

OCTOBER 18, 2022

PROJECT NO: 1101-4125

MTO Central Region Engineering Office
Corridor Management Section
159 Sir William Hearst Ave., 7th Floor
Toronto, ON M3M 0B7

Attention: Peter Dorton
Senior Project Manager, Corridor Management

RE: 7723 HIGHWAY 89 (PILLA LANDS)
TOWNSHIP OF ADJALA-TOSORONTIO, COUNTY OF SIMCOE
TRANSPORATION LETTER OF SUPPORT

Dear Peter,

C.F. Crozier & Associates (Crozier) was retained by Pilla Investments Incorporated (the proponent) to prepare documentation in support of the Draft Plan application for the development of 7723 Highway 89, known as the Pilla Lands, in the Township of Adjala-Tosorontio.

Crozier completed a Highway Access Management Plan (HAMP), dated November 2017, in support of the development. The HAMP reviewed the horizon years of 2026, 2031 and 2036. At the time of the report, individual uses for the site had not been specified, and the Institute of Transportation Engineers (ITE) Trip Generation Manual was used to forecast the trip generation of the site assuming general employment/industrial uses. Land Use Code (LUC) 130 – Industrial Park was utilized for the 73 acres site, and it was forecasted that 512 a.m., 508 p.m. and 344 Saturday two-way trips would be generated by the development. The HAMP concluded that the addition of site traffic was expected to have minimal impact on the boundary road network.

Additionally, the HAMP concluded that the preferred site access to Highway 89 would be 400 m west of Concession Road 7. A secondary access would be provided through the existing connection to Concession Road 7, south of the Home Hardware. This access (Street A) has been built to the Township of Adjala-Tosorontino Engineering Standards and could be assumed by the municipality. A future connection to County Road 50 (Street C), through lands not owned by the proponent, was also reviewed.

The detailed analysis contained within the HAMP resulted in the following recommendations:

- Signalization and construction of an exclusive westbound left-turn lane with 15 m of storage at the intersection of Highway 89 and Street B.
 - Recommended for completion by 2026 by the applicant.
- A southbound left-turn lane with 40 m of storage at the intersection of Country Road 50 and Street C.
 - Recommended for completion by 2036 by a future applicant for 7845 Highway 89.

- Signalization of the intersection of Highway 89 and Concession Road 7/ Dean Drive.
 - Recommended for completion by 2026 by the MTO/ Township of Adjala-Tosorontio.
- Signalization of the intersection of Highway 89 and Concession Road 7/ Elizabeth Street
 - Recommended for completion by 2026 by the MTO/ Township of Adjala-Tosorontio.

The current Draft Plan remains consistent with the previous version, proposing 73 acres of development area. The plan proposes a single connection (20 m ROW) to Highway 89 and a single connection (30 m ROW) to Concession Road 7. As consistent with the HAMP, the connection to Highway 48 is to be 400 m from Concession Road 7 and the existing connection to Concession Road 7 will be utilized. The Draft Plan does not illustrate the proposed future connection to Country Road 50 that was reviewed as part of the HAMP as the connection relies on the use of lands not owned by the proponent.

As the proposed uses of the individual lots is still unknown at this time, the assumptions made to forecast trip generation and the future operations remain appropriate. At the time when the individual lots are proposed for development and undergo Site Plan Approval, updated reports can be prepared to reflect the trip generation associated with the confirmed use.

In conclusion the analysis presented in the November 2017 Highway Access Management Plan is still applicable. The report has been attached to this Letter for your reference.

Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.



Madeleine Ferguson, P.Eng.
Manager of Transportation
MF/kh

C.F. CROZIER & ASSOCIATES INC.



Kerianne Hagan, E.I.T
Engineering Intern, Transportation

Enclosure:
Highway Access Management Plan (Crozier, November 2017)

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HIGHWAY ACCESS MANAGEMENT PLAN

**7723 HIGHWAY 89
TOWNSHIP OF ADJALA-TOSORONTIO
COUNTY OF SIMCOE**

**PREPARED FOR:
PILLA INVESTMENTS INCORPORATED**

PART 1 OF 3

**PREPARED BY:
C.F. CROZIER & ASSOCIATES INC.
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NOVEMBER 2017

CFCA FILE NO. 1101-4125

The material in this report reflects best judgment 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. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Identification	Date	Description of Work
Draft Submission	October 2017	Project Team Review
Final Submission	November 2017	Submission to MTO and Township

1.0 EXECUTIVE SUMMARY

1.1 Introduction

CF Crozier & Associates Inc. (Crozier) was retained by Pilla Investments Incorporated to complete a Highway Access Management Plan (HAMP) for the Highway 89 corridor between County Road 50 and Industrial Parkway. The majority of this portion of Highway 89 is within the Township of Adjala-Tosorontio, and under the jurisdiction of the Ontario Ministry of Transportation (MTO). The Town of New Tecumseth town line is approximately 240 metres west of the intersection of Highway 89/Young Street and Industrial Parkway. At this point Highway 89 becomes a Connecting Link Road through the Town of New Tecumseth and transitions into Young Street, King Street and then Victoria Street for 5.30 kilometers.

The subject lands are approximately 73 acres in size, and are located on the south side of Highway 89, west of Concession Road 7, as illustrated in **Figure 1**. The property is currently zoned as Employment (E1) per the Township of Adjala-Tosorontio Zoning By-law No. 13-14, Schedule 'A', included in **Appendix J**. Prior to further development on the subject lands, the MTO has requested a HAMP be completed to evaluate the potential impacts of the subject lands to the boundary road network, as well as the impact of any proposed access to Highway 89 from an access management perspective. This study also recommends any mitigation measures required to accommodate future developments in the area.

The study analyzes the operations of the boundary road intersections, as well as the proposed accesses to the subject lands. The future traffic operations with and without the addition of the site generated vehicular trips are also analyzed. In addition, a sensitivity analysis was completed for the property located at 7845 Highway 89 for the ultimate horizon year.

1.2 Existing Conditions

Analysis of traffic operations at the study intersections under existing traffic conditions indicate the following:

- Highway 89 and Concession Road 7/Dean Drive (unsignalized) operates at a LOS "F" during the Saturday peak hour, with heavy delays on the minor approaches;
- Highway 89 and Concession Road 7/Elizabeth Street (unsignalized) operates at a LOS "F" during the Saturday peak hour, with heavy delays on the minor approaches; and,
- All other intersections within the study area operate at a LOS "C" or better during the weekday a.m., p.m. and Saturday peak hours.

Currently, the subject lands have one newly constructed access off Concession Road 7, approximately 240 metres south of Highway 89. This access has been constructed to serve the planned Home Hardware development adjacent to the north-east quadrant of the subject lands.

1.3 Study Assumptions

1.3.1. Horizon Years

The study horizons comprised of 10, 15 and 20 years beyond the date of completion of the HAMP (2026, 2031, and 2036) were established in the approved HAMP Workplan dated January 16, 2017.

1.3.2. Growth Rate

Using the historical Average Annual Daily Traffic Volumes provided by the MTO for Highway 89, a conservative growth rate of **3%** was calculated. This growth rate was also supported by Statistics Canada data, which calculated a similar population growth rate in Adjala-Tosorontio from 2011 to 2016.

1.3.3. Access Locations

As shown in **Figure 25**, access locations to the subject lands will consist of the existing access off of Concession Road 7, and the proposed access off of Highway 89.

1.3.4. Land Use

Due to the unknown nature of the development, it was assumed that general employment/industrial would occupy the remaining subject lands. For this reason, Industrial Park (ITE LUC 130) was assumed for trip generation purposes. This use aligns with the Township of Adjala-Tosorontio By-Law, which states both the subject lands and adjacent properties are designated as employment lands.

1.4 Future Background Conditions

Analysis of traffic operations at the study intersections under future background traffic conditions indicate the following:

- The intersection of Highway 89 and Concession Road 7/Dean Drive is warranted for signal implementation by the 2026 future background conditions;
- The intersection of Highway 89 and Concession Road 7/Elizabeth Street is warranted for signal implementation by the 2031 future background conditions. It was assumed that signals would be implemented by 2026 due to the existing LOS "F" in the 2017 Saturday peak hour;
- The intersection of Highway 89 and County Road 50 is expected to operate at an acceptable LOS "C" or better during the 2036 future background weekday a.m., p.m. and Saturday peak hours. Additionally, the intersection is expected to reach capacity with a volume-to-capacity ratio of 1.00 for the northbound-right movement, however, this is considered a background issue and is minimally impacted by the potential development; and,
- All other intersections are expected to operate at an acceptable LOS during all horizon years.

1.5 Highway Access Management

1.5.1. Preferred Access Locations

As shown in **Figure 25**, the preferred access from Highway 89 (Street B) is located approximately 400 metres west of Concession Road 7. This will result in only one access on the south side over the 700 metre segment of Highway 89, which is preferable from a Highway Access Management perspective.

Furthermore, the future potential Street C and County Road 50 intersection should be located a minimum of 400 metres south of Highway 89 in order to adhere to the MTO's Highway Access Management Guidelines.

It is expected that Street A, B, and C ultimately connect in order to provide a through connection from Concession Road 7 to County Road 50, as shown in **Figure 25**.

1.5.2. Constraints and Restrictions

Within the subject lands, there are minimal expected constraints that would provide difficulties when constructing Street A westerly across the site.

If Street A is ultimately going to connect to County Road 50 via Street C, detailed design will need to consider the stream traversing diagonally across 7845 Highway 89. For reference, Street C is the extended portion of Street A through 7845 Highway 89, ultimately connecting to County Road 50.

1.5.3. Street A Classification

The recently constructed access to Concession Road 7 has been built to Adjala-Tosorontio Engineering Standards, thereby supporting the ability for Street A to be assumed by the Township upon development completion.

1.6 Future Total Conditions

Analysis of traffic operations at the study intersections indicate that in addition to the requirements previously stated for the future background operations, future total traffic conditions additionally result in the following:

- The intersection of Highway 89 and Street B is not warranted for signal implementation during any horizon year, however, due to the heavy through volumes on Highway 89, the traffic operations support the implementation of a traffic signal. This is expected to be implemented at the same time as the development in 2026;
- The intersection of Highway 89 and Street B warrants a left-turn lane with a minimum of 30 metres storage under unsignalized conditions, and warrants a left-turn lane with a minimum of 15 metres storage under signalized conditions; and,
- Overall, the addition of site traffic to the boundary road network is expected to have minimal impact to the intersection operations.

1.7 Sensitivity Analysis

- In the 2036 future total sensitivity analysis, the boundary road network is expected to have very similar operations with minor increases to the volume to capacity ratios and control delay, when compared to the 2036 future total operations; and,
- The potential Street C and County Road 50 intersection warrants a left turn lane with minimum 40 metres storage in the 2036 Future Total Sensitivity Conditions. However, this should be reevaluated when further development details are known.

1.8 Access Safety

- Analysis of sight distance at the future Street C connection to County Road 50 indicates that limited sight distance is available to the south. Accordingly, minor adjustments should be considered during detailed design to locate the intersection such that the sight distance is maximized for vehicles exiting the property; and,
- All other analyses of sight distance at the site accesses indicate that there is sufficient sight distance for vehicles exiting the property. The future development is supportable from a sight distance perspective.

1.9 Findings and Recommendations

The detailed analysis contained within this report has resulted in the recommendations described in Table 1, with further recommendations noted below.

Table 1: Recommended Mitigation Measures and Responsibilities

Location	Improvement	Timeline	Responsibility
Highway 89 and Street B	Signalization, and construction of an exclusive westbound left-turn lane with 15 metres of storage	2026	Applicant
County Road 50 and Street C	Southbound left-turn lane with 40 metres of storage	2036	Future Applicant (7845 Highway 89)
Highway 89 and Concession Road 7/ Dean Drive	Signalization	2026	MTO/Township of Adjala-Tosorontio
Highway 89 and Concession Road 7/ Elizabeth Street	Signalization	2026	MTO/Township of Adjala-Tosorontio

1.9.1. Auxiliary Turn-Lanes

- An auxiliary left-turn lane is not warranted at the intersection of Concession Road 7 and Street A;

1.9.2. Signal Warrants

- Signals are not warranted at the intersections of Concession Road 7 and Street A, and County Road 50 and Street C. The intersections were found to operate with acceptable levels of service and delay under 2036 future total conditions, accordingly signals are not recommended at these intersections.

1.9.3. Optimized Signal Timings

- The operations of all signalized intersections were analyzed under optimized signal timings. It is therefore recommended that the signal timings be updated to accommodate the future growth in the area. These improvements should be completed in coordination with the Township of Adjala-Tosorontio and the Ontario Ministry of Transportation.

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2.0 Introduction

2.1 Background

CF Crozier & Associates Inc. (Crozier) was retained by Pilla Investments Incorporated to complete a Highway Access Management Plan (HAMP) for the Highway 89 corridor between County Road 50 and Industrial Parkway. The majority of this portion of Highway 89 is within the Township of Adjala-Tosorontio, and under the jurisdiction of the Ontario Ministry of Transportation (MTO). The Town of New Tecumseth town line is approximately 240 metres west of the intersection of Highway 89/Young Street and Industrial Parkway. At this point Highway 89 becomes a Connecting Link Road through the Town of New Tecumseth and transitions into Young Street, King Street and then Victoria Street for 5.30 kilometers.

The subject lands are approximately 73 acres in size, and are located on the south side of Highway 89, west of Concession Road 7, as illustrated in **Figure 1**. Prior to further development on the subject lands, the MTO has requested a HAMP be completed to evaluate the potential impacts of the subject lands to the boundary road network, as well as the impact of any proposed access to Highway 89 from an access management perspective. This study also recommends any mitigation measures required to accommodate future developments in the area.

The study analyzes the operations of the boundary road intersections, as well as the proposed accesses to the subject lands. The future traffic operations with and without the addition of the site generated vehicular trips are also analyzed. In addition, a sensitivity analysis was completed for the property located at 7845 Highway 89 for the ultimate horizon year.

The work plan for the study was confirmed with Township of Adjala-Tosorontio and MTO staff, with correspondence included in **Appendix A**.

The study has been completed in accordance with the procedures set out in the MTO "Highway Access Management Guidelines" (December, 2013), the MTO "Traffic Impact Study Guidelines" (September, 2014) and agreed upon Work Plan with the Township and MTO, with the associated analyses and findings outlined therein.

2.2 Study Area

The study area includes the Highway 89 corridor between County Road 50 and Industrial Parkway, as shown in **Figure 1**. The majority of this portion of Highway 89 is within the Township of Adjala-Tosorontio, and under the jurisdiction of the Ontario Ministry of Transportation (MTO). The property is currently zoned as Employment (E1) per the Township of Adjala-Tosorontio Zoning By-law No. 13-14, Schedule 'A', included in **Appendix J**.

The Town of New Tecumseth town line is approximately 240 metres west of the intersection of Highway 89/Young Street and Industrial Parkway. At this point Highway 89 becomes a Connecting Link Road through the Town of New Tecumseth and transitions into Young Street, King Street and then Victoria Street for a length of 5.30 kilometers. Land uses in the study area are characterized by commercial, industrial and residential uses. East of the Town of New Tecumseth town line there is an increased presence of commercial, retail and residential developments.

2.3 Evaluation Practices

The level of service of a signalized intersection is based on the average control delay per vehicle and the level of service of a stop-controlled intersection is based on the delay associated with the critical

minor road approach; i.e., Elizabeth Street, Concession Road 6, etc. According to MTO Guidelines, critical volume-to-capacity ratios include values greater than 0.85 for any movement or approach. The level of service tables included in this report identify the critical volume-to-capacity ratios for the governing movement of each intersection, as well as the maximum volume-to-capacity ratio for any intersection not exceeding the critical threshold noted above.

3.0 Existing Conditions

3.1 Development Lands

The subject property is an approximate 73-acre undeveloped lot located in the Township of Adjala-Tosorontio. The subject property is bound by Concession Road 7 to the east, Highway 89 to the north, agricultural uses to the south and industrial uses to the west. The subject property itself currently contains agricultural lands, and has one direct access to Highway 89.

3.2 Boundary Road Network

Table 2: Boundary Road Network Summary

Road	Lanes	Posted Speed (km/h)	Classification	Jurisdiction	Pedestrian Infrastructure
Industrial Parkway	2	50 km/h	Local Roadway	Town of New Tecumseth	Concrete sidewalks (east and west)
Highway 89	4	80 km/h (until 320 m west of Concession Road 7)	Provincial Highway	Ontario Ministry of Transportation	None
Highway 89	4	60 km/h (320 m west of Concession Road 7 to 240 m west of Industrial Street)	Provincial Highway	Ontario Ministry of Transportation	None
Highway 89/Young Street	4	50 km/h (240 m west of Industrial Street)	Connecting Link	Town of New Tecumseth	Concrete sidewalks (south)
Concession Rd 7 (N)	2	60 km/h	Local Roadway	Township of Adjala-Tosorontio	None
Concession Rd 7 (S)	2	60km/h	Local Roadway	Township of Adjala-Tosorontio	None
Dean Drive	2	50 km/h	Local Roadway	Township of Adjala-Tosorontio	None
Concession Rd 6	2	80km/h	Local Roadway	Township of Adjala-Tosorontio	None
County Road 50	2	80 km/h	Primary Arterial	County of Simcoe	None
Elizabeth Street	2	Not posted	Local Roadway	Township of Adjala-Tosorontio	None

As noted in Table 2, Highway 89 is under the jurisdiction of the Ontario Ministry of Transportation until the Town of New Tecumseth town line, at which point Highway 89 transitions into Young Street and becomes a Connecting Link, as noted in the MTO Connecting Links Program Guide (August 2017). The Connecting Link is 5.30 kilometers in length, and is comprised of Young Street, King Street, and Victoria Street.

