

TRAFFIC IMPACT STUDY

**HUNTINGWOOD TRAILS
RESIDENTIAL DEVELOPMENT
TOWN OF COLLINGWOOD**

**PREPARED FOR:
HUNTINGWOOD TRAILS (COLLINGWOOD) LTD.**

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Revision Number	Date	Comments
Rev. 0	June 2009	First Submission
Rev. 1	January 2011	Study Update
Rev. 2	July 2019	Study Update (TIS Update to reflect updated development proposal and updated traffic data)

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Huntingwood Trails (Collingwood) Ltd. to prepare an update of its Traffic Impact Study (TIS) in support of the Zoning By-Law Amendment and Draft Plan of Subdivision application for the proposed Huntingwood Trails residential development located in the Town of Collingwood. The 49-hectare property is located south of Highway 26 and Silver Creek Drive, north of the Georgian Trail, and lies astride of Silver Creek. The site is also bordered by two existing residential neighbourhoods to the east and west, namely: "Silver Glen Preserve" (herein referred to as the Silver Glen development) and "The Forest", respectively.

The purpose of the study is to provide an update on the transportation-related impacts of the proposed development, if any, on the boundary road network and to recommend any required mitigation measures, if warranted. Notwithstanding that the Official Plan does not require an update in relation to Development Area 1, this update takes into consideration updated transportation information in relation to both Development Areas. The study also evaluates active transportation and transit, and potential linkages to adjacent developments per the policies set out in the Town of Collingwood's Official Plan Amendment for the site approved by the Ontario Municipal Board ("OMB") on July 31, 2014.

The original TIS was prepared in June 2009, with a subsequent update prepared in January 2011 (herein referred to as the "Crozier TIS, 2011"). This TIS Update has been prepared to reflect the updated development proposal and updated traffic data.

The development will be divided into two development areas, with Development Area 1 proposed to connect to Silver Glen Boulevard and Development Area 2 proposed to connect to Silver Creek Drive. **Table E1** outlines the development proposal.

Table E1: Development Proposal

Development Area	Dwelling Type	Units	Site Access
1	Townhouse	52	Silver Glen Boulevard
	Semi-Detached	10	
	Total	62	
2	Single-Detached	88	Silver Creek Drive
	Semi-Detached	20	
	Total	108	

Development Area 1 will connect via a north-south public roadway to Silver Glen Boulevard. An east-west segment of the public roadway will provide access to the proposed units. Development Area 2 is proposed to connect to Silver Creek Drive (near Highway 26) via a public roadway connection.

This TIS Update analyzes the following existing intersections:

- Highway 26 and Silver Glen Boulevard
- Highway 26 and Silver Creek Drive

Turning movement count data collected at Highway 26 and Silver Glen Boulevard in March 2018 during the weekday peak hours was used in this analysis, with the volumes adjusted to reflect typical summer conditions. Crozier staff also collected traffic data at Highway 26 and Silver Creek Drive in July 2019 during the weekday peak hours to use in this analysis, with the through volumes balanced to the intersection of Highway 26 and Silver Glen Boulevard.

This TIS Update analyzes the assumed year of full build-out (2025), the five-year horizon (2030) and the ten-year horizon (2035). A growth rate of 1.5% compounded annually was applied to all traffic volumes on the boundary road network to forecast future background traffic volumes.

Per the Development Charges Background Study prepared by Hemson Consulting Ltd. in June 2019 for the Town of Collingwood, Highway 26 is planned to be widened to three lanes from Silver Glen Boulevard to Silver Creek Drive to include a centre two-way left-turn lane (TWLTL). As this improvement is targeted for 2023, it was accounted for under 2025, 2030 and 2035 future background and total conditions in this TIS Update.

The TIS Update also accounted for background developments in the immediate study area. The remaining build-out of the existing Silver Glen residential development that is not reflected in the 2018 traffic counts at Highway 26 and Silver Glen Boulevard was accounted for. The Bridgewater residential development was also accounted for, with the following recommended Highway 26 and Silver Glen Boulevard intersection improvements from the Traffic Impact Study prepared by Crozier (July 2018) for the Bridgewater development applied to this analysis:

- Traffic control signals to be implemented by 2025;
- An auxiliary westbound right-turn lane with 50 metres of storage;
- An auxiliary eastbound left-turn lane with 20 metres of storage; and
- An auxiliary southbound left-turn lane with 45 metres of storage.

Development Area 1 is expected to generate approximately 38 and 44 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. Development Area 2 is expected to generate approximately 81 and 109 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

A signal warrant analysis for the unsignalized intersection of Highway 26 and Silver Creek Drive indicates that traffic signals are not warranted under 2035 future total conditions. The implementation of the Highway 26 widening from Silver Glen Boulevard to Silver Creek Drive for a centre two-way left-turn lane per the Town's Development Charges Background Study would provide an auxiliary left-turn lane on Highway 26 at Silver Creek Drive for site traffic to utilize upon full build-out of Development Area 2.

If the Highway 26 improvements are not implemented prior to full build-out of Development Area 2, then the existing westbound bypass lane at Highway 26 and Silver Creek Drive (which allows westbound through traffic to bypass vehicles slowing down or stopping to turn left onto Silver Creek Drive) and eastbound right-turn taper are expected to be sufficient to accommodate additional site traffic turning onto Silver Creek Drive from Highway 26.

Therefore, no geometric improvements to Highway 26 and Silver Creek Drive are needed to support the proposed development.

A sensitivity analysis was conducted under 2035 future total conditions at the intersection of Highway 26 and Silver Glen Boulevard without the Bridgewater development build-out or associated intersection improvements, and it was determined that the Development Area 1 build-out can be supported without these intersection improvements.

Analysis of existing, future background and future total conditions indicates that the boundary road network is expected to operate at acceptable levels of service with minor delays.

Therefore, the proposed development is supportable from a traffic operations perspective.

The proposed public roadway accesses from Development Area 1 and 2 to Silver Glen Boulevard and Silver Creek Drive, respectively, will provide linkage to the adjacent Silver Glen and Forest developments, and the future Bridgewater development.

There are opportunities for the proposed development to incorporate active transportation and access to public transportation facilities to promote alternative modes of transportation and reduce automobile dependency and satisfy the Transportation policies in the Town's Official Plan.

Collingwood Transit operates the Crosstown route from the downtown Collingwood area to Cranberry Trail West (located approximately 130 metres east of Silver Glen Boulevard). The existing transit route provides transit connectivity to future residents within Development Area 1, as the transit service is accessible via the future sidewalks that will be a part of the public roadway connecting to Silver Glen Boulevard, and the trail connection parallel to Highway 26 from Silver Glen Boulevard to Cranberry Trail West. The provision of access to existing transit services for Development Area 1 will allow for easy transit accessibility to the downtown Collingwood area, and encourage transit as a viable mode of transportation in accordance with the policies set out in the Town's Official Plan.

The Town of Collingwood could extend the Crosstown bus route in the future to Silver Creek Drive. This would provide transit connectivity to future residents of Development Area 2. The future expansion of Collingwood Transit services may be facilitated by increased development in the area, namely the subject development and the adjacent Bridgewater residential development.

A multi-use trail connection is proposed from Development Area 2 to the Georgian Trail. The proponent could provide a multi-use trail connection from Development Area 1 to connect to the Georgian Trail to encourage active transportation to and from Development Area 1.

There are several background planning studies and documents that identify a potential future north-south corridor spanning through the subject property connecting to Highway 26 between Silver Creek Drive and Silver Glen Boulevard to form a bypass to the Town of Collingwood. These documents include the County of Simcoe Transportation Master Plan Update (October 2014) and the Ontario Ministry of Transportation Needs Assessment Report (October 2015). The Town of Collingwood Official plan also makes note of a potential municipal bypass.

The proposed access roadway from Development Area 1 to Silver Glen Boulevard consists of an east-west segment connecting with a north-south segment which extends from Silver Glen Boulevard. The intent of this alignment is to provide access to and from the proposed development without constraining the potential future north-south public corridor. Indeed, the provision of the proposed access roadway may facilitate a future north-south public corridor by providing a segment of the future corridor. Under this scenario, the east-west segment of the access roadway would connect to the north-south corridor to form a three-legged intersection.

The analysis contained within this report was prepared using the Draft Plan of Subdivision prepared by KLM Planning Partners Inc. (dated July 23, 2019). Any minor revisions to the development concept are not expected to affect the conclusions contained with this report.

In conclusion, the proposed development can be supported from a transportation perspective.

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2.0 Introduction

2.1 Background

C.F. Crozier & Associates Inc. (Crozier) was retained by Huntingwood Trails (Collingwood) Ltd. to prepare an update of its Traffic Impact Study (TIS) in support of the Zoning By-Law Amendment and Draft Plan of Subdivision for the proposed Huntingwood Trails residential development in the Town of Collingwood.

The original TIS was prepared in June 2009, with a subsequent update prepared in January 2011 (herein referred to as the "Crozier TIS, 2011"). This TIS Update has been prepared to reflect the updated development proposal and updated traffic data.

2.2 Development Proposal

The development will be divided into two development areas, with Development Area 1 proposed to connect to Silver Glen Boulevard and Development Area 2 proposed to connect to Silver Creek Drive. **Table 1** outlines the development proposal.

Table 1: Development Proposal

Development Area	Dwelling Type	Units	Site Access
1	Townhouse	52	Silver Glen Boulevard
	Semi-Detached	10	
	Total	62	
2	Single-Detached	88	Silver Creek Drive
	Semi-Detached	20	
	Total	108	

Development Area 1 will connect via a north-south public roadway to Silver Glen Boulevard. An east-west segment of the public roadway will provide access to the proposed units. Development Area 2 is proposed to connect to Silver Creek Drive (near Highway 26) via a public roadway connection. Both roadway connections will be constructed with an urban cross-section (including a concrete sidewalk) and two travel lanes.

The Draft Plan of Subdivision prepared by KLM Planning Partners Inc. (dated July 23, 2019) is included as **Appendix A**.

2.3 Purpose and Scope

The Town of Collingwood's Official Plan (updated January 2019), which incorporates the July 2014 OMB approved Official Plan Amendment for the site, provides in section 4.2.4.3.2.5.3.h. (which refers to Huntingwood Part Lot 48, Concession 12) that "All current and future applications for zoning, site plan control approval, severances and/or plan of subdivisions/condominiums shall include submission of the following studies in addition to whatever studies are identified as required by Section 8.13, with the exception of natural heritage studies". Subsection iii requires "a transportation study for Development Area 2 (including active transportation and transit) that explores potential linkages with

adjacent development. This study shall also be circulated to the MTO for review and comment."

The primary purpose of this TIS Update is to provide an update on the transportation-related impacts of the proposed development, if any, on the boundary road network and to recommend any required mitigation measures, if warranted. Notwithstanding that the Official Plan does not require an update in relation to Development Area 1, this update takes into consideration updated transportation information in relation to both Development Areas. The TIS Update also includes the other required components specified in the Town's Official Plan regarding active transportation, transit and potential linkages with adjacent developments.

The study reviews the following main aspects of the proposed development from a transportation engineering perspective:

- Existing, future background, and future total traffic operations on the boundary road network during the weekday a.m. and p.m. peak hours;
- Forecasted trip generation and distribution of the proposed development;
- Mitigation measures to support the proposed development, if required;
- Potential linkages with adjacent developments;
- Opportunities to encourage alternative transportation (i.e. active transportation and public transportation); and
- A review of the development access in relation to a potential north-south public roadway spanning through the subject property connecting to Highway 26.

The study has been prepared based on the guidelines set out in the Institute of Transportation Engineers (ITE) "Transportation Impact Analyses for Site Development".

3.0 Existing Conditions

3.1 Development Lands

The subject property is approximately 49 hectares in size and is located south of Highway 26 and Silver Creek Drive, north of the Georgian Trail, and lies astride of Silver Creek. The site is also bordered by two existing residential neighbourhoods to the east and west, namely: "Silver Glen Preserve" (herein referred to as the Silver Glen development) and "The Forest", respectively.

Figure 1 contains the Site Location Plan.

3.2 Study Intersections

The Crozier TIS, 2011 analyzed the following existing intersections:

- Highway 26 and Silver Glen Boulevard
- Highway 26 and Silver Creek Drive
- County Road 21 and Forest Drive

This TIS Update analyzes the intersections of Highway 26 and Silver Glen Boulevard, and Highway 26 and Silver Creek Drive. Site traffic generated from the proposed development is not expected to significantly impact the intersection of County Road 21 and Forest Drive. The Crozier TIS, 2011 concluded that traffic operations at County Road 21 and Forest Drive are expected to be satisfactory post build-out of the proposed development and that no external intersection improvements are

required. Thus, the intersection was not included in this TIS Update.

3.3 Boundary Road Network

The boundary road network at the site frontage is described in **Table 2**.

Table 2: Boundary Road Network

Road	Lanes	Posted Speed	Function	Jurisdiction
Highway 26 (East of Silver Glen Boulevard)	3 ¹	60 km/h	Arterial roadway	Town of Collingwood
Highway 26 (West of Silver Glen Boulevard)	2	70 km/h		
Silver Creek Drive	2	50 km/h	Local roadway	Town of Collingwood
Silver Glen Boulevard	2	50 km/h (assumed) ²	Local roadway	Private ³

Note 1: The roadway contains left-turn lanes or a centre two-way left-turn lane (TWLTL).

Note 2: Speed limit of 50 km/h assumed per municipal regulation.

Note 3: Silver Glen Boulevard is owned by the Town of Collingwood but has not yet been dedicated as a public highway.

The transfer of Silver Glen Boulevard to the Town of Collingwood indicates that Silver Glen Boulevard is to be opened as a public highway and thoroughfare.

The intersections of Highway 26 and Silver Glen Boulevard, and Highway 26 and Silver Creek Drive are side-street stop-controlled, with no restriction to free flow on Highway 26.

The intersection of Highway 26 and Silver Glen Boulevard consists of an auxiliary westbound left-turn lane and auxiliary eastbound right-turn taper. The south approach on Silver Glen Boulevard has a width of approximately seven metres which allows simultaneous outbound left-turns and right-turns.

The intersection of Highway 26 and Silver Creek Drive consists of a westbound bypass lane to allow westbound through traffic to bypass vehicles slowing down or stopping to turn left onto Silver Creek Drive. The intersection also currently consists of an auxiliary eastbound right-turn taper.

Figure 2 illustrates the existing lane geometrics and intersection control on the boundary road network.

3.4 Active and Public Transportation Network

The existing active transportation facilities on the boundary road network are described in **Table 3**.

Table 3: Active and Public Transportation Network

Road	Pedestrian Facilities	Cycling Facilities	Transit Routes	Typical Headways
Highway 26 (East of Cranberry Trail West)	Off-road Trail (Vacation Inn Trail)		Crosstown Route	60 mins
Highway 26 (West of Cranberry Trail West)	Off-road Trail (Vacation Inn Trail extension to Silver Glen Boulevard)		None	N/A
Cranberry Trail West	None	On-road Bike Route	Crosstown Route	60 mins
Silver Creek Drive	None	None	None	None
Silver Glen Boulevard (Highway 26 to Silver Glen development)	1.5 metres sidewalk on the west side of the roadway	None	None	N/A
Silver Glen Boulevard (within Silver Glen development)	None	None	None	N/A

The Collingwood Transit map illustrates the closest bus stops to the Site and has been included in **Appendix B** for reference. There are three Crosstown Route bus stops along Cranberry Trail West to the east of the subject property (located approximately 130 metres east of Silver Glen Boulevard). Additionally, there is another Crosstown Route bus stop on Highway 26 at Vacation Inn Drive. The Crosstown Route operates with a headway of 60 minutes throughout the day.

The multi-use Georgian Trail is located to the south of the subject property and spans from the Town of Collingwood to the Municipality of Meaford, thus providing extensive connectivity to areas in the Georgian area.

3.5 Traffic Data

The traffic data that was used in the Crozier TIS, 2011 was collected in 2008 and is thus considered to be outdated.

Turning movement count data for the intersection of Highway 26 and Silver Glen Boulevard commissioned by Crozier on Thursday, March 1, 2018 was used in this analysis. This count was conducted for the preparation of the Traffic Impact Study for the Bridgewater development (see Section 4.3.2). The counts were conducted between 6:00 a.m. – 10:00 a.m. and 3:00 p.m. – 7:00 p.m. These time periods are reflective of typical commuter peak hours for residential developments and thus were considered appropriate for traffic analysis of the proposed development.

Crozier staff conducted turning movement counts at the intersection of Highway 26 and Silver Creek Drive on Wednesday July 17, 2019 between 7:00 a.m. – 9:00 a.m. and 4:00 p.m. – 6:00 p.m. These time periods were selected to capture the weekday a.m. and p.m. peak hours at the intersection of Highway 26 and Silver Glen Boulevard outlined in **Table 4**.

Intersection analysis was conducted utilizing peak hour factors (PHFs) as calculated for each intersection from the collected traffic data during each time period. **Table 4** outlines the calculated peak hour factors at each intersection during each peak hour.

Table 4: Intersection Count Peak Hour Factors

Intersection	Count Date	Peak Hour	Peak Hour Factor
Highway 26 and Silver Glen Boulevard	Thursday March 1, 2018	Weekday A.M. 7:45 a.m. – 8:45 a.m.	0.98
		Weekday P.M. 4:30 p.m. – 5:30 p.m.	0.99
Highway 26 and Silver Creek Drive	Wednesday July 17, 2019	Weekday A.M. 8:00 a.m. – 9:00 a.m.	0.84
		Weekday P.M. 4:00 p.m. – 5:00 p.m.	0.94

The traffic count data is contained in **Appendix C**.

3.6 Seasonal Adjustments

Given that the traffic volumes at the intersection of Highway 26 and Silver Glen Boulevard were collected in March (considered to be a “winter” month by the Ministry of Transportation of Ontario – “MTO”), and that Collingwood and the surrounding areas have a large recreational component, the existing traffic volumes at the study intersection were adjusted to reflect summer conditions.

To adjust the traffic volumes for the peak summer driving season, Winter Average Daily Traffic (WADT) and Summer Average Daily Traffic (SADT) volumes from the MTO “Provincial Highways Traffic Volumes, 1988-2016” for the adjacent segment of Highway 26 to the west were compared and a seasonal adjustment factor of 1.43 was calculated. Accordingly, the existing volumes at the intersection of Highway 26 and Silver Glen Boulevard were inflated by 43%.

Given that the traffic volumes at the intersection of Highway 26 and Silver Creek Drive were collected in July, no seasonal adjustments were applied to the intersection.

3.7 Volume Balancing

The traffic volumes at the intersection of Highway 26 and Silver Creek Drive were compared to the seasonally adjusted traffic volumes at the intersection of Highway 26 and Silver Glen Boulevard. The seasonally adjusted volumes at the latter intersection were significantly higher than the raw data collected at Silver Creek Drive. It was noted that the raw data was more similar to the raw data collected at Silver Glen Boulevard (without seasonal adjustments). These volumes indicate that the seasonal adjustment factor outlined in Section 3.6 is likely overstated and thus would yield conservative results.

For the purposes of conservative analysis, the through volumes at the intersection of Highway 26 and Silver Creek Drive were balanced to the seasonally adjusted volumes at Highway 26 and Silver Glen Boulevard. Thus, the analyzed intersection volumes at Highway 26 and Silver Creek Drive are approximately 40% higher than the volumes recorded.

Figure 3 illustrates the adjusted existing traffic volumes reflecting seasonal adjustments at Highway 26 and Silver Glen Boulevard and the balanced through movements at Highway 26 and Silver Creek

Drive.

3.8 Traffic Modelling

The boundary road network was modelled in Synchro 9.2 using existing roadway geometrics, seasonally adjusted traffic data, and calculated PHFs as discussed in Section 3.5.

The assessment of intersections is based on the “Highway Capacity Manual (HCM)” methodology. Intersections are assessed using a Level of Service (LOS) metric with ranges of delay assigned a letter from “A” to “F”; “A” representing low delays and “F” representing heavy delays. The LOS definitions for signalized and unsignalized intersections are included in **Appendix D**.

The south approach on Silver Glen Boulevard has a width of approximately seven metres. Accordingly, the intersection was assumed to operate with dedicated northbound right-turn and left-turn lanes as observed via the camera footage collected during the traffic counts. For modelling purposes, the approaches were modeled with a left-turn lane as a continuation of the through lane, and right-turn lane with 15 metres of storage. As noted in Section 3.9, all 95th percentile queues can be contained within the available storage lengths.

The east approach of Highway 26 and Silver Creek Drive currently consists of a westbound bypass lane to allow westbound through traffic to bypass vehicles slowing down or stopping to turn left onto Silver Creek Drive. The approach was modelled in Synchro with an auxiliary westbound left-turn lane with 20 metres of storage (measured from the existing geometrics) to reflect the separation in westbound left-turning traffic from westbound through traffic.

3.9 Intersection Operations

The existing intersection operations at the study intersections were analyzed using the existing adjusted traffic volumes illustrated in **Figure 3**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 5 outlines the existing traffic operations.

Table 5: Seasonally Adjusted Existing Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Stop	Weekday A.M.	B	13.1 s	0.35 (WBT)	None
		Weekday P.M.	B	14.3 s	0.50 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	B	13.1 s	0.41 (WBT)	None
		Weekday P.M.	B	13.3 s	0.52 (WBT)	None

Note: The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Glen Boulevard and Silver Creek Drive.

The boundary road network is currently operating at LOS “B” during the weekday a.m. and p.m. peak hours, as seasonally adjusted, with minimal delay and reserve capacity for increases in traffic volumes.

4.0 Future Background Conditions

4.1 Horizon Years

Full build-out of the proposed development is expected to occur by 2025. Accordingly, this TIS Update analyzed the year of full build-out (2025), the five-year horizon (2030) and the ten-year horizon (2035).

4.2 Growth Rate

To determine growth rates for the study, the *Environmental Study Report: Highway 26 West from 280 m West of Princeton Shores Boulevard to Harbour Street Improvements* completed by R.J. Burnside and Associates in April 2014 (referred to as the Highway 26 ESR) was reviewed. The two-way peak hour volumes were analyzed on the segment of Highway 26 immediately east of Cranberry Trail West under the “existing” 2013 conditions and future background 2028 conditions. The future background volumes in the Highway 26 ESR include future background traffic growth and background development traffic. Growth rates of 1.49% and 1.28% compounded annually were calculated for the a.m. and p.m. peak periods, respectively.

Additionally, historical Annual Average Daily Traffic (AADT) and Summer Average Daily Traffic (SADT) volumes from the Ministry of Transportation of Ontario (MTO) between 2008-2016 were analyzed on Highway 26 from Long Point Road to Grey Road 21. Average growth rates of 0.26% and 0.40% compounded annually were calculated using the AADT and SADT volumes, respectively.

Therefore, a growth rate of 1.5% compounded annually was applied to all traffic volumes on the boundary road network during the weekday a.m. and p.m. peak hours.

Appendix F contains the detailed growth rate documentation and analysis.

4.3 Background Developments

4.3.1 Silver Glen

At the time of the traffic counts that were conducted at Highway 26 and Silver Glen Boulevard, 20 townhouse units from the existing Silver Glen development were still unoccupied. Accordingly, traffic generated by the remaining 20 units was forecasted using the fitted curve equations provided in the ITE Trip Generation Manual, 10th Edition, for Land Use Category (LUC) 220 “Multifamily Housing (Low-Rise).” The ITE Trip Generation methodology is discussed further in Section 5.1.

The trip generation results are summarized in **Table 6**.

Table 6: Silver Glen Trip Generation

Use	Peak Hour	Number of Trips		
		Inbound	Outbound	Total
L.U. 220: Multifamily Housing (Low-Rise) (20 units)	Weekday A.M.	2	8	10
	Weekday P.M.	9	5	14

The trips generated by the Silver Glen residential development were distributed to the boundary road network based on existing travel patterns. As discussed in Section 5.2, 70 percent of trips were distributed to the east, and 30 percent of trips were distributed to the west on Highway 26. The Silver Glen Trip Distribution and assignment have been illustrated in **Figures 4 and 5**, respectively.

The Silver Glen site traffic was assigned to the intersection of Highway 26 and Silver Glen Boulevard only. The 2019 counts at the intersection of Highway 26 and Silver Creek Drive reflect full build-out of the Silver Glen development which had occurred at this time and thus the site traffic was not added to the intersection.

4.3.2. Bridgewater

The proposed Bridgewater development will be located north of Highway 26, with a site access proposed to form the fourth leg of the existing intersection of Highway 26 and Silver Glen Boulevard. The development is proposed to consist of:

- 529 residential townhouse units, and
- 116 residential apartment units.

The Traffic Impact Study prepared by Crozier in July 2018 for the Bridgewater development forecasted trip generation for the development using the fitted curve equations from the ITE Trip Generation Manual, 10th Edition, under LUC 220 "Multifamily Housing (Low-Rise)" for the townhouse units, and LUC 221 "Multifamily Housing (Mid-Rise)" for the apartment units. The ITE Trip Generation methodology is discussed further in Section 5.1.

The trip generation results are summarized in **Table 7**.

Table 7: Bridgewater Trip Generation

Use	Roadway Peak Hour	Number of Trips		
		Inbound	Outbound	Total
LU 220: Multifamily Housing (Low-Rise) (539 Units)	Weekday A.M.	54	182	236
	Weekday P.M.	167	98	265
LU 221: Multifamily Housing (Mid-Rise) (116 Units)	Weekday A.M.	10	30	40
	Weekday P.M.	31	20	51
Total	Weekday A.M.	64	212	276
	Weekday P.M.	198	118	316

The trips generated by the Bridgewater residential development were distributed to the boundary road network based on existing travel patterns observed at the intersection of Highway 26 and Silver Glen Boulevard. As discussed in Section 5.2, 70 percent of trips were distributed to the east, and 30 percent of trips were distributed to the west on Highway 26. The Silver Glen Trip Distribution and assignment have been illustrated in **Figures 6 and 7**, respectively.

The Bridgewater TIS (Crozier, 2018) concluded that the following roadway improvements were required at the intersection of Highway 26 and Silver Glen Boulevard to support the proposed development:

- Traffic control signals to be implemented by 2025;
- An auxiliary westbound right-turn lane with 50 metres of storage;
- An auxiliary eastbound left-turn lane with 20 metres of storage; and
- An auxiliary southbound left-turn lane with 45 metres of storage.

These improvements were accounted for under future background and total conditions for all horizon years.

An alternate scenario was conducted under 2035 future total conditions (build-out of the proposed development) without the Bridgewater development build-out. This scenario is included as a sensitivity analysis (see Section 7.0).

4.4 Future Roadway Improvements

Per the Development Charges Background Study prepared by Hemson Consulting Ltd. in June 2019 for the Town of Collingwood, improvements to Highway 26 in the study area have been identified. The segment of Highway 26 between Silver Glen Boulevard and Silver Creek Drive is planned to be widened to three lanes to include a centre two-way left-turn lane (TWLTL) and mirror the existing Highway 26 rural arterial cross-section east of Silver Glen Boulevard.

This improvement is planned for 2023. However, the Development Charges Background Study has, at the time of preparing this report, not been finalized and adopted by Town of Collingwood Council. As build-out of the proposed development is expected to occur by 2025 (two years beyond the target 2023 completion for improvements), the identified Highway 26 improvements were accounted for under all horizon years under future background and future total conditions.

Given the modelling of the existing westbound bypass lane for westbound left-turn movements (as discussed in Section 3.8), it should be noted that the Highway 26 improvements outlined above do not affect the future background or future total traffic operations outlined in this report.

Appendix G contains excerpts from the Development Charges Background Study.

4.5 Intersection Operations

The future background intersection operations at the study intersections were analyzed using the 2025, 2030 and 2035 future background traffic volumes illustrated in **Figures 8, 9 and 10**, respectively. Detailed capacity analysis worksheets are included in **Appendix E**.

Tables 8, 9 and 10 outline the 2025, 2030 and 2035 future background traffic operations, respectively.

Table 8: 2025 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	11.5 s	0.66 (WBT)	None
		Weekday P.M.	A	9.0 s	0.68 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	B	14.1 s	0.50 (WBT)	None
		Weekday P.M.	B	14.9 s	0.59 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

Table 9: 2030 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	12.1 s	0.71 (WBT)	None
		Weekday P.M.	A	9.8 s	0.74 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	B	14.9 s	0.53 (WBT)	None
		Weekday P.M.	C	15.8 s	0.64 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

Table 10: 2035 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	13.0 s	0.76 (WBT)	None
		Weekday P.M.	B	10.8 s	0.79 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	C	15.8 s	0.57 (WBT)	None
		Weekday P.M.	C	16.8 s	0.69 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

The intersection of Highway 26 and Silver Glen Boulevard is expected to operate at unchanged levels of service under 2035 future background conditions compared to existing conditions with reduced control delays resulting from the implementation of traffic signals.

The intersection of Highway 26 and Silver Creek Drive is expected to change from LOS “B” to “C” under 2035 future background conditions compared to existing conditions, with a maximum control delay of 16.8 seconds.

These operations indicate that the boundary road network intersection is expected to continue operating at satisfactory levels of service with reserve capacity for site generated traffic.

5.0 Site Generated Traffic

The proposed development will result in additional vehicles on the boundary road network that would otherwise not exist. The proposed development will also result in additional turning movements at the study intersections.

5.1 Site Trip Generation

Trip generation for the proposed development was forecasted using published data from the ITE Trip Generation Manual, 10th Edition. The ITE Trip Generation Manual is a compendium of industry collected trip generation data across North America for a variety of land uses and is used industry-wide as a source for trip generation forecasts.

The fitted curve equations for LUC 210 “Single-Family Detached Housing” were applied to the single-detached and semi-detached units for both Development Areas given that there is no ITE land use for semi-detached dwellings. The fitted curve equations for LUC 220 “Multifamily Housing (Low-Rise)” were applied to the townhouse units for Development Area 1.

Given that the proposed Development Areas are separated from each other, trip generation was forecasted for each individual Development Area.

Table 11 outlines the unadjusted trip generation for the proposed development.

