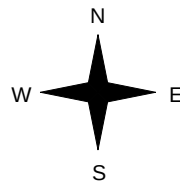
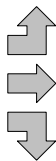
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
4	9	393	406



Hume St

Heavys	Trucks	Cars	Totals
0	1	87	88
1	2	176	179
0	1	16	17
1	4	279	



Pretty River Pkwy

Pretty River Pkwy

Cars	Trucks	Heavys	Totals
629	15	2	646
339	5	3	347
5	1	0	6
973	21	5	

Hwy 26 E



Cars	Trucks	Heavys	Totals
390	16	2	408

Peds Cross: $\times$

West Peds: 0

West Entering: 284

West Leg Total: 690

Cars	51	Cars	8	19	8	35
Trucks	2	Trucks	1	2	3	6
Heavys	0	Heavys	0	0	1	1
Totals	53	Totals	9	21	12	



Peds Cross: $\times$

South Peds: 2

South Entering: 42

South Leg Total: 95

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000010

Intersection: Hume St-Hwy 26 E & Pretty River F

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hume St-Hwy 26 E runs W/E

North Leg Total: 1214

North Entering: 721

North Peds: 0

Peds Cross: $\times$

Heavys	2	1	0	3
Trucks	1	3	14	18
Cars	70	36	594	700
Totals	73	40	608	

Heavys 1

Trucks 10

Cars 482

Totals 493

East Leg Total: 1670

East Entering: 661

East Peds: 0

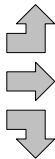
Peds Cross: $\times$

Heavys	Trucks	Cars	Totals
3	2	323	328

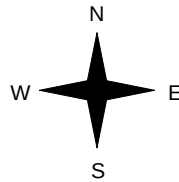


Hume St

Heavys	Trucks	Cars	Totals
0	2	41	43
0	5	366	371
0	0	10	10
0	7	417	



Pretty River Pkwy



Cars	Trucks	Heavys	Totals
403	5	1	409
240	1	0	241
10	1	0	11
653	7	1	

Hwy 26 E



Cars	Trucks	Heavys	Totals
987	20	2	1009

Peds Cross: $\times$

West Peds: 0

West Entering: 424

West Leg Total: 752

Cars	56
Trucks	4
Heavys	1
Totals	61



Cars	13	38	27	78
Trucks	0	3	1	4
Heavys	1	0	2	3
Totals	14	41	30	

Peds Cross: $\times$

South Peds: 0

South Entering: 85

South Leg Total: 146

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Collingwood

Site #: 1842000011

Intersection: Hwy 26 E & Beachwood Rd

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 26 E runs W/E

North Leg Total: 1367

North Entering: 344

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	0	0
Trucks	16	7	23
Cars	229	92	321
Totals	245	99	

Heavys	5
Trucks	32
Cars	986
Totals	1023

East Leg Total: 463

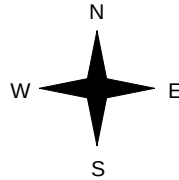
East Entering: 362

East Peds: 0

Peds Cross: $\nlessgtr$



Beachwood Rd



Cars	Trucks	Heavys	Totals
350	8	4	362
0	0	0	0
350	8	4	

Hwy 26 E



Cars	Trucks	Heavys	Totals
93	7	1	101

Beachwood Rd

Cars	229	Cars	636	1	637
Trucks	16	Trucks	24	0	24
Heavys	0	Heavys	1	1	2
Totals	245	Totals	661	2	

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 663

South Leg Total: 908

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000011

Intersection: Hwy 26 E & Beachwood Rd

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 26 E runs W/E

North Leg Total: 1577

North Entering: 975

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	1	1
Trucks	23	1	24
Cars	504	446	950
Totals	527	448	

Heavys	0
Trucks	10
Cars	592
Totals	602

East Leg Total: 678

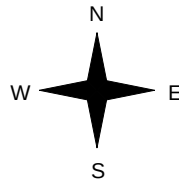
East Entering: 228

East Peds: 0

Peds Cross: $\nlessgtr$



Beachwood Rd



Cars	Trucks	Heavys	Totals
221	3	0	224
4	0	0	4
225	3	0	

Hwy 26 E



Beachwood Rd

Cars	508
Trucks	23
Heavys	0
Totals	531



Cars	371	2	373
Trucks	7	0	7
Heavys	0	0	0
Totals	378	2	

Cars	Trucks	Heavys	Totals
448	1	1	450

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 380

South Leg Total: 911

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000012

Intersection: Mountain Rd & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Mountain Rd runs W/E

North Leg Total: 85

North Entering: 34

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	1	0	0	1
Trucks	0	2	1	3
Cars	2	9	19	30
Totals	3	11	20	



Heavys	1
Trucks	0
Cars	50
Totals	51

East Leg Total: 600

East Entering: 325

East Peds: 0

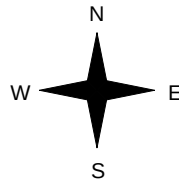
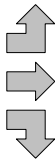
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
3	5	324	332



Mountain Rd

Heavys	Trucks	Cars	Totals
0	0	3	3
0	5	197	202
6	0	24	30
6	5	224	



Tenth Line

Cars	Trucks	Heavys	Totals
25	0	0	25
275	5	0	280
20	0	0	20
320	5	0	

Mountain Rd



Cars	Trucks	Heavys	Totals
266	9	0	275

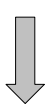
Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 235

West Leg Total: 567

Cars	53	Cars	47	22	50	119
Trucks	2	Trucks	0	0	3	3
Heavys	6	Heavys	2	1	0	3
Totals	61	Totals	49	23	53	



Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 125

South Leg Total: 186

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000012

Intersection: Mountain Rd & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Mountain Rd runs W/E

North Leg Total: 105

North Entering: 79

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	0	0	0
Trucks	0	3	3	6
Cars	9	25	39	73
Totals	9	28	42	



Heavys	0
Trucks	5
Cars	21
Totals	26

East Leg Total: 814

East Entering: 358

East Peds: 0

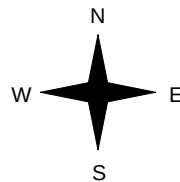
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
2	1	299	302



Mountain Rd

Heavys	Trucks	Cars	Totals
0	2	4	6
0	4	338	342
1	0	48	49
1	6	390	



Cars	Trucks	Heavys	Totals
8	0	0	8
263	1	0	264
86	0	0	86
357	1	0	



Mountain Rd



Cars	Trucks	Heavys	Totals
448	8	0	456

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 397

West Leg Total: 699

Cars	159	Cars	27	9	71	107
Trucks	3	Trucks	0	3	1	4
Heavys	1	Heavys	2	0	0	2
Totals	163	Totals	29	12	72	



Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 113

South Leg Total: 276

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000013

Intersection: First St Extension & Cambridge St-

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St Extension runs W/E

North Leg Total: 130

North Entering: 57

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	2	1	3
Trucks	1	0	1	2
Cars	23	18	11	52
Totals	24	20	13	



Heavys	0
Trucks	1
Cars	72
Totals	73

East Leg Total: 619

East Entering: 362

East Peds: 2

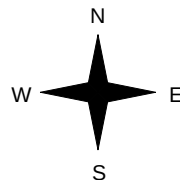
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	6	347	353



First St Extension

Heavys	Trucks	Cars	Totals
0	0	26	26
0	8	209	217
0	0	33	33
0	8	268	



Old Mountain Rd



Cars	Trucks	Heavys	Totals
27	0	0	27
289	4	0	293
39	3	0	42
355	7	0	

First St Extension



Cars	Trucks	Heavys	Totals
246	10	1	257

Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 276

West Leg Total: 629

Cars	90	Cars	35	19	26	80
Trucks	3	Trucks	1	1	1	3
Heavys	2	Heavys	0	0	0	0
Totals	95	Totals	36	20	27	



Cambridge St



Peds Cross: $\nlessgtr$

South Peds: 1

South Entering: 83

South Leg Total: 178

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:15:00

To: 16:15:00

Municipality: Collingwood

Site #: 1842000013

Intersection: First St Extension & Cambridge St-

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: First St Extension runs W/E

North Leg Total: 554

North Entering: 263

North Peds: 2

Peds Cross: $\bowtie$

Heavys	0	2	1	3
Trucks	0	0	0	0
Cars	82	110	68	260
Totals	82	112	69	



Heavys 0

Trucks 2

Cars 289

Totals 291

East Leg Total: 974

East Entering: 484

East Peds: 0

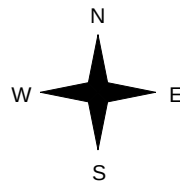
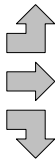
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
0	3	384	387



First St Extension

Heavys	Trucks	Cars	Totals
0	0	71	71
1	9	282	292
0	0	43	43
1	9	396	



Old Mountain Rd



Cars	Trucks	Heavys	Totals
118	1	0	119
241	2	0	243
121	1	0	122
480	4	0	

First St Extension



Cars	Trucks	Heavys	Totals
477	11	2	490

Peds Cross: $\bowtie$

West Peds: 12

West Entering: 406

West Leg Total: 793

Cars	274
Trucks	1
Heavys	2
Totals	277



Cars	61	100	127	288
Trucks	1	1	2	4
Heavys	0	0	0	0
Totals	62	101	129	

Peds Cross: $\bowtie$

South Peds: 3

South Entering: 292

South Leg Total: 569

Cambridge St



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000014

Intersection: High St & Third St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 980

North Entering: 422

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	7	1	8
Trucks	1	12	5	18
Cars	2	338	56	396
Totals	3	357	62	

Heavys 6

Trucks 7

Cars 545

Totals 558

East Leg Total: 189

East Entering: 77

East Peds: 9

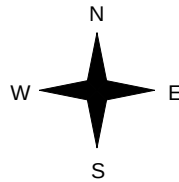
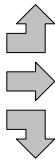
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	1	3	4



Third St

Heavys	Trucks	Cars	Totals
0	0	4	4
0	0	0	0
0	2	1	3
0	2	5	



High St

Cars	Trucks	Heavys	Totals
61	1	2	64
0	0	0	0
13	0	0	13
74	1	2	

Third St



Cars	Trucks	Heavys	Totals
105	5	2	112

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 7

West Leg Total: 11

Cars	352	Cars	1	480	49	530
Trucks	14	Trucks	0	6	0	6
Heavys	7	Heavys	0	4	1	5
Totals	373	Totals	1	490	50	

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 541

South Leg Total: 914

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000014

Intersection: High St & Third St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 1385

North Entering: 795

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	3	0	3
Trucks	0	6	0	6
Cars	3	706	77	786
Totals	3	715	77	

Heavys 3

Trucks 4

Cars 583

Totals 590

East Leg Total: 239

East Entering: 123

East Peds: 12

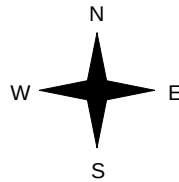
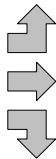
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	0	6	6



Third St

Heavys	Trucks	Cars	Totals
0	0	5	5
0	0	1	1
0	0	12	12
0	0	18	



High St

Cars	Trucks	Heavys	Totals
99	0	2	101
0	0	0	0
22	0	0	22
121	0	2	

Third St



Cars	Trucks	Heavys	Totals
116	0	0	116

Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 18

West Leg Total: 24

Cars	740	Cars	3	479	38	520
Trucks	6	Trucks	0	4	0	4
Heavys	3	Heavys	0	1	0	1
Totals	749	Totals	3	484	38	



Peds Cross: $\nlessgtr$

South Peds: 1

South Entering: 525

South Leg Total: 1274

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000015

Intersection: High St & Sixth St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 840

North Entering: 323

North Peds: 2

Peds Cross: $\bowtie$

Heavys	0	3	1	4
Trucks	3	11	3	17
Cars	39	193	70	302
Totals	42	207	74	

Heavys 4

Trucks 8

Cars 505

Totals 517

East Leg Total: 536

East Entering: 233

East Peds: 4

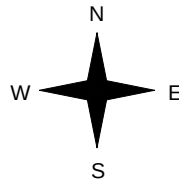
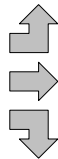
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
6	9	247	262



Sixth St

Heavys	Trucks	Cars	Totals
1	1	69	71
7	3	179	189
2	0	89	91
10	4	337	



High St

Cars	Trucks	Heavys	Totals
90	2	2	94
111	3	6	120
16	0	3	19
217	5	11	

Sixth St



Cars	Trucks	Heavys	Totals
289	6	8	303

Peds Cross: $\bowtie$

West Peds: 0

West Entering: 351

West Leg Total: 613

Cars	298
Trucks	11
Heavys	8
Totals	317



Cars	97	346	40	483
Trucks	3	5	0	8
Heavys	0	1	0	1
Totals	100	352	40	

Peds Cross: $\bowtie$

South Peds: 1

South Entering: 492

South Leg Total: 809

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000015

Intersection: High St & Sixth St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 1167

North Entering: 713

North Peds: 2

Peds Cross: $\bowtie$

Heavys	0	1	0	1
Trucks	1	6	0	7
Cars	83	496	126	705
Totals	84	503	126	

Heavys 1

Trucks 5

Cars 448

Totals 454

East Leg Total: 553

East Entering: 255

East Peds: 3

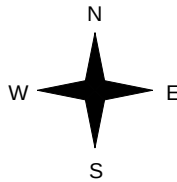
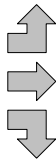
Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
1	5	289	295



Sixth St

Heavys	Trucks	Cars	Totals
1	2	82	85
0	0	142	142
0	2	114	116
1	4	338	



High St

Cars	Trucks	Heavys	Totals
81	0	0	81
135	0	1	136
38	0	0	38
254	0	1	

Sixth St



Cars	Trucks	Heavys	Totals
298	0	0	298

Peds Cross: $\bowtie$

West Peds: 2

West Entering: 343

West Leg Total: 638

Cars	648
Trucks	8
Heavys	1
Totals	657



Cars	71	285	30	386
Trucks	4	3	0	7
Heavys	0	0	0	0
Totals	75	288	30	

Peds Cross: $\bowtie$

South Peds: 1

South Entering: 393

South Leg Total: 1050

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000016

Intersection: High St & Campbell St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 679

North Entering: 321

North Peds: 2

Peds Cross: $\bowtie$

Heavys	5	4	9
Trucks	10	0	10
Cars	200	102	302
Totals	215	106	



Heavys	3
Trucks	6
Cars	349
Totals	358

East Leg Total: 262

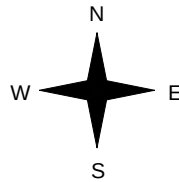
East Entering: 104

East Peds: 0

Peds Cross: $\bowtie$



High St



Cars	Trucks	Heavys	Totals
85	0	3	88



Cars	Trucks	Heavys	Totals
14	1	1	16
99	1	4	

Campbell St



High St



Cars	214
Trucks	11
Heavys	6
Totals	231



Cars	264	52	316
Trucks	6	0	6
Heavys	0	0	0
Totals	270	52	

Peds Cross: $\bowtie$

South Peds: 0

South Entering: 322

South Leg Total: 553

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000016

Intersection: High St & Campbell St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: High St runs N/S

North Leg Total: 787

North Entering: 461

North Peds: 1

Peds Cross: $\bowtie$

Heavys	1	3	4
Trucks	9	0	9
Cars	352	96	448
Totals	362	99	



Heavys	0
Trucks	7
Cars	319
Totals	326

East Leg Total: 177

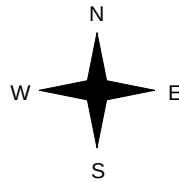
East Entering: 65

East Peds: 2

Peds Cross: $\bowtie$



High St



Cars	Trucks	Heavys	Totals
53	1	0	54
10	1	0	11
63	2	0	



Campbell St



Cars	Trucks	Heavys	Totals
109	0	3	112

High St



Cars	362
Trucks	10
Heavys	1
Totals	373



Cars	266	13	279
Trucks	6	0	6
Heavys	0	0	0
Totals	272	13	

Peds Cross: $\bowtie$

South Peds: 0

South Entering: 285

South Leg Total: 658

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000017

Intersection: Hurontario St & Hume St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hurontario St runs N/S

North Leg Total: 581

North Entering: 175

North Peds: 1

Peds Cross: $\bowtie$

Heavys	0	2	2
Trucks	0	0	0
Cars	89	84	173
Totals	89	86	



Heavys	0
Trucks	2
Cars	404
Totals	406

East Leg Total: 683

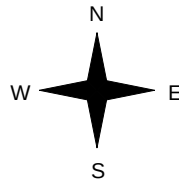
East Entering: 319

East Peds: 5

Peds Cross: $\bowtie$



Hurontario St



Cars	Trucks	Heavys	Totals
159	1	0	160
155	3	1	159
314	4	1	



Hume St



Cars	Trucks	Heavys	Totals
358	3	3	364

Hurontario St



Cars	244	Cars	245	274	519
Trucks	3	Trucks	1	3	4
Heavys	1	Heavys	0	1	1
Totals	248	Totals	246	278	



Peds Cross: $\bowtie$

South Peds: 4

South Entering: 524

South Leg Total: 772

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000017

Intersection: Hurontario St & Hume St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hurontario St runs N/S

North Leg Total: 867

North Entering: 424

North Peds: 5

Peds Cross: $\bowtie$

Heavys	1	1	2
Trucks	2	0	2
Cars	267	153	420
Totals	270	154	

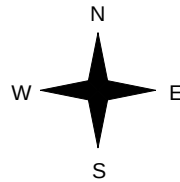
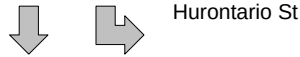
Heavys	0
Trucks	1
Cars	442
Totals	443

East Leg Total: 849

East Entering: 492

East Peds: 13

Peds Cross: $\bowtie$



	Cars	Trucks	Heavys	Totals
Northbound	221	1	0	222
Southbound	270	0	0	270
Total	491	1	0	

Hume St



	Cars	Trucks	Heavys	Totals
Eastbound	353	3	1	357

Cars	537	Cars	221	200	421
Trucks	2	Trucks	0	3	3
Heavys	1	Heavys	0	0	0
Totals	540	Totals	221	203	

Peds Cross: $\bowtie$

South Peds: 7

South Entering: 424

South Leg Total: 964

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000018

Intersection: Sixth St & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Sixth St runs W/E

North Leg Total: 150

North Entering: 50

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	1	1	2
Trucks	1	1	0	2
Cars	2	24	20	46
Totals	3	26	21	

Heavys	5
Trucks	3
Cars	92
Totals	100

East Leg Total: 417

East Entering: 224

East Peds: 0

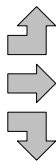
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
2	9	252	263

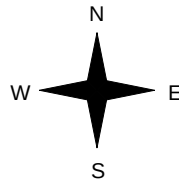


Sixth St

Heavys	Trucks	Cars	Totals
0	0	9	9
0	2	128	130
0	2	30	32
0	4	167	



Tenth Line



Cars	Trucks	Heavys	Totals
35	1	3	39
148	3	1	152
30	0	3	33
213	4	7	

Sixth St



Cars	Trucks	Heavys	Totals
189	2	2	193

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 171

West Leg Total: 434

Cars	84	Cars	102	48	41	191
Trucks	3	Trucks	5	2	0	7
Heavys	4	Heavys	1	2	1	4
Totals	91	Totals	108	52	42	



Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 202

South Leg Total: 293

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:00:00

To: 17:00:00

Municipality: Collingwood

Site #: 1842000018

Intersection: Sixth St & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Sixth St runs W/E

North Leg Total: 213

North Entering: 137

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	1	0	1
Trucks	0	1	1	2
Cars	19	76	39	134
Totals	19	78	40	



Heavys 1

Trucks 4

Cars 71

Totals 76

East Leg Total: 424

East Entering: 194

East Peds: 0

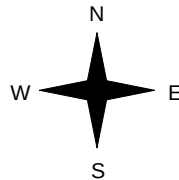
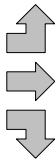
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
1	2	175	178



Sixth St

Heavys	Trucks	Cars	Totals
0	1	8	9
0	1	162	163
1	2	80	83
1	4	250	



Tenth Line

Cars	Trucks	Heavys	Totals
22	0	1	23
124	0	0	124
46	1	0	47
192	1	1	

Sixth St



Cars	Trucks	Heavys	Totals
227	3	0	230

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 255

West Leg Total: 433

Cars	202
Trucks	4
Heavys	2
Totals	208



Cars	32	41	26	99
Trucks	2	3	1	6
Heavys	1	0	0	1
Totals	35	44	27	

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 106

South Leg Total: 314

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000019

Intersection: Poplar Sideroad & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E

North Leg Total: 299

North Entering: 100

North Peds: 0

Peds Cross: 0

Heavys	0	1	2	3
Trucks	0	1	2	3
Cars	14	28	52	94
Totals	14	30	56	

Heavys	3
Trucks	8
Cars	188
Totals	199

East Leg Total: 387

East Entering: 222

East Peds: 0

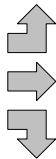
Peds Cross: 0

Heavys	Trucks	Cars	Totals
1	18	105	124

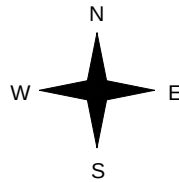


Poplar Sideroad

Heavys	Trucks	Cars	Totals
1	1	12	14
1	10	67	78
0	0	9	9
2	11	88	



Tenth Line



Cars	Trucks	Heavys	Totals
106	3	1	110
80	16	1	97
15	0	0	15
201	19	2	

Poplar Sideroad



Cars	Trucks	Heavys	Totals
147	12	6	165

Peds Cross: 0

West Peds: 0

West Entering: 101

West Leg Total: 225

Cars	52	Cars	11	70	28	109
Trucks	1	Trucks	2	4	0	6
Heavys	1	Heavys	0	1	3	4
Totals	54	Totals	13	75	31	



Tenth Line

Peds Cross: 0

South Peds: 0

South Entering: 119

South Leg Total: 173

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 15:15:00

To: 16:15:00

Municipality: Collingwood

Site #: 1842000019

Intersection: Poplar Sideroad & Tenth Line

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E

North Leg Total: 282

North Entering: 167

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	1	2	1	4
Trucks	0	0	5	5
Cars	19	73	66	158
Totals	20	75	72	



Heavys 4

Trucks 5

Cars 106

Totals 115

East Leg Total: 299

East Entering: 133

East Peds: 0

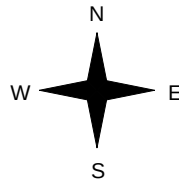
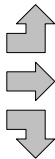
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
4	10	73	87



Poplar Sideroad

Heavys	Trucks	Cars	Totals
3	1	9	13
1	15	68	84
0	0	14	14
4	16	91	



Tenth Line

Cars	Trucks	Heavys	Totals
44	4	0	48
46	10	3	59
23	0	3	26
113	14	6	

Poplar Sideroad



Cars	Trucks	Heavys	Totals
144	20	2	166

Peds Cross: $\nlessgtr$

West Peds: 0

West Entering: 111

West Leg Total: 198

Cars	110
Trucks	0
Heavys	5
Totals	115



Cars	8	53	10	71
Trucks	0	0	0	0
Heavys	0	1	0	1
Totals	8	54	10	

Peds Cross: $\nlessgtr$

South Peds: 0

South Entering: 72

South Leg Total: 187

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 1842000020

Intersection: Poplar Sideroad & Raglan St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E

North Leg Total: 274

North Entering: 64

North Peds: 0

Peds Cross: 0

Heavys	1	0	1
Trucks	4	1	5
Cars	50	8	58
Totals	55	9	

Heavys	15
Trucks	8
Cars	187
Totals	210

East Leg Total: 833

East Entering: 512

East Peds: 0

Peds Cross: 0

Heavys	Trucks	Cars	Totals
14	12	475	501

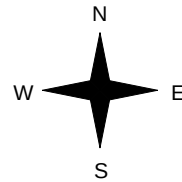


Poplar Sideroad

Heavys	Trucks	Cars	Totals
14	2	128	144
12	11	289	312
26	13	417	



Raglan St



Cars	Trucks	Heavys	Totals
59	6	1	66
425	8	13	446
484	14	14	

Poplar Sideroad



Cars	Trucks	Heavys	Totals
297	12	12	321

Peds Cross: 0

West Peds: 0

West Entering: 456

West Leg Total: 957

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 1842000020

Intersection: Poplar Sideroad & Raglan St

TFR File #: 1

Count date: 12-Dec-18

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E

North Leg Total: 278

North Entering: 177

North Peds: 0

Peds Cross: 0

Heavys	Trucks	Cars	Totals
1	3	126	130
0	1	46	47
1	4	172	



Heavys	Trucks	Cars	Totals
4	16	81	101

East Leg Total: 870

East Entering: 368

East Peds: 0

Peds Cross: 0

Heavys	Trucks	Cars	Totals
1	7	448	456

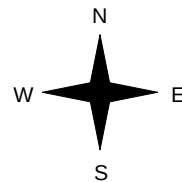


Poplar Sideroad

Heavys	Trucks	Cars	Totals
3	13	43	59
1	16	438	455
4	29	481	



Raglan St



Cars	Trucks	Heavys	Totals
38	3	1	42
322	4	0	326
360	7	1	



Poplar Sideroad



Cars	Trucks	Heavys	Totals
484	17	1	502

Peds Cross: 0

West Peds: 0

West Entering: 514

West Leg Total: 970

Comments



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Existing (2019) Traffic Operations (Synchro)

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2019 Existing AM

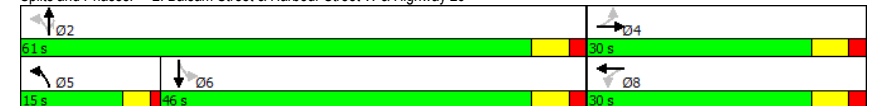
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	49	16	0	3	50	425	4	0	522	20
Future Volume (Veh/h)	20	0	49	16	0	3	50	425	4	0	522	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	23	0	56	18	0	3	57	483	5	0	593	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1193	1195	593	1246	1213	483	616			488		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
VCu, unblocked vol	1193	1195	593	1246	1213	483	616			488		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	100	89	86	100	99	94			100		
cM capacity (veh/h)	157	177	498	129	172	588	954			1086		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	79	21	57	483	5	0	593	23				
Volume Left	23	18	57	0	0	0	0	0				
Volume Right	56	3	0	0	5	0	0	23				
cSH	305	145	954	1700	1700	1700	1700	1700				
Volume to Capacity	0.26	0.14	0.06	0.28	0.00	0.00	0.35	0.01				
Queue Length 95th (m)	7.7	3.7	1.4	0.0	0.0	0.0	0.0	0.0				
Control Delay (s)	20.9	34.0	9.0	0.0	0.0	0.0	0.0	0.0				
Lane LOS	C	D	A									
Approach Delay (s)	20.9	34.0	0.9			0.0						
Approach LOS	C	D										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			44.7%			ICU Level of Service				A		
Analysis Period (min)			15									

Timings
2: Balsam Street & Harbour Street W & Highway 26

2019 Existing AM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	1	2	46	3	62	527	66	5	605
Future Volume (vph)	1	2	46	3	62	527	66	5	605
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max		Max	Max	Max
Act Effct Green (s)	9.3	9.3	9.3	9.3		55.5	57.0		40.4
Actuated g/C Ratio	0.13	0.13	0.13	0.13		0.76	0.78		0.55
v/c Ratio	0.01	0.35	0.33	0.09		0.31	0.06		0.39
Control Delay	29.0	11.5	36.3	17.8		3.9	2.3		11.3
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.0	11.5	36.3	17.8		3.9	2.3		11.3
LOS	C	B	D	B		A	A		B
Approach Delay		11.7		31.5		3.7			11.3
Approach LOS		B		C		A			B
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 73.5									
Natural Cycle: 75									
Control Type: Semi Act-Uncoord									
Maximum v/c Ratio: 0.39									
Intersection Signal Delay: 8.7					Intersection LOS: A				
Intersection Capacity Utilization 88.3%					ICU Level of Service E				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2019 Existing AM

2: Balsam Street & Harbour Street W & Highway 26

	↖	→	↘	←	↑	↙	↓
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	98	54	19	693	78	719
v/c Ratio	0.01	0.35	0.33	0.09	0.31	0.06	0.39
Control Delay	29.0	11.5	36.3	17.8	3.9	2.3	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	11.5	36.3	17.8	3.9	2.3	11.3
Queue Length 50th (m)	0.1	0.3	7.3	0.5	13.8	1.3	29.9
Queue Length 95th (m)	1.3	11.0	16.4	5.6	22.1	4.7	42.6
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	471	577	430	532	2249	1273	1849
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.17	0.13	0.04	0.31	0.06	0.39
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2019 Existing AM

2: Balsam Street & Harbour Street W & Highway 26

	↖	→	↘	←	↑	↙	↓	↖	→	↘	←	↑	↙	↓	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations	↖	↘		↖	↘			↖	↘	↖	↘	↖			
Traffic Volume (vph)	1	2	82	46	3	13	62	527	66	5	605	1			
Future Volume (vph)	1	2	82	46	3	13	62	527	66	5	605	1			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0			6.0			
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00			0.95			
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00			1.00			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00			1.00			
Frt	1.00	0.85		1.00	0.88			1.00	0.85			1.00			
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00			1.00			
Satd. Flow (prot)	1825	1554		1784	1584			3488	1633			3543			
Flt Permitted	0.75	1.00		0.69	1.00			0.82	1.00			0.95			
Satd. Flow (perm)	1431	1554		1303	1584			2878	1633			3366			
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85			
Adj. Flow (vph)	1	2	96	54	4	15	73	620	78	6	712	1			
RTOR Reduction (vph)	0	87	0	0	14	0	0	0	9	0	0	0			
Lane Group Flow (vph)	1	11	0	54	5	0	0	693	69	0	719	0			
Confl. Peds. (#/hr)			1	1											
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%			
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA				
Protected Phases		4			8		5	2			6				
Permitted Phases	4			8			2		2	6					
Actuated Green, G (s)	7.3	7.3		7.3	7.3			55.5	55.5		40.4				
Effective Green, g (s)	7.3	7.3		7.3	7.3			55.5	55.5		40.4				
Actuated g/C Ratio	0.10	0.10		0.10	0.10			0.74	0.74		0.54				
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)	139	151		127	154			2225	1211		1818				
v/s Ratio Prot		0.01			0.00			c0.05							
v/s Ratio Perm	0.00			c0.04				0.18	0.04		c0.21				
v/c Ratio	0.01	0.08		0.43	0.04			0.31	0.06		0.40				
Uniform Delay, d1	30.5	30.7		31.8	30.6			3.2	2.6		10.1				
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	0.0	0.2		2.3	0.1			0.4	0.1		0.6				
Delay (s)	30.5	30.9		34.1	30.7			3.6	2.7		10.7				
Level of Service	C	C		C	C			A	A		B				
Approach Delay (s)		30.9			33.2			3.5			10.7				
Approach LOS		C			C			A			B				
Intersection Summary															
HCM 2000 Control Delay			9.6												
HCM 2000 Volume to Capacity ratio			0.39												
Actuated Cycle Length (s)			74.8								16.0				
Intersection Capacity Utilization			88.3%								E				
Analysis Period (min)			15												

c Critical Lane Group

Timings 2019 Existing AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	18	0	21	3	32	645	3	714
Future Volume (vph)	18	0	21	3	32	645	3	714
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.3	10.3		10.3	53.5	54.3	52.8	52.4
Actuated g/C Ratio	0.16	0.16		0.16	0.84	0.85	0.83	0.82
v/c Ratio	0.08	0.02		0.12	0.07	0.26	0.01	0.31
Control Delay	26.6	0.1		24.7	2.4	4.0	2.7	5.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	0.1		24.7	2.4	4.0	2.7	5.4
LOS	C	A		C	A	A	A	A
Approach Delay		17.7		24.7		3.9		5.4
Approach LOS		B		C		A		A

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 63.8
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.31
Intersection Signal Delay: 5.3
Intersection Capacity Utilization 52.5%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service A

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

↰ Ø1	↱ Ø2	↰ Ø4
15 s	47 s	22 s
↰ Ø5	↱ Ø6	↰ Ø8
15 s	47 s	22 s

Queues 2019 Existing AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	11	33	39	778	4	887
v/c Ratio	0.08	0.02	0.12	0.07	0.26	0.01	0.31
Control Delay	26.6	0.1	24.7	2.4	4.0	2.7	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	0.1	24.7	2.4	4.0	2.7	5.4
Queue Length 50th (m)	1.5	0.0	1.9	0.3	0.0	0.0	0.0
Queue Length 95th (m)	8.0	0.0	10.0	2.9	36.8	0.7	42.9
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	441	652	438	666	2988	784	2890
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.02	0.08	0.06	0.26	0.01	0.31

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Balsam Street & CT Entrance/Plaza Access

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	18	0	9	21	3	3	32	645	1	3	714	22
Future Volume (vph)	18	0	9	21	3	3	32	645	1	3	714	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frft	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1629		1705	3509		1825	3518	
Flt Permitted	1.00	1.00			1.00		0.30	1.00		0.36	1.00	
Satd. Flow (perm)	1715	1633			1690		543	3509		686	3518	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	22	0	11	25	4	4	39	777	1	4	860	27
RTOR Reduction (vph)	0	10	0	0	4	0	0	0	0	0	2	0
Lane Group Flow (vph)	22	1	0	0	29	0	39	778	0	4	885	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	3.4	3.4			3.4		52.6	50.2		50.2	49.0	
Effective Green, g (s)	3.4	3.4			3.4		52.6	50.2		50.2	49.0	
Actuated g/C Ratio	0.05	0.05			0.05		0.74	0.71		0.71	0.69	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	82	78			81		442	2488		505	2434	
v/s Ratio Prot		0.00					0.00	0.22		0.00	0.25	
v/s Ratio Perm	0.01				0.02		0.06			0.01		
v/c Ratio	0.27	0.01			0.36		0.09	0.31		0.01	0.36	
Uniform Delay, d1	32.5	32.1			32.6		2.5	3.9		3.0	4.5	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.0			2.7		0.1	0.3		0.0	0.4	
Delay (s)	34.3	32.1			35.4		2.5	4.2		3.0	4.9	
Level of Service	C	C			D		A	A		A	A	
Approach Delay (s)		33.6			35.4			4.1			4.9	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings

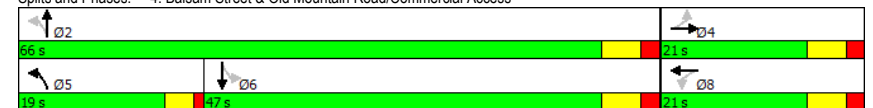
4: Balsam Street & Old Mountain Road/Commercial Access

2019 Existing AM

Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	23	0	0	56	673	696
Future Volume (vph)	23	0	0	56	673	696
Turn Type	Perm	NA	NA	pm+pt	NA	NA
Protected Phases		4	8	5	2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	5	2	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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	4.0	6.0	6.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	10.1	10.1	10.1	65.4	65.9	59.6
Actuated g/C Ratio	0.13	0.13	0.13	0.83	0.84	0.76
v/c Ratio	0.16	0.07	0.00	0.13	0.29	0.34
Control Delay	34.4	0.2	0.0	2.8	3.0	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	0.2	0.0	2.8	3.0	6.7
LOS	C	A	A	A	A	A
Approach Delay		15.4			3.0	6.7
Approach LOS		B			A	A

Intersection Summary	
Cycle Length: 87	
Actuated Cycle Length: 78.6	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 5.2	Intersection LOS: A
Intersection Capacity Utilization 64.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

4: Balsam Street & Old Mountain Road/Commercial Access

2019 Existing AM

	↖	→	←	↙	↑	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	28	35	1	69	833	901
v/c Ratio	0.16	0.07	0.00	0.13	0.29	0.34
Control Delay	34.4	0.2	0.0	2.8	3.0	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	0.2	0.0	2.8	3.0	6.7
Queue Length 50th (m)	4.0	0.0	0.0	2.1	19.4	36.0
Queue Length 95th (m)	10.3	0.0	0.0	4.2	22.5	41.6
Internal Link Dist (m)	175.6		57.5	179.2		181.9
Turn Bay Length (m)			70.0			
Base Capacity (vph)	265	601	392	653	2914	2666
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	0.11	0.06	0.00	0.11	0.29	0.34
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

4: Balsam Street & Old Mountain Road/Commercial Access

2019 Existing AM

	↖	→	↙	↘	←	↖	↙	↑	↘	↗	↓	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Traffic Volume (vph)	23	0	28	0	0	1	56	673	2	0	696	34
Future Volume (vph)	23	0	28	0	0	1	56	673	2	0	696	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95			0.95	
Flpb, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.85			0.86		1.00	1.00			0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1723	1606			1085		1721	3471			3515	
Flt Permitted	0.76	1.00			1.00		0.28	1.00			1.00	
Satd. Flow (perm)	1374	1606			1085		505	3471			3515	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	28	0	35	0	0	1	69	831	2	0	859	42
RTOR Reduction (vph)	0	33	0	0	1	0	0	0	0	0	2	0
Lane Group Flow (vph)	28	2	0	0	0	0	69	833	0	0	899	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.8	5.8			5.8		65.1	65.1			57.0	
Effective Green, g (s)	5.8	5.8			5.8		65.1	65.1			57.0	
Actuated g/C Ratio	0.07	0.07			0.07		0.79	0.79			0.69	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	96	112			75		456	2725			2416	
v/s Ratio Prot		0.00			0.00		0.01	c0.24			c0.26	
v/s Ratio Perm	c0.02						0.11					
v/c Ratio	0.29	0.02			0.00		0.15	0.31			0.37	
Uniform Delay, d1	36.6	35.9			35.9		2.4	2.5			5.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.7	0.1			0.0		0.2	0.3			0.4	
Delay (s)	38.3	36.0			35.9		2.5	2.8			5.9	
Level of Service	D	D			D		A	A			A	
Approach Delay (s)		37.0			35.9			2.8			5.9	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay			5.4								A	
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			82.9				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			64.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
5: High Street/Balsam Street & First Street Ext/First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	14	184	78	263	400	107	330	400	316
Future Volume (vph)	14	184	78	263	400	107	330	400	316
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.2	15.9	28.8	22.2	49.3	20.9	20.9	26.6	26.6
Actuated g/C Ratio	0.26	0.17	0.31	0.24	0.52	0.22	0.22	0.28	0.28
v/c Ratio	0.06	0.51	0.27	0.38	0.52	0.32	0.67	0.64	0.65
Control Delay	25.3	36.0	27.2	34.1	6.1	34.8	36.8	39.1	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	36.0	27.2	34.1	6.1	34.8	36.8	39.1	34.6
LOS	C	D	C	C	A	C	D	D	C
Approach Delay		35.4		18.3			36.4		36.0
Approach LOS		D		B			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 94.1

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 30.3

Intersection LOS: C

Intersection Capacity Utilization 67.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↰ Ø3	↱ Ø4
35.5 s	35.5 s	11 s	38 s
		↰ Ø7	↱ Ø8
		14 s	35 s

Queues
5: High Street/Balsam Street & First Street Ext/First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	17	311	95	321	488	130	522	293	600
v/c Ratio	0.06	0.51	0.27	0.38	0.52	0.32	0.67	0.64	0.65
Control Delay	25.3	36.0	27.2	34.1	6.1	34.8	36.8	39.1	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	36.0	27.2	34.1	6.1	34.8	36.8	39.1	34.6
Queue Length 50th (m)	2.2	25.2	12.9	25.1	13.6	21.3	46.1	53.1	54.2
Queue Length 95th (m)	6.8	36.8	24.1	41.4	28.0	34.6	57.8	83.6	73.6
Internal Link Dist (m)		178.2		250.8		206.8		179.2	
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	308	1060	363	1195	971	570	1100	508	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.29	0.26	0.27	0.50	0.23	0.47	0.58	0.58

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	14	184	71	78	263	400	107	330	98	400	316	16
Future Volume (vph)	14	184	71	78	263	400	107	330	98	400	316	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1686	3378		1823	3544	1530	1807	3419		1612	3284	
Flt Permitted	0.56	1.00		0.44	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	989	3378		835	3544	1530	1807	3419		1612	3284	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	17	224	87	95	321	488	130	402	120	488	385	20
RTOR Reduction (vph)	0	36	0	0	0	142	0	24	0	0	2	0
Lane Group Flow (vph)	17	275	0	95	321	346	130	498	0	293	598	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	20.0	17.5		28.7	22.2	48.8	20.9	20.9		26.6	26.6	
Effective Green, g (s)	20.0	17.5		28.7	22.2	48.8	20.9	20.9		26.6	26.6	
Actuated g/C Ratio	0.21	0.18		0.30	0.23	0.51	0.22	0.22		0.28	0.28	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	223	614		323	817	776	392	742		445	908	
v/s Ratio Prot	0.00	0.08		c0.02	0.09	c0.12	0.07	c0.15		0.18	c0.18	
v/s Ratio Perm	0.01			0.07		0.10						
v/c Ratio	0.08	0.45		0.29	0.39	0.45	0.33	0.67		0.66	0.66	
Uniform Delay, d1	30.5	35.0		25.1	31.3	15.1	31.8	34.5		30.8	30.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.5		0.5	0.3	0.4	0.5	2.4		3.5	1.7	
Delay (s)	30.6	35.6		25.6	31.6	15.5	32.3	36.9		34.3	32.5	
Level of Service	C	D		C	B	C	D	D		C	C	
Approach Delay (s)		35.3			22.3			36.0			33.1	
Approach LOS		D			C			D			C	

Intersection Summary

HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	96.2	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2019 Existing AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	4	676	16	757	5	2	12	4
Future Volume (vph)	4	676	16	757	5	2	12	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.8	90.6	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.86	0.84	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.01	0.27	0.03	0.30	0.05	0.17	0.11	0.05
Control Delay	2.0	4.0	1.9	3.4	45.6	20.3	47.2	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.0	1.9	3.4	45.6	20.3	47.2	36.4
LOS	A	A	A	A	D	C	D	D
Approach Delay		4.0		3.3		24.6		42.9
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 4.6
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	811	19	911	6	29	14	9
v/c Ratio	0.01	0.27	0.03	0.30	0.05	0.17	0.11	0.05
Control Delay	2.0	4.0	1.9	3.4	45.6	20.3	47.2	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.0	1.9	3.4	45.6	20.3	47.2	36.4
Queue Length 50th (m)	0.2	18.5	0.6	21.6	1.2	0.4	2.8	1.0
Queue Length 95th (m)	0.7	36.4	1.5	42.1	4.8	8.0	8.4	5.3
Internal Link Dist (m)	250.8		336.7		166.8		215.7	
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	587	2990	628	3006	333	379	325	415
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	0.01	0.27	0.03	0.30	0.02	0.08	0.04	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2019 Existing AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	4	676	5	16	757	8	5	2	23	12	4	3
Future Volume (vph)	4	676	5	16	757	8	5	2	23	12	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3569		1825	3505		1815	1523		1778	1779	
Flt Permitted	0.31	1.00		0.33	1.00		0.75	1.00		0.74	1.00	
Satd. Flow (perm)	592	3569		638	3505		1437	1523		1382	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	5	805	6	19	901	10	6	2	27	14	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	26	0	0	4	0
Lane Group Flow (vph)	5	811	0	19	911	0	6	3	0	14	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.78	0.77		0.81	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	480	2753		547	2749		79	84		76	98	
v/s Ratio Prot	0.00	0.23		c0.00	c0.26			0.00			0.00	
v/s Ratio Perm	0.01			0.03			0.00			c0.01		
v/c Ratio	0.01	0.29		0.03	0.33		0.08	0.04		0.18	0.05	
Uniform Delay, d1	2.5	3.7		2.0	3.4		48.4	48.3		48.7	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.0	0.3		0.4	0.2		1.2	0.2	
Delay (s)	2.5	3.9		2.0	3.7		48.8	48.5		49.9	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		3.9			3.7			48.6			49.4	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			5.2			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.32									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)			15.9			
Intersection Capacity Utilization			62.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	47	632	9	653	25	34	78	28
Future Volume (vph)	47	632	9	653	25	34	78	28
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	77.4	74.2	74.2	67.9	12.1	12.1	12.1	12.1
Actuated g/C Ratio	0.77	0.74	0.74	0.68	0.12	0.12	0.12	0.12
v/c Ratio	0.10	0.29	0.02	0.32	0.30	0.27	0.56	0.56
Control Delay	3.6	5.5	1.4	4.4	46.2	29.3	53.7	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	5.5	1.4	4.4	46.2	29.3	53.7	17.0
LOS	A	A	A	A	D	C	D	B
Approach Delay		5.3		4.4		34.6		29.3
Approach LOS		A		A		C		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 9.7

Intersection LOS: A

Intersection Capacity Utilization 53.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	768	10	766	29	63	91	181
v/c Ratio	0.10	0.29	0.02	0.32	0.30	0.27	0.56	0.56
Control Delay	3.6	5.5	1.4	4.4	46.2	29.3	53.7	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	5.5	1.4	4.4	46.2	29.3	53.7	17.0
Queue Length 50th (m)	1.9	19.2	0.3	3.4	5.2	7.1	16.9	5.8
Queue Length 95th (m)	5.3	43.8	m0.3	34.5	12.6	16.8	29.2	21.4
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	552	2617	578	2377	194	441	323	499
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	0.10	0.29	0.02	0.32	0.15	0.14	0.28	0.36

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2019 Existing AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	47	632	28	9	653	6	25	34	20	78	28	127
Future Volume (vph)	47	632	28	9	653	6	25	34	20	78	28	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3522		1825	3500		1752	1760		1770	1613	
Flt Permitted	0.32	1.00		0.36	1.00		0.44	1.00		0.72	1.00	
Satd. Flow (perm)	618	3522		693	3500		811	1760		1334	1613	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	55	735	33	10	759	7	29	40	23	91	33	148
RTOR Reduction (vph)	0	2	0	0	0	0	0	20	0	0	130	0
Lane Group Flow (vph)	55	766	0	10	766	0	29	43	0	91	51	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	76.1	71.0		68.3	67.1		12.1	12.1		12.1	12.1	
Effective Green, g (s)	76.1	71.0		68.3	67.1		12.1	12.1		12.1	12.1	
Actuated g/C Ratio	0.76	0.71		0.68	0.67		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	531	2500		486	2348		98	212		161	195	
v/s Ratio Prot	c0.01	c0.22		0.00	c0.22		0.02			0.03		
v/s Ratio Perm	0.07			0.01			0.04			c0.07		
v/c Ratio	0.10	0.31		0.02	0.33		0.30	0.20		0.57	0.26	
Uniform Delay, d1	3.3	5.4		5.1	6.9		40.1	39.6		41.5	39.9	
Progression Factor	1.00	1.00		0.40	0.54		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		0.0	0.3		1.7	0.5		4.5	0.7	
Delay (s)	3.4	5.7		2.0	4.1		41.8	40.1		46.0	40.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		5.5			4.0			40.6			42.4	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	26	549	18	733	96	13	33	25
Future Volume (vph)	26	549	18	733	96	13	33	25
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.7	63.1	66.9	60.9	20.8	13.3	17.5	10.2
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.21	0.13	0.18	0.10
v/c Ratio	0.07	0.32	0.04	0.41	0.42	0.12	0.15	0.33
Control Delay	4.4	8.9	4.7	9.4	35.9	27.7	30.2	25.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.4	8.9	4.7	9.5	35.9	27.7	30.2	25.9
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.7		9.4		34.2		27.4
Approach LOS		A		A		C		C

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 12.0	Intersection LOS: B
Intersection Capacity Utilization 48.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Pine Street & First Street

01	02	03	04
11 s	50 s	13 s	26 s
05	06 (R)	07	08
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	31	706	21	871	113	29	39	69
v/c Ratio	0.07	0.32	0.04	0.41	0.42	0.12	0.15	0.33
Control Delay	4.4	8.9	4.7	9.4	35.9	27.7	30.2	25.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.4	8.9	4.7	9.5	35.9	27.7	30.2	25.9
Queue Length 50th (m)	1.7	35.3	0.9	61.6	17.6	2.6	5.8	5.2
Queue Length 95th (m)	2.1	41.7	2.4	37.8	29.8	10.2	13.0	16.3
Internal Link Dist (m)	579.7		117.0		406.4		46.5	
Turn Bay Length (m)	50.0		40.0		25.0			
Base Capacity (vph)	441	2203	484	2135	266	358	286	377
Starvation Cap Reductn	0	0	0	324	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	0.07	0.32	0.04	0.48	0.42	0.08	0.14	0.18
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2019 Existing AM

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 				 	
Traffic Volume (vph)	26	549	51	18	733	8	96	13	12	33	25	34	
Future Volume (vph)	26	549	51	18	733	8	96	13	12	33	25	34	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00		
Frt	1.00	0.99		1.00	1.00		1.00	0.93		1.00	0.91		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1823	3484		1629	3504		1735	1689		1711	1729		
Flt Permitted	0.27	1.00		0.36	1.00		0.49	1.00		0.74	1.00		
Satd. Flow (perm)	519	3484		618	3504		888	1689		1330	1729		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Adj. Flow (vph)	31	646	60	21	862	9	113	15	14	39	29	40	
RTOR Reduction (vph)	0	5	0	0	0	0	0	12	0	0	37	0	
Lane Group Flow (vph)	31	701	0	21	871	0	113	17	0	39	32	0	
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3	
Confl. Bikes (#/hr)			1						1			1	
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA		
Protected Phases	5	2		1	6		7	4		3	8		
Permitted Phases	2			6			4			8			
Actuated Green, G (s)	63.3	59.1		60.5	57.7		22.2	13.3		13.5	8.6		
Effective Green, g (s)	63.3	59.1		60.5	57.7		22.2	13.3		13.5	8.6		
Actuated g/C Ratio	0.63	0.59		0.60	0.58		0.22	0.13		0.14	0.09		
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	383	2059		402	2021		278	224		198	148		
v/s Ratio Prot	c0.00	0.20		0.00	c0.25		c0.04	0.01		0.01	0.02		
v/s Ratio Perm	0.05			0.03			c0.05			0.02			
v/c Ratio	0.08	0.34		0.05	0.43		0.41	0.08		0.20	0.22		
Uniform Delay, d1	7.4	10.5		8.0	11.9		32.5	38.0		38.3	42.6		
Progression Factor	0.71	0.86		0.77	0.75		1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.4		0.1	0.6		1.0	0.1		0.5	0.7		
Delay (s)	5.3	9.4		6.2	9.5		33.4	38.1		38.8	43.3		
Level of Service	A	A		A	A		C	D		D	D		
Approach Delay (s)	9.3			9.4			34.4			41.7			
Approach LOS	A			A			C			D			
Intersection Summary													
HCM 2000 Control Delay	13.1			HCM 2000 Level of Service					B				
HCM 2000 Volume to Capacity ratio	0.42												
Actuated Cycle Length (s)	100.0			Sum of lost time (s)					19.9				
Intersection Capacity Utilization	48.6%			ICU Level of Service					A				
Analysis Period (min)	15												
c Critical Lane Group													

Timings

2019 Existing AM

9: Hurontario Street & First Street/Huron Street

	↖	→	↗	←	↖	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↖	↖↗	↖	↖↗	↖	↖
Traffic Volume (vph)	21	504	36	628	138	18
Future Volume (vph)	21	504	36	628	138	18
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	73.4	67.7	74.5	69.8	14.4	14.4
Actuated g/C Ratio	0.73	0.68	0.74	0.70	0.14	0.14
v/c Ratio	0.05	0.29	0.07	0.31	0.64	0.21
Control Delay	1.5	2.0	4.0	7.4	50.9	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	2.0	4.0	7.4	50.9	19.0
LOS	A	A	A	A	D	B
Approach Delay		2.0		7.3		42.4
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 9.6

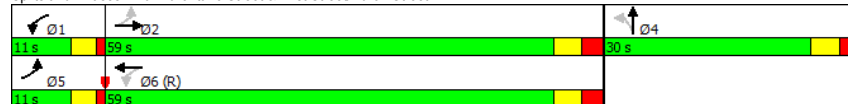
Intersection LOS: A

Intersection Capacity Utilization 42.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues

2019 Existing AM

9: Hurontario Street & First Street/Huron Street

	↖	→	↗	←	↖	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	25	681	43	775	164	59
v/c Ratio	0.05	0.29	0.07	0.31	0.64	0.21
Control Delay	1.5	2.0	4.0	7.4	50.9	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	2.0	4.0	7.4	50.9	19.0
Queue Length 50th (m)	0.3	5.3	1.7	21.9	30.3	3.6
Queue Length 95th (m)	1.0	6.2	4.8	46.8	44.2	12.3
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	497	2367	609	2464	438	446
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	0.05	0.29	0.07	0.31	0.37	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	21	504	68	36	628	23	138	18	32	0	0	0
Future Volume (vph)	21	504	68	36	628	23	138	18	32	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.98		1.00	0.99		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3487		1824	3526		1792	1709				
Flt Permitted	0.35	1.00		0.37	1.00		0.95	1.00				
Satd. Flow (perm)	578	3487		712	3526		1792	1709				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	25	600	81	43	748	27	164	21	38	0	0	0
RTOR Reduction (vph)	0	7	0	0	2	0	0	33	0	0	0	0
Lane Group Flow (vph)	25	674	0	43	773	0	164	26	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	68.7	66.1		71.3	67.4		14.4	14.4				
Effective Green, g (s)	68.7	66.1		71.3	67.4		14.4	14.4				
Actuated g/C Ratio	0.69	0.66		0.71	0.67		0.14	0.14				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	423	2304		551	2376		258	246				
v/s Ratio Prot	0.00	0.19		c0.00	c0.22			0.02				
v/s Ratio Perm	0.04			0.05			c0.09					
v/c Ratio	0.06	0.29		0.08	0.33		0.64	0.11				
Uniform Delay, d1	5.0	7.1		4.3	6.8		40.3	37.2				
Progression Factor	0.33	0.23		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	0.3		0.1	0.4		5.1	0.2				
Delay (s)	1.7	2.0		4.4	7.2		45.4	37.4				
Level of Service	A	A		A	A		D	D				
Approach Delay (s)		2.0			7.0		43.3			0.0		
Approach LOS		A			A		D			A		

Intersection Summary

HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

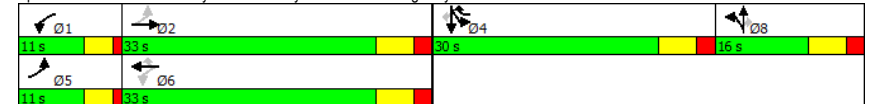
2019 Existing AM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	92	188	6	364	678	9	22	13	228	32	53
Future Volume (vph)	92	188	6	364	678	9	22	13	228	32	53
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	33.0	11.0	33.0	30.0	16.0	16.0	16.0	30.0	30.0	30.0
Total Split (%)	12.2%	36.7%	12.2%	36.7%	33.3%	17.8%	17.8%	17.8%	33.3%	33.3%	33.3%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	38.3	35.0	35.9	28.6	45.7	10.6	10.6	10.6	17.1	17.1	17.1
Actuated g/C Ratio	0.51	0.47	0.48	0.38	0.61	0.14	0.14	0.14	0.23	0.23	0.23
v/c Ratio	0.23	0.14	0.01	0.57	0.62	0.04	0.10	0.05	0.39	0.38	0.13
Control Delay	14.3	15.3	13.7	27.1	3.6	35.8	36.1	0.3	29.9	29.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	15.3	13.7	27.1	3.6	35.8	36.1	0.3	29.9	29.6	0.6
LOS	B	B	B	C	A	D	D	A	C	C	A
Approach Delay		15.0		11.8			25.3			24.8	
Approach LOS		B		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 74.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 15.1	Intersection LOS: B
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2019 Existing AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	231	7	409	762	10	25	15	146	146	60
v/c Ratio	0.23	0.14	0.01	0.57	0.62	0.04	0.10	0.05	0.39	0.38	0.13
Control Delay	14.3	15.3	13.7	27.1	3.6	35.8	36.1	0.3	29.9	29.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	15.3	13.7	27.1	3.6	35.8	36.1	0.3	29.9	29.6	0.6
Queue Length 50th (m)	8.8	10.4	0.6	56.4	3.9	1.5	3.6	0.0	21.3	21.2	0.0
Queue Length 95th (m)	19.3	23.4	3.0	93.7	16.0	6.1	11.2	0.0	37.7	37.5	0.0
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)			60.0		15.0		15.0		70.0		
Base Capacity (vph)	440	1647	533	717	1295	232	246	306	559	574	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.14	0.01	0.57	0.59	0.04	0.10	0.05	0.26	0.25	0.10

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2019 Existing AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	92	188	18	6	364	678	9	22	13	228	32	53
Future Volume (vph)	92	188	18	6	364	678	9	22	13	228	32	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3513		1558	1883	1564	1644	1746	1207	1651	1695	1512
Flt Permitted	0.33	1.00		0.61	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	636	3513		997	1883	1564	1644	1746	1207	1651	1695	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	103	211	20	7	409	762	10	25	15	256	36	60
RTOR Reduction (vph)	0	6	0	0	0	280	0	0	14	0	0	47
Lane Group Flow (vph)	103	225	0	7	409	482	10	25	1	146	146	13
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	40.2	35.0		32.1	30.9	48.0	5.1	5.1	5.1	17.1	17.1	17.1
Effective Green, g (s)	40.2	35.0		32.1	30.9	48.0	5.1	5.1	5.1	17.1	17.1	17.1
Actuated g/C Ratio	0.50	0.44		0.40	0.38	0.60	0.06	0.06	0.06	0.21	0.21	0.21
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	395	1529		406	723	1050	104	110	76	351	360	321
v/s Ratio Prot	c0.02	0.06		0.00	c0.22	c0.10	0.01	c0.01		0.09	0.09	
v/s Ratio Perm	0.11			0.01		0.21			0.00			0.01
v/c Ratio	0.26	0.15		0.02	0.57	0.46	0.10	0.23	0.01	0.42	0.41	0.04
Uniform Delay, d1	11.8	13.7		14.6	19.5	9.0	35.5	35.8	35.3	27.3	27.3	25.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		0.0	3.2	0.3	0.4	1.1	0.1	0.8	0.7	0.1
Delay (s)	12.1	13.9		14.6	22.7	9.3	35.9	36.8	35.4	28.1	28.0	25.2
Level of Service	B	B		B	C	A	D	D	D	C	C	C
Approach Delay (s)	13.3			14.0			36.2			27.6		
Approach LOS	B			B			D			C		

Intersection Summary

HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.4	Sum of lost time (s)	22.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2019 Existing AM

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	0	0	102	694	104	257
Future Volume (vph)	3	0	0	102	694	104	257
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases		4		2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)	13.9	13.9	34.8	27.4	34.8	27.4	27.4
Actuated g/C Ratio	0.22	0.22	0.56	0.44	0.56	0.44	0.44
v/c Ratio	0.08	0.76	0.17	0.51	0.28	0.21	0.21
Control Delay	0.4	17.8	6.6	15.4	7.8	12.3	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	17.8	6.6	15.4	7.8	12.3	12.3
LOS	A	B	A	B	A	B	B
Approach Delay	0.4	17.8		14.3		11.1	
Approach LOS	A	B		B		B	

Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 61.9
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 14.2
 Intersection Capacity Utilization 63.5%
 Analysis Period (min) 15

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2019 Existing AM

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	437	117	800	120	315
v/c Ratio	0.08	0.76	0.17	0.51	0.28	0.21
Control Delay	0.4	17.8	6.6	15.4	7.8	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	17.8	6.6	15.4	7.8	12.3
Queue Length 50th (m)	0.0	16.3	4.4	33.8	4.5	10.9
Queue Length 95th (m)	0.0	41.0	12.3	56.5	12.6	21.1
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	458	717	678	1554	428	1508
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	0.06	0.61	0.17	0.51	0.28	0.21

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2019 Existing AM

11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	3	0	21	0	0	380	102	694	2	104	257	17
Future Volume (vph)	3	0	21	0	0	380	102	694	2	104	257	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.86		1.00	1.00		1.00	0.99	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1648			1613		1789	3505		1706	3389	
Flt Permitted		0.71			1.00		0.56	1.00		0.29	1.00	
Satd. Flow (perm)		1174			1613		1056	3505		519	3389	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	3	0	24	0	0	437	117	798	2	120	295	20
RTOR Reduction (vph)	0	21	0	0	217	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	6	0	0	220	0	117	800	0	120	309	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.8			13.8		32.7	27.4		32.7	27.4	
Effective Green, g (s)		13.8			13.8		32.7	27.4		32.7	27.4	
Actuated g/C Ratio		0.22			0.22		0.52	0.44		0.52	0.44	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		259			356		614	1536		372	1485	
v/s Ratio Prot					c0.14		0.02	c0.23		c0.03	0.09	
v/s Ratio Perm		0.01					0.08			0.14		
v/c Ratio		0.02			0.62		0.19	0.52		0.32	0.21	
Uniform Delay, d1		19.1			22.0		7.6	12.8		7.9	10.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			3.2		0.2	1.3		0.5	0.3	
Delay (s)		19.1			25.1		7.8	14.0		8.4	11.2	
Level of Service		B			C		A	B		A	B	
Approach Delay (s)		19.1			25.1			13.2			10.4	
Approach LOS		B			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		15.5			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.53										
Actuated Cycle Length (s)		62.5			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		63.5%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

2019 Existing AM

12: Tenth Line & Mountain Road

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	242	24	336	59	28	24	13
Future Volume (vph)	4	242	24	336	59	28	24	13
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		38.3		38.3		11.5		11.5
Actuated g/C Ratio		0.68		0.68		0.20		0.20
v/c Ratio		0.28		0.39		0.54		0.20
Control Delay		5.9		7.0		20.3		19.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		5.9		7.0		20.3		19.2
LOS		A		A		C		B
Approach Delay		5.9		7.0		20.3		19.2
Approach LOS		A		A		C		B
Intersection Summary								
Cycle Length: 60.2								
Actuated Cycle Length: 56.2								
Natural Cycle: 55								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.54								
Intersection Signal Delay: 9.6					Intersection LOS: A			
Intersection Capacity Utilization 52.2%					ICU Level of Service A			
Analysis Period (min) 15								

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2019 Existing AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	348	482	187	51
v/c Ratio	0.28	0.39	0.54	0.20
Control Delay	5.9	7.0	20.3	19.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.9	7.0	20.3	19.2
Queue Length 50th (m)	12.8	20.3	11.7	4.0
Queue Length 95th (m)	25.6	38.3	23.2	10.0
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1232	1234	435	335
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	0.28	0.39	0.43	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2019 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	242	36	24	336	30	59	28	64	24	13	4
Future Volume (vph)	4	242	36	24	336	30	59	28	64	24	13	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.94			0.99	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1810			1863			1695			1647	
Flt Permitted		0.99			0.97			0.85			0.73	
Satd. Flow (perm)		1801			1808			1469			1241	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	5	299	44	30	415	37	73	35	79	30	16	5
RTOR Reduction (vph)	0	7	0	0	4	0	0	49	0	0	4	0
Lane Group Flow (vph)	0	341	0	0	478	0	0	138	0	0	47	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		37.0			37.0			9.3			9.3	
Effective Green, g (s)		37.0			37.0			9.3			9.3	
Actuated g/C Ratio		0.65			0.65			0.16			0.16	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1164			1169			238			201	
v/s Ratio Prot												
v/s Ratio Perm		0.19			0.26			0.09			0.04	
v/c Ratio		0.29			0.41			0.58			0.23	
Uniform Delay, d1		4.4			4.8			22.2			20.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			1.1			3.6			0.6	
Delay (s)		5.0			5.9			25.7			21.4	
Level of Service		A			A			C			C	
Approach Delay (s)		5.0			5.9			25.7			21.4	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			9.8		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		57.2			Sum of lost time (s)					10.9		
Intersection Capacity Utilization		52.2%			ICU Level of Service					A		
Analysis Period (min)		15										
c Critical Lane Group												

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext 2019 Existing AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	27	260	44	352	28	38	21	14	21
Future Volume (vph)	27	260	44	352	28	38	21	14	21
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases		2	6		6	8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	31.2	31.2	50.5	50.7	50.7	14.4	14.0	7.8	7.8
Actuated g/C Ratio	0.46	0.46	0.74	0.74	0.74	0.21	0.21	0.11	0.11
v/c Ratio	0.07	0.22	0.07	0.29	0.03	0.16	0.16	0.09	0.25
Control Delay	16.1	13.9	5.9	7.9	0.0	22.4	13.9	33.3	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	13.9	5.9	7.9	0.0	22.4	13.9	33.3	22.7
LOS	B	B	A	A	A	C	B	C	C
Approach Delay		14.1		7.1			17.6		25.1
Approach LOS		B		A			B		C

Intersection Summary

Cycle Length: 93.6
Actuated Cycle Length: 68.1
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.29
Intersection Signal Delay: 11.9
Intersection Capacity Utilization 73.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø6	Ø8		
52.6 s	11 s		

Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext 2019 Existing AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	347	52	414	33	45	58	16	54
v/c Ratio	0.07	0.22	0.07	0.29	0.03	0.16	0.16	0.09	0.25
Control Delay	16.1	13.9	5.9	7.9	0.0	22.4	13.9	33.3	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	13.9	5.9	7.9	0.0	22.4	13.9	33.3	22.7
Queue Length 50th (m)	2.8	16.5	2.5	28.5	0.0	4.9	2.8	2.2	3.4
Queue Length 95th (m)	8.3	26.0	6.6	47.7	0.0	11.4	10.3	7.3	12.5
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	457	1588	782	1415	1236	372	907	484	518
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.22	0.07	0.29	0.03	0.12	0.06	0.03	0.10

Intersection Summary

HCM Signalized Intersection Capacity Analysis
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	27	260	35	44	352	28	38	21	28	14	21	25
Future Volume (vph)	27	260	35	44	352	28	38	21	28	14	21	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3455		1705	1902	1633	1770	1668		1572	1629	
Flt Permitted	0.52	1.00		0.48	1.00	1.00	0.49	1.00		0.95	1.00	
Satd. Flow (perm)	999	3455		865	1902	1633	909	1668		1576	1629	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	32	306	41	52	414	33	45	25	33	16	25	29
RTOR Reduction (vph)	0	9	0	0	0	12	0	27	0	0	27	0
Lane Group Flow (vph)	32	338	0	52	414	21	45	31	0	16	27	0
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	2			1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	31.4	31.4		46.8	46.8	46.8	12.3	12.3		4.2	4.2	
Effective Green, g (s)	31.4	31.4		46.8	46.8	46.8	12.3	12.3		4.2	4.2	
Actuated g/C Ratio	0.43	0.43		0.64	0.64	0.64	0.17	0.17		0.06	0.06	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	431	1492		688	1224	1051	202	282		91	94	
v/s Ratio Prot		0.10		0.01	0.22		0.01	0.02			0.02	
v/s Ratio Perm	0.03			0.04		0.01	0.03			0.01		
v/c Ratio	0.07	0.23		0.08	0.34	0.02	0.22	0.11		0.18	0.28	
Uniform Delay, d1	12.1	13.0		4.9	5.9	4.7	25.9	25.6		32.6	32.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		0.2	0.7	0.0	0.6	0.2		0.9	1.7	
Delay (s)	12.5	13.4		5.1	6.6	4.7	26.4	25.7		33.5	34.5	
Level of Service	B	B		A	A	A	C	C		C	C	
Approach Delay (s)		13.3			6.4			26.0			34.3	
Approach LOS		B			A			C			C	

Intersection Summary

HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	72.7	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
14: High Street & Third Street

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	4	0	3	14	0	67	1	515	53	65	375	3
Future Volume (Veh/h)	4	0	3	14	0	67	1	515	53	65	375	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	0	3	16	0	78	1	599	62	76	436	3
Pedestrians						9						
Lane Width (m)					3.7							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	969	1262	220	1014	1232	340	439			670		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	969	1262	220	1014	1232	340	439			670		
tC, single (s)	7.5	6.5	8.2	7.5	6.5	7.0	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	4.0	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	97	100	100	91	100	88	100			91		
cM capacity (veh/h)	172	155	618	179	161	643	1132			858		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	94	300	362	294	221
Volume Left	5	16	1	0	76	0
Volume Right	3	78	0	62	0	3
cSH	235	446	1132	1700	858	1700
Volume to Capacity	0.03	0.21	0.00	0.21	0.09	0.13
Queue Length 95th (m)	0.8	6.0	0.0	0.0	2.2	0.0
Control Delay (s)	20.8	15.2	0.0	0.0	3.2	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	20.8	15.2	0.0		1.8	
Approach LOS	C	C				

Intersection Summary

Average Delay	2.0					
Intersection Capacity Utilization	43.3%	ICU Level of Service	A			
Analysis Period (min)	15					

Timings
15: High Street & Sixth Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	75	198	20	126	105	370	78	217
Future Volume (vph)	75	198	20	126	105	370	78	217
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	19.4	19.4	19.4	19.4	34.5	26.4	33.4	25.8
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.51	0.39	0.50	0.38
v/c Ratio	0.36	0.70	0.15	0.54	0.21	0.37	0.19	0.25
Control Delay	24.1	28.0	20.8	21.1	9.5	17.4	9.6	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	28.0	20.8	21.1	9.5	17.4	9.6	16.2
LOS	C	C	C	C	A	B	A	B
Approach Delay		27.2		21.1		15.8		14.6
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 67.3

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 19.3

Intersection LOS: B

Intersection Capacity Utilization 65.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

	Ø1		Ø2		Ø4
19.5 s		30.9 s		33.8 s	
	Ø5		Ø6		Ø8
19.5 s		30.9 s		33.8 s	

Queues
15: High Street & Sixth Street

2019 Existing AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	94	368	25	282	131	516	98	326
v/c Ratio	0.36	0.70	0.15	0.54	0.21	0.37	0.19	0.25
Control Delay	24.1	28.0	20.8	21.1	9.5	17.4	9.6	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	28.0	20.8	21.1	9.5	17.4	9.6	16.2
Queue Length 50th (m)	9.6	38.5	2.4	24.7	7.3	24.5	5.4	14.0
Queue Length 95th (m)	19.2	57.3	7.1	40.1	15.9	38.6	12.5	24.3
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	391	767	252	750	736	1390	661	1290
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	0.24	0.48	0.10	0.38	0.18	0.37	0.15	0.25

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	75	198	96	20	126	99	105	370	42	78	217	44
Future Volume (vph)	75	198	96	20	126	99	105	370	42	78	217	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1744		1572	1678		1772	3521		1737	3313	
Flt Permitted	0.49	1.00		0.35	1.00		0.54	1.00		0.44	1.00	
Satd. Flow (perm)	909	1744		585	1678		1015	3521		811	3313	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	94	248	120	25	158	124	131	462	52	98	271	55
RTOR Reduction (vph)	0	22	0	0	36	0	0	9	0	0	18	0
Lane Group Flow (vph)	94	346	0	25	246	0	131	507	0	98	308	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.3	19.3		19.3	19.3		33.0	26.4		32.0	25.9	
Effective Green, g (s)	19.3	19.3		19.3	19.3		33.0	26.4		32.0	25.9	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.49	0.39		0.47	0.38	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	494		166	476		566	1366		464	1261	
v/s Ratio Prot		c0.20			0.15		c0.02	c0.14		0.02	0.09	
v/s Ratio Perm	0.10			0.04			0.09			0.08		
v/c Ratio	0.37	0.70		0.15	0.52		0.23	0.37		0.21	0.24	
Uniform Delay, d1	19.5	21.8		18.2	20.4		9.7	14.9		10.1	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	4.7		0.6	1.3		0.2	0.8		0.2	0.5	
Delay (s)	20.7	26.4		18.8	21.7		9.9	15.6		10.3	14.8	
Level of Service	C	C		B	C		A	B		B	B	
Approach Delay (s)		25.2			21.5			14.5			13.8	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		68.0			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		65.5%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2019 Existing AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	17	92	284	55	111	226
Future Volume (vph)	17	92	284	55	111	226
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	22	119	369	71	144	294
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	141	440	144	294		
Volume Left (vph)	22	0	144	0		
Volume Right (vph)	119	71	0	0		
Hadj (s)	-0.40	-0.07	0.57	0.12		
Departure Headway (s)	5.5	4.9	5.9	5.4		
Degree Utilization, x	0.21	0.59	0.24	0.44		
Capacity (veh/h)	587	723	591	643		
Control Delay (s)	10.0	14.7	9.5	11.5		
Approach Delay (s)	10.0	14.7	10.9			
Approach LOS	A	B	B			
Intersection Summary						
Delay			12.4			
Level of Service			B			
Intersection Capacity Utilization			41.7%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
17: Hurontario Street & Hume Street

2019 Existing AM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	167	168	258	292	90	93
Future Volume (vph)	167	168	258	292	90	93
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	15.7	15.7	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
v/c Ratio	0.52	0.40	0.39	0.41		0.15
Control Delay	28.8	6.2	15.4	3.2		6.6
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	28.8	6.2	15.4	3.2		6.6
LOS	C	A	B	A		A
Approach Delay	17.5		8.9			6.6
Approach LOS	B		A			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 69.3
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 11.2
 Intersection Capacity Utilization 78.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2019 Existing AM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	209	210	323	365	229
v/c Ratio	0.52	0.40	0.39	0.41	0.15
Control Delay	28.8	6.2	15.4	3.2	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	6.2	15.4	3.2	6.6
Queue Length 50th (m)	23.8	0.0	26.8	0.0	5.8
Queue Length 95th (m)	36.6	9.9	41.6	8.6	9.8
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	716	764	832	888	1519
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.29	0.27	0.39	0.41	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2019 Existing AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	167	168	258	292	90	93
Future Volume (vph)	167	168	258	292	90	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3525	3525
Flt Permitted	0.95	1.00	1.00	1.00	0.68	0.68
Satd. Flow (perm)	1772	1581	1921	1575	2447	2447
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	209	210	322	365	112	116
RTOR Reduction (vph)	0	162	0	207	0	0
Lane Group Flow (vph)	209	48	323	158	0	229
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	15.7	15.7	30.0	30.0		41.0
Effective Green, g (s)	15.7	15.7	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	401	358	831	681		1556
v/s Ratio Prot	c0.12		c0.17			c0.01
v/s Ratio Perm		0.03		0.10		0.07
v/c Ratio	0.52	0.13	0.39	0.23		0.15
Uniform Delay, d1	23.5	21.4	13.4	12.4		6.3
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.2	0.2	1.4	0.8		0.2
Delay (s)	24.7	21.5	14.8	13.2		6.5
Level of Service	C	C	B	B		A
Approach Delay (s)	23.1		13.9			6.5
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		15.5		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.40				
Actuated Cycle Length (s)		69.3		Sum of lost time (s)		16.6
Intersection Capacity Utilization		78.3%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2019 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	137	34	35	160	41	113	55	44	22	27	3
Future Volume (vph)	9	137	34	35	160	41	113	55	44	22	27	3
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	11	169	42	43	198	51	140	68	54	27	33	4
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	222	292	262	64								
Volume Left (vph)	11	43	140	27								
Volume Right (vph)	42	51	54	4								
Hadj (s)	-0.06	0.01	0.08	0.19								
Departure Headway (s)	5.2	5.2	5.5	5.9								
Degree Utilization, x	0.32	0.42	0.40	0.11								
Capacity (veh/h)	636	651	607	526								
Control Delay (s)	10.7	12.0	12.0	9.7								
Approach Delay (s)	10.7	12.0	12.0	9.7								
Approach LOS	B	B	B	A								
Intersection Summary												
Delay		11.5										
Level of Service		B										
Intersection Capacity Utilization		47.5%		ICU Level of Service					A			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2019 Existing AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	82	9	16	102	116	14	79	33	59	32	15
Future Volume (vph)	15	82	9	16	102	116	14	79	33	59	32	15
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	98	11	19	121	138	17	94	39	70	38	18
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	127	140	138	150	126							
Volume Left (vph)	18	19	0	17	70							
Volume Right (vph)	11	0	138	39	18							
Hadj (s)	0.19	0.33	-0.63	0.01	0.13							
Departure Headway (s)	5.3	5.7	4.8	5.1	5.3							
Degree Utilization, x	0.19	0.22	0.18	0.21	0.18							
Capacity (veh/h)	631	597	716	654	630							
Control Delay (s)	9.5	9.2	7.6	9.5	9.4							
Approach Delay (s)	9.5	8.4		9.5	9.4							
Approach LOS	A	A		A	A							
Intersection Summary												
Delay			9.0									
Level of Service			A									
Intersection Capacity Utilization			31.6%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2019 Existing AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	151	328	468	69	9	58
Future Volume (Veh/h)	151	328	468	69	9	58
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	159	345	493	73	9	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	566				1192	530
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	566				1192	530
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	83				95	89
cM capacity (veh/h)	963				165	536
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	504	566	70			
Volume Left	159	0	9			
Volume Right	0	73	61			
cSH	963	1700	416			
Volume to Capacity	0.17	0.33	0.17			
Queue Length 95th (m)	4.5	0.0	4.5			
Control Delay (s)	4.3	0.0	15.4			
Lane LOS	A		C			
Approach Delay (s)	4.3	0.0	15.4			
Approach LOS			C			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization	68.5%			ICU Level of Service	C	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2019 Existing PM

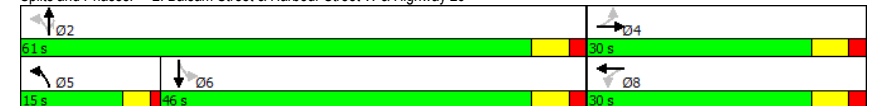
													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	18	2	42	23	0	3	59	581	22	4	560	15	
Future Volume (Veh/h)	18	2	42	23	0	3	59	581	22	4	560	15	
Sign Control		Stop			Stop			Free			Free		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Hourly flow rate (vph)	19	2	45	24	0	3	63	618	23	4	596	16	
Pedestrians												2	
Lane Width (m)												3.7	
Walking Speed (m/s)												1.2	
Percent Blockage												0	
Right turn flare (veh)													
Median type	None								None				
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	1353	1371	596	1394	1364	620	612					641	
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1353	1371	596	1394	1364	620	612					641	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1	
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2	
p0 queue free %	84	99	91	77	100	99	94					100	
cM capacity (veh/h)	121	137	498	102	139	491	977					953	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3					
Volume Total	66	27	63	618	23	4	596	16					
Volume Left	19	24	63	0	0	4	0	0					
Volume Right	45	3	0	0	23	0	0	16					
cSH	251	112	977	1700	1700	953	1700	1700					
Volume to Capacity	0.26	0.24	0.06	0.36	0.01	0.00	0.35	0.01					
Queue Length 95th (m)	7.8	6.7	1.6	0.0	0.0	0.1	0.0	0.0					
Control Delay (s)	24.3	46.9	8.9	0.0	0.0	8.8	0.0	0.0					
Lane LOS	C	E	A				A						
Approach Delay (s)	24.3	46.9	0.8				0.1						
Approach LOS	C	E											
Intersection Summary													
Average Delay	2.5												
Intersection Capacity Utilization	48.3%			ICU Level of Service					A				
Analysis Period (min)	15												

Timings
2: Balsam Street & Harbour Street W & Highway 26

2019 Existing PM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	6	83	5	100	700	69	11	652
Future Volume (vph)	20	6	83	5	100	700	69	11	652
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	11.2	11.2	11.2	11.2		55.1	55.1		40.1
Actuated g/C Ratio	0.14	0.14	0.14	0.14		0.70	0.70		0.51
v/c Ratio	0.11	0.43	0.51	0.06		0.43	0.06		0.43
Control Delay	29.9	10.2	41.2	19.8		5.6	2.8		13.3
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.9	10.2	41.2	19.8		5.6	2.8		13.3
LOS	C	B	D	B		A	A		B
Approach Delay		12.7		38.2		5.4			13.3
Approach LOS		B		D		A			B
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 78.3									
Natural Cycle: 75									
Control Type: Semi Act-Uncoord									
Maximum v/c Ratio: 0.51									
Intersection Signal Delay: 10.8					Intersection LOS: B				
Intersection Capacity Utilization 102.6%					ICU Level of Service G				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2019 Existing PM

2: Balsam Street & Harbour Street W & Highway 26

	↖	→	↗	←	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	22	153	89	14	861	74	723
v/c Ratio	0.11	0.43	0.51	0.06	0.43	0.06	0.43
Control Delay	29.9	10.2	41.2	19.8	5.6	2.8	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.9	10.2	41.2	19.8	5.6	2.8	13.3
Queue Length 50th (m)	2.9	0.8	12.4	0.6	21.2	1.4	32.5
Queue Length 95th (m)	8.9	15.4	25.7	5.4	36.8	5.7	51.7
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	420	592	379	503	1991	1159	1697
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.26	0.23	0.03	0.43	0.06	0.43
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2019 Existing PM

2: Balsam Street & Harbour Street W & Highway 26

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	6	137	83	5	8	100	700	69	11	652	9
Future Volume (vph)	20	6	137	83	5	8	100	700	69	11	652	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Flt	1.00	0.86		1.00	0.90			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1589		1810	1620			3596	1633		3536	
Flt Permitted	0.75	1.00		0.65	1.00			0.74	1.00		0.94	
Satd. Flow (perm)	1369	1589		1231	1620			2680	1633		3316	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	6	147	89	5	9	108	753	74	12	701	10
RTOR Reduction (vph)	0	126	0	0	8	0	0	0	11	0	1	0
Lane Group Flow (vph)	22	27	0	89	6	0	0	861	63	0	722	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	11.2	11.2		11.2	11.2			55.1	55.1		40.1	
Effective Green, g (s)	11.2	11.2		11.2	11.2			55.1	55.1		40.1	
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.70	0.70		0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	195	227		176	231			2014	1149		1698	
v/s Ratio Prot		0.02			0.00			c0.06				
v/s Ratio Perm	0.02			c0.07				c0.24	0.04		0.22	
v/c Ratio	0.11	0.12		0.51	0.03			0.43	0.06		0.43	
Uniform Delay, d1	29.2	29.2		31.0	28.9			4.9	3.6		11.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.2		2.3	0.0			0.7	0.1		0.8	
Delay (s)	29.5	29.5		33.3	28.9			5.6	3.7		12.7	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		29.5			32.7			5.4			12.7	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			11.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			78.3			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			102.6%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

2019 Existing PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	106	4	33	5	69	763	8	802
Future Volume (vph)	106	4	33	5	69	763	8	802
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	12.1	12.1		12.1	55.1	53.1	52.3	46.3
Actuated g/C Ratio	0.16	0.16		0.16	0.74	0.72	0.71	0.63
v/c Ratio	0.50	0.18		0.23	0.15	0.32	0.01	0.41
Control Delay	37.5	10.9		23.7	4.5	6.7	4.0	10.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	10.9		23.7	4.5	6.7	4.0	10.8
LOS	D	B		C	A	A	A	B
Approach Delay		28.5		23.7		6.5		10.7
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 84

Actuated Cycle Length: 74

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 10.8

Intersection LOS: B

Intersection Capacity Utilization 63.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

	Ø1		Ø2		Ø4
15 s		47 s		22 s	
	Ø5		Ø6		Ø8
15 s		47 s		22 s	

Queues

2019 Existing PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	112	57	57	73	809	8	919
v/c Ratio	0.50	0.18	0.23	0.15	0.32	0.01	0.41
Control Delay	37.5	10.9	23.7	4.5	6.7	4.0	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	10.9	23.7	4.5	6.7	4.0	10.8
Queue Length 50th (m)	14.9	0.5	5.0	2.5	20.1	0.4	38.3
Queue Length 95th (m)	29.9	9.5	14.7	7.0	51.5	1.5	61.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	301	402	325	549	2563	671	2217
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.14	0.18	0.13	0.32	0.01	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Balsam Street & CT Entrance/Plaza Access

2019 Existing PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	106	4	50	33	5	16	69	763	6	8	802	71
Future Volume (vph)	106	4	50	33	5	16	69	763	6	8	802	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1821	1653			1781		1772	3575		1825	3531	
Flt Permitted	0.72	1.00			0.78		0.25	1.00		0.35	1.00	
Satd. Flow (perm)	1380	1653			1430		472	3575		665	3531	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	112	4	53	35	5	17	73	803	6	8	844	75
RTOR Reduction (vph)	0	46	0	0	15	0	0	0	0	0	6	0
Lane Group Flow (vph)	112	11	0	0	42	0	73	809	0	8	913	0
Confl. Peds. (#/hr)	1				1		2					2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.7	9.7			9.7		56.9	51.6		48.6	47.3	
Effective Green, g (s)	9.7	9.7			9.7		56.9	51.6		48.6	47.3	
Actuated g/C Ratio	0.12	0.12			0.12		0.72	0.66		0.62	0.60	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	170	203			176		434	2346		430	2124	
v/s Ratio Prot		0.01					c0.01	c0.23		0.00	c0.26	
v/s Ratio Perm	c0.08				0.03		0.11			0.01		
v/c Ratio	0.66	0.05			0.24		0.17	0.34		0.02	0.43	
Uniform Delay, d1	32.9	30.4			31.1		3.8	6.0		5.8	8.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.9	0.1			0.7		0.2	0.4		0.0	0.6	
Delay (s)	41.8	30.5			31.8		4.0	6.4		5.8	9.0	
Level of Service	D	C			C		A	A		A	A	
Approach Delay (s)		38.0			31.8			6.2			9.0	
Approach LOS		D			C			A			A	

Intersection Summary

HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

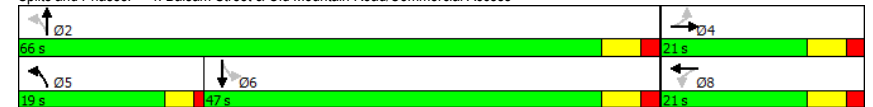
2019 Existing PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	75	4	17	8	166	788	9	801
Future Volume (vph)	75	4	17	8	166	788	9	801
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	11.4	11.4		11.4	62.0	60.0	47.9	47.9
Actuated g/C Ratio	0.14	0.14		0.14	0.74	0.72	0.57	0.57
v/c Ratio	0.43	0.51		0.20	0.38	0.34	0.03	0.44
Control Delay	40.6	10.7		29.2	5.6	4.9	9.4	11.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	10.7		29.2	5.6	4.9	9.4	11.3
LOS	D	B		C	A	A	A	B
Approach Delay		19.6		29.3		5.0		11.3
Approach LOS		B		C		A		B

Intersection Summary

Cycle Length: 87
Actuated Cycle Length: 83.4
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 9.7
Intersection Capacity Utilization 99.9%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service F

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2019 Existing PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	193	35	180	881	10	906
v/c Ratio	0.43	0.51	0.20	0.38	0.34	0.03	0.44
Control Delay	40.6	10.7	29.2	5.6	4.9	9.4	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	10.7	29.2	5.6	4.9	9.4	11.3
Queue Length 50th (m)	12.1	0.6	3.9	6.0	20.7	0.6	37.2
Queue Length 95th (m)	25.2	17.6	11.9	13.9	35.5	3.1	62.1
Internal Link Dist (m)		175.6	57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	250	440	223	585	2567	321	2044
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.44	0.16	0.31	0.34	0.03	0.44
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2019 Existing PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	↘	↙	←	↘	↙	↑	↘	↙	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↘	↖ ↘			↖ ↘		↖ ↘	↖ ↘	↖ ↘	↖ ↘	↖ ↘	↖ ↘
Traffic Volume (vph)	75	4	174	17	8	7	166	788	22	9	801	32
Future Volume (vph)	75	4	174	17	8	7	166	788	22	9	801	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	1585			1806		1788	3564		1643	3556	
Flt Permitted	0.73	1.00			0.65		0.25	1.00		0.32	1.00	
Satd. Flow (perm)	1388	1585			1204		469	3564		558	3556	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	4	189	18	9	8	180	857	24	10	871	35
RTOR Reduction (vph)	0	163	0	0	7	0	0	2	0	0	3	0
Lane Group Flow (vph)	82	30	0	0	28	0	180	879	0	10	903	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.4	11.4			11.4		60.0	60.0		47.9	47.9	
Effective Green, g (s)	11.4	11.4			11.4		60.0	60.0		47.9	47.9	
Actuated g/C Ratio	0.14	0.14			0.14		0.72	0.72		0.57	0.57	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	189	216			164		465	2564		320	2042	
v/s Ratio Prot		0.02					0.04	c0.25			c0.25	
v/s Ratio Perm	c0.06				0.02		0.24			0.02		
v/c Ratio	0.43	0.14			0.17		0.39	0.34		0.03	0.44	
Uniform Delay, d1	33.0	31.7			31.8		4.7	4.4		7.7	10.1	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.3			0.5		0.5	0.4		0.2	0.7	
Delay (s)	34.6	32.0			32.3		5.2	4.7		7.9	10.8	
Level of Service	C	C			C		A	A		A	B	
Approach Delay (s)		32.8			32.3			4.8			10.8	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		11.0			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		83.4			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		99.9%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

2019 Existing PM

5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	70	383	160	328	554	135	319	544	431
Future Volume (vph)	70	383	160	328	554	135	319	544	431
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	31.3	21.2	37.3	26.6	55.2	19.6	19.6	28.1	28.1
Actuated g/C Ratio	0.30	0.21	0.36	0.26	0.54	0.19	0.19	0.27	0.27
v/c Ratio	0.20	0.74	0.57	0.36	0.59	0.41	0.66	0.77	0.76
Control Delay	24.1	42.2	31.8	34.0	7.4	41.5	40.1	49.1	41.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	42.2	31.8	34.0	7.4	41.5	40.1	49.1	41.7
LOS	C	D	C	C	A	D	D	D	D
Approach Delay		40.1		19.5			40.5		44.1
Approach LOS		D		B			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 103

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 34.8

Intersection LOS: C

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↰ Ø3	↱ Ø4
35.5 s	35.5 s	11 s	38 s
		↰ Ø7	↱ Ø8
		14 s	35 s

Queues

2019 Existing PM

5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	547	165	338	571	139	458	337	697
v/c Ratio	0.20	0.74	0.57	0.36	0.59	0.41	0.66	0.77	0.76
Control Delay	24.1	42.2	31.8	34.0	7.4	41.5	40.1	49.1	41.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	42.2	31.8	34.0	7.4	41.5	40.1	49.1	41.7
Queue Length 50th (m)	9.3	49.9	22.5	30.0	19.3	24.9	41.0	67.1	69.0
Queue Length 95th (m)	20.5	74.3	41.9	46.7	49.3	45.3	61.2	#135.3	#110.5
Internal Link Dist (m)		178.2		250.8		206.8		179.2	
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	361	971	294	1110	988	509	1014	458	959
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.56	0.56	0.30	0.58	0.27	0.45	0.74	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2019 Existing PM

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	70	383	147	160	328	554	135	319	125	544	431	28
Future Volume (vph)	70	383	147	160	328	554	135	319	125	544	431	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1769	3421		1806	3650	1574	1789	3447		1612	3363	
Flt Permitted	0.55	1.00		0.23	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	1021	3421		444	3650	1574	1789	3447		1612	3363	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	395	152	165	338	571	139	329	129	561	444	29
RTOR Reduction (vph)	0	35	0	0	0	132	0	37	0	0	2	0
Lane Group Flow (vph)	72	512	0	165	338	439	139	421	0	337	695	0
Confl. Peds. (#/hr)	4		12	12		4	9		2	2		9
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	27.6	22.2		36.0	26.6	54.7	19.6	19.6		28.1	28.1	
Effective Green, g (s)	27.6	22.2		36.0	26.6	54.7	19.6	19.6		28.1	28.1	
Actuated g/C Ratio	0.27	0.21		0.35	0.26	0.53	0.19	0.19		0.27	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	310	732		282	936	830	338	651		436	911	
v/s Ratio Prot	0.01	c0.15		c0.06	0.09	0.14	0.08	c0.12		c0.21	0.21	
v/s Ratio Perm	0.05			0.15		0.14						
v/c Ratio	0.23	0.70		0.59	0.36	0.53	0.41	0.65		0.77	0.76	
Uniform Delay, d1	29.1	37.7		25.3	31.6	16.1	37.0	38.8		34.9	34.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	3.0		3.1	0.2	0.6	0.8	2.2		8.3	3.8	
Delay (s)	29.5	40.7		28.3	31.8	16.7	37.8	41.1		43.2	38.6	
Level of Service	C	D		C	C	B	D	D		D	D	
Approach Delay (s)		39.4			23.2			40.3			40.1	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		34.5										
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		103.7						24.0				
Intersection Capacity Utilization		76.5%										
Analysis Period (min)		15										
c Critical Lane Group												

Timings
6: Spruce Street & First Street

2019 Existing PM

	←	→	↙	↘	↖	↗	↖	↗
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	12	1001	28	1019	17	13	25	9
Future Volume (vph)	12	1001	28	1019	17	13	25	9
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.0	88.3	93.6	92.7	10.1	10.1	10.1	10.1
Actuated g/C Ratio	0.85	0.82	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.03	0.37	0.06	0.36	0.14	0.17	0.20	0.16
Control Delay	2.1	5.4	2.1	3.7	47.7	30.7	49.3	26.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	5.4	2.1	3.7	47.7	30.7	49.3	26.7
LOS	A	A	A	A	D	C	D	C
Approach Delay		5.3		3.7		37.2		37.6
Approach LOS		A		A		D		D
Intersection Summary								
Cycle Length: 108.1								
Actuated Cycle Length: 108.1								
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection								
Natural Cycle: 90								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 0.37								
Intersection Signal Delay: 5.9								
Intersection Capacity Utilization 62.4%								
Analysis Period (min) 15								
Intersection LOS: A								
ICU Level of Service B								
Splits and Phases: 6: Spruce Street & First Street								

Queues
6: Spruce Street & First Street

2019 Existing PM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	13	1068	29	1108	18	29	26	28
v/c Ratio	0.03	0.37	0.06	0.36	0.14	0.17	0.20	0.16
Control Delay	2.1	5.4	2.1	3.7	47.7	30.7	49.3	26.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	5.4	2.1	3.7	47.7	30.7	49.3	26.7
Queue Length 50th (m)	0.4	45.5	0.9	28.2	3.6	2.8	5.2	1.8
Queue Length 95th (m)	1.3	57.4	2.3	60.3	10.5	11.4	13.6	10.2
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	492	2911	486	3047	326	400	324	395
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	0.03	0.37	0.06	0.36	0.06	0.07	0.08	0.07
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2019 Existing PM

	↖	→	↗	←	↖	↗	↓	↖	↗	↓	↖	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	12	1001	24	28	1019	45	17	13	14	25	9	18
Future Volume (vph)	12	1001	24	28	1019	45	17	13	14	25	9	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.97		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.97	1.00		0.96	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3565		1825	3551		1778	1659		1760	1624	
Flt Permitted	0.25	1.00		0.24	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	478	3565		460	3551		1383	1659		1368	1624	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	12	1043	25	29	1061	47	18	14	15	26	9	19
RTOR Reduction (vph)	0	1	0	0	2	0	0	14	0	0	18	0
Lane Group Flow (vph)	13	1067	0	29	1106	0	18	15	0	26	10	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	83.3	81.9		88.9	84.7		6.1	6.1		6.1	6.1	
Effective Green, g (s)	83.3	81.9		88.9	84.7		6.1	6.1		6.1	6.1	
Actuated g/C Ratio	0.77	0.76		0.82	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	385	2700		431	2782		78	93		77	91	
v/s Ratio Prot	0.00	0.30		c0.00	c0.31			0.01			0.01	
v/s Ratio Perm	0.03			0.05			0.01			c0.02		
v/c Ratio	0.03	0.40		0.07	0.40		0.23	0.16		0.34	0.11	
Uniform Delay, d1	2.9	4.5		2.1	3.7		48.8	48.6		49.1	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.4		0.1	0.4		1.5	0.8		2.6	0.5	
Delay (s)	2.9	5.0		2.2	4.1		50.3	49.4		51.7	49.0	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		4.9			4.1			49.7			50.3	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			6.5			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)			15.9			
Intersection Capacity Utilization			62.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2019 Existing PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	28	952	26	991	38	20	80	20
Future Volume (vph)	28	952	26	991	38	20	80	20
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	78.7	74.4	78.6	74.4	11.2	11.2	11.4	11.4
Actuated g/C Ratio	0.79	0.74	0.79	0.74	0.11	0.11	0.11	0.11
v/c Ratio	0.07	0.40	0.06	0.39	0.27	0.21	0.54	0.31
Control Delay	3.4	7.4	2.5	4.7	43.4	24.2	53.4	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.4	7.4	2.5	4.7	43.4	24.2	53.4	19.3
LOS	A	A	A	A	D	C	D	B
Approach Delay		7.3		4.6		33.2		37.4
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 9.0

Intersection LOS: A

Intersection Capacity Utilization 48.7%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

Ø1	Ø2	Ø4
5 s	51 s	30 s
Ø5	Ø6 (R)	Ø8
5 s	51 s	30 s

Queues
7: Cedar Street & First Street

2019 Existing PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	29	1050	27	1050	40	45	84	74
v/c Ratio	0.07	0.40	0.06	0.39	0.27	0.21	0.54	0.31
Control Delay	3.4	7.4	2.5	4.7	43.4	24.2	53.4	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.4	7.4	2.5	4.7	43.4	24.2	53.4	19.3
Queue Length 50th (m)	1.0	44.4	0.0	11.4	7.2	3.7	15.6	3.7
Queue Length 95th (m)	3.3	68.3	m1.9	22.2	16.2	13.0	29.0	15.6
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	431	2619	430	2660	316	438	330	442
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	0.07	0.40	0.06	0.39	0.13	0.10	0.25	0.17

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2019 Existing PM

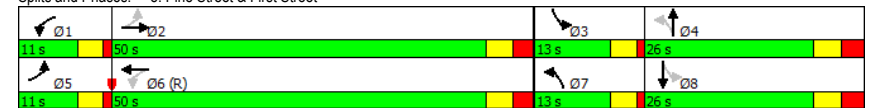
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	28	952	46	26	991	7	38	20	23	80	20	50
Future Volume (vph)	28	952	46	26	991	7	38	20	23	80	20	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1754	3517		1754	3575		1762	1740		1777	1669	
Flt Permitted	0.24	1.00		0.24	1.00		0.71	1.00		0.73	1.00	
Satd. Flow (perm)	451	3517		451	3575		1315	1740		1361	1669	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	29	1002	48	27	1043	7	40	21	24	84	21	53
RTOR Reduction (vph)	0	2	0	0	0	0	0	22	0	0	48	0
Lane Group Flow (vph)	29	1048	0	27	1050	0	40	23	0	84	26	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	74.2	70.5		74.2	70.5		10.1	10.1		10.1	10.1	
Effective Green, g (s)	74.2	70.5		74.2	70.5		10.1	10.1		10.1	10.1	
Actuated g/C Ratio	0.74	0.70		0.74	0.70		0.10	0.10		0.10	0.10	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	382	2479		382	2520		132	175		137	168	
v/s Ratio Prot	c0.00	c0.30		0.00	0.29			0.01			0.02	
v/s Ratio Perm	0.05			0.05			0.03			c0.06		
v/c Ratio	0.08	0.42		0.07	0.42		0.30	0.13		0.61	0.16	
Uniform Delay, d1	3.7	6.2		3.7	6.2		41.7	41.0		43.1	41.1	
Progression Factor	1.00	1.00		0.74	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.5		0.1	0.5		1.3	0.3		7.9	0.4	
Delay (s)	3.8	6.7		2.8	4.2		43.0	41.3		51.0	41.5	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		6.6			4.2			42.1			46.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		9.4			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			15.7				
Intersection Capacity Utilization		48.7%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
8: Pine Street & First Street

2019 Existing PM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	848	18	750	184	34	60	62
Future Volume (vph)	55	848	18	750	184	34	60	62
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	63.3	58.4	61.1	53.7	24.7	15.4	22.5	12.3
Actuated g/C Ratio	0.63	0.58	0.61	0.54	0.25	0.15	0.22	0.12
v/c Ratio	0.15	0.50	0.05	0.45	0.67	0.28	0.20	0.60
Control Delay	3.9	10.7	5.8	12.9	42.1	21.9	28.0	33.7
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	3.9	10.7	5.8	13.0	42.1	21.9	28.0	33.7
LOS	A	B	A	B	D	C	C	C
Approach Delay		10.4		12.9		36.1		32.1
Approach LOS		B		B		D		C
Intersection Summary								
Cycle Length: 100								
Actuated Cycle Length: 100								
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green								
Natural Cycle: 80								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 0.67								
Intersection Signal Delay: 16.2					Intersection LOS: B			
Intersection Capacity Utilization 69.3%					ICU Level of Service C			
Analysis Period (min) 15								

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2019 Existing PM

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	59	1031	19	852	196	83	64	163
v/c Ratio	0.15	0.50	0.05	0.45	0.67	0.28	0.20	0.60
Control Delay	3.9	10.7	5.8	12.9	42.1	21.9	28.0	33.7
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	3.9	10.7	5.8	13.0	42.1	21.9	28.0	33.7
Queue Length 50th (m)	1.2	12.1	0.9	39.1	31.5	6.4	9.5	18.0
Queue Length 95th (m)	2.7	100.2	m3.0	47.0	47.4	19.0	18.2	36.2
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	404	2047	358	1905	292	384	344	396
Starvation Cap Reductn	0	0	0	331	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	0.15	0.50	0.05	0.54	0.67	0.22	0.19	0.41
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2019 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	848	121	18	750	51	184	34	44	60	62	91
Future Volume (vph)	55	848	121	18	750	51	184	34	44	60	62	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3495		1825	3542		1785	1690		1743	1719	
Flt Permitted	0.25	1.00		0.22	1.00		0.45	1.00		0.70	1.00	
Satd. Flow (perm)	485	3495		427	3542		841	1690		1290	1719	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	59	902	129	19	798	54	196	36	47	64	66	97
RTOR Reduction (vph)	0	9	0	0	4	0	0	40	0	0	57	0
Lane Group Flow (vph)	59	1022	0	19	848	0	196	43	0	64	106	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	61.1	55.2		54.9	52.1		24.4	15.4		19.8	13.1	
Effective Green, g (s)	61.1	55.2		54.9	52.1		24.4	15.4		19.8	13.1	
Actuated g/C Ratio	0.61	0.55		0.55	0.52		0.24	0.15		0.20	0.13	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	375	1929		273	1845		290	260		285	225	
v/s Ratio Prot	c0.01	c0.29		0.00	0.24		c0.06	0.03		0.02	0.06	
v/s Ratio Perm	0.09			0.04			c0.10			0.03		
v/c Ratio	0.16	0.53		0.07	0.46		0.68	0.17		0.22	0.47	
Uniform Delay, d1	8.8	14.2		10.8	15.1		32.4	36.7		33.4	40.2	
Progression Factor	0.44	0.73		0.74	0.80		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.0		0.1	0.8		6.1	0.3		0.4	1.5	
Delay (s)	4.1	11.3		8.1	12.8		38.5	37.0		33.8	41.8	
Level of Service	A	B		A	B		D	D		C	D	
Approach Delay (s)		10.9			12.7			38.1			39.5	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			17.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				19.9		
Intersection Capacity Utilization			69.3%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

2019 Existing PM

9: Hurontario Street & First Street/Huron Street

	↖	→	↗	↖	↗	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	15	785	65	603	223	15
Future Volume (vph)	15	785	65	603	223	15
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	68.4	61.7	70.9	66.1	18.2	18.2
Actuated g/C Ratio	0.68	0.62	0.71	0.66	0.18	0.18
v/c Ratio	0.03	0.46	0.17	0.27	0.72	0.23
Control Delay	2.1	3.9	5.9	8.8	50.5	12.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	3.9	5.9	8.8	50.5	12.7
LOS	A	A	A	A	D	B
Approach Delay		3.9		8.5		40.8
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 11.2

Intersection LOS: B

Intersection Capacity Utilization 56.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street

↖ Ø1	↖ Ø2	↖ Ø4
11 s	59 s	30 s
↖ Ø5	↖ Ø6 (R)	
11 s	59 s	

Queues

2019 Existing PM

9: Hurontario Street & First Street/Huron Street

	↖	→	↗	↖	↗	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	16	992	68	644	235	81
v/c Ratio	0.03	0.46	0.17	0.27	0.72	0.23
Control Delay	2.1	3.9	5.9	8.8	50.5	12.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	3.9	5.9	8.8	50.5	12.7
Queue Length 50th (m)	0.3	22.7	3.3	20.7	43.2	2.6
Queue Length 95th (m)	m0.6	12.5	8.5	46.5	63.2	13.7
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	571	2162	411	2360	438	447
Starvation Cap Reductn	0	170	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	0.03	0.50	0.17	0.27	0.54	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 9: Hurontario Street & First Street/Huron Street

2019 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	785	158	65	603	9	223	15	62	0	0	0
Future Volume (vph)	15	785	158	65	603	9	223	15	62	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1702	3484		1825	3570		1789	1627				
Flt Permitted	0.41	1.00		0.23	1.00		0.95	1.00				
Satd. Flow (perm)	730	3484		444	3570		1789	1627				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	16	826	166	68	635	9	235	16	65	0	0	0
RTOR Reduction (vph)	0	14	0	0	1	0	0	53	0	0	0	0
Lane Group Flow (vph)	16	978	0	68	643	0	235	28	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	63.4	60.9		69.0	63.7		18.2	18.2				
Effective Green, g (s)	63.4	60.9		69.0	63.7		18.2	18.2				
Actuated g/C Ratio	0.63	0.61		0.69	0.64		0.18	0.18				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	487	2121		379	2274		325	296				
v/s Ratio Prot	0.00	c0.28		c0.01	0.18			0.02				
v/s Ratio Perm	0.02			0.11			c0.13					
v/c Ratio	0.03	0.46		0.18	0.28		0.72	0.09				
Uniform Delay, d1	6.8	10.6		5.9	8.0		38.5	34.0				
Progression Factor	0.37	0.29		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.0	0.6		0.2	0.3		7.7	0.1				
Delay (s)	2.5	3.7		6.1	8.3		46.3	34.2				
Level of Service	A	A		A	A		D	C				
Approach Delay (s)		3.7			8.1			43.2			0.0	
Approach LOS		A			A			D			A	

Intersection Summary

HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

10: Pretty River Parkway & Hume Street/Highway 26 E

2019 Existing PM

												
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	45	390	12	253	429	15	43	32	638	42	77	
Future Volume (vph)	45	390	12	253	429	15	43	32	638	42	77	
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm	
Protected Phases	5	2	1	6	4	8			4	4		
Permitted Phases	2		6		6			8			4	
Detector Phase	5	2	1	6	4	8	8	8	4	4	4	
Switch Phase												
Minimum Interval (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0	
Total Split (s)	11.0	27.0	11.0	27.0	36.0	16.0	16.0	16.0	36.0	36.0	36.0	
Total Split (%)	12.2%	30.0%	12.2%	30.0%	40.0%	17.8%	17.8%	17.8%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lag								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None	
Act Effct Green (s)	29.6	26.3	28.3	22.5	55.7	10.7	10.7	10.7	24.7	24.7	24.7	
Actuated g/C Ratio	0.38	0.34	0.37	0.29	0.72	0.14	0.14	0.14	0.32	0.32	0.32	
v/c Ratio	0.13	0.37	0.03	0.51	0.37	0.07	0.19	0.11	0.70	0.71	0.14	
Control Delay	18.9	23.6	18.0	32.1	1.6	36.7	38.0	0.6	32.5	32.9	0.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.9	23.6	18.0	32.1	1.6	36.7	38.0	0.6	32.5	32.9	0.7	
LOS	B	C	B	C	A	D	D	A	C	C	A	
Approach Delay		23.1		13.0			24.5			29.4		
Approach LOS		C		B			C			C		

Intersection Summary

Cycle Length: 90

Actuated Cycle Le

Natural Cycle: 75

Control Type: Semi Act-Uncoord

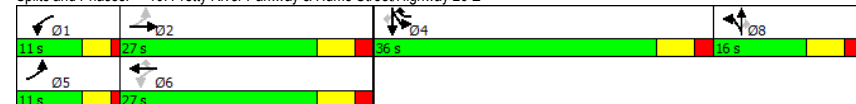
Maximum v/c Ratio: 0.71

Intersection Signal Delay

Intersection Capacity Utilization 57.9%

Analysis Period (min) 15

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2019 Existing PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	51	450	13	284	482	17	48	36	380	384	87
v/c Ratio	0.13	0.37	0.03	0.51	0.37	0.07	0.19	0.11	0.70	0.71	0.14
Control Delay	18.9	23.6	18.0	32.1	1.6	36.7	38.0	0.6	32.5	32.9	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	23.6	18.0	32.1	1.6	36.7	38.0	0.6	32.5	32.9	0.7
Queue Length 50th (m)	5.5	29.5	1.4	44.3	0.0	2.7	7.7	0.0	58.7	59.5	0.0
Queue Length 95th (m)	12.5	49.8	4.9	69.1	9.5	8.6	17.8	0.0	89.6	90.8	0.7
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)	60.0		15.0		15.0		70.0				
Base Capacity (vph)	390	1222	394	557	1321	235	248	341	705	704	743
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.37	0.03	0.51	0.36	0.07	0.19	0.11	0.54	0.55	0.12
Intersection Summary											

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2019 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	45	390	11	12	253	429	15	43	32	638	42	77
Future Volume (vph)	45	390	11	12	253	429	15	43	32	638	42	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3600		1674	1921	1617	1706	1795	1484	1700	1698	1570
Flt Permitted	0.43	1.00		0.49	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	778	3600		867	1921	1617	1706	1795	1484	1700	1698	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	51	438	12	13	284	482	17	48	36	717	47	87
RTOR Reduction (vph)	0	2	0	0	0	195	0	0	33	0	0	61
Lane Group Flow (vph)	51	448	0	13	284	287	17	48	3	380	384	26
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	29.9	26.3		25.1	23.9	48.6	7.3	7.3	7.3	24.7	24.7	24.7
Effective Green, g (s)	29.9	26.3		25.1	23.9	48.6	7.3	7.3	7.3	24.7	24.7	24.7
Actuated g/C Ratio	0.37	0.32		0.31	0.29	0.60	0.09	0.09	0.09	0.30	0.30	0.30
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	327	1161		278	563	1083	152	160	132	515	514	475
v/s Ratio Prot	c0.01	0.12		0.00	c0.15	0.08	0.01	c0.03		0.22	c0.23	
v/s Ratio Perm	0.05			0.01		0.10			0.00			0.02
v/c Ratio	0.16	0.39		0.05	0.50	0.27	0.11	0.30	0.02	0.74	0.75	0.06
Uniform Delay, d1	17.2	21.4		19.7	23.9	7.9	34.1	34.7	33.9	25.5	25.6	20.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.0		0.1	3.2	0.1	0.3	1.1	0.1	5.5	5.9	0.0
Delay (s)	17.4	22.3		19.7	27.1	8.0	34.4	35.8	33.9	31.0	31.4	20.2
Level of Service	B	C		B	C	A	C	D	C	C	C	C
Approach Delay (s)	21.8		15.2		34.9		30.1					
Approach LOS	C		B		C		C					
Intersection Summary												
HCM 2000 Control Delay	23.2			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	81.5			Sum of lost time (s)					22.0			
Intersection Capacity Utilization	57.9%			ICU Level of Service					B			
Analysis Period (min)	15											
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2019 Existing PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	17	0	4	0	27	397	470	553
Future Volume (vph)	17	0	4	0	27	397	470	553
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases		4		8	2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		4.0		4.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		10.4		10.4		36.0		38.4
Actuated g/C Ratio		0.17		0.17		0.60		0.64
v/c Ratio		0.40		0.53		0.05		0.27
Control Delay		10.9		8.1		4.0		11.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		10.9		8.1		4.0		11.2
LOS		B		A		A		B
Approach Delay		10.9		8.1		10.7		13.6
Approach LOS		B		A		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 60.4
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 12.0
Intersection Capacity Utilization 77.8%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
11 s	33 s	26 s	26 s	11 s	33 s	26 s	26 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2019 Existing PM