3.3 Key Intersections

The following are the key intersections contained within the study area. **Figure 2** illustrates the existing lane configuration and control type of each intersection.

- Highway 89/Young Street & Industrial Parkway
- Highway 89 & Elizabeth Street East
- Highway 89 & Concession Road 7 North – Elizabeth Street West
- Highway 89 & Concession Road 7 South – Dean Drive
- Highway 89 & Concession Road 6
- Highway 89 & County Road 50

3.4 Active Transportation Network

3.4.1. Cycling Facilities

No cycling facilities exist within the study area.

3.4.2. Transit Facilities

No public transit facilities exist within the study area.

3.5 Road and Access Spacing

Along Highway 89, there are a number of existing private accesses, most of which permit full-moves. To simplify the inventory, these accesses have been divided into four quadrants. The Highway 89 North-West quadrant extends from County Road 50 to Concession Road 7; the Highway 89 North-East quadrant extends from Concession Road 7 to Industrial Parkway; the Highway 89 South-West quadrant extends from County Road 50 to Concession Road 7; the Highway 89 South-East quadrant extends from Concession Road 7 to Industrial Parkway. The existing access locations are illustrated in **Figures 3 and 4**.

Table 3: Road and Access Spacing

Location		Distance From County Road 50	Distance to Previous Access	Entrance Width
Entrance As labelled in Figure 3/4	Land Use			
Highway 89 North West Leg				
A1	Concession Road 6	195 m	195 m	4 m
A2	Auto Repair	280 m	85 m	12.5 m
A3	Religious	440 m	160 m	9 m
A4	Residential	585 m	145 m	6 m
A5	Residential	735 m	150 m	6 m
A6	Agricultural	838 m	103 m	4 m
A7	Storage	885 m	150 m	7.5 m

Location		Distance From County Road 50	Distance to Previous Access	Entrance Width
Entrance As labelled in Figure 3/4	Land Use			
A8	Storage	925 m	40 m	10.5 m
A9	Auto Repair	1000 m	75 m	9 m
A10	Hydro	1005 m	5 m	28 m
A11	Dean Drive	1230 m	25 m	11.5 m
A12	Concession Road 7	1560 m	30 m	11.5 m
Highway 89 North-East Quadrant				
B1	Auto Service	1740 m	180 m	8 m
B2	Auto Service	1780 m	40 m	11 m
B3	Residential	1830 m	80 m	11 m
B4	Residential	1850 m	20 m	5.75 m
B5	Veterinary Clinic	1880 m	30 m	7 m
B6	Residential	1920 m	40 m	10.5 m
B7	Residential	1970 m	50 m	9.5 m
B8	Residential	2010 m	40 m	5 m
B9	Residential	2040 m	30 m	4 m
B10	Residential	2050 m	10 m	6 m
B11	Residential	2080 m	30 m	5.5 m
B12	Residential	2110 m	30 m	5 m
B13	Residential	2130 m	20 m	5.5 m
B14	Residential	2150 m	20 m	7 m
Highway 89 North-East Quadrant				
B15	Residential	2170 m	20 m	7 m
B16	Residential	2190 m	20 m	6 m
B17	Residential	2220 m	30 m	10 m
B18	Residential	2260 m	40 m	6 m
B19	Commercial Plaza	2330 m	70 m	9.5 m
Highway 89 South-West Quadrant				
C1	Industrial	260 m	260 m	10 m
C2	Residential	375 m	115 m	6 m
C3	Residential	430 m	55 m	8 m
C4	Residential	450 m	20 m	7 m
C5	Residential	485 m	35 m	6 m
C6	Residential	520 m	35 m	17 m
C7	Residential	840 m	20 m	6 m
C8	Concession Road 7	1230 m	90 m	9 m
Highway 89 South-East Quadrant				
D1	Auto Repair	1270 m	40 m	9.5 m
D2	Auto Repair	1300 m	30 m	11 m
D3	Garden Centre	1380 m	80 m	15 m
D4	U Haul	1460 m	80 m	13 m
D5	Elizabeth Street West	1560 m	100 m	15 m
D6	Elizabeth Street East	1820 m	60 m	10 m
D7	Residential	1880 m	60 m	6 m
D8	Residential	1910 m	30 m	7 m
D9	Residential	1930 m	20 m	10 m

Location		Distance From County Road 50	Distance to Previous Access	Entrance Width
Entrance As labelled in Figure 3/4	Land Use			
D10	Residential	2000 m	70 m	6 m
D11	Residential	2030 m	30 m	10 m
D12	Residential	2060 m	30 m	6 m
D13	Residential	2080 m	220 m	5 m
D14	Commercial Plaza	2200 m	120 m	9 m
D15	Industrial Parkway	2330 m	130 m	20 m

3.6 Traffic Data

Turning movement counts for the boundary road intersections were undertaken by Ontario Traffic Inc. on Tuesday, June 13, 2017 from 6:00 a.m. to 10:00 a.m. and 3:00 p.m. to 7:00 p.m. and on Saturday, June 10, 2017 from 11:00 a.m. to 2:00 p.m. Peak Hour Factors (PHFs) were calculated from the traffic data and used in the traffic modelling. The traffic count data is summarized in **Appendix C. Figure 5** illustrates the 2017 existing traffic volumes.

3.7 Intersection Operations

The operations of the critical intersections were analyzed on the basis of the traffic volumes illustrated in **Figure 5**.

The 2017 traffic levels of service (LOS) are summarized in Table 4 for the counts taken at the study intersections under existing conditions. Signal timing plans for the intersections of Highway 89 and County Road 50 and Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access were made available to Crozier for modelling purposes. LOS definitions for signalized and unsignalized intersections are contained in **Appendix B**. Detailed capacity analyses are included in **Appendix F**. Signal timings have been included in **Appendix G**.

Table 4: 2017 Existing Levels of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	A	7.1 s	0.38 (NBR)
		P.M.	B	13.1 s	0.72 (NBR)
		Saturday	B	10.3 s	0.58 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	B	11.6 s	0.11 (SB)
		P.M.	C	15.6 s	0.09 (SB)
		Saturday	C	15.2 s	0.09 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Stop	A.M.	C	19.0 s	0.24 (SB)
		P.M.	D	33.4 s	0.34 (SB)
		Saturday	F	111.8 s	0.94 (SB)
Highway 89 and Concession Road 7/ Elizabeth Street	Stop	A.M.	B	14.3s	0.13 (SB)
		P.M.	D	30.8 s	0.44 (SB)
		Saturday	F	76.6 s	0.84 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.2 s	0.02 (NB)
		P.M.	B	11.1 s	0.02 (NB)
		Saturday	B	11.6 s	0.01 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	B	11.8 s	0.45 (NBL)
		P.M.	B	16.5 s	0.66 (NBL)
		Saturday	B	14.3 s	0.56 (WBL)

The metrics listed in Table 3 above indicate that the study intersections are operating efficiently with minor delays and reserve capacity in the weekday a.m., p.m. and Saturday peak hours, except for two instances. Additionally, the 95th percentile queues are contained with the available storage.

The intersection of Highway 89 and Concession Road 7/ Dean Drive is currently operating at a LOS “F” in the Saturday peak hour. The control delay of 111.8 seconds and maximum individual volume-to-capacity ratio of 0.94 (SB) indicate that the intersection is operating near capacity with heavy delays. This supports future intersection improvements, which is discussed further in Section 4.6.

The intersection of Highway 89 and Concession Road 7/ Elizabeth Street is currently operating at a LOS “F” in the Saturday peak hour. The control delay of 76.6 seconds and maximum individual volume-to-capacity ratio of 0.84 (SB) in the Saturday peak hour indicate that the intersection is approaching capacity with heavy delays. This supports future intersection improvements, which is discussed further in Section 4.6.

4.0 Future Background Conditions

4.1 Horizon Years

Although the specific phasing of the commercial development is yet to be determined at the time of writing this report, the adjacent Home Hardware development is expected to be completed by the end of 2018. The remaining portion of these lands are then expected to be developed in 2020.

Adhering to the *MTO TIS Guidelines – September 2014*, both the 5 and 10-year horizons of 2026 and 2031 will be analyzed. Additionally, the 15-year study horizon will be analyzed to account for the uncertainty of the commercial development completion date.

4.2 Growth Rate

The MTO provides Average Annual Daily Traffic Volumes on all provincial highways. These volumes were used to calculate an average growth rate of 3.1% as summarized in Table 4. Additionally, Statistics Canada data shows an increase in population of 3.5% from 2011 to 2016. As such, a background growth rate of 3% was used to forecast future background traffic volumes for all horizon years. This growth rate is greater than the industry standard of 2%, reflecting an overall conservative analysis.

Table 5: Background AADT Volumes

Corridor	2013	2012	2011
Town of New Tecumseth (W Limit) to Simcoe Road 50	11, 900	11, 500	11, 200
Growth Rate (%)	2.7		3.5

4.3 Future Roadway Improvements

No capacity improvements have been identified for the boundary roads within the study horizons. As a result of the recent Home Hardware development, a new access to Concession Road 7 has been constructed. This access provides the opportunity to create a new east-west (Street A) roadway which would improve connectivity for future developments in the area.

4.4 Background Trip Generation

At the time of writing this report, the only known background development within the study area is the Home Hardware, which is currently being relocated to the south-west quadrant of the intersection of Highway 89 and Concession Road 7/Dean Drive. The existing facility is generating trips under its current operations. These trips were not removed from the boundary road network as information on the specific travel paths could not be tracked, resulting in a conservative analysis.

The trip generation for the Home Hardware was forecasted using the fitted curve equations (where available) from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition, under Land Use Category 816 "Hardware/Paint Store". Per the Site Plan dated August 28, 2017, the proposed Home Hardware will have a gross floor area (GFA) of approximately 33,000 square feet. This GFA includes the main retail area as well as the ground floor office area. This is also consistent with the GFA of the existing Home Hardware.

As defined by the ITE Trip Generation Handbook, 3rd Edition, primary trips are trips made for the specific purpose of visiting the generator and pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Accordingly, these trips do not increase the volume of vehicles on the roadway.

Table F.8 of the ITE Trip Generation Handbook estimates a 26 percent pass-by trip rate for Category 816 “Hardware/Paint Store” during the weekday p.m. peak period. This percentage was applied to the weekday a.m., p.m. and Saturday peak hours.

The forecasted total, pass-by and primary trips are outlined in Table 6 below.

Table 6: Background Generated Traffic

Calculation Method	Size	Peak Hour	Trip Type	In	Out	Total
Hardware/ Paint Store (Category 816)	33,000 ft ²	Weekday A.M.	Primary	14	12	26
			Pass-By	5	5	10
		Weekday P.M.	Primary	62	56	118
			Pass-By	22	20	42
		Saturday	Primary	148	125	273
			Pass-By	52	44	96

Note: Saturday split percentages were not provided so Weekday P.M. values were used

It should be noted that the data used for the Hardware/Paint Store trip generation was derived from a small sample size, which may lead to a higher degree of variance. Additionally, the weekday peak hour of the generator used for the Hardware/Paint Store varied between 10:00 a.m. and 4:00 p.m. while the weekend peak hour varied between 11:00 a.m. and 2:00 p.m.

4.5 Background Trip Distribution and Assignment

The primary trips generated by the Home Hardware were distributed to the boundary road network using Transportation Tomorrow Survey data. Due to the proximity of the Town of New Tecumseth, additional trips were assigned to the east. For a detailed illustration on background primary trip distribution and assignment, refer to **Figures 6 and 8**, respectively.

The pass-by trips generated by the Home Hardware were distributed to the boundary road network based on existing travel patterns. The background primary pass-by distribution and assignment are illustrated in **Figures 7 and 9**, respectively.

4.6 Intersection Operations

The operations of the subject intersections were analyzed on the basis of the future background traffic volumes illustrated in **Figures 11 through 13**. Tables 8, 9 and 10 outline the 2026, 2031, and 2036 future background traffic levels of service, respectively. Detailed capacity analysis worksheets are included in **Appendix F**.

4.6.1 Existing Roadway Conditions

Analysis of the future background traffic volumes under existing roadway conditions indicated operational issues at the intersections of Highway 89 and Concession Road 7/Dean Drive and Highway 89 and Concession Road 7/Elizabeth Street.

Table 7 below summarizes the operations of the noted intersections under 2036 future background traffic conditions.

**Table 7: 2036 Future Background Levels of Service
Existing Roadway Conditions**

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and Concession Road 7/ Dean Drive	Stop	A.M.	F	248.2 s	1.28 (SB)
		P.M.	F	Error	13.48 (SB)
		Saturday	F	Error	Error
Highway 89 and Concession Road 7/ Elizabeth Street	Stop	A.M.	E	40.4 s	0.55 (SB)
		P.M.	F	Error	3.96 (SB)
		Saturday	F	Error	Error

A signal warrant analysis was undertaken for the intersections of Highway 89 and Concession Road 7/Dean Drive and Highway 89 and Concession Road 7/Elizabeth Street for the horizon years. 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 intersections.

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

$$AHV = \frac{amPHV + pm PHV}{4}$$

Where:

AHV = Average Hour Volume

PHV = Peak Hour Volume

Table 8 below outlines the results of the signal warrant analysis. **Appendix G** contains the signal warrant sheets.

Table 8: Signal Warrant Analysis Results – Future Background

Location	Time Period	Warranted	Year	Justification
Highway 89 and Concession Road 7/ Dean Drive	Weekday	✓	2036	3
	Saturday	✓	2026	1-4
Highway 89 and Concession Road 7/ Elizabeth Street	Weekday	✗	-	N/A
	Saturday	✓	2031	2-4

The analysis determined that in the future background conditions, traffic signals are warranted at the intersections of Highway 89 and Concession Road 7/Dean Drive and Highway 89 and Concession Road 7/Elizabeth Street. Accordingly, the intersections were modeled as signals in all horizon years. The intersections were modelled with a cycle-length of 90 seconds and the same inter-green times as the intersection of Highway 89/Young Street and Industrial Parkway.

As signals are warranted under future background conditions, and existing conditions indicate poor

operations in the Saturday peak hour, the design and implementation of the signals should be considered by the MTO and Township of Adjala-Tosorontio. The primary purpose of the modelling is to illustrate the improved traffic operations of the intersection under signalized conditions.

4.6.2. Proposed Roadway Conditions

Table 9: 2026 Future Background Levels of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	A	8.3 s	0.46 (NBR)
		P.M.	C	15.1 s	0.78 (NBR/NBL)
		Saturday	B	11.4 s	0.64 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	B	13.6 s	0.17 (SB)
		P.M.	C	22.0 s	0.17 (SB)
		Saturday	C	19.3 s	0.15 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Future Signal	A.M.	A	8.0 s	0.55 (SB)
		P.M.	A	9.8 s	0.69 (NB)
		Saturday	B	19.3 s	0.76 (SB)
Concession Road 7/ Street A	Stop	A.M.	A	9.4 s	0.02 (EB)
		P.M.	B	10.8 s	0.12 (EB)
		Saturday	B	13.4 s	0.30 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Future Signal	A.M.	A	4.7 s	0.38 (SB)
		P.M.	A	6.7 s	0.53 (SB)
		Saturday	A	9.4 s	0.65 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.7 s	0.02 (NB)
		P.M.	B	11.1 s	0.02 (NB)
		Saturday	B	10.8 s	0.01 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	B	14.4 s	0.54 (NBL)
		P.M.	C	20.3 s	0.75 (NBL)
		Saturday	C	22.2 s	0.82 (WBL)

Table 10: 2031 Future Background Levels of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	A	9.1 s	0.55 (WBL)
		P.M.	B	17.0 s	0.87 (NBL)
		Saturday	B	12.2 s	0.68 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	C	15.6 s	0.23 (SB)
		P.M.	D	30.6 s	0.27 (SB)
		Saturday	C	22.1 s	0.19 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Future Signal	A.M.	A	8.7 s	0.57 (SB)
		P.M.	B	10.8 s	0.71 (NB)
		Saturday	C	21.9 s	0.82 (SB)
Concession Road 7/ Street A	Stop	A.M.	A	9.5 s	0.02 (EB)
		P.M.	B	11.2 s	0.14 (EB)
		Saturday	B	14.0 s	0.32 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Future Signal	A.M.	A	5.0 s	0.41 (SB)
		P.M.	A	7.3 s	0.57 (SB)
		Saturday	B	10.5 s	0.71 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.8 s	0.03 (NB)
		P.M.	B	11.2 s	0.03 (NB)
		Saturday	B	10.9 s	0.02 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	B	16.6 s	0.59 (NBL)
		P.M.	C	24.9 s	0.81 (NBL)
		Saturday	C	30.4 s	0.96 (WBL)

Table 11: 2036 Future Background Levels of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	B	10.8 s	0.70 (WBL)
		P.M.	C	26.6 s	0.99 (NBL) 1.00 (NBR)
		Saturday	B	13.3 s	0.72 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	C	18.8 s	0.31 (SB)
		P.M.	F	50.0 s	0.43 (SB)
		Saturday	D	26.0 s	0.23 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Future Signal	A.M.	A	9.5 s	0.62 (SB)
		P.M.	B	12.2 s	0.74 (NB)
		Saturday	C	25.9 s	0.86 (SB)
Concession Road 7/ Street A	Stop	A.M.	A	9.7 s	0.02 (EB)
		P.M.	B	11.6 s	0.13 (EB)
		Saturday	B	14.9 s	0.34 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Future Signal	A.M.	A	5.9 s	0.46 (SB)
		P.M.	A	8.8 s	0.63 (SB)
		Saturday	B	12.1 s	0.77 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.8 s	0.03 (NB)
		P.M.	B	11.1 s	0.03 (NB)
		Saturday	B	10.9 s	0.02 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	C	21.2 s	0.71 (WBL)
		P.M.	C	33.4 s	0.92 (EBT)
		Saturday	D	52.4 s	1.15 (WBL) 1.08 (EBL) 1.06 (EBT)

The stop controlled intersection of Highway 89 and Concession Road 6 operates at a LOS “F” in the weekday p.m. peak hour under 2036 future background traffic conditions. This is primarily due to the heavy through volumes on Highway 89 that create a 50 second control delay on Concession Road 6. The capacity of the road itself has a maximum volume-to-capacity ratio of 0.43 (SB). Since the 2036 traffic volumes are forecasted approximately 20 years into the future, there is a high degree of uncertainty and traffic operations at this intersection should be reassessed when new development applications are submitted in the future.