Table 11: Site Trip Generation

Development Area	Use	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
1	LUC 210: Single-Family Detached Housing (10 Units)	Weekday A.M.	3	9	12
		Weekday P.M.	7	4	11
	LUC 220: Multifamily Housing (Low-Rise) (52 Units)	Weekday A.M.	6	20	26
		Weekday P.M.	21	12	33
	(62 units)	Weekday A.M.	9	29	38
		Weekday P.M.	28	16	44
2	LUC 210: Single-Family Detached Housing (108 Units)	Weekday A.M.	20	61	81
		Weekday P.M.	69	40	109

Development Area 1 is expected to generate approximately 38 and 44 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. Development Area 2 is expected to generate approximately 81 and 109 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

5.2 Trip Distribution

The trips generated by the proposed development were distributed to the boundary road network based on the travel patterns observed at the intersection of Highway 26 and Silver Glen Boulevard. The distributions were similar in both the a.m. and p.m. peak hours, with approximately 70 percent arriving from and departing to the east, and 30 percent arriving from and departing to the west.

This distribution is consistent with the location of employment, retail and service destinations. The Town of Collingwood is a net importer of jobs and is the site of regional “big box” stores, as well as most services in the regional area. Therefore, the distribution was deemed to be representative of the future trip characteristics of the proposed development, and 70 percent of the trips were judged to arrive from/depart to the east towards Collingwood, and the remaining 30 percent of the trips were judged to arrive from/depart to the west towards the Town of Blue Mountains.

Of the 30% of trips generated by Development Area 2 travelling to the west, it was assumed that half of the outbound trips from the site would turn onto Highway 26 via Silver Creek Drive, and that the other half would travel on Silver Creek Drive to access County Road 21, which provides access to Blue Mountain Resort (the major recreational destination in the area) to the south.

Figures 11 and 12 outline the trip distribution for Development Areas 1 and 2, respectively. **Figures 13 and 14** outline the trip assignment for Development Areas 1 and 2, respectively.

6.0 Future Total Conditions

6.1 Basis of Assessment

The site generated traffic volumes illustrated in **Figures 13 and 14** were added to the 2025, 2030 and 2035 future background traffic volumes in **Figures 8, 9 and 10**, respectively, to determine the future total traffic volumes. **Figures 15, 16 and 17** outline the 2025, 2030 and 2035 future total traffic volumes, respectively.

6.2 Signal Warrant Analysis

A signal warrant analysis was conducted for the intersection of Highway 26 and Silver Creek Drive under 2035 future total conditions. The analysis followed the procedures specified in Chapter 4 of the “Ontario Traffic Manual – Book 12”, March 2012. Justifications 1 (Minimum Vehicular Volume), 2 (Delay to Cross Traffic), 3 (Combination of Justifications 1 and 2), and 4 (4-Hour Volume) were selected as the most appropriate warrants with which to assess the Street “C” intersection.

The average hour volume was determined using the following formula from OTM Book 12:

$$AHV = (amPHV + pmPHV) / 4$$

Where;

AHV = average hour volume

PHV = peak hour volume

The results of the analysis conclude that traffic signals are not warranted at the intersection of Highway 26 and Silver Creek Drive under 2035 future total conditions. The forecasted traffic volumes at the intersection do not trigger the thresholds for traffic signal justification. **Appendix H** contains the signal warrant sheets.

6.3 Auxiliary Left-Turn Lane

As discussed in Section 4.4, Highway 26 is planned to be widened by 2023 to three lanes to provide a centre TWLTL from Silver Glen Boulevard to Silver Creek Drive. This improvement would provide an auxiliary left-turn lane from Highway 26 to Silver Creek Drive. If this improvement were to be implemented prior to full build-out of Development Area 2, then auxiliary left-turn lane requirements would be satisfied by the TWLTL.

If this improvement is not implemented prior to full build-out of Development Area 2, then the existing westbound bypass lane on Highway 26 at Silver Creek Drive is expected to continue accommodate westbound left-turn movements without interrupting westbound traffic until the Highway 26 widening occurs.

The maximum forecasted 95th percentile queue length for the westbound left-turn movement under 2035 future total conditions is 15.7 metres (equivalent to two passenger cars in length). These results indicate that the westbound left-turn queue is not expected to impede westbound through traffic.

6.4 Auxiliary Right-Turn Lane

The west approach currently consists of an auxiliary right-turn taper. This existing taper is expected to continue accommodating eastbound right-turn movements from Highway 26 to Silver Creek Drive and separate turning movements from through traffic. Therefore, no improvements to the existing right-turn taper are needed or recommended to support the proposed development.

6.5 Highway 26 and Silver Glen Boulevard Improvements

Analysis of 2035 future total traffic operations at the intersection of Highway 26 and Silver Glen Boulevard indicate that the recommended intersection improvements resulting from the Bridgewater development (listed in Section 4.3.2) are sufficient and that no additional improvements are needed at Highway 26 and Silver Glen Boulevard to accommodate the proposed development.

Per the sensitivity analysis in Section 7.0, the existing geometrics of Highway 26 and Silver Glen Boulevard can accommodate the Development Area 1 build-out under 2035 future total conditions without the Bridgewater development build-out or associated intersection improvements.

6.6 Intersection Operations

The future total intersection operations at the study intersections were analyzed using the 2025, 2030 and 2035 future total traffic volumes illustrated in **Figures 15, 16 and 17**, respectively, and optimized signal timings. Detailed capacity analysis worksheets are included in **Appendix E**.

Tables 12, 13 and 14 outline the 2025, 2030 and 2035 future total traffic operations, respectively.

Table 12: 2025 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	11.9 s	0.68 (WBT)	None
		Weekday P.M.	A	9.6 s	0.72 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	C	21.3 s	0.50 (WBT)	None
		Weekday P.M.	C	24.1 s	0.60 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

Table 13: 2030 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	12.7 s	0.73 (WBT)	None
		Weekday P.M.	B	10.5 s	0.78 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	C	24.0 s	0.54 (WBT)	None
		Weekday P.M.	D	27.5 s	0.64 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

Table 14: 2035 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Signal	Weekday A.M.	B	13.7 s	0.78 (WBT)	None
		Weekday P.M.	B	11.8 s	0.83 (WBT)	None
Highway 26 and Silver Creek Drive	Stop	Weekday A.M.	D	27.7 s	0.58 (WBT)	None
		Weekday P.M.	D	32.3 s	0.69 (WBT)	None

Note: The Level of Service of a signalized intersection is based on the average control delay per vehicle.
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Creek Drive.

The intersection of Highway 26 and Silver Glen Boulevard is expected to operate at unchanged levels of service under 2035 future total conditions compared to 2035 future background conditions with a maximum increase in control delay of 1.0 second.

The intersection of Highway 26 and Silver Creek Drive is expected to change from LOS “C” to “D” under 2035 future total conditions compared to 2035 future background conditions, with a maximum control delay of 32.3 seconds. This change in LOS is attributed to the additional northbound right-turn volumes added to the intersection, as well as the introduction of northbound left-turn volumes to the intersection (there were no recorded northbound left-turn volumes under existing conditions). The delays for the northbound left-turn movement are higher than the delays for the northbound right-turn movement, thus increasing the average overall delay at the Silver Creek Drive approach.

A LOS “D” is still considered acceptable from a traffic operations perspective. It is also noted that the through volumes at this intersection on Highway 26 are conservative as they were balanced to the seasonally adjusted traffic volumes at Highway 26 and Silver Glen Boulevard (which are considered overstated). Thus, the traffic operations outlined in **Table 14** is considered overstated.

These operations indicate that the boundary road network intersection is expected to continue operating at satisfactory levels of service. Therefore, the proposed development can be accommodated from a traffic operations perspective.

7.0 Sensitivity Analysis

A sensitivity analysis was conducted under 2035 future total conditions for the intersection of Highway 26 and Silver Glen Boulevard without the Bridgewater development build-out. The purpose of this analysis is to determine if the build-out of Development Area 1 triggers any intersection improvements to Highway 26 and Silver Glen Boulevard without the improvements recommended for the Bridgewater development. **Figure 18** outlines the 2035 future total sensitivity traffic volumes.

As the forecasted eastbound right-turn volumes associated with Development Area 1 do not exceed 8 vehicles per hour, the existing eastbound right-turn taper at Silver Glen Boulevard will continue accommodating eastbound right-turn volumes without any required improvements.

Table 15 outlines the 2035 future total sensitivity traffic operations.

Table 15: 2035 Future Total Sensitivity Traffic Operations

Intersection	Control	Peak Hour	Level of Service	Control Delay	Maximum v/c Ratio	95th %ile Queues > Storage
Highway 26 and Silver Glen Boulevard	Stop	Weekday A.M.	C	17.0 s	0.46 (WBT)	None
		Weekday P.M.	C	19.1 s	0.67 (WBT)	None

Note: The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach, i.e. Silver Glen Boulevard

The intersection of Highway 26 and Silver Glen Boulevard is expected to operate at LOS “C” under 2035 future total sensitivity conditions without the Bridgewater development build-out or associated intersection improvements (i.e. under unsignalized intersection control). The intersection is expected to operate with minor delays and no critical volume-to-capacity ratios.

Therefore, no improvements are required at the intersection of Highway 26 and Silver Glen Boulevard to support the build-out of Development Area 1 without the Bridgewater development build-out or associated intersection improvements.

8.0 Potential Linkages with Adjacent Development

Per the Town's Official Plan, potential linkages with adjacent developments must be considered.

The public roadway access from Development Area 1 will connect to Silver Glen Boulevard north of the existing Silver Glen development, thus providing a link to the adjacent development.

The public roadway access from Development Area 2 will connect to Silver Creek Drive south of Highway 26, within the existing Forest development. This will provide a direct link to the existing adjacent Forest development.

Additionally, the future Bridgewater development will form the fourth leg of the existing intersection of Highway 26 and Silver Glen Boulevard, thus providing connectivity from Development Area 1 to Bridgewater development.

Given the acceptable traffic operations at the intersections of Highway 26 and Silver Creek Drive, and Highway 26 and Silver Glen Boulevard, additional internal links between the proposed development areas and the adjacent developments are not required.

Therefore, the development proposes sufficient linkages to the adjacent developments.

9.0 Alternative Transportation

There are opportunities for the proposed development to incorporate active transportation and public transportation facilities to promote alternative transportation and reduce automobile dependency.

9.1 Public Transportation

The Town's Official Plan, Section 5.3.8.3. states "It is a policy of this Official Plan to encourage the use of public transportation through such means as: ... including public transit facilities in the consideration of development proposals."

As discussed in Section 3.4, Collingwood Transit operates the Crosstown route from the urban Collingwood area to Cranberry Trail West (located approximately 130 metres east of Silver Glen Boulevard). The existing transit route provides transit connectivity to future residents within Development Area 1, with available access via the path along Highway 26 from Silver Glen Boulevard to Cranberry Trail West.

The provision of access to existing transit services for Development Area 1 will allow for easy transit accessibility to the urban Collingwood area, and encourage transit as a viable mode of transportation in accordance with the policies set out in the Town's Official Plan.

The Town of Collingwood could extend the Crosstown bus route in the future to Silver Creek Drive. This would provide transit connectivity to future residents of Development Area 2. The future expansion of Collingwood Transit services may be facilitated by increased development in the area, namely the subject development and the adjacent Bridgewater residential development.

9.2 Active Transportation

The Town's Official Plan, Section 5.3.10 states "The establishment of an interconnected system of trails throughout the municipality and into the surrounding region is an objective of this Official Plan.... Lands obtained for trails by parkland dedication, shall be improved by the developer to the satisfaction of the Town of Collingwood."

As discussed in Section 2.2, the proposed roadways to both Development Areas will consist of a single loaded concrete sidewalk, thus enabling pedestrian connectivity to and from the existing road network.

As discussed in Section 3.4, the Georgian Trail is located to the south of the development areas. A multi-use trail connection is proposed from Development Area 2 to connect to the Georgian Trail. This connection to the Regional trail system is expected to encourage active transportation to and from the proposed development in accordance with the policies set out in the Town's Official Plan.

The proponent could provide a multi-use trail connection from Development Area 1 to connect to the Georgian Trail to encourage active transportation to and from Development Area 1.

10.0 North-South Roadway Connection

There are several background planning studies and documents that identify a future north-south corridor spanning through the subject property connecting to Highway 26 between Silver Creek Drive and Silver Glen Boulevard to form a bypass to the Town of Collingwood.

The Town's Official Plan, Section 11.5.5. refers to a municipal bypass with Mountain Road. The County of Simcoe's Official Plan (approved December 29, 2016), Section 4.8.15. states "the County will encourage and support the planning, corridor and connectivity protection and the early construction of Provincial planned corridors and the following transportation facilities... a long-term provincial road facility bypassing traffic around the Stayner and Collingwood areas."

The Simcoe County Transportation Master Plan Update (October 20, 2014) contains many schedules illustrating a future provincial roadway bypassing Collingwood connecting to Highway 26 at the subject property. The Highway 26 Transportation Study Needs Assessment Report prepared for the MTO by AECOM, Paradigm Transportation Solutions Ltd. and PKF Consulting (revised October 2015), Figure ES-8 illustrates a new four-lane rural highway bypassing Collingwood connecting to Highway 26 at the subject property.

The proposed access roadway from Development Area 1 to Silver Glen Boulevard consists of an east-west segment intersecting with a north-south segment which connects to Silver Glen Boulevard. The intent of this alignment is to provide direct access to and from the proposed development without constraining the potential future north-south public corridor. It is noted that this proposed access roadway would not constrain the potential north-south public corridor spanning through the subject property connecting to Highway 26.

Indeed, the provision of the proposed access roadway may facilitate a future north-south public corridor by providing a north-south alignment for the future corridor. Under this scenario, the east-west segment of the access roadway would connect to the north-south corridor to form a three-legged intersection.

11.0 Conclusions

The analysis contained within this report has resulted in the following key findings:

- Development Area 1 is expected to generate approximately 38 and 44 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. Development Area 2 is expected to generate approximately 81 and 109 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.
- Traffic signals are not warranted at the intersection of Highway 26 and Silver Creek Drive under 2035 future total conditions.
- The implementation of the Highway 26 widening from Silver Glen Boulevard to Silver Creek Drive for a centre two-way left-turn lane per the Town's Development Charges Background Study would provide an auxiliary left-turn lane on Highway 26 at Silver Creek Drive for site traffic to utilize upon full build-out of Development Area 2.
- If the Highway 26 improvements are not implemented prior to full build-out of Development Area 2, then the existing westbound bypass lane at Highway 26 and Silver Creek Drive (which allows westbound through traffic to bypass vehicles slowing down or stopping to turn left onto Silver Creek Drive) and eastbound right-turn taper are sufficient to accommodate additional site traffic turning onto Silver Creek Drive from Highway 26.
- Therefore, no geometric improvements to Highway 26 and Silver Creek Drive are recommended to support the proposed development.
- A sensitivity analysis of 2035 future total conditions at the intersection of Highway 26 and Silver Glen Boulevard without the Bridgewater development build-out or associated intersection improvements indicates that the Development Area 1 build-out can be supported without intersection improvements.
- Analysis of existing, future background and future total conditions indicates that the intersection of Highway 26 and Silver Glen Boulevard is expected to operate at LOS "B" under the ultimate 2035 future total conditions scenario, and that the intersection of Highway 26 and Silver Creek Drive is expected to operate at LOS "D" under the ultimate 2035 future total conditions scenario.
- Therefore, the proposed development can be accommodated from a traffic operations perspective.
- The proposed public roadway accesses from Development Area 1 and 2 to Silver Glen Boulevard and Silver Creek Drive, respectively, will provide linkage to the adjacent Silver Glen and Forest developments, and the future Bridgewater development.
- There are opportunities for the proposed development to incorporate active transportation and access to public transportation facilities to promote alternative transportation and reduce automobile dependency in accordance with the Transportation policies in the Town of Collingwood's Official Plan (updated January 2019).

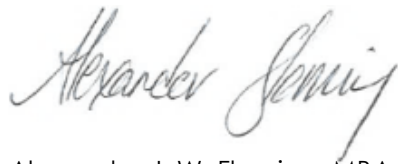
- The provision of access to existing Collingwood Transit services on Cranberry Trail West for Development Area 1 will allow for easy transit accessibility to the urban Collingwood area, and encourage transit as a viable mode of transportation to satisfy the policies set out in the Town's Official Plan.
- The Town of Collingwood could extend the Crosstown bus route in the future to Silver Creek Drive. This would provide transit connectivity to future residents of Development Area 2. The future expansion of Collingwood Transit services may be facilitated by increased development in the area, namely the subject development and the adjacent Bridgewater residential development.
- A multi-use trail connection is proposed from Development Area 2 to the Georgian Trail. However, the proponent could provide a multi-use trail connection from Development Area 1 to connect to the Georgian Trail to encourage active transportation to and from Development Area 1.

The analysis contained within this report was prepared using the Draft Plan of Subdivision prepared by KLM Planning Partners Inc. (dated July 23, 2019). Any minor revisions to the development concept are not expected to affect the conclusions contained with this report.

In conclusion, the proposed development can be supported from a transportation perspective.

Respectfully submitted by,

C.F. CROZIER & ASSOCIATES INC.



Alexander J. W. Fleming, MBA, P.Eng.
Associate

C.F. CROZIER & ASSOCIATES INC.



Darren J. Loro, C.E.T.
Transportation Technologist

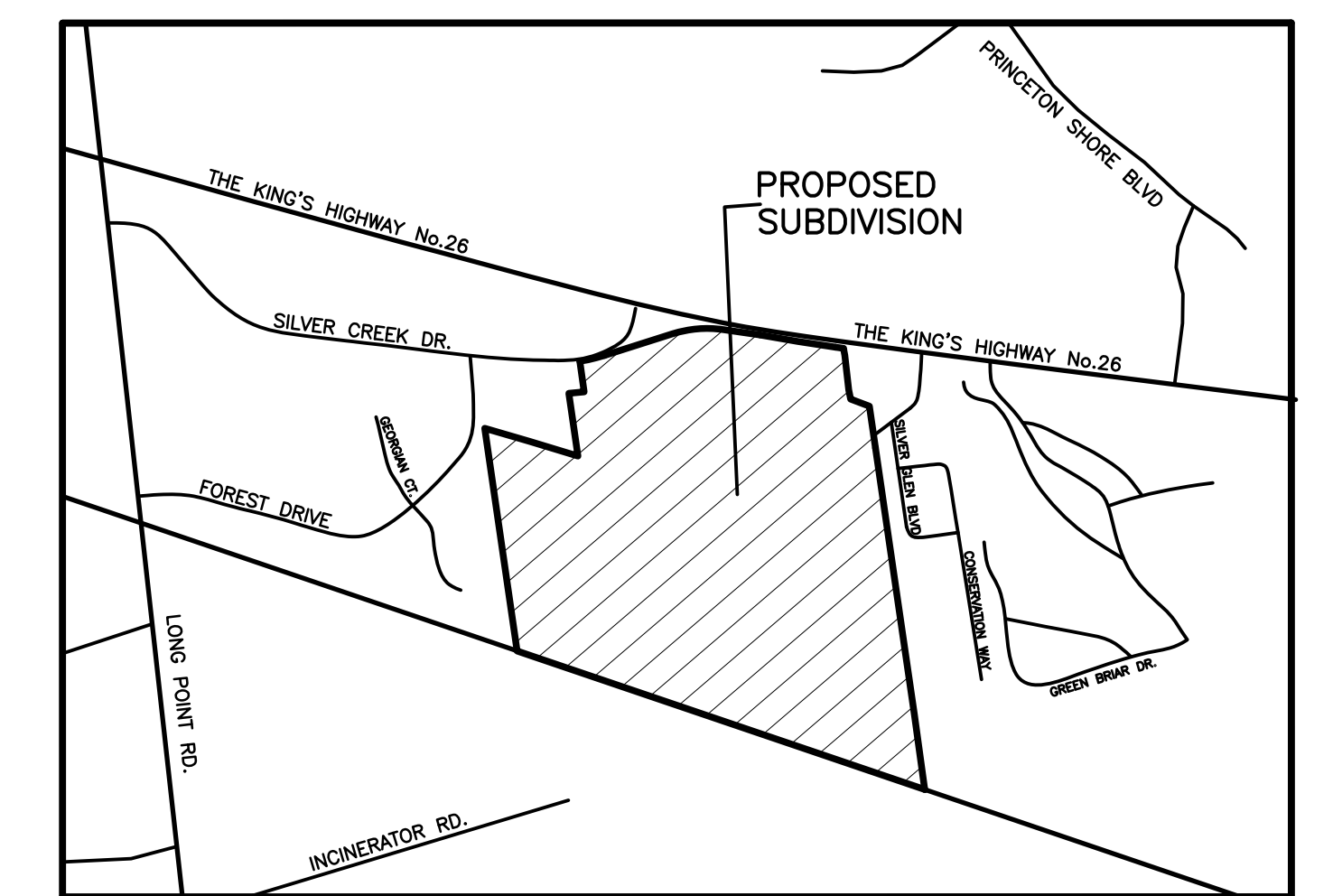
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APPENDIX A

Draft Plan of Subdivision

SCALE 1:1500



KEY PLAN

N.T.S.

- A. AS SHOWN ON DRAFT PLAN
- B. AS SHOWN ON DRAFT PLAN
- C. AS SHOWN ON DRAFT PLAN
- D. SEE SCHEDULE OF LAND USE
- E. AS SHOWN ON DRAFT PLAN
- F. AS SHOWN ON DRAFT PLAN
- G. AS SHOWN ON DRAFT PLAN
- H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
- I. CLAY-LOAM
- J. AS SHOWN ON DRAFT PLAN
- K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
- L. AS SHOWN ON DRAFT PLAN

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE
SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO
THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE -----, 2019

DAN DZALDOV
SCHAEFFER DZALDOV BENNETT LTD.
ONTARIO LAND SURVEYORS
64 JARDIN DRIVE, UNIT 1
CONCORD, ONTARIO L4K 3F3
TEL: (416) 967-0701

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF COLLINGWOOD FOR APPROVAL.

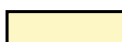
OWNER

HUNTINGWOOD TRAILS (COLLINGWOOD) LTD.

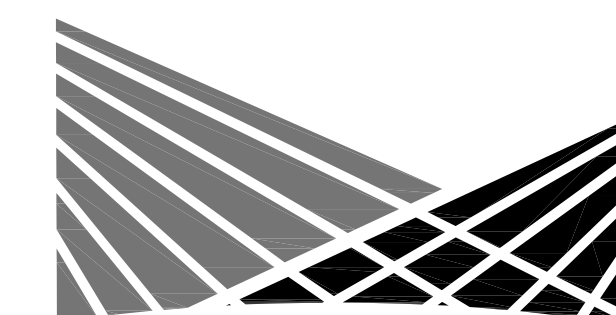
152 DALEMOUNT AVENUE
TORONTO
ONTARIO
M6B 3C9

EDWARD WEISZ
A.S.O.

TOTAL AREA OF LAND TO BE SUBDIVIDED = 48.962±Ha. (120.988±Acs.)

	BLOCKS	LOTS	UNITS	±H _o	±Ac _s
DETACHED DWELLINGS					
 LOTS 1, 9-14, 20, 21, 23, 29-37, 51-54, 58-67, 70-72 and 95 MIN. LOT FRONTAGE=13.7m. MIN LOT AREA=438.4sq.m.		37	37	3.044	7.522
 LOTS 3-8, 15, 50, 55-57, 68, 69 and 73-94 MIN. LOT FRONTAGE=12.8m. MIN LOT AREA=401.2sq.m.		35	35	2.052	5.071
 LOTS 2, 16-19, 22, 24-28, 48, 49 and 90-98 MIN. LOT FRONTAGE=12.2m. MIN LOT AREA=402.6sq.m.		16	16	0.861	2.127
SEMI-DETACHED DWELLINGS					
 LOTS 38-47 and 105-109 MIN. LOT FRONTAGE=16.8m. MIN LOT AREA=562.8sq.m.		15	30	1.160	2.866
STREET TOWNHOUSES					
 BLOCKS 99-104 and 110-116 MIN. FRONTAGE 8.0m. MIN. FRONTAGE 5.1m.	13	52	1,624	4.013	
SUBTOTAL	13	103	170	8.741	21.599
 BLOCK 117 - STORM WATER MANAGEMENT	1		1,000	2.471	
 BLOCKS 118 & 119 - OPEN SPACE	2		0.233	0.576	
 BLOCKS 120 & 121 - ENVIRONMENTAL PROTECTION AREA	2		34.975	86.425	
 BLOCK 122 - WALKWAY	1		0.027	0.067	
STREETS				3.986	9.850
20.0m. WIDE. TOTAL LENGTH= 19033m. AREA= 3,956.8ha.					
TOTAL	19	103	170	48.962	120.988

NOTE — ELEVATIONS RELATED TO
CANADIAN GEODETIC DATUM



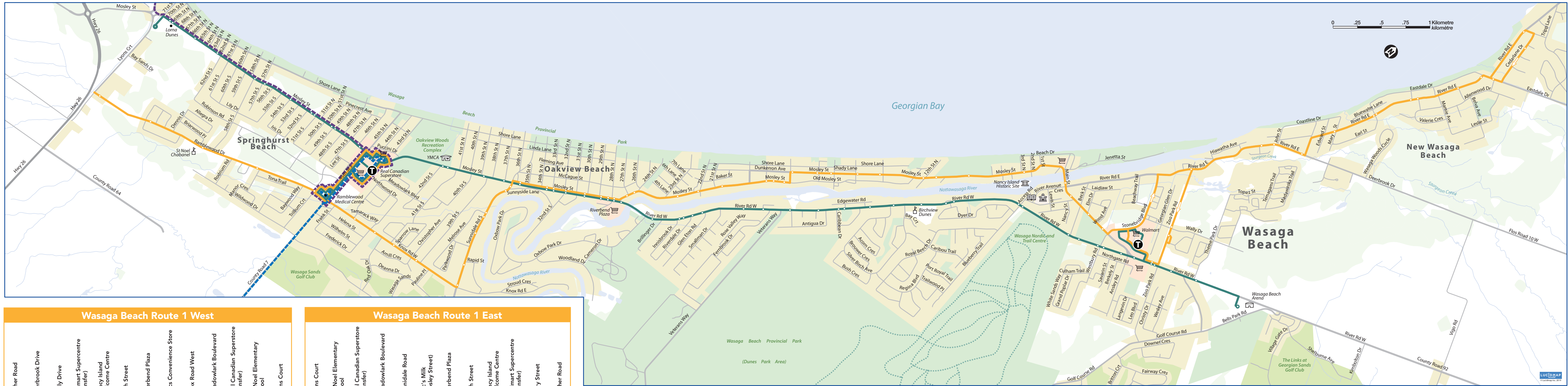
PROJECT No. P-3083
SCALE 1:1500 **JULY 23, 2019**
 (3083DES4) X-REF: (3083MAS2 & 3083TOPO1)

KLM DWG. No. - 19:1
PLANNING PARTNERS INC. 64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
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Planning • Design • Development

APPENDIX B

Transit Information



Wasaga Beach Route 1 West													
Archer Road	Deerbrook Drive	Wally Drive	Walmart Supercentre (Transfer)	Nancy Island Welcome Centre	18th Street	Riverbend Plaza	Macs Convenience Store	Knox Road West	Meadowbank Boulevard	Real Canadian Superstore (Transfer)	St. Noel Elementary School	Lyons Court	
MONDAY - SUNDAY													
7:15	7:20	7:25	7:30	7:35	7:38	7:40	7:41	7:42	7:44	7:45	7:53	8:00	
8:45	8:50	8:55	9:00	9:05	9:08	9:10	9:11	9:12	9:14	9:15	9:23	9:30	
10:15	10:20	10:25	10:30	10:35	10:38	10:40	10:41	10:42	10:44	10:45	10:53	11:00	
11:45	11:50	11:55	12:00	12:05	12:08	12:10	12:11	12:12	12:14	12:15	12:23	12:30	
1:15	1:20	1:25	1:30	1:35	1:38	1:40	1:41	1:42	1:44	1:45	1:53	2:00	
2:45	2:50	2:55	3:00	3:05	3:08	3:10	3:11	3:12	3:14	3:15	3:23	3:30	
4:15	4:20	4:25	4:30	4:35	4:38	4:40	4:41	4:42	4:44	4:45	4:53	5:00	
5:45	5:50	5:55	6:00	6:05	6:08	6:10	6:11	6:12	6:14	6:15	6:23	6:30	
7:15	7:20	7:25	7:30	7:35	7:38	7:40	7:41	7:42	7:44	7:45	7:53	8:00	

Wasaga Beach Route 1 East													
Lyons Court	St. Noel Elementary School	Real Canadian Superstore (Transfer)	Meadowbank Boulevard	Sumidale Road	Mac's Milk (Mosley Street)	Riverbend Plaza	18th Street	Nancy Island Welcome Centre	Walmart Supercentre (Transfer)	Mary Street	Archer Road		
MONDAY - SUNDAY													
8:00	8:02	8:05	8:07	8:10	8:11	8:15	8:18	8:20	8:25	8:34	8:45		
9:30	9:32	9:35	9:37	9:40	9:41	9:45	9:48	9:50	9:55	10:04	10:15		
11:00	11:02	11:05	11:07	11:10	11:11	11:15	11:18	11:20	11:25	11:34	11:45		
12:30	12:32	12:35	12:37	12:40	12:41	12:45	12:48	12:50	12:55	1:04	1:15		
2:00	2:02	2:05	2:07	2:10	2:11	2:15	2:18	2:20	2:25	2:34	2:45		
3:30	3:32	3:35	3:37	3:40	3:41	3:45	3:48	3:50	3:55	4:04	4:15		
5:00	5:02	5:05	5:07	5:10	5:11	5:15	5:18	5:20	5:25	5:34	5:45		
6:30	6:32	6:35	6:37	6:40	6:41	6:45	6:48	6:50	6:55	7:04	7:15		
8:00	8:02	8:05	8:07	8:10	8:11	8:15	8:18	8:20	8:25	8:34	8:45		