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	130	262	30	438	516	612
v/c Ratio	0.40	0.53	0.05	0.27	0.80	0.31
Control Delay	10.9	8.1	4.0	11.2	19.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	8.1	4.0	11.2	19.0	9.0
Queue Length 50th (m)	1.8	0.4	0.9	14.9	21.3	13.2
Queue Length 95th (m)	13.9	16.6	3.2	24.5	#59.5	35.0
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	530	715	587	1599	649	1954
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	0.25	0.37	0.05	0.27	0.80	0.31

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2019 Existing PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	17	0	101	4	0	235	27	397	2	470	553	4
Future Volume (vph)	17	0	101	4	0	235	27	397	2	470	553	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1648		1789	3576		1825	3507	
Flt Permitted		0.83			0.99		0.42	1.00		0.44	1.00	
Satd. Flow (perm)		1378			1639		791	3576		842	3507	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	19	0	111	4	0	258	30	436	2	516	608	4
RTOR Reduction (vph)	0	93	0	0	215	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	37	0	0	47	0	30	437	0	516	612	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.4			10.4		32.2	29.4		40.4	33.6	
Effective Green, g (s)		10.4			10.4		32.2	29.4		40.4	33.6	
Actuated g/C Ratio		0.17			0.17		0.51	0.47		0.64	0.54	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		228			271		450	1674		651	1876	
v/s Ratio Prot							0.00	0.12		c0.09	0.17	
v/s Ratio Perm		0.03			c0.03		0.03			c0.42		
v/c Ratio		0.16			0.17		0.07	0.26		0.79	0.33	
Uniform Delay, d1		22.5			22.5		7.6	10.1		6.6	8.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.3		0.1	0.4		6.6	0.5	
Delay (s)		22.8			22.8		7.6	10.5		13.2	8.7	
Level of Service		C			C		A	B		B	A	
Approach Delay (s)		22.8			22.8			10.3			10.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings

12: Tenth Line & Mountain Road

2019 Existing PM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	7	410	103	317	35	14	50	34
Future Volume (vph)	7	410	103	317	35	14	50	34
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		38.5		38.5		10.7		10.7
Actuated g/C Ratio		0.69		0.69		0.19		0.19
v/c Ratio		0.42		0.50		0.41		0.39
Control Delay		6.7		8.2		12.4		22.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		6.7		8.2		12.4		22.8
LOS		A		A		B		C
Approach Delay		6.7		8.2		12.4		22.8
Approach LOS		A		A		B		C
Intersection Summary								
Cycle Length: 60.2								
Actuated Cycle Length: 55.9								
Natural Cycle: 55								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.50								
Intersection Signal Delay: 9.2					Intersection LOS: A			
Intersection Capacity Utilization 78.7%					ICU Level of Service D			
Analysis Period (min) 15								

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2019 Existing PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	535	526	152	106
v/c Ratio	0.42	0.50	0.41	0.39
Control Delay	6.7	8.2	12.4	22.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.7	8.2	12.4	22.8
Queue Length 50th (m)	22.6	24.3	4.7	8.5
Queue Length 95th (m)	45.7	52.7	16.9	19.7
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1278	1045	476	376
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	0.42	0.50	0.32	0.28
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2019 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	410	59	103	317	48	35	14	86	50	34	11
Future Volume (vph)	7	410	59	103	317	48	35	14	86	50	34	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.91			0.98	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1858			1874			1650			1712	
Flt Permitted		0.99			0.80			0.91			0.78	
Satd. Flow (perm)		1846			1510			1513			1376	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	8	461	66	116	356	54	39	16	97	56	38	12
RTOR Reduction (vph)	0	7	0	0	6	0	0	82	0	0	8	0
Lane Group Flow (vph)	0	528	0	0	520	0	0	70	0	0	98	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		37.4			37.4			8.7			8.7	
Effective Green, g (s)		37.4			37.4			8.7			8.7	
Actuated g/C Ratio		0.66			0.66			0.15			0.15	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1211			990			230			210	
v/s Ratio Prot												
v/s Ratio Perm		0.29			c0.34			0.05			c0.07	
v/c Ratio		0.44			0.53			0.30			0.46	
Uniform Delay, d1		4.7			5.1			21.5			22.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.1			2.0			0.7			1.6	
Delay (s)		5.9			7.1			22.2			23.6	
Level of Service		A			A			C			C	
Approach Delay (s)		5.9			7.1			22.2			23.6	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			9.7		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			57.0		Sum of lost time (s)					10.9		
Intersection Capacity Utilization			78.7%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext 2019 Existing PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	75	350	128	292	125	65	106	72	118
Future Volume (vph)	75	350	128	292	125	65	106	72	118
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases		2	6		6	8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	30.4	30.4	49.3	45.6	45.6	25.6	23.6	14.2	14.2
Actuated g/C Ratio	0.37	0.37	0.59	0.55	0.55	0.31	0.28	0.17	0.17
v/c Ratio	0.21	0.34	0.23	0.31	0.15	0.24	0.49	0.42	0.69
Control Delay	23.0	20.9	10.5	13.1	2.8	21.0	19.2	38.5	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	20.9	10.5	13.1	2.8	21.0	19.2	38.5	39.4
LOS	C	C	B	B	A	C	B	D	D
Approach Delay		21.2		10.1			19.6		39.2
Approach LOS		C		B			B		D

Intersection Summary

Cycle Length: 93.6

Actuated Cycle Length: 83

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 20.2

Intersection LOS: C

Intersection Capacity Utilization 92.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø6	Ø8		
52.6 s	41 s		

Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext 2019 Existing PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	439	142	324	139	72	268	80	227
v/c Ratio	0.21	0.34	0.23	0.31	0.15	0.24	0.49	0.42	0.69
Control Delay	23.0	20.9	10.5	13.1	2.8	21.0	19.2	38.5	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	20.9	10.5	13.1	2.8	21.0	19.2	38.5	39.4
Queue Length 50th (m)	9.3	26.2	9.9	28.1	0.0	8.0	23.8	11.7	29.3
Queue Length 95th (m)	22.2	43.4	22.1	53.1	8.9	16.6	43.9	25.3	53.3
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	396	1286	622	1045	939	353	785	275	453
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.34	0.23	0.31	0.15	0.20	0.34	0.29	0.50

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2019 Existing PM

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	75	350	45	128	292	125	65	106	135	72	118	86
Future Volume (vph)	75	350	45	128	292	125	65	106	135	72	118	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1823	3485		1806	1902	1596	1782	1733		1807	1738	
Flt Permitted	0.56	1.00		0.44	1.00	1.00	0.34	1.00		0.59	1.00	
Satd. Flow (perm)	1083	3485		829	1902	1596	646	1733		1130	1738	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	83	389	50	142	324	139	72	118	150	80	131	96
RTOR Reduction (vph)	0	10	0	0	0	63	0	55	0	0	30	0
Lane Group Flow (vph)	83	429	0	142	324	76	72	213	0	80	197	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	30.5	30.5		45.6	45.6	45.6	24.6	24.6		14.2	14.2	
Effective Green, g (s)	30.5	30.5		45.6	45.6	45.6	24.6	24.6		14.2	14.2	
Actuated g/C Ratio	0.36	0.36		0.54	0.54	0.54	0.29	0.29		0.17	0.17	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	394	1268		580	1034	868	276	508		191	294	
v/s Ratio Prot		0.12		0.03	c0.17		0.02	c0.12			c0.11	
v/s Ratio Perm	0.08			0.10		0.05	0.06			0.07		
v/c Ratio	0.21	0.34		0.24	0.31	0.09	0.26	0.42		0.42	0.67	
Uniform Delay, d1	18.4	19.3		9.6	10.5	9.1	22.2	23.8		31.1	32.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.7		1.0	0.8	0.2	0.5	0.6		1.5	5.9	
Delay (s)	19.6	20.1		10.6	11.3	9.3	22.7	24.4		32.6	38.5	
Level of Service	B	C		B	B	A	C	C		C	D	
Approach Delay (s)		20.0			10.7			24.0			37.0	
Approach LOS		B			B			C			D	
Intersection Summary												
HCM 2000 Control Delay		20.5			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		83.8			Sum of lost time (s)			21.6				
Intersection Capacity Utilization		92.3%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2019 Existing PM

14: High Street & Third Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Traffic Volume (veh/h)	5	1	13	23	0	106	3	508	40	81	751	3
Future Volume (Veh/h)	5	1	13	23	0	106	3	508	40	81	751	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	1	14	25	0	114	3	546	43	87	808	3
Pedestrians		1			12			1				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1378	1592	408	1179	1572	306	812			601		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1378	1592	408	1179	1572	306	812			601		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	99	98	81	100	83	100			91		
cM capacity (veh/h)	81	97	598	131	100	682	823			976		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	20	139	276	316	491	407						
Volume Left	5	25	3	0	87	0						
Volume Right	14	114	0	43	0	3						
cSH	210	388	823	1700	976	1700						
Volume to Capacity	0.10	0.36	0.00	0.19	0.09	0.24						
Queue Length 95th (m)	2.4	12.1	0.1	0.0	2.2	0.0						
Control Delay (s)	24.0	19.4	0.1	0.0	2.5	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	24.0	19.4	0.1		1.4							
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			58.0%		ICU Level of Service					B		
Analysis Period (min)			15									

Timings
15: High Street & Sixth Street

2019 Existing PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	89	149	40	143	79	302	132	528
Future Volume (vph)	89	149	40	143	79	302	132	528
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	15.5	15.5	15.5	15.5	32.9	25.7	34.1	26.3
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.52	0.41	0.54	0.42
v/c Ratio	0.38	0.60	0.19	0.51	0.17	0.24	0.21	0.44
Control Delay	25.4	23.4	21.8	21.7	7.8	14.6	7.7	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	23.4	21.8	21.7	7.8	14.6	7.7	15.6
LOS	C	C	C	C	A	B	A	B
Approach Delay		23.9		21.7		13.3		14.2
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2
Actuated Cycle Length: 63
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 17.1
Intersection Capacity Utilization 66.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 15: High Street & Sixth Street

Ø1	Ø2	Ø4
19.5 s	30.9 s	33.8 s
Ø5	Ø6	Ø8
19.5 s	30.9 s	33.8 s

Queues
15: High Street & Sixth Street

2019 Existing PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	94	285	42	240	83	352	139	649
v/c Ratio	0.38	0.60	0.19	0.51	0.17	0.24	0.21	0.44
Control Delay	25.4	23.4	21.8	21.7	7.8	14.6	7.7	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	23.4	21.8	21.7	7.8	14.6	7.7	15.6
Queue Length 50th (m)	9.4	24.4	4.0	20.6	3.5	13.5	6.0	27.0
Queue Length 95th (m)	21.9	47.3	11.4	40.5	11.0	28.6	17.0	51.5
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	459	830	403	839	654	1458	793	1483
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	0.20	0.34	0.10	0.29	0.13	0.24	0.18	0.44

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2019 Existing PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	89	149	122	40	143	85	79	302	32	132	528	88
Future Volume (vph)	89	149	122	40	143	85	79	302	32	132	528	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1757		1823	1793		1738	3557		1823	3525	
Flt Permitted	0.55	1.00		0.46	1.00		0.37	1.00		0.53	1.00	
Satd. Flow (perm)	1006	1757		884	1793		673	3557		1019	3525	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	94	157	128	42	151	89	83	318	34	139	556	93
RTOR Reduction (vph)	0	39	0	0	29	0	0	8	0	0	14	0
Lane Group Flow (vph)	94	246	0	42	211	0	83	344	0	139	635	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.5	15.5		15.5	15.5		31.6	25.8		32.6	26.3	
Effective Green, g (s)	15.5	15.5		15.5	15.5		31.6	25.8		32.6	26.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.50	0.40		0.51	0.41	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	426		214	435		430	1438		600	1453	
v/s Ratio Prot		c0.14			0.12		0.02	0.10		c0.02	c0.18	
v/s Ratio Perm	0.09			0.05			0.08			0.10		
v/c Ratio	0.39	0.58		0.20	0.49		0.19	0.24		0.23	0.44	
Uniform Delay, d1	20.2	21.3		19.2	20.7		8.6	12.5		8.3	13.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	2.3		0.6	1.2		0.2	0.4		0.2	1.0	
Delay (s)	21.6	23.5		19.8	21.9		8.8	12.9		8.5	14.4	
Level of Service	C	C		B	C		A	B		A	B	
Approach Delay (s)		23.0			21.6			12.1			13.4	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		16.3			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		63.8			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		66.0%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2019 Existing PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	12	57	286	14	104	380
Future Volume (vph)	12	57	286	14	104	380
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	12	58	292	14	106	388
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	70	306	106	388		
Volume Left (vph)	12	0	106	0		
Volume Right (vph)	58	14	0	0		
Hadj (s)	-0.41	0.00	0.55	0.05		
Departure Headway (s)	5.2	4.7	5.5	5.0		
Degree Utilization, x	0.10	0.40	0.16	0.54		
Capacity (veh/h)	609	744	640	710		
Control Delay (s)	8.8	10.8	8.4	12.4		
Approach Delay (s)	8.8	10.8	11.6			
Approach LOS	A	B	B			
Intersection Summary						
Delay		11.1				
Level of Service		B				
Intersection Capacity Utilization		36.2%		ICU Level of Service		A
Analysis Period (min)		15				

Timings
17: Hurontario Street & Hume Street

2019 Existing PM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	284	233	232	213	162	284
Future Volume (vph)	284	233	232	213	162	284
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	18.2	18.2	30.1	30.1		41.1
Actuated g/C Ratio	0.25	0.25	0.42	0.42		0.57
v/c Ratio	0.67	0.43	0.31	0.30		0.32
Control Delay	31.8	5.5	16.2	3.5		9.0
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	31.8	5.5	16.2	3.5		9.0
LOS	C	A	B	A		A
Approach Delay	19.9		10.2			9.0
Approach LOS	B		B			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 72
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 13.4
 Intersection Capacity Utilization 81.5%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2019 Existing PM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	309	253	252	232	485
v/c Ratio	0.67	0.43	0.31	0.30	0.32
Control Delay	31.8	5.5	16.2	3.5	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	5.5	16.2	3.5	9.0
Queue Length 50th (m)	37.4	0.0	21.2	0.0	14.6
Queue Length 95th (m)	60.7	14.7	43.6	12.7	28.6
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	711	774	803	785	1511
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.43	0.33	0.31	0.30	0.32

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2019 Existing PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	284	233	232	213	162	284
Future Volume (vph)	284	233	232	213	162	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1825	1584	1921	1560	3543	3543
Flt Permitted	0.95	1.00	1.00	1.00	0.70	0.70
Satd. Flow (perm)	1825	1584	1921	1560	2531	2531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	309	253	252	232	176	309
RTOR Reduction (vph)	0	189	0	135	0	0
Lane Group Flow (vph)	309	64	252	97	0	485
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.2	18.2	30.1	30.1		41.1
Effective Green, g (s)	18.2	18.2	30.1	30.1		41.1
Actuated g/C Ratio	0.25	0.25	0.42	0.42		0.57
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	461	400	804	653		1545
v/s Ratio Prot	c0.17		0.13			c0.03
v/s Ratio Perm		0.04		0.06		c0.15
v/c Ratio	0.67	0.16	0.31	0.15		0.31
Uniform Delay, d1	24.2	20.9	14.0	13.0		8.0
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	3.8	0.2	1.0	0.5		0.5
Delay (s)	28.0	21.1	15.0	13.4		8.6
Level of Service	C	C	B	B		A
Approach Delay (s)	24.9		14.3			8.6
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		16.3		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.45				
Actuated Cycle Length (s)		71.9		Sum of lost time (s)		16.6
Intersection Capacity Utilization		81.5%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2019 Existing PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	171	87	49	130	24	37	46	28	42	82	20
Future Volume (vph)	9	171	87	49	130	24	37	46	28	42	82	20
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	10	182	93	52	138	26	39	49	30	45	87	21
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	285	216	118	153								
Volume Left (vph)	10	52	39	45								
Volume Right (vph)	93	26	30	21								
Hadj (s)	-0.15	-0.01	0.03	0.02								
Departure Headway (s)	4.8	5.1	5.5	5.4								
Degree Utilization, x	0.38	0.30	0.18	0.23								
Capacity (veh/h)	703	666	584	604								
Control Delay (s)	10.8	10.2	9.6	10.0								
Approach Delay (s)	10.8	10.2	9.6	10.0								
Approach LOS	B	B	A	A								
Intersection Summary												
Delay		10.3										
Level of Service		B										
Intersection Capacity Utilization		45.7%		ICU Level of Service								
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2019 Existing PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	88	15	27	62	50	8	57	11	76	79	21
Future Volume (vph)	14	88	15	27	62	50	8	57	11	76	79	21
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	16	101	17	31	71	57	9	66	13	87	91	24
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	134	102	57	88	202							
Volume Left (vph)	16	31	0	9	87							
Volume Right (vph)	17	0	57	13	24							
Hadj (s)	0.25	0.47	-0.56	-0.04	0.11							
Departure Headway (s)	5.2	5.9	4.8	4.9	4.9							
Degree Utilization, x	0.19	0.17	0.08	0.12	0.27							
Capacity (veh/h)	642	577	697	678	691							
Control Delay (s)	9.5	8.8	7.0	8.6	9.7							
Approach Delay (s)	9.5	8.2		8.6	9.7							
Approach LOS	A	A		A	A							
Intersection Summary												
Delay			9.1									
Level of Service			A									
Intersection Capacity Utilization			36.0%			ICU Level of Service			A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2019 Existing PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	478	342	44	49	137
Future Volume (Veh/h)	62	478	342	44	49	137
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	70	537	384	49	55	154
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	433				1086	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	433				1086	408
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	93				75	76
cM capacity (veh/h)	1005				223	641
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	607	433	209			
Volume Left	70	0	55			
Volume Right	0	49	154			
cSH	1005	1700	429			
Volume to Capacity	0.07	0.25	0.49			
Queue Length 95th (m)	1.7	0.0	19.8			
Control Delay (s)	1.8	0.0	21.1			
Lane LOS	A		C			
Approach Delay (s)	1.8	0.0	21.1			
Approach LOS			C			
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization			70.4%	ICU Level of Service	C	
Analysis Period (min)			15			



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

2031 Background Traffic Operations (Synchro)

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Background AM

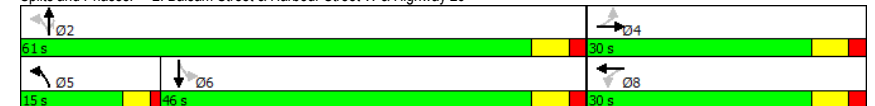
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	0	52	17	0	3	53	451	4	0	554	21
Future Volume (Veh/h)	21	0	52	17	0	3	53	451	4	0	554	21
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	24	0	59	19	0	3	60	513	5	0	630	24
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1266	1268	630	1322	1287	513	654				518	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1266	1268	630	1322	1287	513	654				518	
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	83	100	88	83	100	99	94				100	
cM capacity (veh/h)	139	159	474	112	155	565	923				1058	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	83	22	60	513	5	0	630	24				
Volume Left	24	19	60	0	0	0	0	0				
Volume Right	59	3	0	0	5	0	0	24				
cSH	280	126	923	1700	1700	1700	1700	1700				
Volume to Capacity	0.30	0.17	0.06	0.30	0.00	0.00	0.37	0.01				
Queue Length 95th (m)	9.2	4.6	1.6	0.0	0.0	0.0	0.0	0.0				
Control Delay (s)	23.2	39.6	9.2	0.0	0.0	0.0	0.0	0.0				
Lane LOS	C	E	A									
Approach Delay (s)	23.2	39.6	1.0	0.0								
Approach LOS	C	E										
Intersection Summary												
Average Delay	2.5											
Intersection Capacity Utilization	46.6%			ICU Level of Service			A					
Analysis Period (min)	15											

Timings
2: Balsam Street & Harbour Street W & Highway 26

2031 Background AM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	1	2	49	3	66	560	70	5	642
Future Volume (vph)	1	2	49	3	66	560	70	5	642
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases	4		8		5		2		6
Permitted Phases	4		8		2		2		6
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead				Lag
Lead-Lag Optimize?					Yes				Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	9.5	9.5	9.5	9.5		55.5	57.0		40.4
Actuated g/C Ratio	0.13	0.13	0.13	0.13		0.75	0.77		0.55
v/c Ratio	0.01	0.36	0.35	0.09		0.33	0.06		0.41
Control Delay	29.0	11.2	36.7	17.2		4.1	2.4		11.6
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.0	11.2	36.7	17.2		4.1	2.4		11.6
LOS	C	B	D	B		A	A		B
Approach Delay	11.4		31.7		3.9		11.6		
Approach LOS	B		C		A		B		
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 73.7									
Natural Cycle: 75									
Control Type: Semi Act-Uncoord									
Maximum v/c Ratio: 0.41									
Intersection Signal Delay: 8.9					Intersection LOS: A				
Intersection Capacity Utilization 88.3%					ICU Level of Service E				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2031 Background AM

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	104	58	20	737	82	762
v/c Ratio	0.01	0.36	0.35	0.09	0.33	0.06	0.41
Control Delay	29.0	11.2	36.7	17.2	4.1	2.4	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	11.2	36.7	17.2	4.1	2.4	11.6
Queue Length 50th (m)	0.1	0.3	7.8	0.5	15.2	1.5	32.5
Queue Length 95th (m)	1.3	11.2	17.2	5.8	24.2	5.0	46.2
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	469	580	426	531	2214	1270	1844
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.18	0.14	0.04	0.33	0.06	0.41
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2	87	49	3	14	66	560	70	5	642	1
Traffic Volume (vph)	1	2	87	49	3	14	66	560	70	5	642	1
Future Volume (vph)	1	2	87	49	3	14	66	560	70	5	642	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.85		1.00	0.88			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1825	1554		1785	1586			3488	1633		3543	
Flt Permitted	0.74	1.00		0.69	1.00			0.81	1.00		0.95	
Satd. Flow (perm)	1430	1554		1296	1586			2833	1633		3366	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1	2	102	58	4	16	78	659	82	6	755	1
RTOR Reduction (vph)	0	92	0	0	14	0	0	0	9	0	0	0
Lane Group Flow (vph)	1	12	0	58	6	0	0	737	73	0	762	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	7.5	7.5		7.5	7.5			55.5	55.5		40.4	
Effective Green, g (s)	7.5	7.5		7.5	7.5			55.5	55.5		40.4	
Actuated g/C Ratio	0.10	0.10		0.10	0.10			0.74	0.74		0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	143	155		129	158			2193	1208		1813	
v/s Ratio Prot		0.01			0.00			c0.05				
v/s Ratio Perm	0.00			c0.04				0.20	0.04		c0.23	
v/c Ratio	0.01	0.08		0.45	0.04			0.34	0.06		0.42	
Uniform Delay, d1	30.4	30.6		31.8	30.5			3.4	2.7		10.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.2		2.5	0.1			0.4	0.1		0.7	
Delay (s)	30.4	30.8		34.3	30.6			3.8	2.7		11.0	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		30.8			33.3			3.7			11.0	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			9.8							A		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			75.0							16.0		
Intersection Capacity Utilization			88.3%							E		
Analysis Period (min)			15									
c Critical Lane Group												

Timings 2031 Background AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	19	0	22	3	34	685	3	758
Future Volume (vph)	19	0	22	3	34	685	3	758
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.3	10.3		10.3	53.5	54.3	52.8	52.4
Actuated g/C Ratio	0.16	0.16		0.16	0.84	0.85	0.83	0.82
v/c Ratio	0.08	0.02		0.13	0.07	0.28	0.01	0.33
Control Delay	26.6	0.1		24.9	2.5	4.1	2.7	5.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	0.1		24.9	2.5	4.1	2.7	5.6
LOS	C	A		C	A	A	A	A
Approach Delay		17.5		24.9		4.0		5.5
Approach LOS		B		C		A		A

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 63.8
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.33
Intersection Signal Delay: 5.4
Intersection Capacity Utilization 52.5%
Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

15 s	47 s	22 s	22 s
15 s	47 s	22 s	22 s

Queues 2031 Background AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	23	12	35	41	826	4	941
v/c Ratio	0.08	0.02	0.13	0.07	0.28	0.01	0.33
Control Delay	26.6	0.1	24.9	2.5	4.1	2.7	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	0.1	24.9	2.5	4.1	2.7	5.6
Queue Length 50th (m)	1.5	0.0	2.1	0.3	0.0	0.0	0.0
Queue Length 95th (m)	8.3	0.0	10.4	3.0	39.6	0.7	46.1
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	441	644	441	643	2988	763	2893
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.02	0.08	0.06	0.28	0.01	0.33

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	19	0	10	22	3	3	34	685	1	3	758	23
Future Volume (vph)	19	0	10	22	3	3	34	685	1	3	758	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frft	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1635		1705	3509		1825	3518	
Flt Permitted	1.00	1.00			1.00		0.28	1.00		0.34	1.00	
Satd. Flow (perm)	1715	1633			1698		508	3509		654	3518	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	23	0	12	27	4	4	41	825	1	4	913	28
RTOR Reduction (vph)	0	11	0	0	4	0	0	0	0	0	2	0
Lane Group Flow (vph)	23	1	0	0	31	0	41	826	0	4	939	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	3.4	3.4			3.4		52.6	50.2		50.2	49.0	
Effective Green, g (s)	3.4	3.4			3.4		52.6	50.2		50.2	49.0	
Actuated g/C Ratio	0.05	0.05			0.05		0.74	0.71		0.71	0.69	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	82	78			81		417	2488		483	2434	
v/s Ratio Prot		0.00					0.00	0.24		0.00	0.27	
v/s Ratio Perm	0.01				0.02		0.07			0.01		
v/c Ratio	0.28	0.01			0.39		0.10	0.33		0.01	0.39	
Uniform Delay, d1	32.5	32.1			32.7		2.5	3.9		3.0	4.6	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.0			3.0		0.1	0.4		0.0	0.5	
Delay (s)	34.4	32.1			35.7		2.6	4.3		3.0	5.0	
Level of Service	C	C			D		A	A		A	A	
Approach Delay (s)		33.6			35.7			4.2			5.0	
Approach LOS		C			D			A			A	

Intersection Summary

HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

2031 Background AM

	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations	↰	↱	↰	↰	↱	↱
Traffic Volume (vph)	24	0	0	59	715	739
Future Volume (vph)	24	0	0	59	715	739
Turn Type	Perm	NA	NA	pm+pt	NA	NA
Protected Phases		4	8	5	2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	5	2	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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	4.0	6.0	6.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	10.1	10.1	10.1	65.4	65.9	55.5
Actuated g/C Ratio	0.13	0.13	0.13	0.83	0.84	0.71
v/c Ratio	0.17	0.07	0.00	0.15	0.30	0.38
Control Delay	34.6	0.3	0.0	2.9	3.1	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	0.3	0.0	2.9	3.1	7.5
LOS	C	A	A	A	A	A
Approach Delay		15.6			3.1	7.5
Approach LOS		B			A	A

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 78.6	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 5.6	Intersection LOS: A
Intersection Capacity Utilization 67.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2031 Background AM

4: Balsam Street & Old Mountain Road/Commercial Access

						
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	30	37	1	73	885	956
v/c Ratio	0.17	0.07	0.00	0.15	0.30	0.38
Control Delay	34.6	0.3	0.0	2.9	3.1	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	0.3	0.0	2.9	3.1	7.5
Queue Length 50th (m)	4.3	0.0	0.0	2.3	21.1	39.0
Queue Length 95th (m)	10.8	0.0	0.0	4.3	24.3	44.8
Internal Link Dist (m)	175.6		57.5	179.2		181.9
Turn Bay Length (m)			70.0			
Base Capacity (vph)	265	593	374	626	2914	2484
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	0.11	0.06	0.00	0.12	0.30	0.38
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

2031 Background AM

4: Balsam Street & Old Mountain Road/Commercial Access

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	0	30	0	0	1	59	715	2	0	739	36
Future Volume (vph)	24	0	30	0	0	1	59	715	2	0	739	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95			0.95	
Flpb, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00			1.00	
Flt	1.00	0.85			0.86		1.00	1.00			0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1723	1607			1085		1721	3472			3515	
Flt Permitted	0.76	1.00			1.00		0.25	1.00			1.00	
Satd. Flow (perm)	1374	1607			1085		461	3472			3515	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	30	0	37	0	0	1	73	883	2	0	912	44
RTOR Reduction (vph)	0	34	0	0	1	0	0	0	0	0	3	0
Lane Group Flow (vph)	30	3	0	0	0	0	73	885	0	0	953	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.8	5.8			5.8		64.1	64.1			54.3	
Effective Green, g (s)	5.8	5.8			5.8		64.1	64.1			54.3	
Actuated g/C Ratio	0.07	0.07			0.07		0.78	0.78			0.66	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	97	113			76		450	2717			2330	
v/s Ratio Prot		0.00			0.00		0.01	c0.25			c0.27	
v/s Ratio Perm	c0.02						0.12					
v/c Ratio	0.31	0.02			0.00		0.16	0.33			0.41	
Uniform Delay, d1	36.1	35.4			35.4		2.6	2.6			6.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.8	0.1			0.0		0.2	0.3			0.5	
Delay (s)	38.0	35.5			35.4		2.7	2.9			6.9	
Level of Service	D	D			D		A	A			A	
Approach Delay (s)		36.6			35.4			2.9			6.9	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.0			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.40										
Actuated Cycle Length (s)		81.9			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		67.4%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

Timings 2031 Background AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	15	195	83	279	425	114	350	425	335
Future Volume (vph)	15	195	83	279	425	114	350	425	335
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.6	16.2	29.2	22.6	50.3	21.9	21.9	27.2	27.2
Actuated g/C Ratio	0.26	0.17	0.30	0.24	0.52	0.23	0.23	0.28	0.28
v/c Ratio	0.06	0.54	0.30	0.41	0.56	0.34	0.69	0.68	0.68
Control Delay	25.7	37.5	28.2	35.1	7.3	35.1	37.9	41.6	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	37.5	28.2	35.1	7.3	35.1	37.9	41.6	36.4
LOS	C	D	C	D	A	D	D	D	D
Approach Delay		36.9		19.3			37.3		38.1
Approach LOS		D		B			D		D

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 96.1
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 31.7
Intersection Capacity Utilization 68.0%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service C

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↰ Ø3	↱ Ø4
35.5 s	35.5 s	11 s	38 s
		↰ Ø7	↱ Ø8
		14 s	35 s

Queues 2031 Background AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	18	329	101	340	518	139	554	311	637
v/c Ratio	0.06	0.54	0.30	0.41	0.56	0.34	0.69	0.68	0.68
Control Delay	25.7	37.5	28.2	35.1	7.3	35.1	37.9	41.6	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	37.5	28.2	35.1	7.3	35.1	37.9	41.6	36.4
Queue Length 50th (m)	2.4	27.5	14.0	27.2	17.9	22.9	49.7	58.2	59.3
Queue Length 95th (m)	7.2	39.4	25.6	44.0	34.8	37.0	62.4	90.5	80.2
Internal Link Dist (m)		178.2		250.8		206.8		179.2	
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	301	1040	350	1173	956	559	1079	499	1018
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.32	0.29	0.29	0.54	0.25	0.51	0.62	0.63

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	15	195	75	83	279	425	114	350	104	425	335	17
Future Volume (vph)	15	195	75	83	279	425	114	350	104	425	335	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1686	3379		1823	3544	1530	1807	3419		1612	3284	
Flt Permitted	0.55	1.00		0.41	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	971	3379		791	3544	1530	1807	3419		1612	3284	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	18	238	91	101	340	518	139	427	127	518	409	21
RTOR Reduction (vph)	0	35	0	0	0	135	0	23	0	0	2	0
Lane Group Flow (vph)	18	294	0	101	340	383	139	531	0	311	635	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	20.3	17.8		29.1	22.6	49.8	21.9	21.9		27.2	27.2	
Effective Green, g (s)	20.3	17.8		29.1	22.6	49.8	21.9	21.9		27.2	27.2	
Actuated g/C Ratio	0.21	0.18		0.30	0.23	0.51	0.22	0.22		0.28	0.28	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	218	612		311	815	775	402	762		446	909	
v/s Ratio Prot	0.00	0.09		c0.02	0.10	c0.14	0.08	c0.16		0.19	c0.19	
v/s Ratio Perm	0.01			0.07		0.11						
v/c Ratio	0.08	0.48		0.32	0.42	0.49	0.35	0.70		0.70	0.70	
Uniform Delay, d1	31.2	36.1		25.9	32.2	15.9	32.1	35.1		31.8	31.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.6		0.6	0.3	0.5	0.5	2.8		4.7	2.4	
Delay (s)	31.4	36.6		26.5	32.5	16.4	32.6	37.9		36.5	34.2	
Level of Service	C	D		C	B	C	D	D		D	C	
Approach Delay (s)		36.4			23.2			36.8			35.0	
Approach LOS		D			C			D			C	

Intersection Summary

HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	98.2	Sum of lost time (s)	24.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	4	718	17	804	5	2	13	4
Future Volume (vph)	4	718	17	804	5	2	13	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.8	90.6	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.86	0.84	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.01	0.29	0.03	0.32	0.05	0.18	0.12	0.05
Control Delay	2.0	4.1	1.9	3.5	45.6	20.0	47.3	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.1	1.9	3.5	45.6	20.0	47.3	36.4
LOS	A	A	A	A	D	C	D	D
Approach Delay		4.1		3.4		24.2		43.2
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.32
Intersection Signal Delay: 4.6
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	861	20	967	6	31	15	9
v/c Ratio	0.01	0.29	0.03	0.32	0.05	0.18	0.12	0.05
Control Delay	2.0	4.1	1.9	3.5	45.6	20.0	47.3	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.1	1.9	3.5	45.6	20.0	47.3	36.4
Queue Length 50th (m)	0.2	20.0	0.6	23.6	1.2	0.4	2.9	1.0
Queue Length 95th (m)	0.7	39.1	1.6	45.3	4.8	8.4	8.8	5.3
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	558	2990	601	3006	333	380	325	415
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	0.01	0.29	0.03	0.32	0.02	0.08	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	4	718	5	17	804	8	5	2	24	13	4	3
Future Volume (vph)	4	718	5	17	804	8	5	2	24	13	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3570		1825	3505		1815	1521		1778	1779	
Flt Permitted	0.29	1.00		0.31	1.00		0.75	1.00		0.74	1.00	
Satd. Flow (perm)	555	3570		603	3505		1437	1521		1379	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	5	855	6	20	957	10	6	2	29	15	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	27	0	0	4	0
Lane Group Flow (vph)	5	861	0	20	967	0	6	4	0	15	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4					
Actuated Green, G (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.78	0.77		0.81	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	451	2754		520	2749		79	84		76	98	
v/s Ratio Prot	0.00	0.24		c0.00	c0.28			0.00			0.00	
v/s Ratio Perm	0.01			0.03			0.00			c0.01		
v/c Ratio	0.01	0.31		0.04	0.35		0.08	0.04		0.20	0.05	
Uniform Delay, d1	2.5	3.7		2.0	3.5		48.4	48.3		48.8	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.0	0.4		0.4	0.2		1.3	0.2	
Delay (s)	2.5	4.0		2.1	3.8		48.8	48.5		50.0	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		4.0			3.8			48.6			49.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay				5.3			HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio				0.34								
Actuated Cycle Length (s)				108.1			Sum of lost time (s)			15.9		
Intersection Capacity Utilization				62.4%			ICU Level of Service			B		
Analysis Period (min)				15								
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	50	671	10	693	27	36	83	30
Future Volume (vph)	50	671	10	693	27	36	83	30
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.9	73.7	73.7	67.4	12.5	12.5	12.5	12.5
Actuated g/C Ratio	0.77	0.74	0.74	0.67	0.12	0.12	0.12	0.12
v/c Ratio	0.11	0.31	0.02	0.34	0.33	0.27	0.58	0.57
Control Delay	3.8	5.8	1.5	4.8	47.5	28.7	53.8	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	5.8	1.5	4.8	47.5	28.7	53.8	16.8
LOS	A	A	A	A	D	C	D	B
Approach Delay		5.6		4.8		34.7		29.2
Approach LOS		A		A		C		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 9.9

Intersection LOS: A

Intersection Capacity Utilization 55.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	815	12	813	31	66	97	192
v/c Ratio	0.11	0.31	0.02	0.34	0.33	0.27	0.58	0.57
Control Delay	3.8	5.8	1.5	4.8	47.5	28.7	53.8	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	5.8	1.5	4.8	47.5	28.7	53.8	16.8
Queue Length 50th (m)	2.1	21.2	0.3	3.7	5.6	7.4	18.0	6.2
Queue Length 95th (m)	5.7	48.1	m0.3	36.7	13.2	17.4	30.6	22.1
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	523	2600	553	2359	181	442	322	506
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	0.31	0.02	0.34	0.17	0.15	0.30	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	50	671	30	10	693	6	27	36	21	83	30	135
Future Volume (vph)	50	671	30	10	693	6	27	36	21	83	30	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3522		1825	3501		1752	1761		1771	1613	
Flt Permitted	0.30	1.00		0.34	1.00		0.41	1.00		0.71	1.00	
Satd. Flow (perm)	580	3522		661	3501		757	1761		1331	1613	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	58	780	35	12	806	7	31	42	24	97	35	157
RTOR Reduction (vph)	0	2	0	0	0	0	0	21	0	0	137	0
Lane Group Flow (vph)	58	813	0	12	813	0	31	45	0	97	55	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.8	70.6		67.8	66.6		12.5	12.5		12.5	12.5	
Effective Green, g (s)	75.8	70.6		67.8	66.6		12.5	12.5		12.5	12.5	
Actuated g/C Ratio	0.76	0.71		0.68	0.67		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	504	2486		462	2331		94	220		166	201	
v/s Ratio Prot	c0.01	c0.23		0.00	c0.23		0.03			0.03		
v/s Ratio Perm	0.08			0.02			0.04			c0.07		
v/c Ratio	0.12	0.33		0.03	0.35		0.33	0.20		0.58	0.27	
Uniform Delay, d1	3.4	5.6		5.2	7.3		39.9	39.3		41.3	39.6	
Progression Factor	1.00	1.00		0.40	0.55		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.0	0.4		2.1	0.5		5.2	0.7	
Delay (s)	3.5	6.0		2.1	4.4		42.0	39.7		46.5	40.4	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		5.8			4.3			40.5			42.4	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

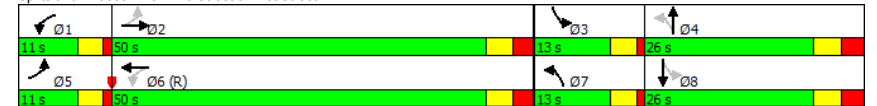
2031 Background AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	28	583	19	778	102	14	35	27
Future Volume (vph)	28	583	19	778	102	14	35	27
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.7	63.1	66.9	60.9	20.8	13.3	17.6	10.2
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.21	0.13	0.18	0.10
v/c Ratio	0.08	0.34	0.05	0.43	0.45	0.13	0.16	0.34
Control Delay	4.4	8.9	4.7	9.5	36.6	27.6	30.1	26.2
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.4	8.9	4.7	9.6	36.6	27.6	30.1	26.2
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.7		9.5		34.8		27.6
Approach LOS		A		A		C		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 12.1
Intersection Capacity Utilization 48.9%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service A

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	750	22	924	120	31	41	74
v/c Ratio	0.08	0.34	0.05	0.43	0.45	0.13	0.16	0.34
Control Delay	4.4	8.9	4.7	9.5	36.6	27.6	30.1	26.2
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.4	8.9	4.7	9.6	36.6	27.6	30.1	26.2
Queue Length 50th (m)	1.6	38.3	1.0	66.5	18.8	2.8	6.1	5.8
Queue Length 95th (m)	2.2	39.1	m2.5	39.9	31.3	10.5	13.3	17.2
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	417	2201	463	2134	266	358	286	379
Starvation Cap Reductn	0	0	0	290	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	0.34	0.05	0.50	0.45	0.09	0.14	0.20
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	28	583	54	19	778	8	102	14	13	35	27	36
Future Volume (vph)	28	583	54	19	778	8	102	14	13	35	27	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3483		1629	3505		1736	1689		1711	1733	
Flt Permitted	0.25	1.00		0.34	1.00		0.48	1.00		0.74	1.00	
Satd. Flow (perm)	480	3483		583	3505		884	1689		1327	1733	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	33	686	64	22	915	9	120	16	15	41	32	42
RTOR Reduction (vph)	0	5	0	0	0	0	0	13	0	0	38	0
Lane Group Flow (vph)	33	745	0	22	924	0	120	18	0	41	36	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	63.3	59.1		60.5	57.7		22.2	13.3		13.5	8.6	
Effective Green, g (s)	63.3	59.1		60.5	57.7		22.2	13.3		13.5	8.6	
Actuated g/C Ratio	0.63	0.59		0.60	0.58		0.22	0.13		0.14	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	360	2058		382	2022		278	224		197	149	
v/s Ratio Prot	c0.00	0.21		0.00	c0.26		c0.04	0.01		0.01	0.02	
v/s Ratio Perm	0.05			0.03			c0.05			0.02		
v/c Ratio	0.09	0.36		0.06	0.46		0.43	0.08		0.21	0.24	
Uniform Delay, d1	7.5	10.6		8.0	12.1		32.6	38.0		38.3	42.6	
Progression Factor	0.68	0.84		0.76	0.73		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.5		0.1	0.7		1.1	0.2		0.5	0.8	
Delay (s)	5.2	9.4		6.2	9.6		33.7	38.1		38.9	43.5	
Level of Service	A	A		A	A		C	D		D	D	
Approach Delay (s)		9.2			9.5			34.6			41.8	
Approach LOS		A			A			C			D	
Intersection Summary												
HCM 2000 Control Delay				13.2			HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio				0.45								
Actuated Cycle Length (s)				100.0			Sum of lost time (s)			19.9		
Intersection Capacity Utilization				48.9%			ICU Level of Service			A		
Analysis Period (min)				15								
c Critical Lane Group												

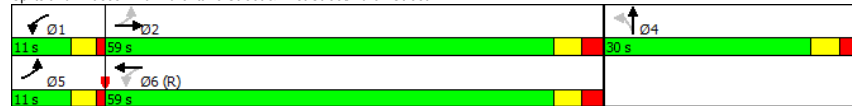
Timings 2031 Background AM
9: Hurontario Street & First Street/Huron Street

	↖	→	↗	↖	↗	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	22	535	38	667	147	19
Future Volume (vph)	22	535	38	667	147	19
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	72.8	67.1	74.0	69.2	15.0	15.0
Actuated g/C Ratio	0.73	0.67	0.74	0.69	0.15	0.15
v/c Ratio	0.06	0.31	0.08	0.34	0.65	0.22
Control Delay	1.5	2.2	4.2	7.9	50.9	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	2.2	4.2	7.9	50.9	18.6
LOS	A	A	A	A	D	B
Approach Delay		2.2		7.7		42.3
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 9.9 Intersection LOS: A
 Intersection Capacity Utilization 43.7% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues 2031 Background AM
9: Hurontario Street & First Street/Huron Street

	↖	→	↗	↖	↗	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	26	723	45	823	175	63
v/c Ratio	0.06	0.31	0.08	0.34	0.65	0.22
Control Delay	1.5	2.2	4.2	7.9	50.9	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	2.2	4.2	7.9	50.9	18.6
Queue Length 50th (m)	0.3	5.6	1.8	24.4	32.4	3.9
Queue Length 95th (m)	1.0	6.5	5.0	51.3	46.5	12.7
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	470	2345	579	2443	438	449
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	0.06	0.31	0.08	0.34	0.40	0.14

Intersection Summary

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	22	535	72	38	667	24	147	19	34	0	0	0
Future Volume (vph)	22	535	72	38	667	24	147	19	34	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.98		1.00	0.99		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3487		1825	3526		1793	1712				
Flt Permitted	0.32	1.00		0.35	1.00		0.95	1.00				
Satd. Flow (perm)	542	3487		674	3526		1793	1712				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	26	637	86	45	794	29	175	23	40	0	0	0
RTOR Reduction (vph)	0	8	0	0	2	0	0	34	0	0	0	0
Lane Group Flow (vph)	26	715	0	45	821	0	175	29	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	68.1	65.5		70.7	66.8		15.0	15.0				
Effective Green, g (s)	68.1	65.5		70.7	66.8		15.0	15.0				
Actuated g/C Ratio	0.68	0.66		0.71	0.67		0.15	0.15				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	396	2283		521	2355		268	256				
v/s Ratio Prot	0.00	0.21		c0.00	c0.23			0.02				
v/s Ratio Perm	0.04			0.06			c0.10					
v/c Ratio	0.07	0.31		0.09	0.35		0.65	0.11				
Uniform Delay, d1	5.2	7.5		4.5	7.2		40.0	36.7				
Progression Factor	0.33	0.23		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	0.3		0.1	0.4		5.6	0.2				
Delay (s)	1.8	2.1		4.6	7.6		45.7	36.9				
Level of Service	A	A		A	A		D	D				
Approach Delay (s)		2.1			7.4			43.4			0.0	
Approach LOS		A			A			D			A	

Intersection Summary

HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings

10: Pretty River Parkway & Hume Street/Highway 26 E

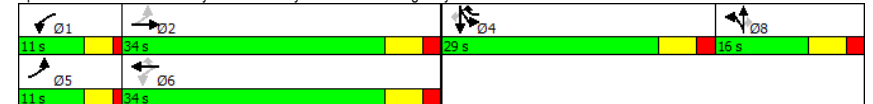
2031 Background AM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	98	200	6	386	720	10	23	14	242	34	56
Future Volume (vph)	98	200	6	386	720	10	23	14	242	34	56
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	34.0	11.0	34.0	29.0	16.0	16.0	16.0	29.0	29.0	29.0
Total Split (%)	12.2%	37.8%	12.2%	37.8%	32.2%	17.8%	17.8%	17.8%	32.2%	32.2%	32.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	39.2	35.9	36.9	29.5	46.8	10.6	10.6	10.6	17.3	17.3	17.3
Actuated g/C Ratio	0.52	0.47	0.49	0.39	0.62	0.14	0.14	0.14	0.23	0.23	0.23
v/c Ratio	0.26	0.15	0.01	0.59	0.66	0.05	0.11	0.05	0.41	0.40	0.14
Control Delay	14.4	15.1	13.5	27.5	4.6	36.2	36.5	0.4	30.9	30.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	15.1	13.5	27.5	4.6	36.2	36.5	0.4	30.9	30.6	0.6
LOS	B	B	B	C	A	D	D	A	C	C	A
Approach Delay		14.9		12.6			25.5			25.6	
Approach LOS		B		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 76	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 15.7	Intersection LOS: B
Intersection Capacity Utilization 72.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Background AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	110	246	7	434	809	11	26	16	155	155	63
v/c Ratio	0.26	0.15	0.01	0.59	0.66	0.05	0.11	0.05	0.41	0.40	0.14
Control Delay	14.4	15.1	13.5	27.5	4.6	36.2	36.5	0.4	30.9	30.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	15.1	13.5	27.5	4.6	36.2	36.5	0.4	30.9	30.6	0.6
Queue Length 50th (m)	9.6	11.4	0.6	61.5	8.2	1.6	3.9	0.0	23.1	23.1	0.0
Queue Length 95th (m)	19.9	24.4	2.9	98.8	23.7	6.6	11.4	0.0	40.6	40.5	0.0
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)	60.0		15.0		15.0		70.0				
Base Capacity (vph)	425	1667	533	731	1282	228	242	303	527	541	590
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.15	0.01	0.59	0.63	0.05	0.11	0.05	0.29	0.29	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	98	200	19	6	386	720	10	23	14	242	34	56
Future Volume (vph)	98	200	19	6	386	720	10	23	14	242	34	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3514		1558	1883	1564	1644	1746	1207	1651	1695	1512
Flt Permitted	0.31	1.00		0.60	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	597	3514		983	1883	1564	1644	1746	1207	1651	1695	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	110	225	21	7	434	809	11	26	16	272	38	63
RTOR Reduction (vph)	0	6	0	0	0	269	0	0	15	0	0	50
Lane Group Flow (vph)	110	240	0	7	434	540	11	26	1	155	155	13
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	41.2	36.0		33.1	31.9	49.2	5.2	5.2	5.2	17.3	17.3	17.3
Effective Green, g (s)	41.2	36.0		33.1	31.9	49.2	5.2	5.2	5.2	17.3	17.3	17.3
Actuated g/C Ratio	0.50	0.44		0.41	0.39	0.60	0.06	0.06	0.06	0.21	0.21	0.21
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	379	1548		406	735	1056	104	111	76	349	358	320
v/s Ratio Prot	c0.02	0.07		0.00	c0.23	c0.11	0.01	c0.01		0.09	0.09	
v/s Ratio Perm	0.13			0.01		0.24			0.00			0.01
v/c Ratio	0.29	0.15		0.02	0.59	0.51	0.11	0.23	0.01	0.44	0.43	0.04
Uniform Delay, d1	12.0	13.7		14.5	19.7	9.3	36.1	36.4	35.8	28.0	27.9	25.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		0.0	3.5	0.4	0.4	1.1	0.1	0.9	0.8	0.1
Delay (s)	12.4	13.9		14.5	23.2	9.8	36.5	37.4	35.9	28.9	28.8	25.7
Level of Service	B	B		B	C	A	D	D	D	C	C	C
Approach Delay (s)	13.5			14.4			36.8			28.3		
Approach LOS	B			B			D			C		

Intersection Summary

HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	22.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2031 Background AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	0	0	108	737	110	273
Future Volume (vph)	3	0	0	108	737	110	273
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases		4		2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)		14.7	14.7	34.8	27.5	34.8	27.5
Actuated g/C Ratio		0.23	0.23	0.56	0.44	0.56	0.44
v/c Ratio		0.08	0.79	0.19	0.55	0.31	0.22
Control Delay		0.5	20.7	7.0	16.4	8.5	12.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.5	20.7	7.0	16.4	8.5	12.8
LOS		A	C	A	B	A	B
Approach Delay		0.5	20.7		15.2		11.7
Approach LOS		A	C		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 62.7
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 65.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues 2031 Background AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	28	463	124	849	126	335
v/c Ratio	0.08	0.79	0.19	0.55	0.31	0.22
Control Delay	0.5	20.7	7.0	16.4	8.5	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.5	20.7	7.0	16.4	8.5	12.8
Queue Length 50th (m)	0.0	20.4	5.2	39.1	5.3	12.5
Queue Length 95th (m)	0.0	48.1	12.9	60.6	13.1	22.3
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	446	705	660	1535	401	1491
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	0.06	0.66	0.19	0.55	0.31	0.22

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	3	0	22	0	0	403	108	737	2	110	273	18
Future Volume (vph)	3	0	22	0	0	403	108	737	2	110	273	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Flt		0.88			0.86		1.00	1.00		1.00	0.99	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1648			1613		1789	3505		1706	3389	
Flt Permitted		0.69			1.00		0.55	1.00		0.26	1.00	
Satd. Flow (perm)		1149			1613		1036	3505		470	3389	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	3	0	25	0	0	463	124	847	2	126	314	21
RTOR Reduction (vph)	0	22	0	0	207	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	6	0	0	256	0	124	849	0	126	329	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA	pm+pt	NA	pm+pt		NA		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.7			14.7		32.8	27.5		32.8	27.5	
Effective Green, g (s)		14.7			14.7		32.8	27.5		32.8	27.5	
Actuated g/C Ratio		0.23			0.23		0.52	0.43		0.52	0.43	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		265			373		597	1517		345	1467	
v/s Ratio Prot					0.16		0.02	0.24		0.03	0.10	
v/s Ratio Perm		0.01					0.09			0.16		
v/c Ratio		0.02			0.68		0.21	0.56		0.37	0.22	
Uniform Delay, d1		18.9			22.3		8.0	13.5		8.4	11.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			5.1		0.2	1.5		0.7	0.4	
Delay (s)		18.9			27.4		8.1	15.0		9.0	11.7	
Level of Service		B			C		A	B		A	B	
Approach Delay (s)		18.9			27.4		14.1			10.9		
Approach LOS		B			C		B			B		

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
12: Tenth Line & Mountain Road

2031 Background AM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	257	25	357	63	30	25	14
Future Volume (vph)	4	257	25	357	63	30	25	14
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		34.4		34.4		11.7		11.7
Actuated g/C Ratio		0.60		0.60		0.20		0.20
v/c Ratio		0.34		0.47		0.57		0.19
Control Delay		6.7		8.2		21.4		18.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		6.7		8.2		21.4		18.9
LOS		A		A		C		B
Approach Delay		6.7		8.2		21.4		18.9
Approach LOS		A		A		C		B
Intersection Summary								
Cycle Length: 60.2								
Actuated Cycle Length: 57.1								
Natural Cycle: 55								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.57								
Intersection Signal Delay: 10.6					Intersection LOS: B			
Intersection Capacity Utilization 54.9%					ICU Level of Service A			
Analysis Period (min) 15								

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2031 Background AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	369	512	199	53
v/c Ratio	0.34	0.47	0.57	0.19
Control Delay	6.7	8.2	21.4	18.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.7	8.2	21.4	18.9
Queue Length 50th (m)	14.3	22.9	12.9	4.1
Queue Length 95th (m)	27.4	41.6	25.0	10.2
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1093	1093	428	356
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	0.34	0.47	0.46	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	257	38	25	357	32	63	30	68	25	14	4
Future Volume (vph)	4	257	38	25	357	32	63	30	68	25	14	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.94			0.99	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1810			1863			1695			1648	
Flt Permitted		0.99			0.97			0.85			0.79	
Satd. Flow (perm)		1800			1805			1466			1339	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	5	317	47	31	441	40	78	37	84	31	17	5
RTOR Reduction (vph)	0	8	0	0	5	0	0	46	0	0	4	0
Lane Group Flow (vph)	0	361	0	0	507	0	0	153	0	0	49	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		34.4			34.4			11.7			11.7	
Effective Green, g (s)		34.4			34.4			11.7			11.7	
Actuated g/C Ratio		0.60			0.60			0.21			0.21	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1086			1089			300			274	
v/s Ratio Prot												
v/s Ratio Perm		0.20			0.28			0.10			0.04	
v/c Ratio		0.33			0.47			0.51			0.18	
Uniform Delay, d1		5.6			6.2			20.1			18.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.8			1.4			1.4			0.3	
Delay (s)		6.4			7.7			21.5			19.0	
Level of Service		A			A			C			B	
Approach Delay (s)		6.4			7.7			21.5			19.0	
Approach LOS		A			A			C			B	
Intersection Summary												
HCM 2000 Control Delay		10.2		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio		0.48										
Actuated Cycle Length (s)		57.0		Sum of lost time (s)					10.9			
Intersection Capacity Utilization		54.9%		ICU Level of Service					A			
Analysis Period (min)		15										
c Critical Lane Group												

Timings 2031 Background AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	29	276	47	374	30	40	22	15	22
Future Volume (vph)	29	276	47	374	30	40	22	15	22
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases	2		6		6	8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	31.2	31.2	50.5	50.7	50.7	14.5	14.0	7.9	7.9
Actuated g/C Ratio	0.46	0.46	0.74	0.74	0.74	0.21	0.21	0.12	0.12
v/c Ratio	0.08	0.23	0.07	0.31	0.03	0.17	0.16	0.10	0.27
Control Delay	16.2	14.1	5.9	8.1	0.2	22.4	13.8	33.5	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	14.1	5.9	8.1	0.2	22.4	13.8	33.5	22.3
LOS	B	B	A	A	A	C	B	C	C
Approach Delay		14.3		7.3			17.5		24.9
Approach LOS		B		A			B		C

Intersection Summary

Cycle Length: 93.6
Actuated Cycle Length: 68.2
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.31
Intersection Signal Delay: 12.0
Intersection Capacity Utilization 73.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø5	Ø6	Ø7	Ø8
52.6 s		11 s	

Queues 2031 Background AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	34	369	55	440	35	47	61	18	58
v/c Ratio	0.08	0.23	0.07	0.31	0.03	0.17	0.16	0.10	0.27
Control Delay	16.2	14.1	5.9	8.1	0.2	22.4	13.8	33.5	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	14.1	5.9	8.1	0.2	22.4	13.8	33.5	22.3
Queue Length 50th (m)	3.0	17.6	2.7	31.0	0.0	5.2	2.9	2.5	3.6
Queue Length 95th (m)	8.7	27.7	7.0	51.9	0.2	11.8	10.6	7.7	12.9
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	445	1588	771	1414	1235	373	905	483	519
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.23	0.07	0.31	0.03	0.13	0.07	0.04	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	29	276	37	47	374	30	40	22	30	15	22	27
Future Volume (vph)	29	276	37	47	374	30	40	22	30	15	22	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3454		1705	1902	1633	1770	1666		1572	1626	
Flt Permitted	0.51	1.00		0.47	1.00	1.00	0.49	1.00		0.95	1.00	
Satd. Flow (perm)	975	3454		847	1902	1633	909	1666		1576	1626	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	34	325	44	55	440	35	47	26	35	18	26	32
RTOR Reduction (vph)	0	10	0	0	0	12	0	29	0	0	30	0
Lane Group Flow (vph)	34	359	0	55	440	23	47	32	0	18	28	0
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	2			1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	31.4	31.4		46.8	46.8	46.8	12.3	12.3		4.2	4.2	
Effective Green, g (s)	31.4	31.4		46.8	46.8	46.8	12.3	12.3		4.2	4.2	
Actuated g/C Ratio	0.43	0.43		0.64	0.64	0.64	0.17	0.17		0.06	0.06	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	421	1491		679	1224	1051	202	281		91	93	
v/s Ratio Prot		0.10		0.01	0.23		0.01	0.02			0.02	
v/s Ratio Perm	0.03			0.04		0.01	0.03			0.01		
v/c Ratio	0.08	0.24		0.08	0.36	0.02	0.23	0.11		0.20	0.30	
Uniform Delay, d1	12.2	13.1		4.9	6.0	4.7	25.9	25.6		32.6	32.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.2	0.8	0.0	0.6	0.2		1.1	1.8	
Delay (s)	12.5	13.5		5.1	6.8	4.7	26.5	25.8		33.7	34.6	
Level of Service	B	B		A	A	A	C	C		C	C	
Approach Delay (s)		13.4			6.5			26.1			34.4	
Approach LOS		B			A			C			C	

Intersection Summary

HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	72.7	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
14: High Street & Third Street

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (veh/h)	4	0	3	15	0	71	1	547	56	69	398	3
Future Volume (Veh/h)	4	0	3	15	0	71	1	547	56	69	398	3
Sign Control	Stop			Stop			Free				Free	
Grade	0%			0%			0%				0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	0	3	17	0	83	1	636	65	80	463	3
Pedestrians					9							
Lane Width (m)					3.7							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1028	1336	233	1074	1306	360	466			710		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1028	1336	233	1074	1306	360	466			710		
tC, single (s)	7.5	6.5	8.2	7.5	6.5	7.0	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	4.0	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	97	100	100	89	100	87	100			90		
cM capacity (veh/h)	153	139	603	161	145	624	1106			827		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	100	319	383	312	234
Volume Left	5	17	1	0	80	0
Volume Right	3	83	0	65	0	3
cSH	212	419	1106	1700	827	1700
Volume to Capacity	0.04	0.24	0.00	0.23	0.10	0.14
Queue Length 95th (m)	0.9	7.0	0.0	0.0	2.4	0.0
Control Delay (s)	22.7	16.3	0.0	0.0	3.3	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	22.7	16.3	0.0		1.9	
Approach LOS	C	C				

Intersection Summary

Average Delay	2.1		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

Timings
15: High Street & Sixth Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	80	210	21	134	111	393	83	230
Future Volume (vph)	80	210	21	134	111	393	83	230
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	34.7	26.4	33.4	25.7
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.50	0.38	0.49	0.37
v/c Ratio	0.38	0.71	0.16	0.55	0.23	0.40	0.21	0.28
Control Delay	24.7	28.3	21.0	21.4	10.0	18.3	10.1	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	28.3	21.0	21.4	10.0	18.3	10.1	17.0
LOS	C	C	C	C	A	B	B	B
Approach Delay		27.5		21.3		16.6		15.4
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2
Actuated Cycle Length: 68.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 19.9
Intersection Capacity Utilization 66.8%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service C

Splits and Phases: 15: High Street & Sixth Street

Ø1	Ø2	Ø4	
19.5 s	30.9 s	33.8 s	
Ø5	Ø6	Ø8	
19.5 s	30.9 s	33.8 s	

Queues
15: High Street & Sixth Street

2031 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	100	391	26	299	139	547	104	347
v/c Ratio	0.38	0.71	0.16	0.55	0.23	0.40	0.21	0.28
Control Delay	24.7	28.3	21.0	21.4	10.0	18.3	10.1	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	28.3	21.0	21.4	10.0	18.3	10.1	17.0
Queue Length 50th (m)	10.4	42.2	2.5	27.1	8.2	27.3	6.0	15.6
Queue Length 95th (m)	20.6	61.8	7.4	43.1	16.6	41.1	13.1	26.1
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	365	748	230	732	713	1360	632	1257
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.52	0.11	0.41	0.19	0.40	0.16	0.28

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	80	210	102	21	134	105	111	393	45	83	230	47
Future Volume (vph)	80	210	102	21	134	105	111	393	45	83	230	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1744		1572	1678		1772	3521		1737	3312	
Flt Permitted	0.47	1.00		0.33	1.00		0.53	1.00		0.42	1.00	
Satd. Flow (perm)	872	1744		550	1678		987	3521		767	3312	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	100	262	128	26	168	131	139	491	56	104	288	59
RTOR Reduction (vph)	0	22	0	0	35	0	0	9	0	0	18	0
Lane Group Flow (vph)	100	369	0	26	264	0	139	538	0	104	329	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.8	20.8		20.8	20.8		33.4	26.5		32.0	25.8	
Effective Green, g (s)	20.8	20.8		20.8	20.8		33.4	26.5		32.0	25.8	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.48	0.38		0.46	0.37	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	260	520		164	500		550	1338		438	1225	
v/s Ratio Prot		c0.21			0.16		c0.02	c0.15		0.02	0.10	
v/s Ratio Perm	0.11			0.05			0.10			0.09		
v/c Ratio	0.38	0.71		0.16	0.53		0.25	0.40		0.24	0.27	
Uniform Delay, d1	19.4	21.8		18.0	20.4		10.3	15.8		10.9	15.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	4.9		0.6	1.3		0.2	0.9		0.3	0.5	
Delay (s)	20.7	26.6		18.6	21.7		10.5	16.7		11.1	15.9	
Level of Service	C	C		B	C		B	B		B	B	
Approach Delay (s)		25.4			21.4			15.4			14.8	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		69.7			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		66.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Background AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	18	98	302	58	118	240
Future Volume (vph)	18	98	302	58	118	240
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	23	127	392	75	153	312
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	150	467	153	312		
Volume Left (vph)	23	0	153	0		
Volume Right (vph)	127	75	0	0		
Hadj (s)	-0.40	-0.07	0.57	0.12		
Departure Headway (s)	5.6	5.0	6.0	5.5		
Degree Utilization, x	0.23	0.64	0.25	0.48		
Capacity (veh/h)	575	704	584	635		
Control Delay (s)	10.3	16.4	9.8	12.3		
Approach Delay (s)	10.3	16.4	11.5			
Approach LOS	B	C	B			
Intersection Summary						
Delay			13.4			
Level of Service			B			
Intersection Capacity Utilization			43.6%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
17: Hurontario Street & Hume Street

2031 Background AM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	177	178	274	310	96	99
Future Volume (vph)	177	178	274	310	96	99
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	16.0	16.0	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
v/c Ratio	0.54	0.42	0.41	0.43		0.17
Control Delay	29.2	6.2	15.9	3.3		6.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	29.2	6.2	15.9	3.3		6.8
LOS	C	A	B	A		A
Approach Delay	17.6		9.2			6.8
Approach LOS	B		A			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 69.6
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.54
 Intersection Signal Delay: 11.4
 Intersection Capacity Utilization 78.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Background AM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	221	223	343	388	244
v/c Ratio	0.54	0.42	0.41	0.43	0.17
Control Delay	29.2	6.2	15.9	3.3	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	6.2	15.9	3.3	6.8
Queue Length 50th (m)	25.4	0.0	28.7	0.0	6.3
Queue Length 95th (m)	38.4	10.1	45.2	8.8	10.7
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	713	770	828	899	1474
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.29	0.41	0.43	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Background AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	177	178	274	310	96	99
Future Volume (vph)	177	178	274	310	96	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3525	3525
Flt Permitted	0.95	1.00	1.00	1.00	0.66	0.66
Satd. Flow (perm)	1772	1581	1921	1575	2369	2369
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	221	222	342	388	120	124
RTOR Reduction (vph)	0	172	0	221	0	0
Lane Group Flow (vph)	221	51	343	167	0	244
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.0	16.0	30.0	30.0		41.0
Effective Green, g (s)	16.0	16.0	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	407	363	828	678		1511
v/s Ratio Prot	c0.12		c0.18			c0.02
v/s Ratio Perm		0.03		0.11		0.08
v/c Ratio	0.54	0.14	0.41	0.25		0.16
Uniform Delay, d1	23.6	21.3	13.7	12.6		6.5
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.5	0.2	1.5	0.9		0.2
Delay (s)	25.1	21.5	15.2	13.5		6.7
Level of Service	C	C	B	B		A
Approach Delay (s)	23.3		14.3			6.7
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay			15.8		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.42			
Actuated Cycle Length (s)			69.6		Sum of lost time (s)	16.6
Intersection Capacity Utilization			78.3%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	145	36	37	170	44	120	58	47	23	29	3
Future Volume (vph)	10	145	36	37	170	44	120	58	47	23	29	3
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	12	179	44	46	210	54	148	72	58	28	36	4
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	235	310	278	68								
Volume Left (vph)	12	46	148	28								
Volume Right (vph)	44	54	58	4								
Hadj (s)	-0.06	0.01	0.08	0.19								
Departure Headway (s)	5.4	5.3	5.6	6.1								
Degree Utilization, x	0.35	0.46	0.43	0.12								
Capacity (veh/h)	620	637	595	506								
Control Delay (s)	11.2	12.7	12.7	9.9								
Approach Delay (s)	11.2	12.7	12.7	9.9								
Approach LOS	B	B	B	A								
Intersection Summary												
Delay				12.1								
Level of Service				B								
Intersection Capacity Utilization				49.8%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	16	87	10	17	108	123	15	84	35	63	34	16
Future Volume (vph)	16	87	10	17	108	123	15	84	35	63	34	16
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	19	104	12	20	129	146	18	100	42	75	40	19
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	135	149	146	160	134							
Volume Left (vph)	19	20	0	18	75							
Volume Right (vph)	12	0	146	42	19							
Hadj (s)	0.19	0.33	-0.63	0.01	0.13							
Departure Headway (s)	5.4	5.8	4.8	5.2	5.3							
Degree Utilization, x	0.20	0.24	0.20	0.23	0.20							
Capacity (veh/h)	617	589	704	641	618							
Control Delay (s)	9.8	9.4	7.8	9.7	9.7							
Approach Delay (s)	9.8	8.6		9.7	9.7							
Approach LOS	A	A		A	A							
Intersection Summary												
Delay			9.3									
Level of Service			A									
Intersection Capacity Utilization			32.3%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Background AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	160	348	497	73	10	62
Future Volume (Veh/h)	160	348	497	73	10	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	366	523	77	11	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	600				1264	562
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	600				1264	562
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	82				93	87
cM capacity (veh/h)	935				147	514
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	534	600	76			
Volume Left	168	0	11			
Volume Right	0	77	65			
cSH	935	1700	377			
Volume to Capacity	0.18	0.35	0.20			
Queue Length 95th (m)	5.0	0.0	5.6			
Control Delay (s)	4.6	0.0	16.9			
Lane LOS	A		C			
Approach Delay (s)	4.6	0.0	16.9			
Approach LOS			C			
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			72.1%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Background PM

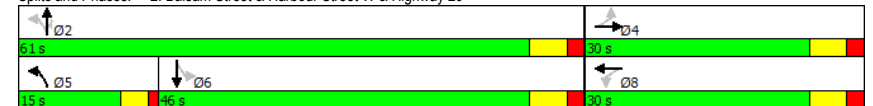
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	2	45	24	0	3	63	617	23	4	595	16
Future Volume (Veh/h)	19	2	45	24	0	3	63	617	23	4	595	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	20	2	48	26	0	3	67	656	24	4	633	17
Pedestrians											2	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1436	1455	633	1480	1448	658	650			680		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
VCu, unblocked vol	1436	1455	633	1480	1448	658	650			680		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	98	90	70	100	99	93			100		
cM capacity (veh/h)	105	121	474	88	123	467	946			922		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	70	29	67	656	24	4	633	17				
Volume Left	20	26	67	0	0	4	0	0				
Volume Right	48	3	0	0	24	0	0	17				
cSH	227	96	946	1700	1700	922	1700	1700				
Volume to Capacity	0.31	0.30	0.07	0.39	0.01	0.00	0.37	0.01				
Queue Length 95th (m)	9.5	8.7	1.7	0.0	0.0	0.1	0.0	0.0				
Control Delay (s)	27.7	58.2	9.1	0.0	0.0	8.9	0.0	0.0				
Lane LOS	D	F	A			A						
Approach Delay (s)	27.7	58.2	0.8			0.1						
Approach LOS	D	F										
Intersection Summary												
Average Delay	2.8											
Intersection Capacity Utilization	50.3%											
Analysis Period (min)	15											
ICU Level of Service												
A												

Timings
2: Balsam Street & Harbour Street W & Highway 26

2031 Background PM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	21	6	88	5	106	743	73	12	692
Future Volume (vph)	21	6	88	5	106	743	73	12	692
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	11.7	11.7	11.7	11.7		55.1	55.1		40.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15		0.70	0.70		0.51
v/c Ratio	0.11	0.44	0.54	0.06		0.48	0.07		0.46
Control Delay	29.6	9.9	42.8	19.5		6.1	3.0		13.9
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.6	9.9	42.8	19.5		6.1	3.0		13.9
LOS	C	A	D	B		A	A		B
Approach Delay	12.3			39.8		5.9		13.9	
Approach LOS	B			D		A		B	
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 78.8									
Natural Cycle: 75									
Control Type: Semi Act-Uncoord									
Maximum v/c Ratio: 0.54									
Intersection Signal Delay: 11.3					Intersection LOS: B				
Intersection Capacity Utilization 103.1%					ICU Level of Service G				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2: Balsam Street & Harbour Street W & Highway 26

2031 Background PM

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	23	162	95	14	913	78	768
v/c Ratio	0.11	0.44	0.54	0.06	0.48	0.07	0.46
Control Delay	29.6	9.9	42.8	19.5	6.1	3.0	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	9.9	42.8	19.5	6.1	3.0	13.9
Queue Length 50th (m)	3.0	0.8	13.3	0.6	23.5	1.6	35.7
Queue Length 95th (m)	9.2	15.7	27.4	5.3	41.2	6.3	56.9
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	417	596	360	500	1921	1152	1681
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.27	0.26	0.03	0.48	0.07	0.46
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2: Balsam Street & Harbour Street W & Highway 26

2031 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰	↱	↰	↱	
Traffic Volume (vph)	21	6	145	88	5	8	106	743	73	12	692	10
Future Volume (vph)	21	6	145	88	5	8	106	743	73	12	692	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	0.86		1.00	0.90			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1589		1811	1620			3596	1633		3535	
Flt Permitted	0.75	1.00		0.62	1.00			0.71	1.00		0.93	
Satd. Flow (perm)	1369	1589		1180	1620			2585	1633		3306	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	23	6	156	95	5	9	114	799	78	13	744	11
RTOR Reduction (vph)	0	133	0	0	8	0	0	0	11	0	1	0
Lane Group Flow (vph)	23	29	0	95	6	0	0	913	67	0	767	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	11.7	11.7		11.7	11.7			55.1	55.1		40.1	
Effective Green, g (s)	11.7	11.7		11.7	11.7			55.1	55.1		40.1	
Actuated g/C Ratio	0.15	0.15		0.15	0.15			0.70	0.70		0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	203	235		175	240			1948	1141		1682	
v/s Ratio Prot		0.02			0.00			c0.07				
v/s Ratio Perm	0.02			c0.08				c0.26	0.04		0.23	
v/c Ratio	0.11	0.12		0.54	0.03			0.47	0.06		0.46	
Uniform Delay, d1	29.1	29.1		31.1	28.7			5.3	3.7		12.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.2		3.4	0.0			0.8	0.1		0.9	
Delay (s)	29.3	29.3		34.5	28.7			6.1	3.8		13.3	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		29.3			33.7			5.9			13.3	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.3									
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			78.8						16.0			
Intersection Capacity Utilization			103.1%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings 2031 Background PM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	113	4	35	5	73	810	8	851
Future Volume (vph)	113	4	35	5	73	810	8	851
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	12.3	12.3		12.3	55.2	53.2	52.4	46.4
Actuated g/C Ratio	0.17	0.17		0.17	0.74	0.72	0.71	0.62
v/c Ratio	0.52	0.19		0.24	0.17	0.34	0.01	0.44
Control Delay	38.3	10.7		23.7	4.7	6.9	4.1	11.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	38.3	10.7		23.7	4.7	6.9	4.1	11.2
LOS	D	B		C	A	A	A	B
Approach Delay		29.1		23.7		6.8		11.2
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 74.3
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 63.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

Ø1	Ø2	Ø4	
15 s	47 s	22 s	
Ø5	Ø6	Ø8	
15 s	47 s	22 s	

Queues 2031 Background PM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	119	60	60	77	859	8	975
v/c Ratio	0.52	0.19	0.24	0.17	0.34	0.01	0.44
Control Delay	38.3	10.7	23.7	4.7	6.9	4.1	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.3	10.7	23.7	4.7	6.9	4.1	11.2
Queue Length 50th (m)	16.0	0.5	5.3	2.7	22.1	0.4	42.1
Queue Length 95th (m)	31.8	9.8	15.3	7.2	55.3	1.5	66.4
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	299	402	324	525	2558	651	2211
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.15	0.19	0.15	0.34	0.01	0.44

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2031 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	113	4	53	35	5	17	73	810	6	8	851	75
Future Volume (vph)	113	4	53	35	5	17	73	810	6	8	851	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1821	1652			1780		1772	3575		1825	3532	
Flt Permitted	0.72	1.00			0.78		0.23	1.00		0.33	1.00	
Satd. Flow (perm)	1376	1652			1425		435	3575		633	3532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	119	4	56	37	5	18	77	853	6	8	896	79
RTOR Reduction (vph)	0	49	0	0	16	0	0	0	0	0	6	0
Lane Group Flow (vph)	119	11	0	0	44	0	77	859	0	8	969	0
Confl. Peds. (#/hr)	1				1		2					2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.9	9.9			9.9		57.0	51.7		48.6	47.3	
Effective Green, g (s)	9.9	9.9			9.9		57.0	51.7		48.6	47.3	
Actuated g/C Ratio	0.13	0.13			0.13		0.72	0.66		0.62	0.60	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	172	207			178		410	2342		409	2117	
v/s Ratio Prot		0.01					c0.01	c0.24		0.00	c0.27	
v/s Ratio Perm	c0.09				0.03		0.12			0.01		
v/c Ratio	0.69	0.05			0.25		0.19	0.37		0.02	0.46	
Uniform Delay, d1	33.0	30.4			31.1		4.0	6.2		5.8	8.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.4	0.1			0.7		0.2	0.4		0.0	0.7	
Delay (s)	44.4	30.5			31.9		4.2	6.6		5.9	9.4	
Level of Service	D	C			C		A	A		A	A	
Approach Delay (s)		39.7			31.9			6.4			9.4	
Approach LOS		D			C			A			A	

Intersection Summary

HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	80	4	18	8	176	837	10	850
Future Volume (vph)	80	4	18	8	176	837	10	850
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	11.5	11.5		11.5	62.1	60.1	47.8	47.8
Actuated g/C Ratio	0.14	0.14		0.14	0.74	0.72	0.57	0.57
v/c Ratio	0.46	0.52		0.24	0.42	0.36	0.04	0.47
Control Delay	41.2	10.6		30.5	6.3	5.1	9.7	11.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	10.6		30.5	6.3	5.1	9.7	11.9
LOS	D	B		C	A	A	A	B
Approach Delay		19.7		30.5		5.3		11.9
Approach LOS		B		C		A		B

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 83.6	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 10.0	Intersection LOS: B
Intersection Capacity Utilization 100.8%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2031 Background PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	205	37	191	935	11	961
v/c Ratio	0.46	0.52	0.24	0.42	0.36	0.04	0.47
Control Delay	41.2	10.6	30.5	6.3	5.1	9.7	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	10.6	30.5	6.3	5.1	9.7	11.9
Queue Length 50th (m)	12.9	0.6	4.2	6.5	22.9	0.7	41.1
Queue Length 95th (m)	26.5	18.1	12.5	14.6	38.5	3.3	67.7
Internal Link Dist (m)	175.6		57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	249	449	201	563	2562	302	2033
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.46	0.18	0.34	0.36	0.04	0.47
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2031 Background PM

4: Balsam Street & Old Mountain Road/Commercial Access

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	4	185	18	8	7	176	837	23	10	850	34
Future Volume (vph)	80	4	185	18	8	7	176	837	23	10	850	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	1585			1807		1789	3564		1643	3556	
Flt Permitted	0.73	1.00			0.59		0.23	1.00		0.31	1.00	
Satd. Flow (perm)	1386	1585			1087		431	3564		529	3556	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	4	201	20	9	8	191	910	25	11	924	37
RTOR Reduction (vph)	0	173	0	0	7	0	0	2	0	0	3	0
Lane Group Flow (vph)	87	32	0	0	30	0	191	933	0	11	958	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.5	11.5			11.5		60.0	60.0		47.7	47.7	
Effective Green, g (s)	11.5	11.5			11.5		60.0	60.0		47.7	47.7	
Actuated g/C Ratio	0.14	0.14			0.14		0.72	0.72		0.57	0.57	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	218			149		444	2560		302	2031	
v/s Ratio Prot		0.02					c0.04	0.26			c0.27	
v/s Ratio Perm	c0.06				0.03		0.27			0.02		
v/c Ratio	0.46	0.15			0.20		0.43	0.36		0.04	0.47	
Uniform Delay, d1	33.1	31.7			31.9		5.0	4.5		7.8	10.5	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.3			0.7		0.7	0.4		0.2	0.8	
Delay (s)	34.9	32.0			32.6		5.7	4.9		8.1	11.3	
Level of Service	C	C			C		A	A		A	B	
Approach Delay (s)		32.8			32.6			5.0			11.3	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay	11.3				HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	83.5				Sum of lost time (s)				16.0			
Intersection Capacity Utilization	100.8%				ICU Level of Service				G			
Analysis Period (min)	15											
c Critical Lane Group												

Timings 2031 Background PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	74	407	170	348	588	143	339	578	458
Future Volume (vph)	74	407	170	348	588	143	339	578	458
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	32.4	22.3	38.4	27.6	57.0	20.6	20.6	28.9	28.9
Actuated g/C Ratio	0.31	0.21	0.36	0.26	0.54	0.19	0.19	0.27	0.27
v/c Ratio	0.21	0.77	0.64	0.38	0.63	0.42	0.69	0.81	0.81
Control Delay	24.6	44.3	35.7	34.7	8.9	42.1	41.6	53.9	45.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	44.3	35.7	34.7	8.9	42.1	41.6	53.9	45.0
LOS	C	D	D	C	A	D	D	D	D
Approach Delay		42.0		21.1			41.7		47.9
Approach LOS		D		C			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 105.8

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 37.0

Intersection LOS: D

Intersection Capacity Utilization 80.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↱ Ø3	↰ Ø4
35.5 s	35.5 s	11 s	38 s
		↱ Ø7	↰ Ø8
		14 s	35 s

Queues 2031 Background PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	76	581	175	359	606	147	486	358	741
v/c Ratio	0.21	0.77	0.64	0.38	0.63	0.42	0.69	0.81	0.81
Control Delay	24.6	44.3	35.7	34.7	8.9	42.1	41.6	53.9	45.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	44.3	35.7	34.7	8.9	42.1	41.6	53.9	45.0
Queue Length 50th (m)	10.0	54.9	24.5	32.6	26.4	27.0	45.0	75.2	77.4
Queue Length 95th (m)	21.9	80.7	#45.5	50.1	61.8	47.6	65.3	#149.8	#127.9
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	357	944	278	1079	973	494	986	445	932
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.62	0.63	0.33	0.62	0.30	0.49	0.80	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	74	407	156	170	348	588	143	339	133	578	458	30
Future Volume (vph)	74	407	156	170	348	588	143	339	133	578	458	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1769	3422		1806	3650	1574	1789	3446		1612	3363	
Flt Permitted	0.54	1.00		0.21	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	1001	3422		397	3650	1574	1789	3446		1612	3363	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	76	420	161	175	359	606	147	349	137	596	472	31
RTOR Reduction (vph)	0	34	0	0	0	122	0	37	0	0	2	0
Lane Group Flow (vph)	76	547	0	175	359	484	147	449	0	358	739	0
Confl. Peds. (#/hr)	4		12	12		4	9		2	2		9
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	28.6	23.2		37.1	27.7	56.6	20.6	20.6		28.9	28.9	
Effective Green, g (s)	28.6	23.2		37.1	27.7	56.6	20.6	20.6		28.9	28.9	
Actuated g/C Ratio	0.27	0.22		0.35	0.26	0.53	0.19	0.19		0.27	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	307	744		269	948	835	345	665		437	911	
v/s Ratio Prot	0.01	c0.16		c0.06	0.10	0.16	0.08	c0.13		c0.22	0.22	
v/s Ratio Perm	0.05			0.17		0.15						
v/c Ratio	0.25	0.74		0.65	0.38	0.58	0.43	0.68		0.82	0.81	
Uniform Delay, d1	29.8	38.8		26.3	32.4	16.9	37.8	39.9		36.4	36.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	3.8		5.5	0.3	1.0	0.8	2.7		11.4	5.5	
Delay (s)	30.2	42.6		31.8	32.6	17.9	38.7	42.6		47.8	41.8	
Level of Service	C	D		C	C	B	D	D		D	D	
Approach Delay (s)		41.2			24.7			41.7			43.8	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	106.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings
6: Spruce Street & First Street

2031 Background PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	13	1063	30	1082	18	14	27	10
Future Volume (vph)	13	1063	30	1082	18	14	27	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.7	83.9	89.5	86.1	10.1	10.1	10.1	10.1
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.03	0.41	0.07	0.42	0.15	0.18	0.22	0.17
Control Delay	2.2	6.2	2.3	5.5	47.8	30.6	49.6	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.2	6.2	2.3	5.5	47.8	30.6	49.6	27.0
LOS	A	A	A	A	D	C	D	C
Approach Delay		6.1		5.4		37.1		37.9
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 7.1
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	14	1133	31	1177	19	31	28	30
v/c Ratio	0.03	0.41	0.07	0.42	0.15	0.18	0.22	0.17
Control Delay	2.2	6.2	2.3	5.5	47.8	30.6	49.6	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.2	6.2	2.3	5.5	47.8	30.6	49.6	27.0
Queue Length 50th (m)	0.4	49.4	1.0	30.8	3.8	2.9	5.6	2.0
Queue Length 95th (m)	1.4	62.7	2.5	66.1	10.9	12.0	14.3	10.8
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	437	2768	441	2829	325	401	324	396
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	0.03	0.41	0.07	0.42	0.06	0.08	0.09	0.08
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	13	1063	25	30	1082	48	18	14	15	27	10	19
Future Volume (vph)	13	1063	25	30	1082	48	18	14	15	27	10	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3566		1825	3551		1790	1667		1776	1633	
Flt Permitted	0.22	1.00		0.22	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	422	3566		425	3551		1390	1667		1378	1633	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	1107	26	31	1127	50	19	15	16	28	10	20
RTOR Reduction (vph)	0	1	0	0	2	0	0	15	0	0	19	0
Lane Group Flow (vph)	14	1132	0	31	1175	0	19	16	0	28	11	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4					
Actuated Green, G (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Effective Green, g (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.77	0.74		0.79	0.75		0.07	0.07		0.07	0.07	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	359	2635		390	2670		104	124		103	122	
v/s Ratio Prot	0.00	0.32		c0.00	c0.33			0.01			0.01	
v/s Ratio Perm	0.03			0.06			0.01			c0.02		
v/c Ratio	0.04	0.43		0.08	0.44		0.18	0.13		0.27	0.09	
Uniform Delay, d1	3.2	5.4		2.9	5.0		46.9	46.7		47.2	46.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5		0.1	0.5		0.8	0.5		1.4	0.3	
Delay (s)	3.3	5.9		2.9	5.5		47.7	47.2		48.6	46.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		5.9			5.4			47.4			47.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay				7.5			HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio				0.42								
Actuated Cycle Length (s)				108.1			Sum of lost time (s)			15.9		
Intersection Capacity Utilization				62.4%			ICU Level of Service			B		
Analysis Period (min)				15								
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	30	1011	28	1052	40	21	85	21
Future Volume (vph)	30	1011	28	1052	40	21	85	21
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	75.8	70.4	75.7	70.3	11.8	11.8	11.8	11.8
Actuated g/C Ratio	0.76	0.70	0.76	0.70	0.12	0.12	0.12	0.12
v/c Ratio	0.08	0.45	0.07	0.44	0.27	0.21	0.55	0.32
Control Delay	3.6	8.3	2.7	5.2	42.9	23.8	53.5	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.3	2.7	5.2	42.9	23.8	53.5	18.9
LOS	A	A	A	A	D	C	D	B
Approach Delay		8.2		5.2		32.8		37.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 9.6

Intersection LOS: A

Intersection Capacity Utilization 50.7%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	1116	29	1114	42	47	89	78
v/c Ratio	0.08	0.45	0.07	0.44	0.27	0.21	0.55	0.32
Control Delay	3.6	8.3	2.7	5.2	42.9	23.8	53.5	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.3	2.7	5.2	42.9	23.8	53.5	18.9
Queue Length 50th (m)	1.1	49.2	0.0	13.2	7.5	3.9	16.5	3.9
Queue Length 95th (m)	3.7	75.8	m1.9	26.5	16.6	13.5	30.3	16.0
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	388	2477	388	2514	315	438	329	443
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	0.45	0.07	0.44	0.13	0.11	0.27	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	30	1011	49	28	1052	7	40	21	24	85	21	53
Future Volume (vph)	30	1011	49	28	1052	7	40	21	24	85	21	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1754	3516		1755	3575		1764	1742		1781	1669	
Flt Permitted	0.22	1.00		0.22	1.00		0.71	1.00		0.73	1.00	
Satd. Flow (perm)	407	3516		408	3575		1311	1742		1362	1669	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	1064	52	29	1107	7	42	22	25	89	22	56
RTOR Reduction (vph)	0	2	0	0	0	0	0	22	0	0	49	0
Lane Group Flow (vph)	32	1114	0	29	1114	0	42	25	0	89	29	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	72.6	68.8		72.4	68.7		11.8	11.8		11.8	11.8	
Effective Green, g (s)	72.6	68.8		72.4	68.7		11.8	11.8		11.8	11.8	
Actuated g/C Ratio	0.73	0.69		0.72	0.69		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	346	2419		345	2456		154	205		160	196	
v/s Ratio Prot	c0.00	c0.32		0.00	0.31		0.01			0.02		
v/s Ratio Perm	0.06			0.06			0.03			c0.07		
v/c Ratio	0.09	0.46		0.08	0.45		0.27	0.12		0.56	0.15	
Uniform Delay, d1	4.3	7.1		4.3	7.1		40.2	39.5		41.6	39.6	
Progression Factor	1.00	1.00		0.73	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.1	0.5		1.0	0.3		4.1	0.3	
Delay (s)	4.4	7.8		3.2	4.9		41.2	39.7		45.8	39.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		7.7			4.8			40.4			43.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

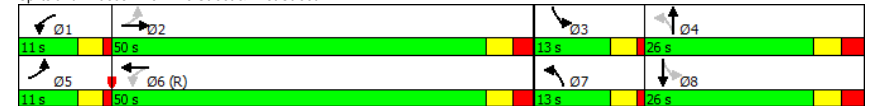
2031 Background PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	58	900	19	796	195	36	64	66
Future Volume (vph)	58	900	19	796	195	36	64	66
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	62.9	58.0	60.6	53.2	25.1	15.8	23.0	12.7
Actuated g/C Ratio	0.63	0.58	0.61	0.53	0.25	0.16	0.23	0.13
v/c Ratio	0.16	0.54	0.06	0.48	0.72	0.28	0.20	0.62
Control Delay	4.1	10.9	5.9	13.4	44.7	21.4	27.7	35.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	4.1	10.9	5.9	13.5	44.7	21.4	27.7	35.1
LOS	A	B	A	B	D	C	C	D
Approach Delay		10.5		13.4		37.7		33.0
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 16.7
Intersection Capacity Utilization 72.1%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	62	1093	20	904	207	88	68	173
v/c Ratio	0.16	0.54	0.06	0.48	0.72	0.28	0.20	0.62
Control Delay	4.1	10.9	5.9	13.4	44.7	21.4	27.7	35.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	4.1	10.9	5.9	13.5	44.7	21.4	27.7	35.1
Queue Length 50th (m)	1.3	13.2	1.0	41.5	33.2	6.7	10.1	19.8
Queue Length 95th (m)	2.8	109.7	m3.1	49.5	49.2	19.5	18.7	38.7
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	380	2034	332	1890	289	386	348	396
Starvation Cap Reductn	0	0	0	295	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	0.54	0.06	0.57	0.72	0.23	0.20	0.44
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	58	900	128	19	796	54	195	36	47	64	66	97
Future Volume (vph)	58	900	128	19	796	54	195	36	47	64	66	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.91		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3496		1825	3542		1785	1690		1744	1719	
Flt Permitted	0.23	1.00		0.20	1.00		0.43	1.00		0.70	1.00	
Satd. Flow (perm)	443	3496		382	3542		802	1690		1285	1719	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	62	957	136	20	847	57	207	38	50	68	70	103
RTOR Reduction (vph)	0	9	0	0	4	0	0	42	0	0	57	0
Lane Group Flow (vph)	62	1084	0	20	900	0	207	46	0	68	116	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	60.7	54.8		54.5	51.7		24.8	15.8		20.2	13.5	
Effective Green, g (s)	60.7	54.8		54.5	51.7		24.8	15.8		20.2	13.5	
Actuated g/C Ratio	0.61	0.55		0.54	0.52		0.25	0.16		0.20	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	350	1915		248	1831		287	267		290	232	
v/s Ratio Prot	c0.01	c0.31		0.00	0.25		c0.06	0.03		0.02	0.07	
v/s Ratio Perm	0.10			0.04			c0.11			0.03		
v/c Ratio	0.18	0.57		0.08	0.49		0.72	0.17		0.23	0.50	
Uniform Delay, d1	9.2	14.8		11.3	15.6		32.6	36.4		33.1	40.1	
Progression Factor	0.43	0.70		0.73	0.79		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.1		0.1	0.9		8.6	0.3		0.4	1.7	
Delay (s)	4.2	11.4		8.4	13.2		41.2	36.7		33.5	41.8	
Level of Service	A	B		A	B		D	D		C	D	
Approach Delay (s)		11.0			13.1			39.9			39.5	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		17.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.62										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			19.9				
Intersection Capacity Utilization		72.1%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

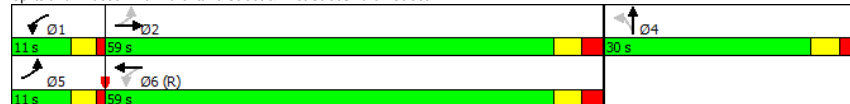
Timings 2031 Background PM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	16	833	69	640	237	16
Future Volume (vph)	16	833	69	640	237	16
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	67.8	61.0	70.4	65.5	18.8	18.8
Actuated g/C Ratio	0.68	0.61	0.70	0.66	0.19	0.19
v/c Ratio	0.03	0.49	0.19	0.29	0.74	0.24
Control Delay	2.1	4.3	6.3	9.1	51.3	12.4
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.3	6.3	9.1	51.3	12.4
LOS	A	A	A	A	D	B
Approach Delay		4.3		8.9		41.3
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 11.6 Intersection LOS: B
 Intersection Capacity Utilization 58.9% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues 2031 Background PM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	17	1054	73	685	249	86
v/c Ratio	0.03	0.49	0.19	0.29	0.74	0.24
Control Delay	2.1	4.3	6.3	9.1	51.3	12.4
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.3	6.3	9.1	51.3	12.4
Queue Length 50th (m)	0.3	34.7	3.6	23.1	45.8	2.7
Queue Length 95th (m)	m0.6	13.2	9.1	50.0	67.3	14.2
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	547	2140	382	2341	438	450
Starvation Cap Reductn	0	130	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	0.03	0.52	0.19	0.29	0.57	0.19

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	16	833	168	69	640	10	237	16	66	0	0	0
Future Volume (vph)	16	833	168	69	640	10	237	16	66	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1703	3484		1825	3569		1790	1628				
Flt Permitted	0.39	1.00		0.21	1.00		0.95	1.00				
Satd. Flow (perm)	697	3484		401	3569		1790	1628				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	17	877	177	73	674	11	249	17	69	0	0	0
RTOR Reduction (vph)	0	14	0	0	1	0	0	56	0	0	0	0
Lane Group Flow (vph)	17	1040	0	73	684	0	249	30	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	62.7	60.2		68.5	63.1		18.8	18.8				
Effective Green, g (s)	62.7	60.2		68.5	63.1		18.8	18.8				
Actuated g/C Ratio	0.63	0.60		0.68	0.63		0.19	0.19				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	462	2097		351	2252		336	306				
v/s Ratio Prot	0.00	c0.30		c0.01	0.19			0.02				
v/s Ratio Perm	0.02			0.13			c0.14					
v/c Ratio	0.04	0.50		0.21	0.30		0.74	0.10				
Uniform Delay, d1	7.0	11.3		6.4	8.4		38.3	33.6				
Progression Factor	0.36	0.30		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.0	0.7		0.3	0.3		8.5	0.1				
Delay (s)	2.6	4.1		6.7	8.8		46.8	33.7				
Level of Service	A	A		A	A		D	C				
Approach Delay (s)		4.1			8.6		43.5			0.0		
Approach LOS		A			A		D			A		

Intersection Summary

HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

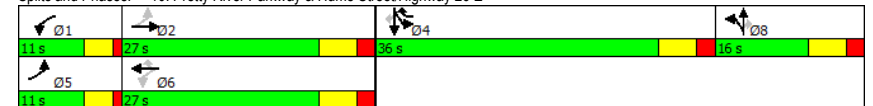
2031 Background PM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	48	414	13	269	455	16	46	34	677	45	82
Future Volume (vph)	48	414	13	269	455	16	46	34	677	45	82
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	27.0	11.0	27.0	36.0	16.0	16.0	16.0	36.0	36.0	36.0
Total Split (%)	12.2%	30.0%	12.2%	30.0%	40.0%	17.8%	17.8%	17.8%	40.0%	40.0%	40.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	29.5	26.2	28.1	22.3	56.9	10.6	10.6	10.6	26.2	26.2	26.2
Actuated g/C Ratio	0.37	0.33	0.36	0.28	0.72	0.13	0.13	0.13	0.33	0.33	0.33
v/c Ratio	0.15	0.40	0.04	0.56	0.39	0.08	0.21	0.11	0.71	0.72	0.15
Control Delay	19.3	24.3	18.1	33.5	1.6	36.9	38.6	0.7	32.8	33.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	24.3	18.1	33.5	1.6	36.9	38.6	0.7	32.8	33.3	1.0
LOS	B	C	B	C	A	D	D	A	C	C	A
Approach Delay		23.8		13.5			25.0			29.8	
Approach LOS		C		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 78.8	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 22.6	Intersection LOS: C
Intersection Capacity Utilization 59.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Background PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	478	15	302	511	18	52	38	403	409	92
v/c Ratio	0.15	0.40	0.04	0.56	0.39	0.08	0.21	0.11	0.71	0.72	0.15
Control Delay	19.3	24.3	18.1	33.5	1.6	36.9	38.6	0.7	32.8	33.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	24.3	18.1	33.5	1.6	36.9	38.6	0.7	32.8	33.3	1.0
Queue Length 50th (m)	5.9	31.6	1.6	47.7	0.0	2.9	8.4	0.0	63.4	64.6	0.0
Queue Length 95th (m)	13.2	52.8	5.3	73.7	9.6	8.9	18.8	0.0	96.3	97.8	1.5
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)			60.0		15.0		15.0		70.0		
Base Capacity (vph)	364	1198	373	544	1317	230	242	337	688	687	729
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.40	0.04	0.56	0.39	0.08	0.21	0.11	0.59	0.60	0.13
Intersection Summary											

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	48	414	12	13	269	455	16	46	34	677	45	82
Future Volume (vph)	48	414	12	13	269	455	16	46	34	677	45	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3600		1674	1921	1617	1706	1795	1484	1700	1698	1570
Flt Permitted	0.39	1.00		0.46	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	715	3600		818	1921	1617	1706	1795	1484	1700	1698	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	54	465	13	15	302	511	18	52	38	761	51	92
RTOR Reduction (vph)	0	2	0	0	0	203	0	0	35	0	0	63
Lane Group Flow (vph)	54	476	0	15	302	308	18	52	3	403	409	29
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	29.9	26.2		24.9	23.7	49.9	7.3	7.3	7.3	26.2	26.2	26.2
Effective Green, g (s)	29.9	26.2		24.9	23.7	49.9	7.3	7.3	7.3	26.2	26.2	26.2
Actuated g/C Ratio	0.36	0.32		0.30	0.29	0.60	0.09	0.09	0.09	0.32	0.32	0.32
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	1137		258	549	1090	150	158	130	537	536	496
v/s Ratio Prot	c0.01	0.13		0.00	c0.16	0.09	0.01	c0.03		0.24	c0.24	
v/s Ratio Perm	0.06			0.02		0.10			0.00			0.02
v/c Ratio	0.18	0.42		0.06	0.55	0.28	0.12	0.33	0.03	0.75	0.76	0.06
Uniform Delay, d1	17.9	22.3		20.5	25.1	7.9	34.8	35.5	34.5	25.4	25.6	19.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.1		0.1	3.9	0.1	0.4	1.2	0.1	5.8	6.4	0.0
Delay (s)	18.2	23.5		20.6	29.0	8.1	35.2	36.7	34.6	31.3	31.9	19.8
Level of Service	B	C		C	C	A	D	D	C	C	C	B
Approach Delay (s)	22.9				15.9		35.7				30.4	
Approach LOS	C				B		D				C	
Intersection Summary												
HCM 2000 Control Delay			23.9		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			82.9		Sum of lost time (s)				22.0			
Intersection Capacity Utilization			59.9%		ICU Level of Service				B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings 2031 Background PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	0	4	0	29	421	499	587
Future Volume (vph)	18	0	4	0	29	421	499	587
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases		4		8	2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		4.0		6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		10.5		10.5		36.0		38.5
Actuated g/C Ratio		0.17		0.17		0.60		0.64
v/c Ratio		0.42		0.55		0.06		0.29
Control Delay		11.1		8.1		4.1		11.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		11.1		8.1		4.1		11.4
LOS		B		A		A		B
Approach Delay		11.1		8.1		10.9		16.4
Approach LOS		B		A		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 60.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 13.7
Intersection Capacity Utilization 80.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues 2031 Background PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	138	278	32	465	548	649
v/c Ratio	0.42	0.55	0.06	0.29	0.86	0.33
Control Delay	11.1	8.1	4.1	11.4	25.0	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	8.1	4.1	11.4	25.0	9.2
Queue Length 50th (m)	1.9	0.4	1.0	16.0	23.2	14.1
Queue Length 95th (m)	14.4	16.8	3.4	26.4	#72.8	37.7
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	519	726	573	1597	637	1952
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	0.27	0.38	0.06	0.29	0.86	0.33

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Volume (vph)	18	0	107	4	0	249	29	421	2	499	587	4
Future Volume (vph)	18	0	107	4	0	249	29	421	2	499	587	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1648		1789	3577		1825	3507	
Flt Permitted		0.80			0.99		0.41	1.00		0.43	1.00	
Satd. Flow (perm)		1330			1639		763	3577		820	3507	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	20	0	118	4	0	274	32	463	2	548	645	4
RTOR Reduction (vph)	0	98	0	0	229	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	40	0	0	49	0	32	464	0	548	649	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.4			10.4		32.3	29.5		40.5	33.7	
Effective Green, g (s)		10.4			10.4		32.3	29.5		40.5	33.7	
Actuated g/C Ratio		0.17			0.17		0.51	0.47		0.64	0.54	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		219			270		437	1677		639	1878	
v/s Ratio Prot							0.00	0.13		c0.10	0.18	
v/s Ratio Perm		0.03			c0.03		0.03			c0.46		
v/c Ratio		0.18			0.18		0.07	0.28		0.86	0.35	
Uniform Delay, d1		22.6			22.6		7.6	10.2		7.2	8.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.3		0.1	0.4		11.0	0.5	
Delay (s)		23.0			22.9		7.7	10.6		18.2	8.8	
Level of Service		C			C		A	B		B	A	
Approach Delay (s)		23.0			22.9			10.4			13.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	62.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings
12: Tenth Line & Mountain Road

2031 Background PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	7	435	109	337	37	15	53	36
Future Volume (vph)	7	435	109	337	37	15	53	36
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effect Green (s)		38.5		38.5		10.9		10.9
Actuated g/C Ratio		0.69		0.69		0.19		0.19
v/c Ratio		0.45		0.54		0.43		0.42
Control Delay		7.1		9.0		12.5		23.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		7.1		9.0		12.5		23.5
LOS		A		A		B		C
Approach Delay		7.1		9.0		12.5		23.5
Approach LOS		A		A		B		C

Intersection Summary	
Cycle Length: 60.2	
Actuated Cycle Length: 56.1	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 79.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2031 Background PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	568	558	161	113
v/c Ratio	0.45	0.54	0.43	0.42
Control Delay	7.1	9.0	12.5	23.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.1	9.0	12.5	23.5
Queue Length 50th (m)	24.6	27.0	5.1	9.2
Queue Length 95th (m)	51.2	60.5	17.6	21.0
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1274	1029	478	367
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	0.45	0.54	0.34	0.31
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	435	63	109	337	51	37	15	91	53	36	12
Future Volume (vph)	7	435	63	109	337	51	37	15	91	53	36	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.91			0.98	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1858			1874			1650			1712	
Flt Permitted		0.99			0.79			0.90			0.77	
Satd. Flow (perm)		1846			1491			1510			1345	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	8	489	71	122	379	57	42	17	102	60	40	13
RTOR Reduction (vph)	0	7	0	0	6	0	0	86	0	0	8	0
Lane Group Flow (vph)	0	561	0	0	552	0	0	75	0	0	105	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		37.4			37.4			8.9			8.9	
Effective Green, g (s)		37.4			37.4			8.9			8.9	
Actuated g/C Ratio		0.65			0.65			0.16			0.16	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1207			974			234			209	
v/s Ratio Prot												
v/s Ratio Perm		0.30			c0.37			0.05			c0.08	
v/c Ratio		0.46			0.57			0.32			0.50	
Uniform Delay, d1		4.9			5.4			21.5			22.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			2.4			0.8			1.9	
Delay (s)		6.2			7.8			22.3			24.0	
Level of Service		A			A			C			C	
Approach Delay (s)		6.2			7.8			22.3			24.0	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		10.1			HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio		0.55										
Actuated Cycle Length (s)		57.2			Sum of lost time (s)				10.9			
Intersection Capacity Utilization		79.4%			ICU Level of Service				D			
Analysis Period (min)		15										
c Critical Lane Group												

Timings 2031 Background PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	80	372	136	310	133	69	113	76	125
Future Volume (vph)	80	372	136	310	133	69	113	76	125
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases		2		6		8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	30.4	30.4	49.3	45.6	45.6	26.3	24.3	14.7	14.7
Actuated g/C Ratio	0.36	0.36	0.59	0.54	0.54	0.31	0.29	0.18	0.18
v/c Ratio	0.23	0.37	0.25	0.33	0.16	0.25	0.51	0.43	0.72
Control Delay	23.8	21.5	11.0	13.6	2.8	21.1	20.0	39.0	40.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	21.5	11.0	13.6	2.8	21.1	20.0	39.0	40.6
LOS	C	C	B	B	A	C	B	D	D
Approach Delay		21.9		10.5			20.2		40.2
Approach LOS		C		B			C		D

Intersection Summary

Cycle Length: 93.6

Actuated Cycle Length: 83.7

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 20.8

Intersection LOS: C

Intersection Capacity Utilization 93.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø6	Ø8		
52.6 s	11 s		

Queues 2031 Background PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	466	151	344	148	77	285	84	240
v/c Ratio	0.23	0.37	0.25	0.33	0.16	0.25	0.51	0.43	0.72
Control Delay	23.8	21.5	11.0	13.6	2.8	21.1	20.0	39.0	40.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	21.5	11.0	13.6	2.8	21.1	20.0	39.0	40.6
Queue Length 50th (m)	10.3	28.7	11.0	31.1	0.0	8.6	26.3	12.4	31.8
Queue Length 95th (m)	23.9	46.3	23.5	57.2	9.2	17.5	47.5	26.5	56.8
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	386	1276	600	1036	936	349	779	269	449
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.37	0.25	0.33	0.16	0.22	0.37	0.31	0.53

Intersection Summary

HCM Signalized Intersection Capacity Analysis
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	80	372	48	136	310	133	69	113	143	76	125	91
Future Volume (vph)	80	372	48	136	310	133	69	113	143	76	125	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1823	3485		1806	1902	1596	1783	1733		1807	1739	
Flt Permitted	0.55	1.00		0.42	1.00	1.00	0.33	1.00		0.59	1.00	
Satd. Flow (perm)	1064	3485		790	1902	1596	610	1733		1113	1739	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	413	53	151	344	148	77	126	159	84	139	101
RTOR Reduction (vph)	0	10	0	0	0	68	0	55	0	0	30	0
Lane Group Flow (vph)	89	456	0	151	344	80	77	230	0	84	210	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	30.5	30.5		45.6	45.6	45.6	25.2	25.2		14.7	14.7	
Effective Green, g (s)	30.5	30.5		45.6	45.6	45.6	25.2	25.2		14.7	14.7	
Actuated g/C Ratio	0.36	0.36		0.54	0.54	0.54	0.30	0.30		0.17	0.17	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	1259		560	1027	862	272	517		193	302	
v/s Ratio Prot		0.13		0.04	c0.18		0.02	c0.13			c0.12	
v/s Ratio Perm	0.08			0.11		0.05	0.06			0.08		
v/c Ratio	0.23	0.36		0.27	0.33	0.09	0.28	0.45		0.44	0.70	
Uniform Delay, d1	18.8	19.8		9.9	10.9	9.4	22.2	23.9		31.1	32.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.8		1.2	0.9	0.2	0.6	0.6		1.6	6.8	
Delay (s)	20.2	20.6		11.1	11.8	9.6	22.8	24.6		32.7	39.6	
Level of Service	C	C		B	B	A	C	C		C	D	
Approach Delay (s)		20.5			11.1			24.2			37.8	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM 2000 Control Delay		21.0										
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		84.4						21.6				
Intersection Capacity Utilization		93.2%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
14: High Street & Third Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	5	1	14	24	0	113	3	539	42	86	797	3
Future Volume (Veh/h)	5	1	14	24	0	113	3	539	42	86	797	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	1	15	26	0	122	3	580	45	92	857	3
Pedestrians		1			12			1				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1462	1686	432	1250	1666	324	861			637		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1462	1686	432	1250	1666	324	861			637		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	97	77	100	82	100			90		
cM capacity (veh/h)	68	84	576	115	87	664	789			946		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	21	148	293	335	520	432						
Volume Left	5	26	3	0	92	0						
Volume Right	15	122	0	45	0	3						
cSH	189	361	789	1700	946	1700						
Volume to Capacity	0.11	0.41	0.00	0.20	0.10	0.25						
Queue Length 95th (m)	2.8	14.8	0.1	0.0	2.4	0.0						
Control Delay (s)	26.4	21.7	0.1	0.0	2.6	0.0						
Lane LOS	D	C	A		A							
Approach Delay (s)	26.4	21.7	0.1		1.4							
Approach LOS	D	C										
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			61.1%				ICU Level of Service			B		
Analysis Period (min)			15									

Timings
15: High Street & Sixth Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	94	158	42	152	84	321	140	561
Future Volume (vph)	94	158	42	152	84	321	140	561
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	16.2	16.2	16.2	16.2	33.0	25.7	34.4	26.4
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.52	0.40	0.54	0.41
v/c Ratio	0.41	0.62	0.21	0.53	0.19	0.26	0.23	0.47
Control Delay	26.2	24.0	22.1	22.1	8.3	15.3	8.2	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	24.0	22.1	22.1	8.3	15.3	8.2	16.5
LOS	C	C	C	C	A	B	A	B
Approach Delay		24.5		22.1		14.0		15.0
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 63.9

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 67.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