While the intersection of Highway 89 and County Road 50 is operating at an acceptable level of service, the maximum volume-to-capacity ratios for the northbound left and right turning movements are at 0.99 and 1.00, respectively. This indicates that the intersection is anticipated to operate at capacity during the p.m. peak hour.

The intersection of Highway 89/Young Street and Industrial Parkway/Commercial Plaza Access is operating at an acceptable level of service with maximum volume-to-capacity ratios exceeding 1.00 for the westbound left, eastbound left, and eastbound through movements. This indicates that the intersection is anticipated to operate at capacity during the Saturday peak hour. The intersection currently operates with a westbound protected phase, however the intersection may benefit from an advanced eastbound left-turn phase as well.

All other intersections operate at a satisfactory level of service for all peak periods.

5.0 Development Proposal

The subject lands are approximately 73 acres in size. At this time, the specific uses proposed for the lands are unknown, however, the potential uses envisioned for the site are of a commercial/industrial nature.

The subject lands currently have one full-moves access to Concession Road 7 (Street A), which operates as the only access to the Home Hardware development at this time. The development proposes one full-moves access to Highway 89 (Street B) which would connect to Street A. Additionally, there is an opportunity to extend Street A westerly to ultimately connect to County Road 50, with the future development of the 7845 Highway 89 lands (not owned by the applicant). For reference, Street C is the extended portion of Street A through 7845 Highway 89, ultimately connecting to County Road 50. Refer to **Figure 25**, which illustrates the location of the subject lands as well as the potential access configuration.

6.0 Highway Access Management

The goal of this Highway Access Management Plan (HAMP) is to outline the strategy required to manage access to Highway 89 between Concession Road 50 and the Industrial Parkway. This HAMP aims to maintain the optimum balance between providing acceptable traffic operations and levels of service to Highway 89 site accesses while maintaining optimal access density and facilitating the Township's Land Use Planning vision in the subject corridor. This HAMP also aims to provide comprehensive guidelines for any potential accesses to Highway 89 that may be proposed in the future. This HAMP will address the current and future function of the corridor.

6.1 Road and Access Spacing

There are six existing intersections and 44 accesses within the study area. Most of the lands within the study area have existing uses and therefore limit new potential accesses when considering the requirements outlined in the MTO Highway Access Management Guidelines. Relevant excerpts are included in **Appendix K**.

According to Table 4 in the Highway Access Management Guidelines, the maximum number of accesses suggested for an arterial roadway (2B) is four per side, per kilometre. The study area being considered in this report is approximately 2.4 kilometres long. The nearest public roads relative to the subject site are Concession Road 7 and Concession Road 6. The distance between these two public roads is approximately 1 km. Within these limits, there are 7 and 8 accesses on the south and north sides, respectively. These existing conditions do not comply with current spacing standards, thereby having no allowance for additional accesses.

Reviewing the spacing distribution on the south side of Highway 89, the majority of the accesses are closer to Concession Road 6. The distance between Concession Road 7 and the nearest access to the west is approximately 700 metres. The potential access to the subject property would be located

within this segment. This spacing distribution would adhere to the access guidelines. Additionally, there is an existing residential access which would be decommissioned or converted into a roadway access for the subject lands, if approved. Existing access locations are outlined in **Figure 1**.

6.2 Constraints and Restrictions

Within the study area, the most significant constraints to probable accesses are the many adjacent existing accesses. As discussed above, the proposed access to the subject lands should be located such that it maintains sufficient spacing relative to adjacent accesses.

If Street A is planned to ultimately connect to County Road 50 through Street C, cooperation with the adjacent landowner(s) would be required. Furthermore, there is a stream running diagonal across the neighbouring property (7845 Highway 89). Although this would pose constraints, it is possible to create a crossing to facilitate vehicular travel.

6.3 Preferred Access Locations

As mentioned previously, the proposed access to the subject property on Highway 89 (Street B) should be located within the 700 metre segment between Concession Road 7 and the nearest access to the west. Accordingly, the preferred access location is approximately 400 metres to the west of Concession Road 7 as illustration in **Figure 25**. This coincides with the existing residential access, and also provides the opportunity to tie into the agricultural lands on the north side of Highway 89 by forming a north leg to the proposed three-legged intersection, should these lands ever be developed.

In order to ensure proper intersection spacing, Street C should be located a minimum of 400 metres south of the intersection of County Road 50 and Highway 89, per MTO Highway Access Guidelines. As noted previously, this would require a development application on the lands not owned by the applicant.

6.4 Street A Classification

This recently constructed access to Concession Road 7 has been built to Adjala-Tosorontio Engineering Standards, thereby supporting the ability for Street A to be assumed by the Township upon development completion.

If Street A is assumed by the Township with the intention to connect to County Road 50, this approximate 400 metre extension would act as secondary collector road parallel to Highway 89. This is expected to reduce traffic impacts to this segment of Highway 89, while concurrently improving connectivity to the future employment lands.

7.0 Site Generated Traffic

7.1 Trip Generation

Site generated traffic of the subject lands was calculated using the fitted curve equation (if available) provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition. Due to the lack of specific information regarding the intended land uses, Industrial Park (ITE LUC 130) was assumed for trip generation purposes.

Table 12: Site Generated Traffic

Calculation Method	Size	Peak Hour	Trip Type	In	Out	Total
Industrial Park ITE Trip Generation Manual (Category 130)	73 Acres	Weekday A.M.	Primary	425	87	512
		Weekday P.M.	Primary	107	401	508
		Saturday	Primary	110	234	344

7.2 Trip Distribution and Assignment

The trips generated by the development were distributed to the boundary road network based on the trip distribution described in Section 4.4. This trip distribution considered vehicle ingress and egress through Street A only, however, given the proposed connection with Street B, the trips were divided between the two accesses. All inbound trips from the west enter the subject lands via Street B. All inbound trips from the east, as well as all outbound trips, were distributed evenly between the two streets.

Given the addition of Street B, the trips generated by the re-located Home Hardware were redistributed to the boundary road network, as described above.

The trips generated by the subject lands, as well as the primary trips generated by the Home Hardware were assigned to the boundary road network per the distributions in **Figure 14**. The pass-by trips generated by the Home Hardware were distributed to the boundary road network per the distributions in **Figure 15**. The trip assignment for the primary trips generated by the Home Hardware and Industrial Park are illustrated in **Figure 16** and **Figure 18**, respectively. The trip assignment for the pass-by trips generated by the Home Hardware are illustrated in **Figure 17**.

8.0 Total Future Conditions

8.1 Basis of Assessment

The traffic impacts arising from the potential development were assessed based on the site generated traffic illustrated in **Figures 16 through 18** being superimposed on the future background traffic volumes in **Figures 11 through 13**. The resulting total traffic volumes for the 2026, 2031 and 2036 weekday a.m., p.m. and Saturday peak hours are illustrated in **Figures 19 through 21**.

8.2 Auxiliary Lane Assessment

Left-turn lane warrants were undertaken for a northbound left-turn lane at the intersection of Concession Road 7 and Street A using the Ontario Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways (GDSOH). The warrants were undertaken for the weekday a.m., p.m. and Saturday peak hours under future total conditions. In keeping with the traffic engineering convention of design speeds 10 km/h in excess of the posted speed limit for lower speed roads, a 70 km/h design speed at the subject site was assumed.

The left-turn lane warrant charts for 70 km/h design speed roads have been included in **Appendix I**.

Table 13 below summarizes the results of the left-turn lane warrants assuming a design speed of 70 km/h, under 2036 future traffic volume conditions. It can be seen that a left-turn lane is not warranted under 2036 future traffic volume conditions.

**Table 13: Left-Turn Lane Warrant
Concession Road 7 and Street A**

Intersection	Peak Hour	V _A	V _O	%LT in V _A	Warranted	Source
Concession Road 7 and Street A	A.M.	101	245	22%	*	EA-11
	P.M.	162	213	5%	*	EA-10
	Saturday	187	270	10%	*	EA-10

Left-turn lane warrants were undertaken for a westbound left-turn lane at the intersection of Highway 89 and Street B using the MTO GDSOH Figure EB-1 “Left Turn Storage Lanes – Four-lane Undivided Highways”. The results are summarized in Table 14 below.

**Table 14: Left-Turn Lane Warrant
Highway 89 and Street B**

Intersection	Peak Hour	V _L	V _O	Warranted	Storage	Source
Highway 89 and Street B	A.M.	137	889	✓	30 m	EB-1
	P.M.	68	978	✓	25 m	EB-1
	Saturday	107	983	✓	30 m	EB-1

It can be seen that under unsignalized conditions, a westbound left-turn lane with a minimum storage of 30 metres is required. As discussed in the following sections, it is recommended that the intersection be signalized as it is expected to experience heavy delay under unsignalized future total conditions. When modelling this intersection, a 15 metres westbound left-turn lane was included and deemed sufficient, as described in Section 8.3 below.

8.3 Traffic Signal Warrants

As discussed in Section 4.6, traffic signals are warranted at the intersections of Highway 89 and Concession Road 7/Dean Drive and Highway 89 and Concession Road 7/Elizabeth Street under future background traffic conditions. Accordingly, the future total traffic operations at these locations were analyzed as signalized intersection.

Analysis of the future total traffic volumes under unsignalized conditions indicated operational issues at the intersections of Highway 89 and Street B. Table 15 below summarizes the operations of the intersection of Highway 89 and Street B under 2026 future total traffic conditions.

Table 15: 2026 Future Total Level of Service – Stop Controlled

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and Street B	Stop	A.M.	C	20.6 s	0.19 (NB)
		P.M.	F	117.3 s	1.05 (NB)
		Saturday	F	97.0 s	0.96 (NB)

As summarized in Table 15, the intersection operates at a LOS “F” in the weekday p.m. and Saturday peak hours. The control delay of 117.3 seconds and maximum volume-to-capacity ratio of 1.05 (NB)

in the weekday p.m. peak hour indicates that the intersection is operating over capacity with heavy delays. Accordingly, a signal warrant analysis was undertaken for the intersection of Highway 89 and Street B for the 2036 horizon year. The analysis followed the procedures outlined in “OTM – Book 12” for justifications 1-4 and 7.

The signal warrant analysis is summarized in Table 16. **Appendix G** contains the signal warrant sheets.

Table 16: Signal Warrant Analysis Results – Future Total

Location	Time Period	Warranted	Year	Justification
Highway 89 and Street B	Weekday	*	2036	N/A
	Saturday	*	2036	N/A

The analysis determined that in the future total conditions, a traffic signal is not warranted at the intersection of Highway 89 and Street B. However, signalizing the intersection is found to improve the operations, as detailed in Table 17 below. Accordingly, the intersection was modeled as signalized in all horizon years. The intersection was modelled with a cycle-length of 90 seconds and the same inter-green times as the intersection of Highway 89/Young Street and Industrial Parkway. The intersection was also modeled with a 15 metre left-turn lane, and it was found that all 95th percentile queues were contained within the available storage.

Table 17: 2036 Future Total Level of Service – Signalized

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 / Street B	Signal	A.M.	A	6.5 s	0.47 (EB)
		P.M.	B	13.4 s	0.71 (NBL)
		Saturday	B	11.9 s	0.67 (NBL)

The exact design specifications of the signalized intersections can be confirmed during detailed design. The primary purpose of the modelling is to illustrate the improved traffic operations of the intersection under signalized conditions.

8.4 Intersection Operations

The 2026 through 2036 future total traffic conditions associated with the boundary road network are outlined in Table 18 through Table 20, with detailed capacity analyses included in **Appendix F**.

Analysis of the signalized intersections were based on optimized signal timings, as determined in Synchro modeling software.

The intersection of Highway 89 and Street B was modeled to include a westbound left-turn lane with approximately 15 metres of storage and a protected/permissive phase. The turning lane and protected/permissive phase were included to account for the increase in traffic volumes at the intersection due to the trips generated by the site.

Table 18: 2026 Future Total Level of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	A	9.4 s	0.50 (WBL)
		P.M.	B	14.8 s	0.78 (NBR/NBL)
		Saturday	B	11.2 s	0.64 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	C	15.5 s	0.23 (SB)
		P.M.	D	29.2 s	0.23 (SB)
		Saturday	C	22.7 s	0.18 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Signal	A.M.	A	8.0 s	0.55 (SB)
		P.M.	B	16.7 s	0.84 (NB)
		Saturday	C	21.5 s	0.78 (NB/SB)
Highway 89 / Street B	Signal	A.M.	A	5.4 s	0.34 (EB)
		P.M.	B	12.5 s	0.71 (NBL)
		Saturday	B	11.2 s	0.67 (NBL)
Concession Road 7/ Street A	Stop	A.M.	B	10.5 s	0.09 (EB)
		P.M.	B	13.5 s	0.40 (EB)
		Saturday	B	13.8 s	0.37 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Signal	A.M.	A	4.6 s	0.38 (SB)
		P.M.	A	6.8 s	0.53 (SB)
		Saturday	A	9.6 s	0.66 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.8 s	0.02 (NB)
		P.M.	B	11.3 s	0.02 (NB)
		Saturday	B	10.9 s	0.01 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	B	14.0 s	0.55 (NBL)
		P.M.	C	23.2 s	0.75 (NBL)
		Saturday	C	24.8 s	0.88 (WBL)

Table 19: 2031 Future Total Level of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	B	10.5 s	0.63 (WBL)
		P.M.	B	16.9 s	0.87 (NBL)
		Saturday	B	12.1 s	0.68 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	C	17.9 s	0.29 (SB)
		P.M.	E	44.4 s	0.37 (SB)
		Saturday	D	26.2 s	0.23 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Signal	A.M.	A	8.8 s	0.59 (SB)
		P.M.	B	18.2 s	0.86 (NB)
		Saturday	C	26.7 s	0.80 (SB)
Highway 89 / Street B	Signal	A.M.	A	6.1 s	0.39 (EB)
		P.M.	B	13.2 s	0.70 (NBL)
		Saturday	B	11.5 s	0.67 (NBL)
Concession Road 7/ Street A	Stop	A.M.	B	10.7 s	0.09 (EB)
		P.M.	B	14.1 s	0.42 (EB)
		Saturday	B	14.4 s	0.38 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Signal	A.M.	A	4.9 s	0.41 (SB)
		P.M.	A	7.6 s	0.57 (SB)
		Saturday	B	10.8 s	0.71 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.9 s	0.03 (NB)
		P.M.	B	11.3 s	0.03 (NB)
		Saturday	B	10.9 s	0.02 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	B	16.7 s	0.60 (NBL/WBL)
		P.M.	C	29.8 s	0.89 (EB)
		Saturday	D	35.7 s	0.99 (EB)

Table 20: 2036 Future Total Level of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	B	13.0 s	0.79 (WBL)
		P.M.	C	26.8 s	0.97 (NBL) 1.02 (NBR)
		Saturday	B	13.3 s	0.72 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	C	22.0 s	0.38 (SB)
		P.M.	F	85.8 s	0.61 (SB)
		Saturday	D	31.5 s	0.29 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Signal	A.M.	B	10.3 s	0.67 (SB)
		P.M.	C	20.0 s	0.88 (NB)
		Saturday	C	28.2 s	0.87 (SB)
Highway 89 / Street B	Signal	A.M.	A	6.5 s	0.47 (EB)
		P.M.	B	13.4 s	0.71 (NBL)
		Saturday	B	11.9 s	0.67 (NBL)
Concession Road 7/ Street A	Stop	A.M.	B	10.9 s	0.10 (EB)
		P.M.	C	15.2 s	0.44 (EB)
		Saturday	C	15.5 s	0.41 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Signal	A.M.	A	6.0 s	0.46 (SB)
		P.M.	A	9.3 s	0.63 (SB)
		Saturday	B	12.7 s	0.77 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.9 s	0.03 (NB)
		P.M.	B	10.9 s	0.03 (NB)
		Saturday	B	10.7 s	0.04 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	C	26.6 s	0.87 (EB)
		P.M.	C	33.4 s	0.92 (EB)
		Saturday	E	66.2 s	1.19 (EBL) 1.16 (EB) 1.15 (WBL)

The stop controlled intersection of Highway 89 and Concession Road 6 operates at a LOS "F" in the weekday p.m. peak hour under future total traffic conditions. This is primarily due to the heavy through volumes that previously existed in the 2036 future background conditions. The control delay is anticipated to increase by 35.8 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.18 (SB) when compared to future background conditions. At this time, no recommendations are being made to improve this intersection due to the low volume of southbound vehicles, and the anticipation that some vehicles may redirect to County Road 7, if signalized.