Legend

- Collingwood Crosstown Route
- Collingwood East Route
- Collingwood West Route
- Collingwood Wasaga Beach Link
- Collingwood Wasaga Beach Link 5-6pm
- Blue Mountain Transit Link
- Wasaga Beach Route 1
- Wasaga Beach Route 2
- Clearview Stayner Route
- Clearview Wasaga Beach Link
- Multiple Routes

Transit Hub
Bus Stops
Arena
Community Centre
Hospital
Library
Municipal Building
Museum
Point of Interest
School
Shopping Centre

SOUTH GEORGIAN BAY REGIONAL TRANSIT

RIDERS GUIDE

Effective January 2019
Blue Mountain - Clearview - Collingwood - Wasaga Beach

Wasaga Beach Route 2 West									
Wasaga Stars Arena	Walmart Supercentre	Blueberry Trail	Lauderdale Boulevard	Riverbend Plaza	Rec Plex	Real Canadian Superstore (Transfer)	57th Street	Lorna Dune	
MONDAY - SUNDAY									
6:55	7:05	7:08	7:11	7:14	7:18	7:20	7:22	7:25	
7:55	8:05	8:08	8:11	8:14	8:18	8:20	8:22	8:25	
8:55	9:05	9:08	9:11	9:14	9:18	9:20	9:22	9:25	
9:55	10:05	10:08	10:11	10:14	10:18	10:20	10:22	10:25	
10:55	11:05	11:08	11:11	11:14	11:18	11:20	11:22	11:25	
11:55	12:05	12:08	12:11	12:14	12:18	12:20	12:22	12:25	
12:55	1:05	1:08	1:11	1:14	1:18	1:20	1:22	1:25	
1:55	2:05	2:08	2:11	2:14	2:18	2:20	2:22	2:25	
2:55	3:05	3:08	3:11	3:14	3:18	3:20	3:22	3:25	
3:55	4:05	4:08	4:11	4:14	4:18	4:20	4:22	4:25	
4:55	5:05	5:08	5:11	5:14	5:18	5:20	5:22	5:25	
5:55	6:05	6:08	6:11	6:14	6:18	6:20	6:22	6:25	
6:55	7:05	7:08	7:11	7:14	7:18	7:20	7:22	7:25	
7:55	8:05	8:08	8:11	8:14	8:18	8:20	8:22	8:25	

Wasaga Beach Route 2 East									
Lorna Dune	5th Street	Real Canadian Superstore (Transfer)	Rec Plex	Riverbend Plaza	Lauderdale Boulevard	Blueberry Trail	Foodland	Pioneer Gas Station	
MONDAY - SUNDAY									
7:30	7:32	7:35	7:38	7:40	7:43	7:46	7:49	7:55	
8:30	8:32	8:35	8:38	8:40	8:43	8:46	8:49	8:55	
9:30	9:32	9:35	9:38	9:40	9:43	9:46	9:49	9:55	
10:30	10:32	10:35	10:38	10:40	10:43	10:46	10:49	10:55	
11:30	11:32	11:35	11:38	11:40	11:43	11:46	11:49	11:55	
12:30	12:32	12:35	12:38	12:40	12:43	12:46	12:49	12:55	
1:30	1:32	1:35	1:38	1:40	1:43	1:46	1:49	1:55	
2:30	2:32	2:35	2:38	2:40	2:43	2:46	2:49	2:55	
3:30	3:32	3:35	3:38	3:40	3:43	3:46	3:49	3:55	
4:30	4:32	4:35	4:38	4:40	4:43	4:46	4:49	4:55	
5:30	5:32	5:35	5:38	5:40	5:43	5:46	5:49	5:55	
6:30	6:32	6:35	6:38	6:40	6:43	6:46	6:49	6:55	
7:30	7:32	7:35	7:38	7:40	7:43	7:46	7:49	7:55	
8:30	8:32	8:35	8:38	8:40	8:43	8:46	8:49	8:55	

Collingwood West Route									
Terminal	Blue Mountain Centre	Walmart	Eighth & Oak	Tenth & High	Oak & Cameron	Collingwood Collegiate	Terminal		
MONDAY - FRIDAY									
6:30	6:36	6:38	6:43	6:45	6:49	6:51	6:55		
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
7:30	7:36	7:38	7:43	7:45	7:49	7:51	7:55		
8:00	8:06	8:08	8:13	8:15	8:19	8:21	8:25		
8:30	8:36	8:38	8:43	8:45	8:49	8:51	8:55		
9:00	9:06	9:08	9:13	9:15	9:19	9:21	9:25		
10:00	10:06	10:08	10:13	10:15	10:19	10:21	10:25		
11:00	11:06	11:08	11:13	11:15	11:19	11:21	11:25		
12:00	12:06	12:08	12:13	12:15	12:19	12:21	12:25		
1:00	1:06	1:08	1:13	1:15	1:19	1:21	1:25		
2:00	2:06	2:08	2:13	2:15	2:19	2:21	2:25		
2:30	2:36	2:38	2:43	2:45	2:49	2:51	2:55		
3:00	3:06	3:08	3:13	3:15	3:19	3:21	3:25		
...and every 30 minutes to...									
6:00	6:06	6:08	6:13	6:15	6:19	6:21	6:25		
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
8:00	8:06	8:08	8:13	8:15	8:19	8:21	8:25		
SATURDAY									
6:30	6:36	6:38	6:43	6:45	6:49	6:51	6:55		
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
...and every 30 minutes to...									
11:30	11:36	11:38	11:43	11:45	11:49	11:51	11:55		
12:00	12:06	12:08	12:13	12:15	12:19	12:21	12:25		
12:30	12:36	12:38	12:43	12:45	12:49	12:51	12:55		
1:00	1:06	1:08	1:13	1:15	1:19	1:21	1:25		
...and every 30 minutes to...									
6:00	6:06	6:08	6:13	6:15	6:19	6:21	6:25		
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
8:00	8:06	8:08	8:13	8:15	8:19	8:21	8:25		
SUNDAY									
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
8:00	8:06	8:08	8:13	8:15	8:19	8:21	8:25		
...and every 60 minutes to...									
12:00	12:06	12:08	12:13	12:15	12:19	12:21	12:25		
1:00	1:06	1:08	1:13	1:15	1:19	1:21	1:25		
...and every 60 minutes to...									
7:00	7:06	7:08	7:13	7:15	7:19	7:21	7:25		
8:00	8:06	8:08	8:13	8:15	8:19	8:21	8:25		

Collingwood East Route									
Terminal	Bay Haven	Sunset Manor	Hospital	Jean Vanier	Collingwood Collegiate	YMCA	Ontario & St. Marie	Terminal	
MONDAY - FRIDAY									
6:30	6:36	6:38	6:41	6:44	6:47	6:50	6:52	6:55	
7:00	7:06	7:08	7:11	7:14	7:17	7:20	7:22	7:25	
7:30	7:36	7:38	7:41	7:44	7:47	7:50	7:52	7:55	
8:00	8:06	8:08	8:11	8:14	8:17	8:20	8:22	8:25	
8:30	8:36	8:38	8:41	8:44	8:47	8:50	8:52	8:55	
9:30	9:36	9:38	9:41	9:44	9:47	9:50	9:52	9:55	
10:30	10:36	10:38	10:41	10:44	10:47	10:50	10:52	10:55	
11:30	11:36	11:38	11:41	11:44	11:47	11:50	11:52	11:55	
12:30	12:36	12:38	12:41	12:44	12:47	12:50	12:52	12:55	
1:30	1:36	1:38	1:41	1:44	1:47	1:50	1:52	1:55	
2:30	2:36	2:38	2:41	2:44	2:47	2:50	2:52	2:55	
3:00	3:06	3:08	3:11	3:14	3:17	3:20	3:22	3:25	
...and every 30 minutes to...									
6:30	6:36	6:38	6:41	6:44	6:47	6:50	6:52	6:55	
7:30	7:36	7:38	7:41	7:44	7:47	7:50	7:52	7:55	
8:30	8:36	8:38	8:41	8:44	8:47	8:50	8:52	8:55	
SATURDAY									
6:30	6:36	6:38	6:41	6:44	6:47	6:50	6:52	6:55	
7:00	7:06	7:08	7:11	7:14	7:17	7:20	7:22	7:25	
...and every 30 minutes to...									
11:30	11:36	11:38	11:41	11:44	11:47	11:50	11:52	11:55	
12:00	12:06	12:08	12:11	12:14	12:17	12:20	12:22	12:25	
12:30	12:36	12:38	12:41	12:44	12:47	12:50	12:52	12:55	
1:00	1:06	1:08	1:11	1:14	1:17	1:20	1:22	1:25	
...and every 30 minutes to...									
6:30	6:36	6:38	6:41	6:44	6:47	6:50	6:52	6:55	
7:30	7:36	7:38	7:41	7:44	7:47	7:50	7:52	7:55	
8:30	8:36	8:38	8:41	8:44	8:47	8:50	8:52	8:55	
SUNDAY									
7:30	7:36	7:38	7:41	7:44	7:47	7:50	7:52	7:55	
8:30	8:36	8:38	8:41	8:44	8:47	8:50	8:52	8:55	
...and every 60 minutes to...									
12:30	12:36	12:38	12:41	12:44	12:47	12:50	12:52	12:55	
1:30	1:36	1:38	1:41	1:44	1:47	1:50	1:52	1:55	
...and every 60 minutes to...									
7:30	7:36	7:38	7:41	7:44	7:47	7:50	7:52	7:55	
8:30	8:36	8:38	8:41	8:44	8:47	8:50	8:52	8:55	

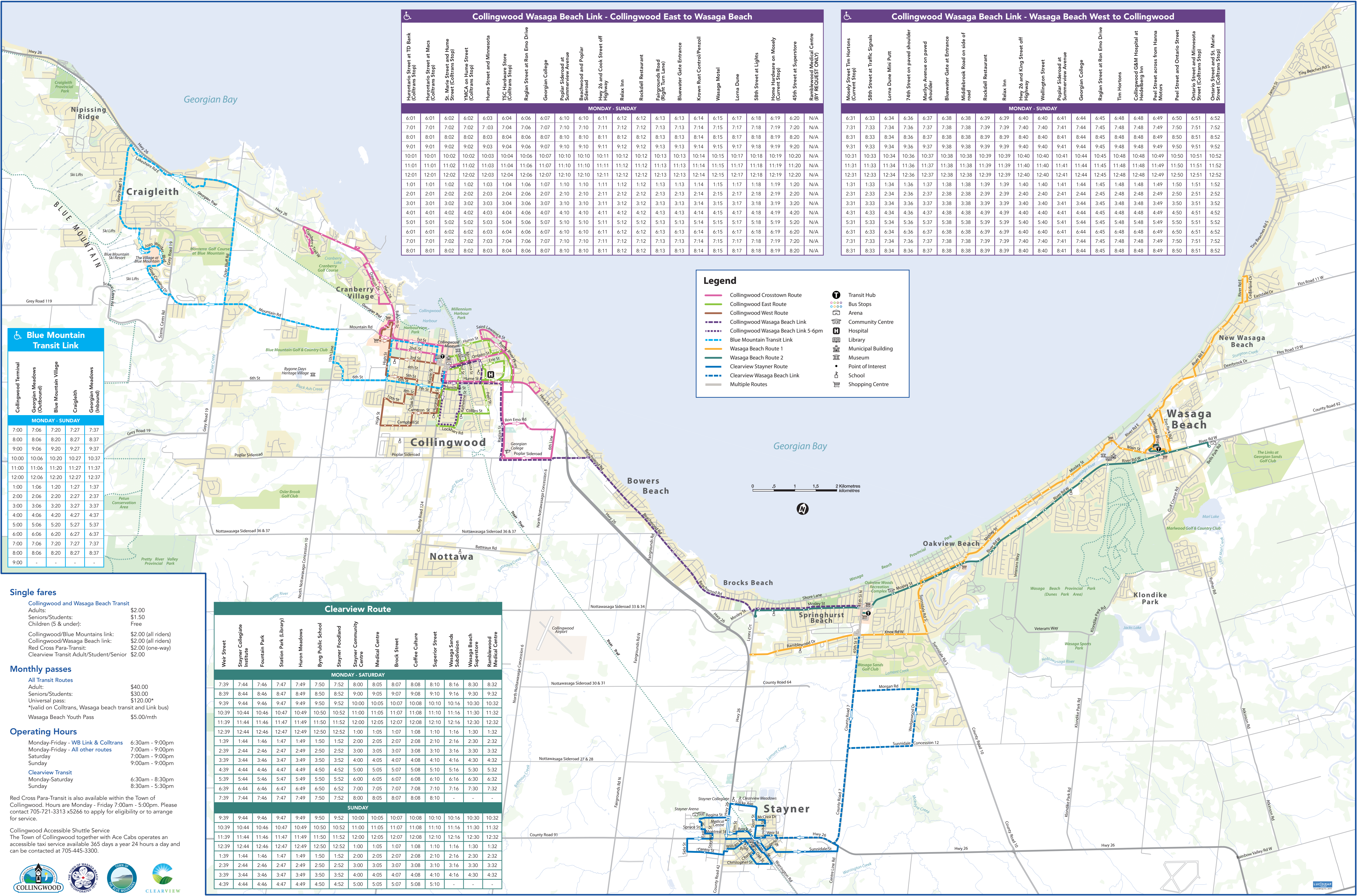


Table with 24 columns representing bus stops and 24 rows representing departure times from 6:01 to 8:01. Title: Collingwood Wasaga Beach Link - Collingwood East to Wasaga Beach.

Table with 24 columns representing bus stops and 24 rows representing departure times from 6:31 to 8:31. Title: Collingwood Wasaga Beach Link - Wasaga Beach West to Collingwood.

Table with 4 columns representing bus stops and 24 rows representing departure times from 7:00 to 9:00. Title: Blue Mountain Transit Link.

Single fares
Collingwood and Wasaga Beach Transit
Adults: \$2.00
Seniors/Students: \$1.50
Children (5 & under): Free
Collingwood/Blue Mountains link: \$2.00 (all riders)
Collingwood/Wasaga Beach link: \$2.00 (all riders)
Red Cross Para-Transit: \$2.00 (one-way)
Clearview Transit Adult/Student/Senior: \$2.00

Monthly passes
All Transit Routes
Adult: \$40.00
Seniors/Students: \$30.00
Universal pass: \$120.00*
(*valid on Colltrans, Wasaga beach transit and Link bus)
Wasaga Beach Youth Pass: \$5.00/mth

Operating Hours
Monday-Friday - WB Link & Colltrans: 6:30am - 9:00pm
Monday-Friday - All other routes: 7:00am - 9:00pm
Saturday: 7:00am - 9:00pm
Sunday: 9:00am - 9:00pm
Clearview Transit
Monday-Saturday: 6:30am - 8:30pm
Sunday: 8:30am - 5:30pm

Red Cross Para-Transit is also available within the Town of Collingwood. Hours are Monday - Friday 7:00am - 5:00pm. Please contact 705-721-3313 x5266 to apply for eligibility or to arrange for service.



APPENDIX C

Traffic Data



Turning Movement Count (1 . HIGHWAY 26 & SILVER GLEN BLVD)

Start Time	E Approach HIGHWAY 26					S Approach SILVER GLEN BLVD					W Approach HIGHWAY 26					Int. Total (15 min)		Int. Total (1 hr)
	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	U-Turn W:W	Peds W:	Approach Total			
06:00:00	24	0	0	0	24	1	0	0	0	1	0	20	0	0	20	45		
06:15:00	21	0	0	0	21	0	1	0	0	1	0	22	0	0	22	44		
06:30:00	30	0	0	0	30	1	1	0	0	2	1	41	0	0	42	74		
06:45:00	42	0	0	0	42	2	0	0	0	2	0	45	0	0	45	89		252
07:00:00	60	1	0	0	61	0	0	0	0	0	1	50	0	0	51	112		319
07:15:00	96	3	0	0	99	2	0	0	0	2	3	41	0	0	44	145		420
07:30:00	92	0	0	0	92	3	3	0	0	6	1	65	0	0	66	164		510
07:45:00	112	6	0	0	118	4	0	0	0	4	2	86	0	0	88	210		631
08:00:00	99	4	0	0	103	7	3	1	0	11	3	101	0	0	104	218		737
08:15:00	86	7	0	0	93	6	4	0	0	10	3	102	0	0	105	208		800
08:30:00	113	2	0	0	115	4	1	0	0	5	2	97	0	0	99	219		855
08:45:00	91	2	0	0	93	6	1	0	1	7	0	107	0	0	107	207		852
09:00:00	93	4	0	0	97	5	2	0	0	7	1	82	0	0	83	187		821
09:15:00	78	4	0	0	82	6	2	0	0	8	1	92	0	0	93	183		796
09:30:00	89	3	0	0	92	7	3	0	2	10	0	86	0	0	86	188		765
09:45:00	77	2	0	0	79	2	2	0	0	4	1	90	0	0	91	174		732
BREAK																		
15:00:00	103	7	0	0	110	4	2	0	0	6	0	84	0	0	84	200		
15:15:00	84	6	0	0	90	3	1	0	0	4	5	105	0	0	110	204		
15:30:00	104	4	0	1	108	5	0	0	0	5	0	137	0	0	137	250		
15:45:00	131	2	0	0	133	5	0	0	2	5	2	113	0	0	115	253		907
16:00:00	145	4	0	0	149	4	4	1	0	9	3	105	0	0	108	266		973
16:15:00	129	6	0	0	135	5	0	0	0	5	1	120	0	0	121	261		1030
16:30:00	144	4	0	0	148	2	2	0	2	4	2	120	0	0	122	274		1054



16:45:00	137	5	0	0	142	2	3	0	0	5	1	126	0	0	127	274	1075
17:00:00	142	3	1	0	146	5	1	1	2	7	2	115	0	0	117	270	1079
17:15:00	162	4	0	0	166	3	0	0	0	3	0	97	0	0	97	266	1084
17:30:00	116	9	0	0	125	6	3	0	0	9	4	80	0	0	84	218	1028
17:45:00	116	6	0	0	122	3	4	0	0	7	0	71	0	0	71	200	954
18:00:00	118	4	0	0	122	2	0	0	1	2	0	72	0	0	72	196	880
18:15:00	119	5	0	0	124	2	0	0	0	2	2	82	0	0	84	210	824
18:30:00	76	2	0	0	78	2	1	0	0	3	1	65	0	0	66	147	753
18:45:00	94	2	1	0	97	3	1	0	0	4	0	53	1	0	54	155	708
Grand Total	3123	111	2	1	3236	112	45	3	10	160	42	2672	1	0	2715	6111	-
Approach%	96.5%	3.4%	0.1%		-	70%	28.1%	1.9%		-	1.5%	98.4%	0%		-	-	-
Totals %	51.1%	1.8%	0%		53%	1.8%	0.7%	0%		2.6%	0.7%	43.7%	0%		44.4%	-	-
Heavy	99	4	0		-	5	2	0		-	5	86	0		-	-	-
Heavy %	3.2%	3.6%	0%		-	4.5%	4.4%	0%		-	11.9%	3.2%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Mostly Cloudy (0.7 °C)

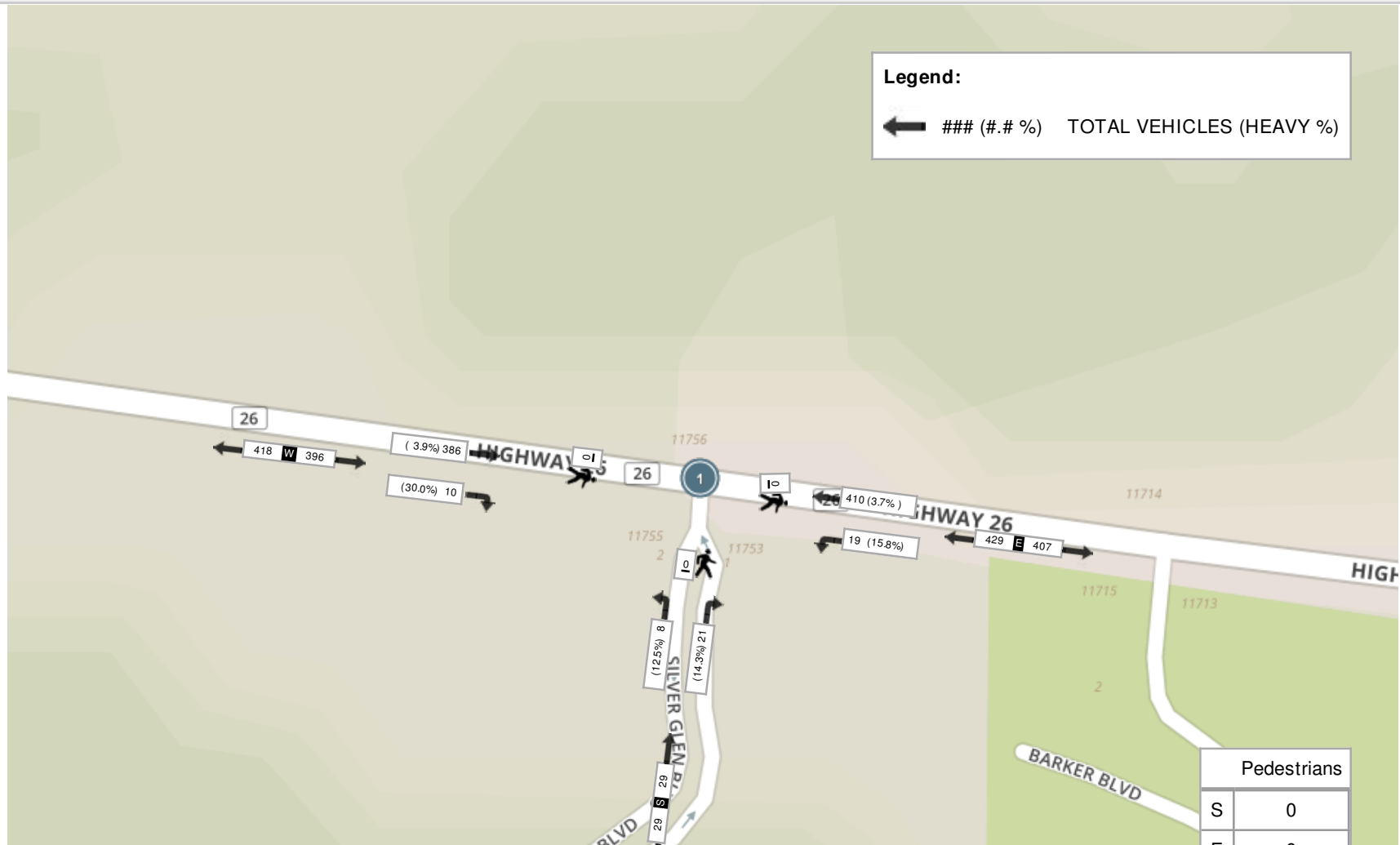
Start Time	E Approach HIGHWAY 26					S Approach SILVER GLEN BLVD					W Approach HIGHWAY 26					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
07:45:00	112	6	0	0	118	4	0	0	0	4	2	86	0	0	88	210
08:00:00	99	4	0	0	103	7	3	1	0	11	3	101	0	0	104	218
08:15:00	86	7	0	0	93	6	4	0	0	10	3	102	0	0	105	208
08:30:00	113	2	0	0	115	4	1	0	0	5	2	97	0	0	99	219
Grand Total	410	19	0	0	429	21	8	1	0	30	10	386	0	0	396	855
Approach%	95.6%	4.4%	0%		-	70%	26.7%	3.3%		-	2.5%	97.5%	0%		-	-
Totals %	48%	2.2%	0%		50.2%	2.5%	0.9%	0.1%		3.5%	1.2%	45.1%	0%		46.3%	-
PHF	0.91	0.68	0		0.91	0.75	0.5	0.25		0.68	0.83	0.95	0		0.94	-
Heavy	15	3	0		18	3	1	0		4	3	15	0		18	-
Heavy %	3.7%	15.8%	0%		4.2%	14.3%	12.5%	0%		13.3%	30%	3.9%	0%		4.5%	-
Lights	395	16	0		411	18	7	1		26	7	371	0		378	-
Lights %	96.3%	84.2%	0%		95.8%	85.7%	87.5%	100%		86.7%	70%	96.1%	0%		95.5%	-
Single-Unit Trucks	11	3	0		14	3	0	0		3	2	6	0		8	-
Single-Unit Trucks %	2.7%	15.8%	0%		3.3%	14.3%	0%	0%		10%	20%	1.6%	0%		2%	-
Buses	2	0	0		2	0	1	0		1	1	5	0		6	-
Buses %	0.5%	0%	0%		0.5%	0%	12.5%	0%		3.3%	10%	1.3%	0%		1.5%	-
Articulated Trucks	2	0	0		2	0	0	0		0	0	4	0		4	-
Articulated Trucks %	0.5%	0%	0%		0.5%	0%	0%	0%		0%	0%	1%	0%		1%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-



Peak Hour: 04:30 PM - 05:30 PM Weather: Overcast (4.1 °C)

Start Time	E Approach HIGHWAY 26					S Approach SILVER GLEN BLVD					W Approach HIGHWAY 26					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
16:30:00	144	4	0	0	148	2	2	0	2	4	2	120	0	0	122	274
16:45:00	137	5	0	0	142	2	3	0	0	5	1	126	0	0	127	274
17:00:00	142	3	1	0	146	5	1	1	2	7	2	115	0	0	117	270
17:15:00	162	4	0	0	166	3	0	0	0	3	0	97	0	0	97	266
Grand Total	585	16	1	0	602	12	6	1	4	19	5	458	0	0	463	1084
Approach%	97.2%	2.7%	0.2%		-	63.2%	31.6%	5.3%		-	1.1%	98.9%	0%		-	-
Totals %	54%	1.5%	0.1%		55.5%	1.1%	0.6%	0.1%		1.8%	0.5%	42.3%	0%		42.7%	-
PHF	0.9	0.8	0.25		0.91	0.6	0.5	0.25		0.68	0.63	0.91	0		0.91	-
Heavy	10	0	0		10	0	0	0		0	0	13	0		13	-
Heavy %	1.7%	0%	0%		1.7%	0%	0%	0%		0%	0%	2.8%	0%		2.8%	-
Lights	575	16	1		592	12	6	1		19	5	445	0		450	-
Lights %	98.3%	100%	100%		98.3%	100%	100%	100%		100%	100%	97.2%	0%		97.2%	-
Single-Unit Trucks	9	0	0		9	0	0	0		0	0	9	0		9	-
Single-Unit Trucks %	1.5%	0%	0%		1.5%	0%	0%	0%		0%	0%	2%	0%		1.9%	-
Buses	0	0	0		0	0	0	0		0	0	2	0		2	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.4%	0%		0.4%	-
Articulated Trucks	1	0	0		1	0	0	0		0	0	2	0		2	-
Articulated Trucks %	0.2%	0%	0%		0.2%	0%	0%	0%		0%	0%	0.4%	0%		0.4%	-
Pedestrians	-	-	-	0	-	-	-	-	4	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Mostly Cloudy (0.7 °C)





Site: Highway 26 & Silver Creek Drive
 Surveyor: Zofia Holland

NORTH APPROACH					EAST APPROACH					SOUTH APPROACH					WEST APPROACH				
DATE	START TIME	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	Intersection Total	
		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left			
7/17/2019	7:00:00	0	0	0	0	0	74	0	0	0	0	0	0	0	55	0	0	129	
7/17/2019	7:15:00	0	0	0	0	0	59	1	1	3	0	0	0	0	85	0	0	148	
7/17/2019	7:30:00	0	0	0	0	0	83	0	0	1	0	2	1	0	63	0	0	149	
7/17/2019	7:45:00	0	0	0	0	0	88	0	0	3	0	0	0	0	71	0	0	162	
7/17/2019	8:00:00	0	0	0	0	0	75	2	0	3	0	0	0	0	67	0	0	147	
7/17/2019	8:15:00	0	0	0	0	0	89	2	0	7	0	0	0	0	111	0	0	209	
7/17/2019	8:30:00	0	0	0	0	0	111	1	1	6	0	0	0	0	123	0	0	241	
7/17/2019	8:45:00	0	0	0	0	0	99	2	0	4	0	0	0	0	110	0	0	215	
7/17/2019	16:00:00	0	0	0	0	0	117	3	0	5	0	0	0	0	137	0	0	262	
7/17/2019	16:15:00	0	0	0	0	0	147	5	0	2	0	0	0	0	137	0	0	291	
7/17/2019	16:30:00	0	0	0	0	0	131	3	0	1	0	0	0	0	123	0	0	258	
7/17/2019	16:45:00	0	0	0	0	0	129	0	0	6	0	0	0	0	148	0	0	283	
7/17/2019	17:00:00	0	0	0	0	0	124	4	0	1	0	0	0	0	126	0	0	255	
7/17/2019	17:15:00	0	0	0	0	0	123	1	0	4	0	0	0	1	145	0	0	274	
7/17/2019	17:30:00	0	0	0	0	0	122	3	0	1	0	0	0	1	147	0	0	274	
7/17/2019	17:45:00	0	0	0	0	0	85	2	0	5	0	0	0	0	116	0	0	208	

NORTH APPROACH					EAST APPROACH					SOUTH APPROACH					WEST APPROACH				
DATE	PEAK HOUR	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	Intersection Total	
		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left			
7/17/2019	8:00am-9:00am	0	0	0	0	0	374	7	1	20	0	0	0	0	411	0	0	812	
7/17/2019	4:45pm-5:45pm	0	0	0	0	0	524	11	0	14	0	0	0	0	545	0	0	1094	

Heavy % AM	0%	0%	0%	0%	6%	14%	0%	0%	0%	0%	3%	0%
Heavy % PM	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%	0%	

HWY 26 - West Approach										
	Straight					Right				
Start Time	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians
7:00	38	17								
7:15	49	34	1	1						
7:30	40	21	1	1						
7:45	50	20	1							
8:00	49	14	4							
8:15	75	32	4							
8:30	94	27	2							
8:45	74	35	1							

HWY 26 - West Approach										
	Straight					Right				
Start Time	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians
4:00	102	31	4							
4:15	104	30	3							
4:30	98	22	3							
4:45	116	31	1							
5:00	104	21	1							
5:15	113	29	3			1				
5:30	111	34	2				1			
5:45	94	20	2							