	Ø1		Ø2		Ø4
19.5 s		30.9 s		33.8 s	
	Ø5		Ø6		Ø8
19.5 s		30.9 s		33.8 s	

Queues
15: High Street & Sixth Street

2031 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	99	303	44	255	88	374	147	689
v/c Ratio	0.41	0.62	0.21	0.53	0.19	0.26	0.23	0.47
Control Delay	26.2	24.0	22.1	22.1	8.3	15.3	8.2	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	24.0	22.1	22.1	8.3	15.3	8.2	16.5
Queue Length 50th (m)	10.0	26.7	4.2	22.4	3.9	14.8	6.7	29.9
Queue Length 95th (m)	23.1	51.1	11.9	43.6	12.0	31.4	18.5	57.1
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	432	821	374	829	631	1441	775	1470
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	0.23	0.37	0.12	0.31	0.14	0.26	0.19	0.47

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	94	158	130	42	152	90	84	321	34	140	561	93
Future Volume (vph)	94	158	130	42	152	90	84	321	34	140	561	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1756		1823	1793		1738	3557		1824	3526	
Flt Permitted	0.52	1.00		0.43	1.00		0.34	1.00		0.52	1.00	
Satd. Flow (perm)	959	1756		832	1793		629	3557		990	3526	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	99	166	137	44	160	95	88	338	36	147	591	98
RTOR Reduction (vph)	0	40	0	0	28	0	0	8	0	0	13	0
Lane Group Flow (vph)	99	263	0	44	227	0	88	366	0	147	676	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.2	16.2		16.2	16.2		31.5	25.7		32.9	26.4	
Effective Green, g (s)	16.2	16.2		16.2	16.2		31.5	25.7		32.9	26.4	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.49	0.40		0.51	0.41	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	440		208	449		406	1415		588	1440	
v/s Ratio Prot		c0.15			0.13		0.02	0.10		c0.03	c0.19	
v/s Ratio Perm	0.10			0.05			0.09			0.10		
v/c Ratio	0.41	0.60		0.21	0.50		0.22	0.26		0.25	0.47	
Uniform Delay, d1	20.2	21.3		19.1	20.8		9.0	13.1		8.5	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	2.6		0.7	1.2		0.3	0.4		0.2	1.1	
Delay (s)	21.8	23.9		19.8	22.0		9.3	13.5		8.7	15.1	
Level of Service	C	C		B	C		A	B		A	B	
Approach Delay (s)		23.4			21.7			12.7			14.0	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		16.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.49										
Actuated Cycle Length (s)		64.6			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		67.4%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Background PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	13	61	304	15	110	403
Future Volume (vph)	13	61	304	15	110	403
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	13	62	310	15	112	411
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	75	325	112	411		
Volume Left (vph)	13	0	112	0		
Volume Right (vph)	62	15	0	0		
Hadj (s)	-0.41	0.00	0.55	0.05		
Departure Headway (s)	5.3	4.8	5.5	5.0		
Degree Utilization, x	0.11	0.43	0.17	0.57		
Capacity (veh/h)	597	737	636	705		
Control Delay (s)	9.0	11.3	8.5	13.4		
Approach Delay (s)	9.0	11.3	12.3			
Approach LOS	A	B	B			
Intersection Summary						
Delay			11.7			
Level of Service			B			
Intersection Capacity Utilization			37.9%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
17: Hurontario Street & Hume Street

2031 Background PM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	302	247	246	226	172	302
Future Volume (vph)	302	247	246	226	172	302
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	18.8	18.8	30.1	30.1		41.1
Actuated g/C Ratio	0.26	0.26	0.41	0.41		0.57
v/c Ratio	0.69	0.44	0.34	0.31		0.35
Control Delay	32.5	5.3	16.9	3.6		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	32.5	5.3	16.9	3.6		9.5
LOS	C	A	B	A		A
Approach Delay	20.3		10.5			9.5
Approach LOS	C		B			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 72.6
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 13.8
 Intersection Capacity Utilization 82.5%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Background PM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	328	268	267	246	515
v/c Ratio	0.69	0.44	0.34	0.31	0.35
Control Delay	32.5	5.3	16.9	3.6	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	5.3	16.9	3.6	9.5
Queue Length 50th (m)	40.2	0.0	23.1	0.0	16.2
Queue Length 95th (m)	64.5	14.8	47.4	13.4	31.5
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	706	779	796	789	1479
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.46	0.34	0.34	0.31	0.35

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Background PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	302	247	246	226	172	302
Future Volume (vph)	302	247	246	226	172	302
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3		6.3
Lane Util. Factor	1.00	1.00	1.00	1.00		0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96		1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00
Flt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.98
Satd. Flow (prot)	1825	1585	1921	1560		3543
Flt Permitted	0.95	1.00	1.00	1.00		0.69
Satd. Flow (perm)	1825	1585	1921	1560		2494
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	268	267	246	187	328
RTOR Reduction (vph)	0	199	0	144	0	0
Lane Group Flow (vph)	328	69	267	102	0	515
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.8	18.8	30.1	30.1		41.1
Effective Green, g (s)	18.8	18.8	30.1	30.1		41.1
Actuated g/C Ratio	0.26	0.26	0.42	0.42		0.57
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	473	411	797	647		1515
v/s Ratio Prot	c0.18		0.14			c0.03
v/s Ratio Perm		0.04		0.07		c0.16
v/c Ratio	0.69	0.17	0.34	0.16		0.34
Uniform Delay, d1	24.2	20.8	14.4	13.3		8.4
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	4.4	0.2	1.1	0.5		0.6
Delay (s)	28.6	21.0	15.5	13.8		9.0
Level of Service	C	C	B	B		A
Approach Delay (s)	25.2		14.7			9.0
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		16.8		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.48				
Actuated Cycle Length (s)		72.5		Sum of lost time (s)		16.6
Intersection Capacity Utilization		82.5%		ICU Level of Service		E
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	182	92	52	138	25	39	49	30	45	87	21
Future Volume (vph)	10	182	92	52	138	25	39	49	30	45	87	21
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	194	98	55	147	27	41	52	32	48	93	22
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	303	229	125	163								
Volume Left (vph)	11	55	41	48								
Volume Right (vph)	98	27	32	22								
Hadj (s)	-0.15	-0.01	0.03	0.02								
Departure Headway (s)	4.9	5.2	5.6	5.5								
Degree Utilization, x	0.41	0.33	0.19	0.25								
Capacity (veh/h)	687	651	569	589								
Control Delay (s)	11.4	10.7	9.9	10.3								
Approach Delay (s)	11.4	10.7	9.9	10.3								
Approach LOS	B	B	A	B								
Intersection Summary												
Delay		10.7										
Level of Service		B										
Intersection Capacity Utilization		47.9%		ICU Level of Service						A		
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	93	16	29	66	53	8	61	12	81	84	22
Future Volume (vph)	15	93	16	29	66	53	8	61	12	81	84	22
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	17	107	18	33	76	61	9	70	14	93	97	25
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	142	109	61	93	215							
Volume Left (vph)	17	33	0	9	93							
Volume Right (vph)	18	0	61	14	25							
Hadj (s)	0.25	0.47	-0.56	-0.05	0.11							
Departure Headway (s)	5.3	5.9	4.9	5.0	5.0							
Degree Utilization, x	0.21	0.18	0.08	0.13	0.30							
Capacity (veh/h)	632	569	686	664	681							
Control Delay (s)	9.7	9.0	7.1	8.7	10.0							
Approach Delay (s)	9.7	8.4		8.7	10.0							
Approach LOS	A	A		A	B							
Intersection Summary												
Delay			9.3									
Level of Service			A									
Intersection Capacity Utilization			36.9%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Background PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	507	363	47	52	145
Future Volume (Veh/h)	66	507	363	47	52	145
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	74	570	408	53	58	163
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	461				1152	434
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	461				1152	434
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	92				71	74
cM capacity (veh/h)	981				202	619
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	644	461	221			
Volume Left	74	0	58			
Volume Right	0	53	163			
cSH	981	1700	402			
Volume to Capacity	0.08	0.27	0.55			
Queue Length 95th (m)	1.9	0.0	24.4			
Control Delay (s)	1.9	0.0	24.4			
Lane LOS	A		C			
Approach Delay (s)	1.9	0.0	24.4			
Approach LOS			C			
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			74.1%	ICU Level of Service	D	
Analysis Period (min)			15			



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix D

2041 Background Traffic Operations (Synchro)

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Background AM

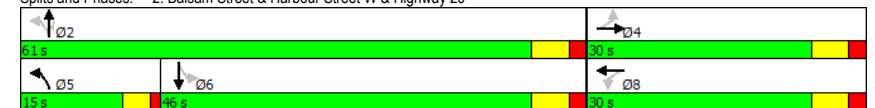
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	0	55	18	0	3	56	474	4	0	583	22
Future Volume (Veh/h)	22	0	55	18	0	3	56	474	4	0	583	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	25	0	63	20	0	3	64	539	5	0	663	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1333	1335	663	1393	1355	539	688			544		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1333	1335	663	1393	1355	539	688			544		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	80	100	86	80	100	99	93			100		
cM capacity (veh/h)	124	144	454	98	140	546	897			1035		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	88	23	64	539	5	0	663	25				
Volume Left	25	20	64	0	0	0	0	0				
Volume Right	63	3	0	0	5	0	0	25				
cSH	259	110	897	1700	1700	1700	1700	1700				
Volume to Capacity	0.34	0.21	0.07	0.32	0.00	0.00	0.39	0.01				
Queue Length 95th (m)	11.0	5.7	1.7	0.0	0.0	0.0	0.0	0.0				
Control Delay (s)	25.9	46.3	9.3	0.0	0.0	0.0	0.0	0.0				
Lane LOS	D	E	A									
Approach Delay (s)	25.9	46.3	1.0			0.0						
Approach LOS	D	E										
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			48.3%			ICU Level of Service				A		
Analysis Period (min)			15									

Timings
2: Balsam Street & Harbour Street W & Highway 26

2041 Background AM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	1	2	51	3	69	588	74	6	675
Future Volume (vph)	1	2	51	3	69	588	74	6	675
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4				2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	9.6	9.6	9.6	9.6		55.5	57.0		40.4
Actuated g/C Ratio	0.13	0.13	0.13	0.13		0.75	0.77		0.55
v/c Ratio	0.01	0.37	0.36	0.10		0.35	0.07		0.44
Control Delay	29.0	11.1	37.1	16.6		4.2	2.5		12.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.0	11.1	37.1	16.6		4.2	2.5		12.0
LOS	C	B	D	B		A	A		B
Approach Delay		11.2		31.6		4.0			12.0
Approach LOS		B		C		A			B
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 73.8									
Natural Cycle: 75									
Control Type: Semi Act-Uncoordinated									
Maximum v/c Ratio: 0.44									
Intersection Signal Delay: 9.1					Intersection LOS: A				
Intersection Capacity Utilization 89.6%					ICU Level of Service E				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2041 Background AM

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	1	110	60	22	773	87	802
v/c Ratio	0.01	0.37	0.36	0.10	0.35	0.07	0.44
Control Delay	29.0	11.1	37.1	16.6	4.2	2.5	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	11.1	37.1	16.6	4.2	2.5	12.0
Queue Length 50th (m)	0.1	0.3	8.1	0.5	16.3	1.7	34.8
Queue Length 95th (m)	1.3	11.5	17.7	6.0	25.9	5.4	49.5
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	468	583	423	533	2191	1268	1838
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.19	0.14	0.04	0.35	0.07	0.44
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2041 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2		1	2		1	2		1	2	
Traffic Volume (vph)	1	2	92	51	3	15	69	588	74	6	675	1
Future Volume (vph)	1	2	92	51	3	15	69	588	74	6	675	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.85		1.00	0.88			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1825	1553		1785	1590			3488	1633		3543	
Flt Permitted	0.74	1.00		0.69	1.00			0.80	1.00		0.95	
Satd. Flow (perm)	1427	1553		1289	1590			2802	1633		3361	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1	2	108	60	4	18	81	692	87	7	794	1
RTOR Reduction (vph)	0	97	0	0	16	0	0	0	9	0	0	0
Lane Group Flow (vph)	1	13	0	60	6	0	0	773	78	0	802	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	7.6	7.6		7.6	7.6			55.5	55.5		40.4	
Effective Green, g (s)	7.6	7.6		7.6	7.6			55.5	55.5		40.4	
Actuated g/C Ratio	0.10	0.10		0.10	0.10			0.74	0.74		0.54	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	144	157		130	160			2172	1206		1808	
v/s Ratio Prot		0.01			0.00			c0.05				
v/s Ratio Perm	0.00			c0.05				0.21	0.05		c0.24	
v/c Ratio	0.01	0.08		0.46	0.04			0.36	0.06		0.44	
Uniform Delay, d1	30.4	30.6		31.8	30.4			3.5	2.7		10.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.2		2.6	0.1			0.5	0.1		0.8	
Delay (s)	30.4	30.8		34.4	30.5			3.9	2.8		11.3	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		30.8			33.4			3.8			11.3	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		10.0							A			
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		75.1			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		89.6%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

Timings 2041 Background AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	20	0	23	3	36	720	3	797
Future Volume (vph)	20	0	23	3	36	720	3	797
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.1	10.1		10.1	55.5	56.2	53.9	50.4
Actuated g/C Ratio	0.15	0.15		0.15	0.84	0.85	0.82	0.76
v/c Ratio	0.09	0.02		0.14	0.08	0.29	0.01	0.37
Control Delay	27.6	0.1		26.0	2.5	4.1	2.7	6.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	0.1		26.0	2.5	4.1	2.7	6.4
LOS	C	A		C	A	A	A	A
Approach Delay		18.5		26.0		4.0		6.4
Approach LOS		B		C		A		A

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 66
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.37
Intersection Signal Delay: 5.9
Intersection Capacity Utilization 52.5%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service A

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

Ø1	Ø2	Ø4
15 s	47 s	22 s
Ø5	Ø6	Ø8
15 s	47 s	22 s

Queues 2041 Background AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	12	36	43	868	4	990
v/c Ratio	0.09	0.02	0.14	0.08	0.29	0.01	0.37
Control Delay	27.6	0.1	26.0	2.5	4.1	2.7	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	0.1	26.0	2.5	4.1	2.7	6.4
Queue Length 50th (m)	2.2	0.0	2.9	0.0	0.0	0.0	16.7
Queue Length 95th (m)	8.4	0.0	10.7	3.1	42.0	0.7	49.1
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	419	620	414	597	2988	736	2684
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.02	0.09	0.07	0.29	0.01	0.37

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Balsam Street & CT Entrance/Plaza Access

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	20	0	10	23	3	3	36	720	1	3	797	25
Future Volume (vph)	20	0	10	23	3	3	36	720	1	3	797	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1638		1705	3509		1825	3518	
Flt Permitted	1.00	1.00			0.99		0.25	1.00		0.33	1.00	
Satd. Flow (perm)	1715	1633			1680		454	3509		628	3518	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	24	0	12	28	4	4	43	867	1	4	960	30
RTOR Reduction (vph)	0	11	0	0	4	0	0	0	0	0	2	0
Lane Group Flow (vph)	24	1	0	0	32	0	43	868	0	4	988	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	3.6	3.6			3.6		56.4	52.3		50.6	49.4	
Effective Green, g (s)	3.6	3.6			3.6		56.4	52.3		50.6	49.4	
Actuated g/C Ratio	0.05	0.05			0.05		0.77	0.72		0.69	0.68	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	84	80			82		420	2510		454	2377	
v/s Ratio Prot		0.00					0.01	0.25		0.00	0.28	
v/s Ratio Perm	0.01				0.02		0.07			0.01		
v/c Ratio	0.29	0.01			0.39		0.10	0.35		0.01	0.42	
Uniform Delay, d1	33.5	33.1			33.7		2.3	3.9		3.5	5.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.0			3.1		0.1	0.4		0.0	0.5	
Delay (s)	35.4	33.1			36.8		2.4	4.3		3.5	5.9	
Level of Service	D	C			D		A	A		A	A	
Approach Delay (s)		34.6			36.8			4.2			5.9	
Approach LOS		C			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.2			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.39										
Actuated Cycle Length (s)		73.1			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		52.5%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

2041 Background AM

Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (vph)	26	0	0	62	751	777
Future Volume (vph)	26	0	0	62	751	777
Turn Type	Perm	NA	NA	pm+pt	NA	NA
Protected Phases		4	8	5	2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	5	2	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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	4.0	6.0	6.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	10.1	10.1	10.1	65.4	65.9	55.5
Actuated g/C Ratio	0.13	0.13	0.13	0.83	0.84	0.71
v/c Ratio	0.18	0.08	0.00	0.16	0.32	0.40
Control Delay	34.8	0.3	0.0	3.1	3.2	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	0.3	0.0	3.1	3.2	7.7
LOS	C	A	A	A	A	A
Approach Delay		16.1			3.2	7.7
Approach LOS		B			A	A
Intersection Summary						
Cycle Length: 87						
Actuated Cycle Length: 78.6						
Natural Cycle: 75						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.40						
Intersection Signal Delay: 5.8						
Intersection Capacity Utilization 69.9%						
Analysis Period (min) 15						
Intersection LOS: A						
ICU Level of Service C						

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Background AM

	↖	→	←	↙	↑	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	32	38	1	77	929	1006
v/c Ratio	0.18	0.08	0.00	0.16	0.32	0.40
Control Delay	34.8	0.3	0.0	3.1	3.2	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	0.3	0.0	3.1	3.2	7.7
Queue Length 50th (m)	4.6	0.0	0.0	2.4	22.5	41.8
Queue Length 95th (m)	11.2	0.0	0.0	4.5	25.6	47.8
Internal Link Dist (m)		175.6	57.5		179.2	181.9
Turn Bay Length (m)				70.0		
Base Capacity (vph)	265	586	360	606	2914	2484
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.06	0.00	0.13	0.32	0.40
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Background AM

	↖	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Traffic Volume (vph)	26	0	31	0	0	1	62	751	2	0	777	38
Future Volume (vph)	26	0	31	0	0	1	62	751	2	0	777	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95			0.95	
Flpb, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.85			0.86		1.00	1.00			0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1723	1607			1085		1721	3472			3515	
Flt Permitted	0.76	1.00			1.00		0.24	1.00			1.00	
Satd. Flow (perm)	1374	1607			1085		432	3472			3515	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	32	0	38	0	0	1	77	927	2	0	959	47
RTOR Reduction (vph)	0	35	0	0	1	0	0	0	0	0	3	0
Lane Group Flow (vph)	32	3	0	0	0	0	77	929	0	0	1003	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.8	5.8			5.8		64.1	64.1			54.3	
Effective Green, g (s)	5.8	5.8			5.8		64.1	64.1			54.3	
Actuated g/C Ratio	0.07	0.07			0.07		0.78	0.78			0.66	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	97	113			76		429	2717			2330	
v/s Ratio Prot		0.00			0.00		0.01	c0.27			c0.29	
v/s Ratio Perm	c0.02						0.13					
v/c Ratio	0.33	0.02			0.00		0.18	0.34			0.43	
Uniform Delay, d1	36.2	35.4			35.4		2.7	2.6			6.5	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.0	0.1			0.0		0.2	0.3			0.6	
Delay (s)	38.2	35.5			35.4		2.9	3.0			7.1	
Level of Service	D	D			D		A	A			A	
Approach Delay (s)		36.7			35.4			3.0			7.1	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.42										
Actuated Cycle Length (s)		81.9			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		69.9%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Timings 2041 Background AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	16	205	87	294	446	119	368	446	353
Future Volume (vph)	16	205	87	294	446	119	368	446	353
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	26.4	16.3	32.2	25.5	53.7	22.5	22.5	27.7	27.7
Actuated g/C Ratio	0.26	0.16	0.32	0.26	0.54	0.23	0.23	0.28	0.28
v/c Ratio	0.07	0.59	0.31	0.40	0.58	0.36	0.73	0.73	0.73
Control Delay	25.9	39.3	28.4	35.0	8.2	35.8	40.3	45.0	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	39.3	28.4	35.0	8.2	35.8	40.3	45.0	39.1
LOS	C	D	C	C	A	D	D	D	D
Approach Delay		38.6		19.9			39.4		41.0
Approach LOS		D		B			D		D

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 99.9
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 33.5
Intersection Capacity Utilization 68.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service C

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↰ Ø3	↱ Ø4
35.5 s	35.5 s	11 s	38 s
		↰ Ø7	↱ Ø8
		14 s	35 s

Queues 2041 Background AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	346	106	359	544	145	582	326	670
v/c Ratio	0.07	0.59	0.31	0.40	0.58	0.36	0.73	0.73	0.73
Control Delay	25.9	39.3	28.4	35.0	8.2	35.8	40.3	45.0	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	39.3	28.4	35.0	8.2	35.8	40.3	45.0	39.1
Queue Length 50th (m)	2.7	29.5	15.0	29.3	22.8	24.0	53.0	62.6	64.2
Queue Length 95th (m)	7.7	41.4	26.6	46.3	41.1	38.8	66.5	96.4	85.7
Internal Link Dist (m)		178.2		250.8		206.8		179.2	
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	303	987	350	1110	962	529	1024	472	965
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.35	0.30	0.32	0.57	0.27	0.57	0.69	0.69

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	16	205	79	87	294	446	119	368	109	446	353	18
Future Volume (vph)	16	205	79	87	294	446	119	368	109	446	353	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1686	3379		1824	3544	1530	1807	3419		1612	3284	
Flt Permitted	0.54	1.00		0.39	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	954	3379		753	3544	1530	1807	3419		1612	3284	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	20	250	96	106	359	544	145	449	133	544	430	22
RTOR Reduction (vph)	0	36	0	0	0	125	0	23	0	0	2	0
Lane Group Flow (vph)	20	310	0	106	359	419	145	559	0	326	668	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	21.5	18.9		32.1	25.5	53.2	22.5	22.5		27.7	27.7	
Effective Green, g (s)	21.5	18.9		32.1	25.5	53.2	22.5	22.5		27.7	27.7	
Actuated g/C Ratio	0.21	0.18		0.31	0.25	0.52	0.22	0.22		0.27	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	624		332	883	795	397	751		436	889	
v/s Ratio Prot	0.00	0.09		c0.03	0.10	c0.14	0.08	c0.16		0.20	c0.20	
v/s Ratio Perm	0.02			0.07		0.13						
v/c Ratio	0.09	0.50		0.32	0.41	0.53	0.37	0.74		0.75	0.75	
Uniform Delay, d1	32.3	37.4		25.8	32.1	16.2	33.8	37.2		34.1	34.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.6		0.6	0.3	0.6	0.6	4.0		6.9	3.6	
Delay (s)	32.5	38.1		26.4	32.4	16.9	34.4	41.2		41.0	37.8	
Level of Service	C	D		C	B	C	D	D		D	D	
Approach Delay (s)		37.8			23.4		39.9				38.8	
Approach LOS		D			C		D				D	

Intersection Summary

HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	102.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	4	754	18	845	6	2	13	4
Future Volume (vph)	4	754	18	845	6	2	13	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.8	90.6	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.86	0.84	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.01	0.30	0.04	0.34	0.05	0.19	0.12	0.05
Control Delay	2.0	4.2	1.9	3.6	45.8	19.5	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.2	1.9	3.6	45.8	19.5	47.4	36.4
LOS	A	A	A	A	D	B	D	D
Approach Delay		4.2		3.5		24.1		43.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 4.7
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	905	21	1017	7	33	15	9
v/c Ratio	0.01	0.30	0.04	0.34	0.05	0.19	0.12	0.05
Control Delay	2.0	4.2	1.9	3.6	45.8	19.5	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	4.2	1.9	3.6	45.8	19.5	47.4	36.4
Queue Length 50th (m)	0.2	21.4	0.6	25.3	1.4	0.4	2.9	1.0
Queue Length 95th (m)	0.7	41.4	1.7	48.5	5.4	8.6	8.8	5.3
Internal Link Dist (m)	250.8		336.7		166.8		215.7	
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	534	2990	576	3006	333	382	324	415
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	0.01	0.30	0.04	0.34	0.02	0.09	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	4	754	6	18	845	9	6	2	26	13	4	3
Future Volume (vph)	4	754	6	18	845	9	6	2	26	13	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3569		1825	3505		1815	1519		1778	1779	
Flt Permitted	0.27	1.00		0.30	1.00		0.75	1.00		0.74	1.00	
Satd. Flow (perm)	524	3569		573	3505		1437	1519		1377	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	5	898	7	21	1006	11	7	2	31	15	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	29	0	0	4	0
Lane Group Flow (vph)	5	905	0	21	1017	0	7	4	0	15	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	84.8	83.4		87.6	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.78	0.77		0.81	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	427	2753		496	2749		79	84		76	98	
v/s Ratio Prot	0.00	0.25		c0.00	c0.29			0.00			0.00	
v/s Ratio Perm	0.01			0.03			0.00			c0.01		
v/c Ratio	0.01	0.33		0.04	0.37		0.09	0.04		0.20	0.05	
Uniform Delay, d1	2.6	3.8		2.1	3.5		48.5	48.3		48.8	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.0	0.4		0.5	0.2		1.3	0.2	
Delay (s)	2.6	4.1		2.1	3.9		48.9	48.6		50.0	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		4.1			3.9			48.6			49.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			5.4							A		
HCM 2000 Volume to Capacity ratio			0.35									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)			15.9			
Intersection Capacity Utilization			62.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	52	705	10	729	28	38	87	31
Future Volume (vph)	52	705	10	729	28	38	87	31
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.5	73.3	73.1	66.8	13.0	13.0	13.0	13.0
Actuated g/C Ratio	0.76	0.73	0.73	0.67	0.13	0.13	0.13	0.13
v/c Ratio	0.12	0.33	0.02	0.37	0.35	0.28	0.58	0.57
Control Delay	4.1	6.1	1.6	5.1	48.3	27.9	53.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.1	6.1	1.6	5.1	48.3	27.9	53.3	16.2
LOS	A	A	A	A	D	C	D	B
Approach Delay		6.0		5.1		34.4		28.6
Approach LOS		A		A		C		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 10.1

Intersection LOS: B

Intersection Capacity Utilization 56.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	856	12	856	33	70	101	201
v/c Ratio	0.12	0.33	0.02	0.37	0.35	0.28	0.58	0.57
Control Delay	4.1	6.1	1.6	5.1	48.3	27.9	53.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.1	6.1	1.6	5.1	48.3	27.9	53.3	16.2
Queue Length 50th (m)	2.2	23.0	0.3	3.8	5.9	7.7	18.7	6.3
Queue Length 95th (m)	6.2	52.9	m0.3	38.7	13.6	17.8	31.1	22.2
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	498	2584	531	2340	173	443	321	512
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	0.12	0.33	0.02	0.37	0.19	0.16	0.31	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2041 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	52	705	31	10	729	7	28	38	22	87	31	142
Future Volume (vph)	52	705	31	10	729	7	28	38	22	87	31	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3523		1825	3500		1752	1759		1773	1612	
Flt Permitted	0.28	1.00		0.33	1.00		0.39	1.00		0.71	1.00	
Satd. Flow (perm)	547	3523		633	3500		723	1759		1328	1612	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	60	820	36	12	848	8	33	44	26	101	36	165
RTOR Reduction (vph)	0	2	0	0	0	0	0	23	0	0	144	0
Lane Group Flow (vph)	60	854	0	12	856	0	33	47	0	101	57	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.3	70.1		67.2	66.0		13.0	13.0		13.0	13.0	
Effective Green, g (s)	75.3	70.1		67.2	66.0		13.0	13.0		13.0	13.0	
Actuated g/C Ratio	0.75	0.70		0.67	0.66		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	479	2469		439	2310		93	228		172	209	
v/s Ratio Prot	c0.01	c0.24		0.00	c0.24		0.03			0.04		
v/s Ratio Perm	0.09			0.02			0.05			c0.08		
v/c Ratio	0.13	0.35		0.03	0.37		0.35	0.21		0.59	0.27	
Uniform Delay, d1	3.7	5.9		5.4	7.7		39.7	38.9		41.0	39.2	
Progression Factor	1.00	1.00		0.40	0.55		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.0	0.4		2.3	0.5		5.0	0.7	
Delay (s)	3.8	6.3		2.2	4.7		42.0	39.4		46.0	40.0	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		6.1			4.6			40.2			42.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	29	613	20	818	107	15	37	28
Future Volume (vph)	29	613	20	818	107	15	37	28
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.6	63.0	66.8	60.8	20.8	13.3	17.7	10.3
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.21	0.13	0.18	0.10
v/c Ratio	0.09	0.36	0.05	0.46	0.48	0.14	0.17	0.36
Control Delay	4.3	8.8	4.8	9.1	37.3	28.0	30.2	25.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.3	8.8	4.8	9.1	37.3	28.0	30.2	25.9
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.6		9.0		35.4		27.5
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 49.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Pine Street & First Street

Ø1	Ø2	Ø3	Ø4
11 s	50 s	13 s	26 s
Ø5	Ø6 (R)	Ø7	Ø8
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	34	788	24	973	126	33	44	78
v/c Ratio	0.09	0.36	0.05	0.46	0.48	0.14	0.17	0.36
Control Delay	4.3	8.8	4.8	9.1	37.3	28.0	30.2	25.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	4.3	8.8	4.8	9.1	37.3	28.0	30.2	25.9
Queue Length 50th (m)	1.6	40.5	1.1	37.4	19.8	3.2	6.6	6.0
Queue Length 95th (m)	2.2	30.6	m2.6	41.7	32.5	11.2	14.0	17.6
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	396	2199	444	2131	265	361	286	381
Starvation Cap Reductn	0	0	0	203	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	0.09	0.36	0.05	0.50	0.48	0.09	0.15	0.20

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	29	613	57	20	818	9	107	15	13	37	28	38
Future Volume (vph)	29	613	57	20	818	9	107	15	13	37	28	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3484		1629	3504		1736	1702		1711	1730	
Flt Permitted	0.23	1.00		0.32	1.00		0.48	1.00		0.74	1.00	
Satd. Flow (perm)	446	3484		553	3504		884	1702		1325	1730	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	34	721	67	24	962	11	126	18	15	44	33	45
RTOR Reduction (vph)	0	5	0	0	0	0	0	13	0	0	41	0
Lane Group Flow (vph)	34	783	0	24	973	0	126	20	0	44	37	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	63.2	59.0		60.4	57.6		22.3	13.3		13.7	8.7	
Effective Green, g (s)	63.2	59.0		60.4	57.6		22.3	13.3		13.7	8.7	
Actuated g/C Ratio	0.63	0.59		0.60	0.58		0.22	0.13		0.14	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	339	2055		364	2018		278	226		200	150	
v/s Ratio Prot	c0.00	0.22		0.00	c0.28		c0.04	0.01		0.01	0.02	
v/s Ratio Perm	0.06			0.04			c0.06			0.02		
v/c Ratio	0.10	0.38		0.07	0.48		0.45	0.09		0.22	0.25	
Uniform Delay, d1	7.7	10.8		8.1	12.4		32.6	38.0		38.2	42.6	
Progression Factor	0.66	0.81		0.76	0.68		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.5		0.1	0.8		1.2	0.2		0.6	0.9	
Delay (s)	5.2	9.3		6.2	9.2		33.8	38.2		38.8	43.4	
Level of Service	A	A		A	A		C	D		D	D	
Approach Delay (s)		9.2			9.1			34.7			41.8	
Approach LOS		A			A			C			D	

Intersection Summary

HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

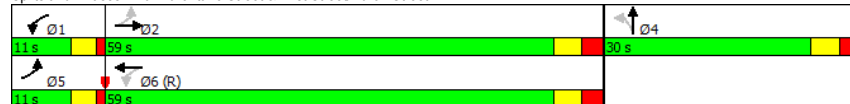
Timings 2041 Background AM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	23	562	40	701	154	20
Future Volume (vph)	23	562	40	701	154	20
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	72.4	66.6	72.8	66.8	15.4	15.4
Actuated g/C Ratio	0.72	0.67	0.73	0.67	0.15	0.15
v/c Ratio	0.06	0.33	0.09	0.37	0.66	0.22
Control Delay	1.7	2.3	4.5	9.1	50.8	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.7	2.3	4.5	9.1	50.8	18.0
LOS	A	A	A	A	D	B
Approach Delay		2.3		8.9		42.0
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 10.5 Intersection LOS: B
 Intersection Capacity Utilization 45.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues 2041 Background AM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	27	759	48	866	183	67
v/c Ratio	0.06	0.33	0.09	0.37	0.66	0.22
Control Delay	1.7	2.3	4.5	9.1	50.8	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.7	2.3	4.5	9.1	50.8	18.0
Queue Length 50th (m)	0.4	6.0	2.0	39.1	33.8	4.1
Queue Length 95th (m)	1.1	6.8	5.4	55.4	48.1	13.1
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	439	2329	559	2358	438	451
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	0.06	0.33	0.09	0.37	0.42	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	23	562	76	40	701	26	154	20	36	0	0	0
Future Volume (vph)	23	562	76	40	701	26	154	20	36	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.98		1.00	0.99		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3487		1825	3526		1793	1711				
Flt Permitted	0.30	1.00		0.34	1.00		0.95	1.00				
Satd. Flow (perm)	500	3487		654	3526		1793	1711				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	27	669	90	48	835	31	183	24	43	0	0	0
RTOR Reduction (vph)	0	8	0	0	2	0	0	36	0	0	0	0
Lane Group Flow (vph)	27	751	0	48	864	0	183	31	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	68.8	65.0		69.2	65.2		15.4	15.4				
Effective Green, g (s)	68.8	65.0		69.2	65.2		15.4	15.4				
Actuated g/C Ratio	0.69	0.65		0.69	0.65		0.15	0.15				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	385	2266		499	2298		276	263				
v/s Ratio Prot	0.00	0.22		c0.00	c0.25			0.02				
v/s Ratio Perm	0.05			0.06			c0.10					
v/c Ratio	0.07	0.33		0.10	0.38		0.66	0.12				
Uniform Delay, d1	5.1	7.8		5.0	8.0		39.9	36.4				
Progression Factor	0.33	0.23		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	0.4		0.1	0.5		5.9	0.2				
Delay (s)	1.7	2.2		5.0	8.5		45.7	36.6				
Level of Service	A	A		A	A		D	D				
Approach Delay (s)		2.2			8.3			43.3			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

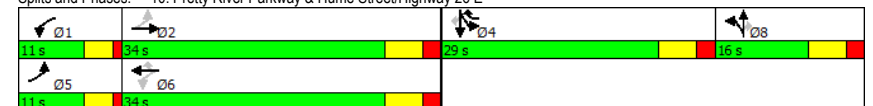
Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background AM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	103	210	7	406	757	10	25	15	254	36	59
Future Volume (vph)	103	210	7	406	757	10	25	15	254	36	59
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	34.0	11.0	34.0	29.0	16.0	16.0	16.0	29.0	29.0	29.0
Total Split (%)	12.2%	37.8%	12.2%	37.8%	32.2%	17.8%	17.8%	17.8%	32.2%	32.2%	32.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	39.2	35.9	36.9	29.5	47.3	10.6	10.6	10.6	17.8	17.8	17.8
Actuated g/C Ratio	0.51	0.47	0.48	0.39	0.62	0.14	0.14	0.14	0.23	0.23	0.23
v/c Ratio	0.29	0.16	0.02	0.63	0.70	0.05	0.12	0.06	0.42	0.41	0.14
Control Delay	14.9	15.3	13.4	28.8	5.8	36.3	36.8	0.3	30.9	30.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	15.3	13.4	28.8	5.8	36.3	36.8	0.3	30.9	30.6	0.6
LOS	B	B	B	C	A	D	D	A	C	C	A
Approach Delay		15.2		13.8			25.6			25.6	
Approach LOS		B		B			C			C	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 76.5	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 74.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	116	258	8	456	851	11	28	17	162	163	66
v/c Ratio	0.29	0.16	0.02	0.63	0.70	0.05	0.12	0.06	0.42	0.41	0.14
Control Delay	14.9	15.3	13.4	28.8	5.8	36.3	36.8	0.3	30.9	30.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	15.3	13.4	28.8	5.8	36.3	36.8	0.3	30.9	30.6	0.6
Queue Length 50th (m)	10.5	12.3	0.7	67.4	13.1	1.7	4.3	0.0	24.3	24.5	0.0
Queue Length 95th (m)	20.8	25.5	3.1	#112.7	38.0	6.6	12.1	0.0	42.2	42.2	0.0
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)			60.0		15.0		15.0		70.0		
Base Capacity (vph)	404	1654	524	727	1269	226	241	302	523	537	587
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.16	0.02	0.63	0.67	0.05	0.12	0.06	0.31	0.30	0.11

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	103	210	20	7	406	757	10	25	15	254	36	59
Future Volume (vph)	103	210	20	7	406	757	10	25	15	254	36	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flrb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flrb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3514		1558	1883	1564	1644	1746	1207	1651	1695	1512
Flt Permitted	0.29	1.00		0.59	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	553	3514		971	1883	1564	1644	1746	1207	1651	1695	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	116	236	22	8	456	851	11	28	17	285	40	66
RTOR Reduction (vph)	0	6	0	0	0	257	0	0	16	0	0	52
Lane Group Flow (vph)	116	252	0	8	456	594	11	28	1	162	163	14
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	41.1	35.9		33.1	31.9	49.7	5.2	5.2	5.2	17.8	17.8	17.8
Effective Green, g (s)	41.1	35.9		33.1	31.9	49.7	5.2	5.2	5.2	17.8	17.8	17.8
Actuated g/C Ratio	0.50	0.44		0.40	0.39	0.61	0.06	0.06	0.06	0.22	0.22	0.22
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	356	1536		400	731	1061	104	110	76	357	367	327
v/s Ratio Prot	c0.02	0.07		0.00	c0.24	c0.12	0.01	c0.02		0.10	0.10	
v/s Ratio Perm	0.14			0.01		0.26			0.00			0.01
v/c Ratio	0.33	0.16		0.02	0.62	0.56	0.11	0.25	0.01	0.45	0.44	0.04
Uniform Delay, d1	12.5	14.0		14.7	20.3	9.7	36.3	36.6	36.0	27.9	27.9	25.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2		0.0	4.0	0.7	0.4	1.2	0.1	0.9	0.9	0.1
Delay (s)	13.0	14.2		14.7	24.2	10.4	36.7	37.8	36.1	28.8	28.7	25.5
Level of Service	B	B		B	C	B	D	D	D	C	C	C
Approach Delay (s)	13.9			15.2			37.1			28.2		
Approach LOS	B			B			D			C		
Intersection Summary												
HCM 2000 Control Delay	17.9			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	82.1			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	74.5%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Timings 2041 Background AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	0	0	114	775	116	287
Future Volume (vph)	3	0	0	114	775	116	287
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases		4		2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)		15.7	15.7	34.8	27.5	34.8	27.5
Actuated g/C Ratio		0.25	0.25	0.55	0.43	0.55	0.43
v/c Ratio		0.08	0.82	0.20	0.59	0.35	0.24
Control Delay		0.4	23.2	7.4	17.5	9.4	13.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.4	23.2	7.4	17.5	9.4	13.3
LOS		A	C	A	B	A	B
Approach Delay		0.4	23.2		16.2		12.3
Approach LOS		A	C		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 63.7
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 16.7 Intersection LOS: B
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues 2041 Background AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	29	487	131	893	133	352
v/c Ratio	0.08	0.82	0.20	0.59	0.35	0.24
Control Delay	0.4	23.2	7.4	17.5	9.4	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	23.2	7.4	17.5	9.4	13.3
Queue Length 50th (m)	0.0	24.9	6.4	46.0	6.6	14.5
Queue Length 95th (m)	0.0	#54.8	13.4	64.6	13.8	23.4
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	440	695	643	1512	376	1469
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	0.07	0.70	0.20	0.59	0.35	0.24

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	3	0	23	0	0	424	114	775	2	116	287	19
Future Volume (vph)	3	0	23	0	0	424	114	775	2	116	287	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Flt		0.88			0.86		1.00	1.00		1.00	0.99	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1647			1613		1789	3505		1706	3389	
Flt Permitted		0.69			1.00		0.54	1.00		0.24	1.00	
Satd. Flow (perm)		1147			1613		1019	3505		425	3389	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	3	0	26	0	0	487	131	891	2	133	330	22
RTOR Reduction (vph)	0	22	0	0	200	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	7	0	0	287	0	131	893	0	133	346	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Effective Green, g (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Actuated g/C Ratio		0.24			0.24		0.51	0.43		0.51	0.43	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		279			392		581	1494		321	1444	
v/s Ratio Prot					c0.18		0.02	c0.25		c0.03	0.10	
v/s Ratio Perm		0.01					0.10			0.18		
v/c Ratio		0.03			0.73		0.23	0.60		0.41	0.24	
Uniform Delay, d1		18.6			22.5		8.4	14.2		9.0	11.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			6.9		0.2	1.8		0.9	0.4	
Delay (s)		18.6			29.4		8.6	16.0		9.8	12.2	
Level of Service		B			C		A	B		A	B	
Approach Delay (s)		18.6			29.4		15.1			11.6		
Approach LOS		B			C		B			B		

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
12: Tenth Line & Mountain Road

2041 Background AM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	4	270	27	375	66	31	27	15
Future Volume (vph)	4	270	27	375	66	31	27	15
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		34.3		34.3		11.9		11.9
Actuated g/C Ratio		0.60		0.60		0.21		0.21
v/c Ratio		0.36		0.49		0.59		0.20
Control Delay		7.0		8.7		21.9		19.1
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		7.0		8.7		21.9		19.1
LOS		A		A		C		B
Approach Delay		7.0		8.7		21.9		19.1
Approach LOS		A		A		C		B
Intersection Summary								
Cycle Length: 60.2								
Actuated Cycle Length: 57.1								
Natural Cycle: 55								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.59								
Intersection Signal Delay: 10.9					Intersection LOS: B			
Intersection Capacity Utilization 57.7%					ICU Level of Service B			
Analysis Period (min) 15								

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Background AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	387	537	207	57
v/c Ratio	0.36	0.49	0.59	0.20
Control Delay	7.0	8.7	21.9	19.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.0	8.7	21.9	19.1
Queue Length 50th (m)	15.6	25.2	13.7	4.5
Queue Length 95th (m)	28.8	44.4	26.2	10.8
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1090	1086	428	351
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	0.36	0.49	0.48	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	270	40	27	375	33	66	31	71	27	15	4
Future Volume (vph)	4	270	40	27	375	33	66	31	71	27	15	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.94			0.99	
Flt Protected		1.00			1.00			0.98			0.97	
Satd. Flow (prot)		1810			1863			1694			1650	
Flt Permitted		0.99			0.96			0.85			0.78	
Satd. Flow (perm)		1801			1801			1463			1326	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	5	333	49	33	463	41	81	38	88	33	19	5
RTOR Reduction (vph)	0	8	0	0	4	0	0	47	0	0	4	0
Lane Group Flow (vph)	0	379	0	0	533	0	0	160	0	0	53	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		34.3			34.3			11.9			11.9	
Effective Green, g (s)		34.3			34.3			11.9			11.9	
Actuated g/C Ratio		0.60			0.60			0.21			0.21	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1081			1081			304			276	
v/s Ratio Prot												
v/s Ratio Perm		0.21			0.30			0.11			0.04	
v/c Ratio		0.35			0.49			0.53			0.19	
Uniform Delay, d1		5.8			6.5			20.1			18.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			1.6			1.7			0.3	
Delay (s)		6.7			8.1			21.8			19.0	
Level of Service		A			A			C			B	
Approach Delay (s)		6.7			8.1			21.8			19.0	
Approach LOS		A			A			C			B	
Intersection Summary												
HCM 2000 Control Delay		10.5		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		57.1		Sum of lost time (s)					10.9			
Intersection Capacity Utilization		57.7%		ICU Level of Service					B			
Analysis Period (min)		15										
c Critical Lane Group												

Timings 2041 Background AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	30	290	49	393	31	42	23	16	23
Future Volume (vph)	30	290	49	393	31	42	23	16	23
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases	2		6		6	8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	31.2	31.2	50.5	50.7	50.7	14.6	14.1	7.9	7.9
Actuated g/C Ratio	0.46	0.46	0.74	0.74	0.74	0.21	0.21	0.12	0.12
v/c Ratio	0.08	0.24	0.08	0.33	0.03	0.17	0.17	0.11	0.28
Control Delay	16.4	14.3	6.0	8.3	0.3	22.5	13.7	33.6	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	14.3	6.0	8.3	0.3	22.5	13.7	33.6	22.4
LOS	B	B	A	A	A	C	B	C	C
Approach Delay		14.5		7.5			17.5		25.1
Approach LOS		B		A			B		C

Intersection Summary

Cycle Length: 93.6
Actuated Cycle Length: 68.3
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.33
Intersection Signal Delay: 12.2
Intersection Capacity Utilization 73.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø5	Ø6	Ø7	Ø8
52.6 s		11 s	

Queues 2041 Background AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	387	58	462	36	49	63	19	60
v/c Ratio	0.08	0.24	0.08	0.33	0.03	0.17	0.17	0.11	0.28
Control Delay	16.4	14.3	6.0	8.3	0.3	22.5	13.7	33.6	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	14.3	6.0	8.3	0.3	22.5	13.7	33.6	22.4
Queue Length 50th (m)	3.1	18.8	2.8	33.1	0.0	5.4	3.1	2.6	3.7
Queue Length 95th (m)	9.0	29.2	7.3	55.2	0.3	12.2	10.8	8.2	13.2
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	435	1586	762	1413	1234	372	905	471	519
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.24	0.08	0.33	0.03	0.13	0.07	0.04	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	30	290	39	49	393	31	42	23	31	16	23	28
Future Volume (vph)	30	290	39	49	393	31	42	23	31	16	23	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3454		1705	1902	1633	1770	1667		1572	1626	
Flt Permitted	0.50	1.00		0.46	1.00	1.00	0.48	1.00		0.93	1.00	
Satd. Flow (perm)	955	3454		833	1902	1633	898	1667		1540	1626	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	35	341	46	58	462	36	49	27	36	19	27	33
RTOR Reduction (vph)	0	9	0	0	0	13	0	30	0	0	31	0
Lane Group Flow (vph)	35	378	0	58	462	23	49	33	0	19	29	0
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	2			1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	31.4	31.4		46.8	46.8	46.8	12.4	12.4		4.3	4.3	
Effective Green, g (s)	31.4	31.4		46.8	46.8	46.8	12.4	12.4		4.3	4.3	
Actuated g/C Ratio	0.43	0.43		0.64	0.64	0.64	0.17	0.17		0.06	0.06	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	411	1489		672	1222	1049	202	283		90	96	
v/s Ratio Prot		0.11		0.01	0.024		0.01	0.02			0.02	
v/s Ratio Perm	0.04			0.04		0.01	0.03			0.01		
v/c Ratio	0.09	0.25		0.09	0.38	0.02	0.24	0.12		0.21	0.30	
Uniform Delay, d1	12.2	13.2		4.9	6.1	4.7	25.9	25.6		32.6	32.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.3	0.9	0.0	0.6	0.2		1.2	1.8	
Delay (s)	12.6	13.6		5.2	7.0	4.7	26.5	25.8		33.8	34.6	
Level of Service	B	B		A	A	A	C	C		C	C	
Approach Delay (s)		13.5			6.7		26.1				34.4	
Approach LOS		B			A		C				C	

Intersection Summary

HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	72.8	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 14: High Street & Third Street

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (veh/h)	4	0	3	16	0	75	1	575	59	73	419	3
Future Volume (Veh/h)	4	0	3	16	0	75	1	575	59	73	419	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	0	3	19	0	87	1	669	69	85	487	3
Pedestrians							9					
Lane Width (m)					3.7							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1082	1408	245	1131	1374	378	490			747		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1082	1408	245	1131	1374	378	490			747		
tC, single (s)	7.5	6.5	8.2	7.5	6.5	7.0	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	4.0	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	96	100	99	87	100	86	100			89		
cM capacity (veh/h)	136	124	591	145	130	607	1084			800		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	106	336	404	328	246
Volume Left	5	19	1	0	85	0
Volume Right	3	87	0	69	0	3
cSH	192	386	1084	1700	800	1700
Volume to Capacity	0.04	0.27	0.00	0.24	0.11	0.14
Queue Length 95th (m)	1.0	8.4	0.0	0.0	2.7	0.0
Control Delay (s)	24.6	17.8	0.0	0.0	3.5	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	24.6	17.8	0.0		2.0	
Approach LOS	C	C				

Intersection Summary

Average Delay	2.3					
Intersection Capacity Utilization	47.2%	ICU Level of Service	A			
Analysis Period (min)	15					

Timings
15: High Street & Sixth Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	84	221	22	141	117	413	87	242
Future Volume (vph)	84	221	22	141	117	413	87	242
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	21.5	21.5	21.5	21.5	37.4	28.7	34.8	25.3
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.52	0.40	0.48	0.35
v/c Ratio	0.43	0.76	0.19	0.59	0.25	0.41	0.23	0.31
Control Delay	26.5	30.8	22.3	22.6	10.2	18.6	10.4	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	30.8	22.3	22.6	10.2	18.6	10.4	18.0
LOS	C	C	C	C	B	B	B	B
Approach Delay		30.0		22.6		16.9		16.2
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 72

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 21.0

Intersection LOS: C

Intersection Capacity Utilization 68.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

↰ Ø1	↱ Ø2	↰ Ø4
19.5 s	30.9 s	33.8 s
↰ Ø5	↱ Ø6	↰ Ø8
19.5 s	30.9 s	33.8 s

Queues
15: High Street & Sixth Street

2041 Background AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	410	28	314	146	575	109	364
v/c Ratio	0.43	0.76	0.19	0.59	0.25	0.41	0.23	0.31
Control Delay	26.5	30.8	22.3	22.6	10.2	18.6	10.4	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	30.8	22.3	22.6	10.2	18.6	10.4	18.0
Queue Length 50th (m)	11.2	45.4	2.8	29.3	9.0	29.9	6.5	17.1
Queue Length 95th (m)	22.0	66.0	8.0	45.9	17.3	43.5	13.5	27.5
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	318	703	191	689	690	1412	632	1180
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	0.33	0.58	0.15	0.46	0.21	0.41	0.17	0.31

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	84	221	107	22	141	110	117	413	47	87	242	49
Future Volume (vph)	84	221	107	22	141	110	117	413	47	87	242	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1744		1572	1678		1772	3521		1737	3314	
Flt Permitted	0.44	1.00		0.29	1.00		0.49	1.00		0.43	1.00	
Satd. Flow (perm)	811	1744		487	1678		914	3521		777	3314	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	105	276	134	28	176	138	146	516	59	109	302	61
RTOR Reduction (vph)	0	22	0	0	35	0	0	9	0	0	18	0
Lane Group Flow (vph)	105	388	0	28	279	0	146	566	0	109	346	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.5	21.5		21.5	21.5		37.6	28.7		32.8	26.3	
Effective Green, g (s)	21.5	21.5		21.5	21.5		37.6	28.7		32.8	26.3	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.52	0.39		0.45	0.36	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	239	514		143	494		576	1386		435	1195	
v/s Ratio Prot		c0.22			0.17		c0.03	c0.16		0.02	0.10	
v/s Ratio Perm	0.13			0.06			0.10			0.09		
v/c Ratio	0.44	0.76		0.20	0.56		0.25	0.41		0.25	0.29	
Uniform Delay, d1	20.8	23.3		19.2	21.7		9.4	16.0		11.8	16.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	6.6		0.9	1.8		0.2	0.9		0.3	0.6	
Delay (s)	22.6	29.9		20.1	23.5		9.6	16.9		12.1	17.2	
Level of Service	C	C		C	C		A	B		B	B	
Approach Delay (s)		28.4			23.3			15.4			16.1	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		20.1			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.53										
Actuated Cycle Length (s)		72.9			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		68.0%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Background AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	19	103	317	61	124	252
Future Volume (vph)	19	103	317	61	124	252
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	25	134	412	79	161	327
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	159	491	161	327		
Volume Left (vph)	25	0	161	0		
Volume Right (vph)	134	79	0	0		
Hadj (s)	-0.40	-0.07	0.57	0.12		
Departure Headway (s)	5.7	5.0	6.1	5.6		
Degree Utilization, x	0.25	0.68	0.27	0.51		
Capacity (veh/h)	564	697	577	627		
Control Delay (s)	10.7	18.2	10.1	13.1		
Approach Delay (s)	10.7	18.2	12.1			
Approach LOS	B	C	B			
Intersection Summary						
Delay			14.5			
Level of Service			B			
Intersection Capacity Utilization		45.2%		ICU Level of Service		A
Analysis Period (min)		15				

Timings
17: Hurontario Street & Hume Street

2041 Background AM

	←	←	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↗
Traffic Volume (vph)	186	187	288	326	100	104
Future Volume (vph)	186	187	288	326	100	104
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	16.2	16.2	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
v/c Ratio	0.57	0.43	0.44	0.45		0.18
Control Delay	29.7	6.1	16.4	3.4		7.0
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	29.7	6.1	16.4	3.4		7.0
LOS	C	A	B	A		A
Approach Delay	17.9		9.5			7.0
Approach LOS	B		A			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 69.8
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 11.7
 Intersection Capacity Utilization 78.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2041 Background AM

	←	←	↑	↗	↓
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	233	234	360	408	255
v/c Ratio	0.57	0.43	0.44	0.45	0.18
Control Delay	29.7	6.1	16.4	3.4	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	6.1	16.4	3.4	7.0
Queue Length 50th (m)	27.0	0.0	30.5	0.0	6.6
Queue Length 95th (m)	40.3	10.1	48.1	8.9	11.4
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	711	775	826	909	1439
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.33	0.30	0.44	0.45	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2041 Background AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	186	187	288	326	100	104
Future Volume (vph)	186	187	288	326	100	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3526	3526
Flt Permitted	0.95	1.00	1.00	1.00	0.64	0.64
Satd. Flow (perm)	1772	1581	1921	1575	2311	2311
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	232	234	360	408	125	130
RTOR Reduction (vph)	0	180	0	233	0	0
Lane Group Flow (vph)	233	54	360	175	0	255
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.2	16.2	30.0	30.0		41.0
Effective Green, g (s)	16.2	16.2	30.0	30.0		41.0
Actuated g/C Ratio	0.23	0.23	0.43	0.43		0.59
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	411	366	825	676		1479
v/s Ratio Prot	c0.13		c0.19			c0.02
v/s Ratio Perm		0.03		0.11		0.08
v/c Ratio	0.57	0.15	0.44	0.26		0.17
Uniform Delay, d1	23.7	21.3	14.0	12.8		6.6
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.8	0.2	1.7	0.9		0.3
Delay (s)	25.5	21.5	15.6	13.7		6.9
Level of Service	C	C	B	B		A
Approach Delay (s)	23.5		14.6			6.9
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		16.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.44				
Actuated Cycle Length (s)		69.8		Sum of lost time (s)		16.6
Intersection Capacity Utilization		78.3%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Background AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	153	38	39	179	46	126	61	49	25	30	3
Future Volume (vph)	10	153	38	39	179	46	126	61	49	25	30	3
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	12	189	47	48	221	57	156	75	60	31	37	4
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	248	326	291	72								
Volume Left (vph)	12	48	156	31								
Volume Right (vph)	47	57	60	4								
Hadj (s)	-0.06	0.01	0.08	0.19								
Departure Headway (s)	5.5	5.4	5.7	6.3								
Degree Utilization, x	0.38	0.49	0.46	0.13								
Capacity (veh/h)	606	625	583	479								
Control Delay (s)	11.8	13.6	13.5	10.2								
Approach Delay (s)	11.8	13.6	13.5	10.2								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay		12.8										
Level of Service		B										
Intersection Capacity Utilization		52.1%		ICU Level of Service								
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Background AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	92	10	18	114	129	16	88	37	66	36	17
Future Volume (vph)	17	92	10	18	114	129	16	88	37	66	36	17
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	20	110	12	21	136	154	19	105	44	79	43	20
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	142	157	154	168	142							
Volume Left (vph)	20	21	0	19	79							
Volume Right (vph)	12	0	154	44	20							
Hadj (s)	0.20	0.33	-0.63	0.01	0.13							
Departure Headway (s)	5.5	5.9	4.9	5.3	5.5							
Degree Utilization, x	0.22	0.26	0.21	0.25	0.22							
Capacity (veh/h)	606	581	694	630	607							
Control Delay (s)	10.0	9.7	8.0	10.0	9.9							
Approach Delay (s)	10.0	8.9		10.0	9.9							
Approach LOS	B	A		B	A							
Intersection Summary												
Delay			9.5									
Level of Service			A									
Intersection Capacity Utilization			37.4%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Background AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	169	366	522	77	10	65
Future Volume (Veh/h)	169	366	522	77	10	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	178	385	549	81	11	68
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	630				1330	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	630				1330	590
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	80				92	86
cM capacity (veh/h)	910				131	495
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	563	630	79			
Volume Left	178	0	11			
Volume Right	0	81	68			
cSH	910	1700	357			
Volume to Capacity	0.20	0.37	0.22			
Queue Length 95th (m)	5.5	0.0	6.3			
Control Delay (s)	4.8	0.0	17.9			
Lane LOS	A		C			
Approach Delay (s)	4.8	0.0	17.9			
Approach LOS			C			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			75.3%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Background PM

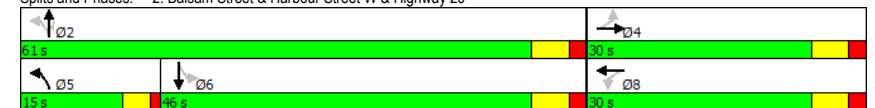
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	2	47	26	0	3	66	648	25	4	625	17
Future Volume (Veh/h)	20	2	47	26	0	3	66	648	25	4	625	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	21	2	50	28	0	3	70	689	27	4	665	18
Pedestrians											2	
Lane Width (m)											3.7	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1507	1529	665	1553	1520	691	683			716		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1507	1529	665	1553	1520	691	683			716		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	98	89	64	100	99	92			100		
cM capacity (veh/h)	93	109	455	77	110	447	919			894		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	73	31	70	689	27	4	665	18				
Volume Left	21	28	70	0	0	4	0	0				
Volume Right	50	3	0	0	27	0	0	18				
cSH	207	83	919	1700	1700	894	1700	1700				
Volume to Capacity	0.35	0.37	0.08	0.41	0.02	0.00	0.39	0.01				
Queue Length 95th (m)	11.4	11.0	1.9	0.0	0.0	0.1	0.0	0.0				
Control Delay (s)	31.6	71.6	9.2	0.0	0.0	9.0	0.0	0.0				
Lane LOS	D	F	A			A						
Approach Delay (s)	31.6	71.6	0.8			0.1						
Approach LOS	D	F										
Intersection Summary												
Average Delay	3.3											
Intersection Capacity Utilization	52.2%											
Analysis Period (min)	15											
ICU Level of Service												
A												

Timings
2: Balsam Street & Harbour Street W & Highway 26

2041 Background PM

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	22	7	93	6	112	781	77	12	728
Future Volume (vph)	22	7	93	6	112	781	77	12	728
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	12.2	12.2	12.2	12.2		55.1	55.1		40.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15		0.69	0.69		0.51
v/c Ratio	0.11	0.45	0.58	0.06		0.52	0.07		0.48
Control Delay	29.3	9.8	44.7	18.9		6.7	3.2		14.6
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	29.3	9.8	44.7	18.9		6.7	3.2		14.6
LOS	C	A	D	B		A	A		B
Approach Delay		12.2		41.1		6.4			14.6
Approach LOS		B		D		A			B
Intersection Summary									
Cycle Length: 91									
Actuated Cycle Length: 79.4									
Natural Cycle: 75									
Control Type: Semi Act-Uncoordinated									
Maximum v/c Ratio: 0.58									
Intersection Signal Delay: 11.9					Intersection LOS: B				
Intersection Capacity Utilization 103.7%					ICU Level of Service G				
Analysis Period (min) 15									

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues 2041 Background PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	24	173	100	16	960	83	807
v/c Ratio	0.11	0.45	0.58	0.06	0.52	0.07	0.48
Control Delay	29.3	9.8	44.7	18.9	6.7	3.2	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	9.8	44.7	18.9	6.7	3.2	14.6
Queue Length 50th (m)	3.2	1.0	14.1	0.8	26.1	1.8	38.9
Queue Length 95th (m)	9.2	16.4	28.7	5.7	45.9	7.0	61.9
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	414	599	341	497	1859	1145	1670
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.29	0.29	0.03	0.52	0.07	0.48
Intersection Summary							

HCM Signalized Intersection Capacity Analysis 2041 Background PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	22	7	153	93	6	9	112	781	77	12	728	10
Future Volume (vph)	22	7	153	93	6	9	112	781	77	12	728	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	0.86		1.00	0.91			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1593		1812	1620			3596	1633		3536	
Flt Permitted	0.75	1.00		0.59	1.00			0.69	1.00		0.93	
Satd. Flow (perm)	1367	1593		1121	1620			2498	1633		3305	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	24	8	165	100	6	10	120	840	83	13	783	11
RTOR Reduction (vph)	0	140	0	0	8	0	0	0	11	0	1	0
Lane Group Flow (vph)	24	33	0	100	8	0	0	960	72	0	806	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	12.2	12.2		12.2	12.2			55.1	55.1		40.1	
Effective Green, g (s)	12.2	12.2		12.2	12.2			55.1	55.1		40.1	
Actuated g/C Ratio	0.15	0.15		0.15	0.15			0.69	0.69		0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	210	245		172	249			1887	1134		1671	
v/s Ratio Prot		0.02			0.00			c0.07				
v/s Ratio Perm	0.02			c0.09				c0.28	0.04		0.24	
v/c Ratio	0.11	0.14		0.58	0.03			0.51	0.06		0.48	
Uniform Delay, d1	28.9	29.0		31.2	28.5			5.7	3.9		12.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.3		4.9	0.0			1.0	0.1		1.0	
Delay (s)	29.1	29.3		36.1	28.6			6.7	4.0		13.8	
Level of Service	C	C		D	C			A	A		B	
Approach Delay (s)		29.2			35.1			6.5			13.8	
Approach LOS		C			D			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.8									
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			79.3						16.0			
Intersection Capacity Utilization			103.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings 2041 Background PM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	118	4	37	6	77	852	9	895
Future Volume (vph)	118	4	37	6	77	852	9	895
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	12.4	12.4		12.4	55.3	53.2	52.4	46.4
Actuated g/C Ratio	0.17	0.17		0.17	0.74	0.71	0.70	0.62
v/c Ratio	0.54	0.19		0.25	0.19	0.35	0.02	0.46
Control Delay	39.0	10.6		23.9	4.9	7.1	4.2	11.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	10.6		23.9	4.9	7.1	4.2	11.6
LOS	D	B		C	A	A	A	B
Approach Delay		29.4		23.9		6.9		11.6
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 74.5
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 11.4
Intersection Capacity Utilization 63.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

Ø1	Ø2	Ø4
15 s	47 s	22 s
Ø5	Ø6	Ø8
15 s	47 s	22 s

Queues 2041 Background PM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	124	63	64	81	904	9	1025
v/c Ratio	0.54	0.19	0.25	0.19	0.35	0.02	0.46
Control Delay	39.0	10.6	23.9	4.9	7.1	4.2	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	10.6	23.9	4.9	7.1	4.2	11.6
Queue Length 50th (m)	16.7	0.5	5.7	2.9	24.3	0.3	46.0
Queue Length 95th (m)	32.9	9.9	16.1	7.5	59.0	1.7	71.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	297	404	324	505	2555	631	2206
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.16	0.20	0.16	0.35	0.01	0.46

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	118	4	56	37	6	18	77	852	7	9	895	79
Future Volume (vph)	118	4	56	37	6	18	77	852	7	9	895	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1821	1651			1782		1772	3575		1825	3532	
Flt Permitted	0.72	1.00			0.78		0.22	1.00		0.32	1.00	
Satd. Flow (perm)	1371	1651			1427		403	3575		606	3532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	124	4	59	39	6	19	81	897	7	9	942	83
RTOR Reduction (vph)	0	52	0	0	17	0	0	0	0	0	6	0
Lane Group Flow (vph)	124	11	0	0	47	0	81	904	0	9	1019	0
Confl. Peds. (#/hr)	1				1		2				2	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.0	10.0			10.0		57.1	51.8		48.6	47.3	
Effective Green, g (s)	10.0	10.0			10.0		57.1	51.8		48.6	47.3	
Actuated g/C Ratio	0.13	0.13			0.13		0.72	0.65		0.61	0.60	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	173	208			180		391	2341		392	2112	
v/s Ratio Prot		0.01					c0.02	c0.25		0.00	c0.29	
v/s Ratio Perm	c0.09				0.03		0.13			0.01		
v/c Ratio	0.72	0.06			0.26		0.21	0.39		0.02	0.48	
Uniform Delay, d1	33.2	30.4			31.2		4.2	6.3		5.9	9.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.2	0.1			0.8		0.3	0.5		0.0	0.8	
Delay (s)	46.4	30.5			32.0		4.5	6.8		5.9	9.8	
Level of Service	D	C			C		A	A		A	A	
Approach Delay (s)		41.0			32.0			6.6			9.7	
Approach LOS		D			C			A			A	

Intersection Summary

HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

2041 Background PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱		↰	↱		↰	↱
Traffic Volume (vph)	84	4	19	9	185	879	10	894
Future Volume (vph)	84	4	19	9	185	879	10	894
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	11.6	11.6		11.6	62.0	60.0	47.6	47.6
Actuated g/C Ratio	0.14	0.14		0.14	0.74	0.72	0.57	0.57
v/c Ratio	0.47	0.53		0.27	0.46	0.38	0.04	0.50
Control Delay	41.8	10.6		31.2	7.0	5.3	10.0	12.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	10.6		31.2	7.0	5.3	10.0	12.4
LOS	D	B		C	A	A	A	B
Approach Delay		19.9		31.2		5.6		12.4
Approach LOS		B		C		A		B

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 83.7	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 101.9%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access

↰ Ø2	↱ Ø4
66 s	21 s
↰ Ø5	↱ Ø6
19 s	47 s
	21 s

Queues

2041 Background PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	91	215	40	201	982	11	1011
v/c Ratio	0.47	0.53	0.27	0.46	0.38	0.04	0.50
Control Delay	41.8	10.6	31.2	7.0	5.3	10.0	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	10.6	31.2	7.0	5.3	10.0	12.4
Queue Length 50th (m)	13.6	0.6	4.5	7.1	25.0	0.7	44.8
Queue Length 95th (m)	27.6	18.4	13.3	15.4	41.1	3.4	73.0
Internal Link Dist (m)	175.6		57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	248	457	190	543	2558	286	2023
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.47	0.21	0.37	0.38	0.04	0.50
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2041 Background PM

4: Balsam Street & Old Mountain Road/Commercial Access

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	4	194	19	9	8	185	879	25	10	894	36
Future Volume (vph)	84	4	194	19	9	8	185	879	25	10	894	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	1585			1806		1789	3564		1643	3556	
Flt Permitted	0.73	1.00			0.55		0.21	1.00		0.29	1.00	
Satd. Flow (perm)	1382	1585			1018		398	3564		505	3556	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	4	211	21	10	9	201	955	27	11	972	39
RTOR Reduction (vph)	0	182	0	0	8	0	0	2	0	0	3	0
Lane Group Flow (vph)	91	33	0	0	32	0	201	980	0	11	1008	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.6	11.6			11.6		60.1	60.1		47.6	47.6	
Effective Green, g (s)	11.6	11.6			11.6		60.1	60.1		47.6	47.6	
Actuated g/C Ratio	0.14	0.14			0.14		0.72	0.72		0.57	0.57	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	219			141		427	2559		287	2022	
v/s Ratio Prot		0.02					c0.05	0.28			c0.28	
v/s Ratio Perm	c0.07				0.03		0.29			0.02		
v/c Ratio	0.48	0.15			0.23		0.47	0.38		0.04	0.50	
Uniform Delay, d1	33.2	31.7			32.1		5.4	4.6		8.0	10.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.3			0.8		0.8	0.4		0.2	0.9	
Delay (s)	35.1	32.0			32.9		6.2	5.0		8.2	11.7	
Level of Service	D	C			C		A	A		A	B	
Approach Delay (s)		33.0			32.9			5.2			11.7	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay	11.6				HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio	0.49											
Actuated Cycle Length (s)	83.7				Sum of lost time (s)				16.0			
Intersection Capacity Utilization	101.9%				ICU Level of Service				G			
Analysis Period (min)	15											
c Critical Lane Group												

Timings 2041 Background PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	78	427	179	366	618	151	356	607	481
Future Volume (vph)	78	427	179	366	618	151	356	607	481
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	35.0	14.0	38.0	35.5	35.5	35.5	35.5	35.5
Total Split (%)	9.2%	29.2%	11.7%	31.7%	29.6%	29.6%	29.6%	29.6%	29.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	33.2	23.2	39.5	28.7	58.4	21.5	21.5	29.2	29.2
Actuated g/C Ratio	0.31	0.21	0.37	0.27	0.54	0.20	0.20	0.27	0.27
v/c Ratio	0.23	0.79	0.70	0.39	0.66	0.44	0.71	0.86	0.85
Control Delay	25.1	45.9	40.1	35.2	10.5	42.6	42.7	60.0	49.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.1	45.9	40.1	35.2	10.5	42.6	42.7	60.0	49.1
LOS	C	D	D	D	B	D	D	E	D
Approach Delay		43.5		22.8			42.7		52.6
Approach LOS		D		C			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 108.1

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 39.5

Intersection LOS: D

Intersection Capacity Utilization 83.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↱ Ø3	↱ Ø4
35.5 s	35.5 s	11 s	38 s
		↱ Ø7	↱ Ø8
		14 s	35 s

Queues 2041 Background PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	609	185	377	637	156	511	376	778
v/c Ratio	0.23	0.79	0.70	0.39	0.66	0.44	0.71	0.86	0.85
Control Delay	25.1	45.9	40.1	35.2	10.5	42.6	42.7	60.0	49.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.1	45.9	40.1	35.2	10.5	42.6	42.7	60.0	49.1
Queue Length 50th (m)	10.9	59.8	26.9	35.4	34.9	29.3	48.8	84.1	86.4
Queue Length 95th (m)	23.0	85.7	#47.9	53.1	73.7	50.3	69.1	#162.1	#139.7
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	353	925	266	1055	961	483	965	435	911
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.66	0.70	0.36	0.66	0.32	0.53	0.86	0.85

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Background PM

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	↗
Traffic Volume (vph)	78	427	164	179	366	618	151	356	140	607	481	31
Future Volume (vph)	78	427	164	179	366	618	151	356	140	607	481	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1770	3422		1806	3650	1574	1789	3447		1612	3363	
Flt Permitted	0.53	1.00		0.19	1.00	1.00	0.95	1.00		0.95	0.98	
Satd. Flow (perm)	984	3422		363	3650	1574	1789	3447		1612	3363	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	80	440	169	185	377	637	156	367	144	626	496	32
RTOR Reduction (vph)	0	34	0	0	0	114	0	37	0	0	2	0
Lane Group Flow (vph)	80	575	0	185	377	523	156	474	0	376	776	0
Confl. Peds. (#/hr)	4		12	12			4	9	2	2		9
Confl. Bikes (#/hr)							2					
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	29.5	24.1		38.1	28.7	57.9	21.5	21.5		29.2	29.2	
Effective Green, g (s)	29.5	24.1		38.1	28.7	57.9	21.5	21.5		29.2	29.2	
Actuated g/C Ratio	0.27	0.22		0.35	0.26	0.53	0.20	0.20		0.27	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	305	757		259	962	837	353	681		432	902	
v/s Ratio Prot	0.01	0.17		c0.07	0.10	0.17	0.09	c0.14		c0.23	0.23	
v/s Ratio Perm	0.06			c0.18		0.16						
v/c Ratio	0.26	0.76		0.71	0.39	0.62	0.44	0.70		0.87	0.86	
Uniform Delay, d1	30.3	39.6		27.0	32.9	17.8	38.4	40.6		38.0	37.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	4.4		9.0	0.3	1.5	0.9	3.1		17.1	8.4	
Delay (s)	30.7	44.0		36.0	33.1	19.3	39.3	43.7		55.1	46.3	
Level of Service	C	D		D	C	B	D	D		E	D	
Approach Delay (s)		42.5			26.2			42.7			49.1	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	108.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
6: Spruce Street & First Street

2041 Background PM

	←	→	↙	↘	↖	↗	↖	↗
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	13	1117	31	1137	19	15	28	10
Future Volume (vph)	13	1117	31	1137	19	15	28	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.7	83.8	89.5	86.0	10.1	10.1	10.1	10.1
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.03	0.43	0.08	0.44	0.15	0.19	0.22	0.18
Control Delay	2.2	6.4	2.4	5.7	47.9	30.3	49.7	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.2	6.4	2.4	5.7	47.9	30.3	49.7	26.4
LOS	A	A	A	A	D	C	D	C
Approach Delay		6.3		5.6		36.9		37.7
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 7.3
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2041 Background PM

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	14	1192	32	1236	20	33	29	31
v/c Ratio	0.03	0.43	0.08	0.44	0.15	0.19	0.22	0.18
Control Delay	2.2	6.4	2.4	5.7	47.9	30.3	49.7	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.2	6.4	2.4	5.7	47.9	30.3	49.7	26.4
Queue Length 50th (m)	0.4	53.3	1.0	33.4	3.9	3.1	5.8	2.0
Queue Length 95th (m)	1.5	67.8	2.5	71.5	11.3	12.4	14.7	11.0
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	413	2764	418	2828	325	402	324	396
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	0.03	0.43	0.08	0.44	0.06	0.08	0.09	0.08
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	1117	27	31	1137	50	19	15	16	28	10	20
Future Volume (vph)	13	1117	27	31	1137	50	19	15	16	28	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3565		1825	3552		1790	1668		1776	1631	
Flt Permitted	0.20	1.00		0.21	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	391	3565		395	3552		1389	1668		1375	1631	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	1164	28	32	1184	52	20	16	17	29	10	21
RTOR Reduction (vph)	0	1	0	0	2	0	0	16	0	0	19	0
Lane Group Flow (vph)	14	1191	0	32	1234	0	20	17	0	29	12	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Effective Green, g (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.77	0.74		0.79	0.75		0.07	0.07		0.07	0.07	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	336	2635		367	2671		104	124		103	122	
v/s Ratio Prot	0.00	0.33		c0.00	c0.35			0.01			0.01	
v/s Ratio Perm	0.03			0.07			0.01			c0.02		
v/c Ratio	0.04	0.45		0.09	0.46		0.19	0.14		0.28	0.09	
Uniform Delay, d1	3.3	5.5		3.0	5.1		46.9	46.7		47.3	46.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.1	0.6		0.9	0.5		1.5	0.3	
Delay (s)	3.4	6.1		3.1	5.7		47.8	47.3		48.8	46.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		6.1			5.6			47.5			47.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		7.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		108.1			Sum of lost time (s)			15.9				
Intersection Capacity Utilization		62.4%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2041 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	31	1062	29	1106	42	22	89	22
Future Volume (vph)	31	1062	29	1106	42	22	89	22
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	75.4	70.0	75.4	69.9	12.2	12.2	12.2	12.2
Actuated g/C Ratio	0.75	0.70	0.75	0.70	0.12	0.12	0.12	0.12
v/c Ratio	0.09	0.48	0.08	0.47	0.28	0.21	0.57	0.32
Control Delay	3.8	8.8	2.8	5.6	42.5	23.1	53.6	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	8.8	2.8	5.6	42.5	23.1	53.6	18.5
LOS	A	A	A	A	D	C	D	B
Approach Delay		8.7		5.5		32.2		37.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 10.0

Intersection LOS: A

Intersection Capacity Utilization 52.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

Ø1	Ø2	Ø4
5 s	51 s	30 s
Ø5	Ø6 (R)	Ø8
5 s	51 s	30 s

Queues
7: Cedar Street & First Street

2041 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	1172	31	1172	44	50	94	82
v/c Ratio	0.09	0.48	0.08	0.47	0.28	0.21	0.57	0.32
Control Delay	3.8	8.8	2.8	5.6	42.5	23.1	53.6	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	8.8	2.8	5.6	42.5	23.1	53.6	18.5
Queue Length 50th (m)	1.2	53.6	0.7	15.0	7.9	4.0	17.4	4.0
Queue Length 95th (m)	3.9	83.2	m2.0	32.1	17.1	13.7	31.5	16.3
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	364	2462	365	2500	314	439	328	446
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	0.09	0.48	0.08	0.47	0.14	0.11	0.29	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	31	1062	51	29	1106	8	42	22	26	89	22	56
Future Volume (vph)	31	1062	51	29	1106	8	42	22	26	89	22	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1754	3517		1755	3575		1764	1740		1782	1669	
Flt Permitted	0.20	1.00		0.20	1.00		0.70	1.00		0.72	1.00	
Satd. Flow (perm)	375	3517		376	3575		1307	1740		1359	1669	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	1118	54	31	1164	8	44	23	27	94	23	59
RTOR Reduction (vph)	0	3	0	0	0	0	0	24	0	0	52	0
Lane Group Flow (vph)	33	1169	0	31	1172	0	44	26	0	94	30	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	72.2	68.4		72.0	68.3		12.2	12.2		12.2	12.2	
Effective Green, g (s)	72.2	68.4		72.0	68.3		12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.72	0.68		0.72	0.68		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	323	2405		321	2441		159	212		165	203	
v/s Ratio Prot	c0.00	c0.33		0.00	0.33		0.02			0.02		
v/s Ratio Perm	0.07			0.07			0.03			c0.07		
v/c Ratio	0.10	0.49		0.10	0.48		0.28	0.12		0.57	0.15	
Uniform Delay, d1	4.6	7.5		4.6	7.5		39.9	39.1		41.4	39.3	
Progression Factor	1.00	1.00		0.72	0.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.7		0.1	0.6		1.0	0.3		4.5	0.3	
Delay (s)	4.7	8.2		3.4	5.2		40.8	39.4		45.9	39.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.1			5.2			40.1			43.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

2041 Background PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	61	946	20	837	205	38	67	69
Future Volume (vph)	61	946	20	837	205	38	67	69
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	62.6	57.7	60.3	52.9	25.4	16.1	23.3	13.0
Actuated g/C Ratio	0.63	0.58	0.60	0.53	0.25	0.16	0.23	0.13
v/c Ratio	0.18	0.57	0.07	0.51	0.76	0.29	0.21	0.64
Control Delay	4.3	11.3	6.2	13.9	48.1	21.2	27.5	36.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	4.3	11.3	6.2	14.0	48.1	21.2	27.5	36.1
LOS	A	B	A	B	D	C	C	D
Approach Delay		11.0		13.9		40.1		33.7
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 17.4
Intersection Capacity Utilization 74.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 8: Pine Street & First Street

⤴ 01	⤴ 02	⤴ 03	⤴ 04
11 s	50 s	13 s	26 s
⤴ 05	⤴ 06 (R)	⤴ 07	⤴ 08
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2041 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1150	21	951	218	92	71	182
v/c Ratio	0.18	0.57	0.07	0.51	0.76	0.29	0.21	0.64
Control Delay	4.3	11.3	6.2	13.9	48.1	21.2	27.5	36.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	4.3	11.3	6.2	14.0	48.1	21.2	27.5	36.1
Queue Length 50th (m)	1.3	14.0	1.0	43.6	35.0	7.0	10.4	21.3
Queue Length 95th (m)	2.9	118.8	m3.1	51.8	#53.7	19.9	19.3	40.5
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	357	2023	310	1876	287	388	351	396
Starvation Cap Reductn	0	0	0	264	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	0.18	0.57	0.07	0.59	0.76	0.24	0.20	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	61	946	135	20	837	57	205	38	49	67	69	102
Future Volume (vph)	61	946	135	20	837	57	205	38	49	67	69	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1824	3495		1825	3541		1785	1691		1744	1719	
Flt Permitted	0.21	1.00		0.18	1.00		0.41	1.00		0.70	1.00	
Satd. Flow (perm)	406	3495		343	3541		774	1691		1280	1719	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	65	1006	144	21	890	61	218	40	52	71	73	109
RTOR Reduction (vph)	0	9	0	0	4	0	0	44	0	0	58	0
Lane Group Flow (vph)	65	1141	0	21	947	0	218	48	0	71	124	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	60.4	54.4		54.0	51.2		25.1	16.1		20.7	13.9	
Effective Green, g (s)	60.4	54.4		54.0	51.2		25.1	16.1		20.7	13.9	
Actuated g/C Ratio	0.60	0.54		0.54	0.51		0.25	0.16		0.21	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	330	1901		226	1812		285	272		296	238	
v/s Ratio Prot	c0.01	c0.33		0.00	0.27		c0.07	0.03		0.02	0.07	
v/s Ratio Perm	0.11			0.05			c0.12			0.03		
v/c Ratio	0.20	0.60		0.09	0.52		0.76	0.18		0.24	0.52	
Uniform Delay, d1	9.6	15.4		11.7	16.3		32.9	36.2		32.8	40.0	
Progression Factor	0.42	0.69		0.73	0.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.3		0.2	1.0		11.6	0.3		0.4	2.1	
Delay (s)	4.3	11.9		8.8	13.8		44.5	36.5		33.2	42.0	
Level of Service	A	B		A	B		D	D		C	D	
Approach Delay (s)		11.5			13.6			42.1			39.6	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

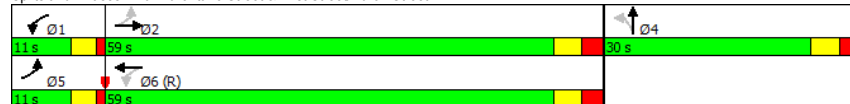
Timings 2041 Background PM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations						
Traffic Volume (vph)	17	876	73	673	249	17
Future Volume (vph)	17	876	73	673	249	17
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	67.2	60.5	69.9	65.0	19.3	19.3
Actuated g/C Ratio	0.67	0.60	0.70	0.65	0.19	0.19
v/c Ratio	0.04	0.52	0.22	0.31	0.76	0.24
Control Delay	2.1	4.5	6.7	9.5	51.9	12.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.6	6.7	9.5	51.9	12.2
LOS	A	A	A	A	D	B
Approach Delay		4.5		9.2		41.7
Approach LOS		A		A		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 11.9 Intersection LOS: B
 Intersection Capacity Utilization 61.0% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues 2041 Background PM
9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	18	1107	77	719	262	91
v/c Ratio	0.04	0.52	0.22	0.31	0.76	0.24
Control Delay	2.1	4.5	6.7	9.5	51.9	12.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.6	6.7	9.5	51.9	12.2
Queue Length 50th (m)	0.3	45.3	4.0	25.2	48.1	2.9
Queue Length 95th (m)	m0.6	13.7	9.6	52.8	70.8	14.7
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	525	2120	358	2322	438	453
Starvation Cap Reductn	0	118	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	0.03	0.55	0.22	0.31	0.60	0.20

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	17	876	176	73	673	10	249	17	69	0	0	0
Future Volume (vph)	17	876	176	73	673	10	249	17	69	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1703	3484		1825	3570		1791	1628				
Flt Permitted	0.37	1.00		0.19	1.00		0.95	1.00				
Satd. Flow (perm)	667	3484		366	3570		1791	1628				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	922	185	77	708	11	262	18	73	0	0	0
RTOR Reduction (vph)	0	15	0	0	1	0	0	59	0	0	0	0
Lane Group Flow (vph)	18	1092	0	77	718	0	262	32	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	62.1	59.6		68.1	62.6		19.3	19.3				
Effective Green, g (s)	62.1	59.6		68.1	62.6		19.3	19.3				
Actuated g/C Ratio	0.62	0.60		0.68	0.63		0.19	0.19				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	440	2076		329	2234		345	314				
v/s Ratio Prot	0.00	c0.31		c0.01	0.20			0.02				
v/s Ratio Perm	0.02			0.15			c0.15					
v/c Ratio	0.04	0.53		0.23	0.32		0.76	0.10				
Uniform Delay, d1	7.3	11.9		6.9	8.8		38.2	33.2				
Progression Factor	0.36	0.30		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.0	0.8		0.4	0.4		9.3	0.1				
Delay (s)	2.6	4.4		7.3	9.1		47.4	33.4				
Level of Service	A	A		A	A		D	C				
Approach Delay (s)		4.3			9.0		43.8			0.0		
Approach LOS		A			A		D			A		

Intersection Summary

HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	50	435	13	282	479	17	48	36	712	47	86
Future Volume (vph)	50	435	13	282	479	17	48	36	712	47	86
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	28.0	11.0	28.0	35.0	16.0	16.0	16.0	35.0	35.0	35.0
Total Split (%)	12.2%	31.1%	12.2%	31.1%	38.9%	17.8%	17.8%	17.8%	38.9%	38.9%	38.9%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	32.7	29.3	30.5	23.3	57.9	10.6	10.6	10.6	26.4	26.4	26.4
Actuated g/C Ratio	0.40	0.36	0.37	0.28	0.71	0.13	0.13	0.13	0.32	0.32	0.32
v/c Ratio	0.16	0.39	0.04	0.58	0.41	0.09	0.23	0.12	0.78	0.79	0.16
Control Delay	18.6	23.4	17.4	34.5	1.7	37.2	39.6	0.8	38.1	38.8	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	23.4	17.4	34.5	1.7	37.2	39.6	0.8	38.1	38.8	1.4
LOS	B	C	B	C	A	D	D	A	D	D	A
Approach Delay		22.9		13.9			25.5			34.7	
Approach LOS		C		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 82	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 24.4	Intersection LOS: C
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E

Ø1	Ø2	Ø3	Ø4
11 s	28 s	35 s	16 s
Ø5	Ø6		
11 s	28 s		

Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	56	502	15	317	538	19	54	40	424	429	97
v/c Ratio	0.16	0.39	0.04	0.58	0.41	0.09	0.23	0.12	0.78	0.79	0.16
Control Delay	18.6	23.4	17.4	34.5	1.7	37.2	39.6	0.8	38.1	38.8	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	23.4	17.4	34.5	1.7	37.2	39.6	0.8	38.1	38.8	1.4
Queue Length 50th (m)	6.0	32.7	1.6	49.7	0.0	3.0	8.7	0.0	69.0	70.2	0.0
Queue Length 95th (m)	13.2	54.8	5.2	76.3	9.8	9.2	19.4	0.0	#112.5	#114.5	2.2
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)	60.0		15.0		15.0		70.0				
Base Capacity (vph)	359	1287	383	544	1300	219	231	329	635	635	685
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.39	0.04	0.58	0.41	0.09	0.23	0.12	0.67	0.68	0.14

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 									 	
Traffic Volume (vph)	50	435	12	13	282	479	17	48	36	712	47	86
Future Volume (vph)	50	435	12	13	282	479	17	48	36	712	47	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3601		1674	1921	1617	1706	1795	1484	1700	1698	1570
Flt Permitted	0.36	1.00		0.47	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	656	3601		824	1921	1617	1706	1795	1484	1700	1698	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	56	489	13	15	317	538	19	54	40	800	53	97
RTOR Reduction (vph)	0	2	0	0	0	214	0	0	37	0	0	67
Lane Group Flow (vph)	56	500	0	15	317	324	19	54	3	424	429	30
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	34.4	29.3		26.8	25.5	51.9	7.3	7.3	7.3	26.4	26.4	26.4
Effective Green, g (s)	34.4	29.3		26.8	25.5	51.9	7.3	7.3	7.3	26.4	26.4	26.4
Actuated g/C Ratio	0.40	0.34		0.31	0.30	0.60	0.08	0.08	0.08	0.31	0.31	0.31
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	1222		268	567	1084	144	151	125	520	519	480
v/s Ratio Prot	c0.01	c0.14		0.00	c0.17	0.09	0.01	c0.03		0.25	c0.25	
v/s Ratio Perm	0.06			0.02		0.11			0.00			0.02
v/c Ratio	0.17	0.41		0.06	0.56	0.30	0.13	0.36	0.03	0.82	0.83	0.06
Uniform Delay, d1	16.8	21.9		20.7	25.7	8.4	36.6	37.3	36.2	27.7	27.8	21.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.0		0.1	3.9	0.2	0.4	1.5	0.1	9.5	10.4	0.1
Delay (s)	17.1	22.9		20.8	29.6	8.5	37.0	38.7	36.3	37.2	38.2	21.2
Level of Service	B	C		C	C	A	D	D	D	D	D	C
Approach Delay (s)	22.3		16.4		37.6		36.0		36.0			
Approach LOS	C		B		D		D		D			

Intersection Summary

HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	22.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2041 Background PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↔	↔	↔	↔
Traffic Volume (vph)	19	0	4	0	30	443	525	617
Future Volume (vph)	19	0	4	0	30	443	525	617
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases		4		8	2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		4.0		4.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		10.5		10.5		36.0		38.4
Actuated g/C Ratio		0.17		0.17		0.60		0.63
v/c Ratio		0.44		0.56		0.31		0.92
Control Delay		11.4		8.1		4.1		11.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		11.4		8.1		4.1		11.5
LOS		B		A		A		B
Approach Delay		11.4		8.1		11.0		20.2
Approach LOS		B		A		B		C

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 60.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 15.9
Intersection Capacity Utilization 83.4%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service E

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
11 s	33 s	26 s	26 s	11 s	33 s	26 s	26 s

Queues 2041 Background PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	145	292	33	489	577	682
v/c Ratio	0.44	0.56	0.06	0.31	0.92	0.35
Control Delay	11.4	8.1	4.1	11.5	33.1	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.4	8.1	4.1	11.5	33.1	9.4
Queue Length 50th (m)	2.0	0.4	1.0	17.0	25.0	15.1
Queue Length 95th (m)	14.8	17.3	3.5	27.9	#84.9	40.0
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	510	734	560	1596	627	1951
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.40	0.06	0.31	0.92	0.35

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	19	0	113	4	0	262	30	443	2	525	617	4
Future Volume (vph)	19	0	113	4	0	262	30	443	2	525	617	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1648		1789	3577		1825	3507	
Flt Permitted		0.78			0.99		0.39	1.00		0.42	1.00	
Satd. Flow (perm)		1293			1639		739	3577		801	3507	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	21	0	124	4	0	288	33	487	2	577	678	4
RTOR Reduction (vph)	0	103	0	0	240	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	42	0	0	52	0	33	488	0	577	682	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.5			10.5		32.3	29.5		40.5	33.7	
Effective Green, g (s)		10.5			10.5		32.3	29.5		40.5	33.7	
Actuated g/C Ratio		0.17			0.17		0.51	0.47		0.64	0.53	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		215			273		425	1674		628	1875	
v/s Ratio Prot							0.00	0.14		c0.10	0.19	
v/s Ratio Perm		c0.03			0.03		0.04			c0.49		
v/c Ratio		0.19			0.19		0.08	0.29		0.92	0.36	
Uniform Delay, d1		22.6			22.6		7.6	10.3		8.0	8.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.3		0.1	0.4		18.4	0.5	
Delay (s)		23.0			22.9		7.7	10.8		26.5	9.0	
Level of Service		C			C		A	B		C	A	
Approach Delay (s)		23.0			22.9			10.6			17.0	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	63.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
12: Tenth Line & Mountain Road

2041 Background PM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	8	458	115	354	39	16	56	38
Future Volume (vph)	8	458	115	354	39	16	56	38
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	40.0	40.0	40.0	40.0	20.2	20.2	20.2	20.2
Total Split (%)	66.4%	66.4%	66.4%	66.4%	33.6%	33.6%	33.6%	33.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)		38.0		38.0		11.1		11.1
Actuated g/C Ratio		0.68		0.68		0.20		0.20
v/c Ratio		0.47		0.58		0.44		0.44
Control Delay		7.5		9.9		12.5		23.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		7.5		9.9		12.5		23.9
LOS		A		A		B		C
Approach Delay		7.5		9.9		12.5		23.9
Approach LOS		A		A		B		C
Intersection Summary								
Cycle Length: 60.2								
Actuated Cycle Length: 55.5								
Natural Cycle: 60								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.58								
Intersection Signal Delay: 10.4					Intersection LOS: B			
Intersection Capacity Utilization 81.8%					ICU Level of Service D			
Analysis Period (min) 15								

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Background PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	598	588	170	119
v/c Ratio	0.47	0.58	0.44	0.44
Control Delay	7.5	9.9	12.5	23.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	9.9	12.5	23.9
Queue Length 50th (m)	26.6	29.8	5.4	9.8
Queue Length 95th (m)	56.7	69.2	18.2	22.0
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1270	1011	487	365
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	0.47	0.58	0.35	0.33
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	458	66	115	354	54	39	16	96	56	38	12
Future Volume (vph)	8	458	66	115	354	54	39	16	96	56	38	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.91			0.99	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1858			1874			1650			1712	
Flt Permitted		0.99			0.78			0.90			0.75	
Satd. Flow (perm)		1844			1468			1509			1323	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	9	515	74	129	398	61	44	18	108	63	43	13
RTOR Reduction (vph)	0	7	0	0	6	0	0	91	0	0	8	0
Lane Group Flow (vph)	0	591	0	0	582	0	0	79	0	0	111	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		36.8			36.8			8.9			8.9	
Effective Green, g (s)		36.8			36.8			8.9			8.9	
Actuated g/C Ratio		0.65			0.65			0.16			0.16	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1198			954			237			208	
v/s Ratio Prot												
v/s Ratio Perm		0.32			c0.40			0.05			c0.08	
v/c Ratio		0.49			0.61			0.33			0.53	
Uniform Delay, d1		5.1			5.7			21.2			21.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.5			2.9			0.8			2.6	
Delay (s)		6.6			8.7			22.0			24.5	
Level of Service		A			A			C			C	
Approach Delay (s)		6.6			8.7			22.0			24.5	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		10.6			HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		56.6			Sum of lost time (s)				10.9			
Intersection Capacity Utilization		81.8%			ICU Level of Service				D			
Analysis Period (min)		15										
c Critical Lane Group												

Timings 2041 Background PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	84	391	143	326	140	73	118	80	132
Future Volume (vph)	84	391	143	326	140	73	118	80	132
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	NA
Protected Phases		2	1	6		3	8		4
Permitted Phases		2		6		8		4	
Detector Phase	2	2	1	6	6	3	8	4	4
Switch Phase									
Minimum Initial (s)	30.0	30.0	5.0	30.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	37.6	9.0	25.0	25.0	25.0
Total Split (s)	37.6	37.6	15.0	52.6	52.6	15.0	41.0	26.0	26.0
Total Split (%)	40.2%	40.2%	16.0%	56.2%	56.2%	16.0%	43.8%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	30.4	30.4	49.3	45.6	45.6	27.0	25.0	15.3	15.3
Actuated g/C Ratio	0.36	0.36	0.58	0.54	0.54	0.32	0.30	0.18	0.18
v/c Ratio	0.25	0.39	0.27	0.35	0.17	0.27	0.53	0.45	0.74
Control Delay	24.3	22.1	11.4	14.1	2.8	21.2	20.4	39.5	41.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	22.1	11.4	14.1	2.8	21.2	20.4	39.5	41.9
LOS	C	C	B	B	A	C	C	D	D
Approach Delay		22.5		10.9			20.6		41.3
Approach LOS		C		B			C		D

Intersection Summary

Cycle Length: 93.6

Actuated Cycle Length: 84.4

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 21.4

Intersection LOS: C

Intersection Capacity Utilization 94.0%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
15 s	37.6 s	15 s	26 s
Ø5	Ø6	Ø7	Ø8
52.6 s		11 s	

Queues 2041 Background PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	93	490	159	362	156	81	299	89	254
v/c Ratio	0.25	0.39	0.27	0.35	0.17	0.27	0.53	0.45	0.74
Control Delay	24.3	22.1	11.4	14.1	2.8	21.2	20.4	39.5	41.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	22.1	11.4	14.1	2.8	21.2	20.4	39.5	41.9
Queue Length 50th (m)	11.0	31.1	11.9	33.9	0.0	9.1	28.3	13.2	34.3
Queue Length 95th (m)	25.1	48.9	24.7	60.7	9.5	18.3	50.1	28.0	60.8
Internal Link Dist (m)		217.8		35.2			32.3		88.4
Turn Bay Length (m)	35.0		50.0			45.0		15.0	
Base Capacity (vph)	377	1266	579	1028	934	343	774	264	446
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.39	0.27	0.35	0.17	0.24	0.39	0.34	0.57

Intersection Summary

HCM Signalized Intersection Capacity Analysis
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	84	391	50	143	326	140	73	118	151	80	132	96
Future Volume (vph)	84	391	50	143	326	140	73	118	151	80	132	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1823	3485		1806	1902	1596	1784	1732		1807	1740	
Flt Permitted	0.55	1.00		0.40	1.00	1.00	0.31	1.00		0.58	1.00	
Satd. Flow (perm)	1046	3485		755	1902	1596	575	1732		1099	1740	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	93	434	56	159	362	156	81	131	168	89	147	107
RTOR Reduction (vph)	0	10	0	0	0	73	0	55	0	0	30	0
Lane Group Flow (vph)	93	480	0	159	362	83	81	244	0	89	224	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	30.5	30.5		45.6	45.6	45.6	26.0	26.0		15.3	15.3	
Effective Green, g (s)	30.5	30.5		45.6	45.6	45.6	26.0	26.0		15.3	15.3	
Actuated g/C Ratio	0.36	0.36		0.54	0.54	0.54	0.31	0.31		0.18	0.18	
Clearance Time (s)	7.6	7.6		4.0	7.6	7.6	4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	374	1247		541	1017	854	270	528		197	312	
v/s Ratio Prot		0.14		0.04	c0.19		0.02	c0.14			c0.13	
v/s Ratio Perm	0.09			0.12		0.05	0.07			0.08		
v/c Ratio	0.25	0.38		0.29	0.36	0.10	0.30	0.46		0.45	0.72	
Uniform Delay, d1	19.3	20.4		10.3	11.4	9.7	22.1	23.9		31.2	32.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.9		1.4	1.0	0.2	0.6	0.6		1.6	7.7	
Delay (s)	20.9	21.3		11.7	12.3	9.9	22.7	24.6		32.9	40.7	
Level of Service	C	C		B	B	A	C	C		C	D	
Approach Delay (s)		21.2			11.6			24.2			38.6	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM 2000 Control Delay		21.5										
HCM 2000 Volume to Capacity ratio		0.49										
Actuated Cycle Length (s)		85.2						21.6				
Intersection Capacity Utilization		94.0%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
14: High Street & Third Street

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	6	1	15	26	0	118	3	567	45	90	838	3
Future Volume (Veh/h)	6	1	15	26	0	118	3	567	45	90	838	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	6	1	16	28	0	127	3	610	48	97	901	3
Pedestrians		1			12			1				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1536	1774	454	1314	1751	341	905			670		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1536	1774	454	1314	1751	341	905			670		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	99	97	73	100	80	100			89		
cM capacity (veh/h)	59	74	558	102	76	648	759			920		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	23	155	308	353	548	454						
Volume Left	6	28	3	0	97	0						
Volume Right	16	127	0	48	0	3						
cSH	160	329	759	1700	920	1700						
Volume to Capacity	0.14	0.47	0.00	0.21	0.11	0.27						
Queue Length 95th (m)	3.7	18.3	0.1	0.0	2.7	0.0						
Control Delay (s)	31.3	25.3	0.1	0.0	2.8	0.0						
Lane LOS	D	D	A		A							
Approach Delay (s)	31.3	25.3	0.1		1.5							
Approach LOS	D	D										
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			63.5%									
Analysis Period (min)			15									
ICU Level of Service B												

Timings
15: High Street & Sixth Street

2041 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	99	166	45	160	88	337	147	589
Future Volume (vph)	99	166	45	160	88	337	147	589
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	16.9	16.9	16.9	16.9	34.4	25.3	37.1	28.7
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.51	0.38	0.55	0.43
v/c Ratio	0.46	0.66	0.25	0.56	0.21	0.29	0.25	0.47
Control Delay	28.3	25.6	23.2	23.1	8.8	16.3	8.5	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	25.6	23.2	23.1	8.8	16.3	8.5	16.9
LOS	C	C	C	C	A	B	A	B
Approach Delay		26.3		23.1		14.9		15.4
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 67.1

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 18.6

Intersection LOS: B

Intersection Capacity Utilization 69.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

	Ø1		Ø2		Ø4
19.5 s		30.9 s		33.8 s	
	Ø5		Ø6		Ø8
19.5 s		30.9 s		33.8 s	

Queues
15: High Street & Sixth Street

2041 Background PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	104	318	47	268	93	393	155	723
v/c Ratio	0.46	0.66	0.25	0.56	0.21	0.29	0.25	0.47
Control Delay	28.3	25.6	23.2	23.1	8.8	16.3	8.5	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	25.6	23.2	23.1	8.8	16.3	8.5	16.9
Queue Length 50th (m)	10.7	28.8	4.6	24.1	4.3	16.2	7.4	32.6
Queue Length 95th (m)	24.7	54.6	12.9	46.3	13.0	34.0	19.9	61.9
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	376	771	319	778	622	1348	747	1523
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	0.41	0.15	0.34	0.15	0.29	0.21	0.47

Intersection Summary

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	99	166	136	45	160	95	88	337	36	147	589	98
Future Volume (vph)	99	166	136	45	160	95	88	337	36	147	589	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1757		1823	1793		1738	3557		1824	3525	
Flt Permitted	0.48	1.00		0.39	1.00		0.35	1.00		0.48	1.00	
Satd. Flow (perm)	893	1757		758	1793		631	3557		915	3525	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	175	143	47	168	100	93	355	38	155	620	103
RTOR Reduction (vph)	0	39	0	0	29	0	0	9	0	0	13	0
Lane Group Flow (vph)	104	279	0	47	239	0	93	384	0	155	710	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.9	16.9		16.9	16.9		32.4	26.3		37.2	28.7	
Effective Green, g (s)	16.9	16.9		16.9	16.9		32.4	26.3		37.2	28.7	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.48	0.39		0.55	0.42	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	222	437		188	446		400	1377		615	1489	
v/s Ratio Prot		c0.16			0.13		0.02	0.11		c0.03	c0.20	
v/s Ratio Perm	0.12			0.06			0.09			0.11		
v/c Ratio	0.47	0.64		0.25	0.54		0.23	0.28		0.25	0.48	
Uniform Delay, d1	21.7	22.8		20.4	22.1		9.8	14.3		7.6	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	3.4		1.0	1.6		0.3	0.5		0.2	1.1	
Delay (s)	23.8	26.2		21.4	23.7		10.1	14.8		7.9	15.3	
Level of Service	C	C		C	C		B	B		A	B	
Approach Delay (s)		25.6			23.3			13.9			14.0	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		17.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		67.9			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		69.0%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Background PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	13	64	319	16	116	424
Future Volume (vph)	13	64	319	16	116	424
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	13	65	326	16	118	433
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	78	342	118	433		
Volume Left (vph)	13	0	118	0		
Volume Right (vph)	65	16	0	0		
Hadj (s)	-0.41	0.00	0.55	0.05		
Departure Headway (s)	5.4	4.8	5.6	5.1		
Degree Utilization, x	0.12	0.46	0.18	0.61		
Capacity (veh/h)	586	731	633	702		
Control Delay (s)	9.1	11.8	8.6	14.4		
Approach Delay (s)	9.1	11.8	13.2			
Approach LOS	A	B	B			
Intersection Summary						
Delay			12.4			
Level of Service			B			
Intersection Capacity Utilization		39.2%		ICU Level of Service		A
Analysis Period (min)		15				

Timings
17: Hurontario Street & Hume Street

2041 Background PM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	317	260	259	238	181	317
Future Volume (vph)	317	260	259	238	181	317
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	19.7	19.7	30.1	30.1		41.2
Actuated g/C Ratio	0.27	0.27	0.41	0.41		0.56
v/c Ratio	0.71	0.45	0.36	0.33		0.38
Control Delay	32.6	5.2	17.7	3.7		10.2
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	32.6	5.2	17.7	3.7		10.2
LOS	C	A	B	A		B
Approach Delay	20.2		11.0			10.2
Approach LOS	C		B			B

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 73.5
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 14.1
 Intersection Capacity Utilization 83.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2041 Background PM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	345	283	282	259	542
v/c Ratio	0.71	0.45	0.36	0.33	0.38
Control Delay	32.6	5.2	17.7	3.7	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.6	5.2	17.7	3.7	10.2
Queue Length 50th (m)	42.7	0.0	25.2	0.0	17.8
Queue Length 95th (m)	67.9	15.1	51.4	14.0	34.3
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	697	782	787	790	1444
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.36	0.36	0.33	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2041 Background PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↪	↩	↪	↩	↪
Traffic Volume (vph)	317	260	259	238	181	317
Future Volume (vph)	317	260	259	238	181	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1825	1585	1921	1559	3543	3543
Flt Permitted	0.95	1.00	1.00	1.00	0.68	0.68
Satd. Flow (perm)	1825	1585	1921	1559	2455	2455
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	345	283	282	259	197	345
RTOR Reduction (vph)	0	207	0	153	0	0
Lane Group Flow (vph)	345	76	282	106	0	542
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	19.7	19.7	30.2	30.2		41.2
Effective Green, g (s)	19.7	19.7	30.2	30.2		41.2
Actuated g/C Ratio	0.27	0.27	0.41	0.41		0.56
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	489	424	789	640		1479
v/s Ratio Prot	c0.19		0.15			c0.03
v/s Ratio Perm		0.05		0.07		c0.17
v/c Ratio	0.71	0.18	0.36	0.17		0.37
Uniform Delay, d1	24.3	20.7	14.9	13.7		8.9
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	4.6	0.2	1.3	0.6		0.7
Delay (s)	28.9	20.9	16.2	14.2		9.6
Level of Service	C	C	B	B		A
Approach Delay (s)	25.3		15.3			9.6
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		17.2		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.51				
Actuated Cycle Length (s)		73.5		Sum of lost time (s)		16.6
Intersection Capacity Utilization		83.3%		ICU Level of Service		E
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	191	97	55	145	27	41	51	31	47	92	22
Future Volume (vph)	10	191	97	55	145	27	41	51	31	47	92	22
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	203	103	59	154	29	44	54	33	50	98	23
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	317	242	131	171								
Volume Left (vph)	11	59	44	50								
Volume Right (vph)	103	29	33	23								
Hadj (s)	-0.15	-0.01	0.03	0.02								
Departure Headway (s)	5.0	5.2	5.7	5.6								
Degree Utilization, x	0.44	0.35	0.21	0.27								
Capacity (veh/h)	675	639	553	574								
Control Delay (s)	11.9	11.1	10.2	10.7								
Approach Delay (s)	11.9	11.1	10.2	10.7								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay		11.2										
Level of Service		B										
Intersection Capacity Utilization		49.9%		ICU Level of Service						A		
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Background PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	16	98	17	30	69	56	9	64	12	85	88	23
Future Volume (vph)	16	98	17	30	69	56	9	64	12	85	88	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	18	113	20	34	79	64	10	74	14	98	101	26
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	151	113	64	98	225							
Volume Left (vph)	18	34	0	10	98							
Volume Right (vph)	20	0	64	14	26							
Hadj (s)	0.25	0.47	-0.56	-0.04	0.11							
Departure Headway (s)	5.4	6.0	5.0	5.1	5.0							
Degree Utilization, x	0.23	0.19	0.09	0.14	0.31							
Capacity (veh/h)	623	562	675	652	673							
Control Delay (s)	9.9	9.2	7.2	8.9	10.3							
Approach Delay (s)	9.9	8.5		8.9	10.3							
Approach LOS	A	A		A	B							
Intersection Summary												
Delay			9.5									
Level of Service			A									
Intersection Capacity Utilization			37.8%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Background PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	69	533	382	49	55	153
Future Volume (Veh/h)	69	533	382	49	55	153
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	78	599	429	55	62	172
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	484				1212	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	484				1212	456
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	92				66	71
cM capacity (veh/h)	961				185	602
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	677	484	234			
Volume Left	78	0	62			
Volume Right	0	55	172			
cSH	961	1700	377			
Volume to Capacity	0.08	0.28	0.62			
Queue Length 95th (m)	2.0	0.0	30.5			
Control Delay (s)	2.1	0.0	29.0			
Lane LOS	A		D			
Approach Delay (s)	2.1	0.0	29.0			
Approach LOS			D			
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			77.4%	ICU Level of Service	D	
Analysis Period (min)			15			



BURNSIDE

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Appendix E

2031 Total Traffic Operations (Synchro)

Timings 2031 Total AM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	27	0	17	0	57	544	5	790	23
Future Volume (vph)	27	0	17	0	57	544	5	790	23
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8	5	2		6	
Permitted Phases	4		8		2		2		6
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag	
Lead-Lag Optimize?					Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	76.0	75.1	75.1	66.3	66.3
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.84	0.83	0.83	0.73	0.73
v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03
Control Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
LOS	D	A	D	A	A	A	A	B	A
Approach Delay		14.1		37.2		3.4		11.3	
Approach LOS		B		D		A		B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 8.7
Intersection Capacity Utilization 65.5%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s
	13 s

Queues 2031 Total AM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	31	76	19	3	65	618	6	898	26
v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03
Control Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Length 50th (m)	5.2	0.0	3.1	0.0	1.6	25.5	0.0	87.9	0.0
Queue Length 95th (m)	13.4	0.0	9.5	0.0	3.3	36.6	0.0	126.0	0.0
Internal Link Dist (m)		79.7		52.6		42.1		217.0	
Turn Bay Length (m)							10.0		10.0
Base Capacity (vph)	112	378	106	493	433	1535	1363	1367	805
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03
Intersection Summary									

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	27	0	67	17	0	3	57	544	5	0	790	23
Future Volume (vph)	27	0	67	17	0	3	57	544	5	0	790	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1825	1541		1825	1633		1755	1847	1633		1865	1067
Flt Permitted	0.76	1.00		0.71	1.00		0.21	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1452	1541		1372	1633		390	1847	1633		1865	1067
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	0	76	19	0	3	65	618	6	0	898	26
RTOR Reduction (vph)	0	71	0	0	3	0	0	1	0	0	0	8
Lane Group Flow (vph)	31	5	0	19	0	0	65	618	5	0	898	18
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	4%	4%	0%	0%	3%	53%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		6			6
Actuated Green, G (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7		65.1	65.1
Effective Green, g (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7		65.1	65.1
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.81	0.81	0.81		0.71	0.71
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	88	93		83	99		398	1494	1321		1315	752
v/s Ratio Prot		0.00			0.00		0.01	c0.33			c0.48	
v/s Ratio Perm	c0.02			0.01			0.12		0.00			0.02
v/c Ratio	0.35	0.05		0.23	0.00		0.16	0.41	0.00		0.68	0.02
Uniform Delay, d1	41.6	40.8		41.3	40.7		5.6	2.5	1.7		7.7	4.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.4	0.2		1.4	0.0		0.2	0.8	0.0		2.9	0.1
Delay (s)	44.0	41.1		42.7	40.7		5.7	3.4	1.7		10.6	4.1
Level of Service	D	D		D	D		A	A	A		B	A
Approach Delay (s)		41.9			42.4			3.6			10.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
2: Balsam Street & Harbour Street W & Highway 26