The intersection of Highway 89 and County Road 50 is expected to continue operating at a LOS “C” in the p.m. peak hour. The control delay is expected to increase by 0.2 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.02 or less when compared to the 2036 future background traffic conditions. These metrics indicate that while the intersection is approaching capacity, the site generated traffic is expected to have a negligible impact on the operations.

The intersection of Highway 89/Young Street and Industrial Parkway/Commercial Plaza Access is expected to operate at a reduced LOS “E” in the Saturday peak hour. The control delay is expected to increase by 13.8 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.09 or less when compared to the 2036 future background traffic conditions. These metrics indicate that while this intersection is exceeding capacity, the site generated traffic is expected to have minimal impacts on the operations. As noted previously, the intersection operates with an advance westbound left-turn phase and may benefit from the addition of an advance eastbound left-turn phase.

All other intersections are expected to continue operating at a satisfactory level of service for all peak periods.

Since the 2036 traffic volumes are forecasted approximately 20 years into the future, there is a high degree of uncertainty and traffic operations at this intersection should be confirmed when new development applications are submitted in the future.

9.0 Sensitivity Analysis

9.1 Trip Generation

At the time of writing this report, there is no proposed development for the property located at 7845 Highway 89. Due to the absence of this data, the assumed use of *Industrial Park* has been made to provide a sensitivity analysis for future potential development within the study area. This aligns with the potential areas of employment growth, as described in By-Law 13-14. Site generated traffic for this property was calculated using the fitted curve equation (if available) provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition.

Table 21: Sensitivity Analysis Trip Generation

Address	Calculation Method	Size (acres)	Peak Hour	In	Out	Total
7845 Highway 89	Industrial Park ITE Trip Generation Manual (Category 130)	44	Weekday A.M.	286	59	345
			Weekday P.M.	74	279	353
			Saturday	66	141	207

The 44 acres estimated in the table above represents the parcel area. Due to a watercourse traversing the property, the developable area will likely be less than what has been assumed. Accordingly, this represents a conservative estimation.

9.2 Trip Distribution and Assignment

The trips generated by the future development were distributed to the boundary road network based on the trip distribution described in Section 4.4. This trip distribution considered vehicle ingress and egress through Street A only, however, given the proposed connection with Street B and Street C, the trips were divided between the three accesses. All inbound trips from the west enter the subject lands

via Street C. All inbound trips from the east, were distributed evenly between the three streets. All trips from the south enter via Street C.

The trips generated by the subject lands were assigned to the boundary road network per the distributions in **Figure 22**. The trip assignment for the primary trips are illustrated in **Figure 23**.

9.3 Basis of Assessment

The traffic impacts arising from the potential development were assessed based on the site generated traffic illustrated in **Figure 22** being superimposed on the 2036 future total traffic volumes in **Figure 21**. The resulting total traffic volumes for the 2036 weekday a.m., p.m. and Saturday peak hours are illustrated in **Figure 24**.

9.4 Auxiliary Lane Assessment

Left-turn lane warrants were undertaken for northbound and southbound left-turn lanes at the intersections of Concession Road 7 and Street A and County Road 50 and Street C, respectively. The warrants were completed using the Ontario Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways (GDSOH). The warrants were undertaken for the weekday a.m., p.m. and Saturday peak hours under future total conditions. In keeping with the traffic engineering convention of design speeds 10 km/h in excess of the posted speed limit for lower speed roads, a 70 km/h design speed at Street A was assumed for Concession Road 7. Furthermore, a design speed of 100 km/h was selected for County Road 50 at Street C in order to reflect the traffic engineering convention of design speeds 20 km/h in excess of the posted speed limit for higher speed roads.

The left-turn lane warrant charts for 70 km/h and 100 km/h design speed roads have been included in **Appendix I**. Table 22 below summarizes the results of the left-turn lane warrants under 2036 future traffic volume conditions.

Table 22: Sensitivity Analysis Left-Turn Lane Warrant

Intersection	Peak Hour	V _A	V _O	%LT in V _A	Warranted	Source
Design Speed = 70 km/h						
Concession Road 7 and Street A	A.M.	101	305	22%	✘	EA-11
	P.M.	162	231	5%	✘	EA-10
	Saturday	187	287	10%	✘	EA-10
Design Speed = 100 km/h						
County Road 50 and Street C	A.M.	723	280	20%	40 m	EA-23
	P.M.	350	738	9%	25 m	EA-22
	Saturday	386	466	8%	15 m	EA-22

Based on the results summarized in Table 22, a left-turn lane is not warranted at the intersection of Concession Road 7 and Street A and a left-turn lane with a minimum storage of 40 metres is required at the intersection of County Road 50 and Street C. As discussed previously, this analysis has been completed on the basis of a conservative 3% growth rate, as well as conservative assumptions regarding the proposed future land uses at the site. As such, the requirement for a left-turn lane on

County Road 50 should be re-evaluated when, and if a development application is being advanced for 7845 Highway 89.

9.5 Traffic Signal Warrants

A signal warrant analysis was undertaken for the intersections of Concession Road 7 and Street A and County Road 50 and Street C for the 2036 horizon year. The analysis followed the procedures outlined in “OTM – Book 12” for justifications 1-4 and 7.

Table 23 below outlines the results of the signal warrant analysis. **Appendix G** contains the signal warrant sheets.

Table 23: Sensitivity Analysis Signal Warrant

Location	Time Period	Warranted	Justification
Concession Road 7 and Street A	Weekday	x	N/A
	Saturday	x	N/A
County Road 50 and Street B	Weekday	x	N/A
	Saturday	x	N/A

As noted above, traffic signals are not warranted at Street A or Street C in the 2036 horizon year including the additional trips generated by 7845 Highway 89. Accordingly, the intersections were analyzed as two-way stop-controlled.

9.6 Intersection Operations

The 2036 future total traffic conditions associated with the boundary road network are outlined in Table 24, with detailed capacity analyses included in **Appendix F**.

Analysis of the signalized intersections were based on optimized signal timings, as determined in Synchro modeling software.

The intersection of Highway 89 and Street B was modeled to include a westbound left-turn lane with approximately 15 metres of storage and a protected/permissive phase. The turning lane and protected/permissive phase were included to account for the increase in traffic volumes at the intersection due to the trips generated by the site.

The intersection of County Road 50 and Street C was modeled to include a southbound left-turn lane with approximately 40 metres of storage.

Table 24: Sensitivity Analysis 2036 Future Total Level of Service

Intersection	Control	Peak Hour	Level of Service	Control Delay	Critical V/C Ratios
Highway 89 and County Road 50	Signal	A.M.	B	18.2 s	0.90 (WBL)
		P.M.	D	39.1 s	0.89 (NBL) 1.18 (NBR)
		Saturday	B	15.4 s	0.74 (NBR)
Highway 89 and Concession Road 6	Stop	A.M.	D	28.8 s	0.49 (SB)
		P.M.	F	115.6 s	0.71 (SB)
		Saturday	D	34.0 s	0.31 (SB)
Highway 89 and Concession Road 7/ Dean Drive	Signal	A.M.	B	10.9 s	0.70 (SB)
		P.M.	C	28.8 s	1.02 (NB) 1.04 (WBL)
		Saturday	C	30.0 s	0.89 (SB)
Highway 89 / Street B	Signal	A.M.	A	7.9 s	0.52 (EB)
		P.M.	B	15.0 s	0.75 (NBL)
		Saturday	B	13.1 s	0.70 (NBL)
Concession Road 7/ Street A	Stop	A.M.	B	11.4 s	0.12 (EB)
		P.M.	C	17.3 s	0.54 (EB)
		Saturday	C	16.7 s	0.47 (EB)
Highway 89 and Concession Road 7/ Elizabeth Street	Signal	A.M.	A	6.2 s	0.46 (SB)
		P.M.	A	9.9 s	0.63 (SB)
		Saturday	B	12.8 s	0.81 (SB)
Highway 89 and Elizabeth Street	Stop	A.M.	B	10.9 s	0.03 (NB)
		P.M.	B	10.6 s	0.03 (NB)
		Saturday	B	12.0 s	0.02 (NB)
Highway 89/Young Street and Industrial Parkway/ Commercial Plaza Access	Signal	A.M.	C	27.7 s	0.91 (EB)
		P.M.	E	55.6 s	1.11 (EB) 1.02 (WBL)
		Saturday	E	67.4 s	1.21 (EBL) 1.18 (EB) 1.12 (WBL)

The stop controlled intersection of Highway 89 and Concession Road 6 is expected to continue operating at a LOS "F" in the weekday p.m. peak hour when compared with future background and future total traffic conditions. The control delay is anticipated to increase 29.8 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.10 (SB) when compared to future total conditions.

The intersection of Highway 89 and County Road 50 is expected to operate at a LOS "D" in the p.m. peak hour. The control delay is expected to increase by 12.3 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.16 or less when compared to the 2036 future total traffic conditions. The addition of the traffic generated by 7845 Highway 89 is expected to reduce operations at the intersection due to the increased northbound turning movements.

The intersection of Highway 89/Young Street and Industrial Parkway/Commercial Plaza Access is expected to continue operating at a LOS "E" in the Saturday peak hour. The control delay is expected to increase by 1.2 seconds and the maximum volume-to-capacity ratio is expected to increase by 0.02 or less when compared to the 2036 future total traffic conditions. These metrics indicate that while this intersection is exceeding capacity, the traffic generated by 7845 Highway 89 is expected to have minimal impacts on the operations.

The intersection of Highway 89 and Concession Road 7/Dean drive is expected to continue operating at a LOS "C" in the future. The westbound left and northbound movements are expected to operate at capacity given the additional traffic generated by 7845 Highway 89.

All other intersections are expected to continue operating at a satisfactory level of service for all peak periods.

Due to the uncertainty associated with the proposed development at 7845 Highway 89, and given the 20 year study horizon, the traffic operations of the boundary road network should be reassessed when a development application is submitted in the future.

10.0 Safety

10.1 Sight Distance Assessment

Sight distance measurements were conducted using the requirements outlined in The County of Simcoe By-Law No. 5544, as well as the Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads (GDGCR). With the future Street C connecting to County Road 50, available sight distances are compared to Simcoe County requirements, whereas available sight distance for Street A and Concession Road 7 are compared to the TAC guidelines. Available sight distances are shown in the table below.

County Road 50 has a posted speed limit of 80km/h, which was used to determine the sight distance requirements, as described in By-Law No. 5544. Concession Road 7 has a posted speed limit 60km/h. Therefore, a 70 km/h design speed was selected to reflect the traffic engineering convention of a 10 km/h increase to the posted speed limit for lower speed roads. Using this speed in combination with Figure 2.3.3.4b, the required sight distances were determined, as shown in Table 25.

Table 25: Available Sight Distance

Location	Required Sight Distance	Available Sight Distance	
		Northerly	Southerly
Concession Road 7 and Street A	200m (left turn) / 150m (right turn)	240m	400m+
County Road 50 and Street C	230m	400m	200m

Although the available sight distance for Street C does not meet the County's requirement, the location of Street C is currently an estimate with a high likelihood of change. Accordingly, minor adjustments should be considered during detailed design to locate the street such that the sight distance is maximized for vehicles exiting the property.

Refer to **Appendix H** for the relevant TAC GDGCR and Simcoe County By-Law excerpts have been attached for reference

11.0 Findings and Recommendations

The detailed analysis contained within this report has resulted in the recommendations described in Table 26, with further recommendations noted below.

Table 26: Recommended Mitigation Measures and Responsibilities

Location	Improvement	Timeline	Responsibility
Highway 89 and Street B	Signalization, and construction of an exclusive westbound left-turn lane with 15 metres of storage	2026	Applicant
County Road 50 and Street C	Southbound left-turn lane with 40 metres of storage	2036	Future Applicant (7845 Highway 89)
Highway 89 and Concession Road 7/ Dean Drive	Signalization	2026	MTO/Township of Adjala-Tosorontio
Highway 89 and Concession Road 7/ Elizabeth Street	Signalization	2026	MTO/Township of Adjala-Tosorontio

11.1 Auxiliary Turn-Lanes

- An auxiliary left-turn lane is not warranted at the intersection of Concession Road 7 and Street A;

11.2 Signal Warrants

- Signals are not warranted at the intersections of Concession Road 7 and Street A, and County Road 50 and Street C. The intersections were found to operate with acceptable levels of service and delay under 2036 future total conditions, accordingly signals are not recommended at these intersections.

11.3 Optimized Signal Timings

- The operations of all signalized intersections were analyzed under optimized signal timings. It is therefore recommended that the signal timings be updated to accommodate the future growth in the area. These improvements should be completed in coordination with the Township of Adjala-Tosorontio and the Ontario Ministry of Transportation.

11.4 Future Analysis

- The enclosed analysis was completed based on assumptions related to the proposed land uses at the subject property and at 7845 Highway 89. It is recommended that operations be confirmed when further development information is available; and,
- The future background traffic volumes were calculated based on a conservative 3% growth rate. This growth rate is greater than the industry standard 2% and as such, it is recommended that operations be confirmed when further development information is available.

12.0 Conclusions

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

- Analysis of 2017 existing traffic operations indicate that the intersections of Highway 89 and Concession Road 7/Dean Drive, and Highway 89 and Concession Road 7/Elizabeth Street operate at LOS "F" during the Saturday peak hour;
- The remaining boundary road network operates at a LOS "D" or better in the weekday a.m., p.m., and Saturday peak hours under 2017 existing traffic conditions;
- The intersection of Highway 89 and County Road 50 is expected to continue operating at a LOS "C" in the p.m. peak hour. The control delay and volume-to-capacity ratio is expected to minimally increase as a result of the site generated traffic. The metrics described in section 8.4 indicate that while the intersection is approaching capacity, the site generated traffic is expected to have a negligible impact on the operations.
- The intersection of Highway 89/Young Street and Industrial Parkway/Commercial Plaza Access is expected to operate at a reduced LOS "E" in the Saturday peak hour. The control delay and volume-to-capacity ratio is expected to minimally increase as a result of the site generated traffic. The intersection was analyzed with a protective/permissive westbound left-turn phase, and may also benefit from a protective/permissive eastbound left-turn phase. These metrics indicate that while this intersection is exceeding capacity, the site generated traffic is expected to have minimal impacts on the operations.
- The stop controlled intersection of Highway 89 and Concession Road 6 operates at a LOS "F" in the weekday p.m. peak hour under future total traffic conditions. This is primarily due to the heavy through volumes that previously existed in the 2036 future background conditions. The control delay and volume-to-capacity ratio is expected to minimally increase as a result of the site generated traffic.
- All other intersections are expected to continue operating at a satisfactory level of service for all peak periods.
- Since the 2036 traffic volumes are forecasted approximately 20 years into the future, there is a high degree of uncertainty and traffic operations at this intersection should be confirmed when new development applications are submitted in the future.
- In the 2036 future total sensitivity analysis, the boundary road network is expected to have very similar operations with minor increases to the volume to capacity ratios and control delay, when compared to the 2036 future total operations.
- Analysis of sight distance at Street A indicates that there is sufficient sight distance to the north

and south of the access for vehicles exiting the property. Accordingly, the future development is supportable from a sight distance perspective.

- Analysis of sight distance at the future Street C connection to County Road 50 indicates that limited sight distance is available to the south. Accordingly, minor adjustments should be considered during detailed design to locate the street such that the sight distance is maximized for vehicles exiting the property.

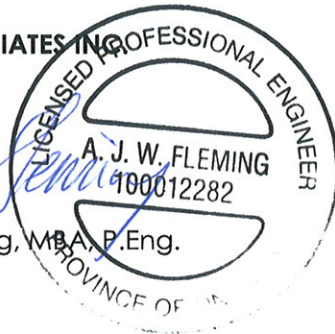
In conclusion, the future potential development can be supported from a traffic operations perspective and a safety perspective, with the implementation of the recommendations noted above.

Prepared by,

C.F. CROZIER & ASSOCIATES INC.



Alexander J.W. Fleming, M.B.A., P.Eng.
Associate



C.F. CROZIER & ASSOCIATES INC.



Ryan MacLaughlan, P.Eng.
Project Engineer



C.F. CROZIER & ASSOCIATES INC.



Madeleine N. Ferguson, B.Eng.Scty.
E.I.T.

/MF.RM

J:\1100\1101-Joe Pilla\4125-7723 HWY 89\Reports\Transportation\4125_HAMP

APPENDIX A

Correspondence

From: Dorton, Peter (MTO) [<mailto:Peter.Dorton@ontario.ca>]
Sent: Tuesday, September 13, 2016 12:25 PM
To: Alex Fleming <afleming@cfcrozier.ca>
Cc: Michael Linton <mlinton@cfcrozier.ca>; Eric Terro <eric.terro@ontario.ca>; Polus, Asia (MTO) <Asia.Polus@ontario.ca>; Venneri, Rita (MTO) <Rita.Venneri@ontario.ca>
Subject: RE: Highway Access Management Plan Proposed Work Plan (Our #1101-4125), Highway 89 Adjala-Tosorontio

Hi Alex:

We have reviewed the proposed HAMP Workplan and offer the following:

- Please ensure that the focus is on the entire Highway 89 Employment Zone, from CR50 to the Alliston (Town of New Tecumseth) border, as opposed to focusing on the 7723 Highway 89 site. A drawing showing the study limits should be included in the work plan.
- Due to its proximity to the border, potential Employment Zone impacts on the intersection of Highway 89 (Young St.) / Industrial Parkway should be taken into consideration in the Traffic Impact Study and HAMP.
- Specific impacts associated with the 7723 Hwy 89 development proposal could be addressed under separate cover, with background info taken from the HAMP, or alternatively, included as a separate section in the HAMP.
- Hwy 89 / Elizabeth St. intersections should also be included in the HAMP.
- Please confirm that the Township of Adjala – Tosorontio has reviewed and commented on this proposed work plan.
- We would suggest that the Town of New Tecumseth be included as a potential stakeholder, or at least be provided with an opportunity to comment on the HAMP.