HWY 26 - East Approach										
	Straight					Left				
Start Time	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians
7:00	39	31	4							
7:15	32	20	7				1			1
7:30	51	28	4							
7:45	57	27	4							
8:00	45	27	3			1	1			
8:15	59	24	6			1	1			
8:30	68	35	7	1	1	1				
8:45	74	20	5			1		1		

HWY 26 - East Approach										
	Straight					Left				
Start Time	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians	Cars	Pick-Ups	Heavy Vehicles	Bikes	Pedestrians
4:00	96	20	1			1	2			
4:15	111	30	6			3	2			
4:30	111	19	1			2	1			
4:45	107	18	4							
5:00	97	26	1			4				
5:15	98	23	2			1				
5:30	101	19	2			2	1			
5:45	64	18	3			1	1			

APPENDIX D

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX E

Detailed Capacity Analysis Worksheets

HCM Unsignalized Intersection Capacity Analysis

1: Silver Glen Blvd & Highway 26

Existing Conditions AM

07/22/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	552	15	28	587	12	31
Future Volume (Veh/h)	552	15	28	587	12	31
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	563	15	29	599	12	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	None			TWLT		
Median storage veh				2		
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			578		1220	563
vC1, stage 1 conf vol					563	
vC2, stage 2 conf vol					657	
vCu, unblocked vol			578		1220	563
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)					5.5	
tF (s)			2.2		3.6	3.4
p0 queue free %			97		97	94
cM capacity (veh/h)			986		392	504
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	563	15	29	599	44	
Volume Left	0	0	29	0	12	
Volume Right	0	15	0	0	32	
cSH	1700	1700	986	1700	692	
Volume to Capacity	0.33	0.01	0.03	0.35	0.06	
Queue Length 95th (m)	0.0	0.0	0.7	0.0	1.5	
Control Delay (s)	0.0	0.0	8.8	0.0	13.1	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.4		13.1	
Approach LOS					B	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			40.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

Existing Conditions AM

07/22/2019

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	547	0	7	592	0	20
Future Volume (Veh/h)	547	0	7	592	0	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	651	0	8	705	0	24
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			651		1372	652
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			651		1372	652
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	95
cM capacity (veh/h)			881		161	471
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	651	0	8	705	24	
Volume Left	0	0	8	0	0	
Volume Right	0	0	0	0	24	
cSH	1700	1700	881	1700	471	
Volume to Capacity	0.38	0.00	0.01	0.41	0.05	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	1.2	
Control Delay (s)	0.0	0.0	9.1	0.0	13.1	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.1		13.1	
Approach LOS					B	
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			41.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Silver Glen Blvd & Highway 26

Existing Conditions PM

07/22/2019

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	655	8	23	837	9	18
Future Volume (Veh/h)	655	8	23	837	9	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	662	8	23	845	9	18
Pedestrians	4			4	4	
Lane Width (m)	3.5			3.5	3.2	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	0			0	0	
Right turn flare (veh)						2
Median type	None			TWLTL		
Median storage veh	2					
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume				674	1561	670
vC1, stage 1 conf vol				666		
vC2, stage 2 conf vol				895		
vCu, unblocked vol				674	1561	670
tC, single (s)				4.1	6.4	6.2
tC, 2 stage (s)				5.4		
tF (s)				2.2	3.5	3.3
p0 queue free %				98	97	96
cM capacity (veh/h)				924	324	457
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	662	8	23	845	27	
Volume Left	0	0	23	0	9	
Volume Right	0	8	0	0	18	
cSH	1700	1700	924	1700	686	
Volume to Capacity	0.39	0.00	0.02	0.50	0.04	
Queue Length 95th (m)	0.0	0.0	0.6	0.0	0.9	
Control Delay (s)	0.0	0.0	9.0	0.0	14.3	
Lane LOS				A		B
Approach Delay (s)	0.0				0.2	14.3
Approach LOS						B
Intersection Summary						
Average Delay				0.4		
Intersection Capacity Utilization				55.3%	ICU Level of Service	
Analysis Period (min)				15	B	

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

Existing Conditions PM

07/22/2019

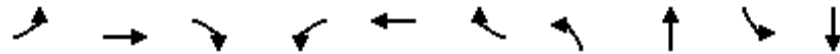
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	649	0	11	835	0	14
Future Volume (Veh/h)	649	0	11	835	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	690	0	12	888	0	15
Pedestrians						
Lane Width (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			690		1602	690
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			690		1602	690
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	97
cM capacity (veh/h)			914		116	449
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	690	0	12	888	15	
Volume Left	0	0	12	0	0	
Volume Right	0	0	0	0	15	
cSH	1700	1700	914	1700	449	
Volume to Capacity	0.41	0.00	0.01	0.52	0.03	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.8	
Control Delay (s)	0.0	0.0	9.0	0.0	13.3	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.1		13.3	
Approach LOS					B	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			53.9%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

2025 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	626	17	34	664	49	15	41	161	70
v/c Ratio	0.05	0.53	0.02	0.08	0.62	0.05	0.06	0.08	0.51	0.13
Control Delay	6.7	10.0	3.5	6.9	12.7	2.5	17.2	0.3	25.3	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	10.0	3.5	6.9	12.7	2.5	17.2	0.3	25.3	0.5
Queue Length 50th (m)	0.8	34.4	0.0	1.3	40.4	0.0	1.2	0.0	14.7	0.0
Queue Length 95th (m)	3.9	76.7	2.3	5.4	#100.9	3.7	4.9	0.0	29.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	418	1185	812	439	1063	1044	418	651	493	698
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	0.05	0.53	0.02	0.08	0.62	0.05	0.04	0.06	0.33	0.10

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2025 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	613	17	33	651	45	15	0	40	148	0	64
Future Volume (vph)	19	613	17	33	651	45	15	0	40	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.35	1.00	1.00	0.37	1.00	1.00	0.71	1.00		0.73	1.00	
Satd. Flow (perm)	637	1807	1229	671	1620	1566	1143	1401		1345	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	626	17	34	664	49	15	0	41	161	0	70
RTOR Reduction (vph)	0	0	6	0	0	19	0	33	0	0	57	0
Lane Group Flow (vph)	21	626	11	34	664	30	15	8	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	396	1123	764	417	1007	974	216	264		254	295	
v/s Ratio Prot		0.35			c0.41			0.01			0.01	
v/s Ratio Perm	0.03		0.01	0.05		0.02	0.01			c0.12		
v/c Ratio	0.05	0.56	0.01	0.08	0.66	0.03	0.07	0.03		0.63	0.04	
Uniform Delay, d1	4.3	6.4	4.2	4.4	7.0	4.2	19.4	19.2		21.7	19.3	
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	2.0	0.0	0.4	3.4	0.1	0.1	0.0		5.1	0.1	
Delay (s)	4.6	8.4	4.2	4.8	10.4	4.3	19.5	19.3		26.8	19.4	
Level of Service	A		A	A	B	A	B	B		C	B	
Approach Delay (s)		8.1			9.8			19.4			24.6	
Approach LOS		A			A			B			C	
Intersection Summary												
HCM 2000 Control Delay			11.5									
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			58.2									
Intersection Capacity Utilization			58.3%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2025 Future Background AM

07/22/2019

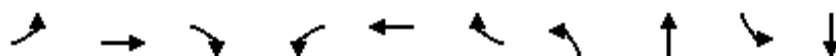
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	617	0	8	711	0	22
Future Volume (Veh/h)	617	0	8	711	0	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	735	0	10	846	0	26
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			735		1601	736
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			735		1601	736
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			818		116	422
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	735	0	10	846	26	
Volume Left	0	0	10	0	0	
Volume Right	0	0	0	0	26	
cSH	1700	1700	818	1700	422	
Volume to Capacity	0.43	0.00	0.01	0.50	0.06	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.5	
Control Delay (s)	0.0	0.0	9.5	0.0	14.1	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.1		14.1	
Approach LOS					B	
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			47.7%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

2025 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	734	12	32	938	151	12	23	90	38
v/c Ratio	0.19	0.52	0.01	0.07	0.66	0.12	0.06	0.05	0.43	0.10
Control Delay	6.0	7.0	2.2	4.3	9.5	1.2	29.9	0.2	38.4	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	7.0	2.2	4.3	9.5	1.2	29.9	0.2	38.4	0.5
Queue Length 50th (m)	2.7	44.1	0.0	1.2	68.6	0.5	1.6	0.0	12.8	0.0
Queue Length 95th (m)	8.4	80.6	1.4	4.2	128.9	5.5	6.1	0.0	26.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	334	1404	1200	489	1418	1237	334	575	347	518
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	0.19	0.52	0.01	0.07	0.66	0.12	0.04	0.04	0.26	0.07

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2025 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	727	12	32	929	139	12	0	23	83	0	35
Future Volume (vph)	59	727	12	32	929	139	12	0	23	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1782	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.24	1.00	1.00	0.34	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	435	1824	1556	635	1842	1566	1320	1553		1367	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	734	12	32	938	151	12	0	23	90	0	38
RTOR Reduction (vph)	0	0	3	0	0	35	0	20	0	0	33	0
Lane Group Flow (vph)	64	734	9	32	938	116	12	3	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	62.2	62.2	62.2	62.2	62.2	62.2	10.3	10.3		10.3	10.3	
Effective Green, g (s)	62.2	62.2	62.2	62.2	62.2	62.2	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	324	1358	1159	473	1372	1166	162	191		168	193	
v/s Ratio Prot		0.40			c0.51			0.00			0.00	
v/s Ratio Perm	0.15		0.01	0.05		0.07	0.01			c0.07		
v/c Ratio	0.20	0.54	0.01	0.07	0.68	0.10	0.07	0.01		0.54	0.02	
Uniform Delay, d1	3.2	4.5	2.7	2.9	5.5	2.9	32.4	32.1		34.4	32.2	
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	1.4	1.5	0.0	0.3	2.8	0.2	0.2	0.0		3.3	0.1	
Delay (s)	4.5	6.1	2.7	3.1	8.3	3.1	32.6	32.2		37.6	32.2	
Level of Service	A	A	A	A	A	A	C	C		D	C	
Approach Delay (s)		5.9			7.5			32.3			36.0	
Approach LOS		A			A			C			D	
Intersection Summary												
HCM 2000 Control Delay			9.0									
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			83.5							11.0		
Intersection Capacity Utilization			69.5%									
ICU Level of Service										C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2025 Future Background PM
07/22/2019

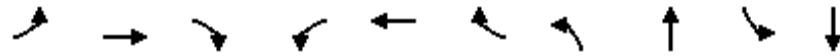
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	769	0	12	948	0	15
Future Volume (Veh/h)	769	0	12	948	0	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	818	0	13	1009	0	16
Pedestrians						
Lane 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	818			1853	818	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	818			1853	818	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	96	
cM capacity (veh/h)	819			81	379	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	818	0	13	1009	16	
Volume Left	0	0	13	0	0	
Volume Right	0	0	0	0	16	
cSH	1700	1700	819	1700	379	
Volume to Capacity	0.48	0.00	0.02	0.59	0.04	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	1.0	
Control Delay (s)	0.0	0.0	9.5	0.0	14.9	
Lane LOS	A			B		
Approach Delay (s)	0.0	0.1		14.9		
Approach LOS				B		
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	59.9%			ICU Level of Service	B	
Analysis Period (min)	15					

Queues

2030 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	673	18	36	716	49	16	44	161	70
v/c Ratio	0.06	0.57	0.02	0.09	0.67	0.05	0.06	0.09	0.51	0.14
Control Delay	6.8	10.7	3.5	7.1	14.4	2.5	17.2	0.4	25.4	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	10.7	3.5	7.1	14.4	2.5	17.2	0.4	25.4	0.6
Queue Length 50th (m)	0.8	38.6	0.0	1.4	46.2	0.0	1.3	0.0	14.7	0.0
Queue Length 95th (m)	3.9	86.3	2.3	5.8	#125.7	3.7	5.0	0.0	29.5	0.0
Internal Link Dist (m)	509.6				563.3		77.4		109.3	
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	375	1185	812	402	1063	1044	418	635	491	682
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	0.06	0.57	0.02	0.09	0.67	0.05	0.04	0.07	0.33	0.10

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2030 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	660	18	35	702	45	16	0	43	148	0	64
Future Volume (vph)	19	660	18	35	702	45	16	0	43	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.31	1.00	1.00	0.34	1.00	1.00	0.71	1.00		0.73	1.00	
Satd. Flow (perm)	573	1807	1229	614	1620	1566	1143	1401		1342	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	673	18	36	716	49	16	0	44	161	0	70
RTOR Reduction (vph)	0	0	7	0	0	19	0	36	0	0	57	0
Lane Group Flow (vph)	21	673	11	36	716	30	16	8	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	356	1123	764	381	1007	974	216	264		253	295	
v/s Ratio Prot		0.37			c0.44			0.01			0.01	
v/s Ratio Perm	0.04		0.01	0.06		0.02	0.01			c0.12		
v/c Ratio	0.06	0.60	0.01	0.09	0.71	0.03	0.07	0.03		0.64	0.04	
Uniform Delay, d1	4.3	6.6	4.2	4.4	7.5	4.2	19.4	19.3		21.8	19.3	
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	2.4	0.0	0.5	4.3	0.1	0.1	0.0		5.2	0.1	
Delay (s)	4.6	9.0	4.2	4.9	11.7	4.3	19.6	19.3		26.9	19.4	
Level of Service	A	A	A	A	B	A	B	B		C	B	
Approach Delay (s)		8.7			11.0			19.4			24.6	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			12.1									
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			58.2									
Intersection Capacity Utilization			61.0%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2: Silver Creek Dr & Highway 26

2030 Future Background AM
07/22/2019

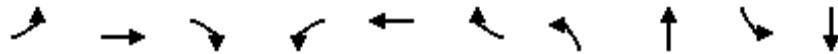
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	663	0	8	761	0	24
Future Volume (Veh/h)	663	0	8	761	0	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	789	0	10	906	0	29
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			789		1715	790
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			789		1715	790
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	93
cM capacity (veh/h)			780		99	393
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	789	0	10	906	29	
Volume Left	0	0	10	0	0	
Volume Right	0	0	0	0	29	
cSH	1700	1700	780	1700	393	
Volume to Capacity	0.46	0.00	0.01	0.53	0.07	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.8	
Control Delay (s)	0.0	0.0	9.7	0.0	14.9	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.1		14.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			50.4%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

2030 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	791	13	33	1011	151	13	25	90	38
v/c Ratio	0.23	0.56	0.01	0.07	0.71	0.12	0.06	0.06	0.43	0.11
Control Delay	6.8	7.6	2.1	4.4	11.0	1.4	30.1	0.3	38.3	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	7.6	2.1	4.4	11.0	1.4	30.1	0.3	38.3	0.6
Queue Length 50th (m)	2.8	50.4	0.0	1.3	80.6	0.9	1.8	0.0	12.8	0.0
Queue Length 95th (m)	9.2	92.3	1.5	4.4	155.2	6.0	6.5	0.0	26.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	284	1403	1199	446	1417	1234	335	556	347	501
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	0.23	0.56	0.01	0.07	0.71	0.12	0.04	0.04	0.26	0.08

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2030 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	783	13	33	1001	139	13	0	25	83	0	35
Future Volume (vph)	59	783	13	33	1001	139	13	0	25	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1782	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.20	1.00	1.00	0.31	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	370	1824	1556	580	1842	1566	1320	1553		1365	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	791	13	33	1011	151	13	0	25	90	0	38
RTOR Reduction (vph)	0	0	3	0	0	32	0	22	0	0	33	0
Lane Group Flow (vph)	64	791	10	33	1011	119	13	3	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	62.1	62.1	62.1	62.1	62.1	62.1	10.3	10.3		10.3	10.3	
Effective Green, g (s)	62.1	62.1	62.1	62.1	62.1	62.1	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	275	1358	1158	431	1371	1166	163	191		168	193	
v/s Ratio Prot		0.43			c0.55			0.00			0.00	
v/s Ratio Perm	0.17		0.01	0.06		0.08	0.01			c0.07		
v/c Ratio	0.23	0.58	0.01	0.08	0.74	0.10	0.08	0.02		0.54	0.02	
Uniform Delay, d1	3.3	4.8	2.7	2.9	6.0	2.9	32.4	32.1		34.3	32.1	
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	2.0	1.8	0.0	0.3	3.6	0.2	0.2	0.0		3.3	0.1	
Delay (s)	5.3	6.6	2.8	3.2	9.6	3.1	32.6	32.1		37.6	32.2	
Level of Service	A	A	A	A	A	A	C	C		D	C	
Approach Delay (s)		6.5			8.6			32.3			36.0	
Approach LOS		A			A			C			D	
Intersection Summary												
HCM 2000 Control Delay			9.8									
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			83.4							11.0		
Intersection Capacity Utilization			73.1%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2030 Future Background PM
07/22/2019

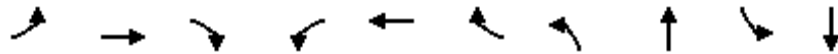
	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↖	
Traffic Volume (veh/h)	823	0	13	1019	0	16
Future Volume (Veh/h)	823	0	13	1019	0	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	876	0	14	1084	0	17
Pedestrians						
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	876			1988	876	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	876			1988	876	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	95	
cM capacity (veh/h)	779			67	351	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	876	0	14	1084	17	
Volume Left	0	0	14	0	0	
Volume Right	0	0	0	0	17	
cSH	1700	1700	779	1700	351	
Volume to Capacity	0.52	0.00	0.02	0.64	0.05	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	1.2	
Control Delay (s)	0.0	0.0	9.7	0.0	15.8	
Lane LOS	A			C		
Approach Delay (s)	0.0	0.1			15.8	
Approach LOS				C		
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	63.6%			ICU Level of Service	B	
Analysis Period (min)	15					

Queues

2035 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	726	19	39	770	49	17	47	161	70
v/c Ratio	0.06	0.61	0.02	0.11	0.73	0.05	0.06	0.10	0.51	0.15
Control Delay	7.1	11.8	3.4	7.4	16.3	2.5	17.3	0.5	25.4	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	11.8	3.4	7.4	16.3	2.5	17.3	0.5	25.4	0.8
Queue Length 50th (m)	0.8	43.6	0.0	1.5	52.8	0.0	1.4	0.0	14.7	0.0
Queue Length 95th (m)	4.0	98.6	2.4	6.3	#140.5	3.8	5.3	0.0	29.5	0.8
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	333	1184	812	361	1062	1043	418	619	489	667
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	0.06	0.61	0.02	0.11	0.73	0.05	0.04	0.08	0.33	0.10

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2035 Future Background AM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	711	19	38	755	45	17	0	46	148	0	64
Future Volume (vph)	19	711	19	38	755	45	17	0	46	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.28	1.00	1.00	0.30	1.00	1.00	0.71	1.00		0.73	1.00	
Satd. Flow (perm)	509	1807	1229	551	1620	1566	1143	1401		1338	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	726	19	39	770	49	17	0	47	161	0	70
RTOR Reduction (vph)	0	0	7	0	0	19	0	38	0	0	57	0
Lane Group Flow (vph)	21	726	12	39	770	30	17	9	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	316	1123	764	342	1007	974	216	264		252	295	
v/s Ratio Prot		0.40			c0.48			0.01			0.01	
v/s Ratio Perm	0.04		0.01	0.07		0.02	0.01			c0.12		
v/c Ratio	0.07	0.65	0.02	0.11	0.76	0.03	0.08	0.03		0.64	0.04	
Uniform Delay, d1	4.3	7.0	4.2	4.5	7.9	4.2	19.4	19.3		21.8	19.3	
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	0.4	2.9	0.0	0.7	5.5	0.1	0.2	0.1		5.2	0.1	
Delay (s)	4.7	9.8	4.2	5.2	13.4	4.3	19.6	19.3		27.0	19.4	
Level of Service	A	A	A	A	B	A	B	B		C	B	
Approach Delay (s)		9.6			12.5			19.4			24.7	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			13.0									
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			58.2									
Intersection Capacity Utilization			63.8%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2035 Future Background AM

07/22/2019

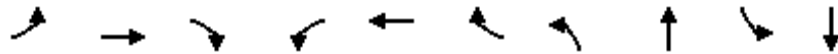
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	713	0	9	815	0	25
Future Volume (Veh/h)	713	0	9	815	0	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	849	0	11	970	0	30
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			849		1841	850
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			849		1841	850
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	92
cM capacity (veh/h)			740		83	363
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	849	0	11	970	30	
Volume Left	0	0	11	0	0	
Volume Right	0	0	0	0	30	
cSH	1700	1700	740	1700	363	
Volume to Capacity	0.50	0.00	0.01	0.57	0.08	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	2.0	
Control Delay (s)	0.0	0.0	9.9	0.0	15.8	
Lane LOS			A	C		
Approach Delay (s)	0.0		0.1		15.8	
Approach LOS					C	
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			53.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues

2035 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	853	14	36	1089	151	14	26	90	38
v/c Ratio	0.28	0.61	0.01	0.09	0.77	0.12	0.07	0.07	0.43	0.11
Control Delay	8.6	8.4	2.0	4.6	13.2	1.5	30.1	0.3	38.3	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	8.4	2.0	4.6	13.2	1.5	30.1	0.3	38.3	0.7
Queue Length 50th (m)	2.9	57.7	0.0	1.4	95.8	1.2	1.9	0.0	12.8	0.0
Queue Length 95th (m)	10.7	107.0	1.6	4.7	#226.6	6.5	6.8	0.0	26.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	229	1403	1199	401	1416	1231	336	537	347	486
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	0.28	0.61	0.01	0.09	0.77	0.12	0.04	0.05	0.26	0.08

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2035 Future Background PM

1: Silver Glen Blvd & Highway 26

07/22/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	844	14	36	1078	139	14	0	26	83	0	35
Future Volume (vph)	59	844	14	36	1078	139	14	0	26	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1782	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.16	1.00	1.00	0.28	1.00	1.00	0.73	1.00		0.74	1.00	
Satd. Flow (perm)	299	1824	1556	521	1842	1566	1320	1553		1364	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	853	14	36	1089	151	14	0	26	90	0	38
RTOR Reduction (vph)	0	0	4	0	0	30	0	23	0	0	33	0
Lane Group Flow (vph)	64	853	10	36	1089	121	14	3	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	61.9	61.9	61.9	61.9	61.9	61.9	10.3	10.3		10.3	10.3	
Effective Green, g (s)	61.9	61.9	61.9	61.9	61.9	61.9	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	222	1357	1157	387	1370	1165	163	192		168	193	
v/s Ratio Prot		0.47			c0.59			0.00			0.00	
v/s Ratio Perm	0.21		0.01	0.07		0.08	0.01			c0.07		
v/c Ratio	0.29	0.63	0.01	0.09	0.79	0.10	0.09	0.02		0.54	0.02	
Uniform Delay, d1	3.5	5.1	2.7	2.9	6.7	3.0	32.3	32.0		34.2	32.0	
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	3.3	2.2	0.0	0.5	4.8	0.2	0.2	0.0		3.3	0.1	
Delay (s)	6.7	7.3	2.8	3.4	11.5	3.1	32.5	32.0		37.5	32.1	
Level of Service	A	A	A	A	B	A	C	C		D	C	
Approach Delay (s)		7.2			10.3			32.2			35.9	
Approach LOS		A			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			10.8									
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			83.2							11.0		
Intersection Capacity Utilization			77.2%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2035 Future Background PM
07/22/2019

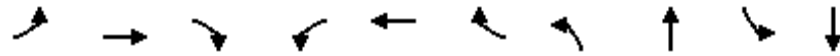
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	883	0	14	1095	0	18
Future Volume (Veh/h)	883	0	14	1095	0	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	939	0	15	1165	0	19
Pedestrians						
Lane 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	939			2134	939	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	939			2134	939	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	98			100	94	
cM capacity (veh/h)	738			54	323	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	939	0	15	1165	19	
Volume Left	0	0	15	0	0	
Volume Right	0	0	0	0	19	
cSH	1700	1700	738	1700	323	
Volume to Capacity	0.55	0.00	0.02	0.69	0.06	
Queue Length 95th (m)	0.0	0.0	0.5	0.0	1.4	
Control Delay (s)	0.0	0.0	10.0	0.0	16.8	
Lane LOS	A			C		
Approach Delay (s)	0.0		0.1		16.8	
Approach LOS				C		
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	67.6%			ICU Level of Service	C	
Analysis Period (min)	15					

Queues

2025 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	669	20	40	679	49	24	61	161	70
v/c Ratio	0.05	0.57	0.02	0.10	0.64	0.05	0.09	0.13	0.51	0.14
Control Delay	6.8	10.7	3.4	7.3	13.3	2.5	17.6	0.6	25.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	10.7	3.4	7.3	13.3	2.5	17.6	0.6	25.5	0.5
Queue Length 50th (m)	0.8	38.2	0.0	1.5	42.1	0.0	2.0	0.0	14.7	0.0
Queue Length 95th (m)	3.9	86.4	2.4	6.3	#116.5	3.8	6.6	0.0	29.5	0.0
Internal Link Dist (m)	509.6				563.3		77.4		109.3	
Turn Bay Length (m)	20.0			50.0	115.0	50.0	15.0			45.0
Base Capacity (vph)	404	1183	812	405	1061	1042	418	635	483	693
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	0.05	0.57	0.02	0.10	0.64	0.05	0.06	0.10	0.33	0.10

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2025 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	656	20	39	665	45	24	0	60	148	0	64
Future Volume (vph)	19	656	20	39	665	45	24	0	60	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.34	1.00	1.00	0.34	1.00	1.00	0.71	1.00		0.72	1.00	
Satd. Flow (perm)	617	1807	1229	617	1620	1566	1143	1401		1321	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	669	20	40	679	49	24	0	61	161	0	70
RTOR Reduction (vph)	0	0	8	0	0	19	0	49	0	0	57	0
Lane Group Flow (vph)	21	669	12	40	679	30	24	12	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	383	1122	763	383	1005	972	217	266		251	298	
v/s Ratio Prot		0.37			c0.42			0.01			0.01	
v/s Ratio Perm	0.03		0.01	0.06		0.02	0.02			c0.12		
v/c Ratio	0.05	0.60	0.02	0.10	0.68	0.03	0.11	0.04		0.64	0.04	
Uniform Delay, d1	4.3	6.7	4.2	4.5	7.2	4.3	19.5	19.3		21.8	19.3	
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	2.3	0.0	0.5	3.6	0.1	0.2	0.1		5.5	0.1	
Delay (s)	4.6	9.0	4.3	5.0	10.9	4.3	19.7	19.3		27.3	19.3	
Level of Service	A	A	A	A	B	A	B	B		C	B	
Approach Delay (s)		8.7			10.1			19.5			24.9	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			11.9				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			58.3				Sum of lost time (s)			11.0		
Intersection Capacity Utilization			59.0%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2025 Future Total AM
07/24/2019

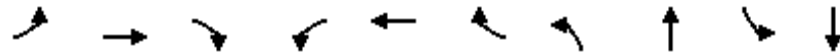
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	620	6	22	720	9	65
Future Volume (Veh/h)	620	6	22	720	9	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	738	7	26	857	11	77
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			745		1647	739
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			745		1647	739
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			97		90	82
cM capacity (veh/h)			811		107	420
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	738	7	26	857	88	
Volume Left	0	0	26	0	11	
Volume Right	0	7	0	0	77	
cSH	1700	1700	811	1700	307	
Volume to Capacity	0.43	0.00	0.03	0.50	0.29	
Queue Length 95th (m)	0.0	0.0	0.8	0.0	8.8	
Control Delay (s)	0.0	0.0	9.6	0.0	21.3	
Lane LOS			A		C	
Approach Delay (s)	0.0		0.3		21.3	
Approach LOS					C	
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			49.5%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

2025 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	763	20	53	987	151	17	34	90	38
v/c Ratio	0.21	0.55	0.02	0.11	0.70	0.12	0.08	0.08	0.43	0.10
Control Delay	6.6	7.4	1.8	4.8	10.5	1.3	30.4	0.4	38.1	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	7.4	1.8	4.8	10.5	1.3	30.4	0.4	38.1	0.6
Queue Length 50th (m)	2.8	47.1	0.0	2.1	76.6	0.8	2.3	0.0	12.8	0.0
Queue Length 95th (m)	9.0	86.7	1.8	6.4	146.1	5.9	7.6	0.0	26.4	0.0
Internal Link Dist (m)	509.6				563.3		77.4		109.3	
Turn Bay Length (m)	20.0	50.0		115.0	50.0		15.0	45.0		
Base Capacity (vph)	298	1399	1198	465	1413	1232	337	567	346	509
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	0.55	0.02	0.11	0.70	0.12	0.05	0.06	0.26	0.07

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2025 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	755	20	52	977	139	17	0	34	83	0	35
Future Volume (vph)	59	755	20	52	977	139	17	0	34	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1782	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.21	1.00	1.00	0.32	1.00	1.00	0.73	1.00		0.73	1.00	
Satd. Flow (perm)	389	1824	1556	606	1842	1566	1320	1553		1354	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	763	20	53	987	151	17	0	34	90	0	38
RTOR Reduction (vph)	0	0	5	0	0	33	0	30	0	0	33	0
Lane Group Flow (vph)	64	763	15	53	987	118	17	4	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	61.5	61.5	61.5	61.5	61.5	61.5	10.3	10.3		10.3	10.3	
Effective Green, g (s)	61.5	61.5	61.5	61.5	61.5	61.5	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	288	1354	1155	450	1368	1163	164	193		168	194	
v/s Ratio Prot		0.42			c0.54			0.00			0.00	
v/s Ratio Perm	0.16		0.01	0.09		0.08	0.01			c0.07		
v/c Ratio	0.22	0.56	0.01	0.12	0.72	0.10	0.10	0.02		0.54	0.02	
Uniform Delay, d1	3.3	4.7	2.8	3.0	5.9	3.0	32.2	31.8		34.0	31.8	
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	1.8	1.7	0.0	0.5	3.3	0.2	0.3	0.0		3.3	0.1	
Delay (s)	5.1	6.4	2.8	3.5	9.2	3.1	32.4	31.9		37.3	31.9	
Level of Service	A	A	A	A	A	A	C	C		D	C	
Approach Delay (s)		6.2			8.2			32.1			35.7	
Approach LOS		A			A			C			D	
Intersection Summary												
HCM 2000 Control Delay			9.6									
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			82.8							11.0		
Intersection Capacity Utilization			71.9%							C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2025 Future Total PM
07/24/2019