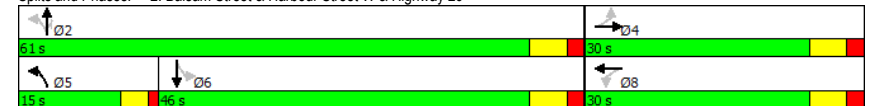
2031 Total AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	4	3	50	4	105	657	70	5	890
Future Volume (vph)	4	3	50	4	105	657	70	5	890
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2		2	6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	10.1	10.1	10.1	10.1		55.0	55.0		40.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13		0.71	0.71		0.52
v/c Ratio	0.03	0.52	0.47	0.10		0.53	0.07		0.61
Control Delay	28.8	10.9	43.8	17.3		5.8	2.6		15.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	28.8	10.9	43.8	17.3		5.8	2.6		15.2
LOS	C	B	D	B		A	A		B
Approach Delay		11.4		36.8		5.6			15.2
Approach LOS		B		D		A			B

Intersection Summary

Cycle Length: 91
Actuated Cycle Length: 77.1
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 11.5
Intersection Capacity Utilization 103.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service G

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2031 Total AM

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	5	192	59	21	897	82	1057
v/c Ratio	0.03	0.52	0.47	0.10	0.53	0.07	0.61
Control Delay	28.8	10.9	43.8	17.3	5.8	2.6	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	10.9	43.8	17.3	5.8	2.6	15.2
Queue Length 50th (m)	0.7	0.5	8.1	0.7	20.6	1.5	52.0
Queue Length 95th (m)	3.4	14.4	18.0	5.8	33.1	5.4	72.6
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0		5.0		
Base Capacity (vph)	445	614	299	502	1691	1176	1746
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.31	0.20	0.04	0.53	0.07	0.61
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2031 Total AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	4	3	160	50	4	14	105	657	70	5	890	3
Future Volume (vph)	4	3	160	50	4	14	105	657	70	5	890	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.85		1.00	0.89			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1825	1555		1786	1578			3481	1633		3542	
Flt Permitted	0.74	1.00		0.51	1.00			0.61	1.00		0.95	
Satd. Flow (perm)	1429	1555		960	1578			2153	1633		3366	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	5	4	188	59	5	16	124	773	82	6	1047	4
RTOR Reduction (vph)	0	163	0	0	14	0	0	0	10	0	0	0
Lane Group Flow (vph)	5	29	0	59	7	0	0	897	72	0	1057	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	10.1	10.1		10.1	10.1			55.0	55.0		40.0	
Effective Green, g (s)	10.1	10.1		10.1	10.1			55.0	55.0		40.0	
Actuated g/C Ratio	0.13	0.13		0.13	0.13			0.71	0.71		0.52	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	187	203		125	206			1725	1164		1746	
v/s Ratio Prot		0.02			0.00			c0.07				
v/s Ratio Perm	0.00			c0.06				0.30	0.04		c0.31	
v/c Ratio	0.03	0.14		0.47	0.03			0.52	0.06		0.61	
Uniform Delay, d1	29.2	29.7		31.0	29.2			5.0	3.3		13.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.3		2.8	0.1			1.1	0.1		1.6	
Delay (s)	29.3	30.0		33.8	29.3			6.2	3.4		14.6	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		30.0			32.6			5.9			14.6	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		12.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.58										
Actuated Cycle Length (s)		77.1			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		103.5%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

2031 Total AM

3: Balsam Street & CT Entrance/Plaza Access

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	22	0	22	3	52	818	3	1072
Future Volume (vph)	22	0	22	3	52	818	3	1072
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.3	10.3		10.3	52.9	52.5	51.4	48.5
Actuated g/C Ratio	0.16	0.16		0.16	0.80	0.79	0.78	0.73
v/c Ratio	0.14	0.05		0.17	0.17	0.36	0.01	0.52
Control Delay	30.1	0.2		28.2	3.7	5.3	3.0	9.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	0.2		28.2	3.7	5.3	3.0	9.4
LOS	C	A		C	A	A	A	A
Approach Delay		16.7		28.2		5.2		9.4
Approach LOS		B		C		A		A

Intersection Summary

Cycle Length: 84

Actuated Cycle Length: 66.3

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 8.0

Intersection LOS: A

Intersection Capacity Utilization 61.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

↖ Ø1	↗ Ø2	↖ Ø4
15 s	47 s	22 s
↖ Ø5	↗ Ø6	↖ Ø8
15 s	47 s	22 s

Queues

2031 Total AM

3: Balsam Street & CT Entrance/Plaza Access

	↖	→	↗	←	↖	↗	↓
Lane Group	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	22	35	63	987	4	1331
v/c Ratio	0.14	0.05	0.17	0.17	0.36	0.01	0.52
Control Delay	30.1	0.2	28.2	3.7	5.3	3.0	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	0.2	28.2	3.7	5.3	3.0	9.4
Queue Length 50th (m)	3.4	0.0	3.9	2.0	24.5	0.2	63.9
Queue Length 95th (m)	9.4	0.0	10.6	4.1	49.2	0.7	74.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	316	597	325	467	2780	661	2578
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.04	0.11	0.13	0.36	0.01	0.52

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Balsam Street & CT Entrance/Plaza Access

2031 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	22	0	18	22	3	3	52	818	1	3	1072	32
Future Volume (vph)	22	0	18	22	3	3	52	818	1	3	1072	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frft	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1635		1706	3509		1825	3519	
Flt Permitted	0.74	1.00			0.76		0.15	1.00		0.29	1.00	
Satd. Flow (perm)	1271	1633			1291		276	3509		549	3519	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	27	0	22	27	4	4	63	986	1	4	1292	39
RTOR Reduction (vph)	0	20	0	0	4	0	0	0	0	0	2	0
Lane Group Flow (vph)	27	2	0	0	31	0	63	987	0	4	1329	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.4	5.4			5.4		53.3	49.5		48.3	47.0	
Effective Green, g (s)	5.4	5.4			5.4		53.3	49.5		48.3	47.0	
Actuated g/C Ratio	0.07	0.07			0.07		0.74	0.69		0.67	0.65	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	95	122			96		279	2405		390	2290	
v/s Ratio Prot		0.00					0.01	0.28		0.00	0.38	
v/s Ratio Perm	0.02				0.02		0.15			0.01		
v/c Ratio	0.28	0.01			0.33		0.23	0.41		0.01	0.58	
Uniform Delay, d1	31.6	30.9			31.7		3.9	5.0		4.0	7.1	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.0			2.0		0.4	0.5		0.0	1.1	
Delay (s)	33.2	31.0			33.7		4.3	5.5		4.0	8.2	
Level of Service	C	C			C		A	A		A	A	
Approach Delay (s)		32.2			33.7			5.4			8.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	72.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings

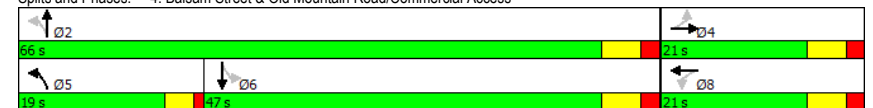
4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total AM

Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (vph)	33	0	0	73	857	1041
Future Volume (vph)	33	0	0	73	857	1041
Turn Type	Perm	NA	NA	pm+pt	NA	NA
Protected Phases		4	8	5	2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	5	2	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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	4.0	6.0	6.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	10.2	10.2	10.2	65.1	64.3	55.3
Actuated g/C Ratio	0.12	0.12	0.12	0.79	0.78	0.67
v/c Ratio	0.24	0.10	0.00	0.27	0.39	0.57
Control Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	0.4	0.0	4.7	4.3	10.8
LOS	D	A	A	A	A	B
Approach Delay		17.4			4.3	10.8
Approach LOS		B			A	B

Intersection Summary	
Cycle Length: 87	
Actuated Cycle Length: 82	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 79.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2031 Total AM

4: Balsam Street & Old Mountain Road/Commercial Access

	↗	→	←	↖	↑	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	41	46	1	90	1062	1345
v/c Ratio	0.24	0.10	0.00	0.27	0.39	0.57
Control Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Length 50th (m)	5.9	0.0	0.0	2.8	27.3	65.0
Queue Length 95th (m)	13.3	0.0	0.0	5.4	32.1	75.4
Internal Link Dist (m)	175.6		57.5	179.2		181.9
Turn Bay Length (m)			70.0			
Base Capacity (vph)	252	548	318	472	2717	2372
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.08	0.00	0.19	0.39	0.57
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

2031 Total AM

4: Balsam Street & Old Mountain Road/Commercial Access

	↗	→	↘	↖	←	↖	↗	↑	↘	↖	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗			↖ ↗		↖ ↗	↖ ↗		↖ ↗	↖ ↗	↖ ↗
Traffic Volume (vph)	33	0	37	0	0	1	73	857	3	0	1041	49
Future Volume (vph)	33	0	37	0	0	1	73	857	3	0	1041	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95			0.95	
Flpb, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00			1.00	
Flt	1.00	0.85			0.86		1.00	1.00			0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1727	1608			1088		1722	3469			3516	
Flt Permitted	0.76	1.00			1.00		0.14	1.00			1.00	
Satd. Flow (perm)	1377	1608			1088		257	3469			3516	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	41	0	46	0	0	1	90	1058	4	0	1285	60
RTOR Reduction (vph)	0	42	0	0	1	0	0	0	0	0	2	0
Lane Group Flow (vph)	41	4	0	0	0	0	90	1062	0	0	1343	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.2	8.2			8.2		63.9	63.9			54.1	
Effective Green, g (s)	8.2	8.2			8.2		63.9	63.9			54.1	
Actuated g/C Ratio	0.10	0.10			0.10		0.76	0.76			0.64	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	134	156			106		296	2635			2261	
v/s Ratio Prot		0.00			0.00		0.02	c0.31			c0.38	
v/s Ratio Perm	c0.03						0.21					
v/c Ratio	0.31	0.03			0.00		0.30	0.40			0.59	
Uniform Delay, d1	35.3	34.3			34.3		5.0	3.5			8.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.3	0.1			0.0		0.6	0.5			1.2	
Delay (s)	36.6	34.4			34.3		5.5	4.0			9.8	
Level of Service	D	C			C		A	A			A	
Approach Delay (s)		35.4			34.3			4.1			9.8	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.55										
Actuated Cycle Length (s)		84.1			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		79.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

2031 Total AM

5: High Street/Balsam Street & First Street Ext/First Street

	↖	→	↗	←	↖	↗	↖	↗	↖
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	48	498	112	444	479	149	418	567	450
Future Volume (vph)	48	498	112	444	479	149	418	567	450
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	37.0	12.0	38.0	40.0	31.0	31.0	40.0	40.0
Total Split (%)	9.2%	30.8%	10.0%	31.7%	33.3%	25.8%	25.8%	33.3%	33.3%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	39.4	29.4	42.0	32.7	66.7	24.5	24.5	33.5	33.5
Actuated g/C Ratio	0.33	0.25	0.35	0.27	0.56	0.21	0.21	0.28	0.28
v/c Ratio	0.22	0.93	0.73	0.56	0.63	0.49	0.94	0.95	0.96
Control Delay	26.7	59.9	49.3	40.5	10.5	47.4	66.2	73.7	63.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	59.9	49.3	40.5	10.5	47.4	66.2	73.7	63.2
LOS	C	E	D	D	B	D	E	E	E
Approach Delay		57.6		27.6			62.2		66.7
Approach LOS		E		C			E		E

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.4

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 52.5

Intersection LOS: D

Intersection Capacity Utilization 81.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↖	↖	↖	↖
02	06	03	04
31 s	40 s	11 s	38 s
		07	08
		12 s	37 s

Queues

2031 Total AM

5: High Street/Balsam Street & First Street Ext/First Street

	↖	→	↗	←	↖	↗	↖	↗	↖
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	59	802	137	541	584	182	680	428	882
v/c Ratio	0.22	0.93	0.73	0.56	0.63	0.49	0.94	0.95	0.96
Control Delay	26.7	59.9	49.3	40.5	10.5	47.4	66.2	73.7	63.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	59.9	49.3	40.5	10.5	47.4	66.2	73.7	63.2
Queue Length 50th (m)	8.9	93.5	21.6	58.8	39.8	38.2	80.0	108.9	111.9
Queue Length 95th (m)	16.3	104.0	#34.2	68.7	51.7	54.6	#96.7	#149.6	#129.8
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	264	880	188	969	932	370	726	452	922
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.91	0.73	0.56	0.63	0.49	0.94	0.95	0.96

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	48	498	160	112	444	479	149	418	139	567	450	57
Future Volume (vph)	48	498	160	112	444	479	149	418	139	567	450	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1689	3401		1825	3544	1529	1807	3408		1612	3269	
Flt Permitted	0.35	1.00		0.12	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (perm)	614	3401		235	3544	1529	1807	3408		1612	3269	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	59	607	195	137	541	584	182	510	170	691	549	70
RTOR Reduction (vph)	0	25	0	0	0	80	0	27	0	0	5	0
Lane Group Flow (vph)	59	777	0	137	541	504	182	653	0	428	877	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	35.9	30.3		40.7	32.7	66.2	24.5	24.5		33.5	33.5	
Effective Green, g (s)	35.9	30.3		40.7	32.7	66.2	24.5	24.5		33.5	33.5	
Actuated g/C Ratio	0.30	0.25		0.34	0.27	0.55	0.20	0.20		0.28	0.28	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	233	856		185	963	841	368	694		448	910	
v/s Ratio Prot	0.01	c0.23		c0.05	0.15	0.17	0.10	c0.19		0.27	c0.27	
v/s Ratio Perm	0.06			0.20		0.16						
v/c Ratio	0.25	0.91		0.74	0.56	0.60	0.49	0.94		0.96	0.96	
Uniform Delay, d1	30.9	43.6		31.1	37.6	18.1	42.4	47.2		42.7	42.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	13.1		14.7	0.8	1.2	1.0	20.9		31.1	21.3	
Delay (s)	31.5	56.8		45.8	38.4	19.3	43.5	68.1		73.7	64.1	
Level of Service	C	E		D	D	B	D	E		E	E	
Approach Delay (s)		55.0			30.4			62.9			67.3	
Approach LOS		E			C			E			E	

Intersection Summary

HCM 2000 Control Delay	53.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.3	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2031 Total AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	5	1199	24	1049	6	2	13	4
Future Volume (vph)	5	1199	24	1049	6	2	13	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.0	88.4	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.85	0.82	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.01	0.49	0.08	0.42	0.05	0.22	0.12	0.05
Control Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
LOS	A	A	A	A	D	B	D	D
Approach Delay		6.5		4.0		23.4		43.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 5.9
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2031 Total AM

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	1440	29	1259	7	38	15	9
v/c Ratio	0.01	0.49	0.08	0.42	0.05	0.22	0.12	0.05
Control Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Length 50th (m)	0.3	72.2	0.9	34.7	1.4	0.4	2.9	1.0
Queue Length 95th (m)	0.7	78.3	2.1	64.8	5.4	9.0	8.8	5.3
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	432	2917	348	3009	333	385	323	415
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	0.01	0.49	0.08	0.42	0.02	0.10	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1199	11	24	1049	8	6	2	30	13	4	3
Future Volume (vph)	5	1199	11	24	1049	8	6	2	30	13	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3567		1825	3506		1815	1516		1778	1779	
Flt Permitted	0.21	1.00		0.15	1.00		0.75	1.00		0.73	1.00	
Satd. Flow (perm)	399	3567		287	3506		1437	1516		1371	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	1427	13	29	1249	10	7	2	36	15	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	34	0	0	4	0
Lane Group Flow (vph)	6	1440	0	29	1259	0	7	4	0	15	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.77	0.76		0.82	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	326	2705		296	2750		79	84		76	98	
v/s Ratio Prot	0.00	c0.40		c0.00	c0.36			0.00			0.00	
v/s Ratio Perm	0.01			0.08			0.00			c0.01		
v/c Ratio	0.02	0.53		0.10	0.46		0.09	0.05		0.20	0.05	
Uniform Delay, d1	2.9	5.3		3.0	3.9		48.5	48.3		48.8	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.8		0.1	0.6		0.5	0.2		1.3	0.2	
Delay (s)	3.0	6.0		3.1	4.5		48.9	48.6		50.0	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		6.0			4.4			48.6			49.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			6.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)				15.9		
Intersection Capacity Utilization			62.4%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	83	1025	10	901	34	36	83	30
Future Volume (vph)	83	1025	10	901	34	36	83	30
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	77.0	73.6	73.0	66.7	12.7	12.7	12.7	12.7
Actuated g/C Ratio	0.77	0.74	0.73	0.67	0.13	0.13	0.13	0.13
v/c Ratio	0.23	0.48	0.03	0.45	0.44	0.27	0.57	0.57
Control Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
LOS	A	A	A	A	D	C	D	B
Approach Delay		7.1		5.5		38.1		28.4
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 9.9

Intersection LOS: A

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street



Queues
7: Cedar Street & First Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	1241	12	1056	40	66	97	200
v/c Ratio	0.23	0.48	0.03	0.45	0.44	0.27	0.57	0.57
Control Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Length 50th (m)	3.6	38.4	0.3	4.6	7.3	7.4	18.0	6.2
Queue Length 95th (m)	8.9	85.7	m0.3	52.8	15.9	17.2	30.3	22.1
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	419	2594	365	2334	171	442	322	512
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	0.23	0.48	0.03	0.45	0.23	0.15	0.30	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2031 Total AM

	←	→	↙	↘	←	→	↙	↘	←	→	↙	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	83	1025	42	10	901	7	34	36	21	83	30	142
Future Volume (vph)	83	1025	42	10	901	7	34	36	21	83	30	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3524		1825	3502		1752	1761		1772	1610	
Flt Permitted	0.22	1.00		0.20	1.00		0.39	1.00		0.71	1.00	
Satd. Flow (perm)	420	3524		389	3502		715	1761		1332	1610	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	97	1192	49	12	1048	8	40	42	24	97	35	165
RTOR Reduction (vph)	0	2	0	0	0	0	0	21	0	0	144	0
Lane Group Flow (vph)	97	1239	0	12	1056	0	40	45	0	97	56	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%		0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.6	70.4		67.1	65.9		12.7	12.7		12.7	12.7	
Effective Green, g (s)	75.6	70.4		67.1	65.9		12.7	12.7		12.7	12.7	
Actuated g/C Ratio	0.76	0.70		0.67	0.66		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	397	2480		278	2307		90	223		169	204	
v/s Ratio Prot	c0.01	c0.35		0.00	0.30			0.03			0.03	
v/s Ratio Perm	0.17			0.03			0.06			c0.07		
v/c Ratio	0.24	0.50		0.04	0.46		0.44	0.20		0.57	0.27	
Uniform Delay, d1	4.3	6.8		5.7	8.3		40.4	39.1		41.1	39.5	
Progression Factor	1.00	1.00		0.44	0.54		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.7		0.1	0.6		3.5	0.4		4.7	0.7	
Delay (s)	4.6	7.5		2.6	5.0		43.9	39.6		45.8	40.2	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		7.3			5.0			41.2			42.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

2031 Total AM

	←	→	↙	↘	←	→	↙	↘
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	35	820	19	969	124	14	51	27
Future Volume (vph)	35	820	19	969	124	14	51	27
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.6	63.0	66.8	60.8	17.3	10.5	19.2	10.3
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.17	0.10	0.19	0.10
v/c Ratio	0.12	0.49	0.07	0.54	0.55	0.17	0.20	0.38
Control Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.4		9.6		39.5		27.0
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 12.1
Intersection Capacity Utilization 52.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service A

Splits and Phases: 8: Pine Street & First Street

⤵ 01	⤵ 02	⤵ 03	⤵ 04
11 s	50 s	13 s	26 s
⤵ 05	⤵ 06 (R)	⤵ 07	⤵ 08
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1077	22	1155	146	32	60	85
v/c Ratio	0.12	0.49	0.07	0.54	0.55	0.17	0.20	0.38
Control Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Length 50th (m)	1.4	57.6	0.9	49.9	23.2	2.9	9.1	5.8
Queue Length 95th (m)	m1.8	34.2	m1.9	54.7	36.8	10.7	17.7	17.9
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	328	2191	329	2129	266	347	303	384
Starvation Cap Reductn	0	0	0	88	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	0.49	0.07	0.57	0.55	0.09	0.20	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Total AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	35	820	95	19	969	13	124	14	14	51	27	45
Future Volume (vph)	35	820	95	19	969	13	124	14	14	51	27	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3470		1629	3503		1733	1676		1715	1715	
Flt Permitted	0.17	1.00		0.21	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	331	3470		361	3503		1280	1676		1228	1715	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	41	965	112	22	1140	15	146	16	16	60	32	53
RTOR Reduction (vph)	0	7	0	0	1	0	0	15	0	0	48	0
Lane Group Flow (vph)	41	1070	0	22	1154	0	146	17	0	60	37	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.7	58.5		59.9	57.1		18.1	8.5		19.5	9.2	
Effective Green, g (s)	62.7	58.5		59.9	57.1		18.1	8.5		19.5	9.2	
Actuated g/C Ratio	0.63	0.58		0.60	0.57		0.18	0.08		0.20	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	270	2029		251	2000		275	142		289	157	
v/s Ratio Prot	c0.01	0.31		0.00	c0.33		c0.05	0.01		0.02	0.02	
v/s Ratio Perm	0.09			0.05			c0.05			0.02		
v/c Ratio	0.15	0.53		0.09	0.58		0.53	0.12		0.21	0.23	
Uniform Delay, d1	8.8	12.5		8.9	13.7		36.6	42.3		33.6	42.1	
Progression Factor	0.50	0.68		0.71	0.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.9		0.1	1.1		2.0	0.4		0.4	0.8	
Delay (s)	4.7	9.4		6.5	10.0		38.6	42.7		33.9	42.9	
Level of Service	A	A		A	B		D	D		C	D	
Approach Delay (s)		9.2			10.0			39.3			39.2	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2031 Total AM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	23	707	41	773	237	20
Future Volume (vph)	23	707	41	773	237	20
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	66.9	59.9	68.0	62.0	20.1	20.1
Actuated g/C Ratio	0.67	0.60	0.68	0.62	0.20	0.20
v/c Ratio	0.07	0.49	0.13	0.43	0.78	0.19
Control Delay	2.1	4.4	6.3	12.0	52.8	14.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.5	6.3	12.0	52.8	14.7
LOS	A	A	A	B	D	B
Approach Delay		4.4		11.8		44.8
Approach LOS		A		B		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 13.4

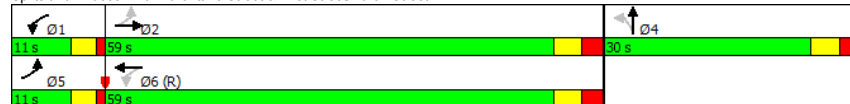
Intersection LOS: B

Intersection Capacity Utilization 55.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues

2031 Total AM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	27	1029	49	949	282	74
v/c Ratio	0.07	0.49	0.13	0.43	0.78	0.19
Control Delay	2.1	4.4	6.3	12.0	52.8	14.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.5	6.3	12.0	52.8	14.7
Queue Length 50th (m)	0.4	67.7	2.6	52.2	51.7	3.8
Queue Length 95th (m)	m0.9	8.5	6.2	67.8	69.8	13.0
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	374	2086	385	2189	438	453
Starvation Cap Reductn	0	127	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	0.07	0.53	0.13	0.43	0.64	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Total AM

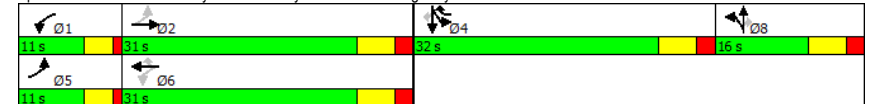
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	23	707	157	41	773	24	237	20	42	0	0	0
Future Volume (vph)	23	707	157	41	773	24	237	20	42	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3456		1825	3528		1796	1703				
Flt Permitted	0.26	1.00		0.22	1.00		0.95	1.00				
Satd. Flow (perm)	436	3456		421	3528		1796	1703				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	27	842	187	49	920	29	282	24	50	0	0	0
RTOR Reduction (vph)	0	16	0	0	2	0	0	40	0	0	0	0
Lane Group Flow (vph)	27	1013	0	49	947	0	282	34	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	63.0	59.1		65.6	60.4		20.1	20.1				
Effective Green, g (s)	63.0	59.1		65.6	60.4		20.1	20.1				
Actuated g/C Ratio	0.63	0.59		0.66	0.60		0.20	0.20				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	319	2042		349	2130		360	342				
v/s Ratio Prot	0.00	c0.29		c0.01	0.27			0.02				
v/s Ratio Perm	0.05			0.08			c0.16					
v/c Ratio	0.08	0.50		0.14	0.44		0.78	0.10				
Uniform Delay, d1	7.3	11.8		7.0	10.7		37.9	32.6				
Progression Factor	0.32	0.30		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	0.8		0.2	0.7		10.6	0.1				
Delay (s)	2.4	4.3		7.2	11.4		48.5	32.7				
Level of Service	A	A		A	B		D	C				
Approach Delay (s)		4.3			11.2		45.2			0.0		
Approach LOS		A			B		D			A		
Intersection Summary												
HCM 2000 Control Delay		13.2			HCM 2000 Level of Service		B					
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		15.6					
Intersection Capacity Utilization		55.0%			ICU Level of Service		A					
Analysis Period (min)		15										
c Critical Lane Group												

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 		 	 		 	 
Traffic Volume (vph)	142	222	30	394	797	22	30	34	281	42	97
Future Volume (vph)	142	222	30	394	797	22	30	34	281	42	97
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	31.0	11.0	31.0	32.0	16.0	16.0	16.0	32.0	32.0	32.0
Total Split (%)	12.2%	34.4%	12.2%	34.4%	35.6%	17.8%	17.8%	17.8%	35.6%	35.6%	35.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	36.8	30.9	34.9	25.6	45.7	10.3	10.3	10.3	20.1	20.1	20.1
Actuated g/C Ratio	0.45	0.38	0.43	0.31	0.56	0.13	0.13	0.13	0.25	0.25	0.25
v/c Ratio	0.49	0.20	0.07	0.75	0.80	0.12	0.15	0.13	0.44	0.44	0.22
Control Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
LOS	C	C	B	D	B	D	D	A	C	C	A
Approach Delay		21.4		19.7			23.2			23.7	
Approach LOS		C		B			C			C	
Intersection Summary											
Cycle Length: 90											
Actuated Cycle Length: 81.3											
Natural Cycle: 75											
Control Type: Semi Act-Uncoord											
Maximum v/c Ratio: 0.80											
Intersection Signal Delay: 20.9						Intersection LOS: C					
Intersection Capacity Utilization 79.0%						ICU Level of Service D					
Analysis Period (min) 15											

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	270	34	443	896	25	34	38	180	183	109
v/c Ratio	0.49	0.20	0.07	0.75	0.80	0.12	0.15	0.13	0.44	0.44	0.22
Control Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Length 50th (m)	15.8	17.3	3.1	68.0	30.8	3.8	5.2	0.0	26.1	26.4	0.0
Queue Length 95th (m)	29.5	28.1	8.7	#119.0	73.0	11.3	14.0	0.0	44.4	44.7	4.5
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)			60.0		15.0		15.0		70.0		
Base Capacity (vph)	329	1342	464	594	1202	207	220	290	541	556	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.20	0.07	0.75	0.75	0.12	0.15	0.13	0.33	0.33	0.18

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	142	222	19	30	394	797	22	30	34	281	42	97
Future Volume (vph)	142	222	19	30	394	797	22	30	34	281	42	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr t	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3520		1558	1883	1566	1644	1746	1209	1651	1697	1512
Flt Permitted	0.24	1.00		0.59	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	466	3520		960	1883	1566	1644	1746	1209	1651	1697	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	160	249	21	34	443	896	25	34	38	316	47	109
RTOR Reduction (vph)	0	6	0	0	0	236	0	0	35	0	0	83
Lane Group Flow (vph)	160	264	0	34	443	660	25	34	3	180	183	26
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	38.1	30.9		31.3	27.5	47.6	7.5	7.5	7.5	20.1	20.1	20.1
Effective Green, g (s)	38.1	30.9		31.3	27.5	47.6	7.5	7.5	7.5	20.1	20.1	20.1
Actuated g/C Ratio	0.45	0.37		0.37	0.33	0.56	0.09	0.09	0.09	0.24	0.24	0.24
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	1290		383	614	995	146	155	107	393	404	360
v/s Ratio Prot	c0.04	0.07		0.00	0.24	c0.16	0.02	c0.02		0.11	0.11	
v/s Ratio Perm	0.18			0.03		0.26			0.00			0.02
v/c Ratio	0.49	0.20		0.09	0.72	0.66	0.17	0.22	0.03	0.46	0.45	0.07
Uniform Delay, d1	15.7	18.3		17.0	25.0	12.8	35.5	35.7	35.1	27.4	27.4	24.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.4		0.1	7.2	1.7	0.6	0.7	0.1	0.8	0.8	0.1
Delay (s)	16.9	18.6		17.1	32.2	14.5	36.1	36.4	35.2	28.3	28.2	25.0
Level of Service	B	B		B	C	B	D	D	D	C	C	C
Approach Delay (s)	18.0		20.2		35.8		27.5					
Approach LOS	B		C		D		C					
Intersection Summary												
HCM 2000 Control Delay	21.9		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	84.3		Sum of lost time (s)		22.0							
Intersection Capacity Utilization	79.0%		ICU Level of Service		D							
Analysis Period (min)	15											
c Critical Lane Group												

Timings 2031 Total AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	↖	→	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	2	4	108	811	112	322
Future Volume (vph)	3	2	4	108	811	112	322
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases	4			2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)		15.7	15.7	34.9	27.5	34.9	27.5
Actuated g/C Ratio		0.25	0.25	0.55	0.43	0.55	0.43
v/c Ratio		0.10	0.82	0.20	0.62	0.36	0.27
Control Delay		10.1	23.4	7.4	17.9	9.6	13.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		10.1	23.4	7.4	17.9	9.6	13.6
LOS		B	C	A	B	A	B
Approach Delay		10.1	23.4		16.7		12.6
Approach LOS		B	C		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 63.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 17.2
Intersection Capacity Utilization 68.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues 2031 Total AM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	→	←	↙	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	484	124	934	129	391
v/c Ratio	0.10	0.82	0.20	0.62	0.36	0.27
Control Delay	10.1	23.4	7.4	17.9	9.6	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	23.4	7.4	17.9	9.6	13.6
Queue Length 50th (m)	0.5	25.4	6.1	48.9	6.4	16.4
Queue Length 95th (m)	5.7	#55.3	12.9	68.3	13.4	26.0
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	391	691	626	1511	360	1468
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	0.08	0.70	0.20	0.62	0.36	0.27

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2031 Total AM

11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	3	2	22	0	4	417	108	811	2	112	322	18
Future Volume (vph)	3	2	22	0	4	417	108	811	2	112	322	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.89			0.87		1.00	1.00		1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1663			1616		1789	3505		1706	3392	
Flt Permitted		0.70			1.00		0.52	1.00		0.22	1.00	
Satd. Flow (perm)		1174			1616		981	3505		392	3392	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	3	2	25	0	5	479	124	932	2	129	370	21
RTOR Reduction (vph)	0	19	0	0	195	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	11	0	0	289	0	124	934	0	129	385	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Effective Green, g (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Actuated g/C Ratio		0.24			0.24		0.51	0.43		0.51	0.43	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		285			393		565	1494		307	1446	
v/s Ratio Prot					c0.18		0.02	c0.27		c0.03	0.11	
v/s Ratio Perm		0.01					0.09			0.18		
v/c Ratio		0.04			0.73		0.22	0.63		0.42	0.27	
Uniform Delay, d1		18.6			22.5		8.4	14.5		9.1	12.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			7.0		0.2	2.0		0.9	0.5	
Delay (s)		18.7			29.5		8.6	16.5		10.0	12.4	
Level of Service		B			C		A	B		A	B	
Approach Delay (s)		18.7			29.5			15.5			11.8	
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2031 Total AM

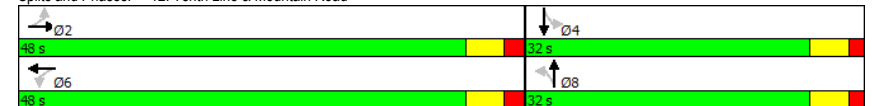
12: Tenth Line & Mountain Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	6	488	92	443	145	58	121	75
Future Volume (vph)	6	488	92	443	145	58	121	75
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	48.0	48.0	48.0	48.0	32.0	32.0	32.0	32.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	42.3	42.3	42.3	42.3	26.8	26.8	26.8	26.8
Actuated g/C Ratio	0.53		0.53		0.34		0.34	
v/c Ratio	0.78		0.98		1.19		0.99	
Control Delay	21.9		48.9		127.5		83.4	
Queue Delay	0.0		0.0		0.0		0.0	
Total Delay	21.9		48.9		127.5		83.4	
LOS	C		D		F		F	
Approach Delay	21.9		48.9		127.5		83.4	
Approach LOS	C		D		F		F	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 65.3
Intersection Capacity Utilization 109.5%
Analysis Period (min) 15
Intersection LOS: E
ICU Level of Service H

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2031 Total AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	737	739	635	254
v/c Ratio	0.78	0.98	1.19	0.99
Control Delay	21.9	48.9	127.5	83.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.9	48.9	127.5	83.4
Queue Length 50th (m)	81.7	101.5	~107.5	37.5
Queue Length 95th (m)	103.8	#149.1	#142.1	#70.8
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	946	754	533	257
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	0.78	0.98	1.19	0.99

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	488	104	92	443	63	145	58	311	121	75	10
Future Volume (vph)	6	488	104	92	443	63	145	58	311	121	75	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.92			0.99	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1784			1852			1654			1669	
Flt Permitted		0.99			0.76			0.83			0.44	
Satd. Flow (perm)		1773			1417			1384			764	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	7	602	128	114	547	78	179	72	384	149	93	12
RTOR Reduction (vph)	0	9	0	0	5	0	0	69	0	0	2	0
Lane Group Flow (vph)	0	728	0	0	734	0	0	566	0	0	252	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		42.3			42.3			26.8			26.8	
Effective Green, g (s)		42.3			42.3			26.8			26.8	
Actuated g/C Ratio		0.53			0.53			0.34			0.34	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		937			749			463			255	
v/s Ratio Prot												
v/s Ratio Perm		0.41			0.52			0.41			0.33	
v/c Ratio		0.78			0.98			1.22			0.99	
Uniform Delay, d1		15.1			18.4			26.6			26.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		6.3			28.3			118.1			52.5	
Delay (s)		21.4			46.7			144.7			79.0	
Level of Service		C			D			F			E	
Approach Delay (s)		21.4			46.7			144.7			79.0	
Approach LOS		C			D			F			E	

Intersection Summary

HCM 2000 Control Delay	68.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2031 Total AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	90	674	112	547	119	62	18	87
Future Volume (vph)	90	674	112	547	119	62	18	87
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2	1	6	3	8		4
Permitted Phases		2	6		8		4	
Detector Phase	2	2	1	6	3	8	4	4
Switch Phase								
Minimum Initial (s)	30.0	30.0	5.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	9.0	25.0	25.0	25.0
Total Split (s)	43.0	43.0	12.0	55.0	10.0	35.0	25.0	25.0
Total Split (%)	47.8%	47.8%	13.3%	61.1%	11.1%	38.9%	27.8%	27.8%
Yellow Time (s)	4.4	4.4	3.0	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	35.5	35.5	51.1	47.5	23.8	21.8	11.8	11.8
Actuated g/C Ratio	0.43	0.43	0.62	0.57	0.29	0.26	0.14	0.14
v/c Ratio	0.34	0.64	0.39	0.34	0.45	0.36	0.14	0.60
Control Delay	20.8	21.0	10.8	10.2	27.6	15.0	32.4	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	21.0	10.8	10.2	27.6	15.0	32.4	37.0
LOS	C	C	B	B	C	B	C	D
Approach Delay		21.0		10.3		20.5		36.5
Approach LOS		C		B		C		D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 82.9
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 18.3 Intersection LOS: B
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

↰ Ø1	↱ Ø2	↰ Ø3	↱ Ø4
12 s	43 s	10 s	25 s
↰ Ø5	↱ Ø6	↰ Ø7	↱ Ø8
55 s	35 s		

Queues 2031 Total AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	106	948	132	700	140	182	21	156
v/c Ratio	0.34	0.64	0.39	0.34	0.45	0.36	0.14	0.60
Control Delay	20.8	21.0	10.8	10.2	27.6	15.0	32.4	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	21.0	10.8	10.2	27.6	15.0	32.4	37.0
Queue Length 50th (m)	10.8	57.8	7.8	27.6	17.0	11.6	3.0	19.2
Queue Length 95th (m)	23.9	79.6	16.3	41.1	28.7	24.7	8.6	34.5
Internal Link Dist (m)		217.8		35.2		32.3		88.4
Turn Bay Length (m)	35.0		50.0		45.0		15.0	
Base Capacity (vph)	316	1485	342	2053	312	639	246	406
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	0.34	0.64	0.39	0.34	0.45	0.28	0.09	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2031 Total AM

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	90	674	132	112	547	48	119	62	93	18	87	46
Future Volume (vph)	90	674	132	112	547	48	119	62	93	18	87	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6		4.0	7.6		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.91		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3433		1706	3573		1771	1661		1582	1679	
Flt Permitted	0.39	1.00		0.19	1.00		0.46	1.00		0.64	1.00	
Satd. Flow (perm)	741	3433		342	3573		858	1661		1070	1679	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	106	793	155	132	644	56	140	73	109	21	102	54
RTOR Reduction (vph)	0	17	0	0	6	0	0	65	0	0	23	0
Lane Group Flow (vph)	106	931	0	132	694	0	140	117	0	21	133	0
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2		1	6		3	8		4		4	
Permitted Phases	2		6		8		4		4		4	
Actuated Green, G (s)	35.5	35.5		47.5	47.5		21.8	21.8		11.8	11.8	
Effective Green, g (s)	35.5	35.5		47.5	47.5		21.8	21.8		11.8	11.8	
Actuated g/C Ratio	0.43	0.43		0.57	0.57		0.26	0.26		0.14	0.14	
Clearance Time (s)	7.6	7.6		4.0	7.6		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	1470		327	2047		291	436		152	238	
v/s Ratio Prot	c0.27		c0.04	0.19		c0.03	0.07		0.08		0.08	
v/s Ratio Perm	0.14		0.19		c0.09		0.02		0.02		0.02	
v/c Ratio	0.33	0.63		0.40	0.34		0.48	0.27		0.14	0.56	
Uniform Delay, d1	15.8	18.6		9.9	9.4		24.6	24.2		31.1	33.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	2.1		3.7	0.4		1.3	0.3		0.4	2.8	
Delay (s)	18.6	20.7		13.6	9.8		25.9	24.6		31.5	35.9	
Level of Service	B	C		B	A		C	C		C	D	
Approach Delay (s)		20.5			10.4			25.1			35.4	
Approach LOS		C			B			C			D	

Intersection Summary

HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	82.9	Sum of lost time (s)	21.6
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Timings

2031 Total AM

14: High Street & Cambridge Street/Third Street

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	4	20	25	31	123	668	86	560
Future Volume (vph)	4	20	25	31	123	668	86	560
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	22.0	22.0	22.0	22.0	13.0	55.0	13.0	55.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	14.4%	61.1%	14.4%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.5	10.5	10.5	10.5	59.7	51.6	58.3	49.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.72	0.62	0.70	0.59
v/c Ratio	0.03	0.38	0.17	0.46	0.23	0.40	0.21	0.32
Control Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
LOS	C	C	D	B	A	A	A	A
Approach Delay		22.1		20.7		8.3		8.6
Approach LOS		C		C		A		A

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 83.1	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 48.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 14: High Street & Cambridge Street/Third Street

Ø1	Ø2	Ø4
13 s	55 s	22 s
Ø5	Ø6	Ø8
13 s	55 s	22 s

Queues
14: High Street & Cambridge Street/Third Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	74	29	133	143	876	100	654
v/c Ratio	0.03	0.38	0.17	0.46	0.23	0.40	0.21	0.32
Control Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Length 50th (m)	0.7	3.3	4.2	5.2	4.6	33.8	3.1	24.3
Queue Length 95th (m)	3.7	14.2	11.2	18.9	9.2	47.8	6.9	36.0
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	248	268	262	396	644	2185	502	2047
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	0.02	0.28	0.11	0.34	0.22	0.40	0.20	0.32
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2031 Total AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	4	20	44	25	31	83	123	668	85	86	560	3
Future Volume (vph)	4	20	44	25	31	83	123	668	85	86	560	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1178		1825	1651		1825	3507		1658	3470	
Flt Permitted	0.67	1.00		0.71	1.00		0.37	1.00		0.30	1.00	
Satd. Flow (perm)	1291	1178		1362	1651		718	3507		527	3470	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	23	51	29	36	97	143	777	99	100	651	3
RTOR Reduction (vph)	0	45	0	0	85	0	0	9	0	0	0	0
Lane Group Flow (vph)	5	29	0	29	48	0	143	867	0	100	654	0
Confl. Peds. (#/hr)									9		9	
Heavy Vehicles (%)	0%	0%	67%	0%	0%	5%	0%	2%	2%	10%	5%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		59.2	51.6		55.8	49.9	
Effective Green, g (s)	10.5	10.5		10.5	10.5		59.2	51.6		55.8	49.9	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.70	0.61		0.66	0.59	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	161	147		170	206		606	2154		429	2061	
v/s Ratio Prot		0.02			c0.03		c0.02	c0.25		0.02	0.19	
v/s Ratio Perm	0.00			0.02			0.14			0.14		
v/c Ratio	0.03	0.20		0.17	0.23		0.24	0.40		0.23	0.32	
Uniform Delay, d1	32.3	33.0		32.9	33.1		4.1	8.3		5.1	8.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.7		0.5	0.6		0.2	0.6		0.3	0.4	
Delay (s)	32.4	33.7		33.3	33.7		4.3	8.9		5.4	8.9	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		33.6			33.6			8.2			8.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		11.4								B		
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		84.0					Sum of lost time (s)		16.0			
Intersection Capacity Utilization		48.8%					ICU Level of Service		A			
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	152	286	27	159	150	581	113	355
Future Volume (vph)	152	286	27	159	150	581	113	355
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	26.6	26.6	26.6	26.6	37.8	26.3	35.5	25.1
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.48	0.34	0.45	0.32
v/c Ratio	0.77	0.88	0.35	0.61	0.40	0.67	0.42	0.51
Control Delay	46.9	41.5	31.7	23.3	13.0	25.7	14.2	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.9	41.5	31.7	23.3	13.0	25.7	14.2	22.7
LOS	D	D	C	C	B	C	B	C
Approach Delay		42.9		24.0		23.3		21.0
Approach LOS		D		C		C		C

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 78.1

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 28.0

Intersection LOS: C

Intersection Capacity Utilization 75.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

	Ø1		Ø2		Ø4
19.5 s		30.9 s		33.8 s	
	Ø5		Ø6		Ø8
19.5 s		30.9 s		33.8 s	

Queues
15: High Street & Sixth Street

2031 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	190	543	34	369	188	804	141	550
v/c Ratio	0.77	0.88	0.35	0.61	0.40	0.67	0.42	0.51
Control Delay	46.9	41.5	31.7	23.3	13.0	25.7	14.2	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.9	41.5	31.7	23.3	13.0	25.7	14.2	22.7
Queue Length 50th (m)	24.7	70.3	3.7	37.6	14.3	53.3	10.5	32.8
Queue Length 95th (m)	#49.5	#107.1	11.0	57.1	21.7	64.6	16.9	43.3
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	260	648	104	637	561	1193	468	1084
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	0.73	0.84	0.33	0.58	0.34	0.67	0.30	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	152	286	148	27	159	136	150	581	62	113	355	85
Future Volume (vph)	152	286	148	27	159	136	150	581	62	113	355	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1740		1573	1673		1772	3524		1738	3299	
Flt Permitted	0.39	1.00		0.18	1.00		0.36	1.00		0.22	1.00	
Satd. Flow (perm)	726	1740		292	1673		664	3524		411	3299	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	190	358	185	34	199	170	188	726	78	141	444	106
RTOR Reduction (vph)	0	22	0	0	36	0	0	9	0	0	24	0
Lane Group Flow (vph)	190	521	0	34	333	0	188	795	0	141	526	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.6	26.6		26.6	26.6		36.4	26.3		34.2	25.2	
Effective Green, g (s)	26.6	26.6		26.6	26.6		36.4	26.3		34.2	25.2	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.47	0.34		0.44	0.32	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	247	592		99	569		452	1186		332	1064	
v/s Ratio Prot		c0.30			0.20		c0.05	c0.23		0.05	0.16	
v/s Ratio Perm	0.26			0.12			0.14			0.14		
v/c Ratio	0.77	0.88		0.34	0.58		0.42	0.67		0.42	0.49	
Uniform Delay, d1	23.0	24.3		19.2	21.2		12.7	22.2		14.1	21.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.2	14.6		2.8	1.8		0.6	3.0		0.9	1.6	
Delay (s)	37.2	38.9		22.1	23.0		13.3	25.2		15.0	23.0	
Level of Service	D	D		C	C		B	C		B	C	
Approach Delay (s)		38.5			22.9			23.0			21.3	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		26.6			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		78.1			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		75.8%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Total AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	25	122	505	78	147	366
Future Volume (vph)	25	122	505	78	147	366
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	32	158	656	101	191	475
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	190	757	191	475		
Volume Left (vph)	32	0	191	0		
Volume Right (vph)	158	101	0	0		
Hadj (s)	-0.39	-0.05	0.57	0.12		
Departure Headway (s)	6.4	5.5	6.4	6.0		
Degree Utilization, x	0.34	1.15	0.34	0.79		
Capacity (veh/h)	542	667	551	591		
Control Delay (s)	12.7	103.7	11.5	26.7		
Approach Delay (s)	12.7	103.7	22.3			
Approach LOS	B	F	C			
Intersection Summary						
Delay			59.4			
Level of Service			F			
Intersection Capacity Utilization			58.8%		ICU Level of Service	B
Analysis Period (min)			15			

Timings
17: Hurontario Street & Hume Street

2031 Total AM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	216	206	437	416	118	165
Future Volume (vph)	216	206	437	416	118	165
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	17.3	17.3	30.1	30.1		41.1
Actuated g/C Ratio	0.24	0.24	0.42	0.42		0.58
v/c Ratio	0.63	0.44	0.67	0.54		0.29
Control Delay	30.9	5.7	22.2	3.9		8.1
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	30.9	5.7	22.2	3.9		8.1
LOS	C	A	C	A		A
Approach Delay	18.6		13.3			8.1
Approach LOS	B		B			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 71
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 13.8
 Intersection Capacity Utilization 78.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Total AM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	270	258	546	520	354
v/c Ratio	0.63	0.44	0.67	0.54	0.29
Control Delay	30.9	5.7	22.2	3.9	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	5.7	22.2	3.9	8.1
Queue Length 50th (m)	32.0	0.0	53.3	0.0	9.6
Queue Length 95th (m)	46.1	9.9	84.3	9.4	17.3
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	700	781	813	966	1234
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.39	0.33	0.67	0.54	0.29

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Total AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	216	206	437	416	118	165
Future Volume (vph)	216	206	437	416	118	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3544	3544
Flt Permitted	0.95	1.00	1.00	1.00	0.54	0.54
Satd. Flow (perm)	1772	1581	1921	1575	1949	1949
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	270	258	546	520	148	206
RTOR Reduction (vph)	0	195	0	300	0	0
Lane Group Flow (vph)	270	63	546	220	0	354
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	17.3	17.3	30.1	30.1		41.1
Effective Green, g (s)	17.3	17.3	30.1	30.1		41.1
Actuated g/C Ratio	0.24	0.24	0.42	0.42		0.58
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	431	385	814	667		1285
v/s Ratio Prot	c0.15		c0.28			c0.03
v/s Ratio Perm		0.04		0.14		0.13
v/c Ratio	0.63	0.16	0.67	0.33		0.28
Uniform Delay, d1	24.0	21.1	16.5	13.7		7.5
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.8	0.2	4.4	1.3		0.5
Delay (s)	26.8	21.3	20.8	15.0		8.0
Level of Service	C	C	C	B		A
Approach Delay (s)	24.1		18.0			8.0
Approach LOS	C		B			A
Intersection Summary						
HCM 2000 Control Delay		17.9		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.61				
Actuated Cycle Length (s)		71.0		Sum of lost time (s)		16.6
Intersection Capacity Utilization		78.3%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	13	169	36	46	193	107	122	144	52	196	260	12
Future Volume (vph)	13	169	36	46	193	107	122	144	52	196	260	12
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	16	209	44	57	238	132	151	178	64	242	321	15
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	269	427	393	578								
Volume Left (vph)	16	57	151	242								
Volume Right (vph)	44	132	64	15								
Hadj (s)	-0.04	-0.06	0.09	0.19								
Departure Headway (s)	9.4	8.7	8.9	8.9								
Degree Utilization, x	0.71	1.03	0.97	1.43								
Capacity (veh/h)	372	412	393	413								
Control Delay (s)	32.1	82.0	67.7	233.1								
Approach Delay (s)	32.1	82.0	67.7	233.1								
Approach LOS	D	F	F	F								
Intersection Summary												
Delay		122.9										
Level of Service		F										
Intersection Capacity Utilization		73.0%		ICU Level of Service								
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	93	10	29	122	181	15	113	39	185	104	38
Future Volume (vph)	19	93	10	29	122	181	15	113	39	185	104	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	111	12	35	145	215	18	135	46	220	124	45
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	146	180	215	199	389							
Volume Left (vph)	23	35	0	18	220							
Volume Right (vph)	12	0	215	46	45							
Hadj (s)	0.20	0.34	-0.63	0.02	0.15							
Departure Headway (s)	6.9	7.0	6.0	6.3	6.1							
Degree Utilization, x	0.28	0.35	0.36	0.35	0.65							
Capacity (veh/h)	456	483	561	513	571							
Control Delay (s)	12.5	12.6	11.2	12.7	19.8							
Approach Delay (s)	12.5	11.8		12.7	19.8							
Approach LOS	B	B		B	C							
Intersection Summary												
Delay	14.8											
Level of Service	B											
Intersection Capacity Utilization	55.1%			ICU Level of Service					B			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Total AM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	210	523	567	89	14	74
Future Volume (Veh/h)	210	523	567	89	14	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	221	551	597	94	15	78
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	691				1637	644
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	691				1637	644
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	74				81	83
cM capacity (veh/h)	863				78	461
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	772	691	93			
Volume Left	221	0	15			
Volume Right	0	94	78			
cSH	863	1700	258			
Volume to Capacity	0.26	0.41	0.36			
Queue Length 95th (m)	7.7	0.0	12.0			
Control Delay (s)	5.9	0.0	26.6			
Lane LOS	A		D			
Approach Delay (s)	5.9	0.0	26.6			
Approach LOS			D			
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization	89.7%		ICU Level of Service		E	
Analysis Period (min)	15					

Timings 2031 Total PM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	22	2	25	0	79	864	25	4	770	22
Future Volume (vph)	22	2	25	0	79	864	25	4	770	22
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		5	2		6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	76.0	75.1	75.1	66.3	66.3	66.3
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.84	0.83	0.83	0.73	0.73	0.73
v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02
Control Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
LOS	D	B	D	A	A	A	A	A	B	A
Approach Delay		25.0		40.8		5.1			10.1	
Approach LOS		C		D		A			B	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90.4
 Natural Cycle: 85
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 8.6
 Intersection Capacity Utilization 90.0%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s
	13 s

Queues 2031 Total PM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	61	27	3	84	919	27	4	819	23
v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02
Control Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Length 50th (m)	3.8	0.3	4.5	0.0	2.1	49.8	0.0	0.2	74.6	0.0
Queue Length 95th (m)	11.3	11.8	12.5	0.0	4.1	75.7	1.1	1.2	111.9	0.0
Internal Link Dist (m)		79.7		52.6		42.1			217.0	
Turn Bay Length (m)						10.0	65.0			10.0
Base Capacity (vph)	111	172	106	343	507	1550	1363	438	1354	1073
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	22	2	55	25	0	3	79	864	25	4	770	22
Future Volume (vph)	22	2	55	25	0	3	79	864	25	4	770	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.97		1.00	0.96		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1795	1527		1825	1574		1825	1865	1633	1825	1847	1432
Flt Permitted	0.76	1.00		0.72	1.00		0.25	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1428	1527		1378	1574		480	1865	1633	598	1847	1432
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	2	59	27	0	3	84	919	27	4	819	23
RTOR Reduction (vph)	0	55	0	0	3	0	0	0	5	0	0	7
Lane Group Flow (vph)	23	6	0	27	0	0	84	919	22	4	819	16
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	0%	3%	0%	0%	4%	14%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7	65.1	65.1	65.1
Effective Green, g (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7	65.1	65.1	65.1
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.81	0.81	0.81	0.71	0.71	0.71
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	86	92		83	95		470	1509	1321	421	1302	1010
v/s Ratio Prot		0.00			0.00		0.01	0.49			0.44	
v/s Ratio Perm	0.02			0.02			0.13		0.01	0.01		0.01
v/c Ratio	0.27	0.06		0.33	0.00		0.18	0.61	0.02	0.01	0.63	0.02
Uniform Delay, d1	41.4	40.9		41.5	40.7		4.4	3.3	1.7	4.0	7.2	4.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.3		2.3	0.0		0.2	1.8	0.0	0.0	2.3	0.0
Delay (s)	43.1	41.1		43.8	40.7		4.6	5.1	1.7	4.1	9.5	4.1
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		41.7			43.5			5.0			9.3	
Approach LOS		D			D			A			A	

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
2: Balsam Street & Harbour Street W & Highway 26

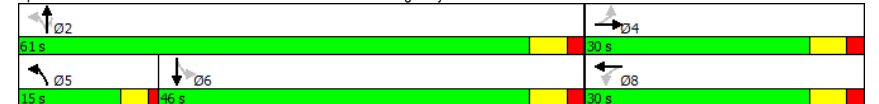
2031 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	24	7	91	6	184	1008	76	12	873
Future Volume (vph)	24	7	91	6	184	1008	76	12	873
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4			8	5	2		6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	13.5	13.5	13.5	13.5		55.1	55.1		40.1
Actuated g/C Ratio	0.17	0.17	0.17	0.17		0.68	0.68		0.50
v/c Ratio	0.11	0.51	0.71	0.05		0.81	0.07		0.59
Control Delay	28.6	9.0	58.4	18.9		14.0	3.6		17.1
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	28.6	9.0	58.4	18.9		14.0	3.6		17.1
LOS	C	A	E	B		B	A		B
Approach Delay		11.0		53.1		13.4			17.1
Approach LOS		B		D		B			B

Intersection Summary

Cycle Length: 91	
Actuated Cycle Length: 80.7	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 107.2%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2031 Total PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	26	233	98	15	1282	82	967
v/c Ratio	0.11	0.51	0.71	0.05	0.81	0.07	0.59
Control Delay	28.6	9.0	58.4	18.9	14.0	3.6	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.6	9.0	58.4	18.9	14.0	3.6	17.1
Queue Length 50th (m)	3.4	1.0	14.3	0.8	42.6	1.9	51.9
Queue Length 95th (m)	9.8	18.3	30.1	5.4	#83.0	7.6	83.8
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	408	634	246	489	1578	1127	1632
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.37	0.40	0.03	0.81	0.07	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2031 Total PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	24	7	209	91	6	8	184	1008	76	12	873	14
Future Volume (vph)	24	7	209	91	6	8	184	1008	76	12	873	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Flt	1.00	0.86		1.00	0.91			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1590		1815	1619			3592	1633		3535	
Flt Permitted	0.75	1.00		0.43	1.00			0.57	1.00		0.93	
Satd. Flow (perm)	1368	1590		825	1619			2060	1633		3284	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	26	8	225	98	6	9	198	1084	82	13	939	15
RTOR Reduction (vph)	0	187	0	0	7	0	0	0	11	0	1	0
Lane Group Flow (vph)	26	46	0	98	8	0	0	1282	71	0	966	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	13.5	13.5		13.5	13.5			55.2	55.2		40.2	
Effective Green, g (s)	13.5	13.5		13.5	13.5			55.2	55.2		40.2	
Actuated g/C Ratio	0.17	0.17		0.17	0.17			0.68	0.68		0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	228	265		138	270			1617	1116		1635	
v/s Ratio Prot		0.03			0.00			c0.11				
v/s Ratio Perm	0.02			c0.12				c0.43	0.04		0.29	
v/c Ratio	0.11	0.17		0.71	0.03			0.79	0.06		0.59	
Uniform Delay, d1	28.5	28.8		31.8	28.1			8.8	4.2		14.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.3		15.8	0.0			4.1	0.1		1.6	
Delay (s)	28.7	29.1		47.5	28.2			12.9	4.3		16.0	
Level of Service	C	C		D	C			B	A		B	
Approach Delay (s)		29.1			45.0			12.4			16.0	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.6									
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			80.7						16.0			
Intersection Capacity Utilization			107.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings

2031 Total PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	123	4	35	5	86	1145	8	1093
Future Volume (vph)	123	4	35	5	86	1145	8	1093
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	12.6	12.6		12.6	55.1	53.1	52.0	46.1
Actuated g/C Ratio	0.17	0.17		0.17	0.74	0.71	0.70	0.62
v/c Ratio	0.56	0.22		0.24	0.25	0.47	0.02	0.56
Control Delay	39.5	10.1		23.5	5.7	8.3	4.2	13.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	10.1		23.5	5.7	8.3	4.2	13.3
LOS	D	B		C	A	A	A	B
Approach Delay		28.9		23.5		8.1		13.2
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 84

Actuated Cycle Length: 74.3

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 12.2

Intersection LOS: B

Intersection Capacity Utilization 63.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

Ø1	Ø2	Ø4	
15 s	47 s	22 s	
Ø5	Ø6	Ø8	
15 s	47 s	22 s	

Queues

2031 Total PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	73	61	91	1211	8	1237
v/c Ratio	0.56	0.22	0.24	0.25	0.47	0.02	0.56
Control Delay	39.5	10.1	23.5	5.7	8.3	4.2	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	10.1	23.5	5.7	8.3	4.2	13.3
Queue Length 50th (m)	17.5	0.5	5.3	3.3	37.3	0.4	61.8
Queue Length 95th (m)	34.3	10.6	15.3	8.3	87.6	1.5	94.1
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	299	413	323	438	2553	511	2203
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.18	0.19	0.21	0.47	0.02	0.56

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	123	4	66	35	5	18	86	1145	6	8	1093	82
Future Volume (vph)	123	4	66	35	5	18	86	1145	6	8	1093	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1821	1649			1778		1772	3576		1825	3538	
Flt Permitted	0.72	1.00			0.77		0.15	1.00		0.21	1.00	
Satd. Flow (perm)	1375	1649			1415		288	3576		404	3538	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	129	4	69	37	5	19	91	1205	6	8	1151	86
RTOR Reduction (vph)	0	60	0	0	17	0	0	0	0	0	5	0
Lane Group Flow (vph)	129	13	0	0	44	0	91	1211	0	8	1232	0
Confl. Peds. (#/hr)	1				1		2				2	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.1	10.1			10.1		56.9	51.6		48.3	47.0	
Effective Green, g (s)	10.1	10.1			10.1		56.9	51.6		48.3	47.0	
Actuated g/C Ratio	0.13	0.13			0.13		0.72	0.65		0.61	0.59	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	175	210			180		318	2335		270	2104	
v/s Ratio Prot		0.01					c0.02	c0.34		0.00	c0.35	
v/s Ratio Perm	c0.09				0.03		0.18			0.02		
v/c Ratio	0.74	0.06			0.25		0.29	0.52		0.03	0.59	
Uniform Delay, d1	33.2	30.3			31.0		5.4	7.2		6.1	9.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.9	0.1			0.7		0.5	0.8		0.0	1.2	
Delay (s)	48.1	30.4			31.7		5.9	8.0		6.2	11.1	
Level of Service	D	C			C		A	A		A	B	
Approach Delay (s)		41.7			31.7			7.9			11.1	
Approach LOS		D			C			A			B	

Intersection Summary

HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings 4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	96	4	18	8	188	1169	10	1095
Future Volume (vph)	96	4	18	8	188	1169	10	1095
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.0	12.0		12.0	62.0	60.0	46.3	46.3
Actuated g/C Ratio	0.14	0.14		0.14	0.74	0.71	0.55	0.55
v/c Ratio	0.53	0.54		0.25	0.55	0.51	0.05	0.63
Control Delay	43.6	10.4		30.1	11.2	6.4	12.2	15.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	10.4		30.1	11.2	6.4	12.2	15.7
LOS	D	B		C	B	A	B	B
Approach Delay		21.0		30.1		7.1		15.7
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 84	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 100.9%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access

↰ Ø2	↱ Ø4
66 s	21 s
↰ Ø5	↱ Ø8
19 s	47 s

Queues

2031 Total PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	104	222	38	204	1297	11	1237
v/c Ratio	0.53	0.54	0.25	0.55	0.51	0.05	0.63
Control Delay	43.6	10.4	30.1	11.2	6.4	12.2	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	10.4	30.1	11.2	6.4	12.2	15.7
Queue Length 50th (m)	15.7	0.6	4.2	7.6	39.4	0.7	62.7
Queue Length 95th (m)	30.9	18.7	12.8	22.8	60.8	3.9	108.0
Internal Link Dist (m)		175.6	57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	247	462	192	465	2550	203	1961
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.48	0.20	0.44	0.51	0.05	0.63
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2031 Total PM

4: Balsam Street & Old Mountain Road/Commercial Access

	↖	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Traffic Volume (vph)	96	4	201	18	8	8	188	1169	24	10	1095	43
Future Volume (vph)	96	4	201	18	8	8	188	1169	24	10	1095	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	1584			1803		1789	3568		1644	3557	
Flt Permitted	0.73	1.00			0.56		0.14	1.00		0.21	1.00	
Satd. Flow (perm)	1385	1584			1036		262	3568		368	3557	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	4	218	20	9	9	204	1271	26	11	1190	47
RTOR Reduction (vph)	0	187	0	0	8	0	0	1	0	0	3	0
Lane Group Flow (vph)	104	35	0	0	30	0	204	1296	0	11	1234	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.0	12.0			12.0		60.0	60.0		46.3	46.3	
Effective Green, g (s)	12.0	12.0			12.0		60.0	60.0		46.3	46.3	
Actuated g/C Ratio	0.14	0.14			0.14		0.71	0.71		0.55	0.55	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	226			148		363	2548		202	1960	
v/s Ratio Prot		0.02					0.06	c0.36			c0.35	
v/s Ratio Perm	c0.08				0.03		0.34			0.03		
v/c Ratio	0.53	0.16			0.20		0.56	0.51		0.05	0.63	
Uniform Delay, d1	33.4	31.6			31.8		8.2	5.4		8.7	13.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	0.3			0.7		2.0	0.7		0.5	1.5	
Delay (s)	35.9	31.9			32.5		10.1	6.1		9.2	14.5	
Level of Service	D	C			C		B	A		A	B	
Approach Delay (s)		33.2			32.5			6.7			14.5	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		12.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		84.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		100.9%			ICU Level of Service			G				
Analysis Period (min)		15										

c Critical Lane Group

Timings 2031 Total PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↱	↰	↱
Traffic Volume (vph)	158	797	279	719	736	223	452	669	564
Future Volume (vph)	158	797	279	719	736	223	452	669	564
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	18.0	43.4	18.0	43.4	40.6	28.0	28.0	40.6	40.6
Total Split (%)	13.8%	33.4%	13.8%	33.4%	31.2%	21.5%	21.5%	31.2%	31.2%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	51.5	36.4	55.0	38.3	72.9	21.5	21.5	34.1	34.1
Actuated g/C Ratio	0.40	0.28	0.42	0.29	0.56	0.17	0.17	0.26	0.26
v/c Ratio	0.58	1.09	1.12	0.69	0.80	0.78	1.05	1.06	1.03
Control Delay	31.5	98.7	126.0	45.0	18.0	70.8	100.2	106.9	85.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	98.7	126.0	45.0	18.0	70.8	100.2	106.9	85.0
LOS	C	F	F	D	B	E	F	F	F
Approach Delay		89.8		46.6			92.3		92.2
Approach LOS		F		D			F		F

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Natural Cycle: 115
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 76.1
Intersection Capacity Utilization 108.5%
Analysis Period (min) 15

Intersection LOS: E
ICU Level of Service G

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰	↱	↰	↱	↰	↱	↱	↰
02	06	03	04	07	08		
28 s	40.6 s	18 s	43.4 s	18 s	43.4 s		

Queues 2031 Total PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	1076	288	741	759	230	629	448	911
v/c Ratio	0.58	1.09	1.12	0.69	0.80	0.78	1.05	1.06	1.03
Control Delay	31.5	98.7	126.0	45.0	18.0	70.8	100.2	106.9	85.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	98.7	126.0	45.0	18.0	70.8	100.2	106.9	85.0
Queue Length 50th (m)	25.3	~160.1	~68.3	89.3	68.1	57.1	~88.6	~138.3	~136.4
Queue Length 95th (m)	40.3	#202.3	#125.6	112.6	101.1	#94.3	#126.1	#208.5	#179.1
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	305	988	257	1074	943	295	598	422	883
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.09	1.12	0.69	0.80	0.78	1.05	1.06	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	158	797	246	279	719	736	223	452	158	669	564	85
Future Volume (vph)	158	797	246	279	719	736	223	452	158	669	564	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1772	3448		1807	3650	1573	1789	3459		1612	3345	
Flt Permitted	0.20	1.00		0.10	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (perm)	378	3448		199	3650	1573	1789	3459		1612	3345	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	163	822	254	288	741	759	230	466	163	690	581	88
RTOR Reduction (vph)	0	22	0	0	0	62	0	27	0	0	6	0
Lane Group Flow (vph)	163	1054	0	288	741	697	230	602	0	448	905	0
Confl. Peds. (#/hr)	4		12	12		4	9		2	2		9
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	48.5	36.4		52.3	38.3	72.4	21.5	21.5		34.1	34.1	
Effective Green, g (s)	48.5	36.4		52.3	38.3	72.4	21.5	21.5		34.1	34.1	
Actuated g/C Ratio	0.37	0.28		0.40	0.29	0.56	0.17	0.17		0.26	0.26	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	270	965		253	1075	876	295	572		422	877	
v/s Ratio Prot	0.06	0.31		c0.12	0.20	0.21	0.13	c0.17		c0.28	0.27	
v/s Ratio Perm	0.17			c0.34		0.23						
v/c Ratio	0.60	1.09		1.14	0.69	0.80	0.78	1.05		1.06	1.03	
Uniform Delay, d1	29.5	46.8		37.9	40.6	22.9	52.0	54.2		48.0	48.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	57.3		99.0	1.9	5.1	12.3	52.3		61.1	38.9	
Delay (s)	33.3	104.1		137.0	42.4	28.0	64.2	106.6		109.0	86.9	
Level of Service	C	F		F	D	C	E	F		F	F	
Approach Delay (s)		94.8			51.5			95.2			94.2	
Approach LOS		F			D			F			F	

Intersection Summary

HCM 2000 Control Delay	80.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	108.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Timings
6: Spruce Street & First Street

2031 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	14	1558	32	1726	24	14	27	10
Future Volume (vph)	14	1558	32	1726	24	14	27	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.7	83.9	89.5	86.1	10.1	10.1	10.1	10.1
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.06	0.60	0.12	0.65	0.19	0.19	0.22	0.18
Control Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
LOS	A	A	A	A	D	C	D	C
Approach Delay		8.3		8.3		38.0		37.0
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 9.2
Intersection Capacity Utilization 67.6%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2031 Total PM

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	15	1659	33	1849	25	33	28	32
v/c Ratio	0.06	0.60	0.12	0.65	0.19	0.19	0.22	0.18
Control Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Length 50th (m)	0.5	92.5	1.0	67.7	4.9	2.9	5.6	2.0
Queue Length 95th (m)	1.5	115.7	2.6	143.7	13.2	12.3	14.3	11.0
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	239	2768	274	2836	324	400	324	397
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	0.06	0.60	0.12	0.65	0.08	0.08	0.09	0.08
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Total PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1558	35	32	1726	49	24	14	17	27	10	21
Future Volume (vph)	14	1558	35	32	1726	49	24	14	17	27	10	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3566		1825	3561		1790	1654		1776	1630	
Flt Permitted	0.08	1.00		0.11	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	162	3566		206	3561		1387	1654		1375	1630	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	15	1623	36	33	1798	51	25	15	18	28	10	22
RTOR Reduction (vph)	0	1	0	0	1	0	0	17	0	0	20	0
Lane Group Flow (vph)	15	1658	0	33	1848	0	25	16	0	28	12	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Effective Green, g (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.77	0.74		0.79	0.75		0.07	0.07		0.07	0.07	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	2635		225	2678		103	123		103	122	
v/s Ratio Prot	0.00	0.46		c0.01	c0.52			0.01			0.01	
v/s Ratio Perm	0.07			0.11			0.02			c0.02		
v/c Ratio	0.09	0.63		0.15	0.69		0.24	0.13		0.27	0.10	
Uniform Delay, d1	5.9	6.9		5.0	6.9		47.1	46.7		47.2	46.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.2		0.3	1.5		1.2	0.5		1.4	0.3	
Delay (s)	6.2	8.0		5.3	8.4		48.3	47.2		48.6	46.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.0			8.3			47.7			47.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			9.5		HCM 2000 Level of Service					A		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			108.1		Sum of lost time (s)					15.9		
Intersection Capacity Utilization			67.6%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	62	1429	28	1545	67	21	86	21
Future Volume (vph)	62	1429	28	1545	67	21	86	21
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.1	70.2	74.3	67.8	12.0	12.0	12.0	12.0
Actuated g/C Ratio	0.76	0.70	0.74	0.68	0.12	0.12	0.12	0.12
v/c Ratio	0.28	0.63	0.12	0.67	0.46	0.20	0.56	0.39
Control Delay	6.2	11.0	2.4	6.3	49.7	23.6	53.5	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	11.0	2.4	6.3	49.7	23.6	53.5	16.8
LOS	A	B	A	A	D	C	D	B
Approach Delay		10.8		6.3		39.3		33.7
Approach LOS		B		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 10.9

Intersection LOS: B

Intersection Capacity Utilization 71.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

Ø1	Ø2	Ø4
5 s	51 s	30 s
Ø5	Ø6 (R)	Ø8
5 s	51 s	30 s

Queues
7: Cedar Street & First Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1566	29	1633	71	47	91	107
v/c Ratio	0.28	0.63	0.12	0.67	0.46	0.20	0.56	0.39
Control Delay	6.2	11.0	2.4	6.3	49.7	23.6	53.5	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	11.0	2.4	6.3	49.7	23.6	53.5	16.8
Queue Length 50th (m)	2.3	85.7	0.5	20.5	13.0	3.9	16.9	3.9
Queue Length 95th (m)	6.3	130.5	m1.1	96.5	25.3	13.4	30.8	17.8
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	234	2474	250	2423	307	438	329	459
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	0.63	0.12	0.67	0.23	0.11	0.28	0.23

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
7: Cedar Street & First Street

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	62	1429	59	28	1545	7	67	21	24	86	21	81
Future Volume (vph)	62	1429	59	28	1545	7	67	21	24	86	21	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3521		1755	3576		1764	1743		1782	1643	
Flt Permitted	0.09	1.00		0.12	1.00		0.69	1.00		0.73	1.00	
Satd. Flow (perm)	173	3521		214	3576		1278	1743		1362	1643	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	65	1504	62	29	1626	7	71	22	25	91	22	85
RTOR Reduction (vph)	0	2	0	0	0	0	0	22	0	0	75	0
Lane Group Flow (vph)	65	1564	0	29	1633	0	71	25	0	91	32	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	73.9	68.6		70.7	67.0		12.0	12.0		12.0	12.0	
Effective Green, g (s)	73.9	68.6		70.7	67.0		12.0	12.0		12.0	12.0	
Actuated g/C Ratio	0.74	0.69		0.71	0.67		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	211	2415		208	2395		153	209		163	197	
v/s Ratio Prot	c0.02	0.44		0.01	c0.46		0.01			0.02		
v/s Ratio Perm	0.21			0.09			0.06			c0.07		
v/c Ratio	0.31	0.65		0.14	0.68		0.46	0.12		0.56	0.16	
Uniform Delay, d1	8.0	8.9		6.4	10.0		41.0	39.3		41.5	39.5	
Progression Factor	1.00	1.00		0.52	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.4		0.2	1.1		2.2	0.3		4.1	0.4	
Delay (s)	8.8	10.2		3.6	5.8		43.2	39.5		45.6	39.9	
Level of Service	A	B		A	A		D	D		D	D	
Approach Delay (s)		10.2			5.7			41.8			42.5	
Approach LOS		B			A			D			D	

Intersection Summary

HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
8: Pine Street & First Street

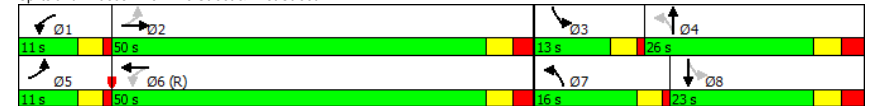
2031 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	76	1241	22	1181	252	38	73	66
Future Volume (vph)	76	1241	22	1181	252	38	73	66
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	16.0	26.0	13.0	23.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	16.0%	26.0%	13.0%	23.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	59.7	54.9	57.7	50.3	30.3	18.7	23.1	12.8
Actuated g/C Ratio	0.60	0.55	0.58	0.50	0.30	0.19	0.23	0.13
v/c Ratio	0.37	0.78	0.11	0.74	0.80	0.25	0.23	0.66
Control Delay	15.1	16.0	7.1	18.8	46.8	19.7	26.2	36.6
Queue Delay	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	15.1	16.5	7.1	19.0	46.8	19.7	26.2	36.6
LOS	B	B	A	B	D	B	C	D
Approach Delay		16.5		18.8		39.9		33.5
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 21.0
Intersection Capacity Utilization 86.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service E

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	81	1500	23	1329	268	91	78	185
v/c Ratio	0.37	0.78	0.11	0.74	0.80	0.25	0.23	0.66
Control Delay	15.1	16.0	7.1	18.8	46.8	19.7	26.2	36.6
Queue Delay	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	15.1	16.5	7.1	19.0	46.8	19.7	26.2	36.6
Queue Length 50th (m)	1.3	76.5	1.2	121.2	42.4	6.8	11.0	21.1
Queue Length 95th (m)	m6.6	#195.6	m2.7	109.9	#67.7	19.5	20.3	41.1
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	219	1930	207	1788	337	398	347	348
Starvation Cap Reductn	0	0	0	71	0	0	0	0
Spillback Cap Reductn	0	130	0	0	0	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.83	0.11	0.77	0.80	0.23	0.22	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	76	1241	169	22	1181	69	252	38	48	73	66	108
Future Volume (vph)	76	1241	169	22	1181	69	252	38	48	73	66	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3498		1825	3547		1787	1694		1744	1711	
Flt Permitted	0.09	1.00		0.08	1.00		0.36	1.00		0.70	1.00	
Satd. Flow (perm)	168	3498		158	3547		671	1694		1281	1711	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	81	1320	180	23	1256	73	268	40	51	78	70	115
RTOR Reduction (vph)	0	9	0	0	4	0	0	41	0	0	61	0
Lane Group Flow (vph)	81	1491	0	23	1325	0	268	50	0	78	124	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	57.5	51.7		51.5	48.7		29.6	18.7		20.5	13.6	
Effective Green, g (s)	57.5	51.7		51.5	48.7		29.6	18.7		20.5	13.6	
Actuated g/C Ratio	0.58	0.52		0.52	0.49		0.30	0.19		0.20	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	1808		128	1727		332	316		294	232	
v/s Ratio Prot	c0.02	c0.43		0.01	0.37		c0.10	0.03		0.02	0.07	
v/s Ratio Perm	0.22			0.09			c0.14			0.04		
v/c Ratio	0.42	0.82		0.18	0.77		0.81	0.16		0.27	0.53	
Uniform Delay, d1	15.0	20.3		16.4	21.0		29.8	34.0		33.1	40.2	
Progression Factor	1.25	0.64		0.70	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	3.6		0.6	2.8		13.4	0.2		0.5	2.3	
Delay (s)	19.9	16.6		12.0	18.8		43.2	34.3		33.6	42.6	
Level of Service	B	B		B	B		D	C		C	D	
Approach Delay (s)		16.8			18.7			40.9			39.9	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2031 Total PM

9: Hurontario Street & First Street/Huron Street

	↖	→	↙	←	↘	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↖	↖↗	↖	↖↗	↖	↖
Traffic Volume (vph)	20	1047	91	906	373	16
Future Volume (vph)	20	1047	91	906	373	16
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	57.0	11.0	57.0	32.0	32.0
Total Split (%)	11.0%	57.0%	11.0%	57.0%	32.0%	32.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead		Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	61.9	55.0	64.4	59.6	24.6	24.6
Actuated g/C Ratio	0.62	0.55	0.64	0.60	0.25	0.25
v/c Ratio	0.06	0.74	0.43	0.45	0.89	0.20
Control Delay	2.1	7.8	13.5	13.2	59.0	10.5
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0
Total Delay	2.1	8.0	13.5	13.3	59.0	10.5
LOS	A	A	B	B	E	B
Approach Delay		7.9		13.3		49.6
Approach LOS		A		B		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 16.6

Intersection LOS: B

Intersection Capacity Utilization 77.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street

↖ 01	↖ 02	↖ 04
11 s	57 s	32 s
↖ 05	↖ 06 (R)	
11 s	57 s	

Queues

2031 Total PM

9: Hurontario Street & First Street/Huron Street

	↖	→	↙	←	↘	↑
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	21	1420	96	965	393	94
v/c Ratio	0.06	0.74	0.43	0.45	0.89	0.20
Control Delay	2.1	7.8	13.5	13.2	59.0	10.5
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0
Total Delay	2.1	8.0	13.5	13.3	59.0	10.5
Queue Length 50th (m)	0.3	119.1	6.4	46.9	71.7	2.5
Queue Length 95th (m)	m0.5	21.8	13.1	79.8	#118.6	14.3
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	371	1922	229	2128	475	487
Starvation Cap Reductn	0	86	0	0	0	0
Spillback Cap Reductn	0	0	0	253	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.77	0.42	0.51	0.83	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	20	1047	302	91	906	10	373	16	73	0	0	0
Future Volume (vph)	20	1047	302	91	906	10	373	16	73	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1704	3452		1825	3572		1798	1630				
Flt Permitted	0.25	1.00		0.09	1.00		0.95	1.00				
Satd. Flow (perm)	455	3452		176	3572		1798	1630				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	1102	318	96	954	11	393	17	77	0	0	0
RTOR Reduction (vph)	0	25	0	0	1	0	0	58	0	0	0	0
Lane Group Flow (vph)	21	1395	0	96	964	0	393	36	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	56.9	54.3		62.7	57.2		24.6	24.6				
Effective Green, g (s)	56.9	54.3		62.7	57.2		24.6	24.6				
Actuated g/C Ratio	0.57	0.54		0.63	0.57		0.25	0.25				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	291	1874		201	2043		442	400				
v/s Ratio Prot	0.00	c0.40		c0.03	0.27			0.02				
v/s Ratio Perm	0.04			0.27			c0.22					
v/c Ratio	0.07	0.74		0.48	0.47		0.89	0.09				
Uniform Delay, d1	9.7	17.5		13.2	12.5		36.4	29.1				
Progression Factor	0.29	0.34		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	1.8		1.8	0.8		19.1	0.1				
Delay (s)	2.9	7.7		15.0	13.3		55.5	29.2				
Level of Service	A	A		B	B		E	C				
Approach Delay (s)		7.7			13.5		50.4			0.0		
Approach LOS		A			B		D			A		

Intersection Summary

HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings

10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total PM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱
Traffic Volume (vph)	102	427	38	294	530	28	57	60	788	56	140
Future Volume (vph)	102	427	38	294	530	28	57	60	788	56	140
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	26.0	11.0	26.0	37.0	16.0	16.0	16.0	37.0	37.0	37.0
Total Split (%)	12.2%	28.9%	12.2%	28.9%	41.1%	17.8%	17.8%	17.8%	41.1%	41.1%	41.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	29.0	23.1	28.3	21.0	58.1	10.5	10.5	10.5	28.8	28.8	28.8
Actuated g/C Ratio	0.35	0.28	0.34	0.26	0.71	0.13	0.13	0.13	0.35	0.35	0.35
v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.79	0.81	0.24
Control Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
LOS	C	C	B	D	A	D	D	A	D	D	A
Approach Delay		28.6		16.1			23.9			33.0	
Approach LOS		C		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 82.2	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 25.8	Intersection LOS: C
Intersection Capacity Utilization 64.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E

Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
11 s	26 s	37 s	16 s	11 s	26 s

Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	115	493	43	330	596	31	64	67	469	479	157
v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.79	0.81	0.24
Control Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Length 50th (m)	13.3	40.3	4.8	53.9	6.7	4.9	10.4	0.0	76.2	78.7	0.0
Queue Length 95th (m)	24.6	55.4	11.3	#90.3	18.5	12.9	22.1	0.0	#124.4	#128.7	11.6
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	315	1011	331	491	1285	218	229	327	674	673	718
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.70	0.71	0.22

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	102	427	12	38	294	530	28	57	60	788	56	140
Future Volume (vph)	102	427	12	38	294	530	28	57	60	788	56	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3601		1674	1921	1617	1706	1795	1484	1700	1697	1570
Flt Permitted	0.33	1.00		0.40	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	605	3601		712	1921	1617	1706	1795	1484	1700	1697	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	115	480	13	43	330	596	31	64	67	885	63	157
RTOR Reduction (vph)	0	2	0	0	0	197	0	0	61	0	0	104
Lane Group Flow (vph)	115	491	0	43	330	399	31	64	6	469	479	53
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	28.2	23.1		25.6	21.8	50.6	7.3	7.3	7.3	28.8	28.8	28.8
Effective Green, g (s)	28.2	23.1		25.6	21.8	50.6	7.3	7.3	7.3	28.8	28.8	28.8
Actuated g/C Ratio	0.33	0.27		0.30	0.26	0.60	0.09	0.09	0.09	0.34	0.34	0.34
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	268	978		257	492	1076	146	154	127	576	574	531
v/s Ratio Prot	c0.03	0.14		0.01	c0.17	0.13	0.02	c0.04	0.28	c0.28		
v/s Ratio Perm	0.12			0.04		0.12			0.00			0.03
v/c Ratio	0.43	0.50		0.17	0.67	0.37	0.21	0.42	0.05	0.81	0.83	0.10
Uniform Delay, d1	20.9	26.1		21.4	28.4	8.9	36.2	36.8	35.7	25.7	25.9	19.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.8		0.3	7.1	0.2	0.7	1.8	0.1	8.6	10.1	0.1
Delay (s)	22.0	27.9		21.7	35.5	9.1	36.9	38.6	35.8	34.3	36.0	19.3
Level of Service	C	C		C	D	A	D	D	D	C	D	B
Approach Delay (s)		26.8			18.7			37.1			32.9	
Approach LOS		C			B			D			C	

Intersection Summary

HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2031 Total PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↔	↔	↔	↔
Traffic Volume (vph)	18	4	4	2	29	508	510	678
Future Volume (vph)	18	4	4	2	29	508	510	678
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases		4		8	2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		4.0		6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		10.5		10.5		36.0		27.0
Actuated g/C Ratio		0.17		0.17		0.60		0.45
v/c Ratio		0.43		0.55		0.06		0.35
Control Delay		11.5		8.2		4.2		11.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		11.5		8.2		4.2		11.9
LOS		B		A		A		B
Approach Delay		11.5		8.2		11.5		22.0
Approach LOS		B		A		B		C

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 60.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 17.0
Intersection Capacity Utilization 81.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues 2031 Total PM
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	142	283	32	560	560	749
v/c Ratio	0.43	0.55	0.06	0.35	0.95	0.38
Control Delay	11.5	8.2	4.2	11.9	38.4	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	8.2	4.2	11.9	38.4	9.6
Queue Length 50th (m)	2.3	0.6	1.0	19.8	24.0	16.8
Queue Length 95th (m)	15.0	17.3	3.4	32.1	#84.4	44.6
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	521	727	538	1596	592	1951
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	0.27	0.39	0.06	0.35	0.95	0.38

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2031 Total PM

11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	18	4	107	4	2	252	29	508	2	510	678	4
Future Volume (vph)	18	4	107	4	2	252	29	508	2	510	678	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Flt		0.89			0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1650		1789	3577		1825	3507	
Flt Permitted		0.80			0.99		0.37	1.00		0.38	1.00	
Satd. Flow (perm)		1337			1641		692	3577		734	3507	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	20	4	118	4	2	277	32	558	2	560	745	4
RTOR Reduction (vph)	0	98	0	0	231	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	44	0	0	52	0	32	559	0	560	749	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.5			10.5		32.3	29.5		40.5	33.7	
Effective Green, g (s)		10.5			10.5		32.3	29.5		40.5	33.7	
Actuated g/C Ratio		0.17			0.17		0.51	0.47		0.64	0.53	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		222			273		403	1674		593	1875	
v/s Ratio Prot							0.00	0.16		c0.10	0.21	
v/s Ratio Perm		c0.03			0.03		0.04			c0.50		
v/c Ratio		0.20			0.19		0.08	0.33		0.94	0.40	
Uniform Delay, d1		22.6			22.6		7.6	10.6		8.2	8.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.3		0.1	0.5		23.9	0.6	
Delay (s)		23.1			22.9		7.7	11.1		32.1	9.3	
Level of Service		C			C		A	B		C	A	
Approach Delay (s)		23.1			22.9			10.9			19.0	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	63.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2031 Total PM

12: Tenth Line & Mountain Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	13	623	365	625	136	74	114	86
Future Volume (vph)	13	623	365	625	136	74	114	86
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	89.0	89.0	89.0	89.0	31.0	31.0	31.0	31.0
Total Split (%)	74.2%	74.2%	74.2%	74.2%	25.8%	25.8%	25.8%	25.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2

Lead/Lag

Lead-Lag Optimize?

Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effect Green (s)	83.3	83.3	83.3	83.3	25.8	25.8	25.8	25.8
Actuated g/C Ratio	0.69		0.69		0.22		0.22	
v/c Ratio	0.72		1.80		1.58		1.40	
Control Delay	14.9		386.0		306.8		245.5	
Queue Delay	0.0		0.0		0.0		0.0	
Total Delay	14.9		386.0		306.8		245.5	
LOS	B		F		F		F	
Approach Delay	14.9		386.0		306.8		245.5	
Approach LOS	B		F		F		F	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 140	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.80	
Intersection Signal Delay: 247.3	Intersection LOS: F
Intersection Capacity Utilization 147.1%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 12: Tenth Line & Mountain Road

→ Ø2	↓ Ø4
89 s	31 s
← Ø6	↑ Ø8
89 s	31 s

Queues
12: Tenth Line & Mountain Road

2031 Total PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	890	1278	508	243
v/c Ratio	0.72	1.80	1.58	1.40
Control Delay	14.9	386.0	306.8	245.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	386.0	306.8	245.5
Queue Length 50th (m)	111.7	~455.7	~163.0	~76.4
Queue Length 95th (m)	154.7	#528.5	#225.2	#125.2
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1244	710	321	174
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	0.72	1.80	1.58	1.40

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Total PM

	↖	→	↘	↙	←	↖	↗	↑	↘	↓	↙	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	13	623	156	365	625	148	136	74	242	114	86	16
Future Volume (vph)	13	623	156	365	625	148	136	74	242	114	86	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.98			0.93			0.99	
Flt Protected		1.00			0.98			0.99			0.97	
Satd. Flow (prot)		1837			1858			1645			1715	
Flt Permitted		0.97			0.54			0.80			0.45	
Satd. Flow (perm)		1783			1018			1335			798	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	15	700	175	410	702	166	153	83	272	128	97	18
RTOR Reduction (vph)	0	7	0	0	5	0	0	35	0	0	2	0
Lane Group Flow (vph)	0	883	0	0	1273	0	0	473	0	0	241	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		83.3			83.3			25.8			25.8	
Effective Green, g (s)		83.3			83.3			25.8			25.8	
Actuated g/C Ratio		0.69			0.69			0.22			0.22	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1237			706			287			171	
v/s Ratio Prot												
v/s Ratio Perm		0.50			c1.25			c0.35			0.30	
v/c Ratio		0.71			1.80			1.65			1.41	
Uniform Delay, d1		11.1			18.4			47.1			47.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.5			367.3			307.5			214.4	
Delay (s)		14.6			385.6			354.6			261.5	
Level of Service		B			F			F			F	
Approach Delay (s)		14.6			385.6			354.6			261.5	
Approach LOS		B			F			F			F	

Intersection Summary

HCM 2000 Control Delay	256.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	147.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2031 Total PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	118	730	265	704	246	341	94	331
Future Volume (vph)	118	730	265	704	246	341	94	331
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	30.0	5.0	30.0	5.0	7.0	5.0	7.0
Minimum Split (s)	9.0	37.6	9.0	37.6	9.0	25.0	9.0	25.0
Total Split (s)	11.0	41.0	17.0	47.0	19.0	53.0	9.0	43.0
Total Split (%)	9.2%	34.2%	14.2%	39.2%	15.8%	44.2%	7.5%	35.8%
Yellow Time (s)	3.0	4.4	3.0	4.4	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	3.2	1.0	3.2	1.0	2.7	1.0	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.6	4.0	7.6	4.0	6.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	44.0	33.4	54.0	39.4	58.0	47.0	44.0	37.0
Actuated g/C Ratio	0.37	0.28	0.45	0.33	0.48	0.39	0.37	0.31
v/c Ratio	0.68	1.02	1.11	0.81	0.94	1.11	0.74	0.95
Control Delay	39.7	76.1	117.6	42.5	71.8	102.6	51.0	67.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	76.1	117.6	42.5	71.8	102.6	51.0	67.1
LOS	D	E	F	D	E	F	D	E
Approach Delay		71.9		60.3		94.7		64.5
Approach LOS		E		E		F		E

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 115
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 73.2 Intersection LOS: E
Intersection Capacity Utilization 104.4% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
17 s	41 s	19 s	43 s
Ø5	Ø6	Ø7	Ø8
11 s	47 s	9 s	53 s

Queues 2031 Total PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	131	995	294	943	273	797	104	538
v/c Ratio	0.68	1.02	1.11	0.81	0.94	1.11	0.74	0.95
Control Delay	39.7	76.1	117.6	42.5	71.8	102.6	51.0	67.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	76.1	117.6	42.5	71.8	102.6	51.0	67.1
Queue Length 50th (m)	17.9	~128.8	~61.8	104.3	47.6	~207.6	13.0	120.0
Queue Length 95th (m)	#33.6	#169.7	#116.1	129.6	#99.3	#281.8	#34.2	#187.8
Internal Link Dist (m)		217.8		35.2		32.3		88.4
Turn Bay Length (m)	35.0		50.0		45.0		15.0	
Base Capacity (vph)	194	975	265	1167	289	715	141	566
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	0.68	1.02	1.11	0.81	0.94	1.11	0.74	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2031 Total PM

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	118	730	166	265	704	145	246	341	376	94	331	153
Future Volume (vph)	118	730	166	265	704	145	246	341	376	94	331	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3447		1807	3513		1789	1743		1807	1792	
Flt Permitted	0.15	1.00		0.11	1.00		0.10	1.00		0.11	1.00	
Satd. Flow (perm)	285	3447		203	3513		184	1743		206	1792	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	131	811	184	294	782	161	273	379	418	104	368	170
RTOR Reduction (vph)	0	16	0	0	14	0	0	33	0	0	14	0
Lane Group Flow (vph)	131	979	0	294	929	0	273	764	0	104	524	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	40.4	33.4		50.4	39.4		56.0	47.0		42.0	37.0	
Effective Green, g (s)	40.4	33.4		50.4	39.4		56.0	47.0		42.0	37.0	
Actuated g/C Ratio	0.34	0.28		0.42	0.33		0.47	0.39		0.35	0.31	
Clearance Time (s)	4.0	7.6		4.0	7.6		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	959		259	1153		286	682		138	552	
v/s Ratio Prot	0.04	0.28		c0.12	0.26		c0.12	c0.44		0.03	0.29	
v/s Ratio Perm	0.20			c0.35			0.33			0.23		
v/c Ratio	0.71	1.02		1.14	0.81		0.95	1.12		0.75	0.95	
Uniform Delay, d1	30.0	43.3		34.2	36.8		34.8	36.5		31.7	40.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.7	34.5		97.3	6.1		40.7	72.5		20.5	25.9	
Delay (s)	41.7	77.8		131.5	42.9		75.5	109.0		52.2	66.5	
Level of Service	D	E		F	D		E	F		D	E	
Approach Delay (s)		73.6			63.9			100.5			64.2	
Approach LOS		E			E			F			E	

Intersection Summary

HCM 2000 Control Delay	76.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2031 Total PM

14: High Street & Cambridge Street/Third Street

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	5	104	37	101	232	718	103	1036
Future Volume (vph)	5	104	37	101	232	718	103	1036
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	27.0	27.0	27.0	27.0	15.0	52.0	11.0	48.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	16.7%	57.8%	12.2%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effect Green (s)	16.5	16.5	16.5	16.5	57.8	47.9	51.9	42.8
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.68	0.56	0.61	0.50
v/c Ratio	0.03	0.81	0.44	0.64	0.66	0.41	0.23	0.61
Control Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
LOS	C	D	D	C	B	B	A	B
Approach Delay		37.8		32.8		13.4		16.9
Approach LOS		D		C		B		B

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 85	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 14: High Street & Cambridge Street/Third Street



Queues

14: High Street & Cambridge Street/Third Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	337	40	250	249	828	111	1117
v/c Ratio	0.03	0.81	0.44	0.64	0.66	0.41	0.23	0.61
Control Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Length 50th (m)	0.7	36.7	5.8	27.4	13.2	40.7	5.4	67.6
Queue Length 95th (m)	3.4	66.3	15.9	50.8	33.6	59.0	11.8	96.9
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	197	504	115	481	405	2018	478	1821
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	0.03	0.67	0.35	0.52	0.61	0.41	0.23	0.61
Intersection Summary								

HCM Signalized Intersection Capacity Analysis

14: High Street & Cambridge Street/Third Street

2031 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	5	104	209	37	101	131	232	718	52	103	1036	3
Future Volume (vph)	5	104	209	37	101	131	232	718	52	103	1036	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.92		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1713		1824	1739		1825	3572		1823	3612	
Flt Permitted	0.41	1.00		0.24	1.00		0.16	1.00		0.32	1.00	
Satd. Flow (perm)	795	1713		465	1739		301	3572		622	3612	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	5	112	225	40	109	141	249	772	56	111	1114	3
RTOR Reduction (vph)	0	85	0	0	54	0	0	5	0	0	0	0
Lane Group Flow (vph)	5	252	0	40	196	0	249	823	0	111	1117	0
Confl. Peds. (#/hr)			1	1			1		12	12		1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.5	16.5		16.5	16.5		57.4	47.9		49.3	43.8	
Effective Green, g (s)	16.5	16.5		16.5	16.5		57.4	47.9		49.3	43.8	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.67	0.56		0.57	0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	152	329		89	334		371	1991		433	1841	
v/s Ratio Prot		c0.15			0.11		c0.07	0.23		0.02	0.31	
v/s Ratio Perm	0.01			0.09			c0.37			0.13		
v/c Ratio	0.03	0.77		0.45	0.59		0.67	0.41		0.26	0.61	
Uniform Delay, d1	28.2	32.9		30.7	31.6		9.5	10.9		8.3	14.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	10.2		3.6	2.6		4.7	0.6		0.3	1.5	
Delay (s)	28.3	43.1		34.3	34.2		14.2	11.6		8.6	16.4	
Level of Service	C	D		C	C		B	B		A	B	
Approach Delay (s)		42.9			34.2			12.2			15.7	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		85.9			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		85.7%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	←	←	←	←	←	←	←	←
Traffic Volume (vph)	181	202	60	248	127	565	213	832
Future Volume (vph)	181	202	60	248	127	565	213	832
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	15.8	15.8	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	33.8	33.8	33.8	33.8	19.5	30.9	19.5	30.9
Total Split (%)	40.1%	40.1%	40.1%	40.1%	23.2%	36.7%	23.2%	36.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	28.0	28.0	28.0	28.0	35.3	25.0	39.2	27.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.44	0.31	0.49	0.34
v/c Ratio	0.96	0.61	0.26	0.67	0.46	0.57	0.52	0.90
Control Delay	85.5	23.7	23.2	26.4	16.1	25.5	14.9	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	23.7	23.2	26.4	16.1	25.5	14.9	37.0
LOS	F	C	C	C	B	C	B	D
Approach Delay		43.8		26.0		23.9		33.2
Approach LOS		D		C		C		C

Intersection Summary

Cycle Length: 84.2

Actuated Cycle Length: 80.1

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 31.7

Intersection LOS: C

Intersection Capacity Utilization 88.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

Ø1	Ø2	Ø4
19.5 s	30.9 s	33.8 s
Ø5	Ø6	Ø8
19.5 s	30.9 s	33.8 s

Queues
15: High Street & Sixth Street

2031 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	191	397	63	439	134	641	224	1085
v/c Ratio	0.96	0.61	0.26	0.67	0.46	0.57	0.52	0.90
Control Delay	85.5	23.7	23.2	26.4	16.1	25.5	14.9	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.5	23.7	23.2	26.4	16.1	25.5	14.9	37.0
Queue Length 50th (m)	27.9	42.1	6.7	50.2	9.9	41.7	17.4	78.8
Queue Length 95th (m)	#71.0	75.0	17.5	86.9	18.5	61.7	29.2	#123.5
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	199	648	241	652	419	1121	516	1199
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	0.96	0.61	0.26	0.67	0.32	0.57	0.43	0.90

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	181	202	175	60	248	169	127	565	44	213	832	199
Future Volume (vph)	181	202	175	60	248	169	127	565	44	213	832	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1754	1753		1824	1784		1738	3571		1825	3494	
Flt Permitted	0.31	1.00		0.36	1.00		0.16	1.00		0.28	1.00	
Satd. Flow (perm)	569	1753		690	1784		293	3571		528	3494	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	191	213	184	63	261	178	134	595	46	224	876	209
RTOR Reduction (vph)	0	36	0	0	29	0	0	7	0	0	23	0
Lane Group Flow (vph)	191	361	0	63	410	0	134	634	0	224	1062	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.0	28.0		28.0	28.0		33.9	25.0		37.9	27.0	
Effective Green, g (s)	28.0	28.0		28.0	28.0		33.9	25.0		37.9	27.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.42	0.31		0.47	0.34	
Clearance Time (s)	5.8	5.8		5.8	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	198	612		241	623		284	1114		426	1177	
v/s Ratio Prot		0.21			0.23		0.05	0.18		0.07	0.30	
v/s Ratio Perm	0.34			0.09			0.15			0.18		
v/c Ratio	0.96	0.59		0.26	0.66		0.47	0.57		0.53	0.90	
Uniform Delay, d1	25.6	21.3		18.6	22.0		16.5	23.0		13.4	25.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	53.6	1.8		0.8	2.8		1.2	2.1		1.2	11.2	
Delay (s)	79.2	23.1		19.4	24.8		17.7	25.2		14.5	36.5	
Level of Service	E	C		B	C		B	C		B	D	
Approach Delay (s)		41.3			24.1			23.9			32.8	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		30.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.89										
Actuated Cycle Length (s)		80.1			Sum of lost time (s)			16.2				
Intersection Capacity Utilization		88.2%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Total PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	35	99	549	28	156	677
Future Volume (vph)	35	99	549	28	156	677
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	36	101	560	29	159	691
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	137	589	159	691		
Volume Left (vph)	36	0	159	0		
Volume Right (vph)	101	29	0	0		
Hadj (s)	-0.32	0.00	0.55	0.05		
Departure Headway (s)	6.5	5.4	6.2	5.7		
Degree Utilization, x	0.25	0.88	0.27	1.09		
Capacity (veh/h)	535	666	576	638		
Control Delay (s)	11.6	34.2	10.3	83.5		
Approach Delay (s)	11.6	34.2	69.8			
Approach LOS	B	D	F			
Intersection Summary						
Delay			51.5			
Level of Service			F			
Intersection Capacity Utilization			57.5%	ICU Level of Service		B
Analysis Period (min)			15			

Timings
17: Hurontario Street & Hume Street

2031 Total PM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	385	287	372	301	216	486
Future Volume (vph)	385	287	372	301	216	486
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	21.9	21.9	30.1	30.1		41.2
Actuated g/C Ratio	0.29	0.29	0.40	0.40		0.54
v/c Ratio	0.79	0.46	0.53	0.40		0.59
Control Delay	36.4	4.9	21.6	3.9		13.9
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	36.4	4.9	21.6	3.9		13.9
LOS	D	A	C	A		B
Approach Delay	23.0		13.7			13.9
Approach LOS	C		B			B

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 75.7
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 16.8
 Intersection Capacity Utilization 87.1%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Total PM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	418	312	404	327	763
v/c Ratio	0.79	0.46	0.53	0.40	0.59
Control Delay	36.4	4.9	21.6	3.9	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	4.9	21.6	3.9	13.9
Queue Length 50th (m)	54.5	0.0	42.9	0.0	31.0
Queue Length 95th (m)	84.8	15.8	76.6	15.5	50.4
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	677	786	764	815	1296
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.62	0.40	0.53	0.40	0.59

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Total PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	385	287	372	301	216	486
Future Volume (vph)	385	287	372	301	216	486
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1825	1586	1921	1559	3555	3555
Flt Permitted	0.95	1.00	1.00	1.00	0.62	0.62
Satd. Flow (perm)	1825	1586	1921	1559	2234	2234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	418	312	404	327	235	528
RTOR Reduction (vph)	0	222	0	197	0	0
Lane Group Flow (vph)	418	90	404	130	0	763
Confl. Peds. (#/hr)	7	5	13	13	13	13
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	21.9	21.9	30.2	30.2	41.2	41.2
Effective Green, g (s)	21.9	21.9	30.2	30.2	41.2	41.2
Actuated g/C Ratio	0.29	0.29	0.40	0.40	0.54	0.54
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	527	458	766	621	1338	1338
v/s Ratio Prot	c0.23		0.21		c0.05	
v/s Ratio Perm		0.06		0.08	c0.26	
v/c Ratio	0.79	0.20	0.53	0.21	0.57	0.57
Uniform Delay, d1	24.8	20.3	17.3	14.9	11.4	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.2	2.6	0.8	1.8	1.8
Delay (s)	32.8	20.5	19.9	15.7	13.2	13.2
Level of Service	C	C	B	B	B	B
Approach Delay (s)	27.6		18.0		13.2	
Approach LOS	C		B		B	
Intersection Summary						
HCM 2000 Control Delay		19.5		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.69				
Actuated Cycle Length (s)		75.7		Sum of lost time (s)		16.6
Intersection Capacity Utilization		87.1%		ICU Level of Service		E
Analysis Period (min)		15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	34	237	92	67	192	215	39	289	49	153	241	30
Future Volume (vph)	34	237	92	67	192	215	39	289	49	153	241	30
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	36	252	98	71	204	229	41	307	52	163	256	32
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	386	504	400	451								
Volume Left (vph)	36	71	41	163								
Volume Right (vph)	98	229	52	32								
Hadj (s)	-0.09	-0.21	0.06	0.08								
Departure Headway (s)	9.5	9.4	9.6	9.6								
Degree Utilization, x	1.02	1.31	1.07	1.21								
Capacity (veh/h)	386	392	381	378								
Control Delay (s)	82.0	184.0	98.0	145.6								
Approach Delay (s)	82.0	184.0	98.0	145.6								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay		131.7										
Level of Service		F										
Intersection Capacity Utilization		94.0%		ICU Level of Service								
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	30	103	16	36	84	151	8	152	20	166	145	35
Future Volume (vph)	30	103	16	36	84	151	8	152	20	166	145	35
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	34	118	18	41	97	174	9	175	23	191	167	40
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	170	138	174	207	398							
Volume Left (vph)	34	41	0	9	191							
Volume Right (vph)	18	0	174	23	40							
Hadj (s)	0.31	0.47	-0.56	-0.03	0.13							
Departure Headway (s)	6.9	7.2	6.2	6.2	5.9							
Degree Utilization, x	0.32	0.28	0.30	0.36	0.66							
Capacity (veh/h)	462	461	537	525	581							
Control Delay (s)	13.1	11.8	10.6	12.6	19.6							
Approach Delay (s)	13.1	11.1		12.6	19.6							
Approach LOS	B	B		B	C							
Intersection Summary												
Delay			14.8									
Level of Service			B									
Intersection Capacity Utilization			53.3%			ICU Level of Service			A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Total PM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	90	650	543	52	74	178
Future Volume (Veh/h)	90	650	543	52	74	178
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	101	730	610	58	83	200
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	668			1571	639	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	668			1571	639	
tC, single (s)	4.4			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.4			3.5	3.3	
p0 queue free %	88			22	58	
cM capacity (veh/h)	815			106	474	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	831	668	283			
Volume Left	101	0	83			
Volume Right	0	58	200			
cSH	815	1700	236			
Volume to Capacity	0.12	0.39	1.20			
Queue Length 95th (m)	3.2	0.0	104.0			
Control Delay (s)	3.1	0.0	167.1			
Lane LOS	A		F			
Approach Delay (s)	3.1	0.0	167.1			
Approach LOS			F			
Intersection Summary						
Average Delay			28.0			
Intersection Capacity Utilization			96.0%		ICU Level of Service	F
Analysis Period (min)			15			



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix F

2031 Total Traffic Operations with Improvements (Synchro)

Timings
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total AM
With Improvements

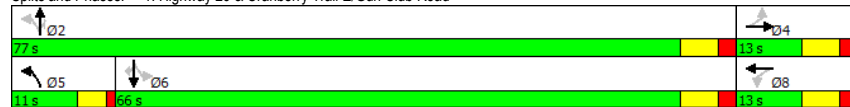
	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	27	0	17	0	57	544	5	790	23
Future Volume (vph)	27	0	17	0	57	544	5	790	23
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8	5	2		6	
Permitted Phases	4		8		2		2		6
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	76.0	75.1	75.1	66.3	66.3
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.84	0.83	0.83	0.73	0.73
v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03
Control Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
LOS	D	A	D	A	A	A	A	B	A
Approach Delay		14.1		37.2		3.4		11.3	
Approach LOS		B		D		A		B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 8.7
Intersection Capacity Utilization 65.5%
Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service C

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road



Queues
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	31	76	19	3	65	618	6	898	26
v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03
Control Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	1.2	43.1	0.0	2.4	3.6	0.0	11.6	0.1
Queue Length 50th (m)	5.2	0.0	3.1	0.0	1.6	25.5	0.0	87.9	0.0
Queue Length 95th (m)	13.4	0.0	9.5	0.0	3.3	36.6	0.0	126.0	0.0
Internal Link Dist (m)		79.7		52.6		42.1		217.0	
Turn Bay Length (m)						10.0			10.0
Base Capacity (vph)	112	378	106	493	433	1535	1363	1367	805
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.20	0.18	0.01	0.15	0.40	0.00	0.66	0.03

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	27	0	67	17	0	3	57	544	5	0	790	23
Future Volume (vph)	27	0	67	17	0	3	57	544	5	0	790	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1825	1541		1825	1633		1755	1847	1633		1865	1067
Flt Permitted	0.76	1.00		0.71	1.00		0.21	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1452	1541		1372	1633		390	1847	1633		1865	1067
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	31	0	76	19	0	3	65	618	6	0	898	26
RTOR Reduction (vph)	0	71	0	0	3	0	0	0	1	0	0	8
Lane Group Flow (vph)	31	5	0	19	0	0	65	618	5	0	898	18
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	4%	4%	0%	0%	3%	53%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2		6		6
Permitted Phases	4			8			2		2		6	
Actuated Green, G (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7		65.1	65.1
Effective Green, g (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7		65.1	65.1
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.81	0.81	0.81		0.71	0.71
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	88	93		83	99		398	1494	1321		1315	752
v/s Ratio Prot		0.00			0.00		0.01	c0.33			c0.48	
v/s Ratio Perm	c0.02			0.01			0.12		0.00			0.02
v/c Ratio	0.35	0.05		0.23	0.00		0.16	0.41	0.00		0.68	0.02
Uniform Delay, d1	41.6	40.8		41.3	40.7		5.6	2.5	1.7		7.7	4.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.4	0.2		1.4	0.0		0.2	0.8	0.0		2.9	0.1
Delay (s)	44.0	41.1		42.7	40.7		5.7	3.4	1.7		10.6	4.1
Level of Service	D	D		D	D		A	A	A		B	A
Approach Delay (s)		41.9			42.4			3.6			10.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

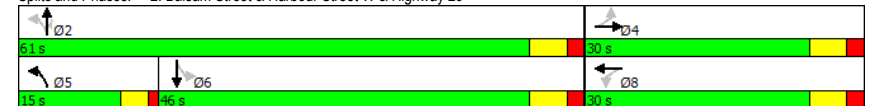
Timings
2: Balsam Street & Harbour Street W & Highway 26

2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	4	3	50	4	105	657	70	5	890
Future Volume (vph)	4	3	50	4	105	657	70	5	890
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2		2	6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	10.1	10.1	10.1	10.1		55.0	55.0		40.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13		0.71	0.71		0.52
v/c Ratio	0.03	0.52	0.47	0.10		0.53	0.07		0.61
Control Delay	28.8	10.9	43.8	17.3		5.8	2.6		15.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	28.8	10.9	43.8	17.3		5.8	2.6		15.2
LOS	C	B	D	B		A	A		B
Approach Delay		11.4		36.8		5.6			15.2
Approach LOS		B		D		A			B