Please feel free to contact me if you have any questions.

Thanks,
Peter Dorton
Senior Project Manager
MTO Central Region Engineering Office
Corridor Management Section
159 Sir William Hearst Ave., 7th Floor
Toronto, ON M3M 0B7
Ph: 416-235-4280
Fx: 416-235-4267
Email: peter.dorton@ontario.ca

From: Alex Fleming [<mailto:afleming@cfcrozier.ca>]
Sent: September 1, 2016 3:25 PM
To: Dorton, Peter (MTO)
Cc: Michael Linton
Subject: Highway Access Management Plan Proposed Work Plan (Our #1101-4125)

Hello Peter,

We had discussed earlier this summer a HAMP workplan for the area on the west side of Alliston (Highway 89) that would examine access arrangements for lands in the area of 7723 Highway 89 (the property that is being put forth for planning applications). Attached is a proposed work plan for MTO's review. If acceptable, we would proceed, or incorporate changes to the work plan from MTO.

If there any questions, please feel free to give me a call.

Thanks,

Alex

| **ALEXANDER FLEMING**, MBA, P.Eng. | ASSOCIATE | C.F. CROZIER & ASSOCIATES

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Ryan MacLaughlan

From: Jacquie Tschekalin <jtschekalin@adjtos.ca>
Sent: Tuesday, June 20, 2017 1:37 PM
To: Ryan MacLaughlan
Subject: RE: requested information

Follow Up Flag: Follow up
Flag Status: Flagged

I'm checking with our clerk to see if we can provide you with a generated list of property owners, and should have an answer for you in the next few days.

As far as the zoning goes, the property is zoned "Employment Lands" (see the by-law I sent earlier for the list of permitted uses). The zoning is similar to a light-industrial zone, but slightly different uses are permitted.

As far as Mr. Pilla's lands go, whatever he envisions is what is likely to be there, although it would be nice if he could come up with an overall concept for the HAMP. It would be particularly helpful for him to determine whether access to the balance of the lands are to be accessed by a private road or whether the Township will be expected to assume the road that will hook up with the 7th Concession.

As far as the other uses go, I think your assumptions will be fine as we don't have any data to assist you.

I'll let you know about the list as soon as I can. Let me know if you need anything else.

Jacquie

Jacquie Tschekalin, MCIP, RPP
Director of Planning

Township of Adjala-Tosorontio
7855 Sideroad 30, R.R. #1
Alliston, ON L9R 1V1
Ph: (705)434-5055
Fax: (705)434-5051

From: Ryan MacLaughlan [mailto:rmaclaughlan@cfcrozier.ca]
Sent: Monday, June 19, 2017 5:03 PM
To: Jacquie Tschekalin <jtschekalin@adjtos.ca>
Subject: RE: requested information

Hey Jacquie,

Thanks for the response.

Stakeholder consultation will form an integral part of the Highway Access Management process. Consultation with the Ministry, Town and relevant property owners north and south of Highway 89 between Concession 7 and County Road 50 will provide the framework for considerations and limitations of the study. If you are able to provide the mailing addresses within those limits, it would be a great help.

I appreciate you sharing this information. We will be sure to keep that document confidential.

Our client, Joe Pilla, is the owner of the entire parcel of land shown below. The “subject property” is where the new Home Hardware is going. The remainder of the land may consist of a few car dealerships, although this has not yet been determined.



It is my understanding that the outlined property above is zoned as light-industrial? As for the information on the surrounding lands, we will just have to make some assumptions for our trip generation and analysis.

Look forward to hearing back from you.

Thanks,

| **RYAN MACLAUGHLAN** P.Eng. | C.F. CROZIER & ASSOCIATES

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& ASSOCIATES**
Consulting Engineers

Land development engineering, from the ground up.

Water Resources • Transportation • Structural • Mechanical • Electrical • Building Science

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From: Jacquie Tschekalin [<mailto:jtschekalin@adjtos.ca>]

Sent: Monday, June 19, 2017 3:05 PM

To: Ryan MacLaughlan <rmaclaughlan@cfcrozier.ca>

Subject: requested information

Hi Ryan,

Here's the information you requested:

1. Re. contact info of residents – I'm not sure what you are looking for; we don't have phone numbers, but I can get you a mailing list of all property owners (not just residents). If this is what you are looking for, please confirm what you need the information for and what addresses you want. It's a little tricky for us due to FOI requirements, but I think I can get it for you if it is for a 'required' circulation.
2. I have attached a copy of the Zoning By-law for the area; this will give you an idea of the types of uses in the area, but it won't tell you what land is vacant. If you are looking for vacant land (there are 2 large parcels plus several smaller ones) you can probably get this on the Simcoe County website maps (which show property boundaries and locations of structures). In addition to that information, the Home Hardware store is re-locating within the adjacent property (which will leave the existing building vacant) and the ambulance station at the corner of Con 7 and Dean Drive has now been converted to a fitness centre.
3. Future developments – we are not sure of what will end up being in our 'Employment lands', but I have attached a draft report we recently received – please be advised that this is in draft form, and has not been reviewed by Council, so it should be treated as confidential – this is also the 'Ec Dev update'. The intent is that the existing residences will change to a mixed use type of activity (ie. maintain the residential component but add a business component) and that general commercial/retail is not anticipated.

I hope this is the information you are looking for – let me know if you need anything else.

Jacquie

Jacquie Tschekalin, MCIP, RPP
Director of Planning

Township of Adjala-Tosorontio
7855 Sideroad 30, R.R. #1
Alliston, ON L9R 1V1
Ph: (705)434-5055
Fax: (705)434-5051

Ryan MacLaughlan

From: Jacquie Tschekalin <jtschekalin@adjtos.ca>
Sent: Monday, June 19, 2017 3:05 PM
To: Ryan MacLaughlan
Subject: requested information
Attachments: Empl Lands ZBL w map.pdf; CONFIDENTIAL Review of Highway 89 Lands.docx

Hi Ryan,

Here's the information you requested:

1. Re. contact info of residents – I'm not sure what you are looking for; we don't have phone numbers, but I can get you a mailing list of all property owners (not just residents). If this is what you are looking for, please confirm what you need the information for and what addresses you want. It's a little tricky for us due to FOI requirements, but I think I can get it for you if it is for a 'required' circulation.
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APPENDIX B

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 C

Turning Movement Counts

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 7:00:00
To: 8:00:00

Municipality: Alliston
Site #: 1717000001
Intersection: Hwy 89 & CR 50
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 runs W/E

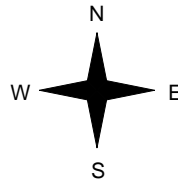
East Leg Total: 771
East Entering: 427
East Peds: 0
Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	50	218	268



Hwy 89

Heavys	Trucks	Cars	Totals
0	40	198	238
0	19	102	121
0	59	300	



Cars	Trucks	Heavys	Totals
181	41	0	222
197	8	0	205
378	49	0	



Hwy 89

Cars	Trucks	Heavys	Totals
291	53	0	344

Peds Cross: ∞
South Peds: 0
South Entering: 152
South Leg Total: 478

Peds Cross: ∞
West Peds: 0
West Entering: 359
West Leg Total: 627

Cars	299
Trucks	27
Heavys	0
Totals	326



Cars	37	93	130
Trucks	9	13	22
Heavys	0	0	0
Totals	46	106	

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 19:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Alliston
Site #: 1717000001
Intersection: Hwy 89 & CR 50
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 runs W/E

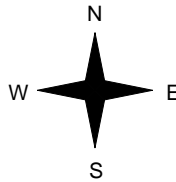
East Leg Total: 1149
 East Entering: 603
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	37	595	632



Hwy 89

Heavys	Trucks	Cars	Totals
0	36	255	291
0	4	42	46
0	40	297	



CR 50



Cars	Trucks	Heavys	Totals
441	27	0	468
122	13	0	135
563	40	0	



Hwy 89



Cars	Trucks	Heavys	Totals
500	46	0	546

Peds Cross: ∞
 West Peds: 0
 West Entering: 337
 West Leg Total: 969

Cars	164
Trucks	17
Heavys	0
Totals	181



Cars	154	245	399
Trucks	10	10	20
Heavys	0	0	0
Totals	164	255	

Peds Cross: ∞
 South Peds: 0
 South Entering: 419
 South Leg Total: 600

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000001
Intersection: Hwy 89 & CR 50
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 runs W/E

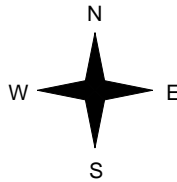
East Leg Total: 7043
 East Entering: 3471
 East Peds: 0
 Peds Cross: X

Heavys	Trucks	Cars	Totals
0	300	2751	3051



Hwy 89

Heavys	Trucks	Cars	Totals
0	271	1958	2229
0	75	527	602
0	346	2485	



CR 50



Cars	Trucks	Heavys	Totals
------	--------	--------	--------



2162	226	0	2388
1007	76	0	1083
3169	302	0	

Hwy 89



Cars	Trucks	Heavys	Totals
3221	351	0	3572

Peds Cross: X
 West Peds: 0
 West Entering: 2831
 West Leg Total: 5882

Cars	1534
Trucks	151
Heavys	0
Totals	1685



Cars	589	1263	1852
Trucks	74	80	154
Heavys	0	0	0
Totals	663	1343	

Peds Cross: X
 South Peds: 2
 South Entering: 2006
 South Leg Total: 3691

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & CR 50

Count Date: 13-Jun-17

Municipality: Alliston

North Approach Totals						South Approach Totals						
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	North/South Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	0	0	0	0	0	121	7:00:00	21	0	100	121	0
8:00:00	0	0	0	0	0	152	8:00:00	46	0	106	152	0
9:00:00	0	0	0	0	0	185	9:00:00	52	0	133	185	0
10:00:00	0	0	0	0	0	185	10:00:00	47	0	138	185	2
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0	247	16:00:00	100	0	147	247	0
17:00:00	0	0	0	0	0	398	17:00:00	147	0	251	398	0
18:00:00	0	0	0	0	0	430	18:00:00	158	0	272	430	0
19:00:00	0	0	0	0	0	288	19:00:00	92	0	196	288	0
Totals:	0	0	0	0	0	2006		663	0	1343	2006	2
East Approach Totals						West Approach Totals						
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	East/West Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	222	168	0	390	0	807	7:00:00	0	277	140	417	0
8:00:00	205	222	0	427	0	786	8:00:00	0	238	121	359	0
9:00:00	114	189	0	303	0	678	9:00:00	0	286	89	375	0
10:00:00	94	229	0	323	0	670	10:00:00	0	271	76	347	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	128	448	0	576	0	1005	16:00:00	0	376	53	429	0
17:00:00	125	472	0	597	0	934	17:00:00	0	289	48	337	0
18:00:00	100	389	0	489	0	796	18:00:00	0	264	43	307	0
19:00:00	95	271	0	366	0	626	19:00:00	0	228	32	260	0
Totals:	1083	2388	0	3471	0	6302		0	2229	602	2831	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00			16:00	17:00	18:00	19:00		
Crossing Values:	21	46	52	47			100	147	158	92		

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 6:45:00
To: 7:45:00

Municipality: Alliston
Site #: 1717000002
Intersection: Hwy 89 & Concession Rd 6
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 79
North Entering: 60
North Peds: 0
Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	42	18	60
Totals	42	18	



Heavys	0
Trucks	1
Cars	18
Totals	19

East Leg Total: 743
East Entering: 404
East Peds: 0
Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	54	382	436



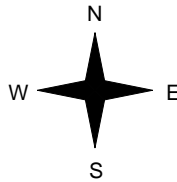
Concession Rd 6



Cars	Trucks	Heavys	Totals
10	0	0	10
340	54	0	394
350	54	0	



Hwy 89



Heavys	Trucks	Cars	Totals
0	1	8	9
0	49	272	321
0	50	280	



Hwy 89



Cars	Trucks	Heavys	Totals
290	49	0	339

Peds Cross: \times
West Peds: 0
West Entering: 330
West Leg Total: 766

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 19:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Alliston
Site #: 1717000002
Intersection: Hwy 89 & Concession Rd 6
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 95
 North Entering: 31
 North Peds: 0
 Peds Cross: \times

Heavys	0	0	0
Trucks	0	1	1
Cars	18	12	30
Totals	18	13	



Heavys	0
Trucks	0
Cars	64
Totals	64

East Leg Total: 1137
 East Entering: 613
 East Peds: 0
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	36	565	601



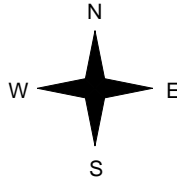
Concession Rd 6



Cars	Trucks	Heavys	Totals
30	0	0	30
547	36	0	583
577	36	0	



Hwy 89



Heavys	Trucks	Cars	Totals
0	0	34	34
0	49	462	511
0	49	496	



Hwy 89



Cars	Trucks	Heavys	Totals
474	50	0	524

Peds Cross: \times
 West Peds: 0
 West Entering: 545
 West Leg Total: 1146

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000002
Intersection: Hwy 89 & Concession Rd 6
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 567
 North Entering: 267
 North Peds: 0
 Peds Cross: \times

Heavys	0	0	0
Trucks	2	3	5
Cars	147	115	262
Totals	149	118	



Heavys 0
 Trucks 4
 Cars 296
 Totals 300

East Leg Total: 7024
 East Entering: 3479
 East Peds: 0
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	313	3163	3476



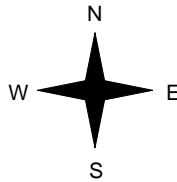
Concession Rd 6



Cars	Trucks	Heavys	Totals
150	2	0	152
3016	311	0	3327
3166	313	0	



Hwy 89



Heavys	Trucks	Cars	Totals
0	2	146	148
0	334	3093	3427
0	336	3239	



Hwy 89



Cars	Trucks	Heavys	Totals
3208	337	0	3545

Peds Cross: \times
 West Peds: 0
 West Entering: 3575
 West Leg Total: 7051

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 6

Count Date: 13-Jun-17

Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	19	0	42	61	0	61	7:00:00	0	0	0	0	0
8:00:00	17	0	33	50	0	50	8:00:00	0	0	0	0	0
9:00:00	15	0	15	30	0	30	9:00:00	0	0	0	0	0
10:00:00	22	0	12	34	0	34	10:00:00	0	0	0	0	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	15	0	8	23	0	23	16:00:00	0	0	0	0	0
17:00:00	13	0	14	27	0	27	17:00:00	0	0	0	0	0
18:00:00	10	0	12	22	0	22	18:00:00	0	0	0	0	0
19:00:00	7	0	13	20	0	20	19:00:00	0	0	0	0	0
Totals:	118	0	149	267	0	267		0	0	0	0	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	0	346	3	349	0	725	7:00:00	9	367	0	376	0
8:00:00	0	395	10	405	0	740	8:00:00	11	324	0	335	0
9:00:00	0	302	10	312	0	734	9:00:00	13	409	0	422	0
10:00:00	0	307	10	317	0	731	10:00:00	10	404	0	414	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	0	558	30	588	0	1123	16:00:00	16	519	0	535	0
17:00:00	0	588	34	622	0	1161	17:00:00	30	509	0	539	0
18:00:00	0	480	32	512	0	1041	18:00:00	42	487	0	529	0
19:00:00	0	351	23	374	0	799	19:00:00	17	408	0	425	0
Totals:	0	3327	152	3479	0	7054		148	3427	0	3575	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00		16:00	17:00	18:00	19:00			
Crossing Values:	19	17	15	22		15	13	10	7			

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 9:00:00
To: 10:00:00

Municipality: Alliston
Site #: 1717000003
Intersection: Hwy 89 & Concession Rd 7-Dean
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 & runs W/E

North Leg Total: 157
North Entering: 76
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	2	0	0	2
Cars	19	6	49	74
Totals	21	6	49	



Heavys	0
Trucks	3
Cars	78
Totals	81

East Leg Total: 859
East Entering: 393
East Peds: 0
Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	45	290	335

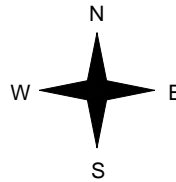


Dean Dr

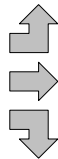
Cars	Trucks	Heavys	Totals
50	3	0	53
266	43	0	309
30	1	0	31
346	47	0	



Hwy 89 &



Heavys	Trucks	Cars	Totals
0	0	21	21
0	57	327	384
0	2	20	22
0	59	368	



Hwy 89 &



Cars	Trucks	Heavys	Totals
409	57	0	466

Peds Cross: \times
West Peds: 0
West Entering: 427
West Leg Total: 762

Cars	56
Trucks	3
Heavys	0
Totals	59



Cars	5	7	33	45
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	5	7	33	

Peds Cross: \times
South Peds: 0
South Entering: 45
South Leg Total: 104

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00
To: 19:00:00

One Hour Peak

From: 16:00:00
To: 17:00:00

Municipality: Alliston
Site #: 1717000003
Intersection: Hwy 89 & Concession Rd 7-Dean
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 & runs W/E

North Leg Total: 136
North Entering: 63
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	25	6	32	63
Totals	25	6	32	