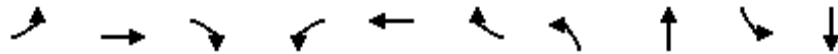
	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	
Traffic Volume (veh/h)	777	21	60	953	6	43
Future Volume (Veh/h)	777	21	60	953	6	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	827	22	64	1014	6	46
Pedestrians						
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	849			1969	827	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	849			1969	827	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	92			91	88	
cM capacity (veh/h)	798			64	375	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	827	22	64	1014	52	
Volume Left	0	0	64	0	6	
Volume Right	0	22	0	0	46	
cSH	1700	1700	798	1700	240	
Volume to Capacity	0.49	0.01	0.08	0.60	0.22	
Queue Length 95th (m)	0.0	0.0	2.0	0.0	6.1	
Control Delay (s)	0.0	0.0	9.9	0.0	24.1	
Lane LOS	A			C		
Approach Delay (s)	0.0	0.6			24.1	
Approach LOS				C		
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			60.2%	ICU Level of Service		B
Analysis Period (min)			15			

Queues

2030 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	717	21	42	731	49	26	64	161	70
v/c Ratio	0.06	0.61	0.03	0.11	0.69	0.05	0.10	0.14	0.52	0.14
Control Delay	6.9	11.6	3.3	7.6	15.0	2.5	17.8	0.6	25.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	11.6	3.3	7.6	15.0	2.5	17.8	0.6	25.6	0.6
Queue Length 50th (m)	0.8	42.8	0.0	1.6	47.9	0.0	2.2	0.0	14.7	0.0
Queue Length 95th (m)	3.9	97.3	2.5	6.8	#130.8	3.8	7.0	0.0	29.6	0.0
Internal Link Dist (m)	509.6				563.3		77.4		109.3	
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	363	1183	812	367	1061	1042	418	621	481	677
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	0.06	0.61	0.03	0.11	0.69	0.05	0.06	0.10	0.33	0.10

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2030 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	703	21	41	716	45	25	0	63	148	0	64
Future Volume (vph)	19	703	21	41	716	45	25	0	63	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.30	1.00	1.00	0.31	1.00	1.00	0.71	1.00		0.72	1.00	
Satd. Flow (perm)	554	1807	1229	560	1620	1566	1143	1401		1318	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	717	21	42	731	49	26	0	64	161	0	70
RTOR Reduction (vph)	0	0	8	0	0	19	0	52	0	0	57	0
Lane Group Flow (vph)	21	717	13	42	731	30	26	12	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	343	1122	763	347	1005	972	217	266		250	298	
v/s Ratio Prot		0.40			c0.45			0.01			0.01	
v/s Ratio Perm	0.04		0.01	0.08		0.02	0.02			c0.12		
v/c Ratio	0.06	0.64	0.02	0.12	0.73	0.03	0.12	0.05		0.64	0.04	
Uniform Delay, d1	4.4	6.9	4.2	4.5	7.6	4.3	19.6	19.3		21.8	19.3	
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	2.8	0.0	0.7	4.6	0.1	0.2	0.1		5.6	0.1	
Delay (s)	4.7	9.7	4.3	5.2	12.2	4.3	19.8	19.3		27.4	19.3	
Level of Service	A	A	A	A	B	A	B	B		C	B	
Approach Delay (s)		9.4			11.4			19.5			24.9	
Approach LOS		A			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			12.7				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			58.3				Sum of lost time (s)			11.0		
Intersection Capacity Utilization			61.7%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2030 Future Total AM
07/24/2019

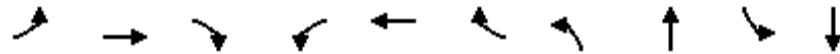
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	666	6	22	770	9	67
Future Volume (Veh/h)	666	6	22	770	9	67
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	793	7	26	917	11	80
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			800		1762	794
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			800		1762	794
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			97		88	80
cM capacity (veh/h)			773		91	391
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	793	7	26	917	91	
Volume Left	0	0	26	0	11	
Volume Right	0	7	0	0	80	
cSH	1700	1700	773	1700	279	
Volume to Capacity	0.47	0.00	0.03	0.54	0.33	
Queue Length 95th (m)	0.0	0.0	0.8	0.0	10.4	
Control Delay (s)	0.0	0.0	9.8	0.0	24.0	
Lane LOS			A		C	
Approach Delay (s)	0.0		0.3		24.0	
Approach LOS					C	
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			52.2%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

2030 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	819	21	54	1060	151	18	36	90	38
v/c Ratio	0.26	0.59	0.02	0.13	0.75	0.12	0.09	0.09	0.43	0.11
Control Delay	7.9	8.0	1.8	5.0	12.4	1.5	30.4	0.4	38.1	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	8.0	1.8	5.0	12.4	1.5	30.4	0.4	38.1	0.6
Queue Length 50th (m)	2.9	53.5	0.0	2.2	89.9	1.1	2.4	0.0	12.8	0.0
Queue Length 95th (m)	10.0	98.7	1.9	6.7	#179.2	6.4	8.1	0.0	26.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	248	1399	1197	423	1412	1229	337	549	346	493
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	0.26	0.59	0.02	0.13	0.75	0.12	0.05	0.07	0.26	0.08

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2030 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	811	21	53	1049	139	18	0	36	83	0	35
Future Volume (vph)	59	811	21	53	1049	139	18	0	36	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1782	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.18	1.00	1.00	0.29	1.00	1.00	0.73	1.00		0.73	1.00	
Satd. Flow (perm)	324	1824	1556	552	1842	1566	1320	1553		1351	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	819	21	54	1060	151	18	0	36	90	0	38
RTOR Reduction (vph)	0	0	5	0	0	31	0	32	0	0	33	0
Lane Group Flow (vph)	64	819	16	54	1060	120	18	4	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	61.4	61.4	61.4	61.4	61.4	61.4	10.3	10.3		10.3	10.3	
Effective Green, g (s)	61.4	61.4	61.4	61.4	61.4	61.4	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	1354	1155	409	1367	1162	164	193		168	195	
v/s Ratio Prot		0.45			c0.58			0.00			0.00	
v/s Ratio Perm	0.20		0.01	0.10		0.08	0.01			c0.07		
v/c Ratio	0.27	0.60	0.01	0.13	0.78	0.10	0.11	0.02		0.54	0.02	
Uniform Delay, d1	3.4	5.0	2.8	3.0	6.5	3.0	32.1	31.8		34.0	31.8	
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	2.7	2.0	0.0	0.7	4.4	0.2	0.3	0.0		3.3	0.1	
Delay (s)	6.1	7.0	2.8	3.7	10.8	3.1	32.4	31.8		37.2	31.8	
Level of Service	A	A	A	A	B	A	C	C		D	C	
Approach Delay (s)		6.8			9.6			32.0			35.6	
Approach LOS		A			A			C			D	
Intersection Summary												
HCM 2000 Control Delay			10.5									
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			82.7							11.0		
Intersection Capacity Utilization			75.6%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2030 Future Total PM
07/24/2019

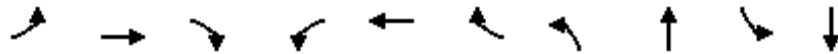
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	831	20	60	1024	6	43
Future Volume (Veh/h)	831	20	60	1024	6	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	884	21	64	1089	6	46
Pedestrians						
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			905		2101	884
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			905		2101	884
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		89	87
cM capacity (veh/h)			760		53	347
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	884	21	64	1089	52	
Volume Left	0	0	64	0	6	
Volume Right	0	21	0	0	46	
cSH	1700	1700	760	1700	211	
Volume to Capacity	0.52	0.01	0.08	0.64	0.25	
Queue Length 95th (m)	0.0	0.0	2.1	0.0	7.1	
Control Delay (s)	0.0	0.0	10.2	0.0	27.5	
Lane LOS			B	D		
Approach Delay (s)	0.0		0.6		27.5	
Approach LOS					D	
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			63.9%	ICU Level of Service		B
Analysis Period (min)			15			

Queues

2035 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Group Flow (vph)	21	769	22	45	786	49	27	67	161	70	
v/c Ratio	0.07	0.65	0.03	0.14	0.74	0.05	0.10	0.15	0.52	0.15	
Control Delay	7.2	13.1	3.3	8.0	17.0	2.6	17.8	0.7	25.6	1.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	7.2	13.1	3.3	8.0	17.0	2.6	17.8	0.7	25.6	1.1	
Queue Length 50th (m)	0.8	48.2	0.0	1.8	55.0	0.0	2.2	0.0	14.7	0.0	
Queue Length 95th (m)	4.0	#129.0	2.6	7.4	#145.9	3.8	7.2	0.2	29.6	1.3	
Internal Link Dist (m)	509.6				563.3				77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0		
Base Capacity (vph)	319	1183	812	326	1060	1042	417	607	480	663	
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	0.07	0.65	0.03	0.14	0.74	0.05	0.06	0.11	0.34	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

2035 Future Total AM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	754	22	44	770	45	26	0	66	148	0	64
Future Volume (vph)	19	754	22	44	770	45	26	0	66	148	0	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1807	1229	1716	1620	1566	1526	1401		1750	1566	
Flt Permitted	0.27	1.00	1.00	0.28	1.00	1.00	0.71	1.00		0.71	1.00	
Satd. Flow (perm)	488	1807	1229	499	1620	1566	1143	1401		1314	1566	
Peak-hour factor, PHF	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Adj. Flow (vph)	21	769	22	45	786	49	27	0	67	161	0	70
RTOR Reduction (vph)	0	0	8	0	0	19	0	54	0	0	57	0
Lane Group Flow (vph)	21	769	14	45	786	30	27	13	0	161	13	0
Heavy Vehicles (%)	2%	4%	30%	4%	16%	2%	13%	2%	14%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Effective Green, g (s)	36.2	36.2	36.2	36.2	36.2	36.2	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.19	0.19		0.19	0.19	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	303	1122	763	309	1005	972	217	266		250	298	
v/s Ratio Prot		0.43			c0.49			0.01			0.01	
v/s Ratio Perm	0.04		0.01	0.09		0.02	0.02			c0.12		
v/c Ratio	0.07	0.69	0.02	0.15	0.78	0.03	0.12	0.05		0.64	0.04	
Uniform Delay, d1	4.4	7.3	4.2	4.6	8.1	4.3	19.6	19.3		21.8	19.3	
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	0.4	3.4	0.0	1.0	6.1	0.1	0.3	0.1		5.6	0.1	
Delay (s)	4.8	10.7	4.3	5.6	14.2	4.3	19.8	19.4		27.4	19.3	
Level of Service	A	B	A	A	B	A	B	B		C	B	
Approach Delay (s)		10.4			13.2			19.5			24.9	
Approach LOS		B			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			13.7									
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			58.3									
Intersection Capacity Utilization			64.6%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2035 Future Total AM
07/24/2019

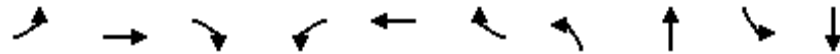
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	716	6	23	824	9	68
Future Volume (Veh/h)	716	6	23	824	9	68
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	852	7	27	981	11	81
Pedestrians				1		
Lane Width (m)				3.5		
Walking Speed (m/s)				1.1		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			859		1887	853
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			859		1887	853
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			96		85	78
cM capacity (veh/h)			733		76	362
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	852	7	27	981	92	
Volume Left	0	0	27	0	11	
Volume Right	0	7	0	0	81	
cSH	1700	1700	733	1700	249	
Volume to Capacity	0.50	0.00	0.04	0.58	0.37	
Queue Length 95th (m)	0.0	0.0	0.9	0.0	12.3	
Control Delay (s)	0.0	0.0	10.1	0.0	27.7	
Lane LOS			B		D	
Approach Delay (s)	0.0		0.3		27.7	
Approach LOS					D	
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			55.1%	ICU Level of Service		B
Analysis Period (min)			15			

Queues

2035 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	881	21	57	1137	151	19	37	90	38
v/c Ratio	0.33	0.63	0.02	0.15	0.81	0.12	0.09	0.09	0.43	0.11
Control Delay	10.9	8.9	1.9	5.4	14.9	1.6	30.5	0.5	38.1	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	8.9	1.9	5.4	14.9	1.6	30.5	0.5	38.1	0.7
Queue Length 50th (m)	3.1	61.3	0.0	2.3	106.9	1.4	2.6	0.0	12.8	0.0
Queue Length 95th (m)	12.6	114.6	1.9	7.2	#243.8	6.8	8.2	0.0	26.4	0.0
Internal Link Dist (m)		509.6			563.3			77.4		109.3
Turn Bay Length (m)	20.0		50.0	115.0		50.0	15.0		45.0	
Base Capacity (vph)	193	1398	1196	378	1412	1227	338	531	346	480
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	0.33	0.63	0.02	0.15	0.81	0.12	0.06	0.07	0.26	0.08

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2035 Future Total PM

1: Silver Glen Blvd & Highway 26

07/24/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	872	21	56	1126	139	19	0	37	83	0	35
Future Volume (vph)	59	872	21	56	1126	139	19	0	37	83	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.5	3.2	3.5	3.5	3.5
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1750	1824	1556	1783	1842	1566	1712	1553		1750	1566	
Flt Permitted	0.14	1.00	1.00	0.26	1.00	1.00	0.73	1.00		0.73	1.00	
Satd. Flow (perm)	253	1824	1556	494	1842	1566	1320	1553		1350	1566	
Peak-hour factor, PHF	0.92	0.99	0.99	0.99	0.99	0.92	0.99	0.92	0.99	0.92	0.92	0.92
Adj. Flow (vph)	64	881	21	57	1137	151	19	0	37	90	0	38
RTOR Reduction (vph)	0	0	5	0	0	29	0	32	0	0	33	0
Lane Group Flow (vph)	64	881	16	57	1137	122	19	5	0	90	5	0
Confl. Peds. (#/hr)			4	4			4		4			
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	2%	0%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	61.3	61.3	61.3	61.3	61.3	61.3	10.3	10.3		10.3	10.3	
Effective Green, g (s)	61.3	61.3	61.3	61.3	61.3	61.3	10.3	10.3		10.3	10.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74	0.12	0.12		0.12	0.12	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	187	1353	1154	366	1367	1162	164	193		168	195	
v/s Ratio Prot		0.48			c0.62			0.00			0.00	
v/s Ratio Perm	0.25		0.01	0.12		0.08	0.01			c0.07		
v/c Ratio	0.34	0.65	0.01	0.16	0.83	0.10	0.12	0.02		0.54	0.02	
Uniform Delay, d1	3.7	5.3	2.8	3.1	7.2	3.0	32.1	31.7		33.9	31.7	
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	4.9	2.4	0.0	0.9	6.0	0.2	0.3	0.1		3.3	0.1	
Delay (s)	8.6	7.8	2.8	4.0	13.2	3.2	32.4	31.8		37.2	31.8	
Level of Service	A	A	A	A	B	A	C	C		D	C	
Approach Delay (s)		7.7			11.7			32.0			35.6	
Approach LOS		A			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			11.8									
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			82.6							11.0		
Intersection Capacity Utilization			79.7%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Silver Creek Dr & Highway 26

2035 Future Total PM
07/24/2019

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	891	21	62	1100	6	46
Future Volume (Veh/h)	891	21	62	1100	6	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	948	22	66	1170	6	49
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	970			2250	948	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	970			2250	948	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	91			86	85	
cM capacity (veh/h)	719			42	319	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	948	22	66	1170	55	
Volume Left	0	0	66	0	6	
Volume Right	0	22	0	0	49	
cSH	1700	1700	719	1700	186	
Volume to Capacity	0.56	0.01	0.09	0.69	0.30	
Queue Length 95th (m)	0.0	0.0	2.3	0.0	8.9	
Control Delay (s)	0.0	0.0	10.5	0.0	32.3	
Lane LOS	B			D		
Approach Delay (s)	0.0		0.6		32.3	
Approach LOS				D		
Intersection Summary						
Average Delay	1.1					
Intersection Capacity Utilization	67.9%			ICU Level of Service	C	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

1: Silver Glen Blvd & Highway 26

2035 Future Total Sensitivity AM
07/24/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Volume (veh/h)	754	22	44	770	26	66
Future Volume (Veh/h)	754	22	44	770	26	66
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	769	22	45	786	27	67
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type	TWLTL		TWLTL			
Median storage veh	2		2			
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			791		1645	769
vC1, stage 1 conf vol					769	
vC2, stage 2 conf vol					876	
vCu, unblocked vol			791		1645	769
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)					5.5	
tF (s)			2.2		3.6	3.4
p0 queue free %			95		91	82
cM capacity (veh/h)			821		291	382
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	769	22	45	786	94	
Volume Left	0	0	45	0	27	
Volume Right	0	22	0	0	67	
cSH	1700	1700	821	1700	537	
Volume to Capacity	0.45	0.01	0.05	0.46	0.18	
Queue Length 95th (m)	0.0	0.0	1.3	0.0	4.8	
Control Delay (s)	0.0	0.0	9.6	0.0	17.0	
Lane LOS			A			C
Approach Delay (s)	0.0			0.5	17.0	
Approach LOS					C	
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			50.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

1: Silver Glen Blvd & Highway 26

2035 Future Total Sensitivity PM
07/24/2019

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↙	↑	↙	↗
Traffic Volume (veh/h)	872	21	56	1126	19	37
Future Volume (Veh/h)	872	21	56	1126	19	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	881	21	57	1137	19	37
Pedestrians	4			4	4	
Lane Width (m)	3.5			3.5	3.2	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	0			0	0	
Right turn flare (veh)						2
Median type	TWLT			TWLT		
Median storage veh	2			2		
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			906		2140	889
vC1, stage 1 conf vol					885	
vC2, stage 2 conf vol					1255	
vCu, unblocked vol			906		2140	889
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			92		91	89
cM capacity (veh/h)			757		211	343
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	881	21	57	1137	56	
Volume Left	0	0	57	0	19	
Volume Right	0	21	0	0	37	
cSH	1700	1700	757	1700	519	
Volume to Capacity	0.52	0.01	0.08	0.67	0.11	
Queue Length 95th (m)	0.0	0.0	1.9	0.0	2.7	
Control Delay (s)	0.0	0.0	10.1	0.0	19.1	
Lane LOS			B		C	
Approach Delay (s)	0.0		0.5		19.1	
Approach LOS					C	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			70.5%	ICU Level of Service		C
Analysis Period (min)			15			

APPENDIX F

Growth Rate Analysis

Environmental Study Report

HIGHWAY 26 WEST FROM 280 m WEST OF PRINCETON SHORES BOULEVARD TO HARBOUR STREET IMPROVEMENTS

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Prepared By:

R.J. Burnside & Associates Limited
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Prepared for:

Town of Collingwood

April 2014

File No: 300032131.0000

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. R.J. Burnside & Associates Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Technical Memorandum

Memorandum No.:	Traffic Memo No. 1	File No.:	300032131
Project:	Class Environmental Assessment Highway 26 – Harbour Street to West of Princeton Shores Boulevard Town of Collingwood		
Date:	February 20, 2013	Revision Date:	
Submitted To:	Ron Kerr, P. Eng.		
Submitted By:	Henry Centen, P. Eng.		
Reviewed By:			

This technical memorandum considers the opportunities and constraints associated with the traffic and transportation operations along the Highway 26 corridor, from Harbour Street to west of Princeton Shores Boulevard, in the Town of Collingwood. This review is completed as part of a Class Environmental Assessment for improvements to Highway 26, in the study area.

1.0 Class Environmental Assessment Considerations

The Town of Collingwood has identified the need to rehabilitate Highway 26 in the study area, due to its deteriorated condition and increasing traffic demands. This section of Highway 26 is a Highway Connecting Link, under the jurisdiction of the Town of Collingwood. Ongoing growth in background traffic, along with forecast development, requires the Town to consider traffic demands that are within the life cycle of the anticipated rehabilitation work. Therefore, for the purposes of establishing traffic constraints, the design requirements have been assessed for a fifteen year time horizon (year 2028). For comparative purposes, the existing traffic operations (2013) have also been analyzed, assuming existing lane configurations, existing traffic controls and existing development. Existing conditions are shown on Figure OV1 (aerial base drawing), attached to this technical memorandum, as well as on Figure TR1 (see Appendix A).

The Town's previous planning work (i.e. Five Year Needs Program), identifies the need to rehabilitate the existing pavement and widen the road to include a continuous centre left turn lane, at an estimated cost of \$3.5 M. Under the provisions of the Environmental Assessment Act, such a project requires environmental review as a Schedule C project, under the Class Environmental Assessment (Class EA) process. The requirements of the Class EA will be confirmed as part of the planning process.

This technical memorandum provides a preliminary assessment of the traffic and transportation operational issues along the corridor, from 280 metres west of Princeton Shores Boulevard to Harbour Street, which is the primary segment delineated by the Town's Terms of Reference (TOR), for review under the Class EA. The TOR also requests consideration of implementing a slip-by lane at the Silver Creek Drive intersection. Therefore some consideration has also been given to traffic operations in a secondary study area, from 280 metres west of Princeton Shores Boulevard to west of Silver Creek Drive. However the planning work in this secondary study area is considered to be outside of the Class EA.

This memo considers the technical environment associated with the proposed undertaking. Additional details pertaining to other environmental assessment considerations (e.g. natural, cultural, and economic environments) are not part of memo, but are dealt with under separate cover.

2.0 Analysis of Traffic Operations

2.1 Traffic Volume Forecasts

Traffic volumes along the corridor were forecast based on the following previous transportation studies:

- Transportation Study, Town of Collingwood; prepared for the Town of Collingwood by C.C. Tatham & Associates Ltd.; dated July 9, 2012.
- Comprehensive Transportation Strategic Plan; prepared for the Town of the Blue Mountains by C. C. Tatham & Associates Ltd and AECOM; dated March 2010.
- Technical Report, Traffic Operations Review, Highway 26 Planning Study; prepared for the Ministry of Transportation by McCormick Rankin Corporation; dated May 2004.
- Highway 26 Transportation Study, Georgian Triangle Area; Municipal Partners Meeting; prepared for the Ministry of Transportation by AECOM; dated December, 2011.

The studies prepared for the Town of Collingwood and the Town of the Blue Mountains have provided turning movement data for the intersections of Highway 26 / Harbour Street and for Highway 26 / Grey Road 21 (Osler Bluff Road). The traffic forecasts were adjusted to rationalize the assumptions made in the two studies, and to balance the traffic between these intersections.

Traffic volume additions/drops are made along the corridor, based on existing and proposed developments in this area. Where available, these forecasts are based on previously prepared Traffic Impact Studies (TIS). The following TIS reports were reviewed to assess background traffic data:

- Signal Warrant Analysis, Highway 26 and Gun Club Road / Cranberry Trail East; prepared by C. C. Tatham & Associates Ltd.; dated August 22, 2012.
- Traffic Impact Study, Rollings / Mundell Property; prepared by C.F. Crozier & Associates Inc.; dated February 2008

- Traffic Impact Study, The Preserve at Georgian Bay; prepared by C. F. Crozier & Associates Inc.; dated February 2007
- Master Servicing Plan, The Preserve at Georgian Bay; prepared by C.R. Crozier & Associates inc.; dated March 2012
- Traffic Impact Study Update, Balmoral Village; prepared by C. F. Crozier & Associates Inc.; dated July 2011
- Traffic Impact Study, Tanglewood at Cranberry Village; prepared by C. F. Crozier & Associates Inc.; dated June 2007
- Traffic Impact Study, Huntingwood Trails; prepared by C. F. Crozier & Associates Inc.; dated June 2009
- Traffic Impact Study, Anchorage Development; prepared by C. C. Tatham & Associates Ltd.; dated August 2011
- Site Servicing Report, Waterstone Development; prepared by C. F. Crozier & Associates Inc.; dated November 2007
- Traffic Impact Assessment, Pretty River Academy; prepared by Cansult Tatham Ltd.; dated April 2005.

The preliminary planned intersection improvements, to accommodate new development, are shown on Figure TR1 (Appendix A). It is noted that the timing and details, of the developments identified, are still subject to change as their planning process proceeds. Consideration of their completion, in this study, provides a sensitivity analysis, when compared with existing traffic operations, to inform the design requirements that may be considered under the present project. Further input should be obtained from the Town, during the detailed design process, to confirm whether the staging of development-related projects should proceed at this time as part of the improvement works (i.e. front-ended), or whether the works should be implemented as part of a future development project.

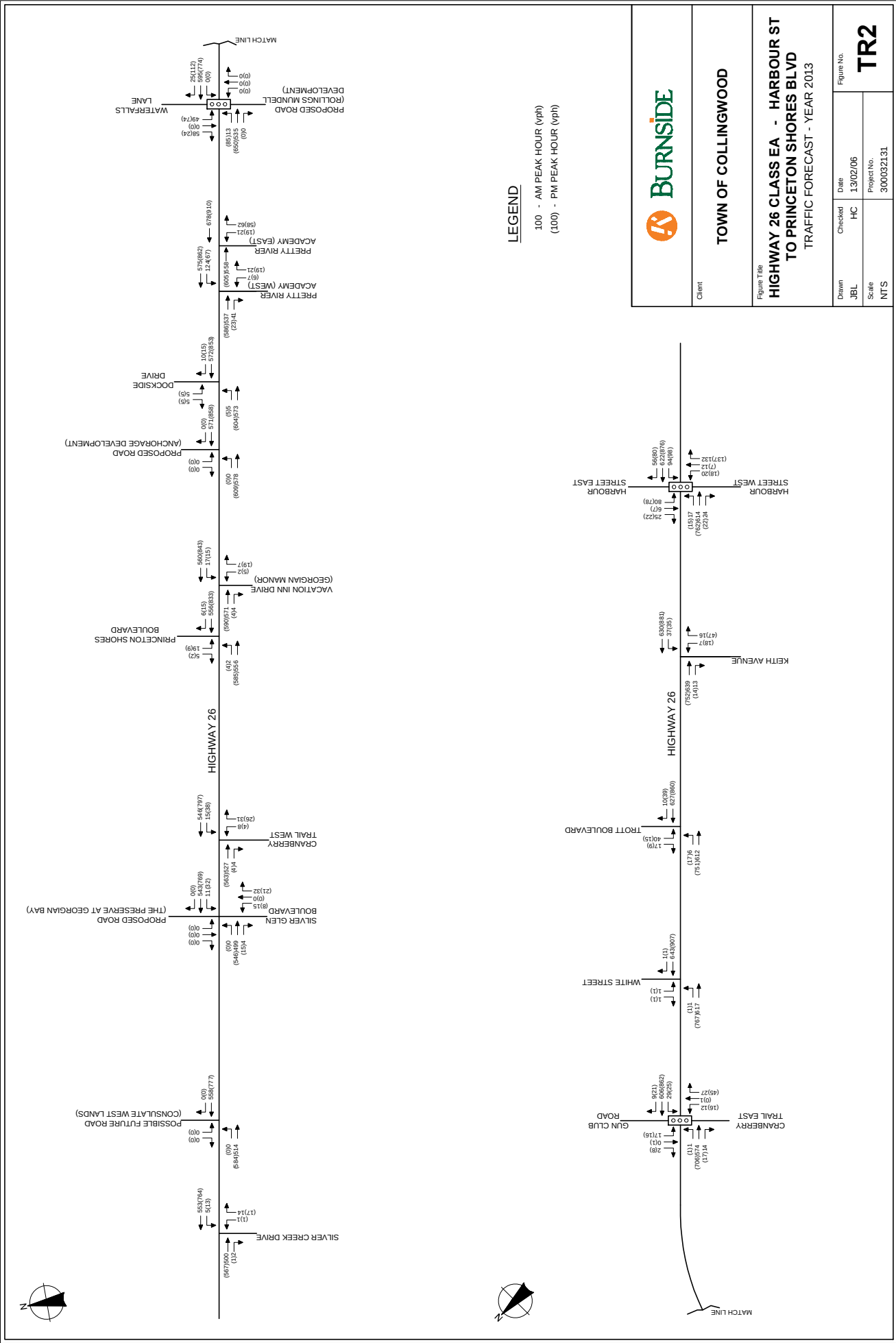
Where previous studies were not available, traffic volumes were forecast based on trip generation rates, provided in the Trip Generation Manual, 9th Edition (Institute of Transportation Engineers), and an assessment of existing / proposed development in the immediate study area.