Intersection Summary	
Cycle Length: 91	
Actuated Cycle Length: 77.1	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 103.5%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	5	192	59	21	897	82	1057
v/c Ratio	0.03	0.52	0.47	0.10	0.53	0.07	0.61
Control Delay	28.8	10.9	43.8	17.3	5.8	2.6	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.8	10.9	43.8	17.3	5.8	2.6	15.2
Queue Length 50th (m)	0.7	0.5	8.1	0.7	20.6	1.5	52.0
Queue Length 95th (m)	3.4	14.4	18.0	5.8	33.1	5.4	72.6
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	445	614	299	502	1691	1176	1746
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.31	0.20	0.04	0.53	0.07	0.61
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰	↱	↰	↱	
Traffic Volume (vph)	4	3	160	50	4	14	105	657	70	5	890	3
Future Volume (vph)	4	3	160	50	4	14	105	657	70	5	890	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.85		1.00	0.89			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1825	1555		1786	1578			3481	1633		3542	
Flt Permitted	0.74	1.00		0.51	1.00			0.61	1.00		0.95	
Satd. Flow (perm)	1429	1555		960	1578			2153	1633		3366	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	5	4	188	59	5	16	124	773	82	6	1047	4
RTOR Reduction (vph)	0	163	0	0	14	0	0	0	10	0	0	0
Lane Group Flow (vph)	5	29	0	59	7	0	0	897	72	0	1057	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	10.1	10.1		10.1	10.1			55.0	55.0		40.0	
Effective Green, g (s)	10.1	10.1		10.1	10.1			55.0	55.0		40.0	
Actuated g/C Ratio	0.13	0.13		0.13	0.13			0.71	0.71		0.52	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	187	203		125	206			1725	1164		1746	
v/s Ratio Prot		0.02			0.00			c0.07				
v/s Ratio Perm	0.00			c0.06				0.30	0.04		c0.31	
v/c Ratio	0.03	0.14		0.47	0.03			0.52	0.06		0.61	
Uniform Delay, d1	29.2	29.7		31.0	29.2			5.0	3.3		13.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.3		2.8	0.1			1.1	0.1		1.6	
Delay (s)	29.3	30.0		33.8	29.3			6.2	3.4		14.6	
Level of Service	C			C				A	A		B	
Approach Delay (s)		30.0			32.6			5.9			14.6	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.9							B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			77.1						16.0			
Intersection Capacity Utilization			103.5%							G		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
3: Balsam Street & CT Entrance/Plaza Access

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	22	0	22	3	52	818	3	1072
Future Volume (vph)	22	0	22	3	52	818	3	1072
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.3	10.3		10.3	52.9	52.5	51.4	48.5
Actuated g/C Ratio	0.16	0.16		0.16	0.80	0.79	0.78	0.73
v/c Ratio	0.14	0.05		0.17	0.17	0.36	0.01	0.52
Control Delay	30.1	0.2		28.2	3.7	5.3	3.0	9.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	0.2		28.2	3.7	5.3	3.0	9.4
LOS	C	A		C	A	A	A	A
Approach Delay		16.7		28.2		5.2		9.4
Approach LOS		B		C		A		A

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 66.3
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 8.0
Intersection Capacity Utilization 61.5%
Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

15 s	47 s	22 s	
15 s	47 s	22 s	

Queues
3: Balsam Street & CT Entrance/Plaza Access

2031 Total AM
With Improvements

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	22	35	63	987	4	1331
v/c Ratio	0.14	0.05	0.17	0.17	0.36	0.01	0.52
Control Delay	30.1	0.2	28.2	3.7	5.3	3.0	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	0.2	28.2	3.7	5.3	3.0	9.4
Queue Length 50th (m)	3.4	0.0	3.9	2.0	24.5	0.2	63.9
Queue Length 95th (m)	9.4	0.0	10.6	4.1	49.2	0.7	74.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	316	597	325	467	2780	661	2578
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.04	0.11	0.13	0.36	0.01	0.52

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	22	0	18	22	3	3	52	818	1	3	1072	32
Future Volume (vph)	22	0	18	22	3	3	52	818	1	3	1072	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frft	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1635		1706	3509		1825	3519	
Flt Permitted	0.74	1.00			0.76		0.15	1.00		0.29	1.00	
Satd. Flow (perm)	1271	1633			1291		276	3509		549	3519	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	27	0	22	27	4	4	63	986	1	4	1292	39
RTOR Reduction (vph)	0	20	0	0	4	0	0	0	0	0	2	0
Lane Group Flow (vph)	27	2	0	0	31	0	63	987	0	4	1329	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.4	5.4			5.4		53.3	49.5		48.3	47.0	
Effective Green, g (s)	5.4	5.4			5.4		53.3	49.5		48.3	47.0	
Actuated g/C Ratio	0.07	0.07			0.07		0.74	0.69		0.67	0.65	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	95	122			96		279	2405		390	2290	
v/s Ratio Prot		0.00					0.01	0.28		0.00	0.38	
v/s Ratio Perm	0.02				0.02		0.15			0.01		
v/c Ratio	0.28	0.01			0.33		0.23	0.41		0.01	0.58	
Uniform Delay, d1	31.6	30.9			31.7		3.9	5.0		4.0	7.1	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.0			2.0		0.4	0.5		0.0	1.1	
Delay (s)	33.2	31.0			33.7		4.3	5.5		4.0	8.2	
Level of Service	C	C			C		A	A		A	A	
Approach Delay (s)		32.2			33.7			5.4			8.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	72.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings 4: Balsam Street & Old Mountain Road/Commercial Access

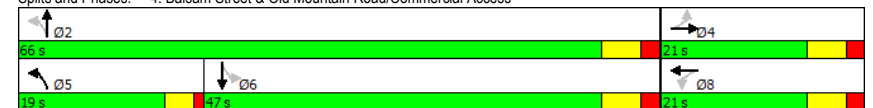
2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (vph)	33	0	0	73	857	1041
Future Volume (vph)	33	0	0	73	857	1041
Turn Type	Perm	NA	NA	pm+pt	NA	NA
Protected Phases		4	8	5	2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	5	2	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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	4.0	6.0	6.0
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	None	Max	Max
Act Effct Green (s)	10.2	10.2	10.2	65.1	64.3	55.3
Actuated g/C Ratio	0.12	0.12	0.12	0.79	0.78	0.67
v/c Ratio	0.24	0.10	0.00	0.27	0.39	0.57
Control Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	0.4	0.0	4.7	4.3	10.8
LOS	D	A	A	A	A	B
Approach Delay		17.4			4.3	10.8
Approach LOS		B			A	B

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 82	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 79.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues
4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total AM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	41	46	1	90	1062	1345
v/c Ratio	0.24	0.10	0.00	0.27	0.39	0.57
Control Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	0.4	0.0	4.7	4.3	10.8
Queue Length 50th (m)	5.9	0.0	0.0	2.8	27.3	65.0
Queue Length 95th (m)	13.3	0.0	0.0	5.4	32.1	75.4
Internal Link Dist (m)	175.6	57.5		179.2	181.9	
Turn Bay Length (m)			70.0			
Base Capacity (vph)	252	548	318	472	2717	2372
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.08	0.00	0.19	0.39	0.57
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↰	↱	↰	↱		↰	↱	
Traffic Volume (vph)	33	0	37	0	0	1	73	857	3	0	1041	49
Future Volume (vph)	33	0	37	0	0	1	73	857	3	0	1041	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95			0.95	
Flpb, ped/bikes	1.00	0.98			0.98		1.00	1.00			1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00			1.00	
Flt	1.00	0.85			0.86		1.00	1.00			0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1727	1608			1088		1722	3469			3518	
Flt Permitted	0.76	1.00			1.00		0.14	1.00			1.00	
Satd. Flow (perm)	1377	1608			1088		257	3469			3518	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	41	0	46	0	0	1	90	1058	4	0	1285	60
RTOR Reduction (vph)	0	42	0	0	1	0	0	0	0	0	2	0
Lane Group Flow (vph)	41	4	0	0	0	0	90	1062	0	0	1343	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA	pm+pt	NA		Perm	NA		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.2	8.2			8.2		63.9	63.9			54.1	
Effective Green, g (s)	8.2	8.2			8.2		63.9	63.9			54.1	
Actuated g/C Ratio	0.10	0.10			0.10		0.76	0.76			0.64	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	134	156			106		296	2635			2263	
v/s Ratio Prot		0.00			0.00		0.02	c0.31			c0.38	
v/s Ratio Perm	c0.03						0.21					
v/c Ratio	0.31	0.03			0.00		0.30	0.40			0.59	
Uniform Delay, d1	35.3	34.3			34.3		5.0	3.5			8.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.3	0.1			0.0		0.6	0.5			1.2	
Delay (s)	36.6	34.4			34.3		5.5	4.0			9.8	
Level of Service	D	C			C		A	A			A	
Approach Delay (s)		35.4			34.3			4.1			9.8	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.55										
Actuated Cycle Length (s)		84.1			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		79.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↩	↗	↘	↩	↗	↘	↩	↗	↘	↩
Traffic Volume (vph)	48	498	160	112	444	479	149	418	567	450
Future Volume (vph)	48	498	160	112	444	479	149	418	567	450
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Prot	NA
Protected Phases	3	8		7	4	1	5	2	1	6
Permitted Phases	8		8	4		4	2			
Detector Phase	3	8	8	7	4	1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	28.0	28.0	11.0	28.0	31.0	30.0	30.0	31.0	31.0
Total Split (%)	11.0%	28.0%	28.0%	11.0%	28.0%	31.0%	30.0%	30.0%	31.0%	31.0%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	30.1	20.1	20.1	31.0	22.6	46.6	37.1	22.0	23.6	30.5
Actuated g/C Ratio	0.31	0.21	0.21	0.32	0.23	0.48	0.38	0.23	0.24	0.32
v/c Ratio	0.22	0.83	0.41	0.59	0.65	0.70	0.39	0.84	0.83	0.57
Control Delay	24.2	47.9	7.8	34.4	39.4	16.2	15.9	44.4	44.7	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	47.9	7.8	34.4	39.4	16.2	15.9	44.4	44.7	29.3
LOS	C	D	A	C	D	B	B	D	D	C
Approach Delay		37.2			28.1		38.4		37.4	
Approach LOS		D			C		D		D	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 96.8

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 34.8

Intersection LOS: C

Intersection Capacity Utilization 72.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

Ø1	Ø2	Ø3	Ø4
31 s	30 s	11 s	28 s
Ø5	Ø6	Ø7	Ø8
30 s	31 s	11 s	28 s

Queues
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	59	607	195	137	541	584	182	680	691	619
v/c Ratio	0.22	0.83	0.41	0.59	0.65	0.70	0.39	0.84	0.83	0.57
Control Delay	24.2	47.9	7.8	34.4	39.4	16.2	15.9	44.4	44.7	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	47.9	7.8	34.4	39.4	16.2	15.9	44.4	44.7	29.3
Queue Length 50th (m)	7.6	59.4	0.0	18.4	51.7	50.4	16.8	61.9	65.4	50.0
Queue Length 95th (m)	14.8	70.3	12.7	29.1	62.3	69.9	25.1	73.0	76.2	59.4
Internal Link Dist (m)		178.2			250.8			206.8		179.2
Turn Bay Length (m)	50.0		50.0	60.0		100.0	50.0		80.0	
Base Capacity (vph)	263	772	492	234	826	854	620	863	873	1106
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.79	0.40	0.59	0.65	0.68	0.29	0.79	0.79	0.56

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	48	498	160	112	444	479	149	418	139	567	450	57
Future Volume (vph)	48	498	160	112	444	479	149	418	139	567	450	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1689	3544	1558	1825	3544	1529	1806	3408		3437	3430	
Flt Permitted	0.33	1.00	1.00	0.21	1.00	1.00	0.42	1.00		0.95	1.00	
Satd. Flow (perm)	591	3544	1558	412	3544	1529	793	3408		3437	3430	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	59	607	195	137	541	584	182	510	170	691	549	70
RTOR Reduction (vph)	0	0	153	0	0	105	0	33	0	0	9	0
Lane Group Flow (vph)	59	607	42	137	541	479	182	647	0	691	610	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	
Protected Phases	3	8		7	4	1	5	2		1	6	
Permitted Phases	8		8	4		4	2					
Actuated Green, G (s)	26.4	21.0	21.0	29.6	22.6	46.2	37.1	22.0		23.6	30.5	
Effective Green, g (s)	26.4	21.0	21.0	29.6	22.6	46.2	37.1	22.0		23.6	30.5	
Actuated g/C Ratio	0.27	0.22	0.22	0.30	0.23	0.47	0.38	0.23		0.24	0.31	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	220	762	335	226	820	723	458	768		831	1071	
v/s Ratio Prot	0.01	c0.17		c0.04	0.15	0.16	0.06	c0.19		c0.20	0.18	
v/s Ratio Perm	0.06		0.03	0.14		0.15	0.09					
v/c Ratio	0.27	0.80	0.13	0.61	0.66	0.66	0.40	0.84		0.83	0.57	
Uniform Delay, d1	27.1	36.3	30.9	26.4	34.0	19.7	20.9	36.1		35.1	28.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	5.8	0.2	4.5	1.9	2.3	0.6	8.3		7.1	0.7	
Delay (s)	27.7	42.1	31.1	30.9	35.9	22.0	21.4	44.5		42.2	28.8	
Level of Service	C	D	C	C	D	C	C	D		D	C	
Approach Delay (s)		38.6			29.0		39.6				35.9	
Approach LOS		D			C		D				D	

Intersection Summary

HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	97.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	5	1199	24	1049	6	2	13	4
Future Volume (vph)	5	1199	24	1049	6	2	13	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.0	88.4	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.85	0.82	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.01	0.49	0.08	0.42	0.05	0.22	0.12	0.05
Control Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
LOS	A	A	A	A	D	B	D	D
Approach Delay		6.5		4.0		23.4		43.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 5.9
Intersection Capacity Utilization 62.4%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	1440	29	1259	7	38	15	9
v/c Ratio	0.01	0.49	0.08	0.42	0.05	0.22	0.12	0.05
Control Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	6.5	2.3	4.0	45.8	19.2	47.4	36.4
Queue Length 50th (m)	0.3	72.2	0.9	34.7	1.4	0.4	2.9	1.0
Queue Length 95th (m)	0.7	78.3	2.1	64.8	5.4	9.0	8.8	5.3
Internal Link Dist (m)	250.8		336.7		166.8		215.7	
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	432	2917	348	3009	333	385	323	415
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	0.01	0.49	0.08	0.42	0.02	0.10	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	5	1199	11	24	1049	8	6	2	30	13	4	3
Future Volume (vph)	5	1199	11	24	1049	8	6	2	30	13	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3567		1825	3506		1815	1516		1778	1779	
Flt Permitted	0.21	1.00		0.15	1.00		0.75	1.00		0.73	1.00	
Satd. Flow (perm)	399	3567		287	3506		1437	1516		1371	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	1427	13	29	1249	10	7	2	36	15	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	34	0	0	4	0
Lane Group Flow (vph)	6	1440	0	29	1259	0	7	4	0	15	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.77	0.76		0.82	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	326	2705		296	2750		79	84		76	98	
v/s Ratio Prot	0.00	c0.40		c0.00	c0.36			0.00			0.00	
v/s Ratio Perm	0.01			0.08			0.00			c0.01		
v/c Ratio	0.02	0.53		0.10	0.46		0.09	0.05		0.20	0.05	
Uniform Delay, d1	2.9	5.3		3.0	3.9		48.5	48.3		48.8	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.8		0.1	0.6		0.5	0.2		1.3	0.2	
Delay (s)	3.0	6.0		3.1	4.5		48.9	48.6		50.0	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		6.0			4.4			48.6			49.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			6.4			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)			15.9			
Intersection Capacity Utilization			62.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	83	1025	10	901	34	36	83	30
Future Volume (vph)	83	1025	10	901	34	36	83	30
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	77.0	73.6	73.0	66.7	12.7	12.7	12.7	12.7
Actuated g/C Ratio	0.77	0.74	0.73	0.67	0.13	0.13	0.13	0.13
v/c Ratio	0.23	0.48	0.03	0.45	0.44	0.27	0.57	0.57
Control Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
LOS	A	A	A	A	D	C	D	B
Approach Delay		7.1		5.5		38.1		28.4
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 9.9

Intersection LOS: A

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street



Queues
7: Cedar Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	1241	12	1056	40	66	97	200
v/c Ratio	0.23	0.48	0.03	0.45	0.44	0.27	0.57	0.57
Control Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	7.3	1.8	5.6	54.0	28.4	53.0	16.4
Queue Length 50th (m)	3.6	38.4	0.3	4.6	7.3	7.4	18.0	6.2
Queue Length 95th (m)	8.9	85.7	m0.3	52.8	15.9	17.2	30.3	22.1
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	419	2594	365	2334	171	442	322	512
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	0.23	0.48	0.03	0.45	0.23	0.15	0.30	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	83	1025	42	10	901	7	34	36	21	83	30	142
Future Volume (vph)	83	1025	42	10	901	7	34	36	21	83	30	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frft	1.00	0.99		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3524		1825	3502		1752	1761		1772	1610	
Flt Permitted	0.22	1.00		0.20	1.00		0.39	1.00		0.71	1.00	
Satd. Flow (perm)	420	3524		389	3502		715	1761		1332	1610	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	97	1192	49	12	1048	8	40	42	24	97	35	165
RTOR Reduction (vph)	0	2	0	0	0	0	0	21	0	0	144	0
Lane Group Flow (vph)	97	1239	0	12	1056	0	40	45	0	97	56	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.6	70.4		67.1	65.9		12.7	12.7		12.7	12.7	
Effective Green, g (s)	75.6	70.4		67.1	65.9		12.7	12.7		12.7	12.7	
Actuated g/C Ratio	0.76	0.70		0.67	0.66		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	397	2480		278	2307		90	223		169	204	
v/s Ratio Prot	c0.01	c0.35		0.00	0.30			0.03			0.03	
v/s Ratio Perm	0.17			0.03			0.06			c0.07		
v/c Ratio	0.24	0.50		0.04	0.46		0.44	0.20		0.57	0.27	
Uniform Delay, d1	4.3	6.8		5.7	8.3		40.4	39.1		41.1	39.5	
Progression Factor	1.00	1.00		0.44	0.54		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.7		0.1	0.6		3.5	0.4		4.7	0.7	
Delay (s)	4.6	7.5		2.6	5.0		43.9	39.6		45.8	40.2	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		7.3			5.0			41.2			42.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	35	820	19	969	124	14	51	27
Future Volume (vph)	35	820	19	969	124	14	51	27
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.6	63.0	66.8	60.8	17.3	10.5	19.2	10.3
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.17	0.10	0.19	0.10
v/c Ratio	0.12	0.49	0.07	0.54	0.55	0.17	0.20	0.38
Control Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.4		9.6		39.5		27.0
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 12.1
Intersection Capacity Utilization 52.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service A

Splits and Phases: 8: Pine Street & First Street

Ø1	Ø2	Ø3	Ø4
11 s	50 s	13 s	26 s
Ø5	Ø6 (R)	Ø7	Ø8
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1077	22	1155	146	32	60	85
v/c Ratio	0.12	0.49	0.07	0.54	0.55	0.17	0.20	0.38
Control Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	8.6	4.6	9.7	42.0	28.0	30.7	24.4
Queue Length 50th (m)	1.4	57.6	0.9	49.9	23.2	2.9	9.1	5.8
Queue Length 95th (m)	m1.8	34.2	m1.9	54.7	36.8	10.7	17.7	17.9
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	328	2191	329	2129	266	347	303	384
Starvation Cap Reductn	0	0	0	88	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	0.49	0.07	0.57	0.55	0.09	0.20	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	35	820	95	19	969	13	124	14	14	51	27	45
Future Volume (vph)	35	820	95	19	969	13	124	14	14	51	27	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.93		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3470		1629	3503		1733	1676		1715	1715	
Flt Permitted	0.17	1.00		0.21	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	331	3470		361	3503		1280	1676		1228	1715	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	41	965	112	22	1140	15	146	16	16	60	32	53
RTOR Reduction (vph)	0	7	0	0	1	0	0	15	0	0	48	0
Lane Group Flow (vph)	41	1070	0	22	1154	0	146	17	0	60	37	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.7	58.5		59.9	57.1		18.1	8.5		19.5	9.2	
Effective Green, g (s)	62.7	58.5		59.9	57.1		18.1	8.5		19.5	9.2	
Actuated g/C Ratio	0.63	0.58		0.60	0.57		0.18	0.08		0.20	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	270	2029		251	2000		275	142		289	157	
v/s Ratio Prot	c0.01	0.31		0.00	c0.33		c0.05	0.01		0.02	0.02	
v/s Ratio Perm	0.09			0.05			c0.05			0.02		
v/c Ratio	0.15	0.53		0.09	0.58		0.53	0.12		0.21	0.23	
Uniform Delay, d1	8.8	12.5		8.9	13.7		36.6	42.3		33.6	42.1	
Progression Factor	0.50	0.68		0.71	0.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.9		0.1	1.1		2.0	0.4		0.4	0.8	
Delay (s)	4.7	9.4		6.5	10.0		38.6	42.7		33.9	42.9	
Level of Service	A	A		A	B		D	D		C	D	
Approach Delay (s)		9.2			10.0			39.3			39.2	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
9: Hurontario Street & First Street/Huron Street

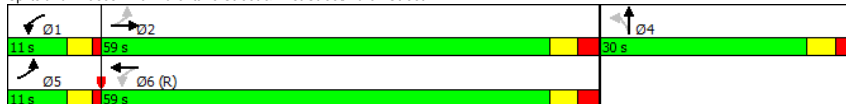
2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations						
Traffic Volume (vph)	23	707	41	773	237	20
Future Volume (vph)	23	707	41	773	237	20
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	66.9	59.9	68.0	62.0	20.1	20.1
Actuated g/C Ratio	0.67	0.60	0.68	0.62	0.20	0.20
v/c Ratio	0.07	0.49	0.13	0.43	0.78	0.19
Control Delay	2.1	4.4	6.3	12.0	52.8	14.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.5	6.3	12.0	52.8	14.7
LOS	A	A	A	B	D	B
Approach Delay		4.4		11.8		44.8
Approach LOS		A		B		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 13.4
 Intersection LOS: B
 Intersection Capacity Utilization 55.0%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues
9: Hurontario Street & First Street/Huron Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	27	1029	49	949	282	74
v/c Ratio	0.07	0.49	0.13	0.43	0.78	0.19
Control Delay	2.1	4.4	6.3	12.0	52.8	14.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	4.5	6.3	12.0	52.8	14.7
Queue Length 50th (m)	0.4	67.7	2.6	52.2	51.7	3.8
Queue Length 95th (m)	m0.9	8.5	6.2	67.8	69.8	13.0
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	374	2086	385	2189	438	453
Starvation Cap Reductn	0	127	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	0.07	0.53	0.13	0.43	0.64	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	707	157	41	773	24	237	20	42	0	0	0
Future Volume (vph)	23	707	157	41	773	24	237	20	42	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3456		1825	3528		1796	1703				
Flt Permitted	0.26	1.00		0.22	1.00		0.95	1.00				
Satd. Flow (perm)	436	3456		421	3528		1796	1703				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	27	842	187	49	920	29	282	24	50	0	0	0
RTOR Reduction (vph)	0	16	0	0	2	0	0	40	0	0	0	0
Lane Group Flow (vph)	27	1013	0	49	947	0	282	34	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	63.0	59.1		65.6	60.4		20.1	20.1				
Effective Green, g (s)	63.0	59.1		65.6	60.4		20.1	20.1				
Actuated g/C Ratio	0.63	0.59		0.66	0.60		0.20	0.20				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	319	2042		349	2130		360	342				
v/s Ratio Prot	0.00	c0.29		c0.01	0.27			0.02				
v/s Ratio Perm	0.05			0.08			c0.16					
v/c Ratio	0.08	0.50		0.14	0.44		0.78	0.10				
Uniform Delay, d1	7.3	11.8		7.0	10.7		37.9	32.6				
Progression Factor	0.32	0.30		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	0.8		0.2	0.7		10.6	0.1				
Delay (s)	2.4	4.3		7.2	11.4		48.5	32.7				
Level of Service	A	A		A	B		D	C				
Approach Delay (s)		4.3			11.2		45.2			0.0		
Approach LOS		A			B		D			A		

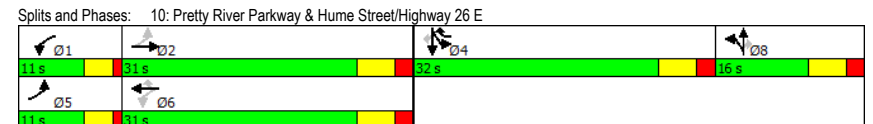
Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	142	222	30	394	797	22	30	34	281	42	97
Future Volume (vph)	142	222	30	394	797	22	30	34	281	42	97
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	31.0	11.0	31.0	32.0	16.0	16.0	16.0	32.0	32.0	32.0
Total Split (%)	12.2%	34.4%	12.2%	34.4%	35.6%	17.8%	17.8%	17.8%	35.6%	35.6%	35.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	36.8	30.9	34.9	25.6	45.7	10.3	10.3	10.3	20.1	20.1	20.1
Actuated g/C Ratio	0.45	0.38	0.43	0.31	0.56	0.13	0.13	0.13	0.25	0.25	0.25
v/c Ratio	0.49	0.20	0.07	0.75	0.80	0.12	0.15	0.13	0.44	0.44	0.22
Control Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
LOS	C	C	B	D	B	D	D	A	C	C	A
Approach Delay		21.4		19.7			23.2			23.7	
Approach LOS		C		B			C			C	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 81.3	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 20.9	Intersection LOS: C
Intersection Capacity Utilization 79.0%	ICU Level of Service D
Analysis Period (min) 15	



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	270	34	443	896	25	34	38	180	183	109
v/c Ratio	0.49	0.20	0.07	0.75	0.80	0.12	0.15	0.13	0.44	0.44	0.22
Control Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	21.5	15.5	37.4	11.1	37.3	37.6	0.9	30.1	29.9	2.6
Queue Length 50th (m)	15.8	17.3	3.1	68.0	30.8	3.8	5.2	0.0	26.1	26.4	0.0
Queue Length 95th (m)	29.5	28.1	8.7	#119.0	73.0	11.3	14.0	0.0	44.4	44.7	4.5
Internal Link Dist (m)	218.1		181.3		157.4		210.6				
Turn Bay Length (m)			60.0		15.0		15.0		70.0		
Base Capacity (vph)	329	1342	464	594	1202	207	220	290	541	556	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.20	0.07	0.75	0.75	0.12	0.15	0.13	0.33	0.33	0.18

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total AM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 	 		 	 		 	 
Traffic Volume (vph)	142	222	19	30	394	797	22	30	34	281	42	97
Future Volume (vph)	142	222	19	30	394	797	22	30	34	281	42	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3520		1558	1883	1566	1644	1746	1209	1651	1697	1512
Flt Permitted	0.24	1.00		0.59	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	466	3520		960	1883	1566	1644	1746	1209	1651	1697	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	160	249	21	34	443	896	25	34	38	316	47	109
RTOR Reduction (vph)	0	6	0	0	0	236	0	0	35	0	0	83
Lane Group Flow (vph)	160	264	0	34	443	660	25	34	3	180	183	26
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	38.1	30.9		31.3	27.5	47.6	7.5	7.5	7.5	20.1	20.1	20.1
Effective Green, g (s)	38.1	30.9		31.3	27.5	47.6	7.5	7.5	7.5	20.1	20.1	20.1
Actuated g/C Ratio	0.45	0.37		0.37	0.33	0.56	0.09	0.09	0.09	0.24	0.24	0.24
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	1290		383	614	995	146	155	107	393	404	360
v/s Ratio Prot	c0.04	0.07		0.00	0.24	c0.16	0.02	c0.02		0.11	0.11	
v/s Ratio Perm	0.18			0.03		0.26			0.00			0.02
v/c Ratio	0.49	0.20		0.09	0.72	0.66	0.17	0.22	0.03	0.46	0.45	0.07
Uniform Delay, d1	15.7	18.3		17.0	25.0	12.8	35.5	35.7	35.1	27.4	27.4	24.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.4		0.1	7.2	1.7	0.6	0.7	0.1	0.8	0.8	0.1
Delay (s)	16.9	18.6		17.1	32.2	14.5	36.1	36.4	35.2	28.3	28.2	25.0
Level of Service	B	B		B	C	B	D	D	D	C	C	C
Approach Delay (s)	18.0		20.2		35.8		27.5					
Approach LOS	B		C		D		C					
Intersection Summary												
HCM 2000 Control Delay	21.9		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	84.3		Sum of lost time (s)		22.0							
Intersection Capacity Utilization	79.0%		ICU Level of Service		D							
Analysis Period (min)	15											
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2031 Total AM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	2	4	108	811	112	322
Future Volume (vph)	3	2	4	108	811	112	322
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases	4			2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)		15.7	15.7	34.9	27.5	34.9	27.5
Actuated g/C Ratio		0.25	0.25	0.55	0.43	0.55	0.43
v/c Ratio		0.10	0.82	0.20	0.62	0.36	0.27
Control Delay		10.1	23.4	7.4	17.9	9.6	13.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		10.1	23.4	7.4	17.9	9.6	13.6
LOS		B	C	A	B	A	B
Approach Delay		10.1	23.4		16.7		12.6
Approach LOS		B	C		B		B

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 63.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 17.2
Intersection Capacity Utilization 68.0%
Analysis Period (min) 15

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2031 Total AM
With Improvements

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	30	484	124	934	129	391
v/c Ratio	0.10	0.82	0.20	0.62	0.36	0.27
Control Delay	10.1	23.4	7.4	17.9	9.6	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	23.4	7.4	17.9	9.6	13.6
Queue Length 50th (m)	0.5	25.4	6.1	48.9	6.4	16.4
Queue Length 95th (m)	5.7	#55.3	12.9	68.3	13.4	26.0
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	391	691	626	1511	360	1468
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	0.08	0.70	0.20	0.62	0.36	0.27

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2031 Total AM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	3	2	22	0	4	417	108	811	2	112	322	18
Future Volume (vph)	3	2	22	0	4	417	108	811	2	112	322	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.89			0.87		1.00	1.00		1.00	0.99	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1663			1616		1789	3505		1706	3392	
Flt Permitted		0.70			1.00		0.52	1.00		0.22	1.00	
Satd. Flow (perm)		1174			1616		981	3505		392	3392	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	3	2	25	0	5	479	124	932	2	129	370	21
RTOR Reduction (vph)	0	19	0	0	195	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	11	0	0	289	0	124	934	0	129	385	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Effective Green, g (s)		15.7			15.7		32.8	27.5		32.8	27.5	
Actuated g/C Ratio		0.24			0.24		0.51	0.43		0.51	0.43	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		285			393		565	1494		307	1446	
v/s Ratio Prot					c0.18		0.02	c0.27		c0.03	0.11	
v/s Ratio Perm		0.01					0.09			0.18		
v/c Ratio		0.04			0.73		0.22	0.63		0.42	0.27	
Uniform Delay, d1		18.6			22.5		8.4	14.5		9.1	12.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			7.0		0.2	2.0		0.9	0.5	
Delay (s)		18.7			29.5		8.6	16.5		10.0	12.4	
Level of Service		B			C		A	B		A	B	
Approach Delay (s)		18.7			29.5			15.5			11.8	
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings

12: Tenth Line & Mountain Road

2031 Total AM

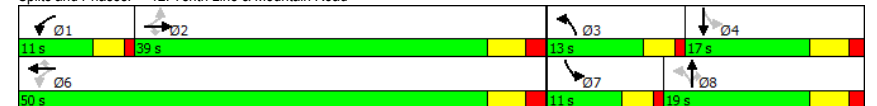
With Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	6	488	104	92	443	63	145	58	311	121	75
Future Volume (vph)	6	488	104	92	443	63	145	58	311	121	75
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		2		1	6		3	8		7	4
Permitted Phases	2		2	6		6	8		8	4	
Detector Phase	2	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	33.0	33.0	33.0	7.0	33.0	33.0	7.0	10.0	10.0	7.0	10.0
Minimum Split (s)	38.7	38.7	38.7	11.0	38.7	38.7	11.0	15.2	15.2	11.0	15.2
Total Split (s)	39.0	39.0	39.0	11.0	50.0	50.0	13.0	19.0	19.0	11.0	17.0
Total Split (%)	48.8%	48.8%	48.8%	13.8%	62.5%	62.5%	16.3%	23.8%	23.8%	13.8%	21.3%
Yellow Time (s)	3.7	3.7	3.7	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.7
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	1.0	1.5	1.5	1.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	None	Max	Max	None	None	None	None	None
Act Effect Green (s)	35.6	35.6	35.6	46.0	44.3	44.3	23.0	12.3	12.3	16.7	10.8
Actuated g/C Ratio	0.45	0.45	0.45	0.59	0.56	0.56	0.29	0.16	0.16	0.21	0.14
v/c Ratio	0.02	0.71	0.18	0.32	0.52	0.08	0.46	0.25	0.73	0.47	0.48
Control Delay	14.0	24.4	3.2	9.9	12.9	2.1	25.2	31.3	14.7	27.1	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	24.4	3.2	9.9	12.9	2.1	25.2	31.3	14.7	27.1	37.0
LOS	B	C	A	A	B	A	C	C	B	C	D
Approach Delay		20.6			11.3			19.5			31.2
Approach LOS		C			B			B			C

Intersection Summary

Cycle Length: 80	
Actuated Cycle Length: 78.6	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 83.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	602	128	114	547	78	179	72	384	149	105
v/c Ratio	0.02	0.71	0.18	0.32	0.52	0.08	0.46	0.25	0.73	0.47	0.48
Control Delay	14.0	24.4	3.2	9.9	12.9	2.1	25.2	31.3	14.7	27.1	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	24.4	3.2	9.9	12.9	2.1	25.2	31.3	14.7	27.1	37.0
Queue Length 50th (m)	0.6	73.0	0.0	6.8	45.8	0.0	20.2	9.5	5.8	16.5	13.7
Queue Length 95th (m)	2.6	97.2	6.0	12.4	62.6	3.7	31.7	18.4	20.9	26.9	25.1
Internal Link Dist (m)	237.3		810.6		849.0		311.9				
Turn Bay Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0	
Base Capacity (vph)	398	852	692	360	1061	958	386	324	551	314	242
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.71	0.18	0.32	0.52	0.08	0.46	0.22	0.70	0.47	0.43
Intersection Summary											

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Total AM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	488	104	92	443	63	145	58	311	121	75	10
Future Volume (vph)	6	488	104	92	443	63	145	58	311	121	75	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1825	1883	1361	1825	1883	1633	1755	1847	1541	1738	1577	
Flt Permitted	0.46	1.00	1.00	0.21	1.00	1.00	0.47	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	881	1883	1361	397	1883	1633	872	1847	1541	1299	1577	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	7	602	128	114	547	78	179	72	384	149	93	12
RTOR Reduction (vph)	0	0	71	0	0	34	0	0	283	0	6	0
Lane Group Flow (vph)	7	602	57	114	547	44	179	72	101	149	99	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	35.6	35.6	35.6	45.2	45.2	45.2	24.4	13.4	13.4	15.7	8.7	
Effective Green, g (s)	35.6	35.6	35.6	45.2	45.2	45.2	24.4	13.4	13.4	15.7	8.7	
Actuated g/C Ratio	0.44	0.44	0.44	0.56	0.56	0.56	0.30	0.17	0.17	0.20	0.11	
Clearance Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	389	832	601	322	1057	916	392	307	256	291	170	
v/s Ratio Prot		c0.32		0.02	c0.29		c0.07	0.04		0.04	0.06	
v/s Ratio Perm	0.01		0.04	0.17		0.03	c0.07		0.07	0.06		
v/c Ratio	0.02	0.72	0.09	0.35	0.52	0.05	0.46	0.23	0.39	0.51	0.58	
Uniform Delay, d1	12.6	18.4	13.1	11.4	10.9	8.0	21.9	29.1	29.9	28.5	34.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	5.4	0.3	0.7	1.8	0.1	0.8	0.4	1.0	1.5	5.0	
Delay (s)	12.7	23.8	13.4	12.1	12.7	8.1	22.7	29.5	30.9	30.0	39.1	
Level of Service	B	C	B	B	B	A	C	C	C	C	D	
Approach Delay (s)	21.9		12.1		28.5		33.8					
Approach LOS	C		B		C		C					
Intersection Summary												
HCM 2000 Control Delay	21.9		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.65											
Actuated Cycle Length (s)	80.5		Sum of lost time (s)		18.9							
Intersection Capacity Utilization	83.5%		ICU Level of Service		E							
Analysis Period (min)	15											
c Critical Lane Group												

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	90	674	112	547	119	62	93	18	87	46
Future Volume (vph)	90	674	112	547	119	62	93	18	87	46
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2	1	6	3	8		7	4	
Permitted Phases	2		6		8		8	4		4
Detector Phase	5	2	1	6	3	8	8	7	4	4
Switch Phase										
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	11.0	37.6	11.0	37.6	11.0	25.0	25.0	9.0	25.0	25.0
Total Split (s)	11.0	46.0	13.0	48.0	11.0	27.0	27.0	9.0	25.0	25.0
Total Split (%)	11.6%	48.4%	13.7%	50.5%	11.6%	28.4%	28.4%	9.5%	26.3%	26.3%
Yellow Time (s)	3.0	4.4	3.0	4.4	3.0	3.3	3.3	3.0	3.3	3.3
All-Red Time (s)	1.0	3.2	1.0	3.2	1.0	2.7	2.7	1.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.6	4.0	7.6	4.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	49.3	38.6	53.8	43.2	20.1	15.5	15.5	15.3	10.4	10.4
Actuated g/C Ratio	0.58	0.46	0.64	0.51	0.24	0.18	0.18	0.18	0.12	0.12
v/c Ratio	0.20	0.60	0.35	0.38	0.47	0.22	0.27	0.09	0.47	0.17
Control Delay	7.8	19.4	9.4	14.9	30.9	31.9	4.5	23.9	42.8	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	19.4	9.4	14.9	30.9	31.9	4.5	23.9	42.8	1.2
LOS	A	B	A	B	C	C	A	C	D	A
Approach Delay		18.2		14.1		22.2			27.8	
Approach LOS		B		B		C			C	

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 84.3
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 18.0
Intersection Capacity Utilization 59.1%
Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
13 s	46 s	11 s	25 s
Ø5	Ø6	Ø7	Ø8
11 s	48 s	9 s	27 s

Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	106	948	132	700	140	73	109	21	102	54
v/c Ratio	0.20	0.60	0.35	0.38	0.47	0.22	0.27	0.09	0.47	0.17
Control Delay	7.8	19.4	9.4	14.9	30.9	31.9	4.5	23.9	42.8	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	19.4	9.4	14.9	30.9	31.9	4.5	23.9	42.8	1.2
Queue Length 50th (m)	6.0	58.8	7.7	37.8	18.3	9.5	0.0	2.6	16.0	0.0
Queue Length 95th (m)	12.6	78.2	15.2	52.1	30.9	21.4	5.7	7.4	28.9	0.0
Internal Link Dist (m)		217.8		35.2		32.3			88.4	
Turn Bay Length (m)	35.0		50.0		45.0		50.0	15.0		
Base Capacity (vph)	522	1588	373	1838	295	459	497	239	395	463
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.60	0.35	0.38	0.47	0.16	0.22	0.09	0.26	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total AM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	90	674	132	112	547	48	119	62	93	18	87	46
Future Volume (vph)	90	674	132	112	547	48	119	62	93	18	87	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3433		1706	3573		1771	1830	1546	1583	1746	1547
Flt Permitted	0.38	1.00		0.20	1.00		0.49	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	738	3433		359	3573		918	1830	1546	1182	1746	1547
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	106	793	155	132	644	56	140	73	109	21	102	54
RTOR Reduction (vph)	0	16	0	0	6	0	0	0	90	0	0	48
Lane Group Flow (vph)	106	932	0	132	694	0	140	73	19	21	102	6
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	44.9	39.5		52.3	43.2		21.4	15.5	15.5	11.8	9.9	9.9
Effective Green, g (s)	44.9	39.5		52.3	43.2		21.4	15.5	15.5	11.8	9.9	9.9
Actuated g/C Ratio	0.51	0.45		0.60	0.49		0.24	0.18	0.18	0.13	0.11	0.11
Clearance Time (s)	4.0	7.6		4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	445	1547		354	1762		297	323	273	167	197	174
v/s Ratio Prot	0.01	c0.27		c0.04	0.19		c0.04	0.04		0.00	0.06	
v/s Ratio Perm	0.11			0.18			c0.07		0.01	0.01		0.00
v/c Ratio	0.24	0.60		0.37	0.39		0.47	0.23	0.07	0.13	0.52	0.04
Uniform Delay, d1	11.0	18.1		9.3	14.0		27.3	30.9	30.0	33.2	36.6	34.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.7		3.0	0.7		1.2	0.4	0.1	0.3	2.3	0.1
Delay (s)	11.3	19.9		12.3	14.6		28.4	31.3	30.2	33.6	38.9	34.7
Level of Service	B	B		B	B		C	C	C	C	D	C
Approach Delay (s)		19.0			14.3			29.7			37.0	
Approach LOS		B			B			C			D	

Intersection Summary

HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	87.6	Sum of lost time (s)	21.6
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

14: High Street & Cambridge Street/Third Street

2031 Total AM

With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	4	20	25	31	123	668	86	560
Future Volume (vph)	4	20	25	31	123	668	86	560
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	22.0	22.0	22.0	22.0	13.0	55.0	13.0	55.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	14.4%	61.1%	14.4%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.5	10.5	10.5	10.5	59.7	51.6	58.3	49.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.72	0.62	0.70	0.59
v/c Ratio	0.03	0.38	0.17	0.46	0.23	0.40	0.21	0.32
Control Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
LOS	C	C	D	B	A	A	A	A
Approach Delay		22.1		20.7		8.3		8.6
Approach LOS		C		C		A		A

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 83.1
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 9.9
Intersection Capacity Utilization 48.8%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service A

Splits and Phases: 14: High Street & Cambridge Street/Third Street

Ø1	Ø2	Ø4
13 s	55 s	22 s
Ø5	Ø6	Ø8
13 s	55 s	22 s

Queues
14: High Street & Cambridge Street/Third Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	74	29	133	143	876	100	654
v/c Ratio	0.03	0.38	0.17	0.46	0.23	0.40	0.21	0.32
Control Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	21.4	35.2	17.5	3.8	9.0	4.0	9.3
Queue Length 50th (m)	0.7	3.3	4.2	5.2	4.6	33.8	3.1	24.3
Queue Length 95th (m)	3.7	14.2	11.2	18.9	9.2	47.8	6.9	36.0
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	248	268	262	396	644	2185	502	2047
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	0.02	0.28	0.11	0.34	0.22	0.40	0.20	0.32
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2031 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	4	20	44	25	31	83	123	668	85	86	560	3
Future Volume (vph)	4	20	44	25	31	83	123	668	85	86	560	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1178		1825	1651		1825	3507		1658	3470	
Flt Permitted	0.67	1.00		0.71	1.00		0.37	1.00		0.30	1.00	
Satd. Flow (perm)	1291	1178		1362	1651		718	3507		527	3470	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	23	51	29	36	97	143	777	99	100	651	3
RTOR Reduction (vph)	0	45	0	0	85	0	0	9	0	0	0	0
Lane Group Flow (vph)	5	29	0	29	48	0	143	867	0	100	654	0
Confl. Peds. (#/hr)									9		9	
Heavy Vehicles (%)	0%	0%	67%	0%	0%	5%	0%	2%	2%	10%	5%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		59.2	51.6		55.8	49.9	
Effective Green, g (s)	10.5	10.5		10.5	10.5		59.2	51.6		55.8	49.9	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.70	0.61		0.66	0.59	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	161	147		170	206		606	2154		429	2061	
v/s Ratio Prot		0.02			c0.03		c0.02	c0.25		0.02	0.19	
v/s Ratio Perm	0.00			0.02			0.14			0.14		
v/c Ratio	0.03	0.20		0.17	0.23		0.24	0.40		0.23	0.32	
Uniform Delay, d1	32.3	33.0		32.9	33.1		4.1	8.3		5.1	8.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.7		0.5	0.6		0.2	0.6		0.3	0.4	
Delay (s)	32.4	33.7		33.3	33.7		4.3	8.9		5.4	8.9	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		33.6			33.6			8.2			8.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		11.4								B		
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		84.0					Sum of lost time (s)	16.0				
Intersection Capacity Utilization		48.8%					ICU Level of Service			A		
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	152	286	27	159	150	581	113	355
Future Volume (vph)	152	286	27	159	150	581	113	355
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	11.0	15.8	11.0	15.8	11.5	25.9	11.5	25.9
Total Split (s)	11.0	36.0	11.0	36.0	12.4	31.2	11.8	30.6
Total Split (%)	12.2%	40.0%	12.2%	40.0%	13.8%	34.7%	13.1%	34.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	34.6	28.8	32.8	23.9	34.7	25.5	33.7	25.0
Actuated g/C Ratio	0.41	0.34	0.39	0.28	0.41	0.30	0.40	0.30
v/c Ratio	0.58	0.88	0.15	0.72	0.52	0.75	0.56	0.55
Control Delay	22.6	43.4	14.4	31.4	21.4	32.4	24.7	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	43.4	14.4	31.4	21.4	32.4	24.7	27.0
LOS	C	D	B	C	C	C	C	C
Approach Delay		38.0		30.0		30.3		26.5
Approach LOS		D		C		C		C

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.1

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 31.3

Intersection LOS: C

Intersection Capacity Utilization 71.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

Ø1	Ø2	Ø3	Ø4
11.8 s	31.2 s	11 s	36 s
Ø5	Ø6	Ø7	Ø8
12.4 s	30.6 s	11 s	36 s

Queues
15: High Street & Sixth Street

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	190	543	34	369	188	804	141	550
v/c Ratio	0.58	0.88	0.15	0.72	0.52	0.75	0.56	0.55
Control Delay	22.6	43.4	14.4	31.4	21.4	32.4	24.7	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	43.4	14.4	31.4	21.4	32.4	24.7	27.0
Queue Length 50th (m)	18.4	84.0	3.0	45.5	20.2	66.7	14.8	40.7
Queue Length 95th (m)	27.2	#114.6	6.9	62.2	30.0	75.1	23.2	48.9
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	330	649	223	638	369	1077	255	1004
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	0.58	0.84	0.15	0.58	0.51	0.75	0.55	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	152	286	148	27	159	136	150	581	62	113	355	85
Future Volume (vph)	152	286	148	27	159	136	150	581	62	113	355	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	1740		1573	1673		1772	3524		1738	3299	
Flt Permitted	0.30	1.00		0.18	1.00		0.34	1.00		0.18	1.00	
Satd. Flow (perm)	558	1740		299	1673		629	3524		328	3299	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	190	358	185	34	199	170	188	726	78	141	444	106
RTOR Reduction (vph)	0	21	0	0	36	0	0	9	0	0	23	0
Lane Group Flow (vph)	190	522	0	34	333	0	188	795	0	141	527	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	35.9	28.8		29.5	25.6		33.3	25.5		32.3	25.0	
Effective Green, g (s)	35.9	28.8		29.5	25.6		33.3	25.5		32.3	25.0	
Actuated g/C Ratio	0.42	0.34		0.34	0.30		0.39	0.30		0.38	0.29	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	584		160	499		348	1048		243	962	
v/s Ratio Prot	c0.05	c0.30		0.01	0.20		0.05	c0.23		c0.05	0.16	
v/s Ratio Perm	0.19			0.06			0.16			0.17		
v/c Ratio	0.57	0.89		0.21	0.67		0.54	0.76		0.58	0.55	
Uniform Delay, d1	17.4	27.0		20.3	26.3		18.2	27.3		19.2	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	16.4		0.7	3.7		1.7	5.1		3.5	2.2	
Delay (s)	19.6	43.4		21.0	30.0		19.9	32.5		22.7	27.8	
Level of Service	B	D		C	C		B	C		C	C	
Approach Delay (s)		37.3			29.3			30.1			26.8	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	85.7	Sum of lost time (s)	20.2
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
16: High Street & Campbell Street

2031 Total AM
With Improvements

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↲	↲	↰	↱
Traffic Volume (vph)	25	122	505	78	147	366
Future Volume (vph)	25	122	505	78	147	366
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0
Minimum Split (s)	22.0	22.0	22.0	22.0	14.0	22.0
Total Split (s)	22.0	22.0	29.0	29.0	14.0	43.0
Total Split (%)	33.8%	33.8%	44.6%	44.6%	21.5%	66.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	4.0	6.0
Lead/Lag		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	10.1	10.1	27.6	27.6	41.8	41.0
Actuated g/C Ratio	0.17	0.17	0.47	0.47	0.71	0.70
v/c Ratio	0.12	0.40	0.74	0.12	0.42	0.38
Control Delay	22.0	7.9	22.4	3.5	6.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	7.9	22.4	3.5	6.6	6.2
LOS	C	A	C	A	A	A
Approach Delay	10.2		19.9			6.4
Approach LOS	B		B			A

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 58.5	
Natural Cycle: 65	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 56.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 16: High Street & Campbell Street



Queues
16: High Street & Campbell Street

2031 Total AM
With Improvements

	←	←	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	32	158	656	101	191	475
v/c Ratio	0.12	0.40	0.74	0.12	0.42	0.38
Control Delay	22.0	7.9	22.4	3.5	6.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	7.9	22.4	3.5	6.6	6.2
Queue Length 50th (m)	3.0	0.0	59.3	0.0	6.4	21.9
Queue Length 95th (m)	7.7	8.5	#91.8	5.1	10.3	29.6
Internal Link Dist (m)	320.1		196.2			1058.0
Turn Bay Length (m)					20.0	
Base Capacity (vph)	441	542	889	824	500	1258
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	0.07	0.29	0.74	0.12	0.38	0.38

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Total AM
With Improvements

	←	←	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰	↑	↗	↘	↰
Traffic Volume (vph)	25	122	505	78	147	366
Future Volume (vph)	25	122	505	78	147	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1615	1563	1883	1633	1755	1795
Flt Permitted	0.95	1.00	1.00	1.00	0.20	1.00
Satd. Flow (perm)	1615	1563	1883	1633	370	1795
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	32	158	656	101	191	475
RTOR Reduction (vph)	0	137	0	54	0	0
Lane Group Flow (vph)	32	21	656	47	191	475
Confl. Peds. (#/hr)			2			
Heavy Vehicles (%)	13%	3%	2%	0%	4%	7%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.0	8.0	27.7	27.7	39.8	39.8
Effective Green, g (s)	8.0	8.0	27.7	27.7	39.8	39.8
Actuated g/C Ratio	0.13	0.13	0.46	0.46	0.67	0.67
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	216	209	872	756	433	1194
v/s Ratio Prot	c0.02		c0.35		0.06	c0.26
v/s Ratio Perm		0.01		0.03	0.23	
v/c Ratio	0.15	0.10	0.75	0.06	0.44	0.40
Uniform Delay, d1	22.9	22.7	13.2	8.9	6.7	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	6.0	0.2	0.7	1.0
Delay (s)	23.2	23.0	19.2	9.0	7.5	5.5
Level of Service	C	C	B	A	A	A
Approach Delay (s)	23.0		17.8			6.1
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings
17: Hurontario Street & Hume Street

2031 Total AM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	216	206	437	416	118	165
Future Volume (vph)	216	206	437	416	118	165
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	17.3	17.3	30.1	30.1		41.1
Actuated g/C Ratio	0.24	0.24	0.42	0.42		0.58
v/c Ratio	0.63	0.44	0.67	0.54		0.29
Control Delay	30.9	5.7	22.2	3.9		8.1
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	30.9	5.7	22.2	3.9		8.1
LOS	C	A	C	A		A
Approach Delay	18.6		13.3			8.1
Approach LOS	B		B			A

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 71
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 13.8
 Intersection Capacity Utilization 78.3%
 Analysis Period (min) 15

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Total AM
With Improvements

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	270	258	546	520	354
v/c Ratio	0.63	0.44	0.67	0.54	0.29
Control Delay	30.9	5.7	22.2	3.9	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	5.7	22.2	3.9	8.1
Queue Length 50th (m)	32.0	0.0	53.3	0.0	9.6
Queue Length 95th (m)	46.1	9.9	84.3	9.4	17.3
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	700	781	813	966	1234
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.39	0.33	0.67	0.54	0.29

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Total AM
With Improvements

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	216	206	437	416	118	165
Future Volume (vph)	216	206	437	416	118	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3544	3544
Flt Permitted	0.95	1.00	1.00	1.00	0.54	0.54
Satd. Flow (perm)	1772	1581	1921	1575	1949	1949
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	270	258	546	520	148	206
RTOR Reduction (vph)	0	195	0	300	0	0
Lane Group Flow (vph)	270	63	546	220	0	354
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	17.3	17.3	30.1	30.1		41.1
Effective Green, g (s)	17.3	17.3	30.1	30.1		41.1
Actuated g/C Ratio	0.24	0.24	0.42	0.42		0.58
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	431	385	814	667		1285
v/s Ratio Prot	c0.15		c0.28			c0.03
v/s Ratio Perm		0.04		0.14		0.13
v/c Ratio	0.63	0.16	0.67	0.33		0.28
Uniform Delay, d1	24.0	21.1	16.5	13.7		7.5
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.8	0.2	4.4	1.3		0.5
Delay (s)	26.8	21.3	20.8	15.0		8.0
Level of Service	C	C	C	B		A
Approach Delay (s)	24.1		18.0			8.0
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings
18: County Road 32 & Sixth Street & Tenth Line

2031 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	13	169	46	193	122	144	196	260
Future Volume (vph)	13	169	46	193	122	144	196	260
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)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	27.0	27.0	27.0	27.0	33.0	33.0	33.0	33.0
Total Split (%)	45.0%	45.0%	45.0%	45.0%	55.0%	55.0%	55.0%	55.0%
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	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effect Green (s)	14.1	14.1	14.1	14.1	16.0	16.0	16.0	16.0
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.37	0.37	0.37	0.37
v/c Ratio	0.05	0.41	0.16	0.62	0.40	0.36	0.58	0.51
Control Delay	12.3	13.7	13.2	16.6	13.9	9.9	17.6	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	13.7	13.2	16.6	13.9	9.9	17.6	13.6
LOS	B	B	B	B	B	A	B	B
Approach Delay		13.6		16.1		11.5		15.2
Approach LOS		B		B		B		B
Intersection Summary								
Cycle Length: 60								
Actuated Cycle Length: 42.8								
Natural Cycle: 45								
Control Type: Actuated-Uncoordinated								
Maximum v/c Ratio: 0.62								
Intersection Signal Delay: 14.3								
Intersection Capacity Utilization 67.8%								
Intersection LOS: B								
ICU Level of Service C								
Analysis Period (min) 15								

Splits and Phases: 18: County Road 32 & Sixth Street & Tenth Line

↰ 02	↱ 04
33 s	27 s
↰ 06	↱ 08
33 s	27 s

Queues
18: County Road 32 & Sixth Street & Tenth Line

2031 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	253	57	370	151	242	242	336
v/c Ratio	0.05	0.41	0.16	0.62	0.40	0.36	0.58	0.51
Control Delay	12.3	13.7	13.2	16.6	13.9	9.9	17.6	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	13.7	13.2	16.6	13.9	9.9	17.6	13.6
Queue Length 50th (m)	0.7	11.7	2.7	17.2	7.1	9.2	12.3	16.2
Queue Length 95th (m)	4.0	30.3	9.8	43.1	18.9	22.1	29.9	35.4
Internal Link Dist (m)	587.3		1205.1		566.2		326.9	
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	493	957	552	914	676	1172	744	1171
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	0.03	0.26	0.10	0.40	0.22	0.21	0.33	0.29
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	169	36	46	193	107	122	144	52	196	260	12
Future Volume (vph)	13	169	36	46	193	107	122	144	52	196	260	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.95		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1822		1674	1711		1722	1734		1738	1749	
Flt Permitted	0.49	1.00		0.60	1.00		0.56	1.00		0.61	1.00	
Satd. Flow (perm)	948	1822		1062	1711		1012	1734		1113	1749	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	16	209	44	57	238	132	151	178	64	242	321	15
RTOR Reduction (vph)	0	13	0	0	34	0	0	24	0	0	3	0
Lane Group Flow (vph)	16	240	0	57	336	0	151	218	0	242	333	0
Confl. Bikes (#/hr)	1											
Heavy Vehicles (%)	0%	2%	6%	9%	3%	10%	6%	8%	2%	5%	8%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.1	14.1		14.1	14.1		16.0	16.0		16.0	16.0	
Effective Green, g (s)	14.1	14.1		14.1	14.1		16.0	16.0		16.0	16.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.38	0.38		0.38	0.38	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	610		355	573		384	659		422	664	
v/s Ratio Prot		0.13			c0.20			0.13			0.19	
v/s Ratio Perm	0.02			0.05			0.15			c0.22		
v/c Ratio	0.05	0.39		0.16	0.59		0.39	0.33		0.57	0.50	
Uniform Delay, d1	9.5	10.7		9.8	11.6		9.5	9.3		10.3	10.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.2	1.5		0.7	0.3		1.9	0.6	
Delay (s)	9.5	11.1		10.1	13.1		10.2	9.5		12.2	10.6	
Level of Service	A	B		B	B		B	A		B	B	
Approach Delay (s)	11.1			12.7			9.8			11.3		
Approach LOS	B			B			A			B		
Intersection Summary												
HCM 2000 Control Delay	11.3			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	42.1			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	67.8%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Total AM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	93	10	29	122	181	15	113	39	185	104	38
Future Volume (vph)	19	93	10	29	122	181	15	113	39	185	104	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	111	12	35	145	215	18	135	46	220	124	45
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	146	180	215	199	389							
Volume Left (vph)	23	35	0	18	220							
Volume Right (vph)	12	0	215	46	45							
Hadj (s)	0.20	0.34	-0.63	0.02	0.15							
Departure Headway (s)	6.9	7.0	6.0	6.3	6.1							
Degree Utilization, x	0.28	0.35	0.36	0.35	0.65							
Capacity (veh/h)	456	483	561	513	571							
Control Delay (s)	12.5	12.6	11.2	12.7	19.8							
Approach Delay (s)	12.5	11.8		12.7	19.8							
Approach LOS	B	B		B	C							
Intersection Summary												
Delay			14.8									
Level of Service			B									
Intersection Capacity Utilization			55.1%	ICU Level of Service					B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Total AM
With Improvements

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	210	523	567	89	14	74
Future Volume (Veh/h)	210	523	567	89	14	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	221	551	597	94	15	78
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	691				1637	644
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	691				1637	644
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	74				81	83
cM capacity (veh/h)	863				78	461
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	772	691	15	78		
Volume Left	221	0	15	0		
Volume Right	0	94	0	78		
cSH	863	1700	78	461		
Volume to Capacity	0.26	0.41	0.19	0.17		
Queue Length 95th (m)	7.7	0.0	5.0	4.6		
Control Delay (s)	5.9	0.0	61.5	14.4		
Lane LOS	A		F	B		
Approach Delay (s)	5.9	0.0	22.0			
Approach LOS			C			
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			87.7%	ICU Level of Service	E	
Analysis Period (min)			15			

Timings
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	22	2	25	0	79	864	25	4	770	22
Future Volume (vph)	22	2	25	0	79	864	25	4	770	22
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		5	2		6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	76.0	75.1	75.1	66.3	66.3	66.3
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.84	0.83	0.83	0.73	0.73	0.73
v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02
Control Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
LOS	D	B	D	A	A	A	A	A	B	A
Approach Delay		25.0		40.8		5.1			10.1	
Approach LOS		C		D		A			B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 8.6
Intersection Capacity Utilization 90.0%
Analysis Period (min) 15

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s

Queues
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	61	27	3	84	919	27	4	819	23
v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02
Control Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	17.9	45.4	0.0	2.4	5.4	0.6	5.2	10.4	0.0
Queue Length 50th (m)	3.8	0.3	4.5	0.0	2.1	49.8	0.0	0.2	74.6	0.0
Queue Length 95th (m)	11.3	11.8	12.5	0.0	4.1	75.7	1.1	1.2	111.9	0.0
Internal Link Dist (m)		79.7		52.6		42.1			217.0	
Turn Bay Length (m)						10.0	65.0			10.0
Base Capacity (vph)	111	172	106	343	507	1550	1363	438	1354	1073
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.35	0.25	0.01	0.17	0.59	0.02	0.01	0.60	0.02

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	22	2	55	25	0	3	79	864	25	4	770	22
Future Volume (vph)	22	2	55	25	0	3	79	864	25	4	770	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.97		1.00	0.96		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1795	1527		1825	1574		1825	1865	1633	1825	1847	1432
Flt Permitted	0.76	1.00		0.72	1.00		0.25	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1428	1527		1378	1574		480	1865	1633	598	1847	1432
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	2	59	27	0	3	84	919	27	4	819	23
RTOR Reduction (vph)	0	55	0	0	3	0	0	0	5	0	0	7
Lane Group Flow (vph)	23	6	0	27	0	0	84	919	22	4	819	16
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	0%	3%	0%	0%	4%	14%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7	65.1	65.1	65.1
Effective Green, g (s)	5.6	5.6		5.6	5.6		74.7	74.7	74.7	65.1	65.1	65.1
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.81	0.81	0.81	0.71	0.71	0.71
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	86	92		83	95		470	1509	1321	421	1302	1010
v/s Ratio Prot		0.00			0.00		0.01	0.49			0.44	
v/s Ratio Perm	0.02			0.02			0.13		0.01	0.01		0.01
v/c Ratio	0.27	0.06		0.33	0.00		0.18	0.61	0.02	0.01	0.63	0.02
Uniform Delay, d1	41.4	40.9		41.5	40.7		4.4	3.3	1.7	4.0	7.2	4.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.3		2.3	0.0		0.2	1.8	0.0	0.0	2.3	0.0
Delay (s)	43.1	41.1		43.8	40.7		4.6	5.1	1.7	4.1	9.5	4.1
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		41.7			43.5			5.0			9.3	
Approach LOS		D			D			A			A	

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
2: Balsam Street & Harbour Street W & Highway 26

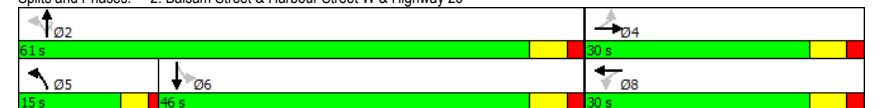
2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	24	7	91	6	184	1008	76	12	873
Future Volume (vph)	24	7	91	6	184	1008	76	12	873
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4			8	5	2		6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	11.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	15.0	61.0	61.0	46.0	46.0
Total Split (s)	30.0	30.0	30.0	30.0	15.0	61.0	61.0	46.0	46.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	16.5%	67.0%	67.0%	50.5%	50.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	13.5	13.5	13.5	13.5		55.1	55.1		40.1
Actuated g/C Ratio	0.17	0.17	0.17	0.17		0.68	0.68		0.50
v/c Ratio	0.11	0.51	0.71	0.05		0.81	0.07		0.59
Control Delay	28.6	9.0	58.4	18.9		14.0	3.6		17.1
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	28.6	9.0	58.4	18.9		14.0	3.6		17.1
LOS	C	A	E	B		B	A		B
Approach Delay		11.0		53.1		13.4			17.1
Approach LOS		B		D		B			B

Intersection Summary

Cycle Length: 91	
Actuated Cycle Length: 80.7	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 107.2%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2: Balsam Street & Harbour Street W & Highway 26

2031 Total PM

With Improvements

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	26	233	98	15	1282	82	967
v/c Ratio	0.11	0.51	0.71	0.05	0.81	0.07	0.59
Control Delay	28.6	9.0	58.4	18.9	14.0	3.6	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.6	9.0	58.4	18.9	14.0	3.6	17.1
Queue Length 50th (m)	3.4	1.0	14.3	0.8	42.6	1.9	51.9
Queue Length 95th (m)	9.8	18.3	30.1	5.4	#83.0	7.6	83.8
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	408	634	246	489	1578	1127	1632
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.37	0.40	0.03	0.81	0.07	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: Balsam Street & Harbour Street W & Highway 26

2031 Total PM

With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	24	7	209	91	6	8	184	1008	76	12	873	14
Future Volume (vph)	24	7	209	91	6	8	184	1008	76	12	873	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.98		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	0.86		1.00	0.91			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1590		1815	1619			3592	1633		3535	
Flt Permitted	0.75	1.00		0.43	1.00			0.57	1.00		0.93	
Satd. Flow (perm)	1368	1590		825	1619			2060	1633		3284	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	26	8	225	98	6	9	198	1084	82	13	939	15
RTOR Reduction (vph)	0	187	0	0	7	0	0	0	11	0	1	0
Lane Group Flow (vph)	26	46	0	98	8	0	0	1282	71	0	966	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	13.5	13.5		13.5	13.5			55.2	55.2		40.2	
Effective Green, g (s)	13.5	13.5		13.5	13.5			55.2	55.2		40.2	
Actuated g/C Ratio	0.17	0.17		0.17	0.17			0.68	0.68		0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	228	265		138	270			1617	1116		1635	
v/s Ratio Prot		0.03			0.00			c0.11				
v/s Ratio Perm	0.02			c0.12				c0.43	0.04		0.29	
v/c Ratio	0.11	0.17		0.71	0.03			0.79	0.06		0.59	
Uniform Delay, d1	28.5	28.8		31.8	28.1			8.8	4.2		14.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.3		15.8	0.0			4.1	0.1		1.6	
Delay (s)	28.7	29.1		47.5	28.2			12.9	4.3		16.0	
Level of Service	C	C		D	C			B	A		B	
Approach Delay (s)		29.1			45.0			12.4			16.0	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.6									
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			80.7						16.0			
Intersection Capacity Utilization			107.2%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings
3: Balsam Street & CT Entrance/Plaza Access

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	123	4	35	5	86	1145	8	1093
Future Volume (vph)	123	4	35	5	86	1145	8	1093
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	12.6	12.6		12.6	55.1	53.1	52.0	46.1
Actuated g/C Ratio	0.17	0.17		0.17	0.74	0.71	0.70	0.62
v/c Ratio	0.56	0.22		0.24	0.25	0.47	0.02	0.56
Control Delay	39.5	10.1		23.5	5.7	8.3	4.2	13.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	10.1		23.5	5.7	8.3	4.2	13.3
LOS	D	B		C	A	A	A	B
Approach Delay		28.9		23.5		8.1		13.2
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 74.3
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 12.2
Intersection Capacity Utilization 63.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

15 s	47 s	22 s	
15 s	47 s	22 s	

Queues
3: Balsam Street & CT Entrance/Plaza Access

2031 Total PM
With Improvements

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	73	61	91	1211	8	1237
v/c Ratio	0.56	0.22	0.24	0.25	0.47	0.02	0.56
Control Delay	39.5	10.1	23.5	5.7	8.3	4.2	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	10.1	23.5	5.7	8.3	4.2	13.3
Queue Length 50th (m)	17.5	0.5	5.3	3.3	37.3	0.4	61.8
Queue Length 95th (m)	34.3	10.6	15.3	8.3	87.6	1.5	94.1
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	299	413	323	438	2553	511	2203
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.18	0.19	0.21	0.47	0.02	0.56

Intersection Summary

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	123	4	66	35	5	18	86	1145	6	8	1093	82
Future Volume (vph)	123	4	66	35	5	18	86	1145	6	8	1093	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1821	1649			1778		1772	3576		1825	3538	
Flt Permitted	0.72	1.00			0.77		0.15	1.00		0.21	1.00	
Satd. Flow (perm)	1375	1649			1415		288	3576		404	3538	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	129	4	69	37	5	19	91	1205	6	8	1151	86
RTOR Reduction (vph)	0	60	0	0	17	0	0	0	0	0	5	0
Lane Group Flow (vph)	129	13	0	0	44	0	91	1211	0	8	1232	0
Confl. Peds. (#/hr)	1				1		2				2	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.1	10.1			10.1		56.9	51.6		48.3	47.0	
Effective Green, g (s)	10.1	10.1			10.1		56.9	51.6		48.3	47.0	
Actuated g/C Ratio	0.13	0.13			0.13		0.72	0.65		0.61	0.59	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	175	210			180		318	2335		270	2104	
v/s Ratio Prot		0.01					c0.02	c0.34		0.00	c0.35	
v/s Ratio Perm	c0.09				0.03		0.18			0.02		
v/c Ratio	0.74	0.06			0.25		0.29	0.52		0.03	0.59	
Uniform Delay, d1	33.2	30.3			31.0		5.4	7.2		6.1	9.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.9	0.1			0.7		0.5	0.8		0.0	1.2	
Delay (s)	48.1	30.4			31.7		5.9	8.0		6.2	11.1	
Level of Service	D	C			C		A	A		A	B	
Approach Delay (s)		41.7			31.7			7.9			11.1	
Approach LOS		D			C			A			B	

Intersection Summary

HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings 4: Balsam Street & Old Mountain Road/Commercial Access

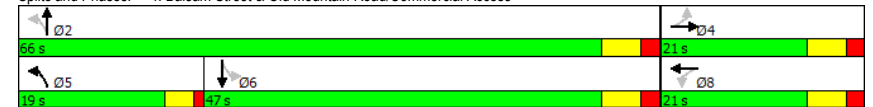
2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	96	4	18	8	188	1169	10	1095
Future Volume (vph)	96	4	18	8	188	1169	10	1095
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.0	12.0		12.0	62.0	60.0	46.3	46.3
Actuated g/C Ratio	0.14	0.14		0.14	0.74	0.71	0.55	0.55
v/c Ratio	0.53	0.54		0.25	0.55	0.51	0.05	0.63
Control Delay	43.6	10.4		30.1	11.1	6.4	12.2	15.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	10.4		30.1	11.1	6.4	12.2	15.7
LOS	D	B		C	B	A	B	B
Approach Delay		21.0		30.1		7.1		15.7
Approach LOS		C		C		A		B

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 84	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 100.9%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues
4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total PM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	104	222	38	204	1297	11	1237
v/c Ratio	0.53	0.54	0.25	0.55	0.51	0.05	0.63
Control Delay	43.6	10.4	30.1	11.1	6.4	12.2	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	10.4	30.1	11.1	6.4	12.2	15.7
Queue Length 50th (m)	15.7	0.6	4.2	7.6	39.4	0.7	62.7
Queue Length 95th (m)	30.9	18.7	12.8	22.7	60.8	3.9	108.0
Internal Link Dist (m)		175.6	57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	247	462	192	465	2550	203	1962
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.48	0.20	0.44	0.51	0.05	0.63
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
4: Balsam Street & Old Mountain Road/Commercial Access

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	96	4	201	18	8	8	188	1169	24	10	1095	43
Future Volume (vph)	96	4	201	18	8	8	188	1169	24	10	1095	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	1584			1803		1789	3568		1644	3558	
Flt Permitted	0.73	1.00			0.56		0.14	1.00		0.21	1.00	
Satd. Flow (perm)	1385	1584			1036		262	3568		368	3558	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	4	218	20	9	9	204	1271	26	11	1190	47
RTOR Reduction (vph)	0	187	0	0	8	0	0	1	0	0	3	0
Lane Group Flow (vph)	104	35	0	0	30	0	204	1296	0	11	1234	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.0	12.0			12.0		60.0	60.0		46.3	46.3	
Effective Green, g (s)	12.0	12.0			12.0		60.0	60.0		46.3	46.3	
Actuated g/C Ratio	0.14	0.14			0.14		0.71	0.71		0.55	0.55	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	226			148		363	2548		202	1961	
v/s Ratio Prot		0.02					0.06	c0.36			c0.35	
v/s Ratio Perm	c0.08				0.03		0.34			0.03		
v/c Ratio	0.53	0.16			0.20		0.56	0.51		0.05	0.63	
Uniform Delay, d1	33.4	31.6			31.8		8.2	5.4		8.7	13.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	0.3			0.7		2.0	0.7		0.5	1.5	
Delay (s)	35.9	31.9			32.5		10.1	6.1		9.2	14.5	
Level of Service	D	C			C		B	A		A	B	
Approach Delay (s)		33.2			32.5			6.7			14.5	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		12.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		84.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		100.9%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	158	797	246	279	719	736	223	452	669	564
Future Volume (vph)	158	797	246	279	719	736	223	452	669	564
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Prot	NA
Protected Phases	3	8		7	4	1	5	2	1	6
Permitted Phases	8		8	4		4	2			
Detector Phase	3	8	8	7	4	1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	11.0	34.0	34.0	18.0	41.0	31.0	27.0	27.0	31.0	31.0
Total Split (%)	10.0%	30.9%	30.9%	16.4%	37.3%	28.2%	24.5%	24.5%	28.2%	28.2%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	37.0	27.0	27.0	48.0	34.0	58.8	37.0	20.4	24.4	28.1
Actuated g/C Ratio	0.34	0.25	0.25	0.44	0.31	0.54	0.34	0.19	0.22	0.26
v/c Ratio	0.64	0.93	0.47	0.94	0.66	0.86	0.62	0.93	0.91	0.73
Control Delay	34.7	59.1	12.8	66.1	36.2	27.4	27.4	63.6	58.4	42.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	59.1	12.8	66.1	36.2	27.4	27.4	63.6	58.4	42.6
LOS	C	E	B	E	D	C	C	E	E	D
Approach Delay		46.4			37.3			53.9		50.6
Approach LOS		D			D			D		D

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 109.7

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 45.6

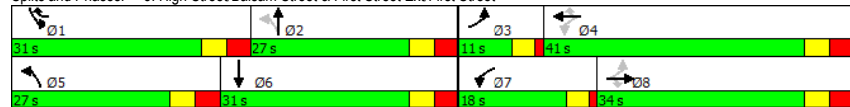
Intersection LOS: D

Intersection Capacity Utilization 94.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street



Queues
5: High Street/Balsam Street & First Street Ext/First Street

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	822	254	288	741	759	230	629	690	669
v/c Ratio	0.64	0.93	0.47	0.94	0.66	0.86	0.62	0.93	0.91	0.73
Control Delay	34.7	59.1	12.8	66.1	36.2	27.4	27.4	63.6	58.4	42.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	59.1	12.8	66.1	36.2	27.4	27.4	63.6	58.4	42.6
Queue Length 50th (m)	21.2	91.2	10.3	44.2	72.3	102.4	29.3	66.5	74.6	66.3
Queue Length 95th (m)	#35.9	#128.1	32.8	#95.2	92.5	#174.3	45.9	#100.4	#106.2	#98.2
Internal Link Dist (m)		178.2			250.8			206.8		179.2
Turn Bay Length (m)	50.0		50.0	60.0		100.0	50.0		80.0	
Base Capacity (vph)	253	880	536	306	1131	886	434	677	767	915
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.93	0.47	0.94	0.66	0.86	0.53	0.93	0.90	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 5: High Street/Balsam Street & First Street Ext/First Street

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	158	797	246	279	719	736	223	452	158	669	564	85
Future Volume (vph)	158	797	246	279	719	736	223	452	158	669	564	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1771	3579	1590	1807	3650	1571	1788	3460		3437	3537	
Flt Permitted	0.27	1.00	1.00	0.13	1.00	1.00	0.29	1.00		0.95	1.00	
Satd. Flow (perm)	512	3579	1590	245	3650	1571	540	3460		3437	3537	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	163	822	254	288	741	759	230	466	163	690	581	88
RTOR Reduction (vph)	0	0	146	0	0	42	0	32	0	0	10	0
Lane Group Flow (vph)	163	822	108	288	741	717	230	597	0	690	659	0
Confl. Peds. (#/hr)	4		12	12			4	9	2	2		9
Confl. Bikes (#/hr)							2					
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	
Protected Phases	3	8		7	4	1	5	2		1	6	
Permitted Phases	8		8	4		4	2					
Actuated Green, G (s)	34.0	27.0	27.0	45.0	34.0	58.4	37.1	20.4		24.4	28.1	
Effective Green, g (s)	34.0	27.0	27.0	45.0	34.0	58.4	37.1	20.4		24.4	28.1	
Actuated g/C Ratio	0.31	0.25	0.25	0.41	0.31	0.53	0.34	0.19		0.22	0.26	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	238	880	390	299	1130	835	372	642		763	905	
v/s Ratio Prot	0.04	0.23		c0.12	0.20	0.19	0.09	c0.17		c0.20	c0.19	
v/s Ratio Perm	0.17		0.07	c0.27		0.27	0.11					
v/c Ratio	0.68	0.93	0.28	0.96	0.66	0.86	0.62	0.93		0.90	0.73	
Uniform Delay, d1	29.7	40.5	33.5	29.4	32.8	22.2	27.8	44.0		41.6	37.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.9	16.5	0.4	41.8	1.4	8.8	3.0	20.2		14.1	2.9	
Delay (s)	37.6	57.1	33.9	71.3	34.2	30.9	30.9	64.2		55.7	40.3	
Level of Service	D	E	C	E	C	C	C	E		E	D	
Approach Delay (s)		49.8			38.8			55.3			48.1	
Approach LOS		D			D			E			D	

Intersection Summary

HCM 2000 Control Delay	46.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	109.8	Sum of lost time (s)	24.0
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings 6: Spruce Street & First Street

2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	14	1558	32	1726	24	14	27	10
Future Volume (vph)	14	1558	32	1726	24	14	27	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.7	83.9	89.5	86.1	10.1	10.1	10.1	10.1
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.06	0.60	0.12	0.65	0.19	0.19	0.22	0.18
Control Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
LOS	A	A	A	A	D	C	D	C
Approach Delay		8.3		8.3		38.0		37.0
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 9.2
Intersection Capacity Utilization 67.6%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2031 Total PM
With Improvements

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	15	1659	33	1849	25	33	28	32
v/c Ratio	0.06	0.60	0.12	0.65	0.19	0.19	0.22	0.18
Control Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	8.4	2.9	8.4	49.0	29.6	49.6	26.1
Queue Length 50th (m)	0.5	92.5	1.0	67.7	4.9	2.9	5.6	2.0
Queue Length 95th (m)	1.5	115.7	2.6	143.7	13.2	12.3	14.3	11.0
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	239	2768	274	2836	324	400	324	397
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	0.06	0.60	0.12	0.65	0.08	0.08	0.09	0.08
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2031 Total PM
With Improvements

	↖	→	↗	←	↖	↑	↗	↓	↖			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	14	1558	35	32	1726	49	24	14	17	27	10	21
Future Volume (vph)	14	1558	35	32	1726	49	24	14	17	27	10	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3566		1825	3561		1790	1654		1776	1630	
Flt Permitted	0.08	1.00		0.11	1.00		0.74	1.00		0.74	1.00	
Satd. Flow (perm)	162	3566		206	3561		1387	1654		1375	1630	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	15	1623	36	33	1798	51	25	15	18	28	10	22
RTOR Reduction (vph)	0	1	0	0	1	0	0	17	0	0	20	0
Lane Group Flow (vph)	15	1658	0	33	1848	0	25	16	0	28	12	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Effective Green, g (s)	82.7	79.9		85.5	81.3		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.77	0.74		0.79	0.75		0.07	0.07		0.07	0.07	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	167	2635		225	2678		103	123		103	122	
v/s Ratio Prot	0.00	0.46		c0.01	c0.52			0.01			0.01	
v/s Ratio Perm	0.07			0.11			0.02			c0.02		
v/c Ratio	0.09	0.63		0.15	0.69		0.24	0.13		0.27	0.10	
Uniform Delay, d1	5.9	6.9		5.0	6.9		47.1	46.7		47.2	46.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.2		0.3	1.5		1.2	0.5		1.4	0.3	
Delay (s)	6.2	8.0		5.3	8.4		48.3	47.2		48.6	46.9	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.0			8.3			47.7			47.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			9.5			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)				15.9		
Intersection Capacity Utilization			67.6%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	62	1429	28	1545	67	21	86	21
Future Volume (vph)	62	1429	28	1545	67	21	86	21
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.1	70.2	74.3	67.8	12.0	12.0	12.0	12.0
Actuated g/C Ratio	0.76	0.70	0.74	0.68	0.12	0.12	0.12	0.12
v/c Ratio	0.28	0.63	0.12	0.67	0.46	0.20	0.56	0.39
Control Delay	6.2	11.0	2.7	7.7	49.7	23.6	53.5	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	11.0	2.7	7.7	49.7	23.6	53.5	16.8
LOS	A	B	A	A	D	C	D	B
Approach Delay		10.8		7.6		39.3		33.7
Approach LOS		B		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 11.5

Intersection LOS: B

Intersection Capacity Utilization 71.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1566	29	1633	71	47	91	107
v/c Ratio	0.28	0.63	0.12	0.67	0.46	0.20	0.56	0.39
Control Delay	6.2	11.0	2.7	7.7	49.7	23.6	53.5	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	11.0	2.7	7.7	49.7	23.6	53.5	16.8
Queue Length 50th (m)	2.3	85.7	0.7	89.4	13.0	3.9	16.9	3.9
Queue Length 95th (m)	6.3	130.5	m1.2	m81.4	25.3	13.4	30.8	17.8
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	234	2474	250	2423	307	438	329	459
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	0.63	0.12	0.67	0.23	0.11	0.28	0.23

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	62	1429	59	28	1545	7	67	21	24	86	21	81
Future Volume (vph)	62	1429	59	28	1545	7	67	21	24	86	21	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3521		1755	3576		1764	1743		1782	1643	
Flt Permitted	0.09	1.00		0.12	1.00		0.69	1.00		0.73	1.00	
Satd. Flow (perm)	173	3521		214	3576		1278	1743		1362	1643	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	65	1504	62	29	1626	7	71	22	25	91	22	85
RTOR Reduction (vph)	0	2	0	0	0	0	0	22	0	0	75	0
Lane Group Flow (vph)	65	1564	0	29	1633	0	71	25	0	91	32	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	73.9	68.6		70.7	67.0		12.0	12.0		12.0	12.0	
Effective Green, g (s)	73.9	68.6		70.7	67.0		12.0	12.0		12.0	12.0	
Actuated g/C Ratio	0.74	0.69		0.71	0.67		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	211	2415		208	2395		153	209		163	197	
v/s Ratio Prot	c0.02	0.44		0.01	c0.46			0.01			0.02	
v/s Ratio Perm	0.21			0.09			0.06			c0.07		
v/c Ratio	0.31	0.65		0.14	0.68		0.46	0.12		0.56	0.16	
Uniform Delay, d1	8.0	8.9		6.4	10.0		41.0	39.3		41.5	39.5	
Progression Factor	1.00	1.00		0.62	0.59		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.4		0.2	1.1		2.2	0.3		4.1	0.4	
Delay (s)	8.8	10.2		4.2	7.0		43.2	39.5		45.6	39.9	
Level of Service	A	B		A	A		D	D		D	D	
Approach Delay (s)		10.2			7.0			41.8			42.5	
Approach LOS		B			A			D			D	

Intersection Summary

HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	76	1241	22	1181	252	38	73	66
Future Volume (vph)	76	1241	22	1181	252	38	73	66
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	62.8	57.7	60.2	52.8	25.2	15.9	23.4	13.0
Actuated g/C Ratio	0.63	0.58	0.60	0.53	0.25	0.16	0.23	0.13
v/c Ratio	0.34	0.74	0.11	0.71	0.95	0.29	0.23	0.64
Control Delay	11.1	13.3	6.3	16.5	75.7	21.5	27.9	34.7
Queue Delay	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	11.1	13.4	6.3	16.7	75.7	21.5	27.9	34.7
LOS	B	B	A	B	E	C	C	C
Approach Delay		13.3		16.6		61.9		32.7
Approach LOS		B		B		E		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 20.9
Intersection Capacity Utilization 86.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service E

Splits and Phases: 8: Pine Street & First Street

Ø1	Ø2	Ø3	Ø4
11 s	50 s	13 s	26 s
Ø5	Ø6 (R)	Ø7	Ø8
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	81	1500	23	1329	268	91	78	185
v/c Ratio	0.34	0.74	0.11	0.71	0.95	0.29	0.23	0.64
Control Delay	11.1	13.3	6.3	16.5	75.7	21.5	27.9	34.7
Queue Delay	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	11.1	13.4	6.3	16.7	75.7	21.5	27.9	34.7
Queue Length 50th (m)	1.3	14.5	1.0	118.2	44.5	7.1	11.5	20.5
Queue Length 95th (m)	m3.9	#189.1	m2.4	m128.2	#61.2	20.0	20.9	39.8
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	241	2026	213	1876	283	388	350	400
Starvation Cap Reductn	0	0	0	96	0	0	0	0
Spillback Cap Reductn	0	83	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.77	0.11	0.75	0.95	0.23	0.22	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	76	1241	169	22	1181	69	252	38	48	73	66	108
Future Volume (vph)	76	1241	169	22	1181	69	252	38	48	73	66	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3499		1825	3547		1785	1692		1744	1711	
Flt Permitted	0.10	1.00		0.08	1.00		0.40	1.00		0.70	1.00	
Satd. Flow (perm)	189	3499		161	3547		759	1692		1282	1711	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	81	1320	180	23	1256	73	268	40	51	78	70	115
RTOR Reduction (vph)	0	9	0	0	4	0	0	43	0	0	64	0
Lane Group Flow (vph)	81	1491	0	23	1325	0	268	48	0	78	121	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	60.6	54.5		54.0	51.2		24.9	15.9		20.7	13.8	
Effective Green, g (s)	60.6	54.5		54.0	51.2		24.9	15.9		20.7	13.8	
Actuated g/C Ratio	0.61	0.54		0.54	0.51		0.25	0.16		0.21	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	214	1906		133	1816		281	269		297	236	
v/s Ratio Prot	c0.02	c0.43		0.00	0.37		c0.09	0.03		0.02	0.07	
v/s Ratio Perm	0.21			0.09			c0.15			0.04		
v/c Ratio	0.38	0.78		0.17	0.73		0.95	0.18		0.26	0.51	
Uniform Delay, d1	13.2	18.0		14.5	19.0		35.5	36.4		32.9	40.0	
Progression Factor	1.05	0.60		0.69	0.74		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	2.6		0.5	2.2		40.9	0.3		0.5	1.9	
Delay (s)	14.8	13.4		10.5	16.3		76.5	36.7		33.4	41.9	
Level of Service	B	B		B	B		E	D		C	D	
Approach Delay (s)		13.5			16.2			66.4			39.4	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
9: Hurontario Street & First Street/Huron Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	20	1047	91	906	373	16
Future Volume (vph)	20	1047	91	906	373	16
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	62.8	56.0	65.4	60.6	23.7	23.7
Actuated g/C Ratio	0.63	0.56	0.65	0.61	0.24	0.24
v/c Ratio	0.06	0.73	0.42	0.45	0.92	0.21
Control Delay	2.0	6.9	12.2	12.4	66.6	11.1
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0
Total Delay	2.0	7.1	12.2	12.4	66.6	11.1
LOS	A	A	B	B	E	B
Approach Delay		7.0		12.4		55.9
Approach LOS		A		B		E

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 16.9
 Intersection LOS: B
 Intersection Capacity Utilization 77.5%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street

↰ Ø1	↱ Ø2	↰ Ø4
11 s	59 s	30 s
↰ Ø5	↱ Ø6 (R)	
11 s	59 s	

Queues
9: Hurontario Street & First Street/Huron Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	21	1420	96	965	393	94
v/c Ratio	0.06	0.73	0.42	0.45	0.92	0.21
Control Delay	2.0	6.9	12.2	12.4	66.6	11.1
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0
Total Delay	2.0	7.1	12.2	12.4	66.6	11.1
Queue Length 50th (m)	0.3	114.8	6.0	44.0	73.9	2.5
Queue Length 95th (m)	m0.5	14.1	11.7	75.8	#126.0	14.7
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	378	1956	234	2163	438	455
Starvation Cap Reductn	0	93	0	0	0	0
Spillback Cap Reductn	0	0	0	206	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.76	0.41	0.49	0.90	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	20	1047	302	91	906	10	373	16	73	0	0	0
Future Volume (vph)	20	1047	302	91	906	10	373	16	73	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1704	3452		1825	3572		1797	1629				
Flt Permitted	0.26	1.00		0.10	1.00		0.95	1.00				
Satd. Flow (perm)	459	3452		183	3572		1797	1629				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	1102	318	96	954	11	393	17	77	0	0	0
RTOR Reduction (vph)	0	26	0	0	1	0	0	59	0	0	0	0
Lane Group Flow (vph)	21	1394	0	96	964	0	393	35	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	57.8	55.2		63.6	58.1		23.7	23.7				
Effective Green, g (s)	57.8	55.2		63.6	58.1		23.7	23.7				
Actuated g/C Ratio	0.58	0.55		0.64	0.58		0.24	0.24				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	297	1905		206	2075		425	386				
v/s Ratio Prot	0.00	c0.40		c0.03	0.27			0.02				
v/s Ratio Perm	0.04			0.27			c0.22					
v/c Ratio	0.07	0.73		0.47	0.46		0.92	0.09				
Uniform Delay, d1	9.3	16.8		12.6	12.0		37.3	29.8				
Progression Factor	0.30	0.31		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	1.8		1.7	0.8		25.8	0.1				
Delay (s)	2.8	7.0		14.3	12.8		63.0	29.9				
Level of Service	A	A		B	B		E	C				
Approach Delay (s)		6.9			12.9			56.6			0.0	
Approach LOS		A			B			E			A	

Intersection Summary

HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

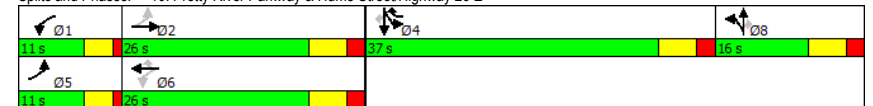
2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	102	427	38	294	530	28	57	60	788	56	140
Future Volume (vph)	102	427	38	294	530	28	57	60	788	56	140
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	26.0	11.0	26.0	37.0	16.0	16.0	16.0	37.0	37.0	37.0
Total Split (%)	12.2%	28.9%	12.2%	28.9%	41.1%	17.8%	17.8%	17.8%	41.1%	41.1%	41.1%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effect Green (s)	29.0	23.1	28.3	21.0	58.1	10.5	10.5	10.5	28.8	28.8	28.8
Actuated g/C Ratio	0.35	0.28	0.34	0.26	0.71	0.13	0.13	0.13	0.35	0.35	0.35
v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.79	0.81	0.24
Control Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
LOS	C	C	B	D	A	D	D	A	D	D	A
Approach Delay		28.6		16.1			23.9			33.0	
Approach LOS		C		B			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 82.2	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 25.8	Intersection LOS: C
Intersection Capacity Utilization 64.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	115	493	43	330	596	31	64	67	469	479	157
v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.79	0.81	0.24
Control Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	29.8	19.7	39.6	2.9	38.1	40.5	1.4	37.0	38.3	4.8
Queue Length 50th (m)	13.3	40.3	4.8	53.9	6.7	4.9	10.4	0.0	76.2	78.7	0.0
Queue Length 95th (m)	24.6	55.4	11.3	#90.3	18.5	12.9	22.1	0.0	#124.4	#128.7	11.6
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	315	1011	331	491	1285	218	229	327	674	673	718
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.49	0.13	0.67	0.46	0.14	0.28	0.20	0.70	0.71	0.22

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	102	427	12	38	294	530	28	57	60	788	56	140
Future Volume (vph)	102	427	12	38	294	530	28	57	60	788	56	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3601		1674	1921	1617	1706	1795	1484	1700	1697	1570
Flt Permitted	0.33	1.00		0.40	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	605	3601		712	1921	1617	1706	1795	1484	1700	1697	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	115	480	13	43	330	596	31	64	67	885	63	157
RTOR Reduction (vph)	0	2	0	0	0	197	0	0	61	0	0	104
Lane Group Flow (vph)	115	491	0	43	330	399	31	64	6	469	479	53
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	28.2	23.1		25.6	21.8	50.6	7.3	7.3	7.3	28.8	28.8	28.8
Effective Green, g (s)	28.2	23.1		25.6	21.8	50.6	7.3	7.3	7.3	28.8	28.8	28.8
Actuated g/C Ratio	0.33	0.27		0.30	0.26	0.60	0.09	0.09	0.09	0.34	0.34	0.34
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	268	978		257	492	1076	146	154	127	576	574	531
v/s Ratio Prot	c0.03	0.14		0.01	c0.17	0.13	0.02	c0.04	0.28	c0.28		
v/s Ratio Perm	0.12			0.04		0.12			0.00			0.03
v/c Ratio	0.43	0.50		0.17	0.67	0.37	0.21	0.42	0.05	0.81	0.83	0.10
Uniform Delay, d1	20.9	26.1		21.4	28.4	8.9	36.2	36.8	35.7	25.7	25.9	19.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.8		0.3	7.1	0.2	0.7	1.8	0.1	8.6	10.1	0.1
Delay (s)	22.0	27.9		21.7	35.5	9.1	36.9	38.6	35.8	34.3	36.0	19.3
Level of Service	C	C		C	D	A	D	D	D	C	D	B
Approach Delay (s)		26.8			18.7			37.1			32.9	
Approach LOS		C			B			D			C	

Intersection Summary

HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↔	↔	↔	↔
Traffic Volume (vph)	18	4	4	2	29	508	510	678
Future Volume (vph)	18	4	4	2	29	508	510	678
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases		4		8	2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	25.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	31.0	11.0	31.0
Total Split (s)	26.0	26.0	26.0	26.0	11.0	33.0	11.0	33.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	15.7%	47.1%	15.7%	47.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		6.0		6.0		4.0		6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		10.5		10.5		36.0		38.4
Actuated g/C Ratio		0.17		0.17		0.60		0.63
v/c Ratio		0.43		0.55		0.06		0.35
Control Delay		11.5		8.2		4.2		11.9
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		11.5		8.2		4.2		11.9
LOS		B		A		A		B
Approach Delay		11.5		8.2		11.5		22.0
Approach LOS		B		A		B		C

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 60.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 17.0
Intersection Capacity Utilization 81.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	33 s	26 s
Ø5	Ø6	Ø8
11 s	33 s	26 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2031 Total PM
With Improvements

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	142	283	32	560	560	749
v/c Ratio	0.43	0.55	0.06	0.35	0.95	0.38
Control Delay	11.5	8.2	4.2	11.9	38.4	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	8.2	4.2	11.9	38.4	9.6
Queue Length 50th (m)	2.3	0.6	1.0	19.8	24.0	16.8
Queue Length 95th (m)	15.0	17.3	3.4	32.1	#84.4	44.6
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	521	727	538	1596	592	1951
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	0.27	0.39	0.06	0.35	0.95	0.38

Intersection Summary

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

11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

With Improvements

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	63.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

12: Tenth Line & Mountain Road

With Improvements

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 29.1	Intersection LOS: C
Intersection Capacity Utilization 88.4%	ICU Level of Service E
Analysis Period (min) 15	

Ø1		Ø2		Ø3		Ø4	
25 s	38.8 s	11 s	15.2 s				
Ø6		Ø7		Ø8			
63.8 s		11 s	15.2 s				

Queues
12: Tenth Line & Mountain Road

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	700	175	410	702	166	153	83	272	128	115
v/c Ratio	0.07	0.93	0.25	0.88	0.57	0.15	0.56	0.49	0.65	0.50	0.58
Control Delay	19.6	48.7	7.8	43.0	11.1	1.3	38.2	48.1	12.8	36.2	48.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	48.7	7.8	43.0	11.1	1.3	38.2	48.1	12.8	36.2	48.0
Queue Length 50th (m)	1.7	~119.3	5.7	49.9	60.5	0.0	21.9	13.7	0.0	18.0	17.8
Queue Length 95th (m)	5.8	#188.3	18.5	#92.8	87.2	5.9	#41.2	27.5	20.9	32.8	#35.1
Internal Link Dist (m)	237.3		810.6		849.0		311.9				
Turn Bay Length (m)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Base Capacity (vph)	227	751	707	509	1240	1113	274	170	421	258	198
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.93	0.25	0.81	0.57	0.15	0.56	0.49	0.65	0.50	0.58

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	13	623	156	365	625	148	136	74	242	114	86	16
Future Volume (vph)	13	623	156	365	625	148	136	74	242	114	86	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1372	1902	1601	1825	1921	1633	1706	1537	1617	1706	1717	
Flt Permitted	0.40	1.00	1.00	0.10	1.00	1.00	0.47	1.00	1.00	0.70	1.00	
Satd. Flow (perm)	575	1902	1601	194	1921	1633	840	1537	1617	1262	1717	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	15	700	175	410	702	166	153	83	272	128	97	18
RTOR Reduction (vph)	0	0	75	0	0	60	0	0	239	0	7	0
Lane Group Flow (vph)	15	700	100	410	702	106	153	83	33	128	108	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	2			1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	35.6	35.6	35.6	58.1	58.1	58.1	21.0	11.0	11.0	15.0	8.0	
Effective Green, g (s)	35.6	35.6	35.6	58.1	58.1	58.1	21.0	11.0	11.0	15.0	8.0	
Actuated g/C Ratio	0.39	0.39	0.39	0.64	0.64	0.64	0.23	0.12	0.12	0.16	0.09	
Clearance Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	224	744	626	455	1226	1042	289	185	195	242	150	
v/s Ratio Prot	0.37			c0.18	0.37		c0.06	0.05		0.04	c0.06	
v/s Ratio Perm	0.03		0.06	c0.39		0.06	0.06		0.02	0.05		
v/c Ratio	0.07	0.94	0.16	0.90	0.57	0.10	0.53	0.45	0.17	0.53	0.72	
Uniform Delay, d1	17.3	26.7	18.0	26.1	9.4	6.4	29.7	37.2	35.9	34.3	40.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	21.4	0.5	20.7	1.9	0.2	1.8	1.7	0.4	2.1	15.1	
Delay (s)	17.9	48.0	18.5	46.8	11.3	6.6	31.4	38.9	36.3	36.4	55.5	
Level of Service	B	D	B	D	B	A	C	D	D	D	E	
Approach Delay (s)	41.7		22.1		35.3		45.4					
Approach LOS	D		C		D		D					

Intersection Summary

HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	91.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	118	730	265	704	246	341	376	94	331	153
Future Volume (vph)	118	730	265	704	246	341	376	94	331	153
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2	1	6	3	8		7	4	
Permitted Phases	2		6		8		8	4		4
Detector Phase	5	2	1	6	3	8	8	7	4	4
Switch Phase										
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	11.0	37.6	11.0	37.6	11.0	15.0	15.0	9.0	15.0	15.0
Total Split (s)	13.0	49.0	20.0	56.0	19.0	42.0	42.0	9.0	32.0	32.0
Total Split (%)	10.8%	40.8%	16.7%	46.7%	15.8%	35.0%	35.0%	7.5%	26.7%	26.7%
Yellow Time (s)	3.0	4.4	3.0	4.4	3.0	3.3	3.3	3.0	3.3	3.3
All-Red Time (s)	1.0	3.2	1.0	3.2	1.0	2.7	2.7	1.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.6	4.0	7.6	4.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	53.5	41.4	65.0	48.9	46.2	35.2	35.2	32.2	25.1	25.1
Actuated g/C Ratio	0.45	0.35	0.55	0.41	0.39	0.30	0.30	0.27	0.21	0.21
v/c Ratio	0.45	0.82	0.90	0.65	0.93	0.68	0.62	0.42	0.93	0.35
Control Delay	19.6	41.4	56.8	30.3	69.2	44.0	15.0	32.0	76.9	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	41.4	56.8	30.3	69.2	44.0	15.0	32.0	76.9	6.3
LOS	B	D	E	C	E	D	B	C	E	A
Approach Delay		38.9		36.6		39.1			50.9	
Approach LOS		D		D		D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.2

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 40.1

Intersection LOS: D

Intersection Capacity Utilization 89.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext



Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	131	995	294	943	273	379	418	104	368	170
v/c Ratio	0.45	0.82	0.90	0.65	0.93	0.68	0.62	0.42	0.93	0.35
Control Delay	19.6	41.4	56.8	30.3	69.2	44.0	15.0	32.0	76.9	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	41.4	56.8	30.3	69.2	44.0	15.0	32.0	76.9	6.3
Queue Length 50th (m)	14.6	109.7	47.1	91.4	46.8	78.0	23.1	15.6	85.0	0.0
Queue Length 95th (m)	24.7	136.1	#97.0	113.6	#98.0	111.4	56.6	27.6	#138.7	13.8
Internal Link Dist (m)		217.8		35.2		32.3			88.4	
Turn Bay Length (m)	35.0		50.0		45.0		50.0	15.0		
Base Capacity (vph)	296	1214	327	1455	292	574	687	248	410	492
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.82	0.90	0.65	0.93	0.66	0.61	0.42	0.90	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2031 Total PM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	118	730	166	265	704	145	246	341	376	94	331	153
Future Volume (vph)	118	730	166	265	704	145	246	341	376	94	331	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3448		1807	3513		1789	1902	1601	1807	1883	1586
Flt Permitted	0.22	1.00		0.11	1.00		0.14	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	419	3448		207	3513		259	1902	1601	760	1883	1586
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	131	811	184	294	782	161	273	379	418	104	368	170
RTOR Reduction (vph)	0	16	0	0	14	0	0	0	206	0	0	134
Lane Group Flow (vph)	131	979	0	294	929	0	273	379	212	104	368	36
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		4
Actuated Green, G (s)	49.9	41.4		61.4	48.9		44.1	35.1	35.1	30.1	25.1	25.1
Effective Green, g (s)	49.9	41.4		61.4	48.9		44.1	35.1	35.1	30.1	25.1	25.1
Actuated g/C Ratio	0.42	0.35		0.52	0.41		0.37	0.29	0.29	0.25	0.21	0.21
Clearance Time (s)	4.0	7.6		4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	275	1198		321	1442		288	560	471	236	396	334
v/s Ratio Prot	0.03	0.28		0.12	0.26		0.12	0.20		0.02	0.20	
v/s Ratio Perm	0.17			0.35			0.23		0.13	0.09		0.02
v/c Ratio	0.48	0.82		0.92	0.64		0.95	0.68	0.45	0.44	0.93	0.11
Uniform Delay, d1	22.4	35.4		31.0	28.1		31.7	37.0	34.2	35.9	46.1	38.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	6.2		32.7	2.2		38.8	3.2	0.7	1.3	27.8	0.1
Delay (s)	23.7	41.6		63.8	30.4		70.5	40.2	34.8	37.2	73.9	38.1
Level of Service	C	D		E	C		E	D	C	D	E	D
Approach Delay (s)		39.5			38.3			45.9			58.5	
Approach LOS		D			D			D			E	

Intersection Summary

HCM 2000 Control Delay	43.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	119.1	Sum of lost time (s)	21.6
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings

14: High Street & Cambridge Street/Third Street

2031 Total PM

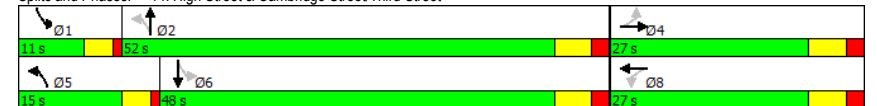
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	5	104	37	101	232	718	103	1036
Future Volume (vph)	5	104	37	101	232	718	103	1036
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	27.0	27.0	27.0	27.0	15.0	52.0	11.0	48.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	16.7%	57.8%	12.2%	53.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	16.5	16.5	16.5	16.5	57.8	47.9	51.9	42.8
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.68	0.56	0.61	0.50
v/c Ratio	0.03	0.81	0.44	0.64	0.66	0.41	0.23	0.61
Control Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
LOS	C	D	D	C	B	B	A	B
Approach Delay		37.8		32.8		13.4		16.9
Approach LOS		D		C		B		B

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 85	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 14: High Street & Cambridge Street/Third Street



Queues
14: High Street & Cambridge Street/Third Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	337	40	250	249	828	111	1117
v/c Ratio	0.03	0.81	0.44	0.64	0.66	0.41	0.23	0.61
Control Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	38.0	46.5	30.6	16.4	12.5	6.8	17.9
Queue Length 50th (m)	0.7	36.7	5.8	27.4	13.2	40.7	5.4	67.6
Queue Length 95th (m)	3.4	66.3	15.9	50.8	33.6	59.0	11.8	96.9
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	197	504	115	481	405	2018	478	1821
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	0.03	0.67	0.35	0.52	0.61	0.41	0.23	0.61
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	5	104	209	37	101	131	232	718	52	103	1036	3
Future Volume (vph)	5	104	209	37	101	131	232	718	52	103	1036	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Fr	1.00	0.90		1.00	0.92		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1713		1824	1739		1825	3572		1823	3612	
Flt Permitted	0.41	1.00		0.24	1.00		0.16	1.00		0.32	1.00	
Satd. Flow (perm)	795	1713		465	1739		301	3572		622	3612	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	5	112	225	40	109	141	249	772	56	111	1114	3
RTOR Reduction (vph)	0	85	0	0	54	0	0	5	0	0	0	0
Lane Group Flow (vph)	5	252	0	40	196	0	249	823	0	111	1117	0
Confl. Peds. (#/hr)			1	1			1		12	12		1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.5	16.5		16.5	16.5		57.4	47.9		49.3	43.8	
Effective Green, g (s)	16.5	16.5		16.5	16.5		57.4	47.9		49.3	43.8	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.67	0.56		0.57	0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	152	329		89	334		371	1991		433	1841	
v/s Ratio Prot		c0.15			0.11		c0.07	0.23		0.02	0.31	
v/s Ratio Perm	0.01			0.09			c0.37			0.13		
v/c Ratio	0.03	0.77		0.45	0.59		0.67	0.41		0.26	0.61	
Uniform Delay, d1	28.2	32.9		30.7	31.6		9.5	10.9		8.3	14.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	10.2		3.6	2.6		4.7	0.6		0.3	1.5	
Delay (s)	28.3	43.1		34.3	34.2		14.2	11.6		8.6	16.4	
Level of Service	C	D		C	C		B	B		A	B	
Approach Delay (s)		42.9			34.2			12.2			15.7	
Approach LOS		D			C			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		85.9			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		85.7%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	181	202	60	248	127	565	213	832
Future Volume (vph)	181	202	60	248	127	565	213	832
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	10.0	7.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	11.0	15.8	11.0	15.8	11.5	25.9	11.5	25.9
Total Split (s)	11.0	29.0	11.0	29.0	11.8	33.4	16.6	38.2
Total Split (%)	12.2%	32.2%	12.2%	32.2%	13.1%	37.1%	18.4%	42.4%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	32.2	24.8	31.3	22.5	37.4	28.8	44.4	32.3
Actuated g/C Ratio	0.36	0.28	0.35	0.25	0.42	0.32	0.50	0.36
v/c Ratio	0.86	0.76	0.22	0.92	0.59	0.55	0.55	0.84
Control Delay	56.8	38.3	18.9	56.6	25.9	27.3	18.0	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	38.3	18.9	56.6	25.9	27.3	18.0	32.9
LOS	E	D	B	E	C	C	B	C
Approach Delay		44.3		51.9		27.0		30.3
Approach LOS		D		D		C		C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 89.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 35.5
Intersection Capacity Utilization 86.7%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service E

Splits and Phases: 15: High Street & Sixth Street

16.6 s	33.4 s	11 s	29 s	11.8 s	33.2 s	11 s	29 s

Queues
15: High Street & Sixth Street

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	191	397	63	439	134	641	224	1085
v/c Ratio	0.86	0.76	0.22	0.92	0.59	0.55	0.55	0.84
Control Delay	56.8	38.3	18.9	56.6	25.9	27.3	18.0	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	38.3	18.9	56.6	25.9	27.3	18.0	32.9
Queue Length 50th (m)	21.7	57.4	6.6	67.9	11.8	47.9	20.8	87.1
Queue Length 95th (m)	#55.0	#103.2	14.3	#121.9	#25.7	65.4	34.2	#114.4
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	221	520	285	491	228	1157	432	1287
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	0.86	0.76	0.22	0.89	0.59	0.55	0.52	0.84

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2031 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	181	202	175	60	248	169	127	565	44	213	832	199
Future Volume (vph)	181	202	175	60	248	169	127	565	44	213	832	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	1752		1825	1783		1738	3571		1825	3494	
Flt Permitted	0.16	1.00		0.27	1.00		0.14	1.00		0.26	1.00	
Satd. Flow (perm)	298	1752		524	1783		254	3571		497	3494	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	191	213	184	63	261	178	134	595	46	224	876	209
RTOR Reduction (vph)	0	34	0	0	27	0	0	6	0	0	23	0
Lane Group Flow (vph)	191	363	0	63	412	0	134	635	0	224	1062	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.8	24.8		29.0	23.4		36.0	28.8		43.2	32.4	
Effective Green, g (s)	31.8	24.8		29.0	23.4		36.0	28.8		43.2	32.4	
Actuated g/C Ratio	0.35	0.27		0.32	0.26		0.40	0.32		0.48	0.36	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	218	481		249	462		219	1140		397	1255	
v/s Ratio Prot	c0.07	0.21		0.02	0.23		0.05	0.18		c0.07	c0.30	
v/s Ratio Perm	c0.24			0.07			0.19			0.20		
v/c Ratio	0.88	0.75		0.25	0.89		0.61	0.56		0.56	0.85	
Uniform Delay, d1	23.5	29.9		22.3	32.2		19.8	25.4		15.1	26.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.1	7.0		0.5	19.3		5.0	2.0		1.8	7.2	
Delay (s)	53.6	36.9		22.8	51.5		24.7	27.4		16.9	33.8	
Level of Service	D	D		C	D		C	C		B	C	
Approach Delay (s)		42.3			47.9			26.9			30.9	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.2	Sum of lost time (s)	20.2
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings
16: High Street & Campbell Street

2031 Total PM
With Improvements

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱	↰	↑
Traffic Volume (vph)	35	99	549	28	156	677
Future Volume (vph)	35	99	549	28	156	677
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	15.0	22.0
Total Split (s)	22.0	22.0	28.0	28.0	15.0	43.0
Total Split (%)	33.8%	33.8%	43.1%	43.1%	23.1%	66.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	10.0	10.0	31.8	31.8	42.0	41.3
Actuated g/C Ratio	0.17	0.17	0.54	0.54	0.71	0.70
v/c Ratio	0.13	0.29	0.55	0.03	0.28	0.53
Control Delay	22.1	8.1	16.0	4.8	5.0	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	8.1	16.0	4.8	5.0	7.8
LOS	C	A	B	A	A	A
Approach Delay	11.8		15.4			7.3
Approach LOS	B		B			A

Intersection Summary	
Cycle Length: 65	
Actuated Cycle Length: 58.8	
Natural Cycle: 65	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 59.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 16: High Street & Campbell Street



Queues
16: High Street & Campbell Street

2031 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	36	101	560	29	159	691
v/c Ratio	0.13	0.29	0.55	0.03	0.28	0.53
Control Delay	22.1	8.1	16.0	4.8	5.0	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.1	8.1	16.0	4.8	5.0	7.8
Queue Length 50th (m)	3.4	0.0	46.2	0.0	5.2	37.1
Queue Length 95th (m)	9.9	10.3	#85.2	3.8	10.2	62.3
Internal Link Dist (m)	320.1		196.2			1058.0
Turn Bay Length (m)				20.0		
Base Capacity (vph)	455	503	1016	874	627	1308
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	0.08	0.20	0.55	0.03	0.25	0.53