Heavys	0
Trucks	0
Cars	73
Totals	73

East Leg Total: 1278
East Entering: 686
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	40	Cars	590	Totals	630
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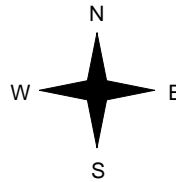


Dean Dr

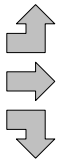
Cars	43	Trucks	0	Heavys	0	Totals	43
Cars	545	Trucks	38	Heavys	0	Totals	583
Cars	60	Trucks	0	Heavys	0	Totals	60
Cars	648	Trucks	38	Heavys	0	Totals	



Hwy 89 &



Heavys	0	Trucks	0	Cars	20	Totals	20
Heavys	0	Trucks	48	Cars	456	Totals	504
Heavys	0	Trucks	3	Cars	12	Totals	15
Heavys	0	Trucks	51	Cars	488	Totals	



Hwy 89 &



Peds Cross: \times
West Peds: 0
West Entering: 539
West Leg Total: 1169

Cars	78	Trucks	3	Heavys	0	Totals	81
Cars	20	Trucks	2	Heavys	0	Totals	22
Cars	10	Trucks	0	Heavys	0	Totals	10
Cars	56	Trucks	0	Heavys	0	Totals	56
Cars	86	Trucks	2	Heavys	0	Totals	



Concession Rd 7



Peds Cross: \times
South Peds: 0
South Entering: 88
South Leg Total: 169

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000003
Intersection: Hwy 89 & Concession Rd 7-Dean
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 & runs W/E

North Leg Total: 819
 North Entering: 387
 North Peds: 0
 Peds Cross: \bowtie

Heavys	0	0	0	0
Trucks	7	0	2	9
Cars	123	35	220	378
Totals	130	35	222	



Heavys	0
Trucks	11
Cars	421
Totals	432

East Leg Total: 7629
 East Entering: 3815
 East Peds: 0
 Peds Cross: \bowtie

Heavys	0	Trucks	312	Cars	3206	Totals	3518
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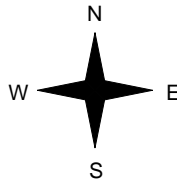


Dean Dr

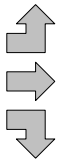
Cars	252	Trucks	8	Heavys	0	Totals	260
Cars	3014	Trucks	299	Heavys	0	Totals	3313
Cars	235	Trucks	7	Heavys	0	Totals	242
Cars	3501	Trucks	314	Heavys	0	Totals	



Hwy 89 &



Heavys	0	Trucks	2	Cars	127	Totals	129
Heavys	0	Trucks	330	Cars	2996	Totals	3326
Heavys	0	Trucks	8	Cars	109	Totals	117
Heavys	0	Trucks	340	Cars	3232	Totals	



Hwy 89 &



Peds Cross: \bowtie
 West Peds: 0
 West Entering: 3572
 West Leg Total: 7090

Cars	379	Cars	69	42	259	370
Trucks	15	Trucks	6	1	7	14
Heavys	0	Heavys	0	0	0	0
Totals	394	Totals	75	43	266	



Concession Rd 7



Peds Cross: \bowtie
 South Peds: 0
 South Entering: 384
 South Leg Total: 778

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 7-Deal Count Date: 13-Jun-17 Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	2	1	0	3	0	17	7:00:00	5	1	8	14	0
8:00:00	7	2	9	18	0	37	8:00:00	6	3	10	19	0
9:00:00	30	1	10	41	0	78	9:00:00	9	1	27	37	0
10:00:00	49	6	21	76	0	121	10:00:00	5	7	33	45	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	46	4	25	75	0	119	16:00:00	5	9	30	44	0
17:00:00	32	6	25	63	0	151	17:00:00	22	10	56	88	0
18:00:00	32	10	30	72	0	158	18:00:00	17	5	64	86	0
19:00:00	24	5	10	39	0	90	19:00:00	6	7	38	51	0
Totals:	222	35	130	387	0	771		75	43	266	384	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	3	352	2	357	0	733	7:00:00	8	356	12	376	0
8:00:00	9	371	23	403	0	717	8:00:00	19	289	6	314	0
9:00:00	25	295	33	353	0	782	9:00:00	22	393	14	429	0
10:00:00	31	309	53	393	0	820	10:00:00	21	384	22	427	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	38	568	47	653	0	1205	16:00:00	19	512	21	552	0
17:00:00	60	583	43	686	0	1225	17:00:00	20	504	15	539	0
18:00:00	43	468	34	545	0	1057	18:00:00	12	482	18	512	0
19:00:00	33	367	25	425	0	848	19:00:00	8	406	9	423	0
Totals:	242	3313	260	3815	0	7387		129	3326	117	3572	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00		16:00	17:00	18:00	19:00			
Crossing Values:	8	16	40	61		60	64	59	37			

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 8:45:00
To: 9:45:00

Municipality: Alliston
Site #: 1717000004
Intersection: Hwy 89 & Concession Rd 7-Elizabeth St
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 145
North Entering: 68
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	5	0	2	7
Cars	24	2	35	61
Totals	29	2	37	



Heavys	0
Trucks	5
Cars	72
Totals	77

East Leg Total: 884
East Entering: 400
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	49	Cars	325	Totals	374
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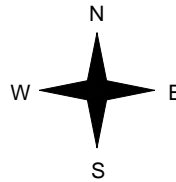


Concession Rd 7

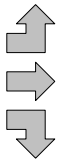
Cars	47	Trucks	2	Heavys	0	Totals	49
Cars	301	Trucks	44	Heavys	0	Totals	345
Cars	4	Trucks	2	Heavys	0	Totals	6
Totals	352	48	0				



Hwy 89



Heavys	0	Trucks	3	Cars	24	Totals	27
Heavys	0	Trucks	54	Cars	392	Totals	446
Heavys	0	Trucks	0	Cars	1	Totals	1
Totals	0	57	417				



Hwy 89



Peds Cross: \times
West Peds: 0
West Entering: 474
West Leg Total: 848

Cars	7
Trucks	2
Heavys	0
Totals	9



Cars	0	1	1	2
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	1	1	

Peds Cross: \times
South Peds: 4
South Entering: 2
South Leg Total: 11

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00
To: 19:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Municipality: Alliston
Site #: 1717000004
Intersection: Hwy 89 & Concession Rd 7-Elizabeth
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 234
North Entering: 108
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	0	1	1
Cars	40	1	66	107
Totals	40	1	67	



Heavys	0
Trucks	3
Cars	123
Totals	126

East Leg Total: 1344
East Entering: 706
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	39	Cars	615	Totals	654
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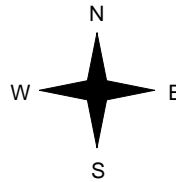


Concession Rd 7

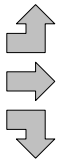
Cars	80	Trucks	0	Heavys	0	Totals	80
Cars	575	Trucks	39	Heavys	0	Totals	614
Cars	12	Trucks	0	Heavys	0	Totals	12
Cars	667	Trucks	39	Heavys	0	Totals	



Hwy 89



Heavys	0	Trucks	3	Cars	43	Totals	46
Heavys	0	Trucks	47	Cars	517	Totals	564
Heavys	0	Trucks	0	Cars	6	Totals	6
Heavys	0	Trucks	50	Cars	566	Totals	



Hwy 89



Peds Cross: \times
West Peds: 0
West Entering: 616
West Leg Total: 1270

Cars	19
Trucks	0
Heavys	0
Totals	19



Cars	0	0	7	7
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	0	0	7	

Peds Cross: \times
South Peds: 0
South Entering: 7
South Leg Total: 26

Comments

Ontario Traffic Inc.

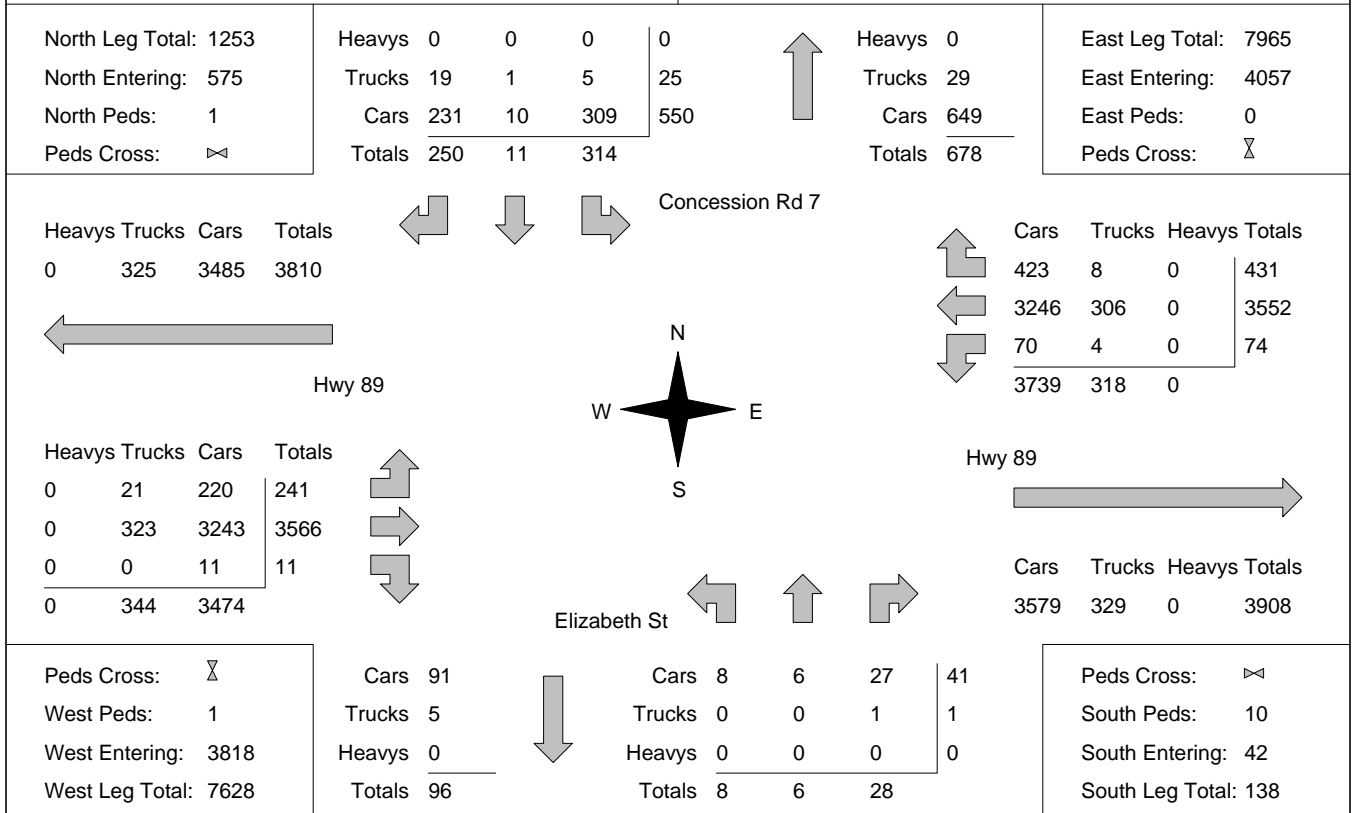
Total Count Diagram

Municipality: Alliston
Site #: 1717000004
Intersection: Hwy 89 & Concession Rd 7-Elizabeth St
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E



Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 7-Elizab Count Date: 13-Jun-17 Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	26	0	24	50	0	52	7:00:00	0	0	2	2	0
8:00:00	32	2	43	77	0	80	8:00:00	0	0	3	3	2
9:00:00	31	3	31	65	0	70	9:00:00	1	1	3	5	1
10:00:00	38	1	28	67	0	67	10:00:00	0	0	0	0	5
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	37	3	27	67	0	77	16:00:00	3	2	5	10	1
17:00:00	51	1	48	100	0	103	17:00:00	0	1	2	3	0
18:00:00	52	1	29	82	0	94	18:00:00	1	2	9	12	1
19:00:00	47	0	20	67	1	74	19:00:00	3	0	4	7	0
Totals:	314	11	250	575	1	617		8	6	28	42	10
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	1	338	9	348	0	684	7:00:00	21	315	0	336	0
8:00:00	2	403	35	440	0	766	8:00:00	27	299	0	326	0
9:00:00	6	322	26	354	0	787	9:00:00	33	400	0	433	1
10:00:00	5	362	45	412	0	871	10:00:00	26	432	1	459	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	17	602	83	702	0	1291	16:00:00	39	547	3	589	0
17:00:00	12	624	85	721	0	1333	17:00:00	41	566	5	612	0
18:00:00	14	509	73	596	0	1179	18:00:00	32	549	2	583	0
19:00:00	17	392	75	484	0	964	19:00:00	22	458	0	480	0
Totals:	74	3552	431	4057	0	7875		241	3566	11	3818	1
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00		16:00	17:00	18:00	19:00			
Crossing Values:	26	34	36	39		43	52	55	50			

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 8:45:00
To: 9:45:00

Municipality: Alliston
Site #: 1717000005
Intersection: Hwy 89 & Elizabeth St
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

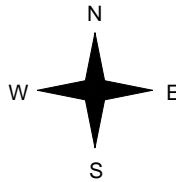
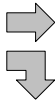
East Leg Total: 921
East Entering: 414
East Peds: 0
Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	47	365	412



Hwy 89

Heavys	Trucks	Cars	Totals
0	58	438	496
0	0	1	1
0	58	439	



Cars	Trucks	Heavys	Totals
365	47	0	412
2	0	0	2
367	47	0	



Hwy 89



Cars	Trucks	Heavys	Totals
448	59	0	507

Peds Cross: ∞
West Peds: 0
West Entering: 497
West Leg Total: 909

Cars	3
Trucks	0
Heavys	0
Totals	3



Cars	0	10	10
Trucks	0	1	1
Heavys	0	0	0
Totals	0	11	

Peds Cross: ∞
South Peds: 0
South Entering: 11
South Leg Total: 14

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 19:00:00

One Hour Peak

From: 15:15:00

To: 16:15:00

Municipality: Alliston
Site #: 1717000005
Intersection: Hwy 89 & Elizabeth St
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

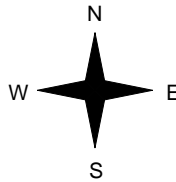
East Leg Total: 1372
 East Entering: 744
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	43	697	740



Hwy 89

Heavys	Trucks	Cars	Totals
0	39	579	618
0	1	2	3
0	40	581	



Elizabeth St



Cars	6
Trucks	1
Heavys	0
Totals	7

Cars	0	7	7
Trucks	0	3	3
Heavys	0	0	0
Totals	0	10	

Cars	Trucks	Heavys	Totals
697	43	0	740
4	0	0	4
701	43	0	



Hwy 89



Cars	Trucks	Heavys	Totals
586	42	0	628

Peds Cross: ∞
 West Peds: 0
 West Entering: 621
 West Leg Total: 1361

Peds Cross: ∞
 South Peds: 3
 South Entering: 10
 South Leg Total: 17

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000005
Intersection: Hwy 89 & Elizabeth St
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

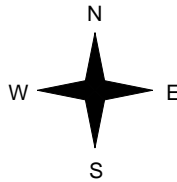
East Leg Total: 8172
 East Entering: 4115
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	311	3781	4092



Hwy 89

Heavys	Trucks	Cars	Totals
0	328	3679	4007
0	1	6	7
0	329	3685	



Elizabeth St



Cars	31
Trucks	1
Heavys	0
Totals	32

Cars	2	45	47
Trucks	0	5	5
Heavys	0	0	0
Totals	2	50	

Cars	Trucks	Heavys	Totals
3779	311	0	4090
25	0	0	25
3804	311	0	



Hwy 89



Cars	Trucks	Heavys	Totals
3724	333	0	4057

Peds Cross: ∞
 West Peds: 0
 West Entering: 4014
 West Leg Total: 8106

Peds Cross: ∞
 South Peds: 7
 South Entering: 52
 South Leg Total: 84

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Elizabeth St

Count Date: 13-Jun-17

Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	1
8:00:00	0	0	0	0	0	1	8:00:00	0	0	1	1	0
9:00:00	0	0	0	0	0	8	9:00:00	0	0	8	8	1
10:00:00	0	0	0	0	0	9	10:00:00	0	0	9	9	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	0	0	0	0	0	10	16:00:00	1	0	9	10	3
17:00:00	0	0	0	0	0	8	17:00:00	0	0	8	8	1
18:00:00	0	0	0	0	0	13	18:00:00	1	0	12	13	1
19:00:00	0	0	0	0	0	3	19:00:00	0	0	3	3	0
Totals:	0	0	0	0	0	52		2	0	50	52	7
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	0	339	0	339	0	708	7:00:00	0	369	0	369	0
8:00:00	0	448	0	448	0	798	8:00:00	0	350	0	350	0
9:00:00	3	367	0	370	0	814	9:00:00	0	443	1	444	0
10:00:00	5	413	0	418	0	896	10:00:00	0	477	1	478	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	4	729	0	733	0	1342	16:00:00	0	606	3	609	0
17:00:00	3	720	0	723	0	1352	17:00:00	0	629	0	629	0
18:00:00	9	601	0	610	0	1234	18:00:00	0	622	2	624	0
19:00:00	1	473	0	474	0	985	19:00:00	0	511	0	511	0
Totals:	25	4090	0	4115	0	8129		0	4007	7	4014	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00			16:00	17:00	18:00	19:00		
Crossing Values:	0	0	0	0			1	0	1	0		