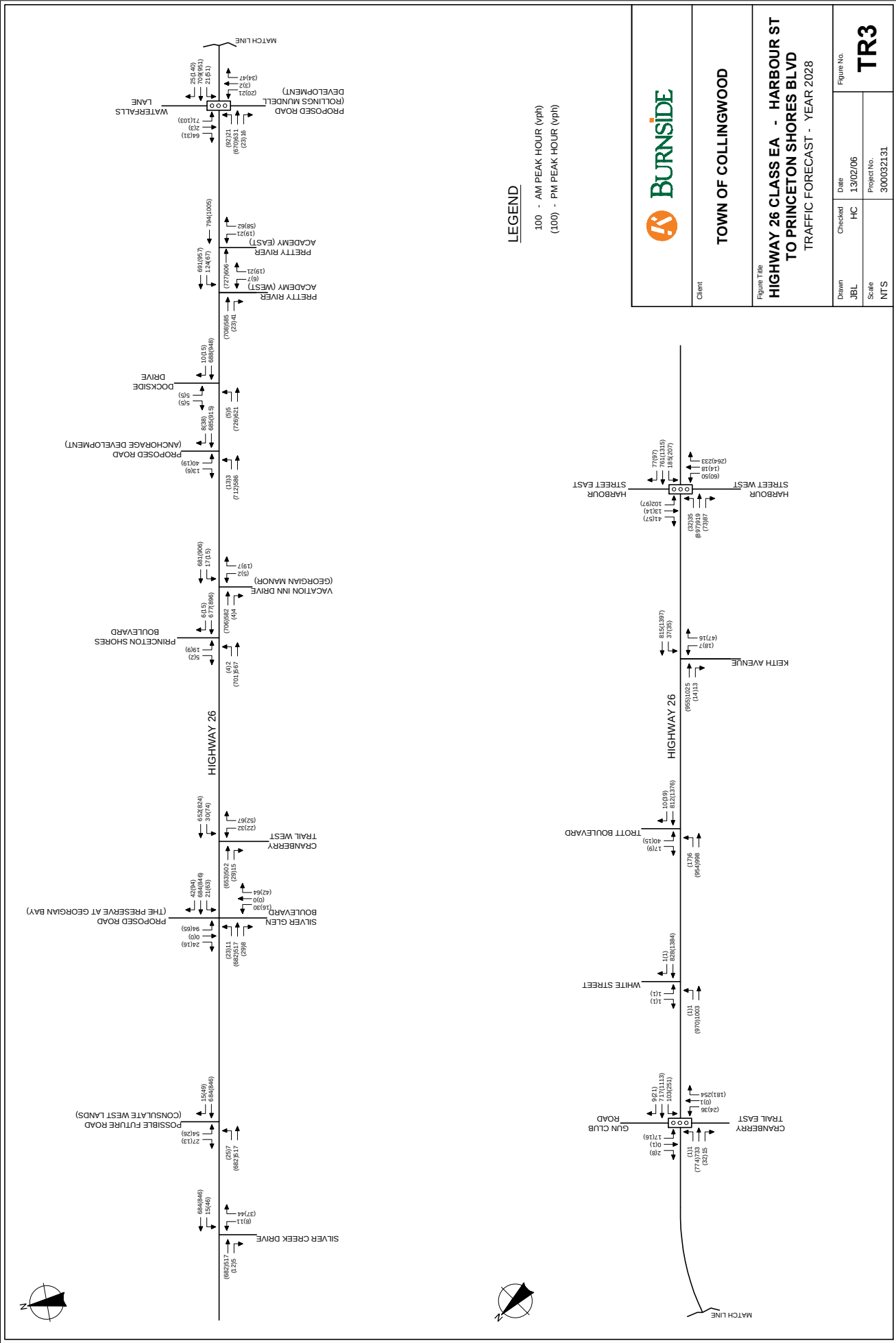
The forecast turning movements for the primary intersections along the corridor are show on Figure TR2 (2013) and on Figure TR3 (2028).

2.2 Identification of Traffic Alternatives

In the study area, Highway 26 is a two lane arterial road, which provides access to abutting development (existing and proposed), while providing a highway connecting link for through traffic travelling to the broader area. In the study area, the posted speeds along Highway 26 are as follows:

- 50 km/h to just north of Harbour Street
- 60 km/h from just north of Harbour Street to just west of Silver Glen Boulevard
- 70 km/h from just west of Silver Glen Boulevard to just east of County Road 21 (Osler Bluff Road), where the speed decreases again to 60 km/h.





Highway 26 Growth Rates - ESR

Highway 26 east of Waterfalls Lane

AM Peak Period

Year	EB Volume (veh/hr)	WB volume (veh/hr)	Two-way Volume (veh/hr)	Growth Rate
2013	584	620	1204	1.49%
2028	749	755	1504	

PM Peak Period

Year	EB Volume (veh/hr)	WB volume (veh/hr)	Two-way Volume (veh/hr)	Growth Rate
2013	724	886	1610	1.28%
2028	807	1142	1949	

Eastbound volumes were determined using the eastbound "exiting" volumes at Highway 26 and Waterfalls Lane (i.e. NBR, EBT, and SBL)

Westbound volumes were determined using the westbound "entering" volumes at Highway 26 and Waterfalls Lane (i.e. WBL, WBT, and WBR)



Ministry of
Transportation

Highway
Standards
Branch

Traffic
Office

Provincial Highways

Traffic Volumes

1988-2016

King's Highways / Secondary Highways / Tertiary Roads

Ministry Contact:

Traffic Office (905)-704-2960

Abstract:

This annual publication contains averaged traffic volume information and accident rate information for each of the sections of highway under MTO jurisdiction.

Key Words:

Annual Average Daily Traffic volume (AADT), Summer Average Daily Traffic volume (SADT), Summer Average Weekday Traffic volume (SAWDT), Winter Average Daily Traffic volume (WADT), Accident Rate (AR)

Distance (KM)

The length of the section in kilometres reported to one decimal place.

Pattern Type

One of 14 pattern types that represent the seasonal variation of the traffic flow on the section indicated. A graphical presentation of these pattern types has been included on the following page.

The 14 pattern types represent the traffic flow variation on the whole network. They include:

Variation Types

LOW	UC	urban commuter
	SC	suburban commuter
	C	commuter
INTER	IC	intermediate commuter
	CR	commuter recreation
	IR	intermediate recreation
	CTR	commuter tourist recreation
	IT	intermediate tourist
HIGH	LT	low tourist
	T	tourist
	HT	high tourist
	LR	low recreation
	R	recreation
	HR	high recreation
	UNKN	unknown
	UNCL	unclassified
	NEW	new volume section

The first three are generally referred to as Low Variation Curves (or commuter travel); the next five as Intermediate Variation Curves

(a blend of all types of traffic); and the last six as High Variation Curves. For the last group, the first three represent tourist travel and the second three, recreational travel; this sub-grouping is distinguished by the relationship of weekend to weekday traffic.

There are two additional codes in the pattern type column. "UNC" indicates that the AADT was calculated using adjustment factors from an unclassified (i.e. new) permanent counting station. "NEW" indicates that this is a new volume section and there is insufficient data to assign a pattern type.

AADT

Annual Average Daily Traffic; defined as the average twenty four hour, two way traffic for the period January 1st to December 31st.

SADT

Summer Average Daily Traffic; defined as the average twenty four hour, two way traffic for the period July 1st to August 31st including weekends.

SAWDT

Summer Average Weekday Traffic; defined as the average twenty four hour, two way traffic for the period July 1st to August 31st, excluding weekends.

WADT

Winter Average Daily Traffic; defined as the average twenty four hour, two way traffic for the period January 1st to March 31st, plus December 1st to December 31st, including weekends.

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
26	POPLAR SDRD ROUNDABOUT	0.9	2016	UNKN	N/A	N/A	N/A	N/A	N/A
26	6 TH LINE\OLD HWY 26 (HWY 7148) - START OF NA	10.6							
26	LONG POINT RD (N)/GREY RD 21 (S) - END OF NA	2.7	1988	CTR	6,700	8,700	8,000	5,500	1.9
			1989	CTR	7,000	8,900	8,300	5,800	1.8
			1990	CTR	7,350	9,100	8,400	6,600	1.2
			1991	CTR	7,550	9,200	8,600	6,700	1.9
			1992	CTR	7,700	9,400	8,700	6,900	1.7
			1993	CTR	7,300	9,100	8,800	6,200	1.5
			1994	CTR	7,200	9,200	8,800	6,050	1.5
			1995	CTR	7,200	9,200	8,850	6,050	1.1
			1996	CTR	7,450	9,250	8,200	6,550	1.6
			1997	CTR	7,500	9,600	9,250	6,300	0.8
			1998	CTR	7,550	9,600	9,200	6,350	0.8
			1999	CTR	7,600	9,600	9,200	6,400	1.5
			2000	CTR	7,950	10,000	9,600	6,700	0.6
			2001	CTR	8,100	10,200	9,800	6,800	1.4
			2002	CTR	8,450	10,700	10,200	7,150	1.0
			2003	CTR	8,650	10,900	10,500	7,350	0.9
			2004	CTR	8,550	10,600	10,200	7,250	1.1
			2005	CTR	8,550	10,600	10,200	7,250	0.6
			2006	CTR	8,550	10,600	10,100	7,250	1.4
			2007	CTR	8,750	10,800	10,700	7,400	1.7
			2008	CTR	8,550	10,300	10,300	7,200	0.8
			2009	CTR	8,950	10,800	10,400	7,550	1.1
			2010	CTR	8,900	10,700	10,300	7,550	1.1
			2011	CTR	8,900	10,400	10,500	7,900	N/A
			2012	CTR	8,300	9,950	9,800	7,050	N/A
			2013	CTR	8,400	10,100	10,300	7,150	N/A
			2014	CTR	8,500	10,400	10,500	7,250	N/A
			2015	CTR	8,600	10,500	10,600	7,300	N/A
			2016	CTR	8,700	10,600	10,700	7,400	N/A
26	GREY RD 19 (S)	10.2	1988	CR	5,750	6,600	6,400	5,000	0.9
			1989	CR	6,150	7,000	6,900	5,400	1.0

MTO Highway 26 - Long point Road to Grey Road 21

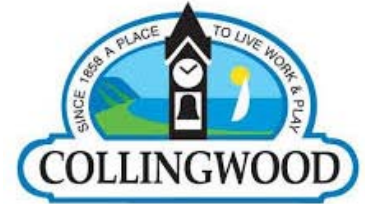
Year	AADT	Year-to-Year Increase	Average Increase
2008	8550	4.68%	0.26%
2009	8950	-0.56%	
2010	8900	0.00%	
2011	8900	-6.74%	
2012	8300	1.20%	
2013	8400	1.19%	
2014	8500	1.18%	
2015	8600	1.16%	
2016	8700		

Year	SADT	Year-to-Year Increase	Average Increase
2008	10300	4.85%	0.40%
2009	10800	-0.93%	
2010	10700	-2.80%	
2011	10400	-4.33%	
2012	9950	1.51%	
2013	10100	2.97%	
2014	10400	0.96%	
2015	10500	0.95%	
2016	10600		

APPENDIX G

Development Charges Background Study Excerpts

DEVELOPMENT CHARGES BACKGROUND STUDY



Version for Public Consultation

HEMSON Consulting Ltd.

June 3, 2019

APPENDIX C.1

TABLE 2

TOWN OF COLLINGWOOD
DEVELOPMENT-RELATED CAPITAL PROGRAM
ROADS AND RELATED

NO.	Location	Timing	Gross Cost	Grants, Subsidies & Other Contributions	Net Municipal Costs	Replacement/Benefit to Existing		Total DC Eligible Costs	Available DC Reserves	DC Eligible Costs 2019-2031	Post Period Allocation	
Widenings and Upgrades												
1	Sandford Fleming Drive Extension: Sixth Line to Highway 26 (extend 2 lanes)	2019 - 2019	\$557,600	\$501,800	\$55,800	0%	\$0	\$55,800	\$55,800	\$0	0%	\$0
2	Hurontario Street: Hume st to Collins St (widen 2 lane to 3)	2022 - 2022	\$3,088,000	\$0	\$3,088,000	14%	\$444,300	\$2,643,700	\$2,643,700	\$0	0%	\$0
3	Mountain Road: Cambridge to Tenth Line (upgrade and widen 2 lanes to 3)	2022 - 2022	\$7,480,000	\$0	\$7,480,000	24%	\$1,809,700	\$5,670,300	\$1,087,834	\$3,521,166	19%	\$1,061,300
4	Tenth line: Sixth St to Mountain Rd (upgrade 2 lanes)	2022 - 2022	\$4,187,400	\$0	\$4,187,400	15%	\$613,600	\$3,573,800	\$0	\$3,573,800	0%	\$0
5	Highway 26: Silver Glen Boulevard to Silver Creek Drive	2023 - 2023	\$1,562,800	\$0	\$1,562,800	24%	\$370,400	\$1,192,400	\$0	\$1,192,400	0%	\$0
6	High St: 3rd St to Fifth St (widen 4 lanes to 5)	2023 - 2023	\$2,040,300	\$0	\$2,040,300	30%	\$612,100	\$1,428,200	\$0	\$1,428,200	0%	\$0
7	High Street: Poplar Sideroad to Tenth St (upgrade and widen 2 lanes to 4)	2024 - 2024	\$5,579,800	\$0	\$5,579,800	37%	\$2,066,800	\$3,513,000	\$0	\$3,513,000	0%	\$0
8	Mountain Road: Tenth Line to Osler Bluff Road (upgrade 2 lanes)	2024 - 2024	\$6,019,100	\$0	\$6,019,100	30%	\$1,782,400	\$4,236,700	\$0	\$4,236,700	0%	\$0
9	Collins St: Ste Marie St to Katherine St (upgrade 2 lanes)	2024 - 2024	\$1,278,500	\$0	\$1,278,500	14%	\$178,200	\$1,100,300	\$0	\$1,100,300	0%	\$0
10	Cameron St: Walnut to Hurontario (upgrade and extend 2 lanes)	2025 - 2025	\$2,799,000	\$0	\$2,799,000	36%	\$1,019,000	\$1,780,000	\$0	\$1,780,000	0%	\$0
11	Peel Street: Ontario St to Bush(upgrade 2 lanes)	2026 - 2026	\$3,072,200	\$0	\$3,072,200	38%	\$1,159,600	\$1,912,600	\$0	\$1,912,600	0%	\$0
12	Third St: High St to Birch St (upgrade 2 lanes)	2028 - 2028	\$2,993,500	\$0	\$2,993,500	40%	\$1,197,400	\$1,796,100	\$0	\$1,796,100	0%	\$0
13	Sixth Line: poplar Sideroad to Sandford Fleming Dr (Upgrade 2 lane)	2028 - 2028	\$1,619,000	\$0	\$1,619,000	21%	\$342,200	\$1,276,800	\$0	\$1,276,800	0%	\$0
14	Highway 26: Keith Ave to Silver Creek Dr (widen 3 lanes to 5)	2029 - 2029	\$12,060,600	\$0	\$12,060,600	14%	\$1,641,900	\$10,418,700	\$0	\$3,125,600	70%	\$7,293,100
15	Harbour Street Extension: Tenth Line to georgian Trail (extend 2 lanes)	2029 - 2029	\$1,388,100	\$0	\$1,388,100	0%	\$0	\$1,388,100	\$0	\$416,400	70%	\$971,700
16	Sixth St: Tenth Line to High St (widen 2 lanes to 3)	2030 - 2030	\$4,761,700	\$0	\$4,761,700	18%	\$846,800	\$3,914,900	\$0	\$1,174,500	70%	\$2,740,400
17	Mountain Road: Cambridge to Tenth Line (upgrade and widen 3 lane rural to 5 lane urban)	2030 - 2030	\$3,617,300	\$0	\$3,617,300	0%	\$0	\$3,617,300	\$0	\$1,085,200	70%	\$2,532,100
Subtotal: Widenings and Upgrades			\$64,104,900	\$501,800	\$63,603,100		\$14,084,400	\$49,518,700	\$3,787,334	\$31,132,766		\$14,598,600
Intersection Improvements												
18	Highway 26 N Sandford Fleming Dr (signals)	2019 - 2019	\$259,000	\$233,100	\$25,900	0%	\$0	\$25,900	\$25,900	\$0	0%	\$0
19	High St / Home Depot Access (relocate access)	2023 - 2023	\$108,000	\$108,000	\$0	0%	\$0	\$0	\$0	\$0	0%	\$0
20	Highway 26/ Harbour St/ Balsam St (turning lanes)	2023 - 2023	\$431,000	\$0	\$431,000	0%	\$0	\$431,000	\$0	\$431,000	0%	\$0
21	Mountain Rd / Tenth Line (roundabout)	2023 - 2023	\$1,149,000	\$0	\$1,149,000	0%	\$0	\$1,149,000	\$0	\$1,149,000	0%	\$0
22	High St/ Third St (signalization, phases, turning lanes)	2023 - 2023	\$703,000	\$180,000	\$523,000	0%	\$0	\$523,000	\$0	\$523,000	0%	\$0
23	Mountain Rd / First St Extension / Cambridge St (turning lanes)	2024 - 2024	\$216,000	\$0	\$216,000	0%	\$0	\$216,000	\$0	\$216,000	0%	\$0
24	High St/First St (turning lanes and timing)	2025 - 2025	\$431,000	\$0	\$431,000	0%	\$0	\$431,000	\$0	\$431,000	0%	\$0
25	High St / First St (turning lanes)	2028 - 2028	\$288,000	\$0	\$288,000	0%	\$0	\$288,000	\$0	\$288,000	0%	\$0
26	High Street / Campbell Street (Roundabout)	2030 - 2030	\$1,149,000	\$0	\$1,149,000	0%	\$0	\$1,149,000	\$0	\$344,700	70%	\$804,300
27	Sixth St / Oak Sk (signals)	2030 - 2030	\$230,000	\$0	\$230,000	0%	\$0	\$230,000	\$0	\$69,000	70%	\$161,000
28	High St/Sixth St (turning lanes)	2030 - 2030	\$108,000	\$0	\$108,000	0%	\$0	\$108,000	\$0	\$32,400	70%	\$75,600
Subtotal: Intersection Improvements			\$5,072,000	\$521,100	\$4,550,900		\$0	\$4,550,900	\$25,900	\$3,484,100		\$1,040,900

4 Road Projects

Road projects include:

- improvements to collector or arterial roads as designated in the Town's Official Plan;
- intersection improvements including additional lanes, roundabouts and signalization; and
- sidewalk and trail improvements.

Project descriptions, estimated timing and costs for the proposed road, intersection and sidewalk projects are summarized in Appendix B. Each summary identifies values for post-period benefit, benefit to existing development, and grants, subsidies and other contributions, reducing the development charge eligible portion of the capital cost estimates.

For road, intersection and sidewalk projects, the benefit to existing development represents the value of replacing existing municipal assets through growth related capital project. More specifically, on substandard roads (i.e. those that are assumed to not meet current road design standards with respect to width, cross-section and/or granular type and/or depths), the benefit to existing value applied was based on the cost to replace the existing road base and asphalt at its current configuration. On existing roads constructed to an appropriate standard, the benefit to existing was assigned based on the cost to replace the asphalt surface only at its current configuration (recognizing the road base is sufficient). The conditions of the existing roads and the benefit to existing values assigned to each project, based on these principles were collaboratively established with the Town.

The capital cost estimates for road projects within existing municipal right-of-ways were developed based on the cost to remove and reinstate the existing road and boulevards (across a typical 20 m right-of-way). Sidewalk and trail projects include boulevard restoration allowances (1 m wide on both sides of the sidewalk or trail) to allow for adequate constructability and blending into the existing boulevard.

Allowances have been included in support of updates to the Transportation Master Plan and miscellaneous Municipal Class Environmental Assessments.

4.1 ROADS

4.1.1 Project 52: Highway 26 - Silver Glen Boulevard to Silver Creek Drive

Improvements to the 570 m section of Highway 26 from Silver Glen Boulevard to Silver Creek Drive will include widening the road from 2 lanes to 3 lanes. This will blend into the recent improvements on Highway 26 completed from Keith Avenue to Silver Glen Boulevard. The improvements will be constructed to an arterial standard rural cross section. This project will



service growth in the west end of Town and provide improved traffic operations along Highway 26. For the purpose of this report, we have assumed a new granular road base will be required throughout in support of the proposed improvements. The benefit to existing was calculated based on pulverizing and paving the existing roadway.

4.1.2 Project 53: Highway 26 - Keith Avenue to Silver Creek Drive

The arterial road improvements along the 3,300 m section of Highway 26 from Keith Avenue to Silver Creek Drive will upgrade the existing 3 lane rural to a 5 lane urban road cross section. The majority of this project is already constructed as a 3 lane rural cross section and the remainder is scheduled to be constructed in 2023. For the purpose of this report, we have assumed the project will re-use the granular base and binder course asphalt from the existing 3 lane roadway. The surface course asphalt will be removed along the existing road and replaced following the installation of the additional 2 lanes. The benefit to existing was based on removing and replacing of the existing 3 lane surface course asphalt. A 70% post-period benefit was included for this project as it is scheduled to proceed at the end of the growth period to service development beyond the development charge horizon period of 2031.

4.1.3 Project 54: Mountain Road - Tenth Line to Osler Bluff Road

Improvements to the 2,800 m section of Mountain Road from Tenth Line to Osler Bluff Road will include road base widening in accordance with the current 2 lane collector rural standards. For the purpose of this report, we have assumed the road was originally constructed to an appropriate standard and the road reconstruction will re-use the existing granular base from the existing roadway. The benefit to existing is based on removing and replacing the asphalt along its current alignment.

4.1.4 Project 55: Sixth Line - Poplar Sideroad to Sandford Fleming Drive.

Improvements to the 680 m section of Sixth Line from Poplar Sideroad to Sandford Fleming Drive will include road base widening in accordance with the current 2 lane collector rural standards. For the purpose of this report, we have assumed a new granular road base will be required throughout in support of the proposed improvements. The benefit to existing is based on removing and replacing the asphalt along its current alignment.

4.1.5 Project 56: Hurontario Street - Hume Street to Collins Street

The arterial road improvements to the 780 m section of Hurontario Street from Hume Street to Collins Street will consist of constructing a continuous centre turn lane throughout to better serve the abutting developments. The improvements will include satisfying the requirements of a 3 lane urban road cross section. For the purpose of this report, we have assumed the road was originally constructed to an appropriate standard and the road reconstruction will re-use the granular base



APPENDIX H

Signal Warrant Analysis Worksheets

Input Data Sheet

[Analysis Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)
[GO TO Justification:](#)

What are the intersecting roadways?

Highway 26 and Silver Creek Drive

What is the direction of the Main Road street?

East-West

When was the data collected?

2035 (Future Total)

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

1

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

3

d.- What is the operating environment?

Rural

Population < 10,000

AND

Speed >= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Eastbound Approach			Minor Northbound Approach			Main Westbound Approach			Minor Southbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	402	7	4	0	29	21	481	0	0	0	0	0
8:00	0	402	7	4	0	29	21	481	0	0	0	0	0
9:00	0	402	7	4	0	29	21	481	0	0	0	0	0
12:00	0	402	7	4	0	29	21	481	0	0	0	0	0
13:00	0	402	7	4	0	29	21	481	0	0	0	0	0
16:00	0	402	7	4	0	29	21	481	0	0	0	0	0
17:00	0	402	7	4	0	29	21	481	0	0	0	0	0
18:00	0	402	7	4	0	29	21	481	0	0	0	0	0
Total	0	3,216	56	32	0	232	168	3,848	0	0	0	0	0

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0

* Include only collisions that are susceptible to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	10,000	5	10	5	0	0	0	0	
Factored 8 hour pedestrian volume	20,005		25		0		0		
% Assigned to crossing rate	23%		34%		30%		100%		
Net 8 Hour Pedestrian Volume at Crossing									4,610
Net 8 Hour Vehicular Volume on Street Being Crossed									2,000

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	10,000	5	10	5	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	10	10	1	6	2	4	0	0	
Factored volume of total pedestrians	20,005		25		0		0		
Factored volume of delayed pedestrians	30		8		8		0		
% Assigned to Crossing Rate	23%		34%		30%		100%		
Net 8 Hour Volume of Total Pedestrians									4,610
Net 8 Hour Volume of Delayed Pedestrians									12

Analysis Sheet

[Input Sheet](#)
[Results Sheet](#)
[Proposed Collision](#)

GO TO Justification:

Intersection: Highway 26 and Silver Creek Drive

Count Date: 2035 (Future Total)

Justification 1: Minimum Vehicle Volumes

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
	☒	☐	☐	☐										
1A	480	720	600	900	944	944	944	944	944	944	944	944	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	180	255	180	255	33	33	33	33	33	33	33	33	147	18
	COMPLIANCE %				18	18	18	18	18	18	18	18		
Free Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes ☐	No ☒
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes ☐	No ☒

Justification 2: Delay to Cross Traffic

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☒	RESTR. FLOW ☐	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	12:00	13:00	16:00	17:00	18:00		
2A	480	720	600	900	911	911	911	911	911	911	911	911	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	4	4	4	4	4	4	4	4		
	COMPLIANCE %				8	8	8	8	8	8	8	8	64	8
Free Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes ☐	No ☒
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes ☐	No ☒

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume	YES ☐	NO ☒	YES ☐	NO ☒
Justification 2	Delay Cross Traffic	YES ☐	NO ☒		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	7:00	911	32	139	23 %	23 %
	8:00	911	32	139	23 %	
	9:00	911	32	139	23 %	
	12:00	911	32	139	23 %	

Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: Highway 26 and Silver Creek Drive

Count Date: 2035 (Future Total)

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600					Justified
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200			
	200 - 300			
	> 300	Not Justified		

Results Sheet

[Input Sheet](#)
[Analysis Sheet](#)
[Proposed Collision](#)

Intersection: Highway 26 and Silver Creek Drive

Count Date: 2035 (Future Total)

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	100	%	☐	☒
	B Crossing Volume	18	%	☐	☒
2. Delay to Cross Traffic	A Main Road	100	%	☐	☒
	B Crossing Road	8	%	☐	☒
3. Combination	A Justificaton 1	18	%	☐	☒
	B Justification 2	8	%	☐	☒
4. 4-Hr Volume		23	%	☐	☒

5. Collision Experience	0	%	☐	☒
-------------------------	---	---	--------------------------	-------------------------------------

6. Pedestrians	A Volume	Justification met	☐	☒
	B Delay	Justification not met	☐	☒

Proposed Collision Justification (Justification 5A)

[Return to Justifications 1- 6](#)

INPUT

a.- Intersection type (no input required):

3

b.- What year is the intersection being considered for traffic signals?

2004

c.- What is the collision history and annual average daily traffic over the past few years? (Please fill in table below)

Year	Traffic Volume		Impact Type/Year						
	Major AADT	Minor AADT	Approach- ing	Angle	Rear end	Sideswipe	Turning movement	SMV	Other
2000	21626	3893	0	4	5	1	4	0	0
2001	22059	3971	0	6	4	1	3	1	1
2002	22500	4050	0	7	5	2	2	1	0
2003	23300	4200	0	8	3	3	2	1	0
2004	23648	6528	0	9	0	4	1	0	0

d.- If known, please enter the expected traffic volume after signals are introduced.
Otherwise, leave the cell blank.