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
16: High Street & Campbell Street

2031 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	35	99	549	28	156	677
Future Volume (vph)	35	99	549	28	156	677
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.99	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1674	1580	1883	1594	1771	1865
Flt Permitted	0.95	1.00	1.00	1.00	0.30	1.00
Satd. Flow (perm)	1674	1580	1883	1594	560	1865
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	36	101	560	29	159	691
RTOR Reduction (vph)	0	88	0	14	0	0
Lane Group Flow (vph)	36	13	560	15	159	691
Confl. Peds. (#/hr)	1		2		2	
Heavy Vehicles (%)	9%	2%	2%	0%	3%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	8.0	8.0	30.5	30.5	40.8	40.8
Effective Green, g (s)	8.0	8.0	30.5	30.5	40.8	40.8
Actuated g/C Ratio	0.13	0.13	0.50	0.50	0.67	0.67
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	220	207	944	799	501	1251
v/s Ratio Prot	c0.02		0.30		0.03	c0.37
v/s Ratio Perm		0.01		0.01	0.18	
v/c Ratio	0.16	0.06	0.59	0.02	0.32	0.55
Uniform Delay, d1	23.4	23.1	10.7	7.6	5.0	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	2.7	0.0	0.4	1.8
Delay (s)	23.8	23.3	13.5	7.7	5.4	7.0
Level of Service	C	C	B	A	A	A
Approach Delay (s)	23.4		13.2		6.7	
Approach LOS	C		B		A	

Intersection Summary

HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings
17: Hurontario Street & Hume Street

2031 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	385	287	372	301	216	486
Future Volume (vph)	385	287	372	301	216	486
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	21.9	21.9	30.1	30.1		41.2
Actuated g/C Ratio	0.29	0.29	0.40	0.40		0.54
v/c Ratio	0.79	0.46	0.53	0.40		0.59
Control Delay	36.4	4.9	21.6	3.9		13.9
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	36.4	4.9	21.6	3.9		13.9
LOS	D	A	C	A		B
Approach Delay	23.0		13.7			13.9
Approach LOS	C		B			B

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 75.7
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 16.8
 Intersection Capacity Utilization 87.1%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2031 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	418	312	404	327	763
v/c Ratio	0.79	0.46	0.53	0.40	0.59
Control Delay	36.4	4.9	21.6	3.9	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	4.9	21.6	3.9	13.9
Queue Length 50th (m)	54.5	0.0	42.9	0.0	31.0
Queue Length 95th (m)	84.8	15.8	76.6	15.5	50.4
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	677	786	764	815	1296
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.62	0.40	0.53	0.40	0.59

Intersection Summary

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2031 Total PM
With Improvements

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	385	287	372	301	216	486
Future Volume (vph)	385	287	372	301	216	486
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1825	1586	1921	1559	3555	3555
Flt Permitted	0.95	1.00	1.00	1.00	0.62	0.62
Satd. Flow (perm)	1825	1586	1921	1559	2234	2234
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	418	312	404	327	235	528
RTOR Reduction (vph)	0	222	0	197	0	0
Lane Group Flow (vph)	418	90	404	130	0	763
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	21.9	21.9	30.2	30.2		41.2
Effective Green, g (s)	21.9	21.9	30.2	30.2		41.2
Actuated g/C Ratio	0.29	0.29	0.40	0.40		0.54
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	527	458	766	621		1338
v/s Ratio Prot	c0.23		0.21			c0.05
v/s Ratio Perm		0.06		0.08		c0.26
v/c Ratio	0.79	0.20	0.53	0.21		0.57
Uniform Delay, d1	24.8	20.3	17.3	14.9		11.4
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	8.0	0.2	2.6	0.8		1.8
Delay (s)	32.8	20.5	19.9	15.7		13.2
Level of Service	C	C	B	B		B
Approach Delay (s)	27.6		18.0			13.2
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.7	Sum of lost time (s)	16.6
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Timings
18: County Road 32 & Sixth Street & Tenth Line

2031 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	34	237	67	192	39	289	153	241
Future Volume (vph)	34	237	67	192	39	289	153	241
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)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	28.0	28.0	28.0	28.0	32.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	46.7%	46.7%	53.3%	53.3%	53.3%	53.3%
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	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	14.2	14.2	14.2	14.2	14.5	14.5	14.5	14.5
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35
v/c Ratio	0.14	0.55	0.21	0.65	0.11	0.57	0.47	0.44
Control Delay	12.2	14.1	12.4	14.5	10.7	14.8	16.4	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	14.1	12.4	14.5	10.7	14.8	16.4	12.6
LOS	B	B	B	B	B	B	B	B
Approach Delay		13.9		14.2		14.4		14.0
Approach LOS		B		B		B		B

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 41.3
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 14.1
Intersection Capacity Utilization 78.3%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 18: County Road 32 & Sixth Street & Tenth Line

↰ 02	↱ 04
32 s	28 s
↰ 06	↱ 08
32 s	28 s

Queues
18: County Road 32 & Sixth Street & Tenth Line

2031 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	350	71	433	41	359	163	288
v/c Ratio	0.14	0.55	0.21	0.65	0.11	0.57	0.47	0.44
Control Delay	12.2	14.1	12.4	14.5	10.7	14.8	16.4	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	14.1	12.4	14.5	10.7	14.8	16.4	12.6
Queue Length 50th (m)	1.5	15.0	3.0	16.1	1.7	16.7	7.7	12.8
Queue Length 95th (m)	7.6	44.4	12.3	50.7	7.4	44.6	24.9	34.7
Internal Link Dist (m)		587.3		1205.1		566.2		326.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	413	1025	566	1019	720	1240	689	1292
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	0.09	0.34	0.13	0.42	0.06	0.29	0.24	0.22
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2031 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	34	237	92	67	192	215	39	289	49	153	241	30
Future Volume (vph)	34	237	92	67	192	215	39	289	49	153	241	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1644	1797		1789	1732		1674	1764		1772	1840	
Flt Permitted	0.42	1.00		0.54	1.00		0.58	1.00		0.53	1.00	
Satd. Flow (perm)	735	1797		1009	1732		1028	1764		983	1840	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	36	252	98	71	204	229	41	307	52	163	256	32
RTOR Reduction (vph)	0	24	0	0	69	0	0	12	0	0	8	0
Lane Group Flow (vph)	36	326	0	71	364	0	41	347	0	163	280	0
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	11%	1%	4%	2%	0%	4%	9%	7%	4%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.2	14.2		14.2	14.2		14.5	14.5		14.5	14.5	
Effective Green, g (s)	14.2	14.2		14.2	14.2		14.5	14.5		14.5	14.5	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.36	0.36		0.36	0.36	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	256	626		352	604		366	628		350	655	
v/s Ratio Prot		0.18			c0.21			c0.20			0.15	
v/s Ratio Perm	0.05			0.07			0.04			0.17		
v/c Ratio	0.14	0.52		0.20	0.60		0.11	0.55		0.47	0.43	
Uniform Delay, d1	9.1	10.5		9.3	10.9		8.8	10.5		10.1	9.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8		0.3	1.7		0.1	1.1		1.0	0.4	
Delay (s)	9.3	11.3		9.6	12.6		8.9	11.6		11.1	10.4	
Level of Service	A	B		A	B		A	B		B	B	
Approach Delay (s)		11.1			12.2			11.3			10.6	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay		11.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.58										
Actuated Cycle Length (s)		40.7			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		78.3%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2031 Total PM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	30	103	16	36	84	151	8	152	20	166	145	35
Future Volume (vph)	30	103	16	36	84	151	8	152	20	166	145	35
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	34	118	18	41	97	174	9	175	23	191	167	40
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	170	138	174	207	398							
Volume Left (vph)	34	41	0	9	191							
Volume Right (vph)	18	0	174	23	40							
Hadj (s)	0.31	0.47	-0.56	-0.03	0.13							
Departure Headway (s)	6.9	7.2	6.2	6.2	5.9							
Degree Utilization, x	0.32	0.28	0.30	0.36	0.66							
Capacity (veh/h)	462	461	537	525	581							
Control Delay (s)	13.1	11.8	10.6	12.6	19.6							
Approach Delay (s)	13.1	11.1		12.6	19.6							
Approach LOS	B	B		B	C							
Intersection Summary												
Delay			14.8									
Level of Service			B									
Intersection Capacity Utilization			53.3%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2031 Total PM
With Improvements

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	650	543	52	74	178
Future Volume (Veh/h)	90	650	543	52	74	178
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	101	730	610	58	83	200
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	668				1571	639
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	668				1571	639
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	88				22	58
cM capacity (veh/h)	815				106	474
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	831	668	83	200		
Volume Left	101	0	83	0		
Volume Right	0	58	0	200		
cSH	815	1700	106	474		
Volume to Capacity	0.12	0.39	0.78	0.42		
Queue Length 95th (m)	3.2	0.0	32.7	15.7		
Control Delay (s)	3.1	0.0	108.8	18.0		
Lane LOS	A		F	C		
Approach Delay (s)	3.1	0.0	44.7			
Approach LOS			E			
Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			85.0%	ICU Level of Service	E	
Analysis Period (min)			15			



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix G

Signal Warrants

Signal Warrants

Major Street: High Street

Minor Street: Campbell Street

Scenario: 2031 Total Traffic

T-Intersection: Yes ☒ No ☐

Number of Lanes: 1 Lane ☒ 2 or More Lanes ☐

Flow Condition: Urban (Restricted Flow) ☒ Rural (Free Flow) ☐

Warrant 1 - Minimum Vehicular Volume (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	All Aproaches	720	1080	900	1350	697	97	39
AM Peak			1243					
PM Peak			1544					
Criteria	Minor Street Approaches	180	255	180	255	70	39	
AM Peak			147					
PM Peak			134					

*Number is the Average Hourly Volume (AHV)

80% Satisfied: NO
100% Satisfied: NO
120% Satisfied: NO

Warrant 2 - Delay to Cross Traffic (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	Major Street Approaches	720	1080	900	1350	627	87	71
AM Peak			1096					
PM Peak			1410					
Criteria	Traffic Crossing Major Street	75	113	75	113	53	71	
AM Peak			99					
PM Peak			113					

*Number is the Average Hourly Volume (AHV)

80% Satisfied: NO
100% Satisfied: NO
120% Satisfied: NO

Signal Warrants

Major Street: Tenth Line

Minor Street: Sixth Street

Scenario: 2031 Total Traffic

T-Intersection: Yes ☐ No ☒

Number of Lanes: 1 Lane ☒ 2 or More Lanes ☐

Flow Condition: Urban (Restricted Flow) ☐ Rural (Free Flow) ☒

Warrant 1 - Minimum Vehicular Volume

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	All Aproaches	480	720	600	900	747	156	156
AM Peak		1350						
PM Peak		1638						
Criteria	Minor Street Approaches	120	170	120	170	350	292	
AM Peak		564						
PM Peak		837						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: YES
100% Satisfied: YES
120% Satisfied: YES
150% Satisfied: YES

Warrant 2 - Delay to Cross Traffic

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	Major Street Approaches	480	720	600	900	397	83	83
AM Peak		786						
PM Peak		801						
Criteria	Traffic Crossing Major Street	50	75	50	75	148	295	
AM Peak		252						
PM Peak		338						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: YES
100% Satisfied: NO
120% Satisfied: NO
150% Satisfied: NO

Signal Warrants

Major Street: Poplar Sideroad

Minor Street: Raglan Street

Scenario: 2031 Total Traffic

T-Intersection: Yes ☒ No ☐

Number of Lanes: 1 Lane ☒ 2 or More Lanes ☐

Flow Condition: Urban (Restricted Flow) ☐ Rural (Free Flow) ☒

Warrant 1 - Minimum Vehicular Volume (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	All Aproaches	720	1080	900	1350	766	106	47
AM Peak		1477						
PM Peak		1587						
Criteria	Minor Street Approaches	180	255	180	255	85	47	
AM Peak		88						
PM Peak		252						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: NO
100% Satisfied: NO
120% Satisfied: NO

Warrant 2 - Delay to Cross Traffic (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	Major Street Approaches	720	1080	900	1350	681	95	29
AM Peak		1389						
PM Peak		1335						
Criteria	Traffic Crossing Major Street	75	113	75	113	22	29	
AM Peak		14						
PM Peak		74						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: NO
100% Satisfied: NO
120% Satisfied: NO

Signal Warrants

Major Street: Poplar Sideroad

Minor Street: Raglan Street

Scenario: 2041 Total Traffic

T-Intersection: Yes ☒ No ☐

Number of Lanes: 1 Lane ☒ 2 or More Lanes ☐

Flow Condition: Urban (Restricted Flow) ☐ Rural (Free Flow) ☒

Warrant 1 - Minimum Vehicular Volume (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	All Aproaches	720	1080	900	1350	1167	162	74
AM Peak		2265						
PM Peak		2403						
Criteria	Minor Street Approaches	180	255	180	255	133	74	
AM Peak		184						
PM Peak		346						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: NO
100% Satisfied: NO
120% Satisfied: NO

Warrant 2 - Delay to Cross Traffic (T-Intersection Criteria)

Volume	Approach Lanes	1		2 or more		Section Compliance		Entire %
	Flow Condition	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Number*	%	
Criteria	Major Street Approaches	720	1080	900	1350	1035	144	115
AM Peak		2081						
PM Peak		2057						
Criteria	Traffic Crossing Major Street	75	113	75	113	87	115	
AM Peak		220						
PM Peak		126						

*Number is the Average Hourly Volume (AHV)

80% Satisfied: YES
100% Satisfied: YES
120% Satisfied: NO



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix H

2041 Total Traffic Operations (Synchro)

Timings
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	28	0	18	0	83	679	5	1040	24
Future Volume (vph)	28	0	18	0	83	679	5	1040	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8		5		2	6
Permitted Phases	4		8		2		2		6
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	73.0	71.0	71.0	62.2	62.2
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.81	0.79	0.79	0.69	0.69
v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04
Control Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
LOS	D	B	D	A	B	A	A	C	A
Approach Delay		16.0		40.1		6.0		25.7	
Approach LOS		B		D		A		C	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 17.5
Intersection Capacity Utilization 93.9%
Analysis Period (min) 15

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s

Queues
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	32	170	20	3	94	772	6	1182	27
v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04
Control Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Length 50th (m)	5.3	0.0	3.3	0.0	2.3	36.6	0.0	163.8	0.0
Queue Length 95th (m)	13.8	10.5	10.2	0.0	13.9	52.0	0.0	#266.4	0.0
Internal Link Dist (m)		79.7		52.6		42.1		217.0	
Turn Bay Length (m)							10.0		10.0
Base Capacity (vph)	112	310	85	409	217	1457	1295	1289	763
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	28	0	150	18	0	3	83	679	5	0	1040	24
Future Volume (vph)	28	0	150	18	0	3	83	679	5	0	1040	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1825	1541		1825	1633		1755	1847	1633		1865	1067
Flt Permitted	0.76	1.00		0.57	1.00		0.06	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1452	1541		1098	1633		112	1847	1633		1865	1067
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	32	0	170	20	0	3	94	772	6	0	1182	27
RTOR Reduction (vph)	0	157	0	0	3	0	0	0	1	0	0	9
Lane Group Flow (vph)	32	13	0	20	0	0	94	772	5	0	1182	18
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	4%	4%	0%	0%	3%	53%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	4			8			5	2		6		
Permitted Phases	4			8			2		6			
Actuated Green, G (s)	7.0	7.0		7.0	7.0		71.8	71.8	71.8		62.2	62.2
Effective Green, g (s)	7.0	7.0		7.0	7.0		71.8	71.8	71.8		62.2	62.2
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.79	0.79	0.79		0.69	0.69
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	111	118		84	125		189	1460	1291		1277	730
v/s Ratio Prot		0.01			0.00		0.03	c0.42			c0.63	
v/s Ratio Perm	c0.02			0.02			0.36		0.00			0.02
v/c Ratio	0.29	0.11		0.24	0.00		0.50	0.53	0.00		0.93	0.03
Uniform Delay, d1	39.5	39.0		39.4	38.7		20.6	3.4	2.0		12.3	4.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.4		1.5	0.0		2.1	1.4	0.0		12.7	0.1
Delay (s)	41.0	39.4		40.9	38.7		22.6	4.8	2.0		25.0	4.6
Level of Service	D	D		D	D		C	A	A		C	A
Approach Delay (s)		39.7			40.6			6.7			24.6	
Approach LOS		D			D			A			C	

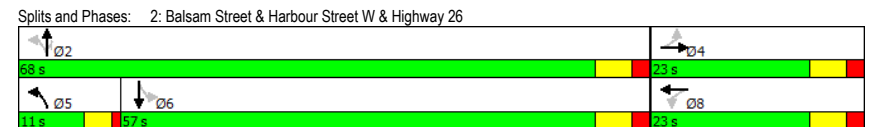
Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings
2: Balsam Street & Harbour Street W & Highway 26

2041 Total AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	7	10	82	9	112	801	117	27	1228
Future Volume (vph)	7	10	82	9	112	801	117	27	1228
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2		6	
Permitted Phases		4		8	2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	7.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	11.0	61.0	61.0	46.0	46.0
Total Split (s)	23.0	23.0	23.0	23.0	11.0	68.0	68.0	57.0	57.0
Total Split (%)	25.3%	25.3%	25.3%	25.3%	12.1%	74.7%	74.7%	62.6%	62.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0		6.0	6.0		6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	13.9	13.9	13.9	13.9		62.1	62.1		51.1
Actuated g/C Ratio	0.16	0.16	0.16	0.16		0.71	0.71		0.58
v/c Ratio	0.04	0.59	0.79	0.17		0.77	0.12		0.80
Control Delay	31.0	17.9	76.6	15.7		12.3	3.4		19.1
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	31.0	17.9	76.6	15.7		12.3	3.4		19.1
LOS	C	B	E	B		B	A		B
Approach Delay		18.4		56.9		11.3			19.1
Approach LOS		B		E		B			B

Intersection Summary	
Cycle Length: 91	
Actuated Cycle Length: 88	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 17.7	Intersection LOS: B
Intersection Capacity Utilization 106.7%	ICU Level of Service G
Analysis Period (min) 15	



Queues 2041 Total AM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	8	226	96	46	1074	138	1482
v/c Ratio	0.04	0.59	0.79	0.17	0.77	0.12	0.80
Control Delay	31.0	17.9	76.6	15.7	12.3	3.4	19.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	17.9	76.6	15.7	12.3	3.4	19.1
Queue Length 50th (m)	1.2	9.8	15.8	1.6	37.6	4.3	100.4
Queue Length 95th (m)	4.6	27.1	#34.9	9.6	46.8	9.3	120.4
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0		5.0		
Base Capacity (vph)	270	433	149	333	1394	1166	1861
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.52	0.64	0.14	0.77	0.12	0.80

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis 2041 Total AM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	7	10	182	82	9	30	112	801	117	27	1228	4
Future Volume (vph)	7	10	182	82	9	30	112	801	117	27	1228	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.86		1.00	0.89			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1825	1567		1787	1577			3484	1633		3541	
Flt Permitted	0.73	1.00		0.41	1.00			0.53	1.00		0.90	
Satd. Flow (perm)	1397	1567		774	1577			1844	1633		3207	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	8	12	214	96	11	35	132	942	138	32	1445	5
RTOR Reduction (vph)	0	136	0	0	29	0	0	0	15	0	0	0
Lane Group Flow (vph)	8	90	0	96	17	0	0	1074	123	0	1482	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	13.9	13.9		13.9	13.9			62.1	62.1		51.1	
Effective Green, g (s)	13.9	13.9		13.9	13.9			62.1	62.1		51.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.71	0.71		0.58	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	220	247		122	249			1431	1152		1862	
v/s Ratio Prot		0.06			0.01			c0.06				
v/s Ratio Perm	0.01			c0.12				0.47	0.08		c0.46	
v/c Ratio	0.04	0.37		0.79	0.07			0.75	0.11		0.80	
Uniform Delay, d1	31.4	33.1		35.6	31.5			8.1	4.1		14.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.9		27.6	0.1			3.7	0.2		3.6	
Delay (s)	31.4	34.0		63.2	31.6			11.8	4.3		18.0	
Level of Service	C	C		E	C			B	A		B	
Approach Delay (s)		33.9			53.0			10.9			18.0	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.0			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		88.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		106.7%			ICU Level of Service			G				
Analysis Period (min)		15										

c Critical Lane Group

Timings 2041 Total AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	31	0	23	3	64	1070	4	1480
Future Volume (vph)	31	0	23	3	64	1070	4	1480
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.4	10.4		10.4	53.1	52.7	51.4	48.5
Actuated g/C Ratio	0.16	0.16		0.16	0.80	0.79	0.77	0.73
v/c Ratio	0.19	0.06		0.18	0.27	0.46	0.01	0.72
Control Delay	30.8	0.2		27.5	6.9	6.3	3.0	14.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	0.2		27.5	6.9	6.3	3.0	14.4
LOS	C	A		C	A	A	A	B
Approach Delay		18.5		27.5		6.3		14.3
Approach LOS		B		C		A		B

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 66.5
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 11.3 Intersection LOS: B
Intersection Capacity Utilization 70.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

↩	↩	↩
15 s	47 s	22 s
↩	↩	↩
15 s	47 s	22 s

Queues 2041 Total AM
3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	25	38	77	1290	5	1842
v/c Ratio	0.19	0.06	0.18	0.27	0.46	0.01	0.72
Control Delay	30.8	0.2	27.5	6.9	6.3	3.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	0.2	27.5	6.9	6.3	3.0	14.4
Queue Length 50th (m)	4.7	0.0	4.0	2.4	36.3	0.2	115.9
Queue Length 95th (m)	11.7	0.0	11.1	6.4	72.0	0.8	#136.6
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	315	583	323	383	2781	545	2568
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.04	0.12	0.20	0.46	0.01	0.72

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	31	0	21	23	3	5	64	1070	1	4	1480	49
Future Volume (vph)	31	0	21	23	3	5	64	1070	1	4	1480	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1614		1706	3509		1825	3516	
Flt Permitted	0.74	1.00			0.77		0.08	1.00		0.19	1.00	
Satd. Flow (perm)	1271	1633			1283		145	3509		368	3516	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	37	0	25	28	4	6	77	1289	1	5	1783	59
RTOR Reduction (vph)	0	23	0	0	6	0	0	0	0	0	2	0
Lane Group Flow (vph)	37	2	0	0	32	0	77	1290	0	5	1840	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.4	5.4			5.4		53.6	49.7		48.2	47.0	
Effective Green, g (s)	5.4	5.4			5.4		53.6	49.7		48.2	47.0	
Actuated g/C Ratio	0.07	0.07			0.07		0.74	0.69		0.67	0.65	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	94	121			95		191	2412		269	2285	
v/s Ratio Prot		0.00					0.02	0.37		0.00	0.52	
v/s Ratio Perm	0.03				0.03		0.28			0.01		
v/c Ratio	0.39	0.02			0.34		0.40	0.53		0.02	0.81	
Uniform Delay, d1	31.9	31.0			31.8		8.9	5.6		4.2	9.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.1			2.1		1.4	0.9		0.0	3.1	
Delay (s)	34.6	31.0			33.9		10.3	6.4		4.2	12.4	
Level of Service	C	C			C		B	A		A	B	
Approach Delay (s)		33.2			33.9			6.7			12.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	72.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings

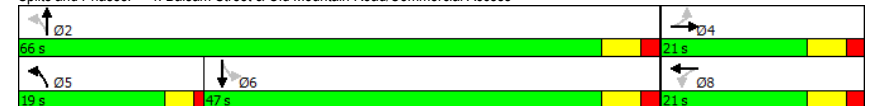
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total AM

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	42	0	0	82	1111	1	1408
Future Volume (vph)	42	0	0	82	1111	1	1408
Turn Type	Perm	NA	NA	pm+pt	NA	Perm	NA
Protected Phases		4	8	5	2		6
Permitted Phases	4			2		6	
Detector Phase	4	4	8	5	2	6	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag		Lag
Lead-Lag Optimize?			Yes		Yes		Yes
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	10.4	10.4	10.4	65.1	64.3	55.1	55.1
Actuated g/C Ratio	0.13	0.13	0.13	0.79	0.78	0.67	0.67
v/c Ratio	0.30	0.11	0.01	0.42	0.51	0.00	0.78
Control Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
LOS	D	A	A	B	A	A	B
Approach Delay		19.1			5.8		16.3
Approach LOS		B			A		B

Intersection Summary	
Cycle Length: 87	
Actuated Cycle Length: 82.2	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2041 Total AM

4: Balsam Street & Old Mountain Road/Commercial Access

							
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	52	52	2	101	1376	1	1829
v/c Ratio	0.30	0.11	0.01	0.42	0.51	0.00	0.78
Control Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Length 50th (m)	7.6	0.0	0.0	3.2	40.5	0.1	114.0
Queue Length 95th (m)	15.9	0.0	0.0	11.8	49.1	0.7	134.1
Internal Link Dist (m)	175.6		57.5	179.2		181.9	
Turn Bay Length (m)				70.0	70.0		
Base Capacity (vph)	251	536	271	390	2714	253	2357
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.10	0.01	0.26	0.51	0.00	0.78
Intersection Summary							

HCM Signalized Intersection Capacity Analysis

2041 Total AM

4: Balsam Street & Old Mountain Road/Commercial Access

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	0	42	0	0	2	82	1111	3	1	1408	74
Future Volume (vph)	42	0	42	0	0	2	82	1111	3	1	1408	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.86		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1609			1088		1722	3470		1825	3513	
Flt Permitted	0.76	1.00			1.00		0.07	1.00		0.20	1.00	
Satd. Flow (perm)	1376	1609			1088		125	3470		378	3513	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	52	0	52	0	0	2	101	1372	4	1	1738	91
RTOR Reduction (vph)	0	47	0	0	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	52	5	0	0	0	0	101	1376	0	1	1826	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.4	8.4			8.4		63.9	63.9		53.9	53.9	
Effective Green, g (s)	8.4	8.4			8.4		63.9	63.9		53.9	53.9	
Actuated g/C Ratio	0.10	0.10			0.10		0.76	0.76		0.64	0.64	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	137	160			108		208	2630		241	2246	
v/s Ratio Prot		0.00			0.00		0.03	c0.40			c0.52	
v/s Ratio Perm	c0.04						0.33			0.00		
v/c Ratio	0.38	0.03			0.00		0.49	0.52		0.00	0.81	
Uniform Delay, d1	35.5	34.3			34.2		12.5	4.1		5.5	11.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.1			0.0		1.8	0.7		0.0	3.4	
Delay (s)	37.3	34.4			34.2		14.3	4.8		5.5	14.8	
Level of Service	D	C			C		B	A		A	B	
Approach Delay (s)		35.8			34.2			5.5			14.8	
Approach LOS		D			C			A			B	
Intersection Summary												
HCM 2000 Control Delay	11.4				HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio	0.75											
Actuated Cycle Length (s)	84.3				Sum of lost time (s)				16.0			
Intersection Capacity Utilization	87.1%				ICU Level of Service				E			
Analysis Period (min)	15											
c Critical Lane Group												

Timings 2041 Total AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	79	658	147	507	613	174	512	756	589
Future Volume (vph)	79	658	147	507	613	174	512	756	589
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	12.0	41.0	11.0	40.0	45.0	33.0	33.0	45.0	45.0
Total Split (%)	9.2%	31.5%	8.5%	30.8%	34.6%	25.4%	25.4%	34.6%	34.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	44.8	34.0	43.2	33.2	72.2	26.5	26.5	38.5	38.5
Actuated g/C Ratio	0.34	0.26	0.33	0.26	0.56	0.20	0.20	0.30	0.30
v/c Ratio	0.44	1.17	1.11	0.68	0.84	0.58	1.24	1.22	1.20
Control Delay	34.3	128.1	135.5	48.2	22.2	53.8	158.8	155.6	141.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	128.1	135.5	48.2	22.2	53.8	158.8	155.6	141.7
LOS	C	F	F	D	C	D	F	F	F
Approach Delay		120.4		45.7		138.7		146.3	
Approach LOS		F		D		F		F	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 111.4
Intersection Capacity Utilization 102.1%
Analysis Period (min) 15
Intersection LOS: F
ICU Level of Service G

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↔ 02	↔ 06	↔ 03	↔ 04
83 s	45 s	12 s	40 s
		↔ 07	↔ 08
		11 s	41 s

Queues 2041 Total AM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	96	1065	179	618	748	212	896	581	1171
v/c Ratio	0.44	1.17	1.11	0.68	0.84	0.58	1.24	1.22	1.20
Control Delay	34.3	128.1	135.5	48.2	22.2	53.8	158.8	155.6	141.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	128.1	135.5	48.2	22.2	53.8	158.8	155.6	141.7
Queue Length 50th (m)	16.3	~167.5	~34.7	75.6	86.6	49.4	~144.6	~200.2	~200.2
Queue Length 95th (m)	26.0	#178.9	#68.9	85.5	102.6	67.3	#159.1	#239.3	#209.7
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	221	913	161	904	894	368	725	477	972
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	1.17	1.11	0.68	0.84	0.58	1.24	1.22	1.20

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total AM

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	↗
Traffic Volume (vph)	79	658	216	147	507	613	174	512	223	756	589	92
Future Volume (vph)	79	658	216	147	507	613	174	512	223	756	589	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1689	3399		1825	3544	1530	1807	3379		1612	3263	
Flt Permitted	0.23	1.00		0.12	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (perm)	412	3399		231	3544	1530	1807	3379		1612	3263	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	96	802	263	179	618	748	212	624	272	922	718	112
RTOR Reduction (vph)	0	24	0	0	0	45	0	37	0	0	6	0
Lane Group Flow (vph)	96	1041	0	179	618	703	212	859	0	581	1165	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	41.8	34.0		40.2	33.2	71.7	26.5	26.5		38.5	38.5	
Effective Green, g (s)	41.8	34.0		40.2	33.2	71.7	26.5	26.5		38.5	38.5	
Actuated g/C Ratio	0.32	0.26		0.31	0.26	0.55	0.20	0.20		0.30	0.30	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	888		157	905	843	368	688		477	966	
v/s Ratio Prot	0.03	c0.31		c0.06	0.17	0.25	0.12	c0.25		c0.36	0.36	
v/s Ratio Perm	0.12			0.29		0.21						
v/c Ratio	0.46	1.17		1.14	0.68	0.83	0.58	1.25		1.22	1.21	
Uniform Delay, d1	32.7	48.0		41.3	43.7	24.2	46.7	51.8		45.8	45.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	89.3		114.5	2.1	7.1	2.2	123.5		116.0	102.7	
Delay (s)	34.3	137.3		155.7	45.8	31.3	48.9	175.2		161.7	148.5	
Level of Service	C	F		F	D	C	D	F		F	F	
Approach Delay (s)		128.8			51.5		151.0			152.9		
Approach LOS		F			D		F			F		

Intersection Summary

HCM 2000 Control Delay	119.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2041 Total AM

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗				
Traffic Volume (vph)	5	1603	25	1270	10	2	13	4				
Future Volume (vph)	5	1603	25	1270	10	2	13	4				
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA				
Protected Phases	5	2	1	6		4		8				
Permitted Phases	2		6									
Detector Phase	5	2	1	6	4	4	8	8				
Switch Phase												
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0				
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1				
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1				
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%				
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3				
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8				
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1				
Lead/Lag	Lead	Lag	Lead	Lag								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Recall Mode	None	Max	None	C-Max	None	None	None	None				
Act Effct Green (s)	92.0	88.4	93.6	92.8	10.0	10.0	10.0	10.0				
Actuated g/C Ratio	0.85	0.82	0.87	0.86	0.09	0.09	0.09	0.09				
v/c Ratio	0.02	0.66	0.13	0.51	0.09	0.23	0.12	0.05				
Control Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4				
LOS	A	A	A	A	D	B	D	D				
Approach Delay		9.0		4.7		25.0		43.3				
Approach LOS		A		A		C		D				

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 7.6
Intersection Capacity Utilization 63.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2041 Total AM

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	1925	30	1523	12	41	15	9
v/c Ratio	0.02	0.66	0.13	0.51	0.09	0.23	0.12	0.05
Control Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
Queue Length 50th (m)	0.3	125.2	0.9	47.6	2.4	0.4	2.9	1.0
Queue Length 95th (m)	0.7	131.0	2.1	86.7	7.6	9.4	8.8	5.3
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	343	2917	228	3009	333	387	322	415
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	0.02	0.66	0.13	0.51	0.04	0.11	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Total AM

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 			 		
Traffic Volume (vph)	5	1603	14	25	1270	9	10	2	33	13	4	3	
Future Volume (vph)	5	1603	14	25	1270	9	10	2	33	13	4	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00		
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1825	3568		1825	3506		1815	1515		1778	1779		
Flt Permitted	0.15	1.00		0.07	1.00		0.75	1.00		0.73	1.00		
Satd. Flow (perm)	285	3568		138	3506		1437	1515		1367	1779		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
Adj. Flow (vph)	6	1908	17	30	1512	11	12	2	39	15	5	4	
RTOR Reduction (vph)	0	0	0	0	0	0	0	37	0	0	4	0	
Lane Group Flow (vph)	6	1925	0	30	1523	0	12	4	0	15	5	0	
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1	
Confl. Bikes (#/hr)			1										
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		
Permitted Phases	2			6			4			8			
Actuated Green, G (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0		
Effective Green, g (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0		
Actuated g/C Ratio	0.77	0.76		0.82	0.78		0.06	0.06		0.06	0.06		
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	239	2706		179	2750		79	84		75	98		
v/s Ratio Prot	0.00	c0.54		c0.01	0.43			0.00			0.00		
v/s Ratio Perm	0.02			0.13			0.01			c0.01			
v/c Ratio	0.03	0.71		0.17	0.55		0.15	0.05		0.20	0.05		
Uniform Delay, d1	3.3	6.8		6.7	4.4		48.6	48.3		48.8	48.4		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.0	1.6		0.4	0.8		0.9	0.2		1.3	0.2		
Delay (s)	3.4	8.5		7.2	5.2		49.5	48.6		50.1	48.6		
Level of Service	A	A		A	A		D	D		D	D		
Approach Delay (s)		8.4			5.3			48.8			49.5		
Approach LOS		A			A			D			D		
Intersection Summary													
HCM 2000 Control Delay			7.9			HCM 2000 Level of Service				A			
HCM 2000 Volume to Capacity ratio			0.65										
Actuated Cycle Length (s)			108.1			Sum of lost time (s)				15.9			
Intersection Capacity Utilization			63.0%			ICU Level of Service				B			
Analysis Period (min)			15										
c Critical Lane Group													

Timings
7: Cedar Street & First Street

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	102	1279	10	1054	37	38	87	31
Future Volume (vph)	102	1279	10	1054	37	38	87	31
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.8	73.3	71.5	64.1	13.0	13.0	13.0	13.0
Actuated g/C Ratio	0.77	0.73	0.72	0.64	0.13	0.13	0.13	0.13
v/c Ratio	0.34	0.60	0.04	0.55	0.52	0.28	0.58	0.65
Control Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
LOS	A	A	A	A	E	C	D	C
Approach Delay		8.8		7.5		40.3		33.7
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 73.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street



Queues
7: Cedar Street & First Street

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	119	1545	12	1235	43	70	101	214
v/c Ratio	0.34	0.60	0.04	0.55	0.52	0.28	0.58	0.65
Control Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Length 50th (m)	4.5	56.4	0.3	17.1	7.9	7.7	18.7	13.5
Queue Length 95th (m)	10.8	122.2	m0.3	82.2	17.2	17.8	31.1	30.8
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	352	2584	270	2244	154	443	321	491
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	0.34	0.60	0.04	0.55	0.28	0.16	0.31	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	102	1279	50	10	1054	8	37	38	22	87	31	153
Future Volume (vph)	102	1279	50	10	1054	8	37	38	22	87	31	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3525		1825	3502		1753	1759		1773	1608	
Flt Permitted	0.16	1.00		0.13	1.00		0.35	1.00		0.71	1.00	
Satd. Flow (perm)	316	3525		254	3502		643	1759		1328	1608	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	119	1487	58	12	1226	9	43	44	26	101	36	178
RTOR Reduction (vph)	0	2	0	0	0	0	0	23	0	0	121	0
Lane Group Flow (vph)	119	1543	0	12	1235	0	43	47	0	101	93	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.3	70.1		65.3	64.1		13.0	13.0		13.0	13.0	
Effective Green, g (s)	75.3	70.1		65.3	64.1		13.0	13.0		13.0	13.0	
Actuated g/C Ratio	0.75	0.70		0.65	0.64		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	346	2471		184	2244		83	228		172	209	
v/s Ratio Prot	c0.02	c0.44		0.00	0.35		0.03			0.06		
v/s Ratio Perm	0.23			0.04			0.07			c0.08		
v/c Ratio	0.34	0.62		0.07	0.55		0.52	0.21		0.59	0.45	
Uniform Delay, d1	5.6	8.0		6.9	10.0		40.6	38.9		41.0	40.2	
Progression Factor	1.00	1.00		0.49	0.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.2		0.1	0.8		5.4	0.5		5.0	1.5	
Delay (s)	6.2	9.2		3.5	6.9		45.9	39.4		46.0	41.7	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.9			6.9			41.9			43.1	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

2041 Total AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	40	971	20	1080	140	15	53	28
Future Volume (vph)	40	971	20	1080	140	15	53	28
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.7	63.0	66.7	60.7	17.4	10.5	19.3	10.3
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.17	0.10	0.19	0.10
v/c Ratio	0.16	0.58	0.09	0.61	0.62	0.18	0.21	0.40
Control Delay	3.6	8.4	4.8	9.9	45.2	28.3	30.8	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.4	4.8	10.0	45.2	28.3	30.8	23.9
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.3		9.9		42.3		26.7
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 12.2
Intersection Capacity Utilization 57.6%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 8: Pine Street & First Street

Ø1	Ø2	Ø3	Ø4
11 s	50 s	13 s	26 s
Ø5	Ø6 (R)	Ø7	Ø8
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2041 Total AM

	↖	→	↗	←	↖	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	1280	24	1287	165	34	62	91
v/c Ratio	0.16	0.58	0.09	0.61	0.62	0.18	0.21	0.40
Control Delay	3.6	8.4	4.8	9.9	45.2	28.3	30.8	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.4	4.8	10.0	45.2	28.3	30.8	23.9
Queue Length 50th (m)	1.3	72.8	1.0	55.0	26.5	3.2	9.4	6.0
Queue Length 95th (m)	m1.4	31.3	m1.8	59.5	41.0	11.2	18.2	18.3
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	286	2189	267	2126	266	350	303	388
Starvation Cap Reductn	0	0	0	49	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	0.58	0.09	0.62	0.62	0.10	0.20	0.23
Intersection Summary								
m Volume for 95th percentile queue is metered by upstream signal.								

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	40	971	117	20	1080	14	140	15	14	53	28	49
Future Volume (vph)	40	971	117	20	1080	14	140	15	14	53	28	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3468		1629	3503		1733	1690		1715	1711	
Flt Permitted	0.14	1.00		0.15	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	260	3468		257	3503		1273	1690		1226	1711	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	1142	138	24	1271	16	165	18	16	62	33	58
RTOR Reduction (vph)	0	7	0	0	1	0	0	15	0	0	53	0
Lane Group Flow (vph)	47	1273	0	24	1286	0	165	19	0	62	38	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.8	58.5		59.8	57.0		18.1	8.5		19.5	9.2	
Effective Green, g (s)	62.8	58.5		59.8	57.0		18.1	8.5		19.5	9.2	
Actuated g/C Ratio	0.63	0.58		0.60	0.57		0.18	0.08		0.20	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	2028		192	1996		274	143		289	157	
v/s Ratio Prot	c0.01	0.37		0.00	c0.37		c0.06	0.01		0.02	0.02	
v/s Ratio Perm	0.12			0.07			c0.05			0.02		
v/c Ratio	0.20	0.63		0.12	0.64		0.60	0.14		0.21	0.24	
Uniform Delay, d1	9.7	13.6		9.8	14.6		37.1	42.3		33.6	42.2	
Progression Factor	0.42	0.59		0.71	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.2		0.3	1.4		3.7	0.4		0.4	0.8	
Delay (s)	4.5	9.2		7.2	10.4		40.8	42.8		34.0	43.0	
Level of Service	A	A		A	B		D	D		C	D	
Approach Delay (s)		9.1			10.3			41.1			39.3	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		13.3			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			19.9				
Intersection Capacity Utilization		57.6%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

2041 Total AM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	24	804	46	864	257	21
Future Volume (vph)	24	804	46	864	257	21
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	66.0	58.9	67.2	61.1	21.0	21.0
Actuated g/C Ratio	0.66	0.59	0.67	0.61	0.21	0.21
v/c Ratio	0.09	0.59	0.18	0.49	0.81	0.20
Control Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	5.1	7.1	13.2	54.5	13.9
LOS	A	A	A	B	D	B
Approach Delay		5.1		12.9		46.0
Approach LOS		A		B		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 14.0

Intersection LOS: B

Intersection Capacity Utilization 60.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street

Ø1	Ø2	Ø4
11 s	59 s	30 s
Ø5	Ø6 (R)	
11 s	59 s	

Queues

2041 Total AM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	29	1213	55	1060	306	81
v/c Ratio	0.09	0.59	0.18	0.49	0.81	0.20
Control Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Length 50th (m)	0.4	85.7	3.1	63.2	56.0	3.9
Queue Length 95th (m)	m0.8	8.5	6.8	78.4	76.1	13.5
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	329	2048	312	2159	438	456
Starvation Cap Reductn	0	93	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	0.09	0.62	0.18	0.49	0.70	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	24	804	215	46	864	26	257	21	47	0	0	0
Future Volume (vph)	24	804	215	46	864	26	257	21	47	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3442		1825	3529		1797	1698				
Flt Permitted	0.22	1.00		0.16	1.00		0.95	1.00				
Satd. Flow (perm)	367	3442		307	3529		1797	1698				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	29	957	256	55	1029	31	306	25	56	0	0	0
RTOR Reduction (vph)	0	21	0	0	2	0	0	44	0	0	0	0
Lane Group Flow (vph)	29	1192	0	55	1058	0	306	37	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)							1					
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	62.0	58.1		64.8	59.5		21.0	21.0				
Effective Green, g (s)	62.0	58.1		64.8	59.5		21.0	21.0				
Actuated g/C Ratio	0.62	0.58		0.65	0.60		0.21	0.21				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	275	1999		279	2099		377	356				
v/s Ratio Prot	0.00	c0.35		c0.01	0.30			0.02				
v/s Ratio Perm	0.06			0.12			c0.17					
v/c Ratio	0.11	0.60		0.20	0.50		0.81	0.10				
Uniform Delay, d1	8.0	13.4		8.3	11.7		37.6	31.9				
Progression Factor	0.28	0.29		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	1.1		0.3	0.9		12.5	0.1				
Delay (s)	2.4	5.0		8.7	12.6		50.1	32.0				
Level of Service	A	A		A	B		D	C				
Approach Delay (s)		4.9			12.4		46.3			0.0		
Approach LOS		A			B		D			A		

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

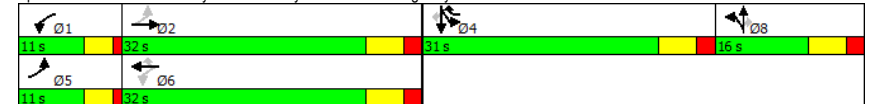
2041 Total AM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	161	265	31	436	855	22	32	35	348	44	140
Future Volume (vph)	161	265	31	436	855	22	32	35	348	44	140
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	32.0	11.0	32.0	31.0	16.0	16.0	16.0	31.0	31.0	31.0
Total Split (%)	12.2%	35.6%	12.2%	35.6%	34.4%	17.8%	17.8%	17.8%	34.4%	34.4%	34.4%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	37.5	31.6	35.7	26.5	48.3	10.2	10.2	10.2	21.8	21.8	21.8
Actuated g/C Ratio	0.45	0.38	0.43	0.32	0.58	0.12	0.12	0.12	0.26	0.26	0.26
v/c Ratio	0.63	0.24	0.08	0.82	0.86	0.13	0.17	0.14	0.51	0.50	0.31
Control Delay	28.2	21.9	15.3	42.6	16.1	37.8	38.4	1.0	31.9	31.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	21.9	15.3	42.6	16.1	37.8	38.4	1.0	31.9	31.6	6.2
LOS	C	C	B	D	B	D	D	A	C	C	A
Approach Delay		24.2		24.8			23.7			25.0	
Approach LOS		C		C			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 83.8	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 24.7	Intersection LOS: C
Intersection Capacity Utilization 83.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total AM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	181	320	35	490	961	25	36	39	219	221	157
v/c Ratio	0.63	0.24	0.08	0.82	0.86	0.13	0.17	0.14	0.51	0.50	0.31
Control Delay	28.2	21.9	15.3	42.6	16.1	37.8	38.4	1.0	31.9	31.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	21.9	15.3	42.6	16.1	37.8	38.4	1.0	31.9	31.6	6.2
Queue Length 50th (m)	19.1	22.0	3.4	81.2	51.2	4.0	5.8	0.0	33.1	33.3	0.0
Queue Length 95th (m)	#36.0	32.5	8.7	#134.1	#135.9	11.3	14.3	0.0	54.5	54.7	12.9
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	286	1334	444	595	1162	199	212	285	502	514	570
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.24	0.08	0.82	0.83	0.13	0.17	0.14	0.44	0.43	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	161	265	20	31	436	855	22	32	35	348	44	140
Future Volume (vph)	161	265	20	31	436	855	22	32	35	348	44	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3526		1558	1883	1567	1644	1746	1209	1651	1691	1512
Flt Permitted	0.19	1.00		0.56	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	366	3526		915	1883	1567	1644	1746	1209	1651	1691	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	181	298	22	35	490	961	25	36	39	391	49	157
RTOR Reduction (vph)	0	5	0	0	0	210	0	0	36	0	0	118
Lane Group Flow (vph)	181	315	0	35	490	751	25	36	3	219	221	39
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	38.7	31.6		32.3	28.4	50.2	7.5	7.5	7.5	21.8	21.8	21.8
Effective Green, g (s)	38.7	31.6		32.3	28.4	50.2	7.5	7.5	7.5	21.8	21.8	21.8
Actuated g/C Ratio	0.45	0.36		0.37	0.33	0.58	0.09	0.09	0.09	0.25	0.25	0.25
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	1283		369	616	1014	142	150	104	414	424	379
v/s Ratio Prot	c0.05	0.09		0.00	0.26	c0.19	0.02	c0.02		0.13	0.13	
v/s Ratio Perm	0.23			0.03		0.29			0.00			0.03
v/c Ratio	0.64	0.25		0.09	0.80	0.74	0.18	0.24	0.03	0.53	0.52	0.10
Uniform Delay, d1	17.4	19.3		17.5	26.6	13.5	36.8	37.0	36.3	28.1	28.0	25.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	0.5		0.1	10.2	2.9	0.6	0.8	0.1	1.2	1.2	0.1
Delay (s)	22.4	19.7		17.6	36.8	16.4	37.4	37.8	36.5	29.3	29.2	25.1
Level of Service	C	B		B	D	B	D	D	D	C	C	C
Approach Delay (s)		20.7			23.2			37.2			28.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay		24.3							C			
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		86.8						22.0				
Intersection Capacity Utilization		83.6%							E			
Analysis Period (min)		15										
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total AM

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	15	5	15	154	867	120	355
Future Volume (vph)	15	5	15	154	867	120	355
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases		4		2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	24.0	7.0	24.0
Minimum Split (s)	16.0	16.0	16.0	11.0	30.0	11.0	30.0
Total Split (s)	29.0	29.0	29.0	11.0	30.0	11.0	30.0
Total Split (%)	41.4%	41.4%	41.4%	15.7%	42.9%	15.7%	42.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)	17.3	17.3	34.1	26.6	33.2	24.2	
Actuated g/C Ratio	0.27	0.27	0.53	0.41	0.51	0.37	
v/c Ratio	0.24	0.84	0.34	0.69	0.43	0.40	
Control Delay	12.3	24.2	9.7	21.4	12.1	15.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.3	24.2	9.7	21.4	12.1	15.5	
LOS	B	C	A	C	B	B	
Approach Delay	12.3	24.2		19.6		14.8	
Approach LOS	B	C		B		B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 64.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 19.1
Intersection Capacity Utilization 72.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	30 s	29 s
Ø5	Ø6	Ø8
11 s	30 s	29 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total AM

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	526	177	999	138	509
v/c Ratio	0.24	0.84	0.34	0.69	0.43	0.40
Control Delay	12.3	24.2	9.7	21.4	12.1	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	24.2	9.7	21.4	12.1	15.5
Queue Length 50th (m)	2.1	28.9	9.5	55.6	7.2	21.3
Queue Length 95th (m)	9.2	59.5	19.9	80.4	16.0	34.5
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	304	749	526	1446	324	1278
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	0.19	0.70	0.34	0.69	0.43	0.40

Intersection Summary

HCM Signalized Intersection Capacity Analysis

11: Highway 26 E & Sanford Fleming Drive Extension/Beachwood Road

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	15	5	30	0	15	443	154	867	2	120	355	88
Future Volume (vph)	15	5	30	0	15	443	154	867	2	120	355	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.92			0.87		1.00	1.00		1.00	0.97	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1706			1622		1789	3506		1706	3341	
Flt Permitted		0.46			1.00		0.42	1.00		0.19	1.00	
Satd. Flow (perm)		790			1622		792	3506		341	3341	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	17	6	34	0	17	509	177	997	2	138	408	101
RTOR Reduction (vph)	0	25	0	0	193	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	32	0	0	333	0	177	999	0	138	480	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.3			17.3		33.7	26.7		30.7	25.2	
Effective Green, g (s)		17.3			17.3		33.7	26.7		30.7	25.2	
Actuated g/C Ratio		0.26			0.26		0.51	0.41		0.47	0.38	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		208			428		514	1429		274	1285	
v/s Ratio Prot					c0.21		0.04	c0.28		c0.04	0.14	
v/s Ratio Perm		0.04					0.14			0.19		
v/c Ratio		0.15			0.78		0.34	0.70		0.50	0.37	
Uniform Delay, d1		18.5			22.3		8.6	16.1		10.8	14.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			8.7		0.4	2.9		1.5	0.8	
Delay (s)		18.8			31.0		9.0	18.9		12.3	15.3	
Level of Service		B			C		A	B		B	B	
Approach Delay (s)		18.8			31.0			17.4			14.7	
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings

12: Tenth Line & Mountain Road

2041 Total AM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	9	552	102	493	173	94	312	189
Future Volume (vph)	9	552	102	493	173	94	312	189
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	65.0	65.0	65.0	65.0	55.0	55.0	55.0	55.0
Total Split (%)	54.2%	54.2%	54.2%	54.2%	45.8%	45.8%	45.8%	45.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2

Lead/Lag

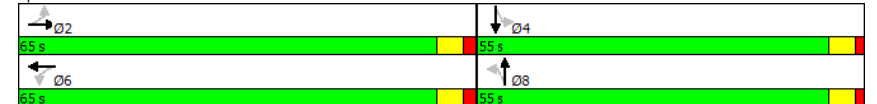
Lead-Lag Optimize?

Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effect Green (s)	59.3	59.3	59.3	59.3	49.8	49.8	49.8	49.8
Actuated g/C Ratio	0.49		0.49		0.42		0.42	
v/c Ratio	0.99		1.54		1.33		2.10	
Control Delay	57.5		277.7		190.2		529.2	
Queue Delay	0.0		0.0		0.0		0.0	
Total Delay	57.5		277.7		190.2		529.2	
LOS	E		F		F		F	
Approach Delay	57.5		277.7		190.2		529.2	
Approach LOS	E		F		F		F	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 110	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 2.10	
Intersection Signal Delay: 248.1	Intersection LOS: F
Intersection Capacity Utilization 146.4%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Total AM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	859	887	757	645
v/c Ratio	0.99	1.54	1.33	2.10
Control Delay	57.5	277.7	190.2	529.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	57.5	277.7	190.2	529.2
Queue Length 50th (m)	191.6	~294.4	~223.3	~243.4
Queue Length 95th (m)	#230.9	#318.8	#251.7	#274.8
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	871	576	568	307
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	0.99	1.54	1.33	2.10

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Total AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	552	135	102	493	123	173	94	346	312	189	22
Future Volume (vph)	9	552	135	102	493	123	173	94	346	312	189	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.98			0.92			0.99	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1772			1838			1665			1673	
Flt Permitted		0.99			0.62			0.76			0.43	
Satd. Flow (perm)		1750			1155			1278			738	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	11	681	167	126	609	152	214	116	427	385	233	27
RTOR Reduction (vph)	0	7	0	0	6	0	0	39	0	0	1	0
Lane Group Flow (vph)	0	852	0	0	881	0	0	718	0	0	644	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		59.3			59.3			49.8			49.8	
Effective Green, g (s)		59.3			59.3			49.8			49.8	
Actuated g/C Ratio		0.49			0.49			0.41			0.41	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		864			570			530			306	
v/s Ratio Prot												
v/s Ratio Perm		0.49			c0.76			0.56			c0.87	
v/c Ratio		0.99			1.55			1.36			2.10	
Uniform Delay, d1		29.9			30.4			35.1			35.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		27.4			254.1			172.0			507.8	
Delay (s)		57.4			284.5			207.1			542.9	
Level of Service		E			F			F			F	
Approach Delay (s)		57.4			284.5			207.1			542.9	
Approach LOS		E			F			F			F	

Intersection Summary

HCM 2000 Control Delay	256.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	146.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2041 Total AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	118	899	125	647	131	63	19	88
Future Volume (vph)	118	899	125	647	131	63	19	88
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases		2	1	6	3	8		4
Permitted Phases			6		8		4	
Detector Phase	2	2	1	6	3	8	4	4
Switch Phase								
Minimum Initial (s)	30.0	30.0	5.0	30.0	5.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	9.0	37.6	9.0	25.0	25.0	25.0
Total Split (s)	50.6	50.6	9.0	59.6	9.0	34.0	25.0	25.0
Total Split (%)	54.1%	54.1%	9.6%	63.7%	9.6%	36.3%	26.7%	26.7%
Yellow Time (s)	4.4	4.4	3.0	4.4	3.0	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	1.0	3.2	1.0	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	4.0	7.6	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	43.1	43.1	55.7	52.1	23.7	21.7	12.6	12.6
Actuated g/C Ratio	0.49	0.49	0.64	0.60	0.27	0.25	0.14	0.14
v/c Ratio	0.43	0.73	0.66	0.38	0.57	0.40	0.14	0.63
Control Delay	20.7	21.0	24.3	10.2	34.6	17.3	33.9	39.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	21.0	24.3	10.2	34.6	17.3	33.9	39.5
LOS	C	C	C	B	C	B	C	D
Approach Delay		20.9		12.4		25.1		38.9
Approach LOS		C		B		C		D

Intersection Summary

Cycle Length: 93.6
Actuated Cycle Length: 87.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 19.7
Intersection Capacity Utilization 87.9%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service E

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

↰	↱	↰	↱
9 s	50.6 s	9 s	25 s
↰	↱	↰	↱
59.6 s	34 s	↰	↱

Queues 2041 Total AM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	139	1253	147	819	154	188	22	169
v/c Ratio	0.43	0.73	0.66	0.38	0.57	0.40	0.14	0.63
Control Delay	20.7	21.0	24.3	10.2	34.6	17.3	33.9	39.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	21.0	24.3	10.2	34.6	17.3	33.9	39.5
Queue Length 50th (m)	14.2	81.4	8.7	33.8	20.5	13.8	3.3	22.0
Queue Length 95th (m)	31.0	109.8	#22.3	49.6	33.6	28.1	9.2	38.4
Internal Link Dist (m)		217.8		35.2		32.3		88.4
Turn Bay Length (m)	35.0		50.0		45.0		15.0	
Base Capacity (vph)	324	1710	222	2138	270	590	232	387
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	0.43	0.73	0.66	0.38	0.57	0.32	0.09	0.44

Intersection Summary

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

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	21.6
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

14: High Street & Cambridge Street/Third Street

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 84.2	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 11.3	Intersection LOS: B
Intersection Capacity Utilization 55.5%	ICU Level of Service B
Analysis Period (min) 15	

Ø1 13 s	Ø2 55 s	Ø4 22 s
Ø5 13 s	Ø6 55 s	Ø8 22 s

Queues
14: High Street & Cambridge Street/Third Street

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	106	36	142	234	1154	115	879
v/c Ratio	0.03	0.49	0.21	0.47	0.46	0.53	0.32	0.44
Control Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
Queue Length 50th (m)	0.7	3.4	5.3	5.3	7.9	50.4	3.7	37.5
Queue Length 95th (m)	3.5	16.1	13.1	19.3	16.1	74.0	8.6	53.4
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	235	278	251	398	517	2186	394	2020
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	0.02	0.38	0.14	0.36	0.45	0.53	0.29	0.44
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2041 Total AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	4	20	71	31	31	91	201	890	102	99	753	3
Future Volume (vph)	4	20	71	31	31	91	201	890	102	99	753	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1112		1825	1645		1825	3513		1659	3471	
Flt Permitted	0.64	1.00		0.69	1.00		0.27	1.00		0.20	1.00	
Satd. Flow (perm)	1238	1112		1323	1645		519	3513		358	3471	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	23	83	36	36	106	234	1035	119	115	876	3
RTOR Reduction (vph)	0	72	0	0	93	0	0	8	0	0	0	0
Lane Group Flow (vph)	5	34	0	36	49	0	234	1146	0	115	879	0
Confl. Peds. (#/hr)									9		9	
Heavy Vehicles (%)	0%	0%	67%	0%	0%	5%	0%	2%	2%	10%	5%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.8	10.8		10.8	10.8		60.6	52.2		55.8	49.8	
Effective Green, g (s)	10.8	10.8		10.8	10.8		60.6	52.2		55.8	49.8	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.71	0.61		0.66	0.59	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	141		168	209		499	2157		326	2033	
v/s Ratio Prot		c0.03			0.03		c0.05	c0.33		0.02	0.25	
v/s Ratio Perm	0.00			0.03			0.29			0.21		
v/c Ratio	0.03	0.24		0.21	0.24		0.47	0.53		0.35	0.43	
Uniform Delay, d1	32.5	33.4		33.3	33.4		4.7	9.4		5.9	9.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.9		0.6	0.6		0.7	0.9		0.7	0.7	
Delay (s)	32.6	34.3		33.9	34.0		5.4	10.3		6.6	10.4	
Level of Service	C	C		C	C		A	B		A	B	
Approach Delay (s)		34.2			34.0			9.5			10.0	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		12.3								B		
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		85.0						16.0				
Intersection Capacity Utilization		55.5%								B		
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	183	367	44	180	230	879	139	529
Future Volume (vph)	183	367	44	180	230	879	139	529
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	9.0	15.8	9.0	15.8	11.5	25.9	11.5	25.9
Total Split (s)	16.0	51.0	9.0	44.0	21.2	46.6	13.4	38.8
Total Split (%)	13.3%	42.5%	7.5%	36.7%	17.7%	38.8%	11.2%	32.3%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	54.1	45.2	43.5	36.7	55.6	40.7	43.7	33.4
Actuated g/C Ratio	0.46	0.38	0.37	0.31	0.47	0.34	0.37	0.28
v/c Ratio	0.70	1.06	0.44	0.77	0.90	1.02	0.89	0.84
Control Delay	32.2	87.2	30.1	44.0	59.2	69.0	69.5	48.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	87.2	30.1	44.0	59.2	69.0	69.5	48.8
LOS	C	F	C	D	E	E	E	D
Approach Delay		74.0		42.4		67.2		52.5
Approach LOS		E		D		E		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 118.2

Natural Cycle: 130

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 62.2

Intersection LOS: E

Intersection Capacity Utilization 88.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

Ø1	Ø2	Ø3	Ø4
13.4 s	46.6 s	9 s	51 s
Ø5	Ø6	Ø7	Ø8
21.2 s	38.8 s	16 s	44 s

Queues
15: High Street & Sixth Street

2041 Total AM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	229	723	55	419	288	1242	174	799
v/c Ratio	0.70	1.06	0.44	0.77	0.90	1.02	0.89	0.84
Control Delay	32.2	87.2	30.1	44.0	59.2	69.0	69.5	48.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	87.2	30.1	44.0	59.2	69.0	69.5	48.8
Queue Length 50th (m)	32.2	~186.0	7.0	80.7	48.3	~164.5	25.2	92.3
Queue Length 95th (m)	42.9	#210.4	12.8	99.1	#76.1	#166.1	#52.2	99.3
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	333	680	124	567	325	1219	195	949
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	0.69	1.06	0.44	0.74	0.89	1.02	0.89	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	183	367	211	44	180	155	230	879	114	139	529	110
Future Volume (vph)	183	367	211	44	180	155	230	879	114	139	529	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	1734		1573	1673		1772	3514		1738	3311	
Flt Permitted	0.23	1.00		0.11	1.00		0.12	1.00		0.12	1.00	
Satd. Flow (perm)	432	1734		177	1673		227	3514		219	3311	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	229	459	264	55	225	194	288	1099	142	174	661	138
RTOR Reduction (vph)	0	17	0	0	26	0	0	9	0	0	14	0
Lane Group Flow (vph)	229	706	0	55	393	0	288	1233	0	174	785	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	53.1	45.2		41.4	37.5		54.2	40.8		42.3	33.4	
Effective Green, g (s)	53.1	45.2		41.4	37.5		54.2	40.8		42.3	33.4	
Actuated g/C Ratio	0.45	0.38		0.35	0.32		0.46	0.34		0.36	0.28	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	323	658		107	527		315	1204		191	929	
v/s Ratio Prot	c0.07	c0.41		0.02	0.23		c0.13	c0.35		0.07	0.24	
v/s Ratio Perm	0.25			0.16			0.29			0.25		
v/c Ratio	0.71	1.07		0.51	0.75		0.91	1.02		0.91	0.84	
Uniform Delay, d1	23.9	36.9		31.1	36.5		30.7	39.1		31.5	40.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.0	56.1		4.1	6.0		29.5	32.3		40.9	9.3	
Delay (s)	30.8	93.0		35.2	42.5		60.2	71.4		72.3	49.6	
Level of Service	C	F		D	D		E	E		E	D	
Approach Delay (s)		78.0			41.7			69.3			53.7	
Approach LOS		E			D			E			D	
Intersection Summary												
HCM 2000 Control Delay		64.2			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.05										
Actuated Cycle Length (s)		119.0			Sum of lost time (s)			20.2				
Intersection Capacity Utilization		88.9%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Total AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↲	↲	↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	44	159	762	107	187	626
Future Volume (vph)	44	159	762	107	187	626
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	57	206	990	139	243	813
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	263	1129	243	813		
Volume Left (vph)	57	0	243	0		
Volume Right (vph)	206	139	0	0		
Hadj (s)	-0.34	-0.04	0.57	0.12		
Departure Headway (s)	6.6	5.9	6.8	6.4		
Degree Utilization, x	0.48	1.84	0.46	1.44		
Capacity (veh/h)	538	621	523	569		
Control Delay (s)	15.7	399.6	14.3	225.4		
Approach Delay (s)	15.7	399.6	176.8			
Approach LOS	C	F	F			
Intersection Summary						
Delay			262.3			
Level of Service			F			
Intersection Capacity Utilization		79.4%		ICU Level of Service		D
Analysis Period (min)		15				

Timings
17: Hurontario Street & Hume Street

2041 Total AM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	258	223	561	516	157	280
Future Volume (vph)	258	223	561	516	157	280
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases		8		2	6	
Detector Phase	3	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	18.9	18.9	30.1	30.1		41.2
Actuated g/C Ratio	0.26	0.26	0.41	0.41		0.57
v/c Ratio	0.70	0.45	0.88	0.63		0.87dl
Control Delay	33.1	5.7	36.0	4.7		10.3
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	33.1	5.7	36.0	4.7		10.3
LOS	C	A	D	A		B
Approach Delay	20.4		21.0			10.3
Approach LOS	C		C			B

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 72.7
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 18.5
 Intersection Capacity Utilization 84.6%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service E
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 17: Hurontario Street & Hume Street

Ø1	Ø2	Ø3
11 s	36.3 s	34.3 s
Ø6	Ø8	
47.3 s	34.3 s	

Queues
17: Hurontario Street & Hume Street

2041 Total AM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	323	279	701	645	546
v/c Ratio	0.70	0.45	0.88	0.63	0.87dl
Control Delay	33.1	5.7	36.0	4.7	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	5.7	36.0	4.7	10.3
Queue Length 50th (m)	39.7	0.5	83.1	0.0	17.6
Queue Length 95th (m)	55.0	10.4	#138.6	9.4	28.5
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	685	779	795	1029	1214
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.36	0.88	0.63	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2041 Total AM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	258	223	561	516	157	280
Future Volume (vph)	258	223	561	516	157	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.98	0.98
Satd. Flow (prot)	1772	1581	1921	1575	3559	3559
Flt Permitted	0.95	1.00	1.00	1.00	0.54	0.54
Satd. Flow (perm)	1772	1581	1921	1575	1965	1965
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	322	279	701	645	196	350
RTOR Reduction (vph)	0	203	0	378	0	0
Lane Group Flow (vph)	323	76	701	267	0	546
Confl. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.9	18.9	30.1	30.1		41.1
Effective Green, g (s)	18.9	18.9	30.1	30.1		41.1
Actuated g/C Ratio	0.26	0.26	0.41	0.41		0.57
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	461	411	796	652		1266
v/s Ratio Prot	c0.18		c0.36			c0.04
v/s Ratio Perm		0.05		0.17		0.20
v/c Ratio	0.70	0.19	0.88	0.41		0.87dl
Uniform Delay, d1	24.3	20.9	19.6	15.0		9.0
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	4.8	0.2	13.4	1.9		1.1
Delay (s)	29.1	21.1	33.0	16.9		10.1
Level of Service	C	C	C	B		B
Approach Delay (s)	25.4		25.3			10.1
Approach LOS	C		C			B
Intersection Summary						
HCM 2000 Control Delay		22.0		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.77				
Actuated Cycle Length (s)		72.6		Sum of lost time (s)		16.6
Intersection Capacity Utilization		84.6%		ICU Level of Service		E
Analysis Period (min)		15				
dl Defacto Left Lane. Recode with 1 though lane as a left lane.						
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	179	40	55	229	150	132	183	56	276	367	19
Future Volume (vph)	15	179	40	55	229	150	132	183	56	276	367	19
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	19	221	49	68	283	185	163	226	69	341	453	23
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	289	536	458	817								
Volume Left (vph)	19	68	163	341								
Volume Right (vph)	49	185	69	23								
Hadj (s)	-0.05	-0.08	0.09	0.19								
Departure Headway (s)	9.5	8.9	9.0	9.2								
Degree Utilization, x	0.76	1.32	1.15	2.08								
Capacity (veh/h)	373	409	402	400								
Control Delay (s)	37.5	187.1	122.4	513.7								
Approach Delay (s)	37.5	187.1	122.4	513.7								
Approach LOS	E	F	F	F								
Intersection Summary												
Delay				279.5								
Level of Service				F								
Intersection Capacity Utilization				95.6%								
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Total AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	99	10	57	137	221	16	129	65	282	143	52
Future Volume (vph)	21	99	10	57	137	221	16	129	65	282	143	52
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	25	118	12	68	163	263	19	154	77	336	170	62
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	155	231	263	250	568							
Volume Left (vph)	25	68	0	19	336							
Volume Right (vph)	12	0	263	77	62							
Hadj (s)	0.21	0.36	-0.63	-0.02	0.16							
Departure Headway (s)	8.1	7.9	6.9	7.3	6.8							
Degree Utilization, x	0.35	0.51	0.51	0.50	1.07							
Capacity (veh/h)	411	444	509	471	521							
Control Delay (s)	15.4	17.6	15.6	17.4	85.2							
Approach Delay (s)	15.4	16.5		17.4	85.2							
Approach LOS	C	C		C	F							
Intersection Summary												
Delay			43.2									
Level of Service			E									
Intersection Capacity Utilization			68.6%			ICU Level of Service			C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Total AM

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	256	950	745	130	92	92
Future Volume (Veh/h)	256	950	745	130	92	92
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	269	1000	784	137	97	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	921				2390	852
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	921				2390	852
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	62				0	72
cM capacity (veh/h)	705				22	349
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1269	921	194			
Volume Left	269	0	97			
Volume Right	0	137	97			
cSH	705	1700	41			
Volume to Capacity	0.38	0.54	4.77			
Queue Length 95th (m)	13.6	0.0	Err			
Control Delay (s)	12.4	0.0	Err			
Lane LOS	B		F			
Approach Delay (s)	12.4	0.0	Err			
Approach LOS			F			
Intersection Summary						
Average Delay			820.3			
Intersection Capacity Utilization			132.0%		ICU Level of Service	H
Analysis Period (min)			15			

Timings 2041 Total PM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	23	2	28	0	169	1131	29	4	978	23
Future Volume (vph)	23	2	28	0	169	1131	29	4	978	23
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		5	2		6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	73.0	71.0	71.0	60.0	60.0	60.0
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.81	0.79	0.79	0.67	0.67	0.67
v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02
Control Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
LOS	D	B	D	A	B	B	A	A	B	A
Approach Delay		21.9		43.0		11.8			19.4	
Approach LOS		C		D		B			B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 15.7
Intersection Capacity Utilization 120.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service H

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s
	13 s

Queues 2041 Total PM
1: Highway 26 & Cranberry Trail E/Gun Club Road

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	24	118	30	3	180	1203	31	4	1040	24
v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02
Control Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Length 50th (m)	4.0	0.3	5.0	0.0	4.7	93.6	0.0	0.2	120.9	0.0
Queue Length 95th (m)	11.6	15.9	13.5	0.0	19.7	158.3	1.3	1.3	#193.8	0.0
Internal Link Dist (m)		79.7		52.6		42.1			217.0	
Turn Bay Length (m)							10.0	65.0		10.0
Base Capacity (vph)	111	225	101	258	301	1471	1295	204	1231	983
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	23	2	109	28	0	3	169	1131	29	4	978	23
Future Volume (vph)	23	2	109	28	0	3	169	1131	29	4	978	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1802	1523		1825	1580		1825	1865	1633	1825	1847	1432
Flt Permitted	0.76	1.00		0.68	1.00		0.11	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	1433	1523		1309	1580		217	1865	1633	308	1847	1432
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	24	2	116	30	0	3	180	1203	31	4	1040	24
RTOR Reduction (vph)	0	107	0	0	3	0	0	0	7	0	0	8
Lane Group Flow (vph)	24	11	0	30	0	0	180	1203	24	4	1040	16
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	0%	3%	0%	0%	4%	14%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	7.0	7.0		7.0	7.0		71.0	71.0	71.0	60.0	60.0	60.0
Effective Green, g (s)	7.0	7.0		7.0	7.0		71.0	71.0	71.0	60.0	60.0	60.0
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.79	0.79	0.79	0.67	0.67	0.67
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	118		101	122		296	1471	1288	205	1231	954
v/s Ratio Prot		0.01			0.00		0.05	0.64			0.56	
v/s Ratio Perm	0.02			0.02			0.43		0.01	0.01		0.01
v/c Ratio	0.22	0.09		0.30	0.00		0.61	0.82	0.02	0.02	0.84	0.02
Uniform Delay, d1	38.9	38.6		39.2	38.3		14.7	5.7	2.0	5.1	11.4	5.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3		1.6	0.0		3.5	5.2	0.0	0.2	7.2	0.0
Delay (s)	39.9	38.9		40.8	38.3		18.3	10.8	2.1	5.2	18.7	5.1
Level of Service	D	D		D	D		B	B	A	A	B	A
Approach Delay (s)		39.1			40.6			11.6			18.3	
Approach LOS		D			D			B			B	

Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	120.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings
2: Balsam Street & Harbour Street W & Highway 26

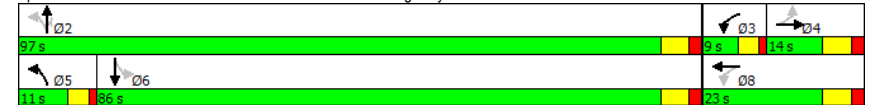
2041 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	27	14	133	13	213	1379	120	31	1124
Future Volume (vph)	27	14	133	13	213	1379	120	31	1124
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4	3	8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	3	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	5.0	8.0	7.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	9.0	14.0	11.0	61.0	61.0	46.0	46.0
Total Split (s)	14.0	14.0	9.0	23.0	11.0	97.0	97.0	86.0	86.0
Total Split (%)	11.7%	11.7%	7.5%	19.2%	9.2%	80.8%	80.8%	71.7%	71.7%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0		6.0	6.0		6.0
Lead/Lag	Lag	Lag	Lead		Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	8.0	8.0	19.0	17.0		91.0	91.0		80.0
Actuated g/C Ratio	0.07	0.07	0.16	0.14		0.76	0.76		0.67
v/c Ratio	0.33	1.00	0.95	0.17		1.10	0.10		0.64
Control Delay	64.0	74.9	111.0	23.8		72.2	2.1		13.6
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	64.0	74.9	111.0	23.8		72.2	2.1		13.6
LOS	E	E	F	C		E	A		B
Approach Delay		73.8		90.9		67.3			13.6
Approach LOS		E		F		E			B

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 145	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 50.2	Intersection LOS: D
Intersection Capacity Utilization 119.0%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues

2041 Total PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	29	266	143	43	1712	129	1260
v/c Ratio	0.33	1.00	0.95	0.17	1.10	0.10	0.64
Control Delay	64.0	74.9	111.0	23.8	72.2	2.1	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.0	74.9	111.0	23.8	72.2	2.1	13.6
Queue Length 50th (m)	6.6	22.1	31.1	2.9	~115.8	3.3	83.3
Queue Length 95th (m)	16.6	#76.6	#73.9	13.4	#172.5	7.7	104.2
Internal Link Dist (m)		86.0		57.9	128.9		84.6
Turn Bay Length (m)	45.0		70.0			5.0	
Base Capacity (vph)	88	267	150	254	1552	1253	1955
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	1.00	0.95	0.17	1.10	0.10	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2041 Total PM

2: Balsam Street & Harbour Street W & Highway 26

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	27	14	233	133	13	27	213	1379	120	31	1124	17
Future Volume (vph)	27	14	233	133	13	27	213	1379	120	31	1124	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Flpb, ped/bikes	1.00	0.96		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Flt	1.00	0.86		1.00	0.90			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1738	1571		1822	1621			3595	1633		3535	
Flt Permitted	0.73	1.00		0.33	1.00			0.54	1.00		0.83	
Satd. Flow (perm)	1334	1571		639	1621			1959	1633		2931	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	15	251	143	14	29	229	1483	129	33	1209	18
RTOR Reduction (vph)	0	162	0	0	25	0	0	0	15	0	1	0
Lane Group Flow (vph)	29	104	0	143	18	0	0	1712	114	0	1259	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	8.0	8.0		17.0	17.0			91.0	91.0		80.0	
Effective Green, g (s)	8.0	8.0		17.0	17.0			91.0	91.0		80.0	
Actuated g/C Ratio	0.07	0.07		0.14	0.14			0.76	0.76		0.67	
Clearance Time (s)	6.0	6.0		4.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	88	104		139	229			1581	1238		1954	
v/s Ratio Prot		0.07		c0.04	0.01			c0.06				
v/s Ratio Perm	0.02			c0.10				c0.76	0.07		0.43	
v/c Ratio	0.33	1.00		1.03	0.08			1.08	0.09		0.64	
Uniform Delay, d1	53.4	56.0		51.2	44.7			14.5	3.8		11.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.2	86.5		84.2	0.1			48.7	0.1		1.7	
Delay (s)	55.6	142.5		135.3	44.9			63.2	3.9		13.3	
Level of Service	E	F		F	D			E	A		B	
Approach Delay (s)		134.0			114.4			59.0			13.3	
Approach LOS		F			F			E			B	

Intersection Summary

HCM 2000 Control Delay	52.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	119.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2041 Total PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	149	4	37	6	96	1647	10	1503
Future Volume (vph)	149	4	37	6	96	1647	10	1503
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	13.4	13.4		13.4	52.4	48.6	48.8	41.4
Actuated g/C Ratio	0.18	0.18		0.18	0.69	0.64	0.64	0.54
v/c Ratio	0.65	0.24		0.25	0.37	0.76	0.04	0.87
Control Delay	43.8	9.8		23.1	10.2	14.3	4.6	23.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	9.8		23.1	10.2	14.3	4.6	23.4
LOS	D	A		C	B	B	A	C
Approach Delay		31.9		23.1		14.0		23.3
Approach LOS		C		C		B		C

Intersection Summary

Cycle Length: 84

Actuated Cycle Length: 76.2

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 19.4

Intersection LOS: B

Intersection Capacity Utilization 77.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

15 s	47 s	22 s	
15 s	47 s	22 s	

Queues

2041 Total PM

3: Balsam Street & CT Entrance/Plaza Access

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	157	84	67	101	1741	11	1681
v/c Ratio	0.65	0.24	0.25	0.37	0.76	0.04	0.87
Control Delay	43.8	9.8	23.1	10.2	14.3	4.6	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	9.8	23.1	10.2	14.3	4.6	23.4
Queue Length 50th (m)	21.9	0.5	5.8	4.1	75.8	0.4	111.6
Queue Length 95th (m)	41.7	11.6	16.4	13.1	#180.6	1.8	#179.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	289	411	317	343	2281	360	1929
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.20	0.21	0.29	0.76	0.03	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
3: Balsam Street & CT Entrance/Plaza Access

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	149	4	76	37	6	21	96	1647	7	10	1503	94
Future Volume (vph)	149	4	76	37	6	21	96	1647	7	10	1503	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1822	1647			1776		1772	3577		1825	3544	
Flt Permitted	0.71	1.00			0.78		0.08	1.00		0.09	1.00	
Satd. Flow (perm)	1368	1647			1417		156	3577		176	3544	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	157	4	80	39	6	22	101	1734	7	11	1582	99
RTOR Reduction (vph)	0	66	0	0	18	0	0	0	0	0	5	0
Lane Group Flow (vph)	157	18	0	0	49	0	101	1741	0	11	1676	0
Confl. Peds. (#/hr)	1				1		2				2	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.4	13.4			13.4		53.9	48.6		45.0	43.7	
Effective Green, g (s)	13.4	13.4			13.4		53.9	48.6		45.0	43.7	
Actuated g/C Ratio	0.17	0.17			0.17		0.68	0.61		0.57	0.55	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	278			239		232	2192		126	1952	
v/s Ratio Prot		0.01					c0.03	c0.49		0.00	c0.47	
v/s Ratio Perm	c0.11				0.03		0.26			0.05		
v/c Ratio	0.68	0.06			0.20		0.44	0.79		0.09	0.86	
Uniform Delay, d1	30.9	27.7			28.4		12.7	11.6		10.3	15.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.7	0.1			0.4		1.3	3.1		0.3	5.2	
Delay (s)	38.7	27.8			28.8		14.0	14.6		10.6	20.3	
Level of Service	D	C			C		B	B		B	C	
Approach Delay (s)		34.9			28.8			14.6			20.3	
Approach LOS		C			C			B			C	

Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings

4: Balsam Street & Old Mountain Road/Commercial Access

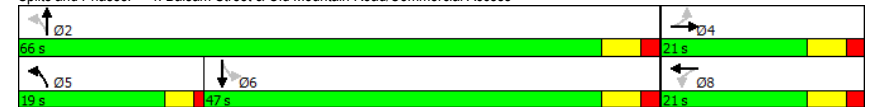
2041 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱		↰	↱		↰	↱
Traffic Volume (vph)	124	4	19	9	201	1654	11	1476
Future Volume (vph)	124	4	19	9	201	1654	11	1476
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.9	12.9		12.9	62.0	60.0	45.5	45.5
Actuated g/C Ratio	0.15	0.15		0.15	0.73	0.71	0.54	0.54
v/c Ratio	0.65	0.54		0.26	0.69	0.72	0.13	0.88
Control Delay	48.8	10.0		29.4	26.9	9.9	16.7	25.5
Queue Delay	0.0	0.0		0.0	0.0	0.4	0.0	0.0
Total Delay	48.8	10.0		29.4	26.9	10.3	16.7	25.5
LOS	D	A		C	C	B	B	C
Approach Delay		24.0		29.4		12.0		25.5
Approach LOS		C		C		B		C

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 84.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 114.5%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues

2041 Total PM

4: Balsam Street & Old Mountain Road/Commercial Access

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	135	239	42	218	1826	12	1672
v/c Ratio	0.65	0.54	0.26	0.69	0.72	0.13	0.88
Control Delay	48.8	10.0	29.4	26.9	9.9	16.7	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	48.8	10.0	29.4	26.9	10.3	16.7	25.5
Queue Length 50th (m)	20.9	0.6	4.5	17.4	80.9	0.9	118.3
Queue Length 95th (m)	38.9	19.4	13.6	39.2	112.3	5.0	#195.3
Internal Link Dist (m)		175.6	57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	244	473	188	400	2526	95	1906
Starvation Cap Reductn	0	0	0	0	258	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.51	0.22	0.55	0.81	0.13	0.88

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2041 Total PM

4: Balsam Street & Old Mountain Road/Commercial Access

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	124	4	216	19	9	10	201	1654	26	11	1476	63
Future Volume (vph)	124	4	216	19	9	10	201	1654	26	11	1476	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1797	1584			1799		1789	3570		1644	3555	
Flt Permitted	0.73	1.00			0.55		0.08	1.00		0.10	1.00	
Satd. Flow (perm)	1380	1584			1015		152	3570		178	3555	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	4	235	21	10	11	218	1798	28	12	1604	68
RTOR Reduction (vph)	0	199	0	0	9	0	0	1	0	0	3	0
Lane Group Flow (vph)	135	40	0	0	33	0	218	1825	0	12	1669	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.9	12.9			12.9		60.1	60.1		45.5	45.5	
Effective Green, g (s)	12.9	12.9			12.9		60.1	60.1		45.5	45.5	
Actuated g/C Ratio	0.15	0.15			0.15		0.71	0.71		0.54	0.54	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	240			154		311	2524		95	1902	
v/s Ratio Prot		0.03					0.09	c0.51			c0.47	
v/s Ratio Perm	c0.10				0.03		0.41			0.07		
v/c Ratio	0.65	0.17			0.21		0.70	0.72		0.13	0.88	
Uniform Delay, d1	33.9	31.4			31.6		20.9	7.5		9.8	17.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	0.3			0.7		7.0	1.8		2.7	6.1	
Delay (s)	40.6	31.7			32.3		27.9	9.3		12.6	23.4	
Level of Service	D	C			C		C	A		B	C	
Approach Delay (s)		34.9			32.3			11.3			23.3	
Approach LOS		C			C			B			C	

Intersection Summary

HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Timings 2041 Total PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↰	↱	↰	↱
Traffic Volume (vph)	217	912	375	907	1000	282	630	869	709
Future Volume (vph)	217	912	375	907	1000	282	630	869	709
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Split	NA
Protected Phases	3	8	7	4	6	2	2	6	6
Permitted Phases	8		4		4				
Detector Phase	3	8	7	4	6	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	15.0	7.0	15.0	20.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	11.0	22.0	26.5	21.5	21.5	26.5	26.5
Total Split (s)	15.0	41.0	18.0	44.0	41.0	30.0	30.0	41.0	41.0
Total Split (%)	11.5%	31.5%	13.8%	33.8%	31.5%	23.1%	23.1%	31.5%	31.5%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	48.0	34.0	54.0	37.0	72.0	23.5	23.5	34.5	34.5
Actuated g/C Ratio	0.37	0.26	0.42	0.28	0.55	0.18	0.18	0.27	0.27
v/c Ratio	1.06	1.35	1.51	0.90	1.15	0.90	1.35	1.36	1.32
Control Delay	109.2	202.3	274.8	57.3	98.9	82.6	207.2	215.3	190.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.2	202.3	274.8	57.3	98.9	82.6	207.2	215.3	190.2
LOS	F	F	F	E	F	F	F	F	F
Approach Delay		188.1		111.3			176.3		198.5
Approach LOS		F		F			F		F

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.51
Intersection Signal Delay: 162.0
Intersection Capacity Utilization 133.3%
Analysis Period (min) 15
Intersection LOS: F
ICU Level of Service H

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street

↰ Ø2	↱ Ø6	↰ Ø3	↱ Ø4
30 s	41 s	15 s	44 s
		↰ Ø7	↱ Ø8
		18 s	41 s

Queues 2041 Total PM
5: High Street/Balsam Street & First Street Ext/First Street

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	224	1249	387	935	1031	291	881	582	1178
v/c Ratio	1.06	1.35	1.51	0.90	1.15	0.90	1.35	1.36	1.32
Control Delay	109.2	202.3	274.8	57.3	98.9	82.6	207.2	215.3	190.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.2	202.3	274.8	57.3	98.9	82.6	207.2	215.3	190.2
Queue Length 50th (m)	~45.6	~218.3	~121.2	121.6	~280.0	73.8	~152.3	~215.2	~214.1
Queue Length 95th (m)	#96.9	#261.2	#182.8	#157.0	#385.1	#124.2	#193.0	#291.3	#258.6
Internal Link Dist (m)		178.2		250.8			206.8		179.2
Turn Bay Length (m)	50.0		60.0		100.0	50.0		80.0	
Base Capacity (vph)	212	924	257	1038	899	323	652	427	892
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	1.35	1.51	0.90	1.15	0.90	1.35	1.36	1.32

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total PM

	←	→	↙	↘	←	→	↙	↘	←	→	↙	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔		↔	↔	
Traffic Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709	129
Future Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.91	0.91	
Flpb, ped/bikes	1.00	0.99		1.00	1.00	0.99	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1772	3441		1807	3650	1573	1789	3457		1612	3336	
Flt Permitted	0.12	1.00		0.11	1.00	1.00	0.95	1.00		0.95	0.99	
Satd. Flow (perm)	219	3441		206	3650	1573	1789	3457		1612	3336	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	224	940	309	387	935	1031	291	649	232	896	731	133
RTOR Reduction (vph)	0	24	0	0	0	28	0	28	0	0	7	0
Lane Group Flow (vph)	224	1225	0	387	935	1003	291	853	0	582	1171	0
Confl. Peds. (#/hr)	4		12	12		4	9		2	2		9
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA		Split	NA	
Protected Phases	3	8		7	4	6	2	2		6	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	45.0	34.0		51.0	37.0	71.5	23.5	23.5		34.5	34.5	
Effective Green, g (s)	45.0	34.0		51.0	37.0	71.5	23.5	23.5		34.5	34.5	
Actuated g/C Ratio	0.35	0.26		0.39	0.28	0.55	0.18	0.18		0.27	0.27	
Clearance Time (s)	4.0	7.0		4.0	7.0	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	207	899		253	1038	865	323	624		427	885	
v/s Ratio Prot	0.09	0.36		c0.16	0.26	0.31	0.16	c0.25		c0.36	0.35	
v/s Ratio Perm	0.28			c0.44		0.33						
v/c Ratio	1.08	1.36		1.53	0.90	1.16	0.90	1.37		1.36	1.32	
Uniform Delay, d1	35.1	48.0		37.6	44.7	29.2	52.1	53.2		47.8	47.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	86.1	170.2		257.4	10.7	84.5	26.6	175.4		177.9	153.2	
Delay (s)	121.3	218.2		295.0	55.4	113.7	78.8	228.6		225.6	200.9	
Level of Service	F	F		F	E	F	E	F		F	F	
Approach Delay (s)		203.5			120.4			191.4			209.1	
Approach LOS		F			F			F			F	

Intersection Summary

HCM 2000 Control Delay	173.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	133.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings
6: Spruce Street & First Street

2041 Total PM

	←	→	↙	↘	←	→	↙	↘
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	15	1908	34	2204	31	15	28	10
Future Volume (vph)	15	1908	34	2204	31	15	28	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.6	83.8	89.4	86.0	10.2	10.2	10.2	10.2
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.08	0.73	0.18	0.83	0.24	0.21	0.22	0.19
Control Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
LOS	A	B	A	B	D	C	D	C
Approach Delay		11.3		13.6		39.0		36.5
Approach LOS		B		B		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 13.3
Intersection Capacity Utilization 80.9%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	2032	35	2349	32	36	29	34
v/c Ratio	0.08	0.73	0.18	0.83	0.24	0.21	0.22	0.19
Control Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Length 50th (m)	0.5	141.1	1.1	121.9	6.4	3.1	5.8	2.0
Queue Length 95th (m)	1.6	180.8	2.7	#302.0	15.7	12.8	14.6	11.1
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	190	2765	198	2836	324	400	323	398
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	0.73	0.18	0.83	0.10	0.09	0.09	0.09

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	15	1908	42	34	2204	51	31	15	19	28	10	23
Future Volume (vph)	15	1908	42	34	2204	51	31	15	19	28	10	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3566		1825	3564		1791	1649		1777	1627	
Flt Permitted	0.05	1.00		0.05	1.00		0.73	1.00		0.73	1.00	
Satd. Flow (perm)	96	3566		105	3564		1385	1649		1372	1627	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	16	1988	44	35	2296	53	32	16	20	29	10	24
RTOR Reduction (vph)	0	1	0	0	1	0	0	18	0	0	22	0
Lane Group Flow (vph)	16	2031	0	35	2348	0	32	18	0	29	12	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	82.6	79.8		85.4	81.2		8.2	8.2		8.2	8.2	
Effective Green, g (s)	82.6	79.8		85.4	81.2		8.2	8.2		8.2	8.2	
Actuated g/C Ratio	0.76	0.74		0.79	0.75		0.08	0.08		0.08	0.08	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	2632		149	2677		105	125		104	123	
v/s Ratio Prot	0.00	0.57		c0.01	c0.66			0.01			0.01	
v/s Ratio Perm	0.10			0.18			c0.02			0.02		
v/c Ratio	0.14	0.77		0.23	0.88		0.30	0.14		0.28	0.10	
Uniform Delay, d1	16.2	8.6		10.2	9.8		47.3	46.7		47.2	46.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.3		0.8	4.4		1.6	0.5		1.5	0.3	
Delay (s)	16.7	10.9		11.0	14.3		48.9	47.2		48.6	46.8	
Level of Service	B	B		B	B		D	D		D	D	
Approach Delay (s)		10.9			14.2			48.0			47.7	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay		13.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		108.1			Sum of lost time (s)			15.9				
Intersection Capacity Utilization		80.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	74	1669	29	1861	79	22	90	22
Future Volume (vph)	74	1669	29	1861	79	22	90	22
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.0	69.9	73.8	67.2	12.3	12.3	12.3	12.3
Actuated g/C Ratio	0.76	0.70	0.74	0.67	0.12	0.12	0.12	0.12
v/c Ratio	0.40	0.74	0.16	0.82	0.59	0.21	0.57	0.46
Control Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
LOS	B	B	A	B	E	C	D	B
Approach Delay		13.9		10.5		44.4		33.0
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 86.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

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Queues
7: Cedar Street & First Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	1829	31	1967	83	50	95	132
v/c Ratio	0.40	0.74	0.16	0.82	0.59	0.21	0.57	0.46
Control Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Length 50th (m)	2.8	117.7	0.6	29.5	15.4	4.0	17.6	6.0
Queue Length 95th (m)	13.8	179.6	m1.0 m#241.5	29.1	13.7	31.7	21.5	
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	194	2461	192	2402	277	439	328	467
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.74	0.16	0.82	0.30	0.11	0.29	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	74	1669	68	29	1861	8	79	22	26	90	22	104
Future Volume (vph)	74	1669	68	29	1861	8	79	22	26	90	22	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3521		1755	3576		1765	1740		1782	1633	
Flt Permitted	0.06	1.00		0.07	1.00		0.62	1.00		0.72	1.00	
Satd. Flow (perm)	108	3521		129	3576		1154	1740		1359	1633	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	78	1757	72	31	1959	8	83	23	27	95	23	109
RTOR Reduction (vph)	0	2	0	0	0	0	0	24	0	0	86	0
Lane Group Flow (vph)	78	1827	0	31	1967	0	83	26	0	95	46	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	73.9	68.2		70.1	66.3		12.3	12.3		12.3	12.3	
Effective Green, g (s)	73.9	68.2		70.1	66.3		12.3	12.3		12.3	12.3	
Actuated g/C Ratio	0.74	0.68		0.70	0.66		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	173	2401		152	2370		141	214		167	200	
v/s Ratio Prot	c0.03	0.52		0.01	c0.55			0.02			0.03	
v/s Ratio Perm	0.31			0.14			c0.07			0.07		
v/c Ratio	0.45	0.76		0.20	0.83		0.59	0.12		0.57	0.23	
Uniform Delay, d1	15.7	10.5		9.4	12.6		41.5	39.0		41.3	39.6	
Progression Factor	1.00	1.00		0.65	0.55		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	2.3		0.4	2.0		6.2	0.3		4.4	0.6	
Delay (s)	17.5	12.8		6.5	9.0		47.6	39.3		45.7	40.2	
Level of Service	B	B		A	A		D	D		D	D	
Approach Delay (s)		13.0			9.0			44.5			42.5	
Approach LOS		B			A			D			D	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

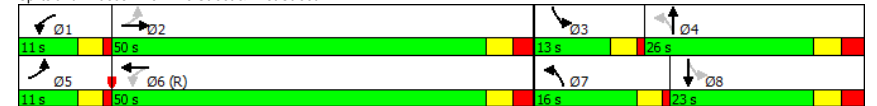
2041 Total PM

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	84	1379	23	1364	287	40	76	69
Future Volume (vph)	84	1379	23	1364	287	40	76	69
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	16.0	26.0	13.0	23.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	16.0%	26.0%	13.0%	23.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	59.4	54.6	57.2	49.8	30.7	19.0	23.5	13.1
Actuated g/C Ratio	0.59	0.55	0.57	0.50	0.31	0.19	0.24	0.13
v/c Ratio	0.42	0.87	0.12	0.86	0.93	0.26	0.24	0.69
Control Delay	19.5	18.9	7.0	23.1	66.0	19.7	26.0	38.1
Queue Delay	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	19.5	21.9	7.0	23.3	66.0	19.7	26.0	38.1
LOS	B	C	A	C	E	B	C	D
Approach Delay		21.8		23.0		54.9		34.6
Approach LOS		C		C		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 26.5
Intersection Capacity Utilization 94.2%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service F

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	1673	24	1528	305	96	81	201
v/c Ratio	0.42	0.87	0.12	0.86	0.93	0.26	0.24	0.69
Control Delay	19.5	18.9	7.0	23.1	66.0	19.7	26.0	38.1
Queue Delay	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	19.5	21.9	7.0	23.3	66.0	19.7	26.0	38.1
Queue Length 50th (m)	1.3	71.0	1.3	150.8	49.0	7.3	11.3	23.2
Queue Length 95th (m)	m7.4	#228.8	m2.3	m#197.6	#75.3	20.4	20.9	44.7
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	212	1917	207	1771	328	400	352	351
Starvation Cap Reductn	0	0	0	14	0	0	0	0
Spillback Cap Reductn	0	158	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.95	0.12	0.87	0.93	0.24	0.23	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	84	1379	194	23	1364	72	287	40	50	76	69	120
Future Volume (vph)	84	1379	194	23	1364	72	287	40	50	76	69	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3496		1825	3549		1787	1697		1744	1706	
Flt Permitted	0.08	1.00		0.08	1.00		0.32	1.00		0.69	1.00	
Satd. Flow (perm)	149	3496		159	3549		609	1697		1276	1706	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	89	1467	206	24	1451	77	305	43	53	81	73	128
RTOR Reduction (vph)	0	10	0	0	4	0	0	43	0	0	65	0
Lane Group Flow (vph)	89	1663	0	24	1524	0	305	53	0	81	136	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	57.3	51.4		51.1	48.3		29.9	19.0		20.8	13.9	
Effective Green, g (s)	57.3	51.4		51.1	48.3		29.9	19.0		20.8	13.9	
Actuated g/C Ratio	0.57	0.51		0.51	0.48		0.30	0.19		0.21	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	184	1796		127	1714		323	322		297	237	
v/s Ratio Prot	c0.03	c0.48		0.01	0.43		c0.11	0.03		0.02	0.08	
v/s Ratio Perm	0.25			0.09			c0.17			0.04		
v/c Ratio	0.48	0.93		0.19	0.89		0.94	0.16		0.27	0.57	
Uniform Delay, d1	18.5	22.5		19.4	23.4		31.6	33.9		32.9	40.3	
Progression Factor	1.37	0.58		0.68	0.74		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	7.1		0.6	5.8		35.4	0.2		0.5	3.3	
Delay (s)	26.6	20.2		13.8	23.1		67.0	34.1		33.4	43.6	
Level of Service	C	C		B	C		E	C		C	D	
Approach Delay (s)		20.5			22.9			59.1			40.7	
Approach LOS		C			C			E			D	

Intersection Summary

HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2041 Total PM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	21	1155	96	1026	440	17
Future Volume (vph)	21	1155	96	1026	440	17
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	55.0	11.0	55.0	34.0	34.0
Total Split (%)	11.0%	55.0%	11.0%	55.0%	34.0%	34.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	59.0	52.1	61.4	56.6	27.6	27.6
Actuated g/C Ratio	0.59	0.52	0.61	0.57	0.28	0.28
v/c Ratio	0.08	0.86	0.50	0.54	0.93	0.20
Control Delay	3.5	12.5	20.5	15.9	63.1	9.6
Queue Delay	0.0	0.9	0.0	0.4	0.0	0.0
Total Delay	3.5	13.4	20.5	16.3	63.1	9.6
LOS	A	B	C	B	E	A
Approach Delay		13.3		16.7		53.5
Approach LOS		B		B		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 21.2

Intersection LOS: C

Intersection Capacity Utilization 85.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street

Ø1	Ø2	Ø4
11 s	55 s	34 s
Ø5	Ø6 (R)	
11 s	55 s	

Queues

2041 Total PM

9: Hurontario Street & First Street/Huron Street

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	22	1575	101	1091	463	101
v/c Ratio	0.08	0.86	0.50	0.54	0.93	0.20
Control Delay	3.5	12.5	20.5	15.9	63.1	9.6
Queue Delay	0.0	0.9	0.0	0.4	0.0	0.0
Total Delay	3.5	13.4	20.5	16.3	63.1	9.6
Queue Length 50th (m)	0.4	143.6	7.2	59.3	86.4	2.5
Queue Length 95th (m)	m0.7	#37.6	19.7	98.6	#142.8	14.3
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	306	1822	204	2022	511	522
Starvation Cap Reductn	0	77	0	0	0	0
Spillback Cap Reductn	0	0	0	442	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.90	0.50	0.69	0.91	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	21	1155	341	96	1026	10	440	17	79	0	0	0
Future Volume (vph)	21	1155	341	96	1026	10	440	17	79	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1705	3449		1825	3573		1801	1631				
Flt Permitted	0.20	1.00		0.07	1.00		0.95	1.00				
Satd. Flow (perm)	355	3449		142	3573		1801	1631				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	22	1216	359	101	1080	11	463	18	83	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	60	0	0	0	0
Lane Group Flow (vph)	22	1549	0	101	1091	0	463	41	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	53.8	51.2		59.8	54.2		27.6	27.6				
Effective Green, g (s)	53.8	51.2		59.8	54.2		27.6	27.6				
Actuated g/C Ratio	0.54	0.51		0.60	0.54		0.28	0.28				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	226	1765		179	1936		497	450				
v/s Ratio Prot	0.00	c0.45		c0.03	0.31			0.03				
v/s Ratio Perm	0.05			0.31			c0.26					
v/c Ratio	0.10	0.88		0.56	0.56		0.93	0.09				
Uniform Delay, d1	11.6	21.6		17.9	15.1		35.3	26.9				
Progression Factor	0.43	0.39		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	3.7		4.0	1.2		24.4	0.1				
Delay (s)	5.1	12.1		22.0	16.3		59.7	27.0				
Level of Service	A	B		C	B		E	C				
Approach Delay (s)		12.0			16.8		53.8			0.0		
Approach LOS		B			B		D			A		

Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Timings

10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	140	470	38	345	616	29	59	62	850	58	167
Future Volume (vph)	140	470	38	345	616	29	59	62	850	58	167
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	27.0	11.0	27.0	36.0	16.0	16.0	16.0	36.0	36.0	36.0
Total Split (%)	12.2%	30.0%	12.2%	30.0%	40.0%	17.8%	17.8%	17.8%	40.0%	40.0%	40.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	32.0	25.9	30.3	21.2	56.8	10.1	10.1	10.1	29.6	29.6	29.6
Actuated g/C Ratio	0.37	0.30	0.35	0.25	0.66	0.12	0.12	0.12	0.34	0.34	0.34
v/c Ratio	0.61	0.50	0.13	0.82	0.58	0.17	0.31	0.22	0.87	0.88	0.28
Control Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
LOS	C	C	B	D	A	D	D	A	D	D	A
Approach Delay		29.8		21.0			24.4			39.7	
Approach LOS		C		C			C			D	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 86.2	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 30.1	Intersection LOS: C
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E

↰ Ø1	↱ Ø2	↰ Ø4	↱ Ø8
11 s	27 s	36 s	16 s
↰ Ø5	↱ Ø6		
11 s	27 s		

Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	157	541	43	388	692	33	66	70	506	514	188
v/c Ratio	0.61	0.50	0.13	0.82	0.58	0.17	0.31	0.22	0.87	0.88	0.28
Control Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Length 50th (m)	18.2	44.3	4.7	64.7	20.5	5.3	10.7	0.0	86.5	88.5	0.0
Queue Length 95th (m)	#35.2	60.3	11.1	#110.4	45.5	13.6	22.6	0.0	#143.6	#147.2	13.1
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	257	1085	324	472	1211	199	210	313	596	595	672
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.50	0.13	0.82	0.57	0.17	0.31	0.22	0.85	0.86	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	140	470	12	38	345	616	29	59	62	850	58	167
Future Volume (vph)	140	470	12	38	345	616	29	59	62	850	58	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3602		1674	1921	1617	1706	1795	1484	1700	1698	1570
Flt Permitted	0.22	1.00		0.40	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	399	3602		697	1921	1617	1706	1795	1484	1700	1698	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	157	528	13	43	388	692	33	66	70	955	65	188
RTOR Reduction (vph)	0	1	0	0	0	164	0	0	64	0	0	126
Lane Group Flow (vph)	157	540	0	43	388	528	33	66	6	506	514	62
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	33.1	26.0		26.9	22.9	52.5	7.7	7.7	7.7	29.6	29.6	29.6
Effective Green, g (s)	33.1	26.0		26.9	22.9	52.5	7.7	7.7	7.7	29.6	29.6	29.6
Actuated g/C Ratio	0.37	0.29		0.30	0.26	0.59	0.09	0.09	0.09	0.33	0.33	0.33
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	254	1048		253	492	1059	147	154	127	563	562	520
v/s Ratio Prot	c0.05	0.15		0.01	c0.20	0.17	0.02	c0.04		0.30	c0.30	
v/s Ratio Perm	0.18			0.04		0.16			0.00			0.04
v/c Ratio	0.62	0.51		0.17	0.79	0.50	0.22	0.43	0.05	0.90	0.91	0.12
Uniform Delay, d1	21.0	26.4		22.4	30.9	10.7	38.0	38.7	37.4	28.4	28.6	20.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	1.8		0.3	12.1	0.4	0.8	1.9	0.2	17.0	19.5	0.1
Delay (s)	25.4	28.2		22.7	43.1	11.1	38.8	40.6	37.6	45.4	48.1	20.9
Level of Service	C	C		C	D	B	D	D	D	D	D	C
Approach Delay (s)	27.6			22.6			39.0				42.8	
Approach LOS	C			C			D				D	
Intersection Summary												
HCM 2000 Control Delay	32.2											
HCM 2000 Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	89.3								22.0			
Intersection Capacity Utilization	71.0%											
Analysis Period (min)	15											
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

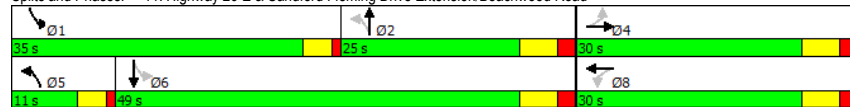
2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	88	19	4	7	43	554	540	729
Future Volume (vph)	88	19	4	7	43	554	540	729
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	19.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	25.0	11.0	31.0
Total Split (s)	30.0	30.0	30.0	30.0	11.0	25.0	35.0	49.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	12.2%	27.8%	38.9%	54.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		20.4		20.4	30.1	21.0	52.2	44.1
Actuated g/C Ratio		0.25		0.25	0.36	0.25	0.63	0.53
v/c Ratio		0.91		0.49	0.14	0.67	0.84	0.44
Control Delay		57.2		6.9	12.2	34.7	25.6	14.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		57.2		6.9	12.2	34.7	25.6	14.4
LOS		E		A	B	C	C	B
Approach Delay		57.2		6.9		33.1		19.1
Approach LOS		E		A		C		B

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 82.7
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 25.1
Intersection Capacity Utilization 95.8%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service F

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road



Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total PM

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	275	305	47	611	593	826
v/c Ratio	0.91	0.49	0.14	0.67	0.84	0.44
Control Delay	57.2	6.9	12.2	34.7	25.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	6.9	12.2	34.7	25.6	14.4
Queue Length 50th (m)	34.0	1.5	2.9	51.8	62.5	49.0
Queue Length 95th (m)	#78.4	20.2	6.7	#77.1	#104.8	64.6
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	348	690	332	908	810	1864
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	0.79	0.44	0.14	0.67	0.73	0.44

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2041 Total PM

11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	88	19	143	4	7	267	43	554	2	540	729	23
Future Volume (vph)	88	19	143	4	7	267	43	554	2	540	729	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0			4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00			1.00			1.00	0.95		1.00	0.95	
Frt	0.92			0.87			1.00	1.00		1.00	1.00	
Flt Protected	0.98			1.00			0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708			1654			1789	3577		1825	3496	
Flt Permitted	0.58			0.99			0.34	1.00		0.24	1.00	
Satd. Flow (perm)	1007			1647			641	3577		466	3496	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	97	21	157	4	8	293	47	609	2	593	801	25
RTOR Reduction (vph)	0	55	0	0	222	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	220	0	0	83	0	47	611	0	593	824	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.4			20.4			26.8	22.9		52.0	44.1	
Effective Green, g (s)	20.4			20.4			26.8	22.9		52.0	44.1	
Actuated g/C Ratio	0.24			0.24			0.32	0.27		0.62	0.52	
Clearance Time (s)	6.0			6.0			4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0			3.0			3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	243			398			256	970		691	1826	
v/s Ratio Prot							0.01	0.17		c0.26	0.24	
v/s Ratio Perm	c0.22			0.05			0.05			c0.27		
v/c Ratio	0.90			0.21			0.18	0.63		0.86	0.45	
Uniform Delay, d1	31.0			25.6			20.2	27.0		14.9	12.6	
Progression Factor	1.00			1.00			1.00	1.00		1.00	1.00	
Incremental Delay, d2	33.1			0.3			0.3	3.1		10.3	0.8	
Delay (s)	64.2			25.8			20.5	30.1		25.2	13.4	
Level of Service	E			C			C	C		C	B	
Approach Delay (s)	64.2			25.8			29.4				18.3	
Approach LOS	E			C			C				B	

Intersection Summary

HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2041 Total PM

12: Tenth Line & Mountain Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Traffic Volume (vph)	25	698	398	680	172	182	239	159
Future Volume (vph)	25	698	398	680	172	182	239	159
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2		6		8		4	
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	33.0	33.0	33.0	33.0	10.0	10.0	10.0	10.0
Minimum Split (s)	38.7	38.7	38.7	38.7	15.2	15.2	15.2	15.2
Total Split (s)	78.0	78.0	78.0	78.0	42.0	42.0	42.0	42.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		5.7		5.7		5.2		5.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	Max	Max	None	None	None	None
Act Effct Green (s)	72.3	72.3	72.3	72.3	36.8	36.8	36.8	36.8
Actuated g/C Ratio	0.60		0.60		0.31		0.31	
v/c Ratio	1.02		2.95		1.64		2.08	
Control Delay	56.5		898.4		327.7		524.8	
Queue Delay	0.0		0.0		0.0		0.0	
Total Delay	56.5		898.4		327.7		524.8	
LOS	E		F		F		F	
Approach Delay	56.5		898.4		327.7		524.8	
Approach LOS	E		F		F		F	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 2.95	
Intersection Signal Delay: 515.6	Intersection LOS: F
Intersection Capacity Utilization 186.2%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Total PM

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1043	1581	696	474
v/c Ratio	1.02	2.95	1.64	2.08
Control Delay	56.5	898.4	327.7	524.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	56.5	898.4	327.7	524.8
Queue Length 50th (m)	~245.5	~523.1	~233.6	~177.9
Queue Length 95th (m)	#329.4	#595.4	#300.9	#238.7
Internal Link Dist (m)	237.3	810.6	849.0	311.9
Turn Bay Length (m)				
Base Capacity (vph)	1026	536	424	228
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	1.02	2.95	1.64	2.08

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Total PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	698	206	398	680	329	172	182	266	239	159	23
Future Volume (vph)	25	698	206	398	680	329	172	182	266	239	159	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.7			5.7			5.2			5.2	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Flt		0.97			0.97			0.94			0.99	
Flt Protected		1.00			0.99			0.99			0.97	
Satd. Flow (prot)		1823			1834			1627			1715	
Flt Permitted		0.93			0.47			0.79			0.42	
Satd. Flow (perm)		1691			876			1309			738	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	28	784	231	447	764	370	193	204	299	269	179	26
RTOR Reduction (vph)	0	8	0	0	9	0	0	23	0	0	2	0
Lane Group Flow (vph)	0	1035	0	0	1572	0	0	673	0	0	472	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		72.3			72.3			36.8			36.8	
Effective Green, g (s)		72.3			72.3			36.8			36.8	
Actuated g/C Ratio		0.60			0.60			0.31			0.31	
Clearance Time (s)		5.7			5.7			5.2			5.2	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1018			527			401			226	
v/s Ratio Prot												
v/s Ratio Perm		0.61			c1.79			0.51			c0.64	
v/c Ratio		1.02			2.98			1.68			2.09	
Uniform Delay, d1		23.9			23.9			41.6			41.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		32.4			897.3			316.1			504.5	
Delay (s)		56.2			921.2			357.7			546.1	
Level of Service		E			F			F			F	
Approach Delay (s)		56.2			921.2			357.7			546.1	
Approach LOS		E			F			F			F	