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 6:00:00
To: 10:00:00

One Hour Peak

From: 8:45:00
To: 9:45:00

Municipality: Alliston
Site #: 1717000006
Intersection: Hwy 89 - Young St & Industrial Pkw
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 - Young St runs W/E

North Leg Total: 94
North Entering: 45
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	2	0	2
Cars	14	22	7	43
Totals	14	24	7	



Heavys	0
Trucks	1
Cars	48
Totals	49

East Leg Total: 932
East Entering: 462
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	47	Cars	369	Totals	416
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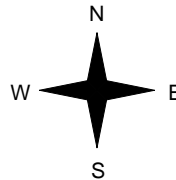
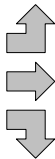


Plaza Driveway

Cars	6	Trucks	1	Heavys	0	Totals	7
Cars	260	Trucks	15	Heavys	0	Totals	275
Cars	179	Trucks	1	Heavys	0	Totals	180
Totals	445	17	0				



Heavys	0	Trucks	0	Cars	25	Totals	25
Heavys	0	Trucks	21	Cars	373	Totals	394
Heavys	0	Trucks	42	Cars	81	Totals	123
Totals	0	63	479				



Young St



Cars	448	Trucks	22	Heavys	0	Totals	470
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Peds Cross: \times
West Peds: 0
West Entering: 542
West Leg Total: 958

Cars	282	Cars	95	17	68	Totals	180
Trucks	45	Trucks	32	0	1	Totals	33
Heavys	0	Heavys	0	0	0	Totals	0
Totals	327	Totals	127	17	69		



Peds Cross: \times
South Peds: 0
South Entering: 213
South Leg Total: 540

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 19:00:00

One Hour Peak

From: 15:15:00

To: 16:15:00

Municipality: Alliston
Site #: 1717000006
Intersection: Hwy 89 - Young St & Industrial Pkw
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 - Young St runs W/E

North Leg Total: 194

North Entering: 108

North Peds: 1

Peds Cross: \times

Heavys	0	0	0	0
Trucks	1	0	1	2
Cars	53	36	17	106
Totals	54	36	18	



Heavys 0

Trucks 1

Cars 85

Totals 86

East Leg Total: 1203

East Entering: 631

East Peds: 6

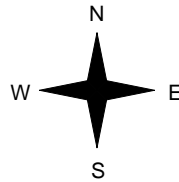
Peds Cross: \times

Heavys	0	Trucks	47	Cars	717	Totals	764
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Hwy 89

Heavys	0	Trucks	0	Cars	36	Totals	36
	0		8		412		420
	0		35		173		208
	0		43		621		



Plaza Driveway



Cars	20	Trucks	0	Heavys	0	Totals	20
	418		10		0		428
	183		0		0		183
	621		10		0		



Young St



Peds Cross: \times
 West Peds: 3
 West Entering: 664
 West Leg Total: 1428

Cars	392	Cars	246	29	132	407
Trucks	35	Trucks	36	1	2	39
Heavys	0	Heavys	0	0	0	0
Totals	427	Totals	282	30	134	



Industrial Pkwy



Peds Cross: \times
 South Peds: 8
 South Entering: 446
 South Leg Total: 873

Comments

Ontario Traffic Inc.

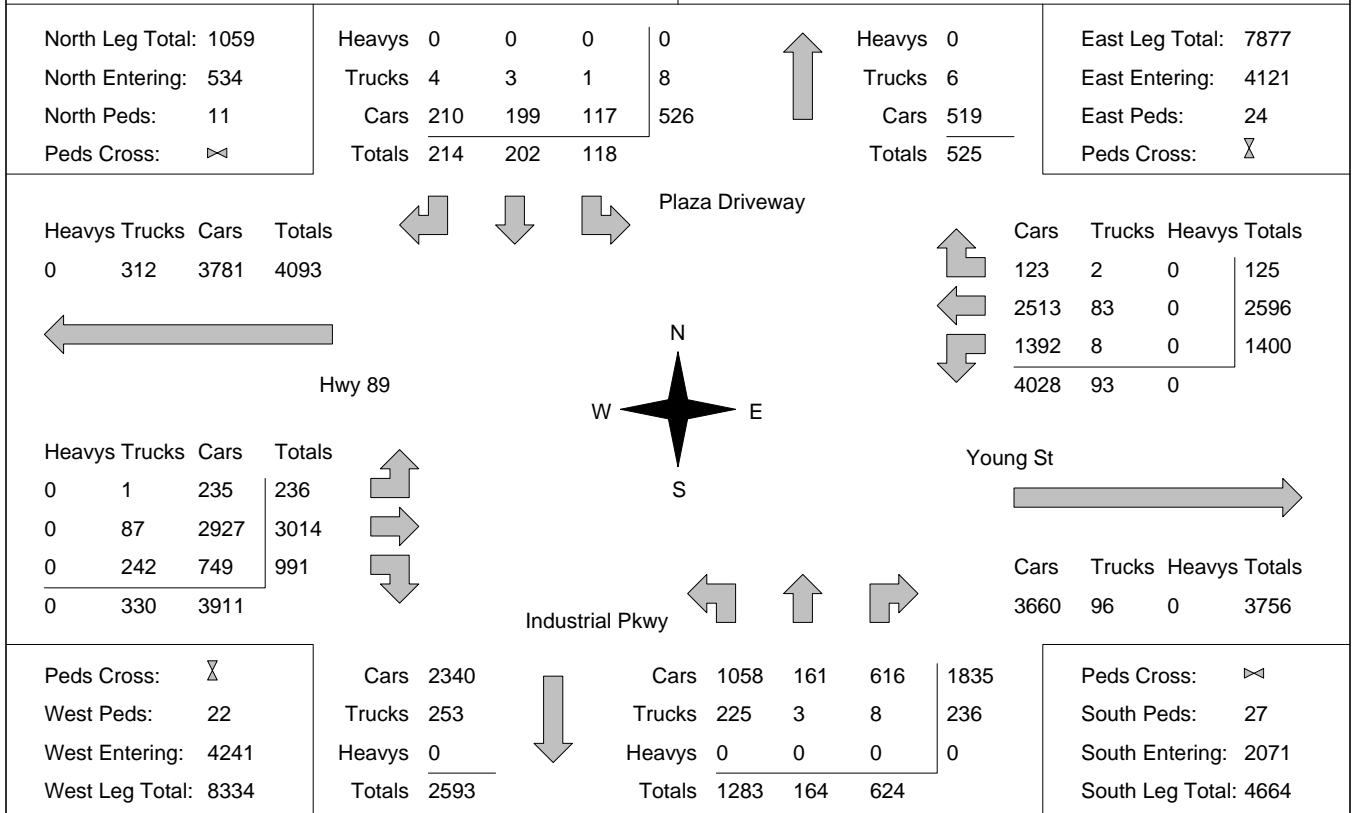
Total Count Diagram

Municipality: Alliston
Site #: 1717000006
Intersection: Hwy 89 - Young St & Industrial Pkw
TFR File #: 1
Count date: 13-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 - Young St runs W/E



Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 - Young St & Industrial Pk Count Date: 13-Jun-17 Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	2	1	1	4	0	120	7:00:00	98	2	16	116	2
8:00:00	4	4	4	12	2	169	8:00:00	123	6	28	157	4
9:00:00	3	13	7	23	0	185	9:00:00	99	13	50	162	1
10:00:00	11	22	18	51	0	263	10:00:00	130	13	69	212	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	22	41	53	116	1	575	16:00:00	300	25	134	459	11
17:00:00	20	36	55	111	0	461	17:00:00	216	19	115	350	3
18:00:00	24	40	50	114	0	485	18:00:00	192	51	128	371	1
19:00:00	32	45	26	103	8	347	19:00:00	125	35	84	244	5
Totals:	118	202	214	534	11	2605		1283	164	624	2071	27
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0
7:00:00	141	232	4	377	0	769	7:00:00	8	205	179	392	1
8:00:00	149	269	6	424	0	771	8:00:00	5	243	99	347	4
9:00:00	197	259	4	460	0	959	9:00:00	22	368	109	499	1
10:00:00	180	265	12	457	0	975	10:00:00	21	386	111	518	0
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0
16:00:00	200	397	18	615	5	1263	16:00:00	37	405	206	648	4
17:00:00	164	454	26	644	2	1292	17:00:00	37	498	113	648	0
18:00:00	195	372	21	588	6	1233	18:00:00	51	510	84	645	2
19:00:00	174	348	34	556	11	1100	19:00:00	55	399	90	544	10
Totals:	1400	2596	125	4121	24	8362		236	3014	991	4241	22
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00		16:00	17:00	18:00	19:00			
Crossing Values:	103	137	116	163		372	274	275	223			

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 11:45:00

To: 12:45:00

Municipality: Alliston
Site #: 1717000007
Intersection: Hwy 89 & CR 50
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 runs W/E

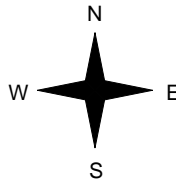
East Leg Total: 1069
 East Entering: 545
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	14	494	508



Hwy 89

Heavys	Trucks	Cars	Totals
0	7	361	368
0	7	51	58
0	14	412	



CR 50



Cars	Trucks	Heavys	Totals
389	11	0	400
143	2	0	145
532	13	0	



Hwy 89



Cars	Trucks	Heavys	Totals
515	9	0	524

Peds Cross: ∞
 West Peds: 0
 West Entering: 426
 West Leg Total: 934

Cars	194
Trucks	9
Heavys	0
Totals	203



Cars	105	154	259
Trucks	3	2	5
Heavys	0	0	0
Totals	108	156	

Peds Cross: ∞
 South Peds: 0
 South Entering: 264
 South Leg Total: 467

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000007
Intersection: Hwy 89 & CR 50
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89 runs W/E

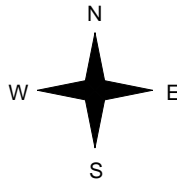
East Leg Total: 3128
 East Entering: 1558
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	30	1407	1437



Hwy 89

Heavys	Trucks	Cars	Totals
0	21	1068	1089
0	21	148	169
0	42	1216	



CR 50

Cars	Trucks	Heavys	Totals
1108	22	0	1130
421	7	0	428
1529	29	0	



Hwy 89



Cars	Trucks	Heavys	Totals
1537	33	0	1570

Peds Cross: ∞
 West Peds: 0
 West Entering: 1258
 West Leg Total: 2695

Cars	569
Trucks	28
Heavys	0
Totals	597



Cars	299	469	768
Trucks	8	12	20
Heavys	0	0	0
Totals	307	481	

Peds Cross: ∞
 South Peds: 0
 South Entering: 788
 South Leg Total: 1385

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & CR 50

Count Date: 10-Jun-17

Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	0	0	0	0	0	289	12:00:00	114	0	175	289	0
13:00:00	0	0	0	0	0	257	13:00:00	103	0	154	257	0
14:00:00	0	0	0	0	0	242	14:00:00	90	0	152	242	0
Totals:	0	0	0	0	0	788		307	0	481	788	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	153	354	0	507	0	917	12:00:00	0	355	55	410	0
13:00:00	133	388	0	521	0	951	13:00:00	0	372	58	430	0
14:00:00	142	388	0	530	0	948	14:00:00	0	362	56	418	0
Totals:	428	1130	0	1558	0	2816		0	1089	169	1258	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00	0:00	11:00	12:00	13:00	14:00			
Crossing Values:	0	0	0	0	0	0	114	103	90			

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:30:00

To: 13:30:00

Municipality: Alliston
Site #: 1717000008
Intersection: Hwy 89 & Concession Rd 6
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 64

North Entering: 31

North Peds: 0

Peds Cross: \times

Heavys	0	0	0
Trucks	0	0	0
Cars	10	21	31
Totals	10	21	



Heavys 0

Trucks 0

Cars 33

Totals 33

East Leg Total: 1082

East Entering: 517

East Peds: 0

Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	9	496	505



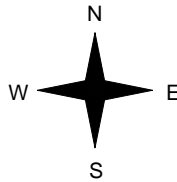
Concession Rd 6



Cars	Trucks	Heavys	Totals
22	0	0	22
486	9	0	495
508	9	0	



Hwy 89



Heavys	Trucks	Cars	Totals
0	0	11	11
0	9	535	544
0	9	546	



Hwy 89



Cars	Trucks	Heavys	Totals
556	9	0	565

Peds Cross: \times
 West Peds: 0
 West Entering: 555
 West Leg Total: 1060

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000008
Intersection: Hwy 89 & Concession Rd 6
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 199
 North Entering: 89
 North Peds: 1
 Peds Cross: \times

Heavys	0	0	0
Trucks	1	0	1
Cars	32	56	88
Totals	33	56	



Heavys	0
Trucks	0
Cars	110
Totals	110

East Leg Total: 3186
 East Entering: 1594
 East Peds: 0
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
0	28	1526	1554



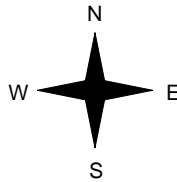
Concession Rd 6



Cars	Trucks	Heavys	Totals
73	0	0	73
1494	27	0	1521
1567	27	0	



Hwy 89



Heavys	Trucks	Cars	Totals
0	0	37	37
0	30	1506	1536
0	30	1543	



Hwy 89



Cars	Trucks	Heavys	Totals
1562	30	0	1592

Peds Cross: \times
 West Peds: 0
 West Entering: 1573
 West Leg Total: 3127

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 6

Count Date: 10-Jun-17

Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	23	0	8	31	1	31	12:00:00	0	0	0	0	0
13:00:00	14	0	13	27	0	27	13:00:00	0	0	0	0	0
14:00:00	19	0	12	31	0	31	14:00:00	0	0	0	0	0
Totals:	56	0	33	89	1	89		0	0	0	0	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	0	499	29	528	0	1061	12:00:00	12	521	0	533	0
13:00:00	0	508	21	529	0	1057	13:00:00	15	513	0	528	0
14:00:00	0	514	23	537	0	1049	14:00:00	10	502	0	512	0
Totals:	0	1521	73	1594	0	3167		37	1536	0	1573	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00			11:00	12:00	13:00	14:00		
Crossing Values:	0	0	0	0			0	23	14	19		

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 11:15:00
To: 12:15:00

Municipality: Alliston
Site #: 1717000009
Intersection: Hwy 89 & Concession Rd 7-Dean D
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 290
North Entering: 141
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	0	1	1
Cars	31	22	87	140
Totals	31	22	88	



Heavys	0
Trucks	0
Cars	149
Totals	149

East Leg Total: 1335
East Entering: 683
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	14	Cars	546	Totals	560
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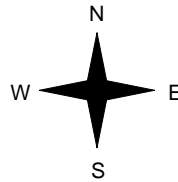


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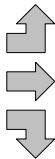
Cars	111	Trucks	0	Heavys	0	Totals	111
Cars	503	Trucks	14	Heavys	0	Totals	517
Cars	54	Trucks	1	Heavys	0	Totals	55
Totals	668	15	0				



Hwy 89



Heavys	0	Trucks	0	Cars	29	Totals	29
Heavys	0	Trucks	12	Cars	474	Totals	486
Heavys	0	Trucks	0	Cars	16	Totals	16
Totals	0	12	0	519			



Hwy 89



Cars	639	Trucks	13	Heavys	0	Totals	652
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Peds Cross: \times
West Peds: 0
West Entering: 531
West Leg Total: 1091

Cars	92	Trucks	1	Heavys	0	Totals	93
Cars	12	Trucks	0	Heavys	0	Totals	12
Cars	9	Trucks	0	Heavys	0	Totals	9
Cars	78	Trucks	0	Heavys	0	Totals	78
Totals	99	0	0	0			



Concession Rd 7



Peds Cross: \times
South Peds: 0
South Entering: 99
South Leg Total: 192

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000009
Intersection: Hwy 89 & Concession Rd 7-Dean D
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 786
 North Entering: 385
 North Peds: 0
 Peds Cross: \bowtie

Heavys	0	0	0	0
Trucks	0	0	2	2
Cars	108	45	230	383
Totals	108	45	232	

Heavys 0
 Trucks 2
 Cars 399
 Totals 401

East Leg Total: 3847
 East Entering: 1925
 East Peds: 0
 Peds Cross: \bowtie

Heavys	0	Trucks	26	Cars	1594	Totals	1620
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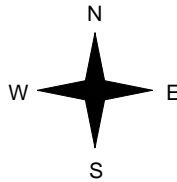


Dean Dr

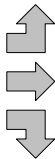
Cars	273	Trucks	1	Heavys	0	Totals	274
Cars	1450	Trucks	26	Heavys	0	Totals	1476
Cars	172	Trucks	3	Heavys	0	Totals	175
Totals	1895	30	0				



Hwy 89



Heavys	0	Trucks	0	Cars	89	Totals	89
Heavys	0	Trucks	26	Cars	1457	Totals	1483
Heavys	0	Trucks	2	Cars	59	Totals	61
Totals	0	28	1605				



Hwy 89



Peds Cross: \bowtie
 West Peds: 0
 West Entering: 1633
 West Leg Total: 3253

Cars	276	Cars	36	37	206	279
Trucks	5	Trucks	0	1	1	2
Heavys	0	Heavys	0	0	0	0
Totals	281	Totals	36	38	207	



Concession Rd 7



Cars	1893	Trucks	29	Heavys	0	Totals	1922
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Peds Cross: \bowtie
 South Peds: 0
 South Entering: 281
 South Leg Total: 562

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 7-Dean | Count Date: 10-Jun-17 | Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	87	19	31	137	0	230	12:00:00	13	9	71	93	0
13:00:00	62	14	39	115	0	212	13:00:00	13	14	70	97	0
14:00:00	83	12	38	133	0	224	14:00:00	10	15	66	91	0
Totals:	232	45	108	385	0	666		36	38	207	281	0
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	61	494	107	662	0	1216	12:00:00	37	495	22	554	0
13:00:00	57	488	87	632	0	1177	13:00:00	28	503	14	545	0
14:00:00	57	494	80	631	0	1165	14:00:00	24	485	25	534	0
Totals:	175	1476	274	1925	0	3558		89	1483	61	1633	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00	0:00	11:00	12:00	13:00	14:00			
Crossing Values:	0	0	0	0	0	0	119	89	108			

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 11:15:00
To: 12:15:00

Municipality: Alliston
Site #: 1717000010
Intersection: Hwy 89 & Concession Rd 7-Elizabeth
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

North Leg Total: 303
North Entering: 148
North Peds: 0
Peds Cross: \times

Heavys	0	0	0	0
Trucks	2	0	3	5
Cars	40	3	100	143
Totals	42	3	103	

Heavys	0
Trucks	3
Cars	152
Totals	155

East Leg Total: 1534
East Entering: 780
East Peds: 0
Peds Cross: \times

Heavys	0	Trucks	16	Cars	683	Totals	699
--------	---	--------	----	------	-----	--------	-----

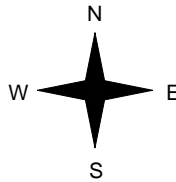


Concession Rd 7

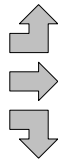
Cars	104	Trucks	2	Heavys	0	Totals	106
Cars	642	Trucks	14	Heavys	0	Totals	656
Cars	18	Trucks	0	Heavys	0	Totals	18
Cars	764	Trucks	16	Heavys	0	Totals	



Hwy 89



Heavys	0	Trucks	1	Cars	44	Totals	45
Heavys	0	Trucks	12	Cars	632	Totals	644
Heavys	0	Trucks	0	Cars	4	Totals	4
Heavys	0	Trucks	13	Cars	680	Totals	

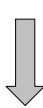


Hwy 89



Peds Cross: \times
West Peds: 0
West Entering: 693
West Leg Total: 1392

Cars	25	Trucks	0	Heavys	0	Totals	25
Cars	1	Trucks	0	Heavys	0	Totals	1
Cars	4	Trucks	0	Heavys	0	Totals	4
Cars	7	Trucks	0	Heavys	0	Totals	7
Cars	12	Trucks	0	Heavys	0	Totals	12
Cars	1	Trucks	4	Heavys	7	Totals	



Elizabeth St

Peds Cross: \times
South Peds: 1
South Entering: 12
South Leg Total: 37

Comments

Ontario Traffic Inc.