Year	Main AADT	Minor AADT
2004		

ANALYSIS

Reducible Collisions

	2000	2001	2002	2003	2004	2004 (Signal)
Total Number of Crashes Per Year	8	9	9	10	10	---
Parameter k	0.81	0.81	0.81	0.81	0.81	0.60
Model Prediction	1.46	1.50	1.53	1.59	2.15	2.15
C _{LY}	0.680	0.696	0.712	0.741	1.000	1.000
Comp. Ratio for Period	3.829					1.000

Non-reducible Collisions

	2000	2001	2002	2003	2004	2004 (Signal)
Total Number of Crashes Per Year	6	7	8	7	4	---
Parameter k	1.47	1.47	1.47	1.47	1.47	1.19
Model Prediction	1.17	1.18	1.20	1.23	1.38	1.38
C _{LY}	0.849	0.860	0.870	0.890	1.000	1.000
Comp. Ratio for Period	4.469					1.000

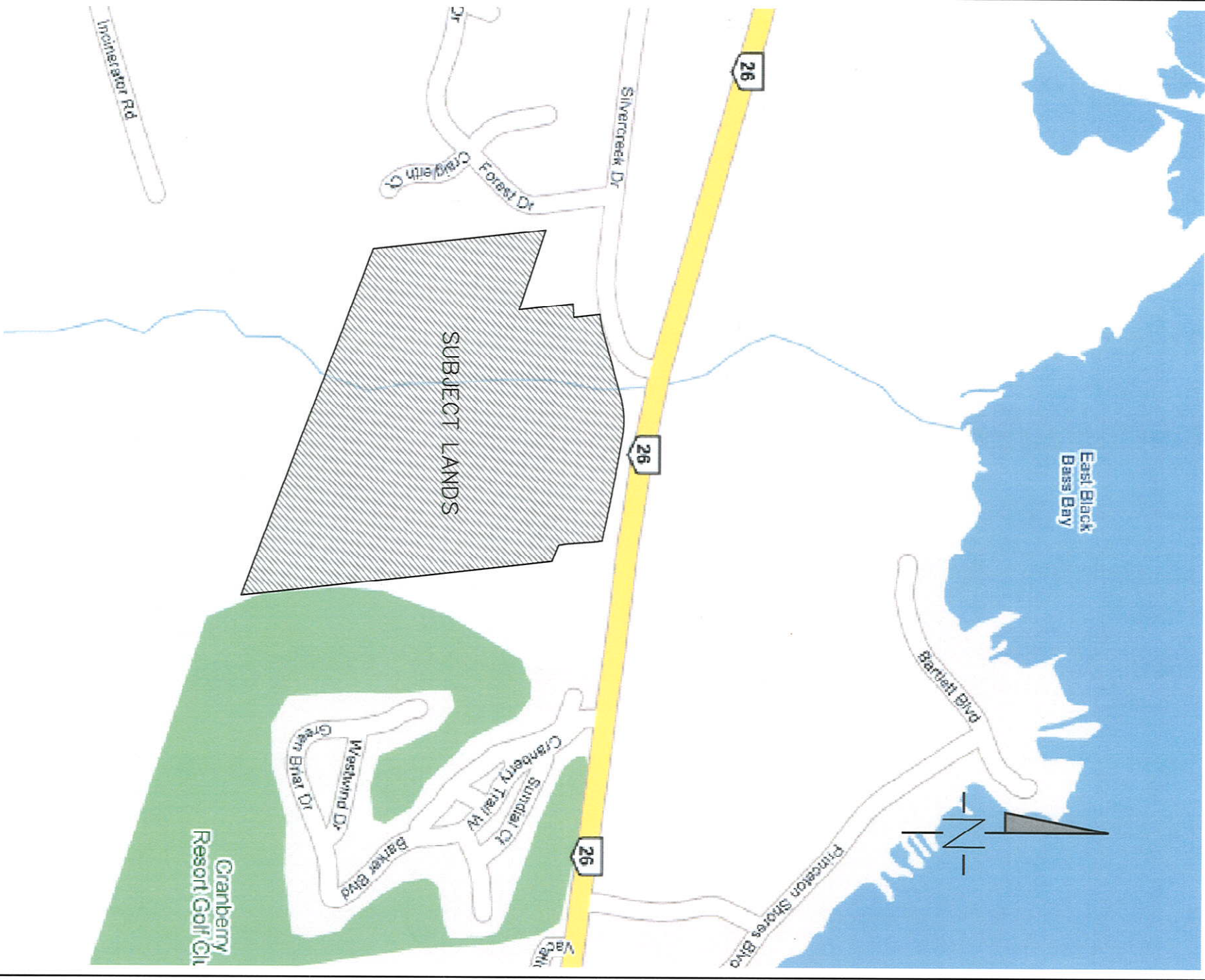
	Reducible Collisions	Non-reducible Collisions
Total Number of Historical Crashes	46	32
Expected Annual Crashes without Signalization based on SPF	2.150	1.377
Expected Annual Crashes without Signalization	11.131	6.046
Variance of Expected Annual Crashes without Signalization	2.647	1.092
Expected Annual Crashes after Signalization based on SPF	2.089	3.286
Expected Annual Crashes after Signalization	10.813	14.425
Variance of Expected Annual Crashes after Signalization	194.857	174.867

	Reducible Collisions	Non-reducible Collisions
Weights for Unsignalized Intersections	0.27	0.18
Weights for Signalized Intersections	0.29	0.25

RESULTS

Justification	Compliance	Signal Justified?	
		YES	NO
5. Collision Experience	Net Safety Change 2.648 Total Collisions will Increase after this intersection is signalized	☐	☒

FIGURES

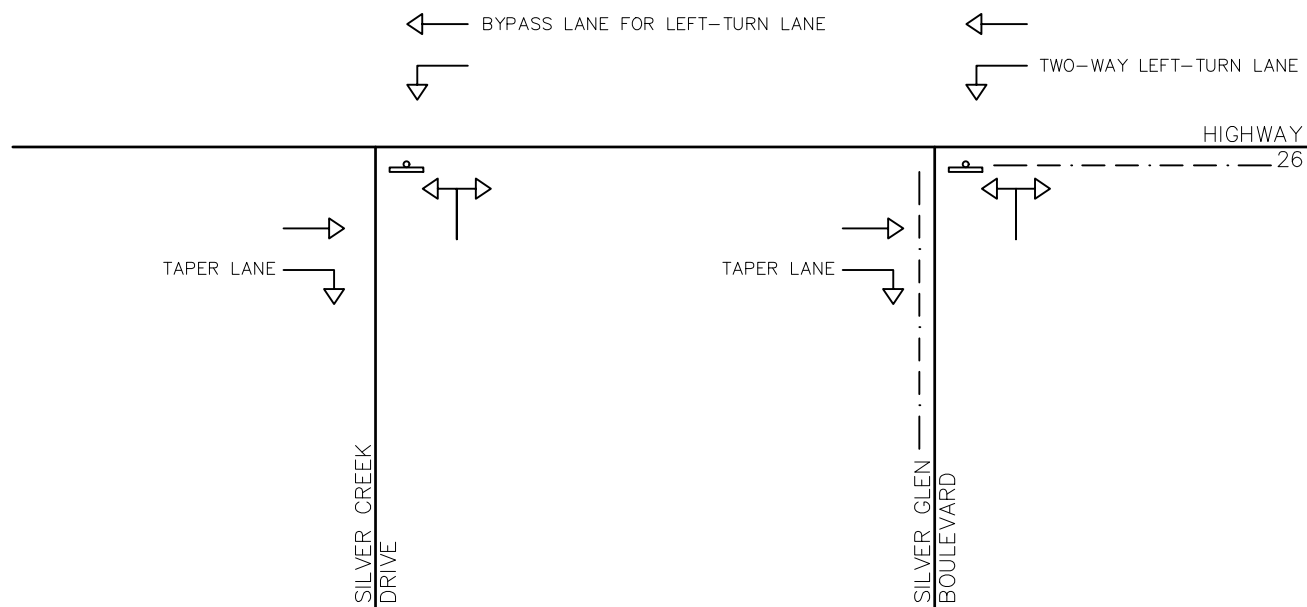


Project		HUNTINGWOOD DEVELOPMENT TOWN OF COLLINGWOOD	
Drawing		SITE LOCATION	
Drawn By	J.R.S.	Design By	P.A.H.
Date	08/14/2008	Check By	A.J.F.
Scale	N.T.S.	Project	281-2769
		FIG. 1	



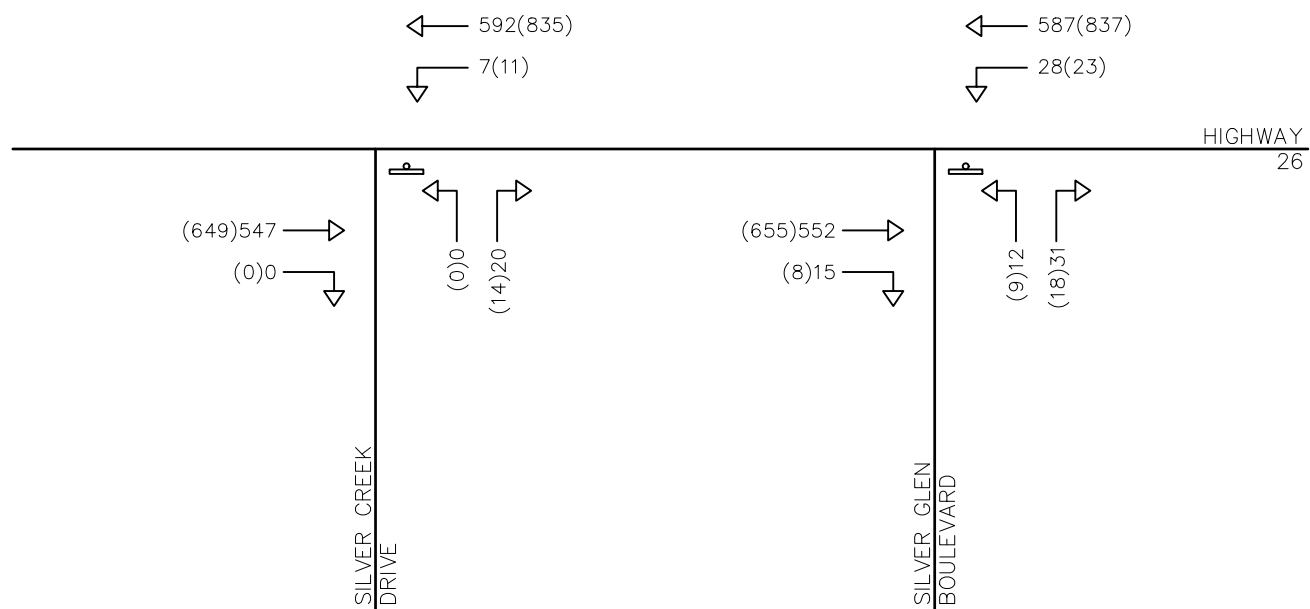
CROZIER & ASSOCIATES
ENGINEERS

110 PINE STREET,
COLLINGWOOD, ON L9Y 2N9
705 446-3510 F
705 446-3510 T
WWW.CROZIERCA
INFO@CROZIERCA



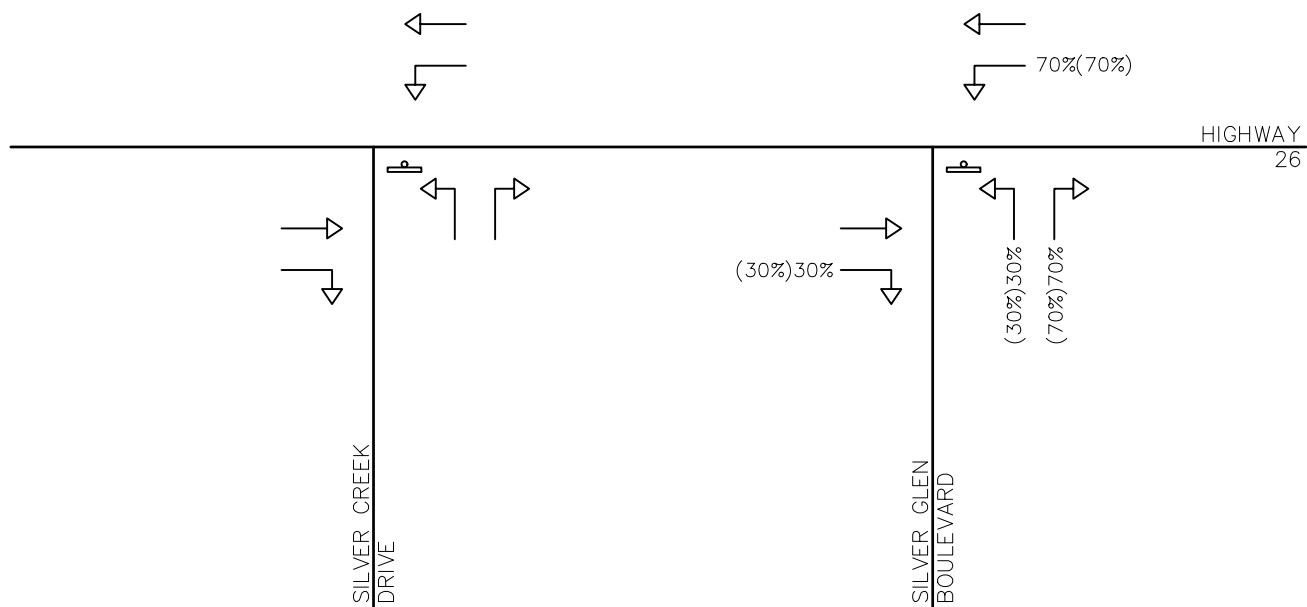
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  PEDESTRIAN SIDEWALK	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. — SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca
	Drawing BOUNDARY ROAD NETWORK	



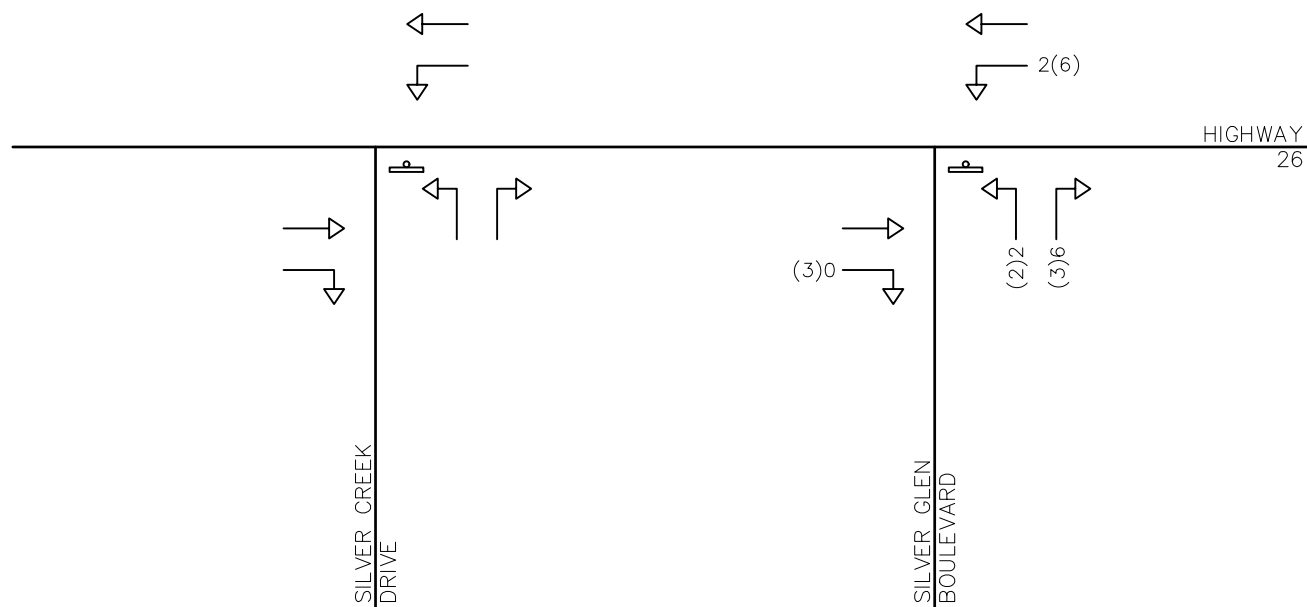
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca
	Drawing EXISTING TRAFFIC VOLUMES	



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca
	Drawing SILVER GLEN TRIP DISTRIBUTION	



NOTE: THIS FIGURE IS FOR SCHEMATIC
PURPOSES ONLY & IS NOT TO BE SCALED.

Legend



SIGNAL CONTROL



STOP CONTROL

xx(y)

WEEKDAY A.M.
(WEEKDAY P.M.)
PEAK HOUR TRAFFIC
VOLUMES

Project

HUNTINGWOOD TRAILS (COLLINGWOOD)
LTD. — SKELTON FARM

Drawing

SILVER GLEN TRIP ASSIGNMENT



**CROZIER
& ASSOCIATES**
Consulting Engineers

The HarbourEdge Building,
40 Huron Street, Suite 301,
Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
info@crozier.ca

Drawn By

D.L.

Design By

D.L.

Project

281-2769

Scale

N.T.S.

Date

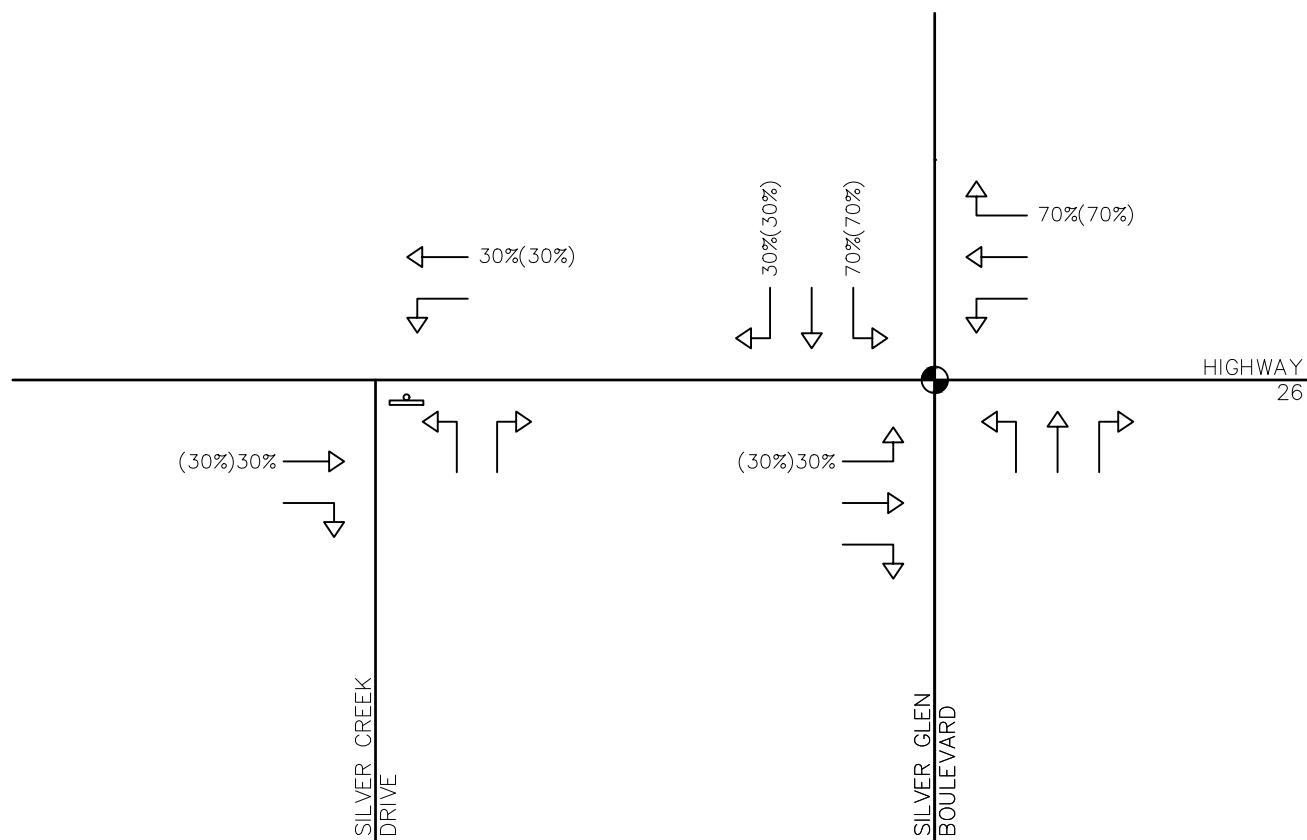
JULY 22, 2019

Check By

A.F.

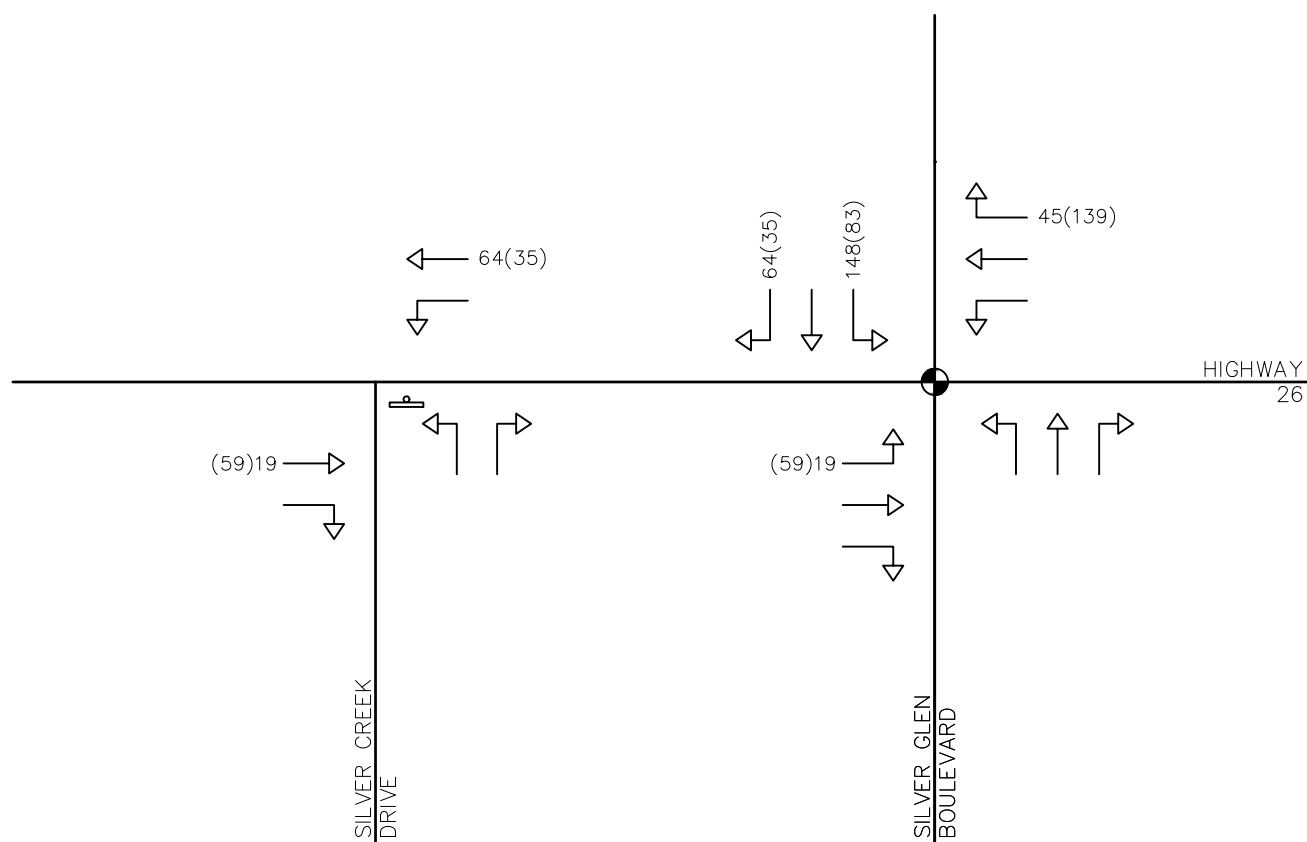
Drawing

FIG. 5



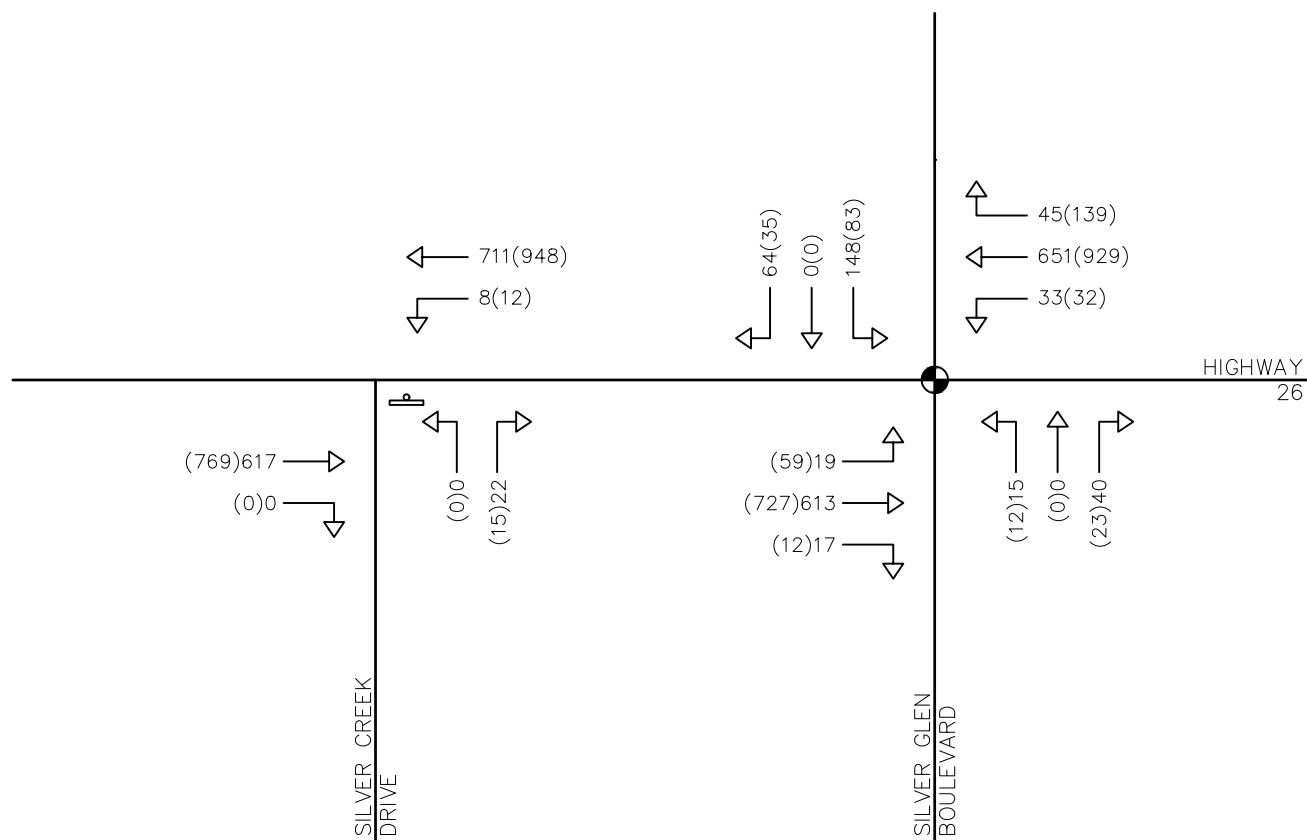
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@ccrozier.ca
	Drawing BRIDGEWATER TRIP DISTRIBUTION	



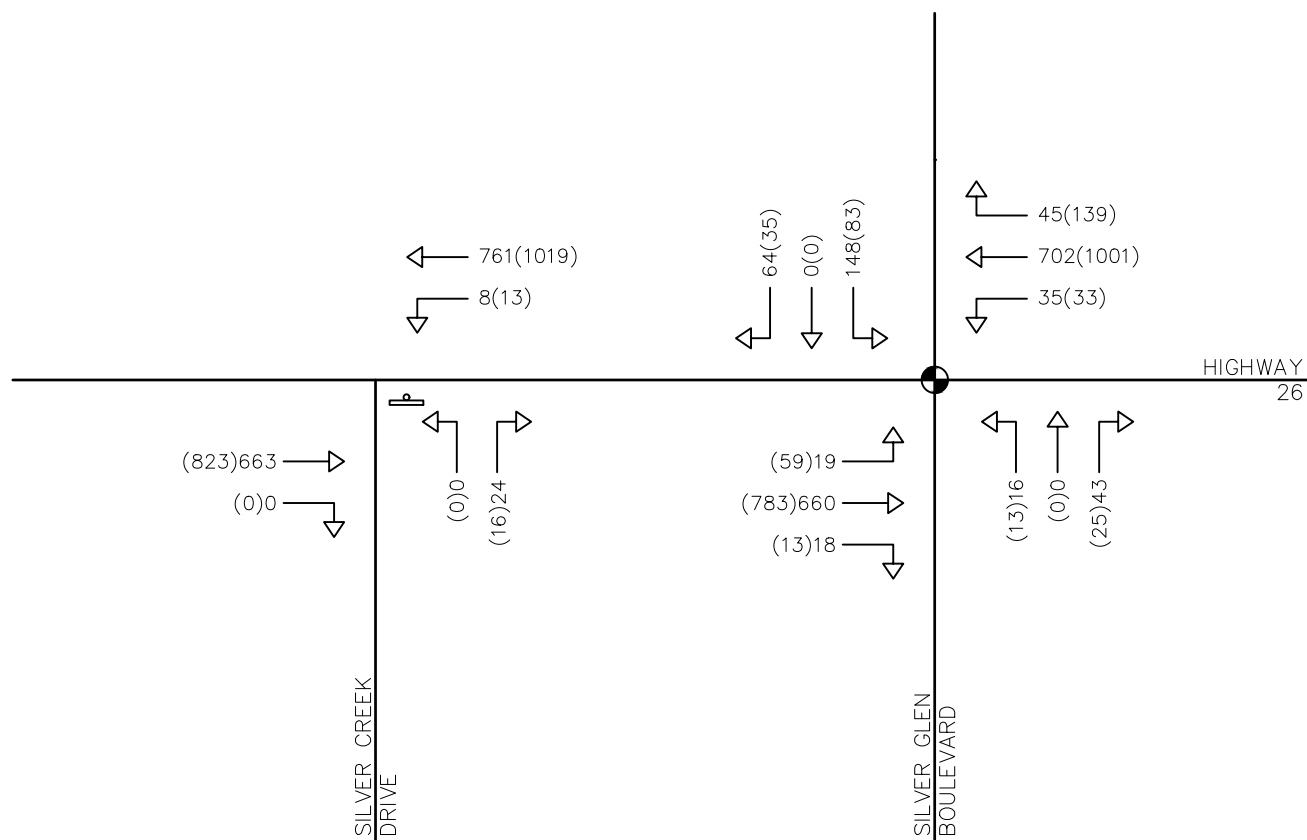
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL xx(y) WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F info@crozier.ca																					
	Drawing BRIDGEWATER TRIP ASSIGNMENT	<table border="1"> <tr> <td>Drawn By</td><td>D.L.</td><td>Design By</td><td>D.L.</td><td>Project</td><td>281-2769</td></tr> <tr> <td>Scale</td><td>N.T.S.</td><td>Date</td><td>JULY 22, 2019</td><td>Check By</td><td>A.F.</td></tr> <tr> <td></td><td></td><td></td><td></td><td>Drawing</td><td>FIG. 7</td></tr> </table>				Drawn By	D.L.	Design By	D.L.	Project	281-2769	Scale	N.T.S.	Date	JULY 22, 2019	Check By	A.F.					Drawing	FIG. 7
Drawn By	D.L.	Design By	D.L.	Project	281-2769																		
Scale	N.T.S.	Date	JULY 22, 2019	Check By	A.F.																		
				Drawing	FIG. 7																		



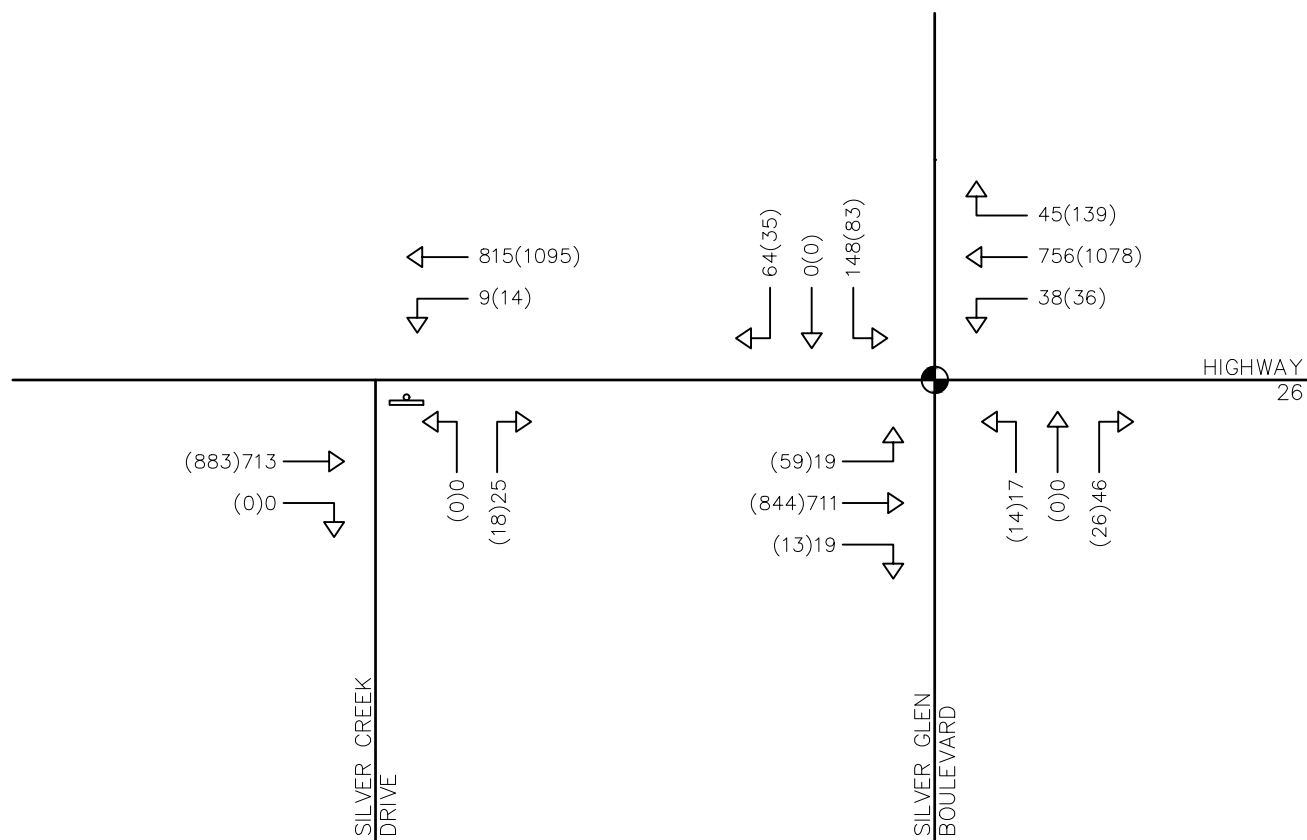
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca
	Drawing 2025 FUTURE BACKGROUND TRAFFIC VOLUMES	