Intersection Summary

HCM 2000 Control Delay	533.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	186.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings 2041 Total PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	138	909	277	964	248	346	98	338
Future Volume (vph)	138	909	277	964	248	346	98	338
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	5.0	30.0	5.0	30.0	5.0	7.0	5.0	7.0
Minimum Split (s)	9.0	37.6	9.0	37.6	9.0	25.0	9.0	13.0
Total Split (s)	10.0	46.0	16.0	52.0	17.0	49.0	9.0	41.0
Total Split (%)	8.3%	38.3%	13.3%	43.3%	14.2%	40.8%	7.5%	34.2%
Yellow Time (s)	3.0	4.4	3.0	4.4	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	3.2	1.0	3.2	1.0	2.7	1.0	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.6	4.0	7.6	4.0	6.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	Max	None	None	None	None
Act Effct Green (s)	48.0	38.4	58.0	44.4	54.0	43.0	42.0	35.0
Actuated g/C Ratio	0.40	0.32	0.48	0.37	0.45	0.36	0.35	0.29
v/c Ratio	0.95	1.09	1.24	0.94	1.06	1.25	0.77	1.08
Control Delay	83.6	92.6	164.4	50.6	103.7	157.6	56.9	102.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.6	92.6	164.4	50.6	103.7	157.6	56.9	102.1
LOS	F	F	F	D	F	F	E	F
Approach Delay		91.6		73.2		144.0		95.0
Approach LOS		F		E		F		F

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 145

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.25

Intersection Signal Delay: 98.3

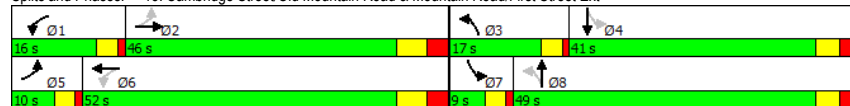
Intersection LOS: F

Intersection Capacity Utilization 112.3%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext



Queues 2041 Total PM
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	153	1218	308	1240	276	822	109	579
v/c Ratio	0.95	1.09	1.24	0.94	1.06	1.25	0.77	1.08
Control Delay	83.6	92.6	164.4	50.6	103.7	157.6	56.9	102.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.6	92.6	164.4	50.6	103.7	157.6	56.9	102.1
Queue Length 50th (m)	19.8	~168.2	~73.0	145.5	~54.9	~234.4	14.7	~148.7
Queue Length 95th (m)	#60.0	#210.5	#128.3	#190.2	#108.2	#309.1	#37.6	#217.0
Internal Link Dist (m)		217.8		35.2		32.3		88.4
Turn Bay Length (m)	35.0		50.0		45.0		15.0	
Base Capacity (vph)	161	1119	249	1318	260	657	142	535
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	0.95	1.09	1.24	0.94	1.06	1.25	0.77	1.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2041 Total PM

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

	↖ ↗		↖ ↗		↖ ↗		↖ ↗		↖ ↗		↖ ↗	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗		↖ ↗	↖ ↗		↖ ↗	↖ ↗		↖ ↗	↖ ↗	
Traffic Volume (vph)	138	909	187	277	964	152	248	346	394	98	338	183
Future Volume (vph)	138	909	187	277	964	152	248	346	394	98	338	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6		4.0	7.6		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3455		1807	3534		1789	1741		1807	1782	
Flt Permitted	0.10	1.00		0.09	1.00		0.10	1.00		0.11	1.00	
Satd. Flow (perm)	200	3455		179	3534		193	1741		217	1782	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	153	1010	208	308	1071	169	276	384	438	109	376	203
RTOR Reduction (vph)	0	14	0	0	11	0	0	34	0	0	16	0
Lane Group Flow (vph)	153	1204	0	308	1229	0	276	788	0	109	563	0
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.4	38.4		54.4	44.4		52.0	43.0		40.0	35.0	
Effective Green, g (s)	44.4	38.4		54.4	44.4		52.0	43.0		40.0	35.0	
Actuated g/C Ratio	0.37	0.32		0.45	0.37		0.43	0.36		0.33	0.29	
Clearance Time (s)	4.0	7.6		4.0	7.6		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	155	1105		243	1307		256	623		138	519	
v/s Ratio Prot	0.05	0.35		c0.13	0.35		c0.12	c0.45		0.03	0.32	
v/s Ratio Perm	0.32			c0.45			0.35			0.23		
v/c Ratio	0.99	1.09		1.27	0.94		1.08	1.26		0.79	1.08	
Uniform Delay, d1	33.4	40.8		34.8	36.5		34.7	38.5		33.2	42.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	67.8	54.8		148.8	14.2		78.6	131.7		25.2	64.2	
Delay (s)	101.2	95.6		183.5	50.7		113.3	170.2		58.4	106.7	
Level of Service	F	F		F	D		F	F		E	F	
Approach Delay (s)		96.2			77.2			155.9			99.1	
Approach LOS		F			E			F			F	

Intersection Summary

HCM 2000 Control Delay	104.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	112.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Timings

2041 Total PM

14: High Street & Cambridge Street/Third Street

	↖ ↗		↖ ↗		↖ ↗		↖ ↗		↖ ↗		↖ ↗	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Lane Configurations	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗				
Traffic Volume (vph)	6	104	49	101	284	991	113	1326				
Future Volume (vph)	6	104	49	101	284	991	113	1326				
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA				
Protected Phases		4		8	5	2	1	6				
Permitted Phases	4		8		2		6					
Detector Phase	4	4	8	8	5	2	1	6				
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0				
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0				
Total Split (s)	30.0	30.0	30.0	30.0	15.0	49.0	11.0	45.0				
Total Split (%)	33.3%	33.3%	33.3%	33.3%	16.7%	54.4%	12.2%	50.0%				
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0				
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0				
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0				
Lead/Lag					Lead	Lag	Lead	Lag				
Lead-Lag Optimize?					Yes	Yes	Yes	Yes				
Recall Mode	None	None	None	None	None	Max	None	Max				
Act Effct Green (s)	18.9	18.9	18.9	18.9	56.2	45.6	48.1	39.1				
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.66	0.54	0.57	0.46				
v/c Ratio	0.03	0.86	0.59	0.59	0.93	0.59	0.37	0.86				
Control Delay	25.2	37.6	56.6	26.1	57.1	16.6	10.1	28.3				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	25.2	37.6	56.6	26.1	57.1	16.6	10.1	28.3				
LOS	C	D	E	C	E	B	B	C				
Approach Delay		37.4		31.2		25.2		26.9				
Approach LOS		D		C		C		C				

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 85.1	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 27.8	Intersection LOS: C
Intersection Capacity Utilization 102.4%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 14: High Street & Cambridge Street/Third Street



Queues

2041 Total PM

14: High Street & Cambridge Street/Third Street

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	421	53	263	305	1135	122	1429
v/c Ratio	0.03	0.86	0.59	0.59	0.93	0.59	0.37	0.86
Control Delay	25.2	37.6	56.6	26.1	57.1	16.6	10.1	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	37.6	56.6	26.1	57.1	16.6	10.1	28.3
Queue Length 50th (m)	0.8	43.2	7.7	26.6	33.8	68.6	6.8	109.0
Queue Length 95th (m)	3.7	#80.4	#22.4	49.8	#87.2	96.5	14.2	#163.8
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	230	586	115	545	329	1920	333	1661
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	0.03	0.72	0.46	0.48	0.93	0.59	0.37	0.86

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2041 Total PM

14: High Street & Cambridge Street/Third Street

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	6	104	287	49	101	143	284	991	64	113	1326	3
Future Volume (vph)	6	104	287	49	101	143	284	991	64	113	1326	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.91		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1693		1824	1732		1825	3576		1824	3613	
Flt Permitted	0.42	1.00		0.21	1.00		0.09	1.00		0.20	1.00	
Satd. Flow (perm)	814	1693		406	1732		174	3576		378	3613	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	112	309	53	109	154	305	1066	69	122	1426	3
RTOR Reduction (vph)	0	117	0	0	60	0	0	5	0	0	0	0
Lane Group Flow (vph)	6	304	0	53	203	0	305	1130	0	122	1429	0
Confl. Peds. (#/hr)			1	1			1		12	12		1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.9	18.9		18.9	18.9		55.1	45.6		45.6	40.1	
Effective Green, g (s)	18.9	18.9		18.9	18.9		55.1	45.6		45.6	40.1	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.64	0.53		0.53	0.47	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	178	372		89	380		322	1896		292	1684	
v/s Ratio Prot		c0.18			0.12		c0.12	0.32		0.03	0.40	
v/s Ratio Perm	0.01			0.13			c0.48			0.19		
v/c Ratio	0.03	0.82		0.60	0.53		0.95	0.60		0.42	0.85	
Uniform Delay, d1	26.4	31.9		30.1	29.7		24.6	13.9		10.7	20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	13.0		10.3	1.4		36.0	1.4		1.0	5.5	
Delay (s)	26.4	44.9		40.4	31.1		60.6	15.3		11.7	25.8	
Level of Service	C	D		D	C		E	B		B	C	
Approach Delay (s)		44.6			32.7			24.9			24.7	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Timings
15: High Street & Sixth Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	213	252	128	309	204	830	243	1154
Future Volume (vph)	213	252	128	309	204	830	243	1154
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	9.0	15.8	9.0	15.8	11.5	25.9	11.5	25.9
Total Split (s)	14.0	42.3	10.0	38.3	15.4	47.1	20.6	52.3
Total Split (%)	11.7%	35.3%	8.3%	31.9%	12.8%	39.3%	17.2%	43.6%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	48.3	36.5	40.3	32.5	54.9	42.6	62.1	46.4
Actuated g/C Ratio	0.40	0.30	0.34	0.27	0.46	0.36	0.52	0.39
v/c Ratio	1.06	0.97	0.85	1.09	0.98	0.76	0.82	1.07
Control Delay	108.2	68.8	69.6	106.1	86.5	38.8	43.9	79.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.2	68.8	69.6	106.1	86.5	38.8	43.9	79.8
LOS	F	E	E	F	F	D	D	E
Approach Delay		80.4		98.9		47.5		74.4
Approach LOS		F		F		D		E

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 72.0

Intersection LOS: E

Intersection Capacity Utilization 108.7%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

↰ 01	↱ 02	↰ 03	↱ 04
20.6 s	47.1 s	10 s	42.3 s
↰ 05	↱ 06	↰ 07	↱ 08
15.4 s	52.3 s	14 s	38.3 s

Queues
15: High Street & Sixth Street

2041 Total PM

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	224	540	135	548	215	961	256	1463
v/c Ratio	1.06	0.97	0.85	1.09	0.98	0.76	0.82	1.07
Control Delay	108.2	68.8	69.6	106.1	86.5	38.8	43.9	79.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.2	68.8	69.6	106.1	86.5	38.8	43.9	79.8
Queue Length 50th (m)	~41.8	116.7	20.2	~140.4	35.8	105.4	35.5	~199.0
Queue Length 95th (m)	#91.1	#186.2	#49.5	#207.7	#84.6	130.4	#72.6	#242.0
Internal Link Dist (m)		59.4		212.9		1058.0		540.0
Turn Bay Length (m)	215.0		25.0		60.0		15.0	
Base Capacity (vph)	211	559	158	503	220	1267	333	1371
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	1.06	0.97	0.85	1.09	0.98	0.76	0.77	1.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	213	252	261	128	309	212	204	830	83	243	1154	236
Future Volume (vph)	213	252	261	128	309	212	204	830	83	243	1154	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	1736		1825	1783		1738	3560		1825	3509	
Flt Permitted	0.11	1.00		0.12	1.00		0.09	1.00		0.12	1.00	
Satd. Flow (perm)	202	1736		236	1783		172	3560		225	3509	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	224	265	275	135	325	223	215	874	87	256	1215	248
RTOR Reduction (vph)	0	31	0	0	20	0	0	6	0	0	14	0
Lane Group Flow (vph)	224	509	0	135	528	0	215	955	0	256	1449	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.5	36.5		38.5	32.5		53.5	42.6		61.1	46.4	
Effective Green, g (s)	46.5	36.5		38.5	32.5		53.5	42.6		61.1	46.4	
Actuated g/C Ratio	0.39	0.30		0.32	0.27		0.45	0.36		0.51	0.39	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	207	528		155	482		218	1263		310	1356	
v/s Ratio Prot	c0.09	0.29		0.04	0.30		c0.09	0.27		c0.10	c0.41	
v/s Ratio Perm	c0.33			0.24			0.35			0.32		
v/c Ratio	1.08	0.96		0.87	1.09		0.99	0.76		0.83	1.07	
Uniform Delay, d1	31.0	41.1		34.6	43.8		33.5	34.1		25.9	36.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	86.1	30.0		37.7	69.2		56.5	4.3		16.2	45.0	
Delay (s)	117.2	71.1		72.3	112.9		90.0	38.4		42.1	81.8	
Level of Service	F	E		E	F		F	D		D	F	
Approach Delay (s)		84.6			104.9			47.8			75.9	
Approach LOS		F			F			D			E	
Intersection Summary												
HCM 2000 Control Delay		74.4			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.09										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			20.2				
Intersection Capacity Utilization		108.7%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Total PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↱		↰	↱
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	63	147	893	57	200	995
Future Volume (vph)	63	147	893	57	200	995
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	64	150	911	58	204	1015
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total (vph)	214	969	204	1015		
Volume Left (vph)	64	0	204	0		
Volume Right (vph)	150	58	0	0		
Hadj (s)	-0.29	0.00	0.55	0.05		
Departure Headway (s)	6.7	5.7	6.6	6.1		
Degree Utilization, x	0.40	1.54	0.37	1.71		
Capacity (veh/h)	534	637	542	599		
Control Delay (s)	14.0	264.8	12.2	343.2		
Approach Delay (s)	14.0	264.8	287.8			
Approach LOS	B	F	F			
Intersection Summary						
Delay			254.2			
Level of Service			F			
Intersection Capacity Utilization		84.2%		ICU Level of Service		E
Analysis Period (min)		15				

Timings
17: Hurontario Street & Hume Street

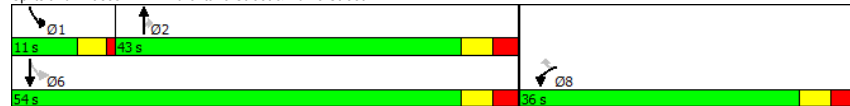
2041 Total PM

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	503	333	533	371	241	655
Future Volume (vph)	503	333	533	371	241	655
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	36.0	36.0	43.0	43.0	11.0	54.0
Total Split (%)	40.0%	40.0%	47.8%	47.8%	12.2%	60.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	28.5	28.5	36.7	36.7		47.8
Actuated g/C Ratio	0.32	0.32	0.41	0.41		0.54
v/c Ratio	0.94	0.51	0.73	0.46		0.94dl
Control Delay	54.8	7.5	28.8	3.8		26.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	54.8	7.5	28.8	3.8		26.8
LOS	D	A	C	A		C
Approach Delay	35.9		18.5			26.8
Approach LOS	D		B			C

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 88.9
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 26.9 Intersection LOS: C
 Intersection Capacity Utilization 96.8% ICU Level of Service F
 Analysis Period (min) 15
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2041 Total PM

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	547	362	579	403	974
v/c Ratio	0.94	0.51	0.73	0.46	0.94dl
Control Delay	54.8	7.5	28.8	3.8	26.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	7.5	28.8	3.8	26.8
Queue Length 50th (m)	89.7	6.8	82.8	0.0	54.0
Queue Length 95th (m)	#148.9	27.7	122.0	16.4	#77.8
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	610	734	794	880	1123
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.49	0.73	0.46	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2041 Total PM

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	503	333	533	371	241	655
Future Volume (vph)	503	333	533	371	241	655
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.99	0.99
Satd. Flow (prot)	1825	1588	1921	1560	3564	3564
Flt Permitted	0.95	1.00	1.00	1.00	0.54	0.54
Satd. Flow (perm)	1825	1588	1921	1560	1933	1933
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	547	362	579	403	262	712
RTOR Reduction (vph)	0	207	0	236	0	0
Lane Group Flow (vph)	547	155	579	167	0	974
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	28.5	28.5	36.7	36.7		47.7
Effective Green, g (s)	28.5	28.5	36.7	36.7		47.7
Actuated g/C Ratio	0.32	0.32	0.41	0.41		0.54
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	585	509	793	644		1166
v/s Ratio Prot	c0.30		0.30			c0.07
v/s Ratio Perm		0.10		0.11		c0.38
v/c Ratio	0.94	0.30	0.73	0.26		0.94dl
Uniform Delay, d1	29.3	22.7	21.9	17.1		17.3
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	22.3	0.3	5.9	1.0		7.1
Delay (s)	51.6	23.0	27.7	18.1		24.4
Level of Service	D	C	C	B		C
Approach Delay (s)	40.2		23.8			24.4
Approach LOS	D		C			C

Intersection Summary

HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	16.6
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Total PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↩			↩			↩			↩	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	40	286	101	73	217	299	44	396	61	217	317	35
Future Volume (vph)	40	286	101	73	217	299	44	396	61	217	317	35
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	43	304	107	78	231	318	47	421	65	231	337	37
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	454	627	533	605								
Volume Left (vph)	43	78	47	231								
Volume Right (vph)	107	318	65	37								
Hadj (s)	-0.08	-0.24	0.06	0.09								
Departure Headway (s)	9.5	9.3	9.6	9.7								
Degree Utilization, x	1.20	1.62	1.42	1.62								
Capacity (veh/h)	384	390	384	377								
Control Delay (s)	140.7	315.6	232.0	315.8								
Approach Delay (s)	140.7	315.6	232.0	315.8								
Approach LOS	F	F	F	F								

Intersection Summary

Delay	259.8		
Level of Service	F		
Intersection Capacity Utilization	116.3%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Total PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	114	17	72	92	228	9	182	51	251	182	47
Future Volume (vph)	35	114	17	72	92	228	9	182	51	251	182	47
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	40	131	20	83	106	262	10	209	59	289	209	54
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	191	189	262	278	552							
Volume Left (vph)	40	83	0	10	289							
Volume Right (vph)	20	0	262	59	54							
Hadj (s)	0.31	0.52	-0.56	-0.09	0.14							
Departure Headway (s)	8.3	8.3	7.2	7.4	7.0							
Degree Utilization, x	0.44	0.44	0.53	0.57	1.08							
Capacity (veh/h)	404	420	475	466	504							
Control Delay (s)	17.6	16.4	16.8	19.6	87.8							
Approach Delay (s)	17.6	16.7		19.6	87.8							
Approach LOS	C	C		C	F							
Intersection Summary												
Delay			44.0									
Level of Service			E									
Intersection Capacity Utilization			66.3%	ICU Level of Service		C						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Total PM

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	116	878	933	130	126	220
Future Volume (Veh/h)	116	878	933	130	126	220
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	130	987	1048	146	142	247
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1194				2368	1121
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1194				2368	1121
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	74				0	1
cM capacity (veh/h)	505				29	250
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1117	1194	389			
Volume Left	130	0	142			
Volume Right	0	146	247			
cSH	505	1700	65			
Volume to Capacity	0.26	0.70	5.96			
Queue Length 95th (m)	7.7	0.0	Err			
Control Delay (s)	9.6	0.0	Err			
Lane LOS	A		F			
Approach Delay (s)	9.6	0.0	Err			
Approach LOS			F			
Intersection Summary						
Average Delay			1444.6			
Intersection Capacity Utilization			140.1%	ICU Level of Service	H	
Analysis Period (min)			15			



BURNSIDE

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Appendix I

2041 Total Traffic Operations with Improvements (Synchro)

Timings
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	28	0	18	0	83	679	5	1040	24
Future Volume (vph)	28	0	18	0	83	679	5	1040	24
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases		4		8	5	2		6	
Permitted Phases	4		8		2		2		6
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag	
Lead-Lag Optimize?					Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	73.0	71.0	71.0	62.2	62.2
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.81	0.79	0.79	0.69	0.69
v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04
Control Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
LOS	D	B	D	A	B	A	A	C	A
Approach Delay		16.0		40.1		6.0		25.7	
Approach LOS		B		D		A		C	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Natural Cycle: 85
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 17.5
 Intersection Capacity Utilization 93.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service F

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s

Queues
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	32	170	20	3	94	772	6	1182	27
v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04
Control Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	10.4	46.2	0.0	14.3	5.0	0.0	26.3	0.1
Queue Length 50th (m)	5.3	0.0	3.3	0.0	2.3	36.6	0.0	163.8	0.0
Queue Length 95th (m)	13.8	10.5	10.2	0.0	13.9	52.0	0.0	#266.4	0.0
Internal Link Dist (m)		79.7		52.6		42.1		217.0	
Turn Bay Length (m)							10.0		10.0
Base Capacity (vph)	112	310	85	409	217	1457	1295	1289	763
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.55	0.24	0.01	0.43	0.53	0.00	0.92	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	28	0	150	18	0	3	83	679	5	0	1040	24
Future Volume (vph)	28	0	150	18	0	3	83	679	5	0	1040	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1825	1541		1825	1633		1755	1847	1633		1865	1067
Flt Permitted	0.76	1.00		0.57	1.00		0.06	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1452	1541		1098	1633		112	1847	1633		1865	1067
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	32	0	170	20	0	3	94	772	6	0	1182	27
RTOR Reduction (vph)	0	157	0	0	3	0	0	0	1	0	0	9
Lane Group Flow (vph)	32	13	0	20	0	0	94	772	5	0	1182	18
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	4%	4%	0%	0%	3%	53%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	4			8			5	2		6		
Permitted Phases	4			8			2		6			
Actuated Green, G (s)	7.0	7.0		7.0	7.0		71.8	71.8	71.8		62.2	62.2
Effective Green, g (s)	7.0	7.0		7.0	7.0		71.8	71.8	71.8		62.2	62.2
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.79	0.79	0.79		0.69	0.69
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	111	118		84	125		189	1460	1291		1277	730
v/s Ratio Prot		0.01			0.00		0.03	c0.42			c0.63	
v/s Ratio Perm	c0.02			0.02			0.36		0.00			0.02
v/c Ratio	0.29	0.11		0.24	0.00		0.50	0.53	0.00		0.93	0.03
Uniform Delay, d1	39.5	39.0		39.4	38.7		20.6	3.4	2.0		12.3	4.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.4		1.5	0.0		2.1	1.4	0.0		12.7	0.1
Delay (s)	41.0	39.4		40.9	38.7		22.6	4.8	2.0		25.0	4.6
Level of Service	D	D		D	D		C	A	A		C	A
Approach Delay (s)		39.7			40.6			6.7			24.6	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

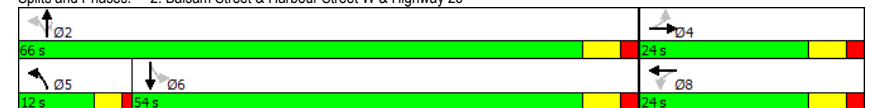
Timings
2: Balsam Street & Harbour Street W & Highway 26

2041 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	7	10	82	9	112	801	117	27	1228
Future Volume (vph)	7	10	82	9	112	801	117	27	1228
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2		6	
Permitted Phases		4		8	5	2		6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	7.0	40.0	40.0	40.0	40.0
Minimum Split (s)	14.0	14.0	14.0	14.0	11.0	61.0	61.0	46.0	46.0
Total Split (s)	24.0	24.0	24.0	24.0	12.0	66.0	66.0	54.0	54.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	13.3%	73.3%	73.3%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effect Green (s)	13.8	13.8	13.8	13.8	62.1	60.1	60.1	48.1	48.1
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.72	0.70	0.70	0.56	0.56
v/c Ratio	0.04	0.56	0.76	0.16	0.49	0.38	0.12	0.10	0.73
Control Delay	29.7	14.4	68.8	15.1	13.9	6.3	3.4	11.0	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	14.4	68.8	15.1	13.9	6.3	3.4	11.0	17.5
LOS	C	B	E	B	B	A	A	B	B
Approach Delay		14.9		51.4		6.8			17.4
Approach LOS		B		D		A			B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 85.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 105.2%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	8	226	96	46	132	942	138	32	1450
v/c Ratio	0.04	0.56	0.76	0.16	0.49	0.38	0.12	0.10	0.73
Control Delay	29.7	14.4	68.8	15.1	13.9	6.3	3.4	11.0	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	14.4	68.8	15.1	13.9	6.3	3.4	11.0	17.5
Queue Length 50th (m)	1.1	6.6	15.2	1.6	5.6	29.3	3.8	2.3	88.6
Queue Length 95th (m)	4.4	22.6	#32.1	9.3	17.3	41.1	9.4	6.8	112.6
Internal Link Dist (m)		86.0		57.9		128.9			84.6
Turn Bay Length (m)	45.0		70.0		60.0		5.0	30.0	
Base Capacity (vph)	293	471	167	358	268	2455	1159	326	1982
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.48	0.57	0.13	0.49	0.38	0.12	0.10	0.73

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	7	10	182	82	9	30	112	801	117	27	1228	4
Future Volume (vph)	7	10	182	82	9	30	112	801	117	27	1228	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.86		1.00	0.89		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1825	1567		1787	1577		1738	3510	1633	1825	3542	
Flt Permitted	0.73	1.00		0.42	1.00		0.09	1.00	1.00	0.30	1.00	
Satd. Flow (perm)	1397	1567		795	1577		168	3510	1633	583	3542	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	8	12	214	96	11	35	132	942	138	32	1445	5
RTOR Reduction (vph)	0	151	0	0	29	0	0	0	17	0	0	0
Lane Group Flow (vph)	8	75	0	96	17	0	132	942	121	32	1450	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	0%	4%	2%	33%	0%	5%	4%	0%	0%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	13.8	13.8		13.8	13.8		60.1	60.1	60.1	48.1	48.1	
Effective Green, g (s)	13.8	13.8		13.8	13.8		60.1	60.1	60.1	48.1	48.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.70	0.70	0.70	0.56	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	224	251		127	253		263	2455	1142	326	1983	
v/s Ratio Prot		0.05			0.01		c0.05	0.27			c0.41	
v/s Ratio Perm	0.01			c0.12			0.30		0.07	0.05		
v/c Ratio	0.04	0.30		0.76	0.07		0.50	0.38	0.11	0.10	0.73	
Uniform Delay, d1	30.4	31.8		34.4	30.6		10.6	5.3	4.2	8.8	14.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.7		22.3	0.1		6.7	0.5	0.2	0.6	2.4	
Delay (s)	30.5	32.5		56.7	30.7		17.3	5.8	4.4	9.4	16.5	
Level of Service	C	C		E	C		B	A	A	A	B	
Approach Delay (s)		32.4			48.3			6.9			16.3	
Approach LOS		C			D			A			B	

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Timings
3: Balsam Street & CT Entrance/Plaza Access

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	31	0	23	3	64	1070	4	1480
Future Volume (vph)	31	0	23	3	64	1070	4	1480
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.4	10.4		10.4	53.1	52.7	51.4	48.5
Actuated g/C Ratio	0.16	0.16		0.16	0.80	0.79	0.77	0.73
v/c Ratio	0.19	0.06		0.18	0.27	0.46	0.01	0.72
Control Delay	30.8	0.2		27.5	6.9	6.3	3.0	14.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	0.2		27.5	6.9	6.3	3.0	14.4
LOS	C	A		C	A	A	A	B
Approach Delay		18.5		27.5		6.3		14.3
Approach LOS		B		C		A		B

Intersection Summary

Cycle Length: 84
Actuated Cycle Length: 66.5
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 11.3
Intersection Capacity Utilization 70.1%
Analysis Period (min) 15

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

↰ Ø1	↱ Ø2	↰ Ø4
15 s	47 s	22 s
↰ Ø5	↱ Ø6	↰ Ø8
15 s	47 s	22 s

Queues
3: Balsam Street & CT Entrance/Plaza Access

2041 Total AM
With Improvements

	EBL	EBT	WBL	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	25	38	77	1290	5	1842
v/c Ratio	0.19	0.06	0.18	0.27	0.46	0.01	0.72
Control Delay	30.8	0.2	27.5	6.9	6.3	3.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	0.2	27.5	6.9	6.3	3.0	14.4
Queue Length 50th (m)	4.7	0.0	4.0	2.4	36.3	0.2	115.9
Queue Length 95th (m)	11.7	0.0	11.1	6.4	72.0	0.8	#136.6
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	315	583	323	383	2781	545	2568
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.04	0.12	0.20	0.46	0.01	0.72

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	31	0	21	23	3	5	64	1070	1	4	1480	49
Future Volume (vph)	31	0	21	23	3	5	64	1070	1	4	1480	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.98		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1633			1614		1706	3509		1825	3516	
Flt Permitted	0.74	1.00			0.77		0.08	1.00		0.19	1.00	
Satd. Flow (perm)	1271	1633			1283		145	3509		368	3516	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	37	0	25	28	4	6	77	1289	1	5	1783	59
RTOR Reduction (vph)	0	23	0	0	6	0	0	0	0	0	2	0
Lane Group Flow (vph)	37	2	0	0	32	0	77	1290	0	5	1840	0
Confl. Peds. (#/hr)							5		1	1		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	12%	0%	0%	5%	33%	33%	7%	4%	0%	0%	3%	10%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.4	5.4			5.4		53.6	49.7		48.2	47.0	
Effective Green, g (s)	5.4	5.4			5.4		53.6	49.7		48.2	47.0	
Actuated g/C Ratio	0.07	0.07			0.07		0.74	0.69		0.67	0.65	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	94	121			95		191	2412		269	2285	
v/s Ratio Prot		0.00					0.02	0.37		0.00	0.52	
v/s Ratio Perm	0.03				0.03		0.28			0.01		
v/c Ratio	0.39	0.02			0.34		0.40	0.53		0.02	0.81	
Uniform Delay, d1	31.9	31.0			31.8		8.9	5.6		4.2	9.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.1			2.1		1.4	0.9		0.0	3.1	
Delay (s)	34.6	31.0			33.9		10.3	6.4		4.2	12.4	
Level of Service	C	C			C		B	A		A	B	
Approach Delay (s)		33.2			33.9			6.7			12.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	72.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

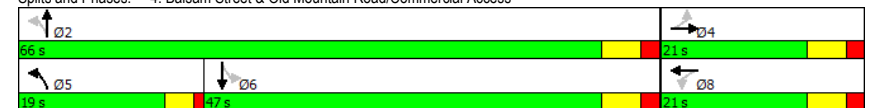
Timings 4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total AM
With Improvements

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰
Traffic Volume (vph)	42	0	0	82	1111	1	1408
Future Volume (vph)	42	0	0	82	1111	1	1408
Turn Type	Perm	NA	NA	pm+pt	NA	Perm	NA
Protected Phases		4	8	5	2		6
Permitted Phases	4			2		6	
Detector Phase	4	4	8	5	2	6	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag		Lag
Lead-Lag Optimize?			Yes		Yes		Yes
Recall Mode	None	None	None	None	Max	Max	Max
Act Effct Green (s)	10.4	10.4	10.4	65.1	64.3	55.1	55.1
Actuated g/C Ratio	0.13	0.13	0.13	0.79	0.78	0.67	0.67
v/c Ratio	0.30	0.11	0.01	0.42	0.51	0.00	0.78
Control Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
LOS	D	A	A	B	A	A	B
Approach Delay		19.1			5.8		16.3
Approach LOS		B			A		B

Intersection Summary	
Cycle Length: 87	
Actuated Cycle Length: 82.2	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total AM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	52	52	2	101	1376	1	1829
v/c Ratio	0.30	0.11	0.01	0.42	0.51	0.00	0.78
Control Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	0.5	0.0	12.6	5.3	8.0	16.3
Queue Length 50th (m)	7.6	0.0	0.0	3.2	40.5	0.1	114.0
Queue Length 95th (m)	15.9	0.0	0.0	11.8	49.1	0.7	134.1
Internal Link Dist (m)	175.6	57.5		179.2		181.9	
Turn Bay Length (m)			70.0		70.0		
Base Capacity (vph)	251	536	271	390	2714	253	2359
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.10	0.01	0.26	0.51	0.00	0.78
Intersection Summary							

HCM Signalized Intersection Capacity Analysis
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↰	↱	↰	↱		↰	↱	
Traffic Volume (vph)	42	0	42	0	0	2	82	1111	3	1	1408	74
Future Volume (vph)	42	0	42	0	0	2	82	1111	3	1	1408	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.86		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1728	1609			1088		1722	3470		1825	3515	
Flt Permitted	0.76	1.00			1.00		0.07	1.00		0.20	1.00	
Satd. Flow (perm)	1376	1609			1088		125	3470		378	3515	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	52	0	52	0	0	2	101	1372	4	1	1738	91
RTOR Reduction (vph)	0	47	0	0	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	52	5	0	0	0	0	101	1376	0	1	1826	0
Confl. Peds. (#/hr)	2		1	1		2	6					6
Heavy Vehicles (%)	5%	0%	0%	0%	0%	50%	6%	5%	50%	0%	3%	3%
Turn Type	Perm	NA			NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.4	8.4			8.4		63.9	63.9		53.9	53.9	
Effective Green, g (s)	8.4	8.4			8.4		63.9	63.9		53.9	53.9	
Actuated g/C Ratio	0.10	0.10			0.10		0.76	0.76		0.64	0.64	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	137	160			108		208	2630		241	2247	
v/s Ratio Prot		0.00			0.00		0.03	c0.40			c0.52	
v/s Ratio Perm	c0.04						0.33			0.00		
v/c Ratio	0.38	0.03			0.00		0.49	0.52		0.00	0.81	
Uniform Delay, d1	35.5	34.3			34.2		12.5	4.1		5.5	11.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.1			0.0		1.8	0.7		0.0	3.3	
Delay (s)	37.3	34.4			34.2		14.3	4.8		5.5	14.8	
Level of Service	D	C			C		B	A		A	B	
Approach Delay (s)		35.8			34.2			5.5			14.7	
Approach LOS		D			C			A			B	
Intersection Summary												
HCM 2000 Control Delay		11.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		84.3			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		87.1%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Timings
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	79	658	216	147	507	613	174	512	223	756	589
Future Volume (vph)	79	658	216	147	507	613	174	512	223	756	589
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA
Protected Phases	3	8		7	4	1	5	2		1	6
Permitted Phases	8		8	4		4	2		2		
Detector Phase	3	8	8	7	4	1	5	2	2	1	6
Switch Phase											
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	20.0	15.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	22.0	11.0	22.0	26.5	21.5	21.5	21.5	26.5	26.5
Total Split (s)	12.0	40.0	40.0	13.0	41.0	45.0	24.2	32.0	32.0	45.0	52.8
Total Split (%)	9.2%	30.8%	30.8%	10.0%	31.5%	34.6%	18.6%	24.6%	24.6%	34.6%	40.6%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	42.8	32.0	32.0	45.2	33.2	71.2	40.5	24.9	24.9	37.4	46.8
Actuated g/C Ratio	0.34	0.25	0.25	0.35	0.26	0.56	0.32	0.20	0.20	0.29	0.37
v/c Ratio	0.42	0.90	0.50	0.92	0.67	0.83	0.61	0.90	0.60	0.91	0.66
Control Delay	33.0	60.7	17.7	79.1	46.6	25.8	28.5	67.7	23.1	57.7	36.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	60.7	17.7	79.1	46.6	25.8	28.5	67.7	23.1	57.7	36.1
LOS	C	E	B	E	D	C	C	E	C	E	D
Approach Delay		48.6			40.3			49.2			47.5
Approach LOS		D			D			D			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 127.4

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 46.1

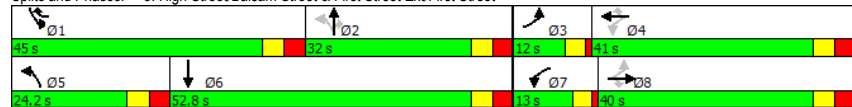
Intersection LOS: D

Intersection Capacity Utilization 82.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street



Queues
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	96	802	263	179	618	748	212	624	272	922	830
v/c Ratio	0.42	0.90	0.50	0.92	0.67	0.83	0.61	0.90	0.60	0.91	0.66
Control Delay	33.0	60.7	17.7	79.1	46.6	25.8	28.5	67.7	23.1	57.7	36.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	60.7	17.7	79.1	46.6	25.8	28.5	67.7	23.1	57.7	36.1
Queue Length 50th (m)	16.1	104.8	17.9	31.5	74.7	112.9	27.1	82.8	21.4	117.2	89.5
Queue Length 95th (m)	25.7	114.6	35.0	#60.2	84.6	134.0	36.9	93.6	40.7	126.1	101.2
Internal Link Dist (m)		178.2			250.8		206.8				179.2
Turn Bay Length (m)	50.0		50.0	60.0		100.0	50.0		50.0	80.0	
Base Capacity (vph)	229	919	534	194	947	917	377	711	457	1040	1297
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.87	0.49	0.92	0.65	0.82	0.56	0.88	0.60	0.89	0.64

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	79	658	216	147	507	613	174	512	223	756	589	92
Future Volume (vph)	79	658	216	147	507	613	174	512	223	756	589	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1689	3544	1559	1825	3544	1530	1806	3544	1579	3437	3421	
Flt Permitted	0.25	1.00	1.00	0.12	1.00	1.00	0.34	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	451	3544	1559	231	3544	1530	645	3544	1579	3437	3421	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
Adj. Flow (vph)	96	802	263	179	618	748	212	624	272	922	718	112
RTOR Reduction (vph)	0	0	131	0	0	51	0	0	141	0	9	0
Lane Group Flow (vph)	96	802	132	179	618	697	212	624	131	922	821	0
Confl. Peds. (#/hr)	5		4	4		5	4		1	1		4
Heavy Vehicles (%)	8%	3%	3%	0%	3%	6%	1%	3%	2%	3%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4	1	5	2		1	6	
Permitted Phases	8		8	4		4	2		2			
Actuated Green, G (s)	39.8	32.0	32.0	42.2	33.2	70.6	40.6	25.0	25.0	37.4	46.8	
Effective Green, g (s)	39.8	32.0	32.0	42.2	33.2	70.6	40.6	25.0	25.0	37.4	46.8	
Actuated g/C Ratio	0.31	0.25	0.25	0.33	0.26	0.55	0.32	0.20	0.20	0.29	0.37	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	216	890	391	189	923	847	347	695	309	1008	1256	
v/s Ratio Prot	0.03	0.23		c0.07	0.17	0.24	0.07	c0.18		c0.27	0.24	
v/s Ratio Perm	0.11		0.08	c0.25		0.21	0.12		0.08			
v/c Ratio	0.44	0.90	0.34	0.95	0.67	0.82	0.61	0.90	0.42	0.91	0.65	
Uniform Delay, d1	32.6	46.2	39.0	35.0	42.2	23.3	33.5	50.0	44.9	43.5	33.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	12.2	0.5	49.8	1.9	6.5	3.2	14.3	0.9	12.4	1.2	
Delay (s)	34.1	58.3	39.5	84.8	44.0	29.8	36.7	64.3	45.8	55.8	34.8	
Level of Service	C	E	D	F	D	C	D	E	D	E	C	
Approach Delay (s)		52.1			41.8			54.5			45.9	
Approach LOS		D			D			D			D	

Intersection Summary

HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	127.4	Sum of lost time (s)	24.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Timings
6: Spruce Street & First Street

2041 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	5	1603	25	1270	10	2	13	4
Future Volume (vph)	5	1603	25	1270	10	2	13	4
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	92.0	88.4	93.6	92.8	10.0	10.0	10.0	10.0
Actuated g/C Ratio	0.85	0.82	0.87	0.86	0.09	0.09	0.09	0.09
v/c Ratio	0.02	0.66	0.13	0.51	0.09	0.23	0.12	0.05
Control Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
LOS	A	A	A	A	D	B	D	D
Approach Delay		9.0		4.7		25.0		43.3
Approach LOS		A		A		C		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBT, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 7.6
Intersection Capacity Utilization 63.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Spruce Street & First Street



Queues
6: Spruce Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	1925	30	1523	12	41	15	9
v/c Ratio	0.02	0.66	0.13	0.51	0.09	0.23	0.12	0.05
Control Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	9.0	3.0	4.8	46.7	18.6	47.4	36.4
Queue Length 50th (m)	0.3	125.2	0.9	47.6	2.4	0.4	2.9	1.0
Queue Length 95th (m)	0.7	131.0	2.1	86.7	7.6	9.4	8.8	5.3
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	343	2917	228	3009	333	387	322	415
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	0.02	0.66	0.13	0.51	0.04	0.11	0.05	0.02
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SEB
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SEB
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	5	1603	14	25	1270	9	10	2	33	13	4	3
Future Volume (vph)	5	1603	14	25	1270	9	10	2	33	13	4	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3568		1825	3506		1815	1515		1778	1779	
Flt Permitted	0.15	1.00		0.07	1.00		0.75	1.00		0.73	1.00	
Satd. Flow (perm)	285	3568		138	3506		1437	1515		1367	1779	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	1908	17	30	1512	11	12	2	39	15	5	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	37	0	0	4	0
Lane Group Flow (vph)	6	1925	0	30	1523	0	12	4	0	15	5	0
Confl. Peds. (#/hr)	5		3	3		5	1		5	5		1
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	20%	0%	4%	0%	0%	0%	5%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Effective Green, g (s)	83.4	82.0		89.0	84.8		6.0	6.0		6.0	6.0	
Actuated g/C Ratio	0.77	0.76		0.82	0.78		0.06	0.06		0.06	0.06	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	239	2706		179	2750		79	84		75	98	
v/s Ratio Prot	0.00	c0.54		c0.01	0.43			0.00			0.00	
v/s Ratio Perm	0.02			0.13			0.01			c0.01		
v/c Ratio	0.03	0.71		0.17	0.55		0.15	0.05		0.20	0.05	
Uniform Delay, d1	3.3	6.8		6.7	4.4		48.6	48.3		48.8	48.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.6		0.4	0.8		0.9	0.2		1.3	0.2	
Delay (s)	3.4	8.5		7.2	5.2		49.5	48.6		50.1	48.6	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.4			5.3			48.8			49.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			7.9							A		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			108.1			Sum of lost time (s)			15.9			
Intersection Capacity Utilization			63.0%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	102	1279	10	1054	37	38	87	31
Future Volume (vph)	102	1279	10	1054	37	38	87	31
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.8	73.3	71.5	64.1	13.0	13.0	13.0	13.0
Actuated g/C Ratio	0.77	0.73	0.72	0.64	0.13	0.13	0.13	0.13
v/c Ratio	0.34	0.60	0.04	0.55	0.52	0.28	0.58	0.65
Control Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
LOS	A	A	A	A	E	C	D	C
Approach Delay		8.8		7.5		40.3		33.7
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 73.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street



Queues
7: Cedar Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	119	1545	12	1235	43	70	101	214
v/c Ratio	0.34	0.60	0.04	0.55	0.52	0.28	0.58	0.65
Control Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	9.0	2.2	7.6	60.5	27.9	53.3	24.4
Queue Length 50th (m)	4.5	56.4	0.3	17.1	7.9	7.7	18.7	13.5
Queue Length 95th (m)	10.8	122.2	m0.3	82.2	17.2	17.8	31.1	30.8
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	352	2584	270	2244	154	443	321	491
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	0.34	0.60	0.04	0.55	0.28	0.16	0.31	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	102	1279	50	10	1054	8	37	38	22	87	31	153
Future Volume (vph)	102	1279	50	10	1054	8	37	38	22	87	31	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00	
Frft	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3525		1825	3502		1753	1759		1773	1608	
Flt Permitted	0.16	1.00		0.13	1.00		0.35	1.00		0.71	1.00	
Satd. Flow (perm)	316	3525		254	3502		643	1759		1328	1608	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	119	1487	58	12	1226	9	43	44	26	101	36	178
RTOR Reduction (vph)	0	2	0	0	0	0	0	23	0	0	121	0
Lane Group Flow (vph)	119	1543	0	12	1235	0	43	47	0	101	93	0
Confl. Peds. (#/hr)	11		1	1		11	1		9	9		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	0%	4%	17%	4%	3%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	75.3	70.1		65.3	64.1		13.0	13.0		13.0	13.0	
Effective Green, g (s)	75.3	70.1		65.3	64.1		13.0	13.0		13.0	13.0	
Actuated g/C Ratio	0.75	0.70		0.65	0.64		0.13	0.13		0.13	0.13	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	346	2471		184	2244		83	228		172	209	
v/s Ratio Prot	c0.02	c0.44		0.00	0.35			0.03			0.06	
v/s Ratio Perm	0.23			0.04			0.07			c0.08		
v/c Ratio	0.34	0.62		0.07	0.55		0.52	0.21		0.59	0.45	
Uniform Delay, d1	5.6	8.0		6.9	10.0		40.6	38.9		41.0	40.2	
Progression Factor	1.00	1.00		0.49	0.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.2		0.1	0.8		5.4	0.5		5.0	1.5	
Delay (s)	6.2	9.2		3.5	6.9		45.9	39.4		46.0	41.7	
Level of Service	A	A		A	A		D	D		D	D	
Approach Delay (s)		8.9			6.9			41.9			43.1	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

2041 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	40	971	20	1080	140	15	53	28
Future Volume (vph)	40	971	20	1080	140	15	53	28
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	13.0	26.0	13.0	26.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	13.0%	26.0%	13.0%	26.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	67.7	63.0	66.7	60.7	17.4	10.5	19.3	10.3
Actuated g/C Ratio	0.68	0.63	0.67	0.61	0.17	0.10	0.19	0.10
v/c Ratio	0.16	0.58	0.09	0.61	0.62	0.18	0.21	0.40
Control Delay	3.6	8.4	4.8	9.9	45.2	28.3	30.8	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.4	4.8	10.0	45.2	28.3	30.8	23.9
LOS	A	A	A	A	D	C	C	C
Approach Delay		8.3		9.9		42.3		26.7
Approach LOS		A		A		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 12.2
Intersection Capacity Utilization 57.6%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 8: Pine Street & First Street

Ø1	Ø2	Ø3	Ø4
11 s	50 s	13 s	26 s
Ø5	Ø6 (R)	Ø7	Ø8
11 s	50 s	13 s	26 s

Queues
8: Pine Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	47	1280	24	1287	165	34	62	91
v/c Ratio	0.16	0.58	0.09	0.61	0.62	0.18	0.21	0.40
Control Delay	3.6	8.4	4.8	9.9	45.2	28.3	30.8	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.6	8.4	4.8	10.0	45.2	28.3	30.8	23.9
Queue Length 50th (m)	1.3	72.8	1.0	55.0	26.5	3.2	9.4	6.0
Queue Length 95th (m)	m1.4	31.3	m1.8	59.5	41.0	11.2	18.2	18.3
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	286	2189	267	2126	266	350	303	388
Starvation Cap Reductn	0	0	0	49	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	0.58	0.09	0.62	0.62	0.10	0.20	0.23

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	40	971	117	20	1080	14	140	15	14	53	28	49
Future Volume (vph)	40	971	117	20	1080	14	140	15	14	53	28	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3468		1629	3503		1733	1690		1715	1711	
Flt Permitted	0.14	1.00		0.15	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	260	3468		257	3503		1273	1690		1226	1711	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	1142	138	24	1271	16	165	18	16	62	33	58
RTOR Reduction (vph)	0	7	0	0	1	0	0	15	0	0	53	0
Lane Group Flow (vph)	47	1273	0	24	1286	0	165	19	0	62	38	0
Confl. Peds. (#/hr)	17		1	1		17	3		4	4		3
Confl. Bikes (#/hr)			1						1			1
Heavy Vehicles (%)	0%	3%	6%	12%	4%	0%	5%	0%	9%	6%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	62.8	58.5		59.8	57.0		18.1	8.5		19.5	9.2	
Effective Green, g (s)	62.8	58.5		59.8	57.0		18.1	8.5		19.5	9.2	
Actuated g/C Ratio	0.63	0.58		0.60	0.57		0.18	0.08		0.20	0.09	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	2028		192	1996		274	143		289	157	
v/s Ratio Prot	c0.01	0.37		0.00	c0.37		c0.06	0.01		0.02	0.02	
v/s Ratio Perm	0.12			0.07			c0.05			0.02		
v/c Ratio	0.20	0.63		0.12	0.64		0.60	0.14		0.21	0.24	
Uniform Delay, d1	9.7	13.6		9.8	14.6		37.1	42.3		33.6	42.2	
Progression Factor	0.42	0.59		0.71	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.2		0.3	1.4		3.7	0.4		0.4	0.8	
Delay (s)	4.5	9.2		7.2	10.4		40.8	42.8		34.0	43.0	
Level of Service	A	A		A	B		D	D		C	D	
Approach Delay (s)		9.1			10.3			41.1			39.3	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings
9: Hurontario Street & First Street/Huron Street

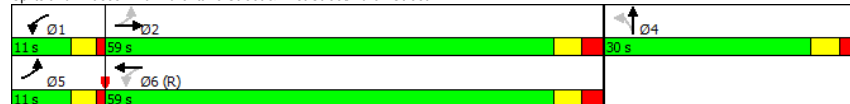
2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations						
Traffic Volume (vph)	24	804	46	864	257	21
Future Volume (vph)	24	804	46	864	257	21
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	59.0	11.0	59.0	30.0	30.0
Total Split (%)	11.0%	59.0%	11.0%	59.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	66.0	58.9	67.2	61.1	21.0	21.0
Actuated g/C Ratio	0.66	0.59	0.67	0.61	0.21	0.21
v/c Ratio	0.09	0.59	0.18	0.49	0.81	0.20
Control Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	5.1	7.1	13.2	54.5	13.9
LOS	A	A	A	B	D	B
Approach Delay		5.1		12.9		46.0
Approach LOS		A		B		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 14.0
 Intersection Capacity Utilization 60.6%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues
9: Hurontario Street & First Street/Huron Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	29	1213	55	1060	306	81
v/c Ratio	0.09	0.59	0.18	0.49	0.81	0.20
Control Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	2.1	5.1	7.1	13.2	54.5	13.9
Queue Length 50th (m)	0.4	85.7	3.1	63.2	56.0	3.9
Queue Length 95th (m)	m0.8	8.5	6.8	78.4	76.1	13.5
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	329	2048	312	2159	438	456
Starvation Cap Reductn	0	93	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	0.09	0.62	0.18	0.49	0.70	0.18

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	24	804	215	46	864	26	257	21	47	0	0	0
Future Volume (vph)	24	804	215	46	864	26	257	21	47	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.90				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1587	3442		1825	3529		1797	1698				
Flt Permitted	0.22	1.00		0.16	1.00		0.95	1.00				
Satd. Flow (perm)	367	3442		307	3529		1797	1698				
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	29	957	256	55	1029	31	306	25	56	0	0	0
RTOR Reduction (vph)	0	21	0	0	2	0	0	44	0	0	0	0
Lane Group Flow (vph)	29	1192	0	55	1058	0	306	37	0	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	4		5	5		4
Confl. Bikes (#/hr)							1					
Heavy Vehicles (%)	15%	3%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	62.0	58.1		64.8	59.5		21.0	21.0				
Effective Green, g (s)	62.0	58.1		64.8	59.5		21.0	21.0				
Actuated g/C Ratio	0.62	0.58		0.65	0.60		0.21	0.21				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	275	1999		279	2099		377	356				
v/s Ratio Prot	0.00	c0.35		c0.01	0.30			0.02				
v/s Ratio Perm	0.06			0.12			c0.17					
v/c Ratio	0.11	0.60		0.20	0.50		0.81	0.10				
Uniform Delay, d1	8.0	13.4		8.3	11.7		37.6	31.9				
Progression Factor	0.28	0.29		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	1.1		0.3	0.9		12.5	0.1				
Delay (s)	2.4	5.0		8.7	12.6		50.1	32.0				
Level of Service	A	A		A	B		D	C				
Approach Delay (s)		4.9			12.4		46.3			0.0		
Approach LOS		A			B		D			A		

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

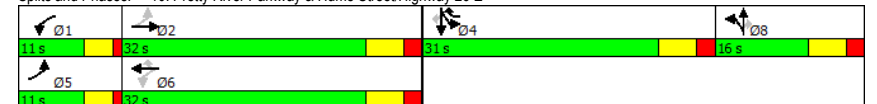
2041 Total AM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	161	265	31	436	855	22	32	35	348	44	140
Future Volume (vph)	161	265	31	436	855	22	32	35	348	44	140
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	32.0	11.0	32.0	31.0	16.0	16.0	16.0	31.0	31.0	31.0
Total Split (%)	12.2%	35.6%	12.2%	35.6%	34.4%	17.8%	17.8%	17.8%	34.4%	34.4%	34.4%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	37.5	31.6	35.7	26.5	48.3	10.2	10.2	10.2	21.8	21.8	21.8
Actuated g/C Ratio	0.45	0.38	0.43	0.32	0.58	0.12	0.12	0.12	0.26	0.26	0.26
v/c Ratio	0.63	0.24	0.08	0.82	0.86	0.13	0.17	0.14	0.51	0.50	0.31
Control Delay	28.2	21.9	15.3	42.6	16.2	37.8	38.4	1.0	31.9	31.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	21.9	15.3	42.6	16.2	37.8	38.4	1.0	31.9	31.6	6.2
LOS	C	C	B	D	B	D	D	A	C	C	A
Approach Delay		24.2		24.9			23.7			25.0	
Approach LOS		C		C			C			C	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 83.8	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 24.7	Intersection LOS: C
Intersection Capacity Utilization 83.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E



Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	181	320	35	490	961	25	36	39	219	221	157
v/c Ratio	0.63	0.24	0.08	0.82	0.86	0.13	0.17	0.14	0.51	0.50	0.31
Control Delay	28.2	21.9	15.3	42.6	16.2	37.8	38.4	1.0	31.9	31.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	21.9	15.3	42.6	16.2	37.8	38.4	1.0	31.9	31.6	6.2
Queue Length 50th (m)	19.1	22.0	3.4	81.2	51.2	4.0	5.8	0.0	33.1	33.3	0.0
Queue Length 95th (m)	#36.0	32.5	8.7	#134.1	#136.3	11.3	14.3	0.0	54.5	54.7	12.9
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	286	1333	444	595	1160	199	212	285	501	514	569
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.24	0.08	0.82	0.83	0.13	0.17	0.14	0.44	0.43	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	161	265	20	31	436	855	22	32	35	348	44	140
Future Volume (vph)	161	265	20	31	436	855	22	32	35	348	44	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1807	3526		1558	1883	1565	1644	1746	1209	1651	1691	1512
Flt Permitted	0.19	1.00		0.56	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	366	3526		915	1883	1565	1644	1746	1209	1651	1691	1512
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	181	298	22	35	490	961	25	36	39	391	49	157
RTOR Reduction (vph)	0	5	0	0	0	210	0	0	36	0	0	118
Lane Group Flow (vph)	181	315	0	35	490	751	25	36	3	219	221	39
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	1%	2%	6%	17%	2%	3%	11%	10%	33%	5%	0%	8%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	38.7	31.6		32.3	28.4	50.2	7.5	7.5	7.5	21.8	21.8	21.8
Effective Green, g (s)	38.7	31.6		32.3	28.4	50.2	7.5	7.5	7.5	21.8	21.8	21.8
Actuated g/C Ratio	0.45	0.36		0.37	0.33	0.58	0.09	0.09	0.09	0.25	0.25	0.25
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	1283		369	616	1013	142	150	104	414	424	379
v/s Ratio Prot	c0.05	0.09		0.00	0.26	c0.19	0.02	c0.02		0.13	0.13	
v/s Ratio Perm	0.23			0.03		0.29			0.00			0.03
v/c Ratio	0.64	0.25		0.09	0.80	0.74	0.18	0.24	0.03	0.53	0.52	0.10
Uniform Delay, d1	17.4	19.3		17.5	26.6	13.5	36.8	37.0	36.3	28.1	28.0	25.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	0.5		0.1	10.2	3.0	0.6	0.8	0.1	1.2	1.2	0.1
Delay (s)	22.4	19.7		17.6	36.8	16.5	37.4	37.8	36.5	29.3	29.2	25.1
Level of Service	C	B		B	D	B	D	D	D	C	C	C
Approach Delay (s)		20.7			23.2			37.2			28.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay		24.4							C			
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		86.8						22.0				
Intersection Capacity Utilization		83.6%							E			
Analysis Period (min)		15										
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total AM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔	↔	↖	↗	↖	↗
Traffic Volume (vph)	15	5	15	154	867	120	355
Future Volume (vph)	15	5	15	154	867	120	355
Turn Type	Perm	NA	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4	8	5	2	1	6
Permitted Phases		4		2		6	
Detector Phase	4	4	8	5	2	1	6
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	7.0	24.0	7.0	24.0
Minimum Split (s)	16.0	16.0	16.0	11.0	30.0	11.0	30.0
Total Split (s)	29.0	29.0	29.0	11.0	30.0	11.0	30.0
Total Split (%)	41.4%	41.4%	41.4%	15.7%	42.9%	15.7%	42.9%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	None	Max
Act Effct Green (s)	17.3	17.3	34.1	26.6	33.2	24.2	
Actuated g/C Ratio	0.27	0.27	0.53	0.41	0.51	0.37	
v/c Ratio	0.24	0.84	0.34	0.69	0.43	0.40	
Control Delay	12.3	24.2	9.7	21.4	12.1	15.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.3	24.2	9.7	21.4	12.1	15.5	
LOS	B	C	A	C	B	B	
Approach Delay	12.3	24.2		19.6		14.8	
Approach LOS	B	C		B		B	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 64.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 19.1
Intersection Capacity Utilization 72.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

Ø1	Ø2	Ø4
11 s	30 s	29 s
Ø5	Ø6	Ø8
11 s	30 s	29 s

Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total AM
With Improvements

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	526	177	999	138	509
v/c Ratio	0.24	0.84	0.34	0.69	0.43	0.40
Control Delay	12.3	24.2	9.7	21.4	12.1	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	24.2	9.7	21.4	12.1	15.5
Queue Length 50th (m)	2.1	28.9	9.5	55.6	7.2	21.3
Queue Length 95th (m)	9.2	59.5	19.9	80.4	16.0	34.5
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	304	749	526	1446	324	1278
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	0.19	0.70	0.34	0.69	0.43	0.40

Intersection Summary

HCM Signalized Intersection Capacity Analysis

11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total AM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	15	5	30	0	15	443	154	867	2	120	355	88
Future Volume (vph)	15	5	30	0	15	443	154	867	2	120	355	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Flt		0.92			0.87		1.00	1.00		1.00	0.97	
Flt Protected		0.99			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1706			1622		1789	3506		1706	3341	
Flt Permitted		0.46			1.00		0.42	1.00		0.19	1.00	
Satd. Flow (perm)		790			1622		792	3506		341	3341	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	17	6	34	0	17	509	177	997	2	138	408	101
RTOR Reduction (vph)	0	25	0	0	193	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	32	0	0	333	0	177	999	0	138	480	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	2%	4%	50%	7%	7%	2%
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.3			17.3		33.7	26.7		30.7	25.2	
Effective Green, g (s)		17.3			17.3		33.7	26.7		30.7	25.2	
Actuated g/C Ratio		0.26			0.26		0.51	0.41		0.47	0.38	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		208			428		514	1429		274	1285	
v/s Ratio Prot					c0.21		0.04	c0.28		c0.04	0.14	
v/s Ratio Perm		0.04					0.14			0.19		
v/c Ratio		0.15			0.78		0.34	0.70		0.50	0.37	
Uniform Delay, d1		18.5			22.3		8.6	16.1		10.8	14.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			8.7		0.4	2.9		1.5	0.8	
Delay (s)		18.8			31.0		9.0	18.9		12.3	15.3	
Level of Service		B			C		A	B		B	B	
Approach Delay (s)		18.8			31.0		17.4			14.7		
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Timings

12: Tenth Line & Mountain Road

2041 Total AM

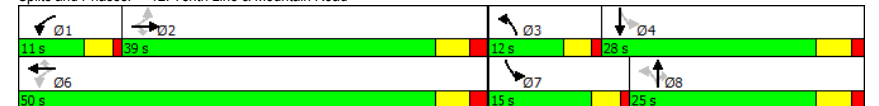
With Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	9	552	135	102	493	123	173	94	346	312	189
Future Volume (vph)	9	552	135	102	493	123	173	94	346	312	189
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		2		1	6		3	8		7	4
Permitted Phases	2		2	6		6	8		8	4	
Detector Phase	2	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	33.0	33.0	33.0	7.0	33.0	33.0	7.0	10.0	10.0	7.0	10.0
Minimum Split (s)	38.7	38.7	38.7	11.0	38.7	38.7	11.0	15.2	15.2	11.0	15.2
Total Split (s)	39.0	39.0	39.0	11.0	50.0	50.0	12.0	25.0	25.0	15.0	28.0
Total Split (%)	43.3%	43.3%	43.3%	12.2%	55.6%	55.6%	13.3%	27.8%	27.8%	16.7%	31.1%
Yellow Time (s)	3.7	3.7	3.7	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.7
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	1.0	1.5	1.5	1.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	None	Max	Max	None	None	None	None	None
Act Effect Green (s)	33.4	33.4	33.4	46.1	44.4	44.4	25.3	16.1	16.1	31.4	19.1
Actuated g/C Ratio	0.39	0.39	0.39	0.53	0.51	0.51	0.29	0.19	0.19	0.36	0.22
v/c Ratio	0.04	0.49	0.27	0.33	0.33	0.17	0.63	0.34	0.87	0.82	0.73
Control Delay	18.7	22.2	4.5	13.4	13.5	2.7	29.5	32.9	32.4	38.9	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	22.2	4.5	13.4	13.5	2.7	29.5	32.9	32.4	38.9	43.5
LOS	B	C	A	B	B	A	C	C	C	D	D
Approach Delay		18.7			11.6			31.7			40.7
Approach LOS		B			B			C			D

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 86.5
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 24.4
Intersection Capacity Utilization 97.8%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service F

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Total AM
With Improvements

	↖	→	↘	↙	←	↖	↙	↗	↘	↖	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	681	167	126	609	152	214	116	427	385	260
v/c Ratio	0.04	0.49	0.27	0.33	0.33	0.17	0.63	0.34	0.87	0.82	0.73
Control Delay	18.7	22.2	4.5	13.4	13.5	2.7	29.5	32.9	32.4	38.9	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	22.2	4.5	13.4	13.5	2.7	29.5	32.9	32.4	38.9	43.5
Queue Length 50th (m)	1.2	46.4	0.0	10.6	31.5	0.0	24.7	16.8	28.0	50.2	39.2
Queue Length 95th (m)	4.2	55.3	8.8	17.7	38.5	6.6	36.1	27.9	49.6	66.7	56.3
Internal Link Dist (m)	237.3		810.6		849.0		311.9				
Turn Bay Length (m)	50.0		50.0	50.0		50.0	50.0		50.0	50.0	
Base Capacity (vph)	312	1381	627	384	1837	912	340	423	549	468	422
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.49	0.27	0.33	0.33	0.17	0.63	0.27	0.78	0.82	0.62
Intersection Summary											

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Total AM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	9	552	135	102	493	123	173	94	346	312	189	22
Future Volume (vph)	9	552	135	102	493	123	173	94	346	312	189	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1825	3579	1361	1825	3579	1633	1755	1847	1541	1738	1582	
Flt Permitted	0.42	1.00	1.00	0.27	1.00	1.00	0.48	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	810	3579	1361	523	3579	1633	888	1847	1541	1052	1582	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	11	681	167	126	609	152	214	116	427	385	233	27
RTOR Reduction (vph)	0	0	102	0	0	74	0	0	207	0	5	0
Lane Group Flow (vph)	11	681	65	126	609	78	214	116	220	385	255	0
Heavy Vehicles (%)	0%	2%	20%	0%	2%	0%	4%	4%	6%	5%	18%	33%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	33.4	33.4	33.4	44.4	44.4	44.4	24.1	16.1	16.1	30.1	19.1	
Effective Green, g (s)	33.4	33.4	33.4	44.4	44.4	44.4	24.1	16.1	16.1	30.1	19.1	
Actuated g/C Ratio	0.39	0.39	0.39	0.51	0.51	0.51	0.28	0.19	0.19	0.35	0.22	
Clearance Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	313	1383	526	374	1839	839	327	344	287	453	349	
v/s Ratio Prot		c0.19		0.03	c0.17		0.06	0.06		c0.11	0.16	
v/s Ratio Perm	0.01		0.05	0.15		0.05	0.12		0.14	c0.19		
v/c Ratio	0.04	0.49	0.12	0.34	0.33	0.09	0.65	0.34	0.77	0.85	0.73	
Uniform Delay, d1	16.5	20.1	17.1	11.9	12.3	10.7	25.9	30.5	33.4	24.8	31.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.3	0.5	0.5	0.5	0.2	4.7	0.6	11.6	13.9	7.7	
Delay (s)	16.7	21.3	17.5	12.4	12.8	10.9	30.5	31.1	45.0	38.7	39.0	
Level of Service	B	C	B	B	B	B	C	C	D	D	D	
Approach Delay (s)	20.5		12.4		38.8		38.8					
Approach LOS	C		B		D		D					D
Intersection Summary												
HCM 2000 Control Delay	26.4			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	86.4			Sum of lost time (s)					18.9			
Intersection Capacity Utilization	97.8%			ICU Level of Service					F			
Analysis Period (min)	15											
c Critical Lane Group												

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext
2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	118	899	166	125	647	131	63	97	19	88	55
Future Volume (vph)	118	899	166	125	647	131	63	97	19	88	55
Turn Type	Perm	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6	3	8			4	
Permitted Phases		2	2	6		8		8	4		4
Detector Phase	2	2	2	1	6	3	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	30.0	30.0	30.0	5.0	30.0	5.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	37.6	37.6	37.6	9.0	37.6	9.0	25.0	25.0	23.0	23.0	23.0
Total Split (s)	57.0	57.0	57.0	10.0	67.0	9.0	33.0	33.0	24.0	24.0	24.0
Total Split (%)	57.0%	57.0%	57.0%	10.0%	67.0%	9.0%	33.0%	33.0%	24.0%	24.0%	24.0%
Yellow Time (s)	4.4	4.4	4.4	3.0	4.4	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	3.2	3.2	1.0	3.2	1.0	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.6	7.6	7.6	4.0	7.6	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	49.6	49.6	49.6	63.3	59.7	19.8	17.8	17.8	10.8	10.8	10.8
Actuated g/C Ratio	0.54	0.54	0.54	0.69	0.65	0.22	0.20	0.20	0.12	0.12	0.12
v/c Ratio	0.39	0.55	0.21	0.45	0.35	0.61	0.21	0.29	0.16	0.50	0.21
Control Delay	17.7	15.8	3.3	10.0	8.1	41.6	31.1	7.9	39.0	46.8	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	15.8	3.3	10.0	8.1	41.6	31.1	7.9	39.0	46.8	1.6
LOS	B	B	A	B	A	D	C	A	D	D	A
Approach Delay		14.2			8.4		28.1		30.5		
Approach LOS		B			A		C		C		

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 91.2

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 15.0

Intersection LOS: B

Intersection Capacity Utilization 81.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

↰ Ø1	↰ Ø2	↰ Ø3	↰ Ø4
10 s	57 s	9 s	24 s
↰ Ø6	↰ Ø8		
57 s	33 s		

Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext
2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	139	1058	195	147	819	154	74	114	22	104	65
v/c Ratio	0.39	0.55	0.21	0.45	0.35	0.61	0.21	0.29	0.16	0.50	0.21
Control Delay	17.7	15.8	3.3	10.0	8.1	41.6	31.1	7.9	39.0	46.8	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	15.8	3.3	10.0	8.1	41.6	31.1	7.9	39.0	46.8	1.6
Queue Length 50th (m)	13.9	62.9	1.8	8.1	31.6	23.2	10.9	0.0	3.6	17.7	0.0
Queue Length 95th (m)	28.8	82.3	10.8	15.7	44.3	37.4	20.8	11.0	10.0	31.2	0.0
Internal Link Dist (m)		217.8			35.2		32.3			88.4	
Turn Bay Length (m)	35.0		45.0	50.0		45.0		50.0	15.0		
Base Capacity (vph)	358	1910	948	329	2346	251	544	540	234	346	416
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.55	0.21	0.45	0.35	0.61	0.14	0.21	0.09	0.30	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2041 Total AM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	118	899	166	125	647	49	131	63	97	19	88	55
Future Volume (vph)	118	899	166	125	647	49	131	63	97	19	88	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6	7.6	4.0	7.6		4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3510	1599	1706	3578		1771	1830	1547	1578	1746	1547
Flt Permitted	0.34	1.00	1.00	0.19	1.00		0.48	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	659	3510	1599	345	3578		896	1830	1547	1178	1746	1547
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	139	1058	195	147	761	58	154	74	114	22	104	65
RTOR Reduction (vph)	0	0	79	0	5	0	0	0	90	0	0	59
Lane Group Flow (vph)	139	1058	116	147	814	0	154	74	24	22	104	6
Confl. Peds. (#/hr)			1	1			1		2	2		1
Heavy Vehicles (%)	0%	4%	0%	7%	1%	0%	3%	5%	4%	15%	10%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	2		2	1	6		3	8			4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	49.7	49.7	49.7	59.7	59.7		19.1	19.1	19.1	9.2	9.2	9.2
Effective Green, g (s)	49.7	49.7	49.7	59.7	59.7		19.1	19.1	19.1	9.2	9.2	9.2
Actuated g/C Ratio	0.54	0.54	0.54	0.65	0.65		0.21	0.21	0.21	0.10	0.10	0.10
Clearance Time (s)	7.6	7.6	7.6	4.0	7.6		4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	354	1887	860	311	2311		241	378	319	117	173	154
v/s Ratio Prot	c0.30		c0.03	0.23			c0.04	0.04			0.06	
v/s Ratio Perm	0.21		0.07	0.27			c0.09		0.02	0.02		0.00
v/c Ratio	0.39	0.56	0.13	0.47	0.35		0.64	0.20	0.07	0.19	0.60	0.04
Uniform Delay, d1	12.5	14.1	10.6	8.2	7.5		32.5	30.3	29.5	38.2	39.8	37.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	1.2	0.3	5.1	0.4		5.5	0.3	0.1	0.8	5.8	0.1
Delay (s)	15.8	15.3	11.0	13.3	7.9		38.0	30.6	29.6	39.0	45.6	37.7
Level of Service	B	B	B	B	A		D	C	C	D	D	D
Approach Delay (s)		14.8			8.7			33.6			42.2	
Approach LOS		B			A			C			D	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	92.4	Sum of lost time (s)	21.6
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings

14: High Street & Cambridge Street/Third Street

2041 Total AM

With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	4	20	31	31	201	890	99	753
Future Volume (vph)	4	20	31	31	201	890	99	753
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	22.0	22.0	22.0	22.0	13.0	55.0	13.0	55.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	14.4%	61.1%	14.4%	61.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	10.8	10.8	10.8	10.8	61.1	52.2	58.5	49.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.73	0.62	0.69	0.58
v/c Ratio	0.03	0.49	0.21	0.47	0.46	0.53	0.32	0.44
Control Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
LOS	C	C	D	B	A	B	A	B
Approach Delay		20.7		20.9		10.1		10.3
Approach LOS		C		C		B		B

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 84.2
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.53
Intersection Signal Delay: 11.3
Intersection Capacity Utilization 55.5%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service B

Splits and Phases: 14: High Street & Cambridge Street/Third Street

↰ 01 ↱ 02 13 s 55 s	↰ 04 ↱ 08 22 s 22 s
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Queues
14: High Street & Cambridge Street/Third Street

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	106	36	142	234	1154	115	879
v/c Ratio	0.03	0.49	0.21	0.47	0.46	0.53	0.32	0.44
Control Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	20.2	36.2	17.0	6.3	10.8	5.5	10.9
Queue Length 50th (m)	0.7	3.4	5.3	5.3	7.9	50.4	3.7	37.5
Queue Length 95th (m)	3.5	16.1	13.1	19.3	16.1	74.0	8.6	53.4
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	235	278	251	398	517	2186	394	2020
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	0.02	0.38	0.14	0.36	0.45	0.53	0.29	0.44
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	4	20	71	31	31	91	201	890	102	99	753	3
Future Volume (vph)	4	20	71	31	31	91	201	890	102	99	753	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.89		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1112		1825	1645		1825	3513		1659	3471	
Flt Permitted	0.64	1.00		0.69	1.00		0.27	1.00		0.20	1.00	
Satd. Flow (perm)	1238	1112		1323	1645		519	3513		358	3471	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	23	83	36	36	106	234	1035	119	115	876	3
RTOR Reduction (vph)	0	72	0	0	93	0	0	8	0	0	0	0
Lane Group Flow (vph)	5	34	0	36	49	0	234	1146	0	115	879	0
Confl. Peds. (#/hr)									9		9	
Heavy Vehicles (%)	0%	0%	67%	0%	0%	5%	0%	2%	2%	10%	5%	33%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.8	10.8		10.8	10.8		60.6	52.2		55.8	49.8	
Effective Green, g (s)	10.8	10.8		10.8	10.8		60.6	52.2		55.8	49.8	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.71	0.61		0.66	0.59	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	157	141		168	209		499	2157		326	2033	
v/s Ratio Prot		c0.03			0.03		c0.05	c0.33		0.02	0.25	
v/s Ratio Perm	0.00			0.03			0.29			0.21		
v/c Ratio	0.03	0.24		0.21	0.24		0.47	0.53		0.35	0.43	
Uniform Delay, d1	32.5	33.4		33.3	33.4		4.7	9.4		5.9	9.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.9		0.6	0.6		0.7	0.9		0.7	0.7	
Delay (s)	32.6	34.3		33.9	34.0		5.4	10.3		6.6	10.4	
Level of Service	C	C		C	C		A	B		A	B	
Approach Delay (s)		34.2			34.0			9.5			10.0	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM 2000 Control Delay		12.3								B		
HCM 2000 Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		85.0					Sum of lost time (s)		16.0			
Intersection Capacity Utilization		55.5%					ICU Level of Service		B			
Analysis Period (min)		15										
c Critical Lane Group												

Timings
15: High Street & Sixth Street

2041 Total AM
With Improvements

	←	→	↙	↘	←	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↙	↑	↘	↙	↑	↘	↙	↑	↘	↑
Traffic Volume (vph)	183	367	211	44	180	155	230	879	139	529
Future Volume (vph)	183	367	211	44	180	155	230	879	139	529
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	7.0	20.0	6.5	20.0
Minimum Split (s)	9.0	15.8	15.8	9.0	15.8	15.8	11.5	25.9	11.0	25.9
Total Split (s)	14.0	35.0	35.0	9.0	30.0	30.0	20.9	44.0	12.0	35.1
Total Split (%)	14.0%	35.0%	35.0%	9.0%	30.0%	30.0%	20.9%	44.0%	12.0%	35.1%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	2.5	1.0	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	37.2	28.4	28.4	28.3	21.4	21.4	51.1	38.2	40.3	31.4
Actuated g/C Ratio	0.38	0.29	0.29	0.29	0.22	0.22	0.52	0.39	0.41	0.32
v/c Ratio	0.58	0.86	0.43	0.32	0.58	0.38	0.77	0.89	0.82	0.74
Control Delay	27.9	50.6	8.6	24.4	40.0	5.5	30.7	37.9	51.7	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	50.6	8.6	24.4	40.0	5.5	30.7	37.9	51.7	34.6
LOS	C	D	A	C	D	A	C	D	D	C
Approach Delay		33.5			24.0			36.6		37.7
Approach LOS		C			C			D		D

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 97.4

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 34.6

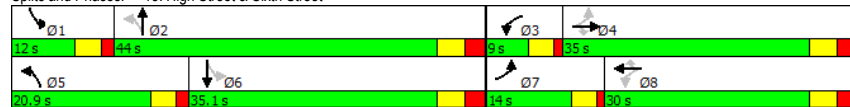
Intersection LOS: C

Intersection Capacity Utilization 76.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street



Queues
15: High Street & Sixth Street

2041 Total AM
With Improvements

	←	→	↙	↘	←	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	229	459	264	55	225	194	288	1242	174	799
v/c Ratio	0.58	0.86	0.43	0.32	0.58	0.38	0.77	0.89	0.82	0.74
Control Delay	27.9	50.6	8.6	24.4	40.0	5.5	30.7	37.9	51.7	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	50.6	8.6	24.4	40.0	5.5	30.7	37.9	51.7	34.6
Queue Length 50th (m)	30.0	83.9	5.9	6.5	38.0	0.0	30.9	117.6	18.4	73.0
Queue Length 95th (m)	41.6	#104.3	17.3	12.5	52.8	7.3	46.4	122.0	#43.1	81.3
Internal Link Dist (m)		59.4			212.9		1058.0			540.0
Turn Bay Length (m)	215.0		50.0	25.0		25.0	60.0		15.0	
Base Capacity (vph)	393	550	626	171	443	547	410	1388	212	1084
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.83	0.42	0.32	0.51	0.35	0.70	0.89	0.82	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 15: High Street & Sixth Street

2041 Total AM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	183	367	211	44	180	155	230	879	114	139	529	110
Future Volume (vph)	183	367	211	44	180	155	230	879	114	139	529	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1771	1830	1566	1573	1779	1546	1772	3514		1738	3311	
Flt Permitted	0.41	1.00	1.00	0.23	1.00	1.00	0.16	1.00		0.13	1.00	
Satd. Flow (perm)	756	1830	1566	382	1779	1546	308	3514		233	3311	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	229	459	264	55	225	194	288	1099	142	174	661	138
RTOR Reduction (vph)	0	0	158	0	0	150	0	10	0	0	17	0
Lane Group Flow (vph)	229	459	106	55	225	44	288	1232	0	174	782	0
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	3%	5%	2%	16%	8%	4%	3%	2%	0%	5%	7%	7%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	36.3	28.4	28.4	26.2	22.3	22.3	50.2	38.2		38.9	31.4	
Effective Green, g (s)	36.3	28.4	28.4	26.2	22.3	22.3	50.2	38.2		38.9	31.4	
Actuated g/C Ratio	0.37	0.29	0.29	0.27	0.23	0.23	0.51	0.39		0.40	0.32	
Clearance Time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	382	529	452	149	403	351	370	1366		207	1058	
v/s Ratio Prot	c0.06	c0.25		0.01	0.13		c0.11	c0.35		0.06	0.24	
v/s Ratio Perm	0.16		0.07	0.08		0.03	0.28			0.27		
v/c Ratio	0.60	0.87	0.23	0.37	0.56	0.13	0.78	0.90		0.84	0.74	
Uniform Delay, d1	22.9	33.1	26.6	28.1	33.6	30.2	17.3	28.2		23.0	29.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	14.4	0.4	1.5	2.1	0.2	9.9	9.9		25.2	4.6	
Delay (s)	25.5	47.6	27.0	29.7	35.7	30.4	27.2	38.1		48.2	34.4	
Level of Service	C	D	C	C	D	C	C	D		D	C	
Approach Delay (s)		36.5			32.8			36.1			36.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	98.2	Sum of lost time (s)	20.2
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings 16: High Street & Campbell Street

2041 Total AM
With Improvements

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	159	762	107	187	626
Future Volume (vph)	44	159	762	107	187	626
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	9.0	9.0	10.0	10.0	7.0	10.0
Minimum Split (s)	15.0	15.0	20.0	20.0	11.0	20.0
Total Split (s)	15.0	15.0	62.0	62.0	13.0	75.0
Total Split (%)	16.7%	16.7%	68.9%	68.9%	14.4%	83.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	4.0	6.0
Lead/Lag		Lag	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	9.0	9.0	56.3	56.3	71.0	69.0
Actuated g/C Ratio	0.10	0.10	0.63	0.63	0.79	0.77
v/c Ratio	0.35	0.60	0.84	0.13	0.80	0.59
Control Delay	44.5	14.0	21.9	1.6	32.6	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	14.0	21.9	1.6	32.6	6.6
LOS	D	B	C	A	C	A
Approach Delay	20.6		19.4			12.6
Approach LOS	C		B			B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 16: High Street & Campbell Street



Queues
16: High Street & Campbell Street

2041 Total AM
With Improvements

	←	←	↑	↘	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	57	206	990	139	243	813
v/c Ratio	0.35	0.60	0.84	0.13	0.80	0.59
Control Delay	44.5	14.0	21.9	1.6	32.6	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	14.0	21.9	1.6	32.6	6.6
Queue Length 50th (m)	9.4	0.0	123.4	0.0	14.9	47.1
Queue Length 95th (m)	17.8	11.1	130.1	3.9	#29.3	51.9
Internal Link Dist (m)	320.1		196.2			1058.0
Turn Bay Length (m)				20.0		
Base Capacity (vph)	161	341	1178	1073	310	1376
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	0.35	0.60	0.84	0.13	0.78	0.59

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Total AM
With Improvements

	←	←	↑	↘	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↘	↑	↘	↘	↑
Traffic Volume (vph)	44	159	762	107	187	626
Future Volume (vph)	44	159	762	107	187	626
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1615	1557	1883	1633	1755	1795
Flt Permitted	0.95	1.00	1.00	1.00	0.11	1.00
Satd. Flow (perm)	1615	1557	1883	1633	197	1795
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	57	206	990	139	243	813
RTOR Reduction (vph)	0	185	0	52	0	0
Lane Group Flow (vph)	57	21	990	87	243	813
Confl. Peds. (#/hr)			2			
Heavy Vehicles (%)	13%	3%	2%	0%	4%	7%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	9.0	9.0	56.3	56.3	69.0	69.0
Effective Green, g (s)	9.0	9.0	56.3	56.3	69.0	69.0
Actuated g/C Ratio	0.10	0.10	0.63	0.63	0.77	0.77
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	161	155	1177	1021	301	1376
v/s Ratio Prot	c0.04		0.53		c0.08	0.45
v/s Ratio Perm		0.01		0.05	c0.54	
v/c Ratio	0.35	0.13	0.84	0.09	0.81	0.59
Uniform Delay, d1	37.8	36.9	13.3	6.7	20.6	4.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	7.3	0.2	14.6	1.9
Delay (s)	39.1	37.3	20.7	6.8	35.1	6.3
Level of Service	D	D	C	A	D	A
Approach Delay (s)	37.7		19.0			13.0
Approach LOS	D		B			B

Intersection Summary

HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Timings
17: Hurontario Street & Hume Street

2041 Total AM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	258	223	561	516	157	280
Future Volume (vph)	258	223	561	516	157	280
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases		8		2	6	
Detector Phase	3	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	34.3	34.3	36.3	36.3	11.0	47.3
Total Split (%)	42.0%	42.0%	44.5%	44.5%	13.5%	58.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	18.9	18.9	30.1	30.1		41.2
Actuated g/C Ratio	0.26	0.26	0.41	0.41		0.57
v/c Ratio	0.70	0.45	0.88	0.63		0.87dl
Control Delay	33.1	5.7	36.0	4.7		10.3
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	33.1	5.7	36.0	4.7		10.3
LOS	C	A	D	A		B
Approach Delay	20.4		21.0			10.3
Approach LOS	C		C			B

Intersection Summary

Cycle Length: 81.6
 Actuated Cycle Length: 72.7
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 18.5
 Intersection LOS: B
 Intersection Capacity Utilization 84.6%
 ICU Level of Service E
 Analysis Period (min) 15
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 17: Hurontario Street & Hume Street

↩ Ø1	↩ Ø2	↩ Ø3
11 s	36.3 s	34.3 s
↩ Ø6	↩ Ø8	
47.3 s	34.3 s	

Queues
17: Hurontario Street & Hume Street

2041 Total AM
With Improvements

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	323	279	701	645	546
v/c Ratio	0.70	0.45	0.88	0.63	0.87dl
Control Delay	33.1	5.7	36.0	4.7	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	5.7	36.0	4.7	10.3
Queue Length 50th (m)	39.7	0.5	83.1	0.0	17.6
Queue Length 95th (m)	55.0	10.4	#138.6	9.4	28.5
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	685	779	795	1029	1214
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.36	0.88	0.63	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis

17: Hurontario Street & Hume Street

2041 Total AM
With Improvements

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	258	223	561	516	157	280
Future Volume (vph)	258	223	561	516	157	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3		6.3
Lane Util. Factor	1.00	1.00	1.00	1.00		0.95
Frpb, ped/bikes	1.00	0.98	1.00	0.97		1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.98
Satd. Flow (prot)	1772	1581	1921	1575		3559
Flt Permitted	0.95	1.00	1.00	1.00		0.54
Satd. Flow (perm)	1772	1581	1921	1575		1965
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	322	279	701	645	196	350
RTOR Reduction (vph)	0	203	0	378	0	0
Lane Group Flow (vph)	323	76	701	267	0	546
Confli. Peds. (#/hr)	4	1		5	5	
Heavy Vehicles (%)	3%	1%	0%	1%	2%	0%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.9	18.9	30.1	30.1		41.1
Effective Green, g (s)	18.9	18.9	30.1	30.1		41.1
Actuated g/C Ratio	0.26	0.26	0.41	0.41		0.57
Clearance Time (s)	6.3	6.3	6.3	6.3		6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	461	411	796	652		1266
v/s Ratio Prot	c0.18		c0.36			c0.04
v/s Ratio Perm		0.05		0.17		0.20
v/c Ratio	0.70	0.19	0.88	0.41		0.87dl
Uniform Delay, d1	24.3	20.9	19.6	15.0		9.0
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	4.8	0.2	13.4	1.9		1.1
Delay (s)	29.1	21.1	33.0	16.9		10.1
Level of Service	C	C	C	B		B
Approach Delay (s)	25.4		25.3			10.1
Approach LOS	C		C			B

Intersection Summary

HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	16.6
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Timings
18: County Road 32 & Sixth Street & Tenth Line

2041 Total AM
With Improvements

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	179	55	229	132	183	276	367
Future Volume (vph)	15	179	55	229	132	183	276	367
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	10.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	11.0	22.0
Total Split (s)	42.0	42.0	42.0	42.0	38.0	38.0	20.0	58.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	38.0%	38.0%	20.0%	58.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Effect Green (s)	28.3	28.3	28.3	28.3	34.7	34.7	54.3	52.3
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.37	0.37	0.59	0.56
v/c Ratio	0.16	0.48	0.26	0.86	0.49	0.45	0.56	0.48
Control Delay	26.0	27.5	26.3	44.3	31.6	25.5	15.1	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	27.5	26.3	44.3	31.6	25.5	15.1	15.3
LOS	C	C	C	D	C	C	B	B
Approach Delay		27.4		42.0		27.7		15.2
Approach LOS		C		D		C		B

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 92.6

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

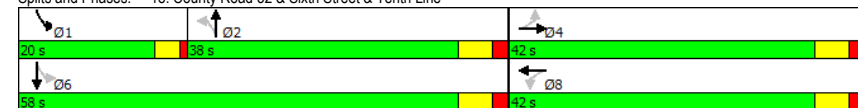
Maximum v/c Ratio: 0.86

Intersection Signal Delay: 26.4

Intersection Capacity Utilization 78.3%

Analysis Period (min) 15

Splits and Phases: 18: County Road 32 & Sixth Street & Tenth Line



Queues
18: County Road 32 & Sixth Street & Tenth Line

2041 Total AM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	19	270	68	468	163	295	341	476
v/c Ratio	0.16	0.48	0.26	0.86	0.49	0.45	0.56	0.48
Control Delay	26.0	27.5	26.3	44.3	31.6	25.5	15.1	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	27.5	26.3	44.3	31.6	25.5	15.1	15.3
Queue Length 50th (m)	2.5	37.0	9.1	72.2	23.2	38.8	30.4	49.1
Queue Length 95th (m)	7.0	51.1	17.3	92.8	41.6	60.2	47.4	72.5
Internal Link Dist (m)	587.3		1205.1		566.2		326.9	
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	153	718	331	685	333	661	633	987
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	0.12	0.38	0.21	0.68	0.49	0.45	0.54	0.48
Intersection Summary								

HCM Signalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Total AM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	15	179	40	55	229	150	132	183	56	276	367	19
Future Volume (vph)	15	179	40	55	229	150	132	183	56	276	367	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1819		1674	1694		1722	1739		1738	1746	
Flt Permitted	0.20	1.00		0.48	1.00		0.49	1.00		0.44	1.00	
Satd. Flow (perm)	393	1819		848	1694		890	1739		804	1746	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	19	221	49	68	283	185	163	226	69	341	453	23
RTOR Reduction (vph)	0	8	0	0	26	0	0	10	0	0	2	0
Lane Group Flow (vph)	19	262	0	68	442	0	163	285	0	341	474	0
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	6%	9%	3%	10%	6%	8%	2%	5%	8%	33%
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.3	28.3		28.3	28.3		34.7	34.7		52.3	52.3	
Effective Green, g (s)	28.3	28.3		28.3	28.3		34.7	34.7		52.3	52.3	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.37	0.37		0.56	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	555		259	517		333	651		591	986	
v/s Ratio Prot		0.14			c0.26			0.16		c0.08	0.27	
v/s Ratio Perm	0.05			0.08			0.18			c0.24		
v/c Ratio	0.16	0.47		0.26	0.86		0.49	0.44		0.58	0.48	
Uniform Delay, d1	23.5	26.1		24.3	30.2		22.2	21.7		11.6	12.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6		0.5	13.0		5.1	2.1		1.4	1.7	
Delay (s)	24.1	26.7		24.8	43.3		27.2	23.8		13.0	13.7	
Level of Service	C	C		C	D		C	C		B	B	
Approach Delay (s)		26.5			40.9			25.0			13.4	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay		24.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		92.6			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		78.3%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Total AM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	99	10	57	137	221	16	129	65	282	143	52
Future Volume (vph)	21	99	10	57	137	221	16	129	65	282	143	52
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	25	118	12	68	163	263	19	154	77	336	170	62
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2						
Volume Total (vph)	155	231	263	250	336	232						
Volume Left (vph)	25	68	0	19	336	0						
Volume Right (vph)	12	0	263	77	0	62						
Hadj (s)	0.21	0.36	-0.63	-0.02	0.62	-0.10						
Departure Headway (s)	8.5	7.9	6.9	7.8	7.9	7.2						
Degree Utilization, x	0.36	0.51	0.51	0.54	0.74	0.46						
Capacity (veh/h)	384	436	491	437	435	487						
Control Delay (s)	16.2	17.7	15.6	19.4	29.1	15.1						
Approach Delay (s)	16.2	16.6		19.4	23.4							
Approach LOS	C	C		C	C							
Intersection Summary												
Delay	19.7											
Level of Service	C											
Intersection Capacity Utilization	57.9%			ICU Level of Service				B				
Analysis Period (min)	15											

Timings
20: Poplar Sideroad & Raglan Street

2041 Total AM
With Improvements

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	256	950	745	130	92	92
Future Volume (vph)	256	950	745	130	92	92
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	11.0	68.0	57.0	57.0	22.0	22.0
Total Split (%)	12.2%	75.6%	63.3%	63.3%	24.4%	24.4%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	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)	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	None
Act Effct Green (s)	64.5	62.5	51.5	51.5	11.4	11.4
Actuated g/C Ratio	0.75	0.73	0.60	0.60	0.13	0.13
v/c Ratio	0.72	0.77	0.71	0.15	0.45	0.34
Control Delay	16.8	12.7	17.1	2.5	41.0	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	12.7	17.1	2.5	41.0	11.0
LOS	B	B	B	A	D	B
Approach Delay	13.6		14.9		26.0	
Approach LOS	B		B		C	
Intersection Summary						
Cycle Length: 90						
Actuated Cycle Length: 85.9						
Natural Cycle: 80						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.77						
Intersection Signal Delay: 15.1				Intersection LOS: B		
Intersection Capacity Utilization 75.1%				ICU Level of Service D		
Analysis Period (min) 15						

Splits and Phases: 20: Poplar Sideroad & Raglan Street



Queues
20: Poplar Sideroad & Raglan Street

2041 Total AM
With Improvements

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	269	1000	784	137	97	97
v/c Ratio	0.72	0.77	0.71	0.15	0.45	0.34
Control Delay	16.8	12.7	17.1	2.5	41.0	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	12.7	17.1	2.5	41.0	11.0
Queue Length 50th (m)	9.7	77.4	78.9	0.9	14.8	0.0
Queue Length 95th (m)	#27.8	157.7	138.0	8.1	29.0	12.6
Internal Link Dist (m)		224.0	268.0		291.9	
Turn Bay Length (m)	50.0			50.0	50.0	
Base Capacity (vph)	373	1306	1098	931	306	357
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	0.72	0.77	0.71	0.15	0.32	0.27

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Total AM
With Improvements

	EBL	EBT	WBT	WBR	SBL	SBR
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	256	950	745	130	92	92
Future Volume (vph)	256	950	745	130	92	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1644	1795	1830	1471	1644	1498
Flt Permitted	0.21	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	356	1795	1830	1471	1644	1498
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	269	1000	784	137	97	97
RTOR Reduction (vph)	0	0	0	49	0	84
Lane Group Flow (vph)	269	1000	784	88	97	13
Heavy Vehicles (%)	11%	7%	5%	11%	11%	9%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	62.5	62.5	51.5	51.5	11.4	11.4
Effective Green, g (s)	62.5	62.5	51.5	51.5	11.4	11.4
Actuated g/C Ratio	0.73	0.73	0.60	0.60	0.13	0.13
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	363	1306	1097	881	218	198
v/s Ratio Prot	0.06	c0.56	0.43		c0.06	
v/s Ratio Perm	0.48			0.06		0.01
v/c Ratio	0.74	0.77	0.71	0.10	0.44	0.07
Uniform Delay, d1	9.9	7.2	12.1	7.3	34.3	32.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.9	4.3	4.0	0.2	1.4	0.1
Delay (s)	17.8	11.5	16.0	7.6	35.8	32.7
Level of Service	B	B	B	A	D	C
Approach Delay (s)	12.9	14.8			34.3	
Approach LOS	B	B			C	

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Timings
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	23	2	28	0	169	1131	29	4	978	23
Future Volume (vph)	23	2	28	0	169	1131	29	4	978	23
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4		8		5	2		6	
Permitted Phases	4					2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	38.0	38.0	45.0	45.0	45.0
Minimum Split (s)	13.0	13.0	13.0	13.0	11.0	51.0	51.0	60.0	60.0	60.0
Total Split (s)	13.0	13.0	13.0	13.0	11.0	77.0	77.0	66.0	66.0	66.0
Total Split (%)	14.4%	14.4%	14.4%	14.4%	12.2%	85.6%	85.6%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag					Lead			Lag	Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	7.0	7.0	7.0	7.0	73.0	71.0	71.0	60.0	60.0	60.0
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.81	0.79	0.79	0.67	0.67	0.67
v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02
Control Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
LOS	D	B	D	A	B	B	A	A	B	A
Approach Delay		21.9		43.0		11.8			19.4	
Approach LOS		C		D		B			B	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 85
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 15.7
Intersection Capacity Utilization 120.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service H

Splits and Phases: 1: Highway 26 & Cranberry Trail E/Gun Club Road

↰ Ø2	↱ Ø4
77 s	13 s
↰ Ø5	↱ Ø6
11 s	66 s
	13 s

Queues
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	24	118	30	3	180	1203	31	4	1040	24
v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02
Control Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	17.4	47.2	0.0	13.9	11.7	0.7	5.5	19.9	0.0
Queue Length 50th (m)	4.0	0.3	5.0	0.0	4.7	93.6	0.0	0.2	120.9	0.0
Queue Length 95th (m)	11.6	15.9	13.5	0.0	19.7	158.3	1.3	1.3	#193.8	0.0
Internal Link Dist (m)		79.7		52.6		42.1			217.0	
Turn Bay Length (m)						10.0	65.0			10.0
Base Capacity (vph)	111	225	101	258	301	1471	1295	204	1231	983
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.52	0.30	0.01	0.60	0.82	0.02	0.02	0.84	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Highway 26 & Cranberry Trail E/Gun Club Road

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	23	2	109	28	0	3	169	1131	29	4	978	23
Future Volume (vph)	23	2	109	28	0	3	169	1131	29	4	978	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1802	1523		1825	1580		1825	1865	1633	1825	1847	1432
Flt Permitted	0.76	1.00		0.68	1.00		0.11	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	1433	1523		1309	1580		217	1865	1633	308	1847	1432
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	24	2	116	30	0	3	180	1203	31	4	1040	24
RTOR Reduction (vph)	0	107	0	0	3	0	0	0	7	0	0	8
Lane Group Flow (vph)	24	11	0	30	0	0	180	1203	24	4	1040	16
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	5%	0%	0%	0%	0%	3%	0%	0%	4%	14%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	7.0	7.0		7.0	7.0		71.0	71.0	71.0	60.0	60.0	60.0
Effective Green, g (s)	7.0	7.0		7.0	7.0		71.0	71.0	71.0	60.0	60.0	60.0
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.79	0.79	0.79	0.67	0.67	0.67
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	111	118		101	122		296	1471	1288	205	1231	954
v/s Ratio Prot		0.01			0.00		0.05	0.64			0.56	
v/s Ratio Perm	0.02			0.02			0.43		0.01	0.01		0.01
v/c Ratio	0.22	0.09		0.30	0.00		0.61	0.82	0.02	0.02	0.84	0.02
Uniform Delay, d1	38.9	38.6		39.2	38.3		14.7	5.7	2.0	5.1	11.4	5.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3		1.6	0.0		3.5	5.2	0.0	0.2	7.2	0.0
Delay (s)	39.9	38.9		40.8	38.3		18.3	10.8	2.1	5.2	18.7	5.1
Level of Service	D	D		D	D		B	B	A	A	B	A
Approach Delay (s)		39.1			40.6			11.6			18.3	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	120.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

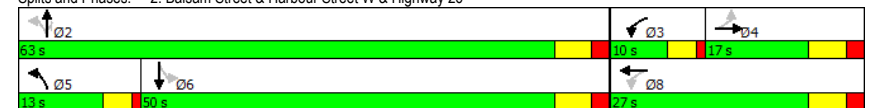
Timings
2: Balsam Street & Harbour Street W & Highway 26

2041 Total PM
With Improvements

Movement	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱	↱
Traffic Volume (vph)	27	14	133	13	213	1379	120	31	1124
Future Volume (vph)	27	14	133	13	213	1379	120	31	1124
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4	3	8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	3	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	7.0	7.0	5.0	8.0	7.0	40.0	40.0	40.0	40.0
Minimum Split (s)	13.0	13.0	9.0	14.0	11.0	61.0	61.0	46.0	46.0
Total Split (s)	17.0	17.0	10.0	27.0	13.0	63.0	63.0	50.0	50.0
Total Split (%)	18.9%	18.9%	11.1%	30.0%	14.4%	70.0%	70.0%	55.6%	55.6%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	1.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead		Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	8.9	8.9	20.9	18.9	59.0	57.0	57.0	44.0	44.0
Actuated g/C Ratio	0.10	0.10	0.24	0.22	0.67	0.65	0.65	0.50	0.50
v/c Ratio	0.22	0.74	0.64	0.12	0.72	0.63	0.12	0.22	0.69
Control Delay	40.0	22.4	41.9	14.9	24.7	11.0	2.9	17.6	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	22.4	41.9	14.9	24.7	11.0	2.9	17.6	19.6
LOS	D	C	D	B	C	B	A	B	B
Approach Delay		24.1		35.7		12.1			19.5
Approach LOS		C		D		B			B

Intersection Summary			
Cycle Length: 90			
Actuated Cycle Length: 87.9			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 16.9		Intersection LOS: B	
Intersection Capacity Utilization 112.8%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Balsam Street & Harbour Street W & Highway 26



Queues
2: Balsam Street & Harbour Street W & Highway 26

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	29	266	143	43	229	1483	129	33	1227
v/c Ratio	0.22	0.74	0.64	0.12	0.72	0.63	0.12	0.22	0.69
Control Delay	40.0	22.4	41.9	14.9	24.7	11.0	2.9	17.6	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	22.4	41.9	14.9	24.7	11.0	2.9	17.6	19.6
Queue Length 50th (m)	4.6	7.1	20.0	1.9	12.6	68.7	2.4	3.0	78.3
Queue Length 95th (m)	12.6	#32.2	#36.8	9.9	#45.3	96.0	8.6	9.8	106.8
Internal Link Dist (m)		86.0		57.9		128.9			84.6
Turn Bay Length (m)	45.0		70.0		60.0		5.0	30.0	
Base Capacity (vph)	167	392	225	409	318	2343	1089	152	1771
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.68	0.64	0.11	0.72	0.63	0.12	0.22	0.69

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
2: Balsam Street & Harbour Street W & Highway 26

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	27	14	233	133	13	27	213	1379	120	31	1124	17
Future Volume (vph)	27	14	233	133	13	27	213	1379	120	31	1124	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		4.0	6.0		4.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.86		1.00	0.90		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1738	1586		1823	1621		1825	3614	1633	1825	3536	
Flt Permitted	0.73	1.00		0.31	1.00		0.12	1.00	1.00	0.16	1.00	
Satd. Flow (perm)	1334	1586		595	1621		233	3614	1633	303	3536	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	15	251	143	14	29	229	1483	129	33	1209	18
RTOR Reduction (vph)	0	199	0	0	23	0	0	0	30	0	1	0
Lane Group Flow (vph)	29	67	0	143	20	0	229	1483	99	33	1226	0
Confl. Peds. (#/hr)			5	5			2					2
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	5%	0%	1%	0%	20%	0%	0%	1%	0%	0%	3%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	8.9	8.9		18.9	18.9		57.0	57.0	57.0	44.0	44.0	
Effective Green, g (s)	8.9	8.9		18.9	18.9		57.0	57.0	57.0	44.0	44.0	
Actuated g/C Ratio	0.10	0.10		0.22	0.22		0.65	0.65	0.65	0.50	0.50	
Clearance Time (s)	6.0	6.0		4.0	6.0		4.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	135	160		211	348		314	2343	1058	151	1770	
v/s Ratio Prot		0.04		c0.05	0.01		c0.07	0.41			0.35	
v/s Ratio Perm	0.02			c0.10			c0.40		0.06	0.11		
v/c Ratio	0.21	0.42		0.68	0.06		0.73	0.63	0.09	0.22	0.69	
Uniform Delay, d1	36.3	37.1		29.9	27.4		12.3	9.2	5.8	12.3	16.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	1.8		8.3	0.1		13.9	1.3	0.2	3.3	2.3	
Delay (s)	37.1	38.9		38.2	27.5		26.1	10.5	6.0	15.6	19.0	
Level of Service	D	D		D	C		C	B	A	B	B	
Approach Delay (s)		38.7			35.7			12.1			18.9	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.0									
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			87.9						20.0			
Intersection Capacity Utilization			112.8%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings
3: Balsam Street & CT Entrance/Plaza Access

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	149	4	37	6	96	1647	10	1503
Future Volume (vph)	149	4	37	6	96	1647	10	1503
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	7.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	11.0	47.0
Total Split (s)	22.0	22.0	22.0	22.0	15.0	47.0	15.0	47.0
Total Split (%)	26.2%	26.2%	26.2%	26.2%	17.9%	56.0%	17.9%	56.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	13.4	13.4		13.4	52.4	48.6	48.8	41.4
Actuated g/C Ratio	0.18	0.18		0.18	0.69	0.64	0.64	0.54
v/c Ratio	0.65	0.24		0.25	0.37	0.76	0.04	0.87
Control Delay	43.8	9.8		23.1	10.2	14.3	4.6	23.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	9.8		23.1	10.2	14.3	4.6	23.4
LOS	D	A		C	B	B	A	C
Approach Delay		31.9		23.1		14.0		23.3
Approach LOS		C		C		B		C

Intersection Summary

Cycle Length: 84
 Actuated Cycle Length: 76.2
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 19.4
 Intersection Capacity Utilization 77.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 3: Balsam Street & CT Entrance/Plaza Access

15 s	47 s	22 s	
15 s	47 s	22 s	

Queues
3: Balsam Street & CT Entrance/Plaza Access

2041 Total PM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	157	84	67	101	1741	11	1681
v/c Ratio	0.65	0.24	0.25	0.37	0.76	0.04	0.87
Control Delay	43.8	9.8	23.1	10.2	14.3	4.6	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.8	9.8	23.1	10.2	14.3	4.6	23.4
Queue Length 50th (m)	21.9	0.5	5.8	4.1	75.8	0.4	111.6
Queue Length 95th (m)	41.7	11.6	16.4	13.1	#180.6	1.8	#179.2
Internal Link Dist (m)		90.9	36.9		181.9		96.5
Turn Bay Length (m)	25.0			80.0		50.0	
Base Capacity (vph)	289	411	317	343	2281	360	1929
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.20	0.21	0.29	0.76	0.03	0.87

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis 3: Balsam Street & CT Entrance/Plaza Access

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	149	4	76	37	6	21	96	1647	7	10	1503	94
Future Volume (vph)	149	4	76	37	6	21	96	1647	7	10	1503	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1822	1647			1776		1772	3577		1825	3544	
Flt Permitted	0.71	1.00			0.78		0.08	1.00		0.09	1.00	
Satd. Flow (perm)	1368	1647			1417		156	3577		176	3544	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	157	4	80	39	6	22	101	1734	7	11	1582	99
RTOR Reduction (vph)	0	66	0	0	18	0	0	0	0	0	5	0
Lane Group Flow (vph)	157	18	0	0	49	0	101	1741	0	11	1676	0
Confl. Peds. (#/hr)	1				1		2				2	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.4	13.4			13.4		53.9	48.6		45.0	43.7	
Effective Green, g (s)	13.4	13.4			13.4		53.9	48.6		45.0	43.7	
Actuated g/C Ratio	0.17	0.17			0.17		0.68	0.61		0.57	0.55	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	278			239		232	2192		126	1952	
v/s Ratio Prot		0.01					c0.03	c0.49		0.00	c0.47	
v/s Ratio Perm	c0.11				0.03		0.26			0.05		
v/c Ratio	0.68	0.06			0.20		0.44	0.79		0.09	0.86	
Uniform Delay, d1	30.9	27.7			28.4		12.7	11.6		10.3	15.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.7	0.1			0.4		1.3	3.1		0.3	5.2	
Delay (s)	38.7	27.8			28.8		14.0	14.6		10.6	20.3	
Level of Service	D	C			C		B	B		B	C	
Approach Delay (s)		34.9			28.8			14.6			20.3	
Approach LOS		C			C			B			C	

Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Timings 4: Balsam Street & Old Mountain Road/Commercial Access

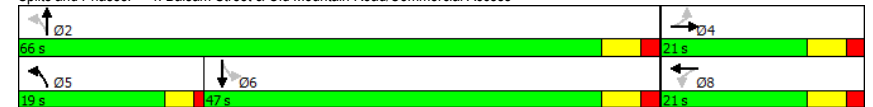
2041 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	124	4	19	9	201	1654	11	1476
Future Volume (vph)	124	4	19	9	201	1654	11	1476
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	41.0	41.0	41.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	47.0	47.0	47.0
Total Split (s)	21.0	21.0	21.0	21.0	19.0	66.0	47.0	47.0
Total Split (%)	24.1%	24.1%	24.1%	24.1%	21.8%	75.9%	54.0%	54.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	4.0	6.0	6.0	6.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
Act Effct Green (s)	12.9	12.9		12.9	62.0	60.0	45.5	45.5
Actuated g/C Ratio	0.15	0.15		0.15	0.73	0.71	0.54	0.54
v/c Ratio	0.65	0.54		0.26	0.69	0.72	0.13	0.88
Control Delay	48.8	10.0		29.4	26.6	9.9	16.7	25.5
Queue Delay	0.0	0.0		0.0	0.0	0.4	0.0	0.0
Total Delay	48.8	10.0		29.4	26.6	10.3	16.7	25.5
LOS	D	A		C	C	B	B	C
Approach Delay		24.0		29.4		12.0		25.4
Approach LOS		C		C		B		C

Intersection Summary

Cycle Length: 87	
Actuated Cycle Length: 84.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 114.5%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 4: Balsam Street & Old Mountain Road/Commercial Access



Queues
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total PM
With Improvements

	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	135	239	42	218	1826	12	1672
v/c Ratio	0.65	0.54	0.26	0.69	0.72	0.13	0.88
Control Delay	48.8	10.0	29.4	26.6	9.9	16.7	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	48.8	10.0	29.4	26.6	10.3	16.7	25.5
Queue Length 50th (m)	20.9	0.6	4.5	17.2	80.9	0.9	118.3
Queue Length 95th (m)	38.9	19.4	13.6	39.2	112.3	5.0	#195.3
Internal Link Dist (m)		175.6	57.5		179.2		181.9
Turn Bay Length (m)				70.0		70.0	
Base Capacity (vph)	244	473	188	400	2526	95	1907
Starvation Cap Reductn	0	0	0	0	258	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.51	0.22	0.55	0.81	0.13	0.88

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
4: Balsam Street & Old Mountain Road/Commercial Access

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	124	4	216	19	9	10	201	1654	26	11	1476	63
Future Volume (vph)	124	4	216	19	9	10	201	1654	26	11	1476	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85			0.96		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1797	1584			1799		1789	3570		1644	3557	
Flt Permitted	0.73	1.00			0.55		0.08	1.00		0.10	1.00	
Satd. Flow (perm)	1380	1584			1015		152	3570		178	3557	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	4	235	21	10	11	218	1798	28	12	1604	68
RTOR Reduction (vph)	0	199	0	0	9	0	0	1	0	0	3	0
Lane Group Flow (vph)	135	40	0	0	33	0	218	1825	0	12	1669	0
Confl. Peds. (#/hr)	3		1	1		3	12		2	2		12
Heavy Vehicles (%)	1%	0%	2%	0%	0%	0%	2%	2%	0%	11%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.9	12.9			12.9		60.1	60.1		45.5	45.5	
Effective Green, g (s)	12.9	12.9			12.9		60.1	60.1		45.5	45.5	
Actuated g/C Ratio	0.15	0.15			0.15		0.71	0.71		0.54	0.54	
Clearance Time (s)	6.0	6.0			6.0		4.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	240			154		311	2524		95	1904	
v/s Ratio Prot		0.03					0.09	c0.51			c0.47	
v/s Ratio Perm	c0.10				0.03		0.41			0.07		
v/c Ratio	0.65	0.17			0.21		0.70	0.72		0.13	0.88	
Uniform Delay, d1	33.9	31.4			31.6		20.9	7.5		9.8	17.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	0.3			0.7		7.0	1.8		2.7	6.0	
Delay (s)	40.6	31.7			32.3		27.9	9.3		12.6	23.3	
Level of Service	D	C			C		C	A		B	C	
Approach Delay (s)		34.9			32.3			11.3			23.3	
Approach LOS		C			C			B			C	

Intersection Summary

HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Timings
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709
Future Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA
Protected Phases	3	8		7	4	1	5	2		1	6
Permitted Phases	8		8	4		4	2		2		
Detector Phase	3	8	8	7	4	1	5	2	2	1	6
Switch Phase											
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	20.0	15.0	15.0	15.0	20.0	20.0
Minimum Split (s)	11.0	22.0	22.0	11.0	22.0	26.5	21.5	21.5	21.5	26.5	26.5
Total Split (s)	15.0	40.0	40.0	21.0	46.0	42.0	24.4	27.0	27.0	42.0	44.6
Total Split (%)	11.5%	30.8%	30.8%	16.2%	35.4%	32.3%	18.8%	20.8%	20.8%	32.3%	34.3%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	3.7	3.7	1.0	3.7	3.2	3.2	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	47.0	33.0	33.0	57.0	39.0	75.0	38.2	20.5	20.5	35.5	38.3
Actuated g/C Ratio	0.36	0.25	0.25	0.44	0.30	0.58	0.29	0.16	0.16	0.27	0.29
v/c Ratio	1.06	1.04	0.55	1.29	0.85	1.10	0.94	1.14	0.54	0.96	0.82
Control Delay	109.6	86.5	18.1	186.5	51.7	85.9	74.8	131.3	13.9	66.9	49.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.6	86.5	18.1	186.5	51.7	85.9	74.8	131.3	13.9	66.9	49.7
LOS	F	F	B	F	D	F	E	F	B	E	D
Approach Delay		75.6			88.9			94.1			58.5
Approach LOS		E			F			F			E

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.29

Intersection Signal Delay: 79.0

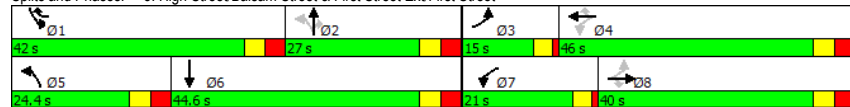
Intersection LOS: E

Intersection Capacity Utilization 108.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 5: High Street/Balsam Street & First Street Ext/First Street



Queues
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	224	940	309	387	935	1031	291	649	232	896	864
v/c Ratio	1.06	1.04	0.55	1.29	0.85	1.10	0.94	1.14	0.54	0.96	0.82
Control Delay	109.6	86.5	18.1	186.5	51.7	85.9	74.8	131.3	13.9	66.9	49.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.6	86.5	18.1	186.5	51.7	85.9	74.8	131.3	13.9	66.9	49.7
Queue Length 50th (m)	~45.2	~136.0	21.3	~109.7	118.7	~294.5	55.4	~102.0	4.9	116.7	107.1
Queue Length 95th (m)	#96.9	#176.6	50.8	#171.4	144.8	#262.7	#108.0	#139.5	29.2	#156.5	132.1
Internal Link Dist (m)		178.2			250.8		206.8				179.2
Turn Bay Length (m)	50.0		50.0	60.0		100.0	50.0		50.0	80.0	
Base Capacity (vph)	212	908	557	299	1095	934	311	569	427	938	1048
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	1.04	0.55	1.29	0.85	1.10	0.94	1.14	0.54	0.96	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: High Street/Balsam Street & First Street Ext/First Street

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709	129
Future Volume (vph)	217	912	300	375	907	1000	282	630	225	869	709	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1772	3579	1591	1807	3650	1573	1788	3614	1591	3437	3524	
Flt Permitted	0.12	1.00	1.00	0.11	1.00	1.00	0.22	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	226	3579	1591	206	3650	1573	416	3614	1591	3437	3524	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	224	940	309	387	935	1031	291	649	232	896	731	133
RTOR Reduction (vph)	0	0	154	0	0	27	0	0	177	0	11	0
Lane Group Flow (vph)	224	940	155	387	935	1004	291	649	55	896	853	0
Confl. Peds. (#/hr)	4		12	12			4	9	2	2		9
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	3%	2%	0%	1%	0%	3%	2%	1%	1%	3%	1%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4	1	5	2		1	6	
Permitted Phases	8		8	4		4	2		2			
Actuated Green, G (s)	44.0	33.0	33.0	54.0	39.0	74.5	38.2	20.5	20.5	35.5	38.3	
Effective Green, g (s)	44.0	33.0	33.0	54.0	39.0	74.5	38.2	20.5	20.5	35.5	38.3	
Actuated g/C Ratio	0.34	0.25	0.25	0.42	0.30	0.57	0.29	0.16	0.16	0.27	0.29	
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	908	403	294	1095	901	309	569	250	938	1038	
v/s Ratio Prot	0.09	0.26		c0.17	0.26	c0.30	0.13	c0.18		0.26	0.24	
v/s Ratio Perm	0.27		0.10	c0.37		0.33	0.15		0.03			
v/c Ratio	1.08	1.04	0.39	1.32	0.85	1.11	0.94	1.14	0.22	0.96	0.82	
Uniform Delay, d1	35.5	48.5	40.1	39.3	42.8	27.8	39.1	54.8	47.8	46.5	42.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	86.1	39.3	0.6	164.4	6.6	66.5	35.9	82.9	0.4	19.3	5.3	
Delay (s)	121.6	87.8	40.7	203.7	49.5	94.3	75.0	137.6	48.2	65.7	48.0	
Level of Service	F	F	D	F	D	F	E	F	D	E	D	
Approach Delay (s)		83.1			94.5			104.4			57.0	
Approach LOS		F			F			F			E	

Intersection Summary

HCM 2000 Control Delay	84.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Timings
6: Spruce Street & First Street

2041 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	15	1908	34	2204	31	15	28	10
Future Volume (vph)	15	1908	34	2204	31	15	28	10
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	7.0	53.0	7.0	53.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	58.8	11.0	58.8	16.1	16.1	16.1	16.1
Total Split (s)	11.0	66.0	11.0	66.0	31.1	31.1	31.1	31.1
Total Split (%)	10.2%	61.1%	10.2%	61.1%	28.8%	28.8%	28.8%	28.8%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	2.8	2.8	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	6.1	6.1	6.1	6.1
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	88.6	83.8	89.4	86.0	10.2	10.2	10.2	10.2
Actuated g/C Ratio	0.82	0.78	0.83	0.80	0.09	0.09	0.09	0.09
v/c Ratio	0.08	0.73	0.18	0.83	0.24	0.21	0.22	0.19
Control Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
LOS	A	B	A	B	D	C	D	C
Approach Delay		11.3		13.6		39.0		36.5
Approach LOS		B		B		D		D

Intersection Summary

Cycle Length: 108.1
Actuated Cycle Length: 108.1
Offset: 0 (0%), Referenced to phase 6:WBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 13.3
Intersection Capacity Utilization 80.9%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 6: Spruce Street & First Street

Ø1	Ø2	Ø4
11 s	66 s	31.1 s
Ø5	Ø6 (R)	Ø8
11 s	66 s	31.1 s

Queues
6: Spruce Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	2032	35	2349	32	36	29	34
v/c Ratio	0.08	0.73	0.18	0.83	0.24	0.21	0.22	0.19
Control Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.9	11.4	4.1	13.7	50.2	29.1	49.5	25.4
Queue Length 50th (m)	0.5	141.1	1.1	121.9	6.4	3.1	5.8	2.0
Queue Length 95th (m)	1.6	180.8	2.7	#302.0	15.7	12.8	14.6	11.1
Internal Link Dist (m)		250.8		336.7		166.8		215.7
Turn Bay Length (m)	50.0		50.0		20.0			
Base Capacity (vph)	190	2765	198	2836	324	400	323	398
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	0.73	0.18	0.83	0.10	0.09	0.09	0.09

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Spruce Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	15	1908	42	34	2204	51	31	15	19	28	10	23
Future Volume (vph)	15	1908	42	34	2204	51	31	15	19	28	10	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.92		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3566		1825	3564		1791	1649		1777	1627	
Flt Permitted	0.05	1.00		0.05	1.00		0.73	1.00		0.73	1.00	
Satd. Flow (perm)	96	3566		105	3564		1385	1649		1372	1627	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	16	1988	44	35	2296	53	32	16	20	29	10	24
RTOR Reduction (vph)	0	1	0	0	1	0	0	18	0	0	22	0
Lane Group Flow (vph)	16	2031	0	35	2348	0	32	18	0	29	12	0
Confl. Peds. (#/hr)	15		11	11		15	5		7	7		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	2%	0%	0%	8%	0%	11%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	82.6	79.8		85.4	81.2		8.2	8.2		8.2	8.2	
Effective Green, g (s)	82.6	79.8		85.4	81.2		8.2	8.2		8.2	8.2	
Actuated g/C Ratio	0.76	0.74		0.79	0.75		0.08	0.08		0.08	0.08	
Clearance Time (s)	4.0	5.8		4.0	5.8		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	2632		149	2677		105	125		104	123	
v/s Ratio Prot	0.00	0.57		c0.01	c0.66			0.01			0.01	
v/s Ratio Perm	0.10			0.18			c0.02			0.02		
v/c Ratio	0.14	0.77		0.23	0.88		0.30	0.14		0.28	0.10	
Uniform Delay, d1	16.2	8.6		10.2	9.8		47.3	46.7		47.2	46.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.3		0.8	4.4		1.6	0.5		1.5	0.3	
Delay (s)	16.7	10.9		11.0	14.3		48.9	47.2		48.6	46.8	
Level of Service	B	B		B	B		D	D		D	D	
Approach Delay (s)		10.9			14.2			48.0			47.7	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay				13.7			HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio				0.81								
Actuated Cycle Length (s)				108.1			Sum of lost time (s)			15.9		
Intersection Capacity Utilization				80.9%			ICU Level of Service			D		
Analysis Period (min)				15								
c Critical Lane Group												

Timings
7: Cedar Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	74	1669	29	1861	79	22	90	22
Future Volume (vph)	74	1669	29	1861	79	22	90	22
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	5.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	9.7	9.0	9.7	10.0	10.0	10.0	10.0
Total Split (s)	9.0	61.0	9.0	61.0	30.0	30.0	30.0	30.0
Total Split (%)	9.0%	61.0%	9.0%	61.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.0	2.4	1.0	2.4	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.7	4.0	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	76.0	69.9	73.8	67.2	12.3	12.3	12.3	12.3
Actuated g/C Ratio	0.76	0.70	0.74	0.67	0.12	0.12	0.12	0.12
v/c Ratio	0.40	0.74	0.16	0.82	0.59	0.21	0.57	0.46
Control Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
LOS	B	B	A	B	E	C	D	B
Approach Delay		13.9		10.5		44.4		33.0
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 59 (59%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 86.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Cedar Street & First Street

3 s	51 s	30 s	
3 s	51 s	30 s	

Queues
7: Cedar Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	1829	31	1967	83	50	95	132
v/c Ratio	0.40	0.74	0.16	0.82	0.59	0.21	0.57	0.46
Control Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	13.9	3.3	10.6	57.2	23.1	53.6	18.2
Queue Length 50th (m)	2.8	117.7	0.6	29.5	15.4	4.0	17.6	6.0
Queue Length 95th (m)	13.8	179.6	m1.0 m#241.5	29.1	13.7	31.7	21.5	
Internal Link Dist (m)		336.7		579.7		137.5		109.4
Turn Bay Length (m)	50.0		50.0		20.0		20.0	
Base Capacity (vph)	194	2461	192	2402	277	439	328	467
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.74	0.16	0.82	0.30	0.11	0.29	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis 7: Cedar Street & First Street

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	74	1669	68	29	1861	8	79	22	26	90	22	104
Future Volume (vph)	74	1669	68	29	1861	8	79	22	26	90	22	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3521		1755	3576		1765	1740		1782	1633	
Flt Permitted	0.06	1.00		0.07	1.00		0.62	1.00		0.72	1.00	
Satd. Flow (perm)	108	3521		129	3576		1154	1740		1359	1633	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	78	1757	72	31	1959	8	83	23	27	95	23	109
RTOR Reduction (vph)	0	2	0	0	0	0	0	24	0	0	86	0
Lane Group Flow (vph)	78	1827	0	31	1967	0	83	26	0	95	46	0
Confl. Peds. (#/hr)	12		8	8		12	2		6	6		2
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	4%	3%	2%	4%	2%	0%	3%	0%	0%	1%	0%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	73.9	68.2		70.1	66.3		12.3	12.3		12.3	12.3	
Effective Green, g (s)	73.9	68.2		70.1	66.3		12.3	12.3		12.3	12.3	
Actuated g/C Ratio	0.74	0.68		0.70	0.66		0.12	0.12		0.12	0.12	
Clearance Time (s)	4.0	5.7		4.0	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	173	2401		152	2370		141	214		167	200	
v/s Ratio Prot	c0.03	0.52		0.01	c0.55			0.02			0.03	
v/s Ratio Perm	0.31			0.14			c0.07			0.07		
v/c Ratio	0.45	0.76		0.20	0.83		0.59	0.12		0.57	0.23	
Uniform Delay, d1	15.7	10.5		9.4	12.6		41.5	39.0		41.3	39.6	
Progression Factor	1.00	1.00		0.65	0.55		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	2.3		0.4	2.0		6.2	0.3		4.4	0.6	
Delay (s)	17.5	12.8		6.5	9.0		47.6	39.3		45.7	40.2	
Level of Service	B	B		A	A		D	D		D	D	
Approach Delay (s)		13.0			9.0			44.5			42.5	
Approach LOS		B			A			D			D	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings 8: Pine Street & First Street

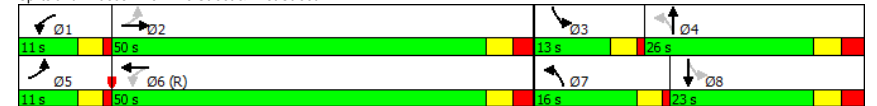
2041 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	84	1379	23	1364	287	40	76	69
Future Volume (vph)	84	1379	23	1364	287	40	76	69
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	7	4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	1	6	7	4	3	8
Switch Phase								
Minimum Initial (s)	7.0	32.0	7.0	32.0	7.0	10.0	7.0	10.0
Minimum Split (s)	11.0	37.8	11.0	37.8	11.0	16.1	11.0	16.1
Total Split (s)	11.0	50.0	11.0	50.0	16.0	26.0	13.0	23.0
Total Split (%)	11.0%	50.0%	11.0%	50.0%	16.0%	26.0%	13.0%	23.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	1.0	2.5	1.0	2.8	1.0	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	4.0	5.8	4.0	6.1	4.0	6.1
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes		Yes		Yes		Yes	
Recall Mode	None	Max	None	C-Max	None	None	None	None
Act Effct Green (s)	59.4	54.6	57.2	49.8	30.7	19.0	23.5	13.1
Actuated g/C Ratio	0.59	0.55	0.57	0.50	0.31	0.19	0.24	0.13
v/c Ratio	0.42	0.87	0.12	0.86	0.93	0.26	0.24	0.69
Control Delay	19.5	18.9	7.0	23.1	66.0	19.7	26.0	38.1
Queue Delay	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	19.5	21.9	7.0	23.3	66.0	19.7	26.0	38.1
LOS	B	C	A	C	E	B	C	D
Approach Delay		21.8		23.0		54.9		34.6
Approach LOS		C		C		D		C

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 26.5
Intersection Capacity Utilization 94.2%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service F

Splits and Phases: 8: Pine Street & First Street



Queues
8: Pine Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	1673	24	1528	305	96	81	201
v/c Ratio	0.42	0.87	0.12	0.86	0.93	0.26	0.24	0.69
Control Delay	19.5	18.9	7.0	23.1	66.0	19.7	26.0	38.1
Queue Delay	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	19.5	21.9	7.0	23.3	66.0	19.7	26.0	38.1
Queue Length 50th (m)	1.3	71.0	1.3	150.8	49.0	7.3	11.3	23.2
Queue Length 95th (m)	m7.4	#228.8	m2.3	m#197.6	#75.3	20.4	20.9	44.7
Internal Link Dist (m)		579.7		117.0		406.4		46.5
Turn Bay Length (m)	50.0		40.0			25.0		
Base Capacity (vph)	212	1917	207	1771	328	400	352	351
Starvation Cap Reductn	0	0	0	14	0	0	0	0
Spillback Cap Reductn	0	158	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.95	0.12	0.87	0.93	0.24	0.23	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: Pine Street & First Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	84	1379	194	23	1364	72	287	40	50	76	69	120
Future Volume (vph)	84	1379	194	23	1364	72	287	40	50	76	69	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3496		1825	3549		1787	1697		1744	1706	
Flt Permitted	0.08	1.00		0.08	1.00		0.32	1.00		0.69	1.00	
Satd. Flow (perm)	149	3496		159	3549		609	1697		1276	1706	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	89	1467	206	24	1451	77	305	43	53	81	73	128
RTOR Reduction (vph)	0	10	0	0	4	0	0	43	0	0	65	0
Lane Group Flow (vph)	89	1663	0	24	1524	0	305	53	0	81	136	0
Confl. Peds. (#/hr)	11		8	8		11	7		7	7		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	2%	3%	2%	4%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	57.3	51.4		51.1	48.3		29.9	19.0		20.8	13.9	
Effective Green, g (s)	57.3	51.4		51.1	48.3		29.9	19.0		20.8	13.9	
Actuated g/C Ratio	0.57	0.51		0.51	0.48		0.30	0.19		0.21	0.14	
Clearance Time (s)	4.0	5.8		4.0	5.8		4.0	6.1		4.0	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	184	1796		127	1714		323	322		297	237	
v/s Ratio Prot	c0.03	c0.48		0.01	0.43		c0.11	0.03		0.02	0.08	
v/s Ratio Perm	0.25			0.09			c0.17			0.04		
v/c Ratio	0.48	0.93		0.19	0.89		0.94	0.16		0.27	0.57	
Uniform Delay, d1	18.5	22.5		19.4	23.4		31.6	33.9		32.9	40.3	
Progression Factor	1.37	0.58		0.68	0.74		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	7.1		0.6	5.8		35.4	0.2		0.5	3.3	
Delay (s)	26.6	20.2		13.8	23.1		67.0	34.1		33.4	43.6	
Level of Service	C	C		B	C		E	C		C	D	
Approach Delay (s)		20.5			22.9			59.1			40.7	
Approach LOS		C			C			E			D	

Intersection Summary

HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings
9: Hurontario Street & First Street/Huron Street

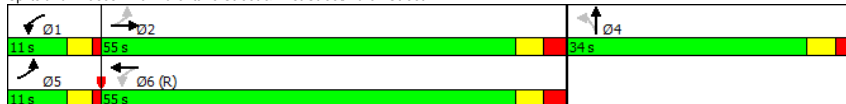
2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	21	1155	96	1026	440	17
Future Volume (vph)	21	1155	96	1026	440	17
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	5	2	1	6		4
Permitted Phases	2		6		4	
Detector Phase	5	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	5.0	4.0	4.0	4.0
Minimum Split (s)	8.0	10.0	9.0	10.0	9.6	9.6
Total Split (s)	11.0	55.0	11.0	55.0	34.0	34.0
Total Split (%)	11.0%	55.0%	11.0%	55.0%	34.0%	34.0%
Yellow Time (s)	3.0	3.3	3.0	3.3	3.3	3.3
All-Red Time (s)	1.0	2.7	1.0	2.7	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	C-Max	None	None
Act Effct Green (s)	59.0	52.1	61.4	56.6	27.6	27.6
Actuated g/C Ratio	0.59	0.52	0.61	0.57	0.28	0.28
v/c Ratio	0.08	0.86	0.50	0.54	0.93	0.20
Control Delay	3.5	12.5	20.5	15.9	63.1	9.6
Queue Delay	0.0	0.9	0.0	0.4	0.0	0.0
Total Delay	3.5	13.4	20.5	16.3	63.1	9.6
LOS	A	B	C	B	E	A
Approach Delay		13.3		16.7		53.5
Approach LOS		B		B		D

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 12 (12%), Referenced to phase 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 21.2
 Intersection LOS: C
 Intersection Capacity Utilization 85.8%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Hurontario Street & First Street/Huron Street



Queues
9: Hurontario Street & First Street/Huron Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT
Lane Group Flow (vph)	22	1575	101	1091	463	101
v/c Ratio	0.08	0.86	0.50	0.54	0.93	0.20
Control Delay	3.5	12.5	20.5	15.9	63.1	9.6
Queue Delay	0.0	0.9	0.0	0.4	0.0	0.0
Total Delay	3.5	13.4	20.5	16.3	63.1	9.6
Queue Length 50th (m)	0.4	143.6	7.2	59.3	86.4	2.5
Queue Length 95th (m)	m0.7	#37.6	19.7	98.6	#142.8	14.3
Internal Link Dist (m)		117.0		100.6		812.8
Turn Bay Length (m)	40.0		50.0			
Base Capacity (vph)	306	1822	204	2022	511	522
Starvation Cap Reductn	0	77	0	0	0	0
Spillback Cap Reductn	0	0	0	442	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.90	0.50	0.69	0.91	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Hurontario Street & First Street/Huron Street

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	21	1155	341	96	1026	10	440	17	79	0	0	0
Future Volume (vph)	21	1155	341	96	1026	10	440	17	79	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98				
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00				
Frt	1.00	0.97		1.00	1.00		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1705	3449		1825	3573		1801	1631				
Flt Permitted	0.20	1.00		0.07	1.00		0.95	1.00				
Satd. Flow (perm)	355	3449		142	3573		1801	1631				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	22	1216	359	101	1080	11	463	18	83	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	60	0	0	0	0
Lane Group Flow (vph)	22	1549	0	101	1091	0	463	41	0	0	0	0
Confl. Peds. (#/hr)	16		11	11		16	12		11	11		12
Heavy Vehicles (%)	7%	2%	1%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA				
Protected Phases	5	2		1	6			4				
Permitted Phases	2			6			4					
Actuated Green, G (s)	53.8	51.2		59.8	54.2		27.6	27.6				
Effective Green, g (s)	53.8	51.2		59.8	54.2		27.6	27.6				
Actuated g/C Ratio	0.54	0.51		0.60	0.54		0.28	0.28				
Clearance Time (s)	4.0	6.0		4.0	6.0		5.6	5.6				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	226	1765		179	1936		497	450				
v/s Ratio Prot	0.00	c0.45		c0.03	0.31			0.03				
v/s Ratio Perm	0.05			0.31			c0.26					
v/c Ratio	0.10	0.88		0.56	0.56		0.93	0.09				
Uniform Delay, d1	11.6	21.6		17.9	15.1		35.3	26.9				
Progression Factor	0.43	0.39		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.1	3.7		4.0	1.2		24.4	0.1				
Delay (s)	5.1	12.1		22.0	16.3		59.7	27.0				
Level of Service	A	B		C	B		E	C				
Approach Delay (s)		12.0			16.8		53.8			0.0		
Approach LOS		B			B		D			A		

Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Timings
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	140	470	38	345	616	29	59	62	850	58	167
Future Volume (vph)	140	470	38	345	616	29	59	62	850	58	167
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2	1	6	4	8	8		4	4	
Permitted Phases	2		6		6			8			4
Detector Phase	5	2	1	6	4	8	8	8	4	4	4
Switch Phase											
Minimum Initial (s)	7.0	10.0	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	11.0	22.0	22.0	16.0	16.0	16.0	22.0	22.0	22.0
Total Split (s)	11.0	27.0	11.0	27.0	36.0	16.0	16.0	16.0	36.0	36.0	36.0
Total Split (%)	12.2%	30.0%	12.2%	30.0%	40.0%	17.8%	17.8%	17.8%	40.0%	40.0%	40.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes							
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None
Act Effct Green (s)	32.0	25.9	30.3	21.2	56.8	10.1	10.1	10.1	29.6	29.6	29.6
Actuated g/C Ratio	0.37	0.30	0.35	0.25	0.66	0.12	0.12	0.12	0.34	0.34	0.34
v/c Ratio	0.61	0.50	0.13	0.82	0.58	0.17	0.31	0.22	0.87	0.88	0.28
Control Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
LOS	C	C	B	D	A	D	D	A	D	D	A
Approach Delay		29.8		21.0			24.4			39.7	
Approach LOS		C		C			C			D	

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 86.2	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 30.1	Intersection LOS: C
Intersection Capacity Utilization 71.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Pretty River Parkway & Hume Street/Highway 26 E

↰ 01	↱ 02	↰ 04	↱ 08
11 s	27 s	36 s	16 s
↰ 05	↱ 06		
11 s	27 s		

Queues
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	157	541	43	388	692	33	66	70	506	514	188
v/c Ratio	0.61	0.50	0.13	0.82	0.58	0.17	0.31	0.22	0.87	0.88	0.28
Control Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	29.4	19.1	48.5	5.7	38.6	41.5	1.6	45.2	47.0	4.7
Queue Length 50th (m)	18.2	44.3	4.7	64.7	20.5	5.3	10.7	0.0	86.5	88.5	0.0
Queue Length 95th (m)	#35.2	60.3	11.1	#110.4	45.5	13.6	22.6	0.0	#143.6	#147.2	13.1
Internal Link Dist (m)	218.1		181.3			157.4			210.6		
Turn Bay Length (m)			60.0			15.0		15.0			70.0
Base Capacity (vph)	257	1085	324	472	1211	199	210	313	596	595	672
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.50	0.13	0.82	0.57	0.17	0.31	0.22	0.85	0.86	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Pretty River Parkway & Hume Street/Highway 26 E

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	140	470	12	38	345	616	29	59	62	850	58	167
Future Volume (vph)	140	470	12	38	345	616	29	59	62	850	58	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1738	3602		1674	1921	1617	1706	1795	1484	1700	1698	1570
Flt Permitted	0.22	1.00		0.40	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	399	3602		697	1921	1617	1706	1795	1484	1700	1698	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	157	528	13	43	388	692	33	66	70	955	65	188
RTOR Reduction (vph)	0	1	0	0	0	164	0	0	64	0	0	126
Lane Group Flow (vph)	157	540	0	43	388	528	33	66	6	506	514	62
Heavy Vehicles (%)	5%	1%	0%	9%	0%	1%	7%	7%	10%	2%	10%	4%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6	4	8	8		4	4	
Permitted Phases	2			6		6			8			4
Actuated Green, G (s)	33.1	26.0		26.9	22.9	52.5	7.7	7.7	7.7	29.6	29.6	29.6
Effective Green, g (s)	33.1	26.0		26.9	22.9	52.5	7.7	7.7	7.7	29.6	29.6	29.6
Actuated g/C Ratio	0.37	0.29		0.30	0.26	0.59	0.09	0.09	0.09	0.33	0.33	0.33
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	254	1048		253	492	1059	147	154	127	563	562	520
v/s Ratio Prot	c0.05	0.15		0.01	c0.20	0.17	0.02	c0.04		0.30	c0.30	
v/s Ratio Perm	0.18			0.04		0.16			0.00			0.04
v/c Ratio	0.62	0.51		0.17	0.79	0.50	0.22	0.43	0.05	0.90	0.91	0.12
Uniform Delay, d1	21.0	26.4		22.4	30.9	10.7	38.0	38.7	37.4	28.4	28.6	20.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	1.8		0.3	12.1	0.4	0.8	1.9	0.2	17.0	19.5	0.1
Delay (s)	25.4	28.2		22.7	43.1	11.1	38.8	40.6	37.6	45.4	48.1	20.9
Level of Service	C	C		C	D	B	D	D	D	D	D	C
Approach Delay (s)	27.6			22.6			39.0				42.8	
Approach LOS	C			C			D				D	
Intersection Summary												
HCM 2000 Control Delay	32.2											
HCM 2000 Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	89.3								22.0			
Intersection Capacity Utilization	71.0%								C			
Analysis Period (min)	15											
c Critical Lane Group												

Timings
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	88	19	4	7	43	554	540	729
Future Volume (vph)	88	19	4	7	43	554	540	729
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	19.0	7.0	25.0
Minimum Split (s)	16.0	16.0	16.0	16.0	11.0	25.0	11.0	31.0
Total Split (s)	30.0	30.0	30.0	30.0	11.0	25.0	35.0	49.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	12.2%	27.8%	38.9%	54.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	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	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)		20.4		20.4	30.1	21.0	52.2	44.1
Actuated g/C Ratio		0.25		0.25	0.36	0.25	0.63	0.53
v/c Ratio		0.91		0.49	0.14	0.67	0.84	0.44
Control Delay		57.2		6.9	12.2	34.7	25.6	14.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		57.2		6.9	12.2	34.7	25.6	14.4
LOS		E		A	B	C	C	B
Approach Delay		57.2		6.9		33.1		19.1
Approach LOS		E		A		C		B

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 82.7

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 25.1

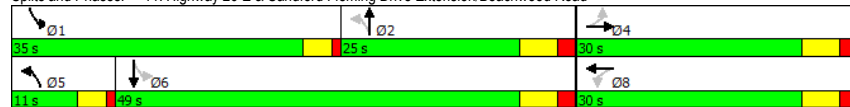
Intersection LOS: C

Intersection Capacity Utilization 95.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road



Queues
11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total PM
With Improvements

	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	275	305	47	611	593	826
v/c Ratio	0.91	0.49	0.14	0.67	0.84	0.44
Control Delay	57.2	6.9	12.2	34.7	25.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	6.9	12.2	34.7	25.6	14.4
Queue Length 50th (m)	34.0	1.5	2.9	51.8	62.5	49.0
Queue Length 95th (m)	#78.4	20.2	6.7	#77.1	#104.8	64.6
Internal Link Dist (m)	141.3	72.4		263.5		240.6
Turn Bay Length (m)			120.0		60.0	
Base Capacity (vph)	348	690	332	908	810	1864
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	0.79	0.44	0.14	0.67	0.73	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

11: Highway 26 E & Sandford Fleming Drive Extension/Beachwood Road

2041 Total PM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	88	19	143	4	7	267	43	554	2	540	729	23
Future Volume (vph)	88	19	143	4	7	267	43	554	2	540	729	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0			4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00			1.00			1.00	0.95		1.00	0.95	
Flt	0.92			0.87			1.00	1.00		1.00	1.00	
Flt Protected	0.98			1.00			0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708			1654			1789	3577		1825	3496	
Flt Permitted	0.58			0.99			0.34	1.00		0.24	1.00	
Satd. Flow (perm)	1007			1647			641	3577		466	3496	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	97	21	157	4	8	293	47	609	2	593	801	25
RTOR Reduction (vph)	0	55	0	0	222	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	220	0	0	83	0	47	611	0	593	824	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	1%	2%	2%	0%	0%	4%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.4			20.4			26.8	22.9		52.0	44.1	
Effective Green, g (s)	20.4			20.4			26.8	22.9		52.0	44.1	
Actuated g/C Ratio	0.24			0.24			0.32	0.27		0.62	0.52	
Clearance Time (s)	6.0			6.0			4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0			3.0			3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	243			398			256	970		691	1826	
v/s Ratio Prot							0.01	0.17		c0.26	0.24	
v/s Ratio Perm	c0.22			0.05			0.05			c0.27		
v/c Ratio	0.90			0.21			0.18	0.63		0.86	0.45	
Uniform Delay, d1	31.0			25.6			20.2	27.0		14.9	12.6	
Progression Factor	1.00			1.00			1.00	1.00		1.00	1.00	
Incremental Delay, d2	33.1			0.3			0.3	3.1		10.3	0.8	
Delay (s)	64.2			25.8			20.5	30.1		25.2	13.4	
Level of Service	E			C			C	C		C	B	
Approach Delay (s)	64.2			25.8			29.4			18.3		
Approach LOS	E			C			C			B		

Intersection Summary

HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings

12: Tenth Line & Mountain Road

2041 Total PM

With Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	25	698	206	398	680	329	172	182	266	239	159
Future Volume (vph)	25	698	206	398	680	329	172	182	266	239	159
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	2		2	6		6	3	8		7	4
Permitted Phases	2		2	6		6	3	8		8	4
Detector Phase	2	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	18.3	18.3	18.3	7.0	33.0	33.0	7.0	10.0	10.0	7.0	10.0
Minimum Split (s)	24.0	24.0	24.0	11.0	38.7	38.7	11.0	15.2	15.2	11.0	15.2
Total Split (s)	30.6	30.6	30.6	30.0	60.6	60.6	12.0	23.4	23.4	16.0	27.4
Total Split (%)	30.6%	30.6%	30.6%	30.0%	60.6%	60.6%	12.0%	23.4%	23.4%	16.0%	27.4%
Yellow Time (s)	3.7	3.7	3.7	3.0	3.7	3.7	3.0	3.7	3.7	3.0	3.7
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	1.0	1.5	1.5	1.0	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	None	Max	Max	None	None	None	None	None
Act Effect Green (s)	28.9	28.9	28.9	56.7	55.0	55.0	25.5	16.3	16.3	33.5	20.3
Actuated g/C Ratio	0.29	0.29	0.29	0.58	0.56	0.56	0.26	0.17	0.17	0.34	0.21
v/c Ratio	0.18	0.74	0.38	0.87	0.37	0.34	0.58	0.80	0.58	0.78	0.57
Control Delay	33.3	38.0	8.4	39.9	13.0	2.1	33.6	62.8	9.2	43.4	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.3	38.0	8.4	39.9	13.0	2.1	33.6	62.8	9.2	43.4	40.4
LOS	C	D	A	D	B	A	C	E	A	D	D
Approach Delay		31.3			18.0			31.7			42.1
Approach LOS		C			B			C			D

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 98.2
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 27.2
Intersection Capacity Utilization 82.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service E

Splits and Phases: 12: Tenth Line & Mountain Road



Queues
12: Tenth Line & Mountain Road

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	28	784	231	447	764	370	193	204	299	269	205
v/c Ratio	0.18	0.74	0.38	0.87	0.37	0.34	0.58	0.80	0.58	0.78	0.57
Control Delay	33.3	38.0	8.4	39.9	13.0	2.1	33.6	62.8	9.2	43.4	40.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.3	38.0	8.4	39.9	13.0	2.1	33.6	62.8	9.2	43.4	40.4
Queue Length 50th (m)	4.3	75.8	4.1	60.9	42.0	0.0	27.0	37.7	0.0	39.6	34.0
Queue Length 95th (m)	12.0	#105.2	21.9	#104.3	53.6	11.5	44.0	#67.8	20.6	#70.0	55.5
Internal Link Dist (m)	237.3		50.0		810.6		50.0		849.0		311.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0		50.0		50.0
Base Capacity (vph)	153	1061	614	573	2042	1076	330	284	543	343	394
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.74	0.38	0.78	0.37	0.34	0.58	0.72	0.55	0.78	0.52

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
12: Tenth Line & Mountain Road

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Lane Configurations												
Traffic Volume (vph)	25	698	206	398	680	329	172	182	266	239	159	23
Future Volume (vph)	25	698	206	398	680	329	172	182	266	239	159	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1372	3614	1601	1825	3650	1633	1706	1537	1617	1706	1719	
Flt Permitted	0.36	1.00	1.00	0.15	1.00	1.00	0.60	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	523	3614	1601	289	3650	1633	1074	1537	1617	615	1719	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	28	784	231	447	764	370	193	204	299	269	179	26
RTOR Reduction (vph)	0	0	143	0	0	163	0	0	249	0	6	0
Lane Group Flow (vph)	28	784	88	447	764	207	193	204	50	269	199	0
Heavy Vehicles (%)	33%	1%	2%	0%	0%	0%	7%	25%	1%	7%	11%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	NA
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	28.8	28.8	28.8	54.9	54.9	54.9	24.3	16.3	16.3	32.3	20.3	
Effective Green, g (s)	28.8	28.8	28.8	54.9	54.9	54.9	24.3	16.3	16.3	32.3	20.3	
Actuated g/C Ratio	0.29	0.29	0.29	0.56	0.56	0.56	0.25	0.17	0.17	0.33	0.21	
Clearance Time (s)	5.7	5.7	5.7	4.0	5.7	5.7	4.0	5.2	5.2	4.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	153	1060	470	507	2042	913	317	255	268	335	355	
v/s Ratio Prot		0.22		c0.20	0.21		0.05	0.13		c0.10	0.12	
v/s Ratio Perm	0.05		0.05	c0.29		0.13	0.10		0.03	c0.17		
v/c Ratio	0.18	0.74	0.19	0.88	0.37	0.23	0.61	0.80	0.19	0.80	0.56	
Uniform Delay, d1	25.9	31.3	25.9	23.6	12.0	10.9	31.5	39.3	35.2	27.0	34.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.6	4.6	0.9	16.4	0.5	0.6	3.3	16.3	0.3	13.0	2.0	
Delay (s)	28.5	35.9	26.8	39.9	12.6	11.5	34.8	55.6	35.5	40.0	36.9	
Level of Service	C	D	C	D	B	B	C	E	D	D	D	
Approach Delay (s)		33.7			20.0			41.2			38.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			30.0		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			98.1		Sum of lost time (s)				18.9			
Intersection Capacity Utilization			82.7%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

Timings
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext
2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	138	909	187	277	964	248	346	394	98	338	183
Future Volume (vph)	138	909	187	277	964	248	346	394	98	338	183
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	3	8		7	4	
Permitted Phases	2		2	6		8		8	4		4
Detector Phase	5	2	2	1	6	3	8	8	7	4	4
Switch Phase											
Minimum Initial (s)	5.0	30.0	30.0	5.0	30.0	5.0	7.0	7.0	5.0	7.0	7.0
Minimum Split (s)	9.0	37.6	37.6	9.0	37.6	9.0	25.0	25.0	9.0	25.0	25.0
Total Split (s)	11.0	49.0	49.0	20.0	58.0	19.0	42.0	42.0	9.0	32.0	32.0
Total Split (%)	9.2%	40.8%	40.8%	16.7%	48.3%	15.8%	35.0%	35.0%	7.5%	26.7%	26.7%
Yellow Time (s)	3.0	4.4	4.4	3.0	4.4	3.0	3.3	3.3	3.0	3.3	3.3
All-Red Time (s)	1.0	3.2	3.2	1.0	3.2	1.0	2.7	2.7	1.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.6	7.6	4.0	7.6	4.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	52.0	41.4	41.4	65.0	50.4	46.4	35.4	35.4	32.4	25.4	25.4
Actuated g/C Ratio	0.44	0.35	0.35	0.54	0.42	0.39	0.30	0.30	0.27	0.21	0.21
v/c Ratio	0.85	0.82	0.31	0.96	0.83	0.95	0.68	0.66	0.44	0.94	0.42
Control Delay	60.0	42.5	7.8	70.4	36.0	72.2	44.2	18.5	32.8	78.9	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.0	42.5	7.8	70.4	36.0	72.2	44.2	18.5	32.8	78.9	10.0
LOS	E	D	A	E	D	E	D	B	C	E	A
Approach Delay		39.2			42.9		41.0		51.3		
Approach LOS		D			D		D		D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.4

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 42.6

Intersection LOS: D

Intersection Capacity Utilization 90.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

Ø1	Ø2	Ø3	Ø4
20 s	49 s	19 s	32 s
Ø5	Ø6	Ø7	Ø8
11 s	58 s	9 s	42 s

Queues
13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext
2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	153	1010	208	308	1240	276	384	438	109	376	203
v/c Ratio	0.85	0.82	0.31	0.96	0.83	0.95	0.68	0.66	0.44	0.94	0.42
Control Delay	60.0	42.5	7.8	70.4	36.0	72.2	44.2	18.5	32.8	78.9	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.0	42.5	7.8	70.4	36.0	72.2	44.2	18.5	32.8	78.9	10.0
Queue Length 50th (m)	17.4	113.9	5.5	52.7	132.8	47.8	79.2	32.9	16.4	87.3	3.0
Queue Length 95th (m)	#54.4	140.2	22.1	#107.6	161.8	#99.8	113.2	69.0	28.8	#143.1	22.4
Internal Link Dist (m)		217.8			35.2		32.3			88.4	
Turn Bay Length (m)	35.0		45.0	50.0		45.0		50.0	15.0		
Base Capacity (vph)	180	1228	664	321	1502	291	573	672	247	409	491
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.82	0.31	0.96	0.83	0.95	0.67	0.65	0.44	0.92	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

13: Cambridge Street/Old Mountain Road & Mountain Road/First Street Ext

2041 Total PM

With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	138	909	187	277	964	152	248	346	394	98	338	183
Future Volume (vph)	138	909	187	277	964	152	248	346	394	98	338	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	7.6	7.6	4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	3544	1592	1807	3534		1789	1902	1601	1807	1883	1586
Flt Permitted	0.10	1.00	1.00	0.10	1.00		0.14	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	196	3544	1592	194	3534		256	1902	1601	745	1883	1586
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	153	1010	208	308	1071	169	276	384	438	109	376	203
RTOR Reduction (vph)	0	0	113	0	10	0	0	0	191	0	0	147
Lane Group Flow (vph)	153	1010	95	308	1230	0	276	384	247	109	376	56
Confl. Peds. (#/hr)	2		3	3		2	12					12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	3%	0%	1%	1%	1%	2%	1%	2%	1%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	48.4	41.4	41.4	61.4	50.4		44.4	35.4	35.4	30.4	25.4	25.4
Effective Green, g (s)	48.4	41.4	41.4	61.4	50.4		44.4	35.4	35.4	30.4	25.4	25.4
Actuated g/C Ratio	0.41	0.35	0.35	0.51	0.42		0.37	0.30	0.30	0.25	0.21	0.21
Clearance Time (s)	4.0	7.6	7.6	4.0	7.6		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	174	1228	552	315	1491		287	563	474	234	400	337
v/s Ratio Prot	0.05	0.29		c0.13	0.35		c0.12	0.20		0.02	0.20	
v/s Ratio Perm	0.30		0.06	c0.37			c0.24		0.15	0.10		0.04
v/c Ratio	0.88	0.82	0.17	0.98	0.82		0.96	0.68	0.52	0.47	0.94	0.17
Uniform Delay, d1	26.4	35.6	27.1	33.8	30.6		32.3	37.0	34.9	36.3	46.3	38.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.9	6.3	0.7	45.4	5.3		42.5	3.4	1.0	1.5	29.8	0.2
Delay (s)	62.3	41.9	27.8	79.1	35.9		74.8	40.4	36.0	37.7	76.0	38.6
Level of Service	E	D	C	E	D		E	D	D	D	E	D
Approach Delay (s)		42.1			44.5			47.3			58.9	
Approach LOS		D			D			D			E	

Intersection Summary

HCM 2000 Control Delay	46.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	119.4	Sum of lost time (s)	21.6
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Timings

14: High Street & Cambridge Street/Third Street

2041 Total PM

With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	6	104	49	101	284	991	113	1326
Future Volume (vph)	6	104	49	101	284	991	113	1326
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	11.0	20.0	11.0	20.0
Total Split (s)	30.0	30.0	30.0	30.0	13.0	49.0	11.0	47.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	14.4%	54.4%	12.2%	52.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
Act Effct Green (s)	18.9	18.9	18.9	18.9	54.6	45.6	50.2	41.1
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.64	0.54	0.59	0.48
v/c Ratio	0.03	0.86	0.59	0.59	1.07	0.59	0.37	0.82
Control Delay	25.2	37.6	56.6	26.1	99.3	16.6	9.8	24.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	37.6	56.6	26.1	99.3	16.6	9.8	24.7
LOS	C	D	E	C	F	B	A	C
Approach Delay		37.4		31.2		34.1		23.5
Approach LOS		D		C		C		C

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 85.1	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 29.9	Intersection LOS: C
Intersection Capacity Utilization 102.4%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 14: High Street & Cambridge Street/Third Street



Queues
14: High Street & Cambridge Street/Third Street

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	6	421	53	263	305	1135	122	1429
v/c Ratio	0.03	0.86	0.59	0.59	1.07	0.59	0.37	0.82
Control Delay	25.2	37.6	56.6	26.1	99.3	16.6	9.8	24.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	37.6	56.6	26.1	99.3	16.6	9.8	24.7
Queue Length 50th (m)	0.8	43.2	7.7	26.6	~42.1	68.6	6.8	103.7
Queue Length 95th (m)	3.7	#80.4	#22.4	49.8	#96.0	96.5	14.2	143.6
Internal Link Dist (m)		64.2		222.1		540.0		198.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	230	586	115	545	284	1920	332	1746
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	0.03	0.72	0.46	0.48	1.07	0.59	0.37	0.82

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
14: High Street & Cambridge Street/Third Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	6	104	287	49	101	143	284	991	64	113	1326	3
Future Volume (vph)	6	104	287	49	101	143	284	991	64	113	1326	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.91		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1693		1824	1732		1825	3576		1825	3613	
Flt Permitted	0.42	1.00		0.21	1.00		0.09	1.00		0.19	1.00	
Satd. Flow (perm)	814	1693		406	1732		169	3576		360	3613	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	112	309	53	109	154	305	1066	69	122	1426	3
RTOR Reduction (vph)	0	117	0	0	60	0	0	5	0	0	0	0
Lane Group Flow (vph)	6	304	0	53	203	0	305	1130	0	122	1429	0
Confl. Peds. (#/hr)			1	1			1		12	12		1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.9	18.9		18.9	18.9		54.6	45.6		47.6	42.1	
Effective Green, g (s)	18.9	18.9		18.9	18.9		54.6	45.6		47.6	42.1	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.63	0.53		0.55	0.49	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	178	372		89	380		280	1896		292	1768	
v/s Ratio Prot		c0.18			0.12		c0.11	0.32		0.03	0.40	
v/s Ratio Perm	0.01			0.13			c0.58			0.20		
v/c Ratio	0.03	0.82		0.60	0.53		1.09	0.60		0.42	0.81	
Uniform Delay, d1	26.4	31.9		30.1	29.7		24.4	13.9		10.1	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	13.0		10.3	1.4		79.7	1.4		1.0	4.1	
Delay (s)	26.4	44.9		40.4	31.1		104.1	15.3		11.0	22.6	
Level of Service	C	D		D	C		F	B		B	C	
Approach Delay (s)		44.6			32.7			34.1			21.7	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Timings
15: High Street & Sixth Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔
Traffic Volume (vph)	213	252	261	128	309	212	204	830	243	1154
Future Volume (vph)	213	252	261	128	309	212	204	830	243	1154
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases	4		4	8		8	2		6	
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	7.0	20.0	7.0	20.0
Minimum Split (s)	9.0	15.8	15.8	9.0	15.8	15.8	11.5	25.9	11.5	25.9
Total Split (s)	15.2	33.2	33.2	10.2	28.2	28.2	17.0	52.0	24.6	59.6
Total Split (%)	12.7%	27.7%	27.7%	8.5%	23.5%	23.5%	14.2%	43.3%	20.5%	49.7%
Yellow Time (s)	3.0	3.3	3.3	3.0	3.3	3.3	3.0	3.3	3.0	3.3
All-Red Time (s)	1.0	2.5	2.5	1.0	2.5	2.5	1.5	2.6	1.5	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9	4.5	5.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Max	None	Max	None
Act Effct Green (s)	39.1	27.1	27.1	30.1	22.1	22.1	65.2	51.5	68.9	53.7
Actuated g/C Ratio	0.33	0.23	0.23	0.25	0.18	0.18	0.55	0.43	0.58	0.45
v/c Ratio	0.97	0.61	0.50	0.50	0.92	0.50	0.89	0.62	0.69	0.92
Control Delay	87.3	48.3	10.0	38.5	80.5	14.6	66.1	29.1	22.7	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.3	48.3	10.0	38.5	80.5	14.6	66.1	29.1	22.7	41.0
LOS	F	D	A	D	F	B	E	C	C	D
Approach Delay	45.9			50.7			35.9			38.3
Approach LOS	D			D			D			D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.5

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.9

Intersection LOS: D

Intersection Capacity Utilization 95.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 15: High Street & Sixth Street

↙	↗	↘	↙	↗	↘	↙	↗	↘	↙	↗	↘
24.6 s	52 s		10.2 s	33.2 s		17 s	59.6 s		15.2 s	28.2 s	

Queues
15: High Street & Sixth Street

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	224	265	275	135	325	223	215	961	256	1463
v/c Ratio	0.97	0.61	0.50	0.50	0.92	0.50	0.89	0.62	0.69	0.92
Control Delay	87.3	48.3	10.0	38.5	80.5	14.6	66.1	29.1	22.7	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.3	48.3	10.0	38.5	80.5	14.6	66.1	29.1	22.7	41.0
Queue Length 50th (m)	40.5	56.3	4.5	23.0	75.9	8.3	34.2	89.5	26.4	164.9
Queue Length 95th (m)	#85.9	84.1	27.5	38.6	#127.6	31.3	#80.9	121.5	44.1	#213.4
Internal Link Dist (m)	59.4			212.9			1058.0			540.0
Turn Bay Length (m)	215.0		50.0	25.0		25.0	60.0		15.0	
Base Capacity (vph)	230	440	551	270	356	448	245	1540	448	1591
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.60	0.50	0.50	0.91	0.50	0.88	0.62	0.57	0.92

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
15: High Street & Sixth Street

2041 Total PM
With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	213	252	261	128	309	212	204	830	83	243	1154	236
Future Volume (vph)	213	252	261	128	309	212	204	830	83	243	1154	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9		4.5	5.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	1921	1563	1824	1902	1608	1738	3561		1825	3509	
Flt Permitted	0.15	1.00	1.00	0.46	1.00	1.00	0.08	1.00		0.17	1.00	
Satd. Flow (perm)	283	1921	1563	877	1902	1608	142	3561		329	3509	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	224	265	275	135	325	223	215	874	87	256	1215	248
RTOR Reduction (vph)	0	0	194	0	0	148	0	6	0	0	14	0
Lane Group Flow (vph)	224	265	81	135	325	75	215	955	0	256	1449	0
Confl. Peds. (#/hr)	2		1	1		2	2		3	3		2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	0%	2%	0%	1%	0%	5%	1%	0%	0%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	37.3	27.1	27.1	28.3	22.1	22.1	63.8	51.5		68.2	53.7	
Effective Green, g (s)	37.3	27.1	27.1	28.3	22.1	22.1	63.8	51.5		68.2	53.7	
Actuated g/C Ratio	0.31	0.23	0.23	0.24	0.18	0.18	0.53	0.43		0.57	0.45	
Clearance Time (s)	4.0	5.8	5.8	4.0	5.8	5.8	4.5	5.9		4.5	5.9	
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	226	435	354	256	351	297	240	1534		369	1576	
v/s Ratio Prot	c0.09	0.14		0.03	0.17		c0.09	0.27		c0.08	c0.41	
v/s Ratio Perm	c0.22		0.05	0.10		0.05	0.39			0.31		
v/c Ratio	0.99	0.61	0.23	0.53	0.93	0.25	0.90	0.62		0.69	0.92	
Uniform Delay, d1	35.6	41.4	37.7	38.4	47.9	41.7	33.9	26.4		16.8	30.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	57.2	2.8	0.5	2.0	30.0	0.6	31.7	1.9		5.6	10.2	
Delay (s)	92.8	44.2	38.1	40.4	77.9	42.3	65.6	28.4		22.3	41.0	
Level of Service	F	D	D	D	E	D	E	C		C	D	
Approach Delay (s)		56.3			58.8			35.2			38.2	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	119.5	Sum of lost time (s)	20.2
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Timings
16: High Street & Campbell Street

2041 Total PM
With Improvements

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↑	↱	↰	↑
Traffic Volume (vph)	63	147	893	57	200	995
Future Volume (vph)	63	147	893	57	200	995
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0
Minimum Split (s)	18.0	18.0	22.0	22.0	11.0	22.0
Total Split (s)	18.0	18.0	60.0	60.0	12.0	72.0
Total Split (%)	20.0%	20.0%	66.7%	66.7%	13.3%	80.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	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	4.0	6.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	None	Max
Act Effct Green (s)	10.4	10.4	54.3	54.3	68.0	66.0
Actuated g/C Ratio	0.12	0.12	0.61	0.61	0.77	0.75
v/c Ratio	0.32	0.47	0.79	0.06	0.61	0.73
Control Delay	40.6	11.7	19.4	2.3	12.9	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	11.7	19.4	2.3	12.9	10.3
LOS	D	B	B	A	B	B
Approach Delay	20.4		18.3			10.7
Approach LOS	C		B			B

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88.4	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 79.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 16: High Street & Campbell Street



Queues
16: High Street & Campbell Street

2041 Total PM
With Improvements

	←	←	↑	↘	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	64	150	911	58	204	1015
v/c Ratio	0.32	0.47	0.79	0.06	0.61	0.73
Control Delay	40.6	11.7	19.4	2.3	12.9	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	11.7	19.4	2.3	12.9	10.3
Queue Length 50th (m)	10.1	0.0	104.5	0.0	6.8	75.3
Queue Length 95th (m)	21.8	16.1	169.0	4.3	21.3	131.5
Internal Link Dist (m)	320.1		196.2			1058.0
Turn Bay Length (m)				20.0		
Base Capacity (vph)	227	343	1156	1004	340	1392
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.44	0.79	0.06	0.60	0.73
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
16: High Street & Campbell Street

2041 Total PM
With Improvements

	←	←	↑	↘	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↘	↑	↘	↘	↑
Traffic Volume (vph)	63	147	893	57	200	995
Future Volume (vph)	63	147	893	57	200	995
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1674	1578	1883	1598	1772	1865
Flt Permitted	0.95	1.00	1.00	1.00	0.14	1.00
Satd. Flow (perm)	1674	1578	1883	1598	266	1865
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	64	150	911	58	204	1015
RTOR Reduction (vph)	0	132	0	22	0	0
Lane Group Flow (vph)	64	18	911	36	204	1015
Confl. Peds. (#/hr)		1		2		2
Heavy Vehicles (%)	9%	2%	2%	0%	3%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	10.4	10.4	54.3	54.3	66.0	66.0
Effective Green, g (s)	10.4	10.4	54.3	54.3	66.0	66.0
Actuated g/C Ratio	0.12	0.12	0.61	0.61	0.75	0.75
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	196	185	1156	981	329	1392
v/s Ratio Prot	c0.04		c0.48		0.05	c0.54
v/s Ratio Perm		0.01		0.02	0.41	
v/c Ratio	0.33	0.10	0.79	0.04	0.62	0.73
Uniform Delay, d1	35.8	34.8	12.7	6.7	12.4	6.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	5.5	0.1	3.6	3.4
Delay (s)	36.8	35.0	18.2	6.8	16.0	9.6
Level of Service	D	D	B	A	B	A
Approach Delay (s)	35.5		17.5			10.7
Approach LOS	D		B			B
Intersection Summary						
HCM 2000 Control Delay		15.7			HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio		0.73				
Actuated Cycle Length (s)		88.4			Sum of lost time (s)	16.0
Intersection Capacity Utilization		79.7%			ICU Level of Service	D
Analysis Period (min)		15				
c Critical Lane Group						

Timings
17: Hurontario Street & Hume Street

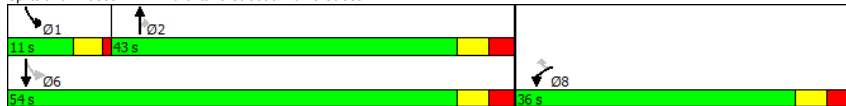
2041 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	503	333	533	371	241	655
Future Volume (vph)	503	333	533	371	241	655
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	15.0	15.0	30.0	30.0	7.0	30.0
Minimum Split (s)	21.3	21.3	36.3	36.3	11.0	36.3
Total Split (s)	36.0	36.0	43.0	43.0	11.0	54.0
Total Split (%)	40.0%	40.0%	47.8%	47.8%	12.2%	60.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.0	3.3
All-Red Time (s)	3.0	3.0	3.0	3.0	1.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3		6.3
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	Max	Max	Max	Max
Act Effct Green (s)	28.5	28.5	36.7	36.7		47.8
Actuated g/C Ratio	0.32	0.32	0.41	0.41		0.54
v/c Ratio	0.94	0.51	0.73	0.46		0.94dl
Control Delay	54.8	7.5	28.8	3.8		26.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	54.8	7.5	28.8	3.8		26.8
LOS	D	A	C	A		C
Approach Delay	35.9		18.5			26.8
Approach LOS	D		B			C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 88.9
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 26.9 Intersection LOS: C
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 17: Hurontario Street & Hume Street



Queues
17: Hurontario Street & Hume Street

2041 Total PM
With Improvements

	WBL	WBR	NBT	NBR	SBT
Lane Group	WBL	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	547	362	579	403	974
v/c Ratio	0.94	0.51	0.73	0.46	0.94dl
Control Delay	54.8	7.5	28.8	3.8	26.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	54.8	7.5	28.8	3.8	26.8
Queue Length 50th (m)	89.7	6.8	82.8	0.0	54.0
Queue Length 95th (m)	#148.9	27.7	122.0	16.4	#77.8
Internal Link Dist (m)	125.5		101.3		812.8
Turn Bay Length (m)	65.0				
Base Capacity (vph)	610	734	794	880	1123
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.49	0.73	0.46	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

HCM Signalized Intersection Capacity Analysis
17: Hurontario Street & Hume Street

2041 Total PM
With Improvements

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	503	333	533	371	241	655
Future Volume (vph)	503	333	533	371	241	655
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Flpb, ped/bikes	1.00	0.97	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.99	0.99
Satd. Flow (prot)	1825	1588	1921	1560	3564	3564
Flt Permitted	0.95	1.00	1.00	1.00	0.54	0.54
Satd. Flow (perm)	1825	1588	1921	1560	1933	1933
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	547	362	579	403	262	712
RTOR Reduction (vph)	0	207	0	236	0	0
Lane Group Flow (vph)	547	155	579	167	0	974
Confl. Peds. (#/hr)	7	5		13	13	
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	28.5	28.5	36.7	36.7	47.7	47.7
Effective Green, g (s)	28.5	28.5	36.7	36.7	47.7	47.7
Actuated g/C Ratio	0.32	0.32	0.41	0.41	0.54	0.54
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	585	509	793	644	1166	1166
v/s Ratio Prot	c0.30		0.30		c0.07	
v/s Ratio Perm		0.10		0.11	c0.38	
v/c Ratio	0.94	0.30	0.73	0.26	0.94dl	
Uniform Delay, d1	29.3	22.7	21.9	17.1	17.3	17.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.3	0.3	5.9	1.0	7.1	7.1
Delay (s)	51.6	23.0	27.7	18.1	24.4	24.4
Level of Service	D	C	C	B	C	C
Approach Delay (s)	40.2		23.8		24.4	
Approach LOS	D		C		C	

Intersection Summary

HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	16.6
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Timings
18: County Road 32 & Sixth Street & Tenth Line

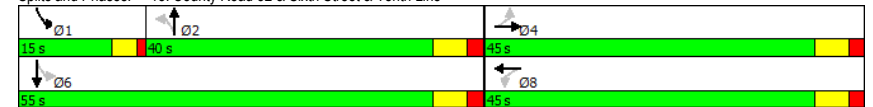
2041 Total PM
With Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	40	286	73	217	44	396	217	317
Future Volume (vph)	40	286	73	217	44	396	217	317
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	7.0	10.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	11.0	22.0
Total Split (s)	45.0	45.0	45.0	45.0	40.0	40.0	15.0	55.0
Total Split (%)	45.0%	45.0%	45.0%	45.0%	40.0%	40.0%	15.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	Max	Max	None	Max
Act Effect Green (s)	30.9	30.9	30.9	30.9	35.3	35.3	51.4	49.4
Actuated g/C Ratio	0.33	0.33	0.33	0.33	0.38	0.38	0.56	0.54
v/c Ratio	0.51	0.67	0.39	0.88	0.13	0.71	0.57	0.38
Control Delay	46.2	30.2	29.2	40.3	23.1	33.2	18.1	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	30.2	29.2	40.3	23.1	33.2	18.1	15.1
LOS	D	C	C	D	C	C	B	B
Approach Delay		31.7		38.9		32.3		16.2
Approach LOS		C		D		C		B

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 92.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 29.7	Intersection LOS: C
Intersection Capacity Utilization 93.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 18: County Road 32 & Sixth Street & Tenth Line



Queues
18: County Road 32 & Sixth Street & Tenth Line

2041 Total PM
With Improvements

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	411	78	549	47	486	231	374
v/c Ratio	0.51	0.67	0.39	0.88	0.13	0.71	0.57	0.38
Control Delay	46.2	30.2	29.2	40.3	23.1	33.2	18.1	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	30.2	29.2	40.3	23.1	33.2	18.1	15.1
Queue Length 50th (m)	6.0	58.3	10.4	78.5	5.6	74.0	20.3	37.0
Queue Length 95th (m)	18.2	88.0	23.1	120.5	14.8	#133.4	38.6	65.7
Internal Link Dist (m)		587.3		1205.1		566.2		326.9
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	108	779	253	775	363	680	417	988
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.53	0.31	0.71	0.13	0.71	0.55	0.38

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
18: County Road 32 & Sixth Street & Tenth Line

2041 Total PM
With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	40	286	101	73	217	299	44	396	61	217	317	35
Future Volume (vph)	40	286	101	73	217	299	44	396	61	217	317	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.91		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1644	1804		1789	1714		1674	1766		1772	1843	
Flt Permitted	0.15	1.00		0.32	1.00		0.54	1.00		0.25	1.00	
Satd. Flow (perm)	257	1804		596	1714		950	1766		468	1843	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	43	304	107	78	231	318	47	421	65	231	337	37
RTOR Reduction (vph)	0	14	0	0	54	0	0	5	0	0	4	0
Lane Group Flow (vph)	43	397	0	78	495	0	47	481	0	231	370	0
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	11%	1%	4%	2%	0%	4%	9%	7%	4%	3%	3%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.9	30.9		30.9	30.9		35.3	35.3		49.3	49.3	
Effective Green, g (s)	30.9	30.9		30.9	30.9		35.3	35.3		49.3	49.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.38	0.38		0.53	0.53	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	86	604		199	574		363	676		391	985	
v/s Ratio Prot		0.22			c0.29			c0.27		c0.06	0.20	
v/s Ratio Perm	0.17			0.13			0.05			0.25		
v/c Ratio	0.50	0.66		0.39	0.86		0.13	0.71		0.59	0.38	
Uniform Delay, d1	24.5	26.1		23.5	28.7		18.5	24.1		14.1	12.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	2.6		1.3	12.7		0.7	6.3		2.4	1.1	
Delay (s)	29.0	28.7		24.7	41.3		19.2	30.4		16.5	13.6	
Level of Service	C	C		C	D		B	C		B	B	
Approach Delay (s)		28.7			39.3			29.4			14.7	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
19: Nottawasaga Concession 10/County Road 32 & Poplar Sideroad

2041 Total PM
With Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	114	17	72	92	228	9	182	51	251	182	47
Future Volume (vph)	35	114	17	72	92	228	9	182	51	251	182	47
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	40	131	20	83	106	262	10	209	59	289	209	54
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2						
Volume Total (vph)	191	189	262	278	289	263						
Volume Left (vph)	40	83	0	10	289	0						
Volume Right (vph)	20	0	262	59	0	54						
Hadj (s)	0.31	0.52	-0.56	-0.09	0.64	-0.09						
Departure Headway (s)	8.6	8.3	7.2	7.8	8.1	7.4						
Degree Utilization, x	0.46	0.44	0.52	0.60	0.65	0.54						
Capacity (veh/h)	382	413	469	436	421	464						
Control Delay (s)	18.7	16.4	16.7	22.0	24.0	17.6						
Approach Delay (s)	18.7	16.6		22.0	21.0							
Approach LOS	C	C		C	C							
Intersection Summary												
Delay			19.5									
Level of Service			C									
Intersection Capacity Utilization			53.9%	ICU Level of Service		A						
Analysis Period (min)			15									

Timings
20: Poplar Sideroad & Raglan Street

2041 Total PM
With Improvements

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	116	878	933	130	126	220
Future Volume (vph)	116	878	933	130	126	220
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	11.0	78.0	67.0	67.0	22.0	22.0
Total Split (%)	11.0%	78.0%	67.0%	67.0%	22.0%	22.0%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	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)	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Max	Max	Max	None	None
Act Effct Green (s)	74.1	72.1	61.1	61.1	12.9	12.9
Actuated g/C Ratio	0.76	0.74	0.63	0.63	0.13	0.13
v/c Ratio	0.72	0.72	0.88	0.15	0.60	0.63
Control Delay	37.3	11.1	25.7	3.5	50.4	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	11.1	25.7	3.5	50.4	15.9
LOS	D	B	C	A	D	B
Approach Delay		14.2	23.0		28.5	
Approach LOS		B	C		C	
Intersection Summary						
Cycle Length: 100						
Actuated Cycle Length: 97						
Natural Cycle: 90						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.88						
Intersection Signal Delay: 20.1				Intersection LOS: C		
Intersection Capacity Utilization 77.2%				ICU Level of Service D		
Analysis Period (min) 15						

Splits and Phases: 20: Poplar Sideroad & Raglan Street



Queues
20: Poplar Sideroad & Raglan Street

2041 Total PM
With Improvements

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	130	987	1048	146	142	247
v/c Ratio	0.72	0.72	0.88	0.15	0.60	0.63
Control Delay	37.3	11.1	25.7	3.5	50.4	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	11.1	25.7	3.5	50.4	15.9
Queue Length 50th (m)	7.7	84.7	147.5	3.2	25.4	5.7
Queue Length 95th (m)	#36.2	142.9	#258.7	10.7	43.7	27.4
Internal Link Dist (m)		224.0	268.0		291.9	
Turn Bay Length (m)	50.0			50.0	50.0	
Base Capacity (vph)	181	1372	1197	970	295	439
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	0.72	0.72	0.88	0.15	0.48	0.56

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
20: Poplar Sideroad & Raglan Street

2041 Total PM
With Improvements

	EBL	EBT	WBT	WBR	SBL	SBR
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	116	878	933	130	126	220
Future Volume (vph)	116	878	933	130	126	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1437	1847	1902	1484	1789	1585
Flt Permitted	0.08	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	114	1847	1902	1484	1789	1585
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	130	987	1048	146	142	247
RTOR Reduction (vph)	0	0	0	36	0	185
Lane Group Flow (vph)	130	987	1048	110	142	62
Heavy Vehicles (%)	27%	4%	1%	10%	2%	3%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	72.0	72.0	61.0	61.0	12.9	12.9
Effective Green, g (s)	72.0	72.0	61.0	61.0	12.9	12.9
Actuated g/C Ratio	0.74	0.74	0.63	0.63	0.13	0.13
Clearance Time (s)	4.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	180	1372	1197	934	238	211
v/s Ratio Prot	0.05	c0.53	c0.55		c0.08	
v/s Ratio Perm	0.49			0.07		0.04
v/c Ratio	0.72	0.72	0.88	0.12	0.60	0.30
Uniform Delay, d1	22.7	6.9	14.8	7.2	39.6	37.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	3.3	9.1	0.3	4.0	0.8
Delay (s)	36.0	10.2	23.9	7.4	43.5	38.7
Level of Service	D	B	C	A	D	D
Approach Delay (s)	13.2	21.9			40.5	
Approach LOS	B	C			D	

Intersection Summary

HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	96.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix J

Roundabout Operations (Arcady Analysis)

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.5.0.6896
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Filename: 043606_Mountain_Tenth_Total.j9
Path: C:\Users\jester\RJB\300043606 Collingwood Transportation Study Update - Documents\02_Technical and Project Documents\Analysis\Arcady
Report generation date: 3/25/2019 9:16:15 AM

- »Mountain & Tenth - Single Lane Roundabout - 2031, AM
- »Mountain & Tenth - Single Lane Roundabout - 2031, PM
- »Mountain & Tenth - Single Lane Roundabout - 2041, AM
- »Mountain & Tenth - Single Lane Roundabout - 2041, PM
- »Mountain & Tenth - Multilane Roundabout - 2031, AM
- »Mountain & Tenth - Multilane Roundabout - 2031, PM
- »Mountain & Tenth - Multilane Roundabout - 2041, AM
- »Mountain & Tenth - Multilane Roundabout - 2041, PM

Summary of intersection performance

	AM								PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
Mountain & Tenth - Single Lane Roundabout - 2031																
1 - Tenth Line - N	0.4	1.5	6.49	0.29	A	10.09	B	18 % [3 - Tenth Line - S]	0.7	3.0	10.10	0.40	B	154.30	F	-19 % [2 - Mountain Road - E]
2 - Mountain Road - E	1.6	1.8	8.59	0.61	A				99.0	159.3	298.24	1.16	F			
3 - Tenth Line - S	2.1	7.5	13.73	0.68	B				1.9	5.9	14.19	0.66	B			
4 - Mountain Road - W	1.8	2.8	9.71	0.64	A				15.7	66.2	67.34	0.97	F			
Mountain & Tenth - Single Lane Roundabout - 2041																
1 - Tenth Line - N	3.4	16.9	21.87	0.78	C	42.63	E	-8 % [3 - Tenth Line - S]	2.1	8.8	16.68	0.68	C	753.70	F	-37 % [2 - Mountain Road - E]
2 - Mountain Road - E	3.0	13.1	14.10	0.75	B				421.8	200.0	1443.43	1.57	F			
3 - Tenth Line - S	17.7	62.1	94.47	1.00	F				12.7	55.9	70.29	0.96	F			
4 - Mountain Road - W	8.4	45.1	42.01	0.91	E				119.8	184.2	501.30	1.26	F			
Mountain & Tenth - Multilane Roundabout - 2031																
1 - Tenth Line - N	0.2	0.5	2.99	0.16	A	3.29	A	82 % [3 - Tenth Line - S]	0.3	1.1	4.16	0.21	A	4.92	A	43 % [4 - Mountain Road - W]
2 - Mountain Road - E	0.5	2.1	2.70	0.33	A				1.7	2.7	4.86	0.62	A			
3 - Tenth Line - S	0.6	2.8	3.92	0.38	A				0.6	2.6	4.06	0.36	A			
4 - Mountain Road - W	0.6	2.8	3.46	0.38	A				1.4	1.6	5.70	0.58	A			
Mountain & Tenth - Multilane Roundabout - 2041																
1 - Tenth Line - N	0.7	3.0	4.52	0.42	A	4.59	A	41 % [3 - Tenth Line - S]	0.8	3.5	6.50	0.45	A	9.67	A	14 % [2 - Mountain Road - E]
2 - Mountain Road - E	0.7	2.7	3.12	0.40	A				4.6	20.7	10.89	0.82	B			
3 - Tenth Line - S	1.1	2.2	5.78	0.52	A				1.2	2.1	6.55	0.55	A			
4 - Mountain Road - W	1.1	1.6	5.09	0.52	A				3.2	12.4	11.36	0.76	B			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

Title	Title
Location	Collingwood
Site number	
Date	11/20/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	RJBURNSIDE\jester
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓		✓	Delay	0.90	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Mountain & Tenth - Single Lane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Mountain & Tenth - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	10.09	B

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	18	3 - Tenth Line - S

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Mountain Road - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - Tenth Line - S	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Mountain Road - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.566	1222
2 - Mountain Road - E	0.566	1222
3 - Tenth Line - S	0.566	1222
4 - Mountain Road - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	208	100.000
2 - Mountain Road - E		ONE HOUR	✓	600	100.000
3 - Tenth Line - S		ONE HOUR	✓	516	100.000
4 - Mountain Road - W		ONE HOUR	✓	600	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	121	75	10
	2 - Mountain Road - E	63	2	92	443
	3 - Tenth Line - S	58	311	2	145
	4 - Mountain Road - W	6	488	104	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.29	6.49	0.4	1.5	A	191	286
2 - Mountain Road - E	0.61	8.59	1.6	1.8	A	551	826
3 - Tenth Line - S	0.68	13.73	2.1	7.5	B	473	710
4 - Mountain Road - W	0.64	9.71	1.8	2.8	A	551	826

Mountain & Tenth - Single Lane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Mountain & Tenth - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	154.30	F

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-19	2 - Mountain Road - E

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Mountain Road - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - Tenth Line - S	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Mountain Road - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.566	1222
2 - Mountain Road - E	0.566	1222
3 - Tenth Line - S	0.566	1222
4 - Mountain Road - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	218	100.000
2 - Mountain Road - E		ONE HOUR	✓	1140	100.000
3 - Tenth Line - S		ONE HOUR	✓	454	100.000
4 - Mountain Road - W		ONE HOUR	✓	794	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	114	86	16
	2 - Mountain Road - E	148	2	365	625
	3 - Tenth Line - S	74	242	2	136
	4 - Mountain Road - W	13	623	156	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.40	10.10	0.7	3.0	B	200	300
2 - Mountain Road - E	1.16	298.24	99.0	159.3	F	1046	1569
3 - Tenth Line - S	0.66	14.19	1.9	5.9	B	417	625
4 - Mountain Road - W	0.97	67.34	15.7	66.2	F	729	1093

Mountain & Tenth - Single Lane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Mountain & Tenth - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	42.63	E

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-8	3 - Tenth Line - S

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Mountain Road - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - Tenth Line - S	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Mountain Road - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.566	1222
2 - Mountain Road - E	0.566	1222
3 - Tenth Line - S	0.566	1222
4 - Mountain Road - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	525	100.000
2 - Mountain Road - E		ONE HOUR	✓	720	100.000
3 - Tenth Line - S		ONE HOUR	✓	615	100.000
4 - Mountain Road - W		ONE HOUR	✓	698	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	312	189	22
	2 - Mountain Road - E	123	2	102	493
	3 - Tenth Line - S	94	346	2	173
	4 - Mountain Road - W	9	552	135	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.78	21.87	3.4	16.9	C	482	723
2 - Mountain Road - E	0.75	14.10	3.0	13.1	B	661	991
3 - Tenth Line - S	1.00	94.47	17.7	62.1	F	564	847
4 - Mountain Road - W	0.91	42.01	8.4	45.1	E	640	961

Mountain & Tenth - Single Lane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Mountain & Tenth - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	753.70	F

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-37	2 - Mountain Road - E

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Mountain Road - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - Tenth Line - S	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Mountain Road - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.566	1222
2 - Mountain Road - E	0.566	1222
3 - Tenth Line - S	0.566	1222
4 - Mountain Road - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	423	100.000
2 - Mountain Road - E		ONE HOUR	✓	1409	100.000
3 - Tenth Line - S		ONE HOUR	✓	622	100.000
4 - Mountain Road - W		ONE HOUR	✓	931	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	239	159	23
	2 - Mountain Road - E	329	2	398	680
	3 - Tenth Line - S	182	266	2	172
	4 - Mountain Road - W	25	698	206	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.68	16.68	2.1	8.8	C	388	582
2 - Mountain Road - E	1.57	1443.43	421.8	200.0	F	1293	1939
3 - Tenth Line - S	0.96	70.29	12.7	55.9	F	571	856
4 - Mountain Road - W	1.26	501.30	119.8	184.2	F	854	1281

Mountain & Tenth - Multilane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - Tenth Line - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Mountain Road - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - Tenth Line - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Mountain & Tenth - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	3.29	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	62	3 - Tenth Line - S

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Mountain Road - E	7.00	8.00	30.0	20.0	55.0	25.0	
3 - Tenth Line - S	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Mountain Road - W	3.50	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.677	1967
2 - Mountain Road - E	0.723	2193
3 - Tenth Line - S	0.677	1967
4 - Mountain Road - W	0.672	1940

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	208	100.000
2 - Mountain Road - E		ONE HOUR	✓	600	100.000
3 - Tenth Line - S		ONE HOUR	✓	516	100.000
4 - Mountain Road - W		ONE HOUR	✓	600	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	121	75	10
	2 - Mountain Road - E	63	2	92	443
	3 - Tenth Line - S	58	311	2	145
	4 - Mountain Road - W	6	488	104	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.16	2.99	0.2	0.5	A	191	286
2 - Mountain Road - E	0.33	2.70	0.5	2.1	A	551	826
3 - Tenth Line - S	0.38	3.92	0.6	2.8	A	473	710
4 - Mountain Road - W	0.38	3.46	0.6	2.8	A	551	826

Mountain & Tenth - Multilane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - Tenth Line - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Mountain Road - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - Tenth Line - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Mountain & Tenth - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	4.92	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	43	4 - Mountain Road - W

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Mountain Road - E	7.00	8.00	30.0	20.0	55.0	25.0	
3 - Tenth Line - S	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Mountain Road - W	3.50	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.677	1967
2 - Mountain Road - E	0.723	2193
3 - Tenth Line - S	0.677	1967
4 - Mountain Road - W	0.672	1940

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	218	100.000
2 - Mountain Road - E		ONE HOUR	✓	1140	100.000
3 - Tenth Line - S		ONE HOUR	✓	454	100.000
4 - Mountain Road - W		ONE HOUR	✓	794	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	114	86	16
	2 - Mountain Road - E	148	2	365	625
	3 - Tenth Line - S	74	242	2	136
	4 - Mountain Road - W	13	623	156	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.21	4.16	0.3	1.1	A	200	300
2 - Mountain Road - E	0.62	4.86	1.7	2.7	A	1046	1569
3 - Tenth Line - S	0.36	4.06	0.6	2.6	A	417	625
4 - Mountain Road - W	0.58	5.70	1.4	1.6	A	729	1093

Mountain & Tenth - Multilane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - Tenth Line - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Mountain Road - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - Tenth Line - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Mountain & Tenth - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	4.59	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	41	3 - Tenth Line - S

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Mountain Road - E	7.00	8.00	30.0	20.0	55.0	25.0	
3 - Tenth Line - S	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Mountain Road - W	3.50	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.677	1967
2 - Mountain Road - E	0.723	2193
3 - Tenth Line - S	0.677	1967
4 - Mountain Road - W	0.672	1940

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	525	100.000
2 - Mountain Road - E		ONE HOUR	✓	720	100.000
3 - Tenth Line - S		ONE HOUR	✓	615	100.000
4 - Mountain Road - W		ONE HOUR	✓	698	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	312	189	22
	2 - Mountain Road - E	123	2	102	493
	3 - Tenth Line - S	94	346	2	173
	4 - Mountain Road - W	9	552	135	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.42	4.52	0.7	3.0	A	482	723
2 - Mountain Road - E	0.40	3.12	0.7	2.7	A	661	991
3 - Tenth Line - S	0.52	5.78	1.1	2.2	A	564	847
4 - Mountain Road - W	0.52	5.09	1.1	1.6	A	640	961

Mountain & Tenth - Multilane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - Tenth Line - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Mountain Road - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - Tenth Line - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Mountain & Tenth - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Mountain Rd & Tenth Line	Standard Roundabout		2, 1, 4, 3	9.67	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	14	2 - Mountain Road - E

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Mountain Road - E	East Leg
3	Tenth Line - S	South Leg
4	Mountain Road - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Mountain Road - E	7.00	8.00	30.0	20.0	55.0	25.0	
3 - Tenth Line - S	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Mountain Road - W	3.50	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Mountain Road - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Mountain Road - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Tenth Line - N	0.677	1967
2 - Mountain Road - E	0.723	2193
3 - Tenth Line - S	0.677	1967
4 - Mountain Road - W	0.672	1940

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	423	100.000
2 - Mountain Road - E		ONE HOUR	✓	1409	100.000
3 - Tenth Line - S		ONE HOUR	✓	622	100.000
4 - Mountain Road - W		ONE HOUR	✓	931	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	2	239	159	23
	2 - Mountain Road - E	329	2	398	680
	3 - Tenth Line - S	182	266	2	172
	4 - Mountain Road - W	25	698	206	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Mountain Road - E	3 - Tenth Line - S	4 - Mountain Road - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Mountain Road - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Mountain Road - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.45	6.50	0.8	3.5	A	388	582
2 - Mountain Road - E	0.82	10.89	4.6	20.7	B	1293	1939
3 - Tenth Line - S	0.55	6.55	1.2	2.1	A	571	856
4 - Mountain Road - W	0.76	11.36	3.2	12.4	B	854	1281

Filename: 043606_High_Campbell_Total.j9
Path: C:\Users\jester\OneDrive\Documents\Collingwood Transportation Study Update - Documents\02_Technical and Project Documents\Analysis\Arcady
Report generation date: 3/25/2019 9:14:37 AM

- »High & Campbell - Single Lane Roundabout - 2031, AM
- »High & Campbell - Single Lane Roundabout - 2031, PM
- »High & Campbell - Single Lane Roundabout - 2041, AM
- »High & Campbell - Single Lane Roundabout - 2041, PM
- »High & Campbell - Multilane Roundabout - 2031, AM
- »High & Campbell - Multilane Roundabout - 2031, PM
- »High & Campbell - Multilane Roundabout - 2041, AM
- »High & Campbell - Multilane Roundabout - 2041, PM

Summary of intersection performance

	AM								PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
High & Campbell - Single Lane Roundabout - 2031																
1 - High Street - N	0.9	1.9	5.77	0.47	A	6.52	A	53 % [3 - High Street - S]	3.3	14.5	13.14	0.77	B	10.35	B	20 % [1 - High Street - N]
2 - Campbell Street - E	0.2	0.5	4.96	0.18	A				0.2	0.5	5.05	0.17	A			
3 - High Street - S	1.3	1.5	7.59	0.57	A				1.3	1.5	7.57	0.57	A			
High & Campbell - Single Lane Roundabout - 2041																
1 - High Street - N	3.0	12.6	12.42	0.75	B	17.42	C	5 % [3 - High Street - S]	80.5	142.6	211.49	1.12	F	126.29	F	-17 % [1 - High Street - N]
2 - Campbell Street - E	0.4	1.7	7.07	0.30	A				0.5	2.5	8.46	0.35	A			
3 - High Street - S	6.2	31.8	24.53	0.87	C				12.4	62.7	45.39	0.95	E			
High & Campbell - Multilane Roundabout - 2031																
1 - High Street - N	0.4	1.5	2.66	0.29	A	3.08	A	147 % [2 - Campbell Street - E]	0.9	1.5	3.60	0.47	A	3.50	A	99 % [1 - High Street - N]
2 - Campbell Street - E	0.2	0.5	4.75	0.18	A				0.2	0.5	4.82	0.16	A			
3 - High Street - S	0.5	2.5	3.03	0.35	A				0.5	2.5	3.03	0.34	A			
High & Campbell - Multilane Roundabout - 2041																
1 - High Street - N	0.9	1.6	3.55	0.46	A	4.19	A	69 % [2 - Campbell Street - E]	2.2	4.3	6.12	0.69	A	5.72	A	38 % [1 - High Street - N]
2 - Campbell Street - E	0.4	1.5	6.54	0.29	A				0.5	2.1	7.70	0.33	A			
3 - High Street - S	1.1	1.5	4.24	0.53	A				1.4	1.8	4.79	0.58	A			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.
Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description	
Title	Collingwood
Location	Collingwood
Site number	
Date	11/20/2018
Version	
Status	(new file)
Identifier	
Client	
Job number	
Analyst	RJBURNSIDE\jester
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓		✓	Delay	0.90	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

High & Campbell - Single Lane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	High & Campbell - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	6.52	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	53	3 - High Street - S

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Campbell Street - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - High Street - S	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.566	1222
2 - Campbell Street - E	0.566	1222
3 - High Street - S	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	515	100.000
2 - Campbell Street - E		ONE HOUR	✓	149	100.000
3 - High Street - S		ONE HOUR	✓	585	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
From	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	2	147	366	
	122	2	25	
	505	78	2	

Vehicle Mix

Truck Percentages

		To		
From	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	0	2	2	
	2	0	2	
	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.47	5.77	0.9	1.9	A	473	709
2 - Campbell Street - E	0.18	4.96	0.2	0.5	A	137	205
3 - High Street - S	0.57	7.59	1.3	1.5	A	537	805

High & Campbell - Single Lane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	High & Campbell - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	10.35	B

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	20	1 - High Street - N

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Campbell Street - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - High Street - S	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.566	1222
2 - Campbell Street - E	0.566	1222
3 - High Street - S	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	835	100.000
2 - Campbell Street - E		ONE HOUR	✓	136	100.000
3 - High Street - S		ONE HOUR	✓	579	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	2	156	677
	2 - Campbell Street - E	99	2	35
	3 - High Street - S	549	28	2

Vehicle Mix

Truck Percentages

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	0	2	2
	2 - Campbell Street - E	2	0	2
	3 - High Street - S	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.77	13.14	3.3	14.5	B	766	1149
2 - Campbell Street - E	0.17	5.06	0.2	0.5	A	125	187
3 - High Street - S	0.57	7.57	1.3	1.5	A	531	797

High & Campbell - Single Lane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	High & Campbell - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	17.42	C

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	5	3 - High Street - S

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Campbell Street - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - High Street - S	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.566	1222
2 - Campbell Street - E	0.566	1222
3 - High Street - S	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	815	100.000
2 - Campbell Street - E		ONE HOUR	✓	205	100.000
3 - High Street - S		ONE HOUR	✓	871	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	2	187	626
	2 - Campbell Street - E	159	2	44
	3 - High Street - S	762	107	2

Vehicle Mix

Truck Percentages

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	0	2	2
	2 - Campbell Street - E	2	0	2
	3 - High Street - S	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.75	12.42	3.0	12.6	B	748	1122
2 - Campbell Street - E	0.30	7.07	0.4	1.7	A	188	282
3 - High Street - S	0.87	24.53	6.2	31.8	C	799	1199

High & Campbell - Single Lane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	High & Campbell - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	126.29	F

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-17	1 - High Street - N

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Campbell Street - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - High Street - S	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.566	1222
2 - Campbell Street - E	0.566	1222
3 - High Street - S	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	1197	100.000
2 - Campbell Street - E		ONE HOUR	✓	212	100.000
3 - High Street - S		ONE HOUR	✓	952	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	2	200	995
	2 - Campbell Street - E	147	2	63
	3 - High Street - S	893	57	2

Vehicle Mix

Truck Percentages

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	0	2	2
	2 - Campbell Street - E	2	0	2
	3 - High Street - S	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	1.12	211.49	80.5	142.6	F	1098	1648
2 - Campbell Street - E	0.35	8.46	0.5	2.5	A	195	292
3 - High Street - S	0.95	45.39	12.4	62.7	E	874	1310

High & Campbell - Multilane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - High Street - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - High Street - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	High & Campbell - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	3.08	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	147	2 - Campbell Street - E

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Campbell Street - E	3.75	4.50	30.0	20.0	55.0	25.0	
3 - High Street - S	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.677	1967
2 - Campbell Street - E	0.529	1233
3 - High Street - S	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	515	100.000
2 - Campbell Street - E		ONE HOUR	✓	149	100.000
3 - High Street - S		ONE HOUR	✓	585	100.000

Origin-Destination Data

Demand (PCE/hr)

From	To			
	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	2	147	365	
	122	2	25	
	505	78	2	

Vehicle Mix

Truck Percentages

From	To			
	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	0	2	2	
	2	0	2	
	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.29	2.66	0.4	1.5	A	473	709
2 - Campbell Street - E	0.18	4.75	0.2	0.5	A	137	205
3 - High Street - S	0.35	3.03	0.5	2.5	A	537	805

High & Campbell - Multilane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - High Street - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - High Street - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	High & Campbell - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	3.50	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	99	1 - High Street - N

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Campbell Street - E	3.75	4.50	30.0	20.0	55.0	25.0	
3 - High Street - S	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.677	1967
2 - Campbell Street - E	0.529	1233
3 - High Street - S	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	835	100.000
2 - Campbell Street - E		ONE HOUR	✓	136	100.000
3 - High Street - S		ONE HOUR	✓	579	100.000

Origin-Destination Data

Demand (PCE/hr)

From	To			
	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	2	156	677	
	99	2	35	
	549	28	2	

Vehicle Mix

Truck Percentages

From	To			
	1 - High Street - N	2 - Campbell Street - E	3 - High Street - S	
	0	2	2	
	2	0	2	
	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.47	3.60	0.9	1.5	A	766	1149
2 - Campbell Street - E	0.16	4.82	0.2	0.5	A	125	187
3 - High Street - S	0.34	3.03	0.5	2.5	A	531	797

High & Campbell - Multilane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - High Street - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - High Street - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	High & Campbell - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	4.19	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	69	2 - Campbell Street - E

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Campbell Street - E	3.75	4.50	30.0	20.0	55.0	25.0	
3 - High Street - S	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.677	1967
2 - Campbell Street - E	0.529	1233
3 - High Street - S	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	815	100.000
2 - Campbell Street - E		ONE HOUR	✓	205	100.000
3 - High Street - S		ONE HOUR	✓	871	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	2	187	626
	2 - Campbell Street - E	159	2	44
	3 - High Street - S	762	107	2

Vehicle Mix

Truck Percentages

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	0	2	2
	2 - Campbell Street - E	2	0	2
	3 - High Street - S	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.46	3.55	0.9	1.6	A	748	1122
2 - Campbell Street - E	0.29	6.54	0.4	1.5	A	188	282
3 - High Street - S	0.53	4.24	1.1	1.5	A	799	1199

High & Campbell - Multilane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	1 - High Street - N - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	3 - High Street - S - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	High & Campbell - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	High St & Campbell St	Standard Roundabout		2, 1, 3	5.72	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	38	1 - High Street - N

Legs

Legs

Leg	Name	Description
1	High Street - N	North Leg
2	Campbell Street - E	East Leg
3	High Street - S	South Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - High Street - N	3.75	8.00	50.0	20.0	55.0	25.0	
2 - Campbell Street - E	3.75	4.50	30.0	20.0	55.0	25.0	
3 - High Street - S	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - High Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Campbell Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - High Street - S	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - High Street - N	0.677	1967
2 - Campbell Street - E	0.529	1233
3 - High Street - S	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - High Street - N		ONE HOUR	✓	1197	100.000
2 - Campbell Street - E		ONE HOUR	✓	212	100.000
3 - High Street - S		ONE HOUR	✓	952	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	2	200	995
	2 - Campbell Street - E	147	2	63
	3 - High Street - S	893	57	2

Vehicle Mix

Truck Percentages

		To		
		1 - High Street - N	2 - Campbell Street - E	3 - High Street - S
From	1 - High Street - N	0	2	2
	2 - Campbell Street - E	2	0	2
	3 - High Street - S	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - High Street - N	0.69	6.12	2.2	4.3	A	1098	1648
2 - Campbell Street - E	0.33	7.70	0.5	2.1	A	195	292
3 - High Street - S	0.58	4.79	1.4	1.8	A	874	1310

Filename: 043606_Raglan_Poplar_Total.j9
Path: C:\Users\jester\RJB\300043606 Collingwood Transportation Study Update - Documents\02_Technical and Project Documents\Analysis\Arcady
Report generation date: 3/25/2019 9:22:39 AM

- »Raglan & Poplar - Single Lane Roundabout - 2031, AM
- »Raglan & Poplar - Single Lane Roundabout - 2031, PM
- »Raglan & Poplar - Single Lane Roundabout - 2041, AM
- »Raglan & Poplar - Single Lane Roundabout - 2041, PM
- »Raglan & Poplar - Multilane Roundabout - 2031, AM
- »Raglan & Poplar - Multilane Roundabout - 2031, PM
- »Raglan & Poplar - Multilane Roundabout - 2041, AM
- »Raglan & Poplar - Multilane Roundabout - 2041, PM

Summary of intersection performance

	AM								PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
Raglan & Poplar - Single Lane Roundabout - 2031																
1 - Raglan Street - N	0.1	0.5	4.79	0.11	A	9.29	A	32 % [2 - Poplar Sideroad - E]	0.5	2.0	6.11	0.32	A	8.49	A	31 % [4 - Poplar Sideroad - W]
2 - Poplar Sideroad - E	2.0	4.5	10.08	0.67	B				1.3	1.5	7.26	0.57	A			
4 - Poplar Sideroad - W	2.0	3.9	9.14	0.67	A				2.3	6.4	10.29	0.70	B			
Raglan & Poplar - Single Lane Roundabout - 2041																
1 - Raglan Street - N	0.4	1.1	6.65	0.27	A	155.02	F	-19 % [4 - Poplar Sideroad - W]	1.4	4.6	13.28	0.58	B	64.49	F	-10 % [2 - Poplar Sideroad - E]
2 - Poplar Sideroad - E	7.5	41.1	29.73	0.89	D				31.3	92.9	93.30	1.02	F			
4 - Poplar Sideroad - W	95.8	157.9	268.82	1.14	F				14.9	69.8	51.56	0.96	F			
Raglan & Poplar - Multilane Roundabout - 2031																
1 - Raglan Street - N	0.1	0.5	4.58	0.11	A	3.37	A	113 % [2 - Poplar Sideroad - E]	0.4	1.8	5.78	0.31	A	3.60	A	89 % [1 - Raglan Street - N]
2 - Poplar Sideroad - E	0.7	2.7	3.39	0.40	A				0.5	2.5	2.96	0.35	A			
4 - Poplar Sideroad - W	0.7	2.5	3.21	0.41	A				0.8	2.3	3.36	0.43	A			
Raglan & Poplar - Multilane Roundabout - 2041																
1 - Raglan Street - N	0.4	1.5	6.20	0.26	A	5.71	A	35 % [4 - Poplar Sideroad - W]	1.3	4.2	12.06	0.56	B	6.01	A	22 % [1 - Raglan Street - N]
2 - Poplar Sideroad - E	1.2	1.5	4.54	0.54	A				1.7	2.7	5.21	0.62	A			
4 - Poplar Sideroad - W	2.4	4.7	6.49	0.70	A				1.4	1.9	4.74	0.59	A			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.
Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description	
Title	Title
Location	Collingwood
Site number	
Date	11/20/2018
Version	
Status	(new file)
Identifier	
Client	
Job number	
Analyst	RJBURNSIDE\jester
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓		✓	Delay	0.90	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Raglan & Poplar - Single Lane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Raglan & Poplar - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	9.29	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	32	2 - Poplar Sideroad - E

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Poplar Sideroad - E	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Poplar Sideroad - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.566	1222
2 - Poplar Sideroad - E	0.566	1222
4 - Poplar Sideroad - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	90	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	658	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	735	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
From	1 - Raglan Street - N	2	14	74
	2 - Poplar Sideroad - E	89	2	567
	4 - Poplar Sideroad - W	210	523	2

Vehicle Mix

Truck Percentages

		To		
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
From	1 - Raglan Street - N	0	2	2
	2 - Poplar Sideroad - E	2	0	2
	4 - Poplar Sideroad - W	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.11	4.79	0.1	0.5	A	83	124
2 - Poplar Sideroad - E	0.67	10.08	2.0	4.5	B	604	906
4 - Poplar Sideroad - W	0.67	9.14	2.0	3.9	A	674	1012

Raglan & Poplar - Single Lane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Raglan & Poplar - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	8.49	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	31	4 - Poplar Sideroad - W

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Poplar Sideroad - E	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Poplar Sideroad - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.566	1222
2 - Poplar Sideroad - E	0.566	1222
4 - Poplar Sideroad - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	254	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	597	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	742	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
From	1 - Raglan Street - N	2	74	178
	2 - Poplar Sideroad - E	52	2	543
	4 - Poplar Sideroad - W	90	650	2

Vehicle Mix

Truck Percentages

		To		
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
From	1 - Raglan Street - N	0	2	2
	2 - Poplar Sideroad - E	2	0	2
	4 - Poplar Sideroad - W	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.32	6.11	0.5	2.0	A	233	350
2 - Poplar Sideroad - E	0.57	7.26	1.3	1.5	A	548	822
4 - Poplar Sideroad - W	0.70	10.29	2.3	6.4	B	681	1021

Raglan & Poplar - Single Lane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Raglan & Poplar - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	155.02	F

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-19	4 - Poplar Sideroad - W

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Poplar Sideroad - E	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Poplar Sideroad - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.566	1222
2 - Poplar Sideroad - E	0.566	1222
4 - Poplar Sideroad - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	186	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	877	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	1208	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
From	1 - Raglan Street - N	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
		2	92	92
	2 - Poplar Sideroad - E	130	2	745
	4 - Poplar Sideroad - W	256	950	2

Vehicle Mix

Truck Percentages

		To		
From	1 - Raglan Street - N	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W
		0	2	2
	2 - Poplar Sideroad - E	2	0	2
	4 - Poplar Sideroad - W	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.27	6.65	0.4	1.1	A	171	256
2 - Poplar Sideroad - E	0.89	29.73	7.5	41.1	D	805	1207
4 - Poplar Sideroad - W	1.14	268.82	96.8	157.9	F	1108	1663

Raglan & Poplar - Single Lane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Raglan & Poplar - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	64.49	F

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	-10	2 - Poplar Sideroad - E

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Poplar Sideroad - E	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Poplar Sideroad - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.566	1222
2 - Poplar Sideroad - E	0.566	1222
4 - Poplar Sideroad - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	348	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	1065	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	996	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
From	1 - Raglan Street - N	2	126	220	
	2 - Poplar Sideroad - E	130	2	933	
	4 - Poplar Sideroad - W	116	878	2	

Vehicle Mix

Truck Percentages

		To			
		1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
From	1 - Raglan Street - N	0	2	2	
	2 - Poplar Sideroad - E	2	0	2	
	4 - Poplar Sideroad - W	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.58	13.28	1.4	4.5	B	319	479
2 - Poplar Sideroad - E	1.02	93.30	31.3	92.9	F	977	1466
4 - Poplar Sideroad - W	0.96	51.56	14.9	69.8	F	914	1371

Raglan & Poplar - Multilane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - Poplar Sideroad - E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Poplar Sideroad - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Raglan & Poplar - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	3.37	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	113	2 - Poplar Sideroad - E

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.75	4.50	30.0	20.0	55.0	25.0	
2 - Poplar Sideroad - E	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Poplar Sideroad - W	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.529	1233
2 - Poplar Sideroad - E	0.677	1967
4 - Poplar Sideroad - W	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	90	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	656	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	735	100.000

Origin-Destination Data

Demand (PCE/hr)

		To		
From	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
	2	14	74	
	2 - Poplar Sideroad - E	89	567	
	4 - Poplar Sideroad - W	210	523	2

Vehicle Mix

Truck Percentages

		To		
From	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
	0	2	2	
	2	0	2	
	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.11	4.58	0.1	0.5	A	83	124
2 - Poplar Sideroad - E	0.40	3.39	0.7	2.7	A	604	906
4 - Poplar Sideroad - W	0.41	3.21	0.7	2.5	A	674	1012

Raglan & Poplar - Multilane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - Poplar Sideroad - E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Poplar Sideroad - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Raglan & Poplar - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	3.60	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	69	1 - Raglan Street - N

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.75	4.50	30.0	20.0	55.0	25.0	
2 - Poplar Sideroad - E	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Poplar Sideroad - W	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.529	1233
2 - Poplar Sideroad - E	0.677	1967
4 - Poplar Sideroad - W	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	254	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	597	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	742	100.000

Origin-Destination Data

Demand (PCE/hr)

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
1 - Raglan Street - N	2	74	178	
2 - Poplar Sideroad - E	52	2	543	
4 - Poplar Sideroad - W	90	650	2	

Vehicle Mix

Truck Percentages

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
1 - Raglan Street - N	0	2	2	
2 - Poplar Sideroad - E	2	0	2	
4 - Poplar Sideroad - W	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.31	5.78	0.4	1.8	A	233	350
2 - Poplar Sideroad - E	0.35	2.96	0.5	2.5	A	548	822
4 - Poplar Sideroad - W	0.43	3.36	0.8	2.3	A	681	1021

Raglan & Poplar - Multilane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - Poplar Sideroad - E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Poplar Sideroad - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Raglan & Poplar - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	5.71	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	35	4 - Poplar Sideroad - W

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.75	4.50	30.0	20.0	55.0	25.0	
2 - Poplar Sideroad - E	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Poplar Sideroad - W	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.529	1233
2 - Poplar Sideroad - E	0.677	1967
4 - Poplar Sideroad - W	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	186	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	877	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	1208	100.000

Origin-Destination Data

Demand (PCE/hr)

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
	1 - Raglan Street - N	2	92	92
	2 - Poplar Sideroad - E	130	2	745
4 - Poplar Sideroad - W	256	950	2	

Vehicle Mix

Truck Percentages

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
	1 - Raglan Street - N	0	2	2
	2 - Poplar Sideroad - E	2	0	2
4 - Poplar Sideroad - W	2	2	0	

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.26	6.20	0.4	1.5	A	171	256
2 - Poplar Sideroad - E	0.54	4.54	1.2	1.5	A	805	1207
4 - Poplar Sideroad - W	0.70	6.49	2.4	4.7	A	1108	1663

Raglan & Poplar - Multilane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	2 - Poplar Sideroad - E - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	4 - Poplar Sideroad - W - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	Raglan & Poplar - Multilane Roundabout	55 m ICD	✓	100.000	100.000

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Raglan Street & Poplar Sideroad	Standard Roundabout		2, 1, 4	6.01	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	22	1 - Raglan Street - N

Legs

Legs

Leg	Name	Description
1	Raglan Street - N	North Leg
2	Poplar Sideroad - E	East Leg
4	Poplar Sideroad - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Raglan Street - N	3.75	4.50	30.0	20.0	55.0	25.0	
2 - Poplar Sideroad - E	3.75	8.00	50.0	20.0	55.0	25.0	
4 - Poplar Sideroad - W	3.75	8.00	50.0	20.0	55.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Raglan Street - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Poplar Sideroad - E	Percentage	Region Waterloo TIS Guideline	90.00
4 - Poplar Sideroad - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final intercept (PCE/hr)
1 - Raglan Street - N	0.529	1233
2 - Poplar Sideroad - E	0.677	1967
4 - Poplar Sideroad - W	0.677	1967

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Raglan Street - N		ONE HOUR	✓	348	100.000
2 - Poplar Sideroad - E		ONE HOUR	✓	1065	100.000
4 - Poplar Sideroad - W		ONE HOUR	✓	996	100.000

Origin-Destination Data

Demand (PCE/hr)

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
1 - Raglan Street - N	2	126	220	
2 - Poplar Sideroad - E		130	933	
4 - Poplar Sideroad - W		116	878	2

Vehicle Mix

Truck Percentages

From	To			
	1 - Raglan Street - N	2 - Poplar Sideroad - E	4 - Poplar Sideroad - W	
1 - Raglan Street - N	0	2	2	
2 - Poplar Sideroad - E		2	0	2
4 - Poplar Sideroad - W		2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Raglan Street - N	0.56	12.06	1.3	4.2	B	319	479
2 - Poplar Sideroad - E	0.62	5.21	1.7	2.7	A	977	1466
4 - Poplar Sideroad - W	0.59	4.74	1.4	1.9	A	914	1371

Filename: 043606_Tenth_Sixth_Total.j9
Path: C:\Users\jester\RJ\300043606 Collingwood Transporton Study Update - Documents\02_Technical and Project Documents\Analysis\Arcady
Report generation date: 3/25/2019 9:17:43 AM

- »Tenth & Sixth - Single Lane Roundabout - 2031, AM
- »Tenth & Sixth - Single Lane Roundabout - 2031, PM
- »Tenth & Sixth - Single Lane Roundabout - 2041, AM
- »Tenth & Sixth - Single Lane Roundabout - 2041, PM

Summary of intersection performance

	AM								PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Network Residual Capacity
Tenth & Sixth - Single Lane Roundabout - 2031																
1 - Tenth Line - N	1.1	2.2	7.72	0.52	A	6.36	A	51 % [1 - Tenth Line - N]	0.8	2.6	6.52	0.45	A	7.07	A	50 % [2 - Sixth Street - E]
2 - Sixth Street - E	0.6	2.7	5.55	0.37	A				1.1	2.1	7.84	0.53	A			
3 - Tenth Line - S	0.6	2.7	5.83	0.36	A				0.8	2.9	6.84	0.44	A			
4 - Sixth Street - W	0.4	1.1	5.54	0.27	A				0.8	2.9	6.94	0.43	A			
Tenth & Sixth - Single Lane Roundabout - 2041																
1 - Tenth Line - N	3.2	14.9	16.02	0.76	C	10.51	B	13 % [1 - Tenth Line - N]	1.7	2.2	9.62	0.62	A	11.22	B	18 % [2 - Sixth Street - E]
2 - Sixth Street - E	0.9	2.5	6.90	0.47	A				2.4	9.3	13.65	0.71	B			
3 - Tenth Line - S	0.8	2.9	7.14	0.44	A				1.7	3.4	11.25	0.63	B			
4 - Sixth Street - W	0.5	2.2	7.01	0.33	A				1.3	3.0	9.99	0.56	A			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.
Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description	
Title	Title
Location	Collingwood
Site number	
Date	11/20/2018
Version	
Status	(new file)
Identifier	
Client	
Job number	
Analyst	RJBURNSIDE\jester
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	Residual capacity criteria type	V/C Ratio Threshold	Average Delay threshold (s)	Queue threshold (PCE)
5.75	✓		✓	Delay	0.90	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓
D4	2041	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Name	Description	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	Tenth & Sixth - Single Lane Roundabout	40 m ICD	✓	100.000	100.000

Tenth & Sixth - Single Lane Roundabout - 2031, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Tenth Line & Sixth Street	Standard Roundabout		2, 1, 4, 3	6.36	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	51	1 - Tenth Line - N

Legs

Legs

Leg	Name	Description
1	Tenth Line - N	North Leg
2	Sixth Street - E	East Leg
3	Tenth Line - S	South Leg
4	Sixth Street - W	West Leg

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Tenth Line - N	3.50	4.50	30.0	20.0	45.0	25.0	
2 - Sixth Street - E	3.50	4.50	30.0	20.0	45.0	25.0	
3 - Tenth Line - S	3.50	4.50	30.0	20.0	45.0	25.0	
4 - Sixth Street - W	3.50	4.50	30.0	20.0	45.0	25.0	

Slope / Intercept / Capacity

Leg Intercept Adjustments

Leg	Type	Reason	Percentage intercept adjustment (%)
1 - Tenth Line - N	Percentage	Region Waterloo TIS Guideline	90.00
2 - Sixth Street - E	Percentage	Region Waterloo TIS Guideline	90.00
3 - Tenth Line - S	Percentage	Region Waterloo TIS Guideline	90.00
4 - Sixth Street - W	Percentage	Region Waterloo TIS Guideline	90.00

Roundabout Slope and Intercept used in model

Leg	Final slope	Final Intercept (PCE/hr)
1 - Tenth Line - N	0.566	1222
2 - Sixth Street - E	0.566	1222
3 - Tenth Line - S	0.566	1222
4 - Sixth Street - W	0.566	1222

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2031	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	470	100.000
2 - Sixth Street - E		ONE HOUR	✓	348	100.000
3 - Tenth Line - S		ONE HOUR	✓	320	100.000
4 - Sixth Street - W		ONE HOUR	✓	220	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
From	1 - Tenth Line - N	1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
	2 - Sixth Street - E	2	196	260	12
	3 - Tenth Line - S	107	2	46	193
	4 - Sixth Street - W	144	52	2	122
		13	169	36	2

Vehicle Mix

Truck Percentages

		To			
From	1 - Tenth Line - N	1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
	2 - Sixth Street - E	0	2	2	2
	3 - Tenth Line - S	2	0	2	2
	4 - Sixth Street - W	2	2	0	2
		2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.52	7.72	1.1	2.2	A	431	647
2 - Sixth Street - E	0.37	5.55	0.6	2.7	A	319	479
3 - Tenth Line - S	0.36	5.83	0.6	2.7	A	294	440
4 - Sixth Street - W	0.27	5.54	0.4	1.1	A	202	303

Tenth & Sixth - Single Lane Roundabout - 2031, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Tenth Line & Sixth Street	Standard Roundabout		2, 1, 4, 3	7.07	A

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	50	2 - Sixth Street - E

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2031	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	426	100.000
2 - Sixth Street - E		ONE HOUR	✓	476	100.000
3 - Tenth Line - S		ONE HOUR	✓	379	100.000
4 - Sixth Street - W		ONE HOUR	✓	365	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	2	153	241	30
	2 - Sixth Street - E	215	2	67	192
	3 - Tenth Line - S	289	49	2	39
	4 - Sixth Street - W	34	237	92	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Sixth Street - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Sixth Street - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.45	6.52	0.8	2.6	A	391	586
2 - Sixth Street - E	0.53	7.84	1.1	2.1	A	437	655
3 - Tenth Line - S	0.44	6.84	0.8	2.9	A	348	522
4 - Sixth Street - W	0.43	6.94	0.8	2.9	A	335	502

Tenth & Sixth - Single Lane Roundabout - 2041, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Tenth Line & Sixth Street	Standard Roundabout		2, 1, 4, 3	10.51	B

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	13	1 - Tenth Line - N

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2041	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	664	100.000
2 - Sixth Street - E		ONE HOUR	✓	436	100.000
3 - Tenth Line - S		ONE HOUR	✓	373	100.000
4 - Sixth Street - W		ONE HOUR	✓	236	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	2	276	367	19
	2 - Sixth Street - E	150	2	55	229
	3 - Tenth Line - S	183	56	2	132
	4 - Sixth Street - W	15	179	40	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Sixth Street - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Sixth Street - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.76	16.02	3.2	14.9	C	609	914
2 - Sixth Street - E	0.47	6.90	0.9	2.5	A	400	600
3 - Tenth Line - S	0.44	7.14	0.8	2.9	A	342	513
4 - Sixth Street - W	0.33	7.01	0.5	2.2	A	217	325

Tenth & Sixth - Single Lane Roundabout - 2041, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Queue percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Intersection Network

Intersections

Intersection	Name	Intersection type	Use circulating lanes	Leg order	Intersection Delay (s)	Intersection LOS
1	Tenth Line & Sixth Street	Standard Roundabout		2, 1, 4, 3	11.22	B

Intersection Network Options

Driving side	Lighting	Network residual capacity (%)	First leg reaching threshold
Right	Normal/unknown	18	2 - Sixth Street - E

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2041	PM	ONE HOUR	18:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCE Factor for a Truck (PCE)
✓	✓	Truck Percentages	2.00

Demand overview (Traffic)

Leg	Linked leg	Profile type	Use O-D data	Average Demand (PCE/hr)	Scaling Factor (%)
1 - Tenth Line - N		ONE HOUR	✓	571	100.000
2 - Sixth Street - E		ONE HOUR	✓	591	100.000
3 - Tenth Line - S		ONE HOUR	✓	503	100.000
4 - Sixth Street - W		ONE HOUR	✓	429	100.000

Origin-Destination Data

Demand (PCE/hr)

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	2	217	317	35
	2 - Sixth Street - E	299	2	73	217
	3 - Tenth Line - S	396	61	2	44
	4 - Sixth Street - W	40	286	101	2

Vehicle Mix

Truck Percentages

		To			
		1 - Tenth Line - N	2 - Sixth Street - E	3 - Tenth Line - S	4 - Sixth Street - W
From	1 - Tenth Line - N	0	2	2	2
	2 - Sixth Street - E	2	0	2	2
	3 - Tenth Line - S	2	2	0	2
	4 - Sixth Street - W	2	2	2	0

Results

Results Summary for whole modelled period

Leg	Max VIC Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)
1 - Tenth Line - N	0.62	9.62	1.7	2.2	A	524	786
2 - Sixth Street - E	0.71	13.65	2.4	9.3	B	542	813
3 - Tenth Line - S	0.63	11.25	1.7	3.4	B	462	692
4 - Sixth Street - W	0.56	9.99	1.3	3.0	A	394	590