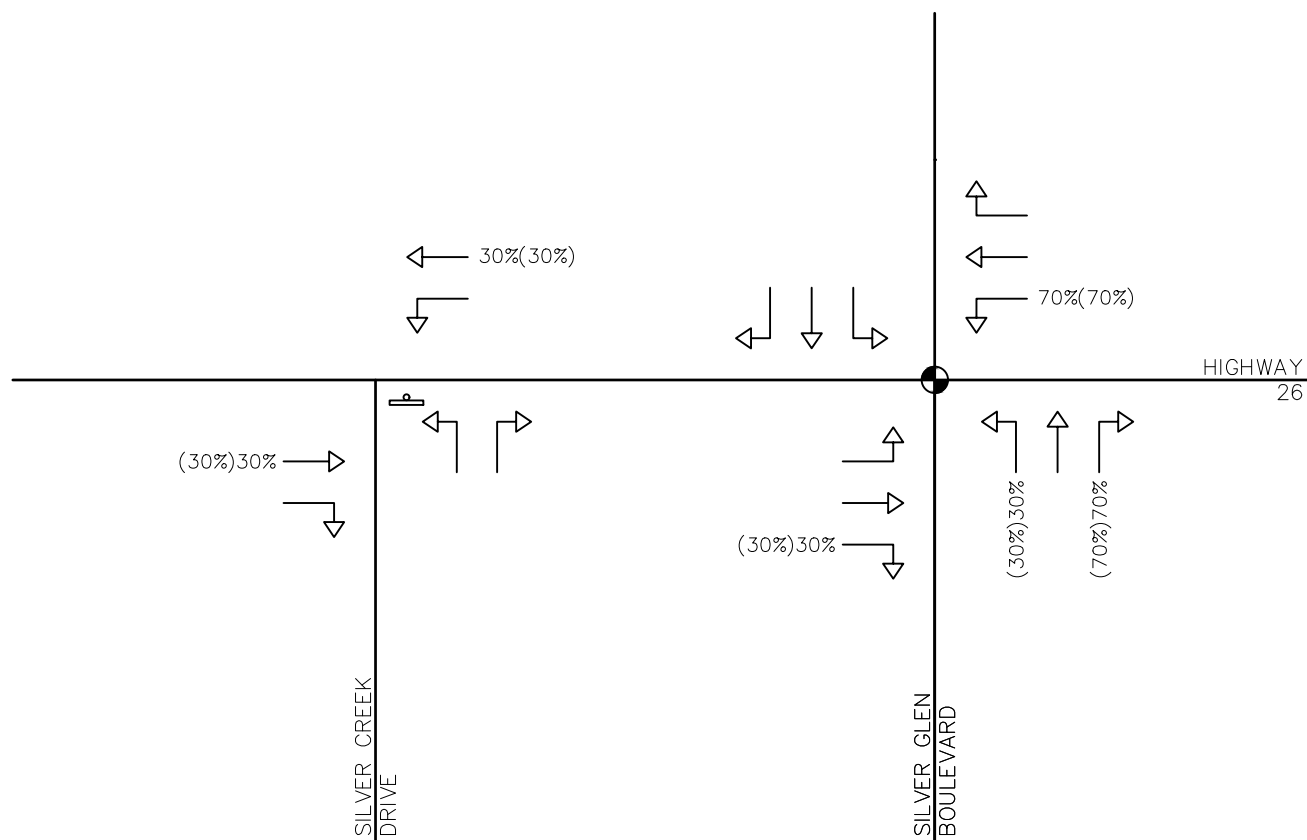
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca
	Drawing 2030 FUTURE BACKGROUND TRAFFIC VOLUMES	



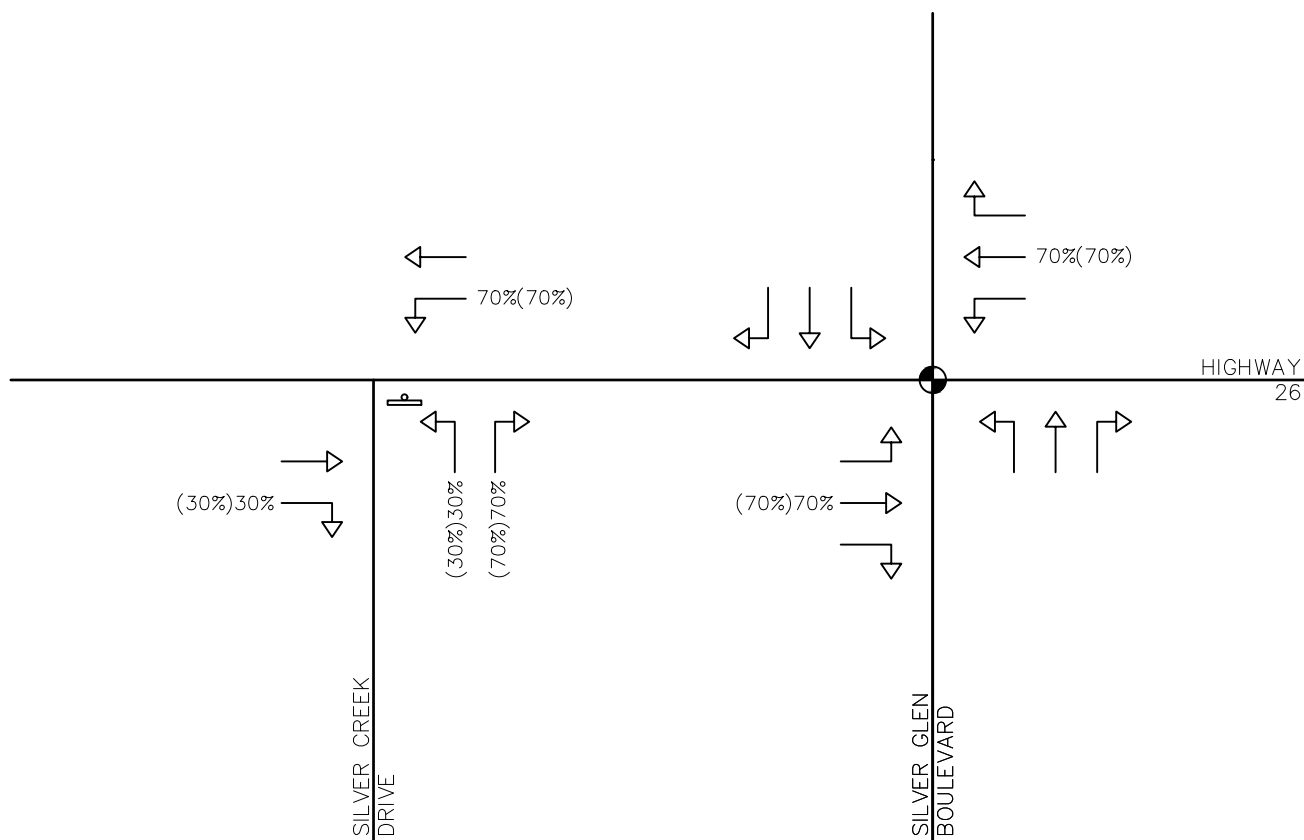
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca	
	Drawing 2035 FUTURE BACKGROUND TRAFFIC VOLUMES		Drawn By D.L. Design By D.L. Project 281-2769
	Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 10		



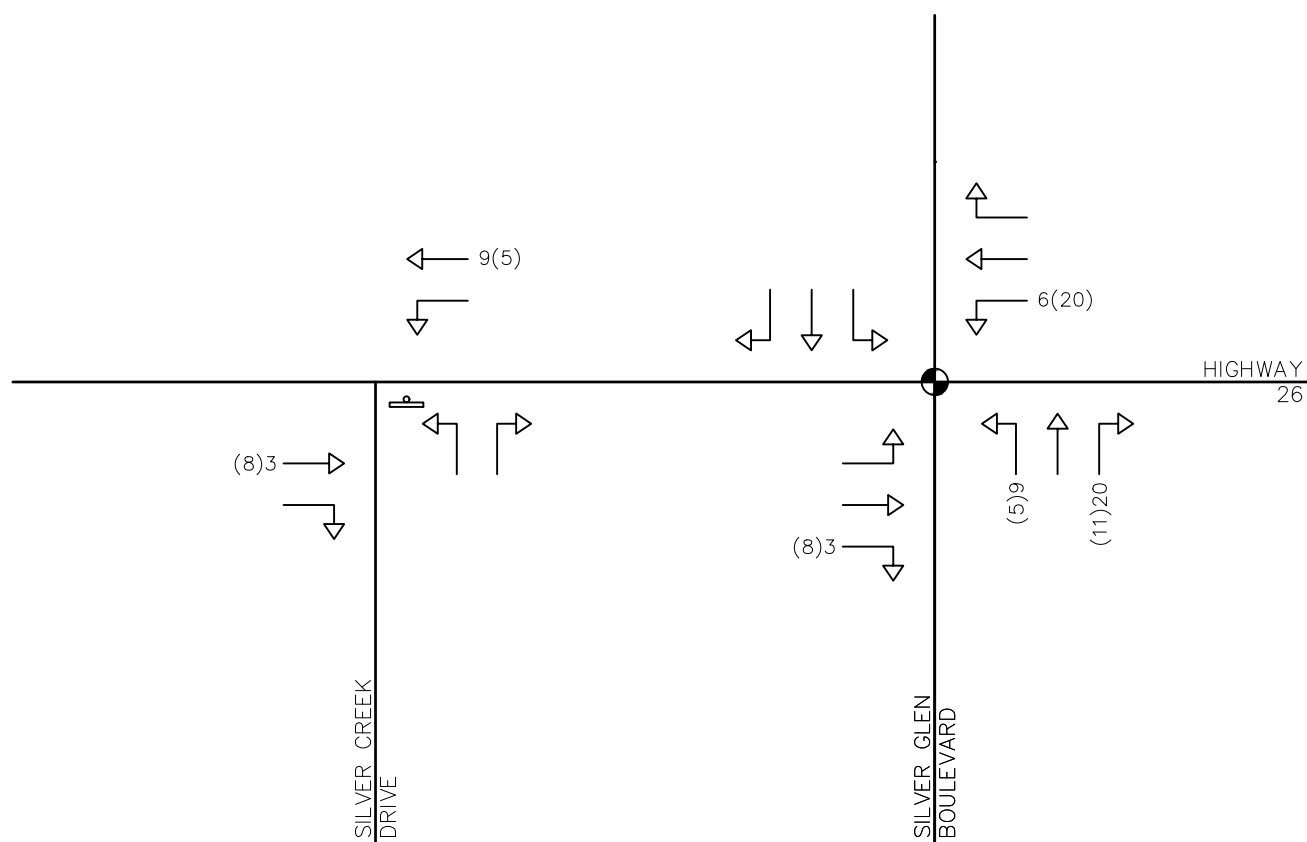
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca
	Drawing TRIP DISTRIBUTION – DEVELOPMENT AREA 1	
	Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 11	



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

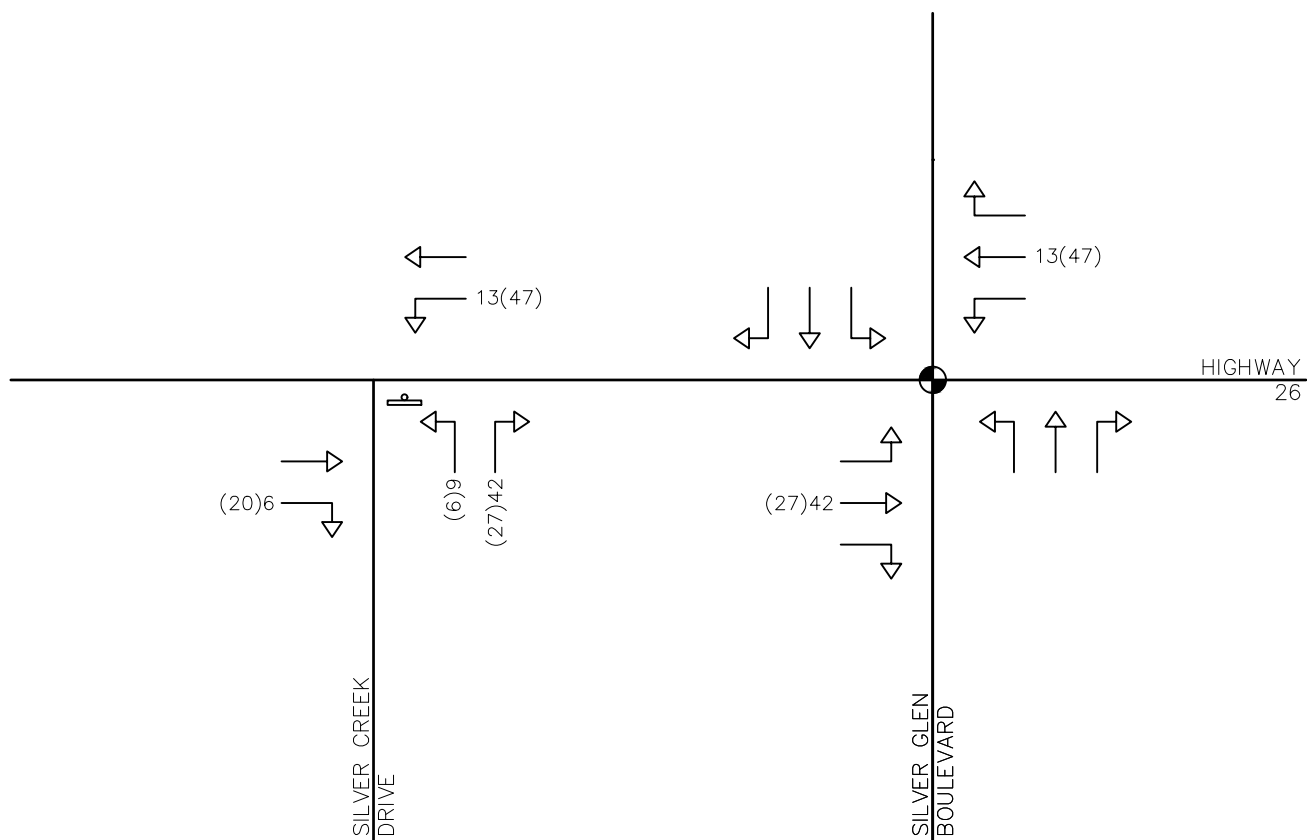
Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca
	Drawing TRIP DISTRIBUTION – DEVELOPMENT AREA 2	



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

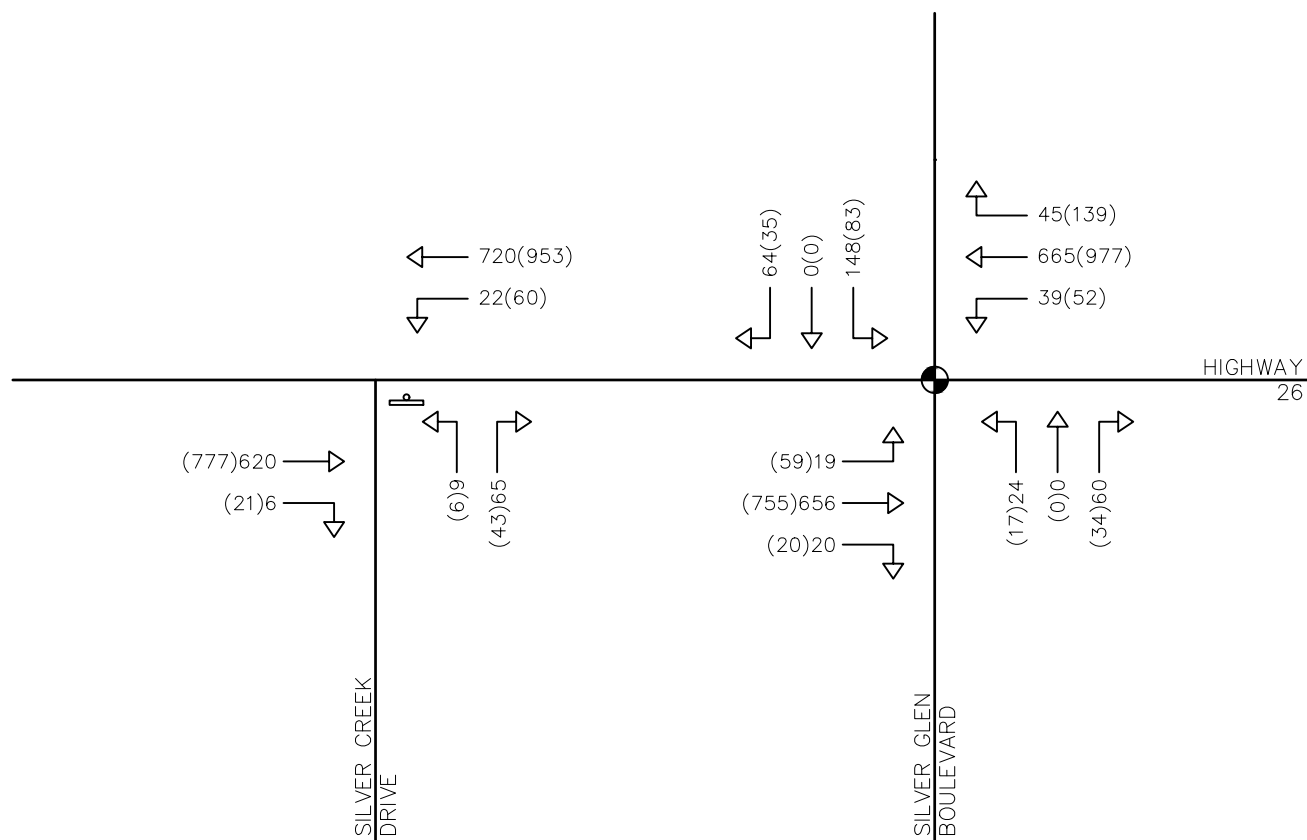
Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca
	Drawing TRIP ASSIGNMENT – DEVELOPMENT AREA 1	

Drawn By	D.L.	Design By	D.L.	Project	281-2769	
Scale	N.T.S.	Date	JULY 22, 2019	Check By	A.F.	
					Drawing	FIG. 13



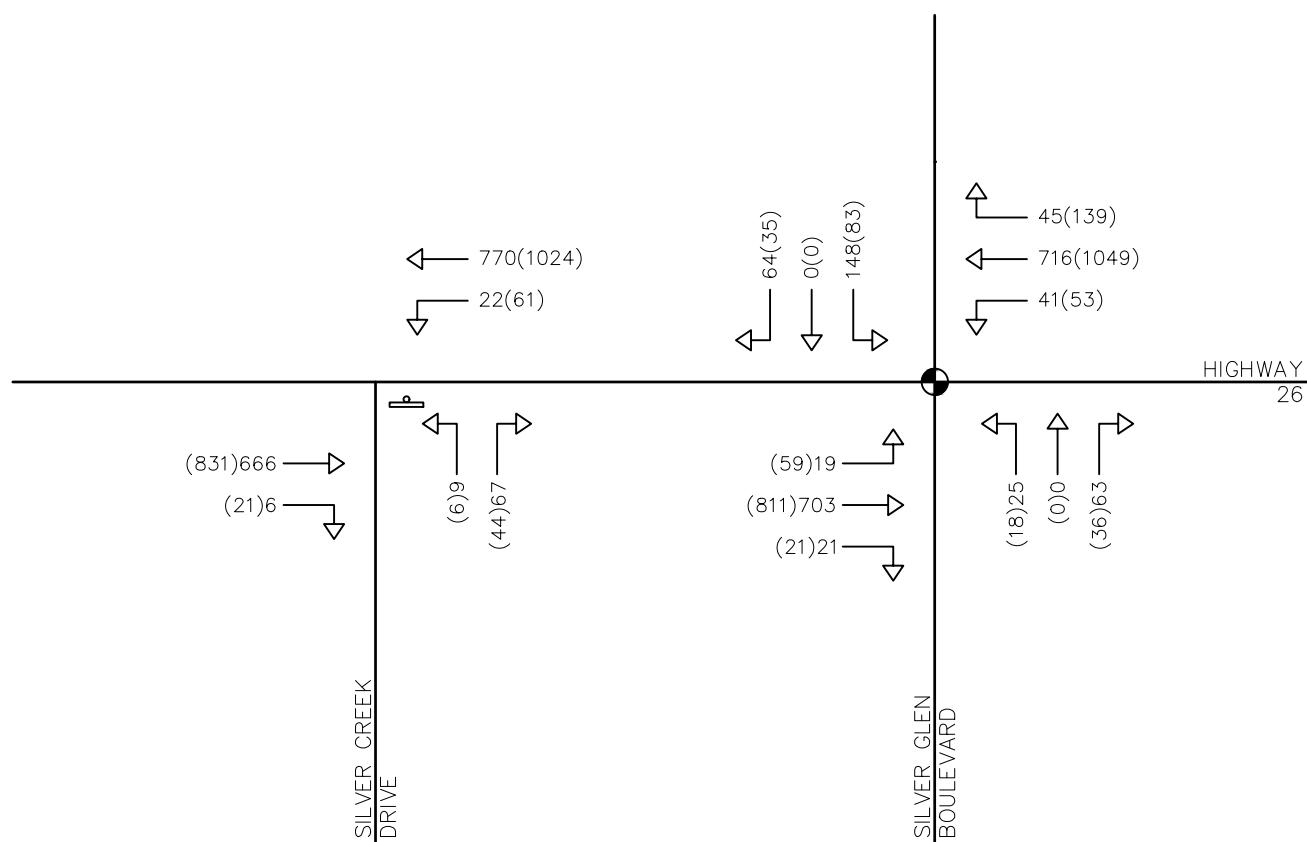
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@crozier.ca Drawn By D.L. Design By D.L. Project 281-2769 Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 14
	Drawing TRIP ASSIGNMENT – DEVELOPMENT AREA 2	



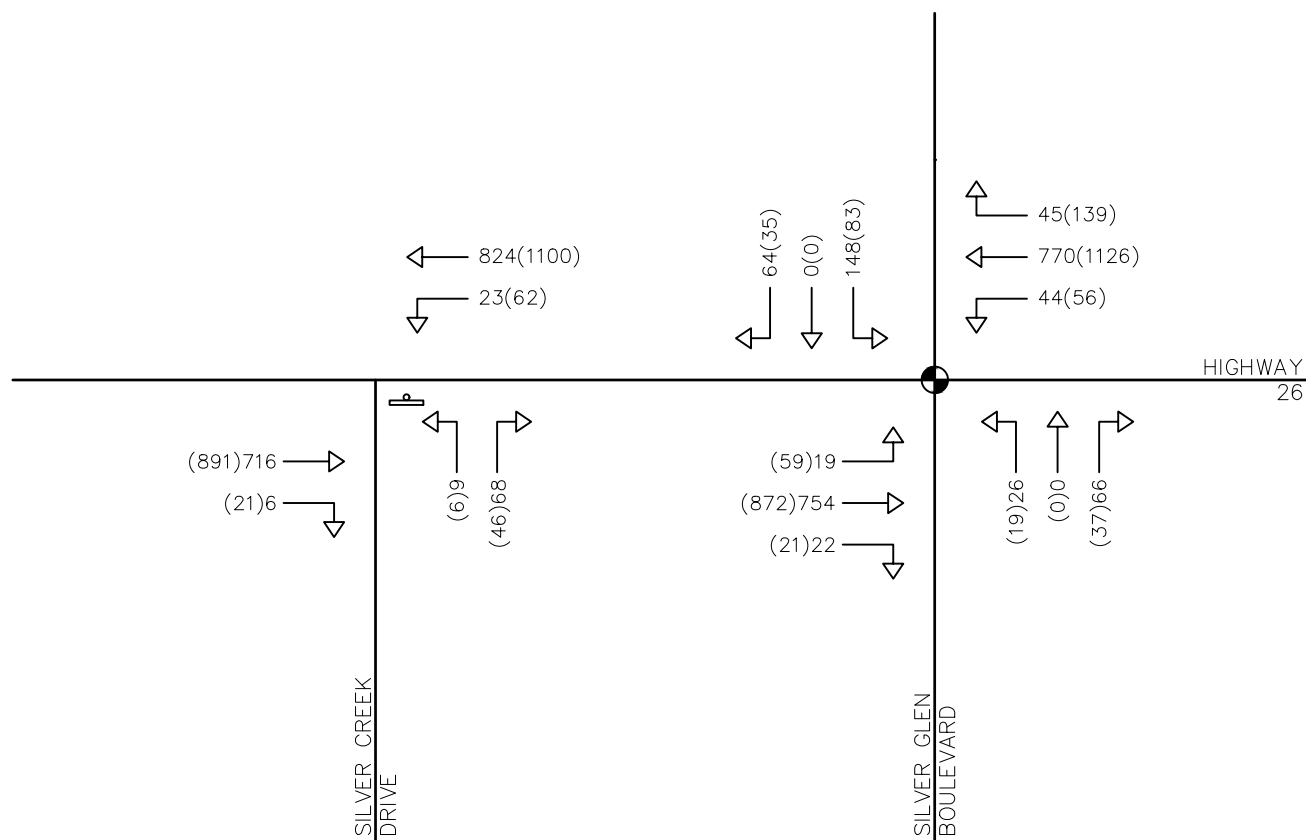
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL  WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM Drawing 2025 FUTURE TOTAL TRAFFIC VOLUMES	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@ccrozier.ca Drawn By D.L. Design By D.L. Project 281-2769 Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 15
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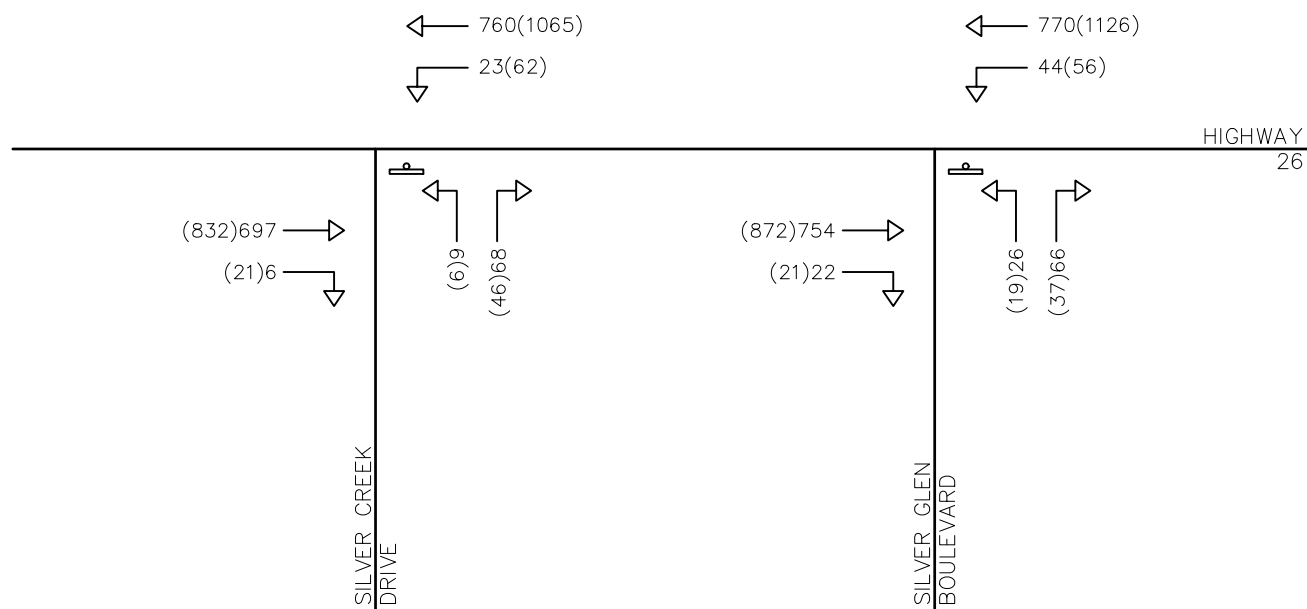
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL xx(m) WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM Drawing 2030 FUTURE TOTAL TRAFFIC VOLUMES	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca Drawn By D.L. Design By D.L. Project 281-2769 Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 16
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NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL xx(m) WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM Drawing 2035 FUTURE TOTAL TRAFFIC VOLUMES	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@ccrozier.ca Drawn By D.L. Design By D.L. Project 281-2769 Scale N.T.S. Date JULY 22, 2019 Check By A.F. Drawing FIG. 17
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NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

Legend  SIGNAL CONTROL  STOP CONTROL xx(m) WEEKDAY A.M. (WEEKDAY P.M.) PEAK HOUR TRAFFIC VOLUMES	Project HUNTINGWOOD TRAILS (COLLINGWOOD) LTD. – SKELTON FARM	 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca		
	Drawing 2035 FUTURE TOTAL SENSITIVITY TRAFFIC VOLUMES			
Drawn By D.L.		Design By D.L.	Project 281-2769	
Scale N.T.S.		Date JULY 22, 2019	Check By A.F.	Drawing FIG. 18