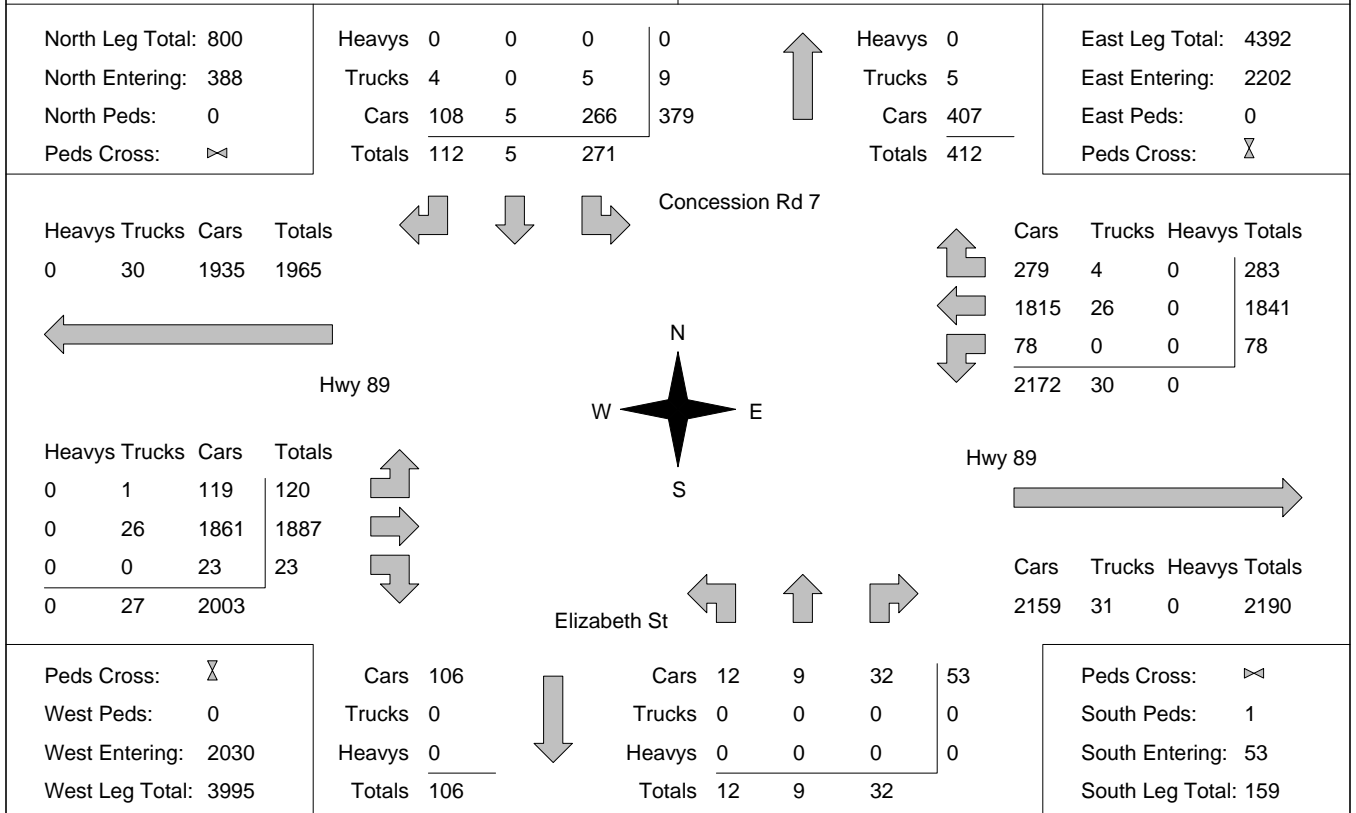
Total Count Diagram

Municipality: Alliston
Site #: 1717000010
Intersection: Hwy 89 & Concession Rd 7-Elizabeth
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E



Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Concession Rd 7-Elizabeth Count Date: 10-Jun-17 Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	112	2	45	159	0	171	12:00:00	2	2	8	12	0
13:00:00	99	1	28	128	0	146	13:00:00	6	2	10	18	1
14:00:00	60	2	39	101	0	124	14:00:00	4	5	14	23	0
Totals:	271	5	112	388	0	441		12	9	32	53	1
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	23	631	105	759	0	1459	12:00:00	40	657	3	700	0
13:00:00	24	605	92	721	0	1394	13:00:00	43	617	13	673	0
14:00:00	31	605	86	722	0	1379	14:00:00	37	613	7	657	0
Totals:	78	1841	283	2202	0	4232		120	1887	23	2030	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00		11:00	12:00	13:00	14:00			
Crossing Values:	0	0	0	0		0	116	107	69			

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 11:00:00

To: 12:00:00

Municipality: Alliston
Site #: 1717000011
Intersection: Hwy 89 & Elizabeth St
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

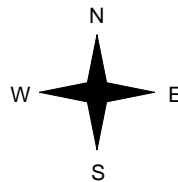
East Leg Total: 1556
 East Entering: 780
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	12	764	776



Hwy 89

Heavys	Trucks	Cars	Totals
0	15	755	770
0	1	1	2
0	16	756	



Elizabeth St

Cars	Trucks	Heavys	Totals
764	12	0	776
4	0	0	4
768	12	0	



Hwy 89



Cars	Trucks	Heavys	Totals
760	16	0	776

Peds Cross: ∞
 West Peds: 0
 West Entering: 772
 West Leg Total: 1548

Cars	5
Trucks	1
Heavys	0
Totals	6



Cars	0	5	5
Trucks	0	1	1
Heavys	0	0	0
Totals	0	6	6

Peds Cross: ∞
 South Peds: 2
 South Entering: 6
 South Leg Total: 12

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Alliston
Site #: 1717000011
Intersection: Hwy 89 & Elizabeth St
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

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

Major Road: Hwy 89 runs W/E

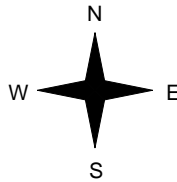
East Leg Total: 4425
 East Entering: 2220
 East Peds: 0
 Peds Cross: ∞

Heavys	Trucks	Cars	Totals
0	33	2180	2213



Hwy 89

Heavys	Trucks	Cars	Totals
0	35	2152	2187
0	1	1	2
0	36	2153	



Elizabeth St



Cars	13
Trucks	1
Heavys	0
Totals	14

Cars	4	17	21
Trucks	1	1	2
Heavys	0	0	0
Totals	5	18	

Cars	Trucks	Heavys	Totals
2176	32	0	2208
12	0	0	12
2188	32	0	



Hwy 89



Cars	Trucks	Heavys	Totals
2169	36	0	2205

Peds Cross:	∞
West Peds:	0
West Entering:	2189
West Leg Total:	4402

Peds Cross:	∞
South Peds:	4
South Entering:	23
South Leg Total:	37

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89 & Elizabeth St

Count Date: 10-Jun-17

Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	0	0	0	0	0	6	12:00:00	0	0	6	6	2
13:00:00	0	0	0	0	0	8	13:00:00	4	0	4	8	2
14:00:00	0	0	0	0	0	9	14:00:00	1	0	8	9	0
Totals:	0	0	0	0	0	23		5	0	18	23	4
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	4	776	0	780	0	1552	12:00:00	0	770	2	772	0
13:00:00	4	714	0	718	0	1446	13:00:00	0	728	0	728	0
14:00:00	4	718	0	722	0	1411	14:00:00	0	689	0	689	0
Totals:	12	2208	0	2220	0	4409		0	2187	2	2189	0
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00			11:00	12:00	13:00	14:00		
Crossing Values:	0	0	0	0			0	0	4	1		

Ontario Traffic Inc.

Mid-day Peak Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 11:45:00
To: 12:45:00

Municipality: Alliston
Site #: 1717000012
Intersection: Hwy 89-Young St & Industrial Pkwy
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89-Young St runs W/E

North Leg Total: 337
North Entering: 181
North Peds: 3
Peds Cross: \times

Heavys	0	0	0	0
Trucks	0	0	1	1
Cars	66	81	33	180
Totals	66	81	34	



Heavys	0
Trucks	1
Cars	155
Totals	156

East Leg Total: 1616
East Entering: 853
East Peds: 3
Peds Cross: \times

Heavys	0	Trucks	10	Cars	757	Totals	767
--------	---	--------	----	------	-----	--------	-----

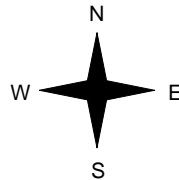
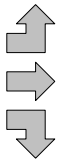


Plaza Driveway

Cars	23	Trucks	0	Heavys	0	Totals	23
Cars	527	Trucks	5	Heavys	0	Totals	532
Cars	297	Trucks	1	Heavys	0	Totals	298
Cars	847	Trucks	6	Heavys	0	Totals	



Heavys	0	Trucks	1	Cars	95	Totals	96
Heavys	0	Trucks	2	Cars	555	Totals	557
Heavys	0	Trucks	7	Cars	116	Totals	123
Heavys	0	Trucks	10	Cars	766	Totals	



Hwy 89

Young St



Peds Cross: \times
West Peds: 4
West Entering: 776
West Leg Total: 1543

Cars	494	Cars	164	37	171	372
Trucks	8	Trucks	5	0	1	6
Heavys	0	Heavys	0	0	0	0
Totals	502	Totals	169	37	172	



Industrial Pkwy,



Cars	759	Trucks	4	Heavys	0	Totals	763
------	-----	--------	---	--------	---	--------	-----

Peds Cross: \times
South Peds: 1
South Entering: 378
South Leg Total: 880

Comments

Ontario Traffic Inc.

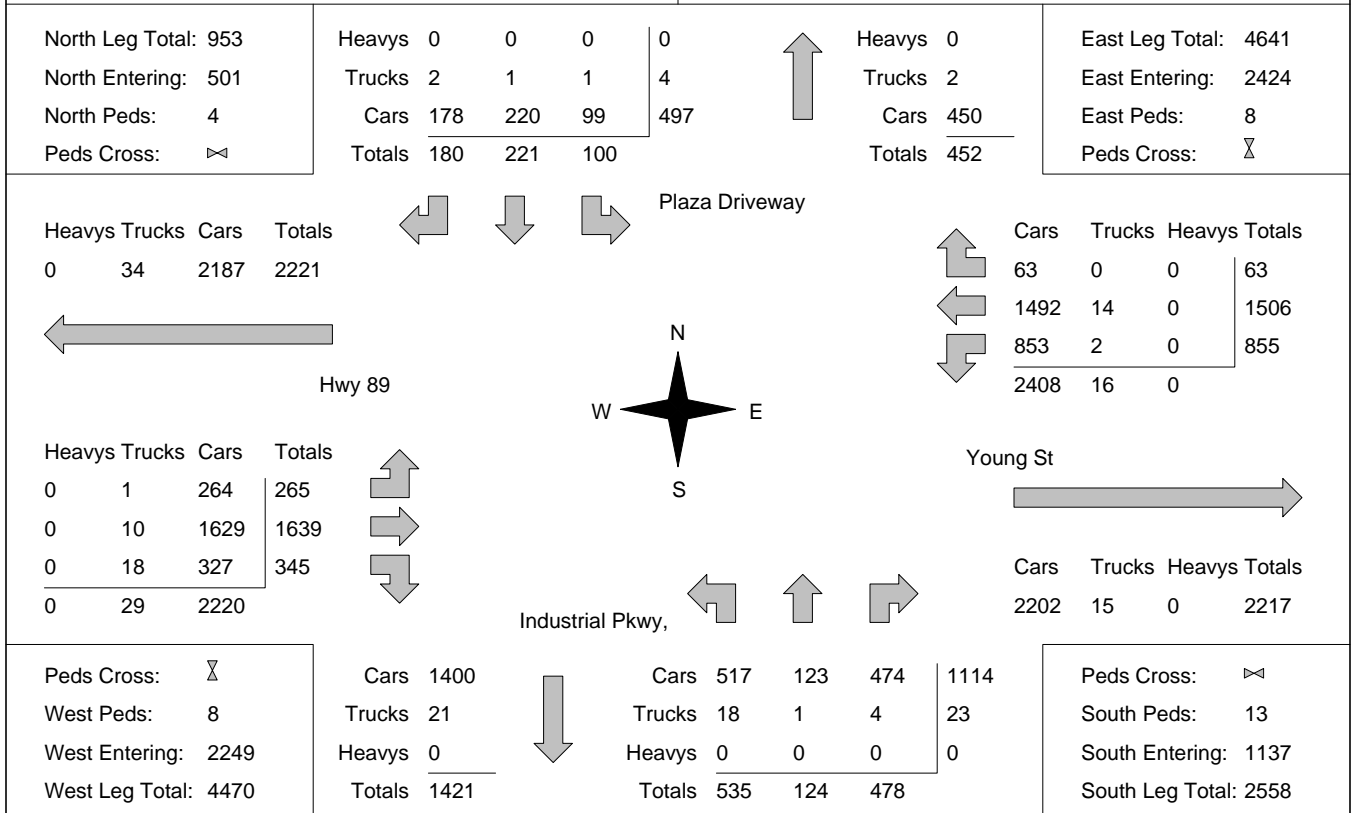
Total Count Diagram

Municipality: Alliston
Site #: 1717000012
Intersection: Hwy 89-Young St & Industrial Pkwy
TFR File #: 1
Count date: 10-Jun-17

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hwy 89-Young St runs W/E



Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Hwy 89-Young St & Industrial Pkw Count Date: 10-Jun-17 Municipality: Alliston

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	36	80	64	180	0	582	12:00:00	193	44	165	402	4
13:00:00	30	58	54	142	4	504	13:00:00	163	37	162	362	4
14:00:00	34	83	62	179	0	552	14:00:00	179	43	151	373	5
Totals:	100	221	180	501	4	1638		535	124	478	1137	13
East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0
12:00:00	293	524	17	834	3	1600	12:00:00	80	566	120	766	0
13:00:00	276	496	23	795	4	1574	13:00:00	99	571	109	779	5
14:00:00	286	486	23	795	1	1499	14:00:00	86	502	116	704	3
Totals:	855	1506	63	2424	8	4673		265	1639	345	2249	8
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	0:00	0:00	0:00	0:00			11:00	12:00	13:00	14:00		
Crossing Values:	0	0	0	0			0	312	260	300		

APPENDIX D

AADT Data



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)

PREFACE

Traffic volume information is used by many people to assist them in assessing the viability of business proposals, land use options, marketing, advertising, and a host of other activities. This publication, **Provincial Highways Traffic Volumes 1988-2016**, provides traffic volumes on an annual and seasonal average basis for selected links in the provincial highway network. The traffic pattern type and accident rates on the selected links are also indicated.

Some highway routes which have not yet been assigned an official highway number, are included under the title Selected 7000 Series Highways. **The Highway 407 ETR is maintained by 407 ETR Concession Company Ltd. and is not included in this publication. For information contact the 407 ETR Traffic**

Department at (905) 265-4070. Site or time specific information not contained herein may be obtained from the Ministry of Transportation's Regional Traffic Sections, located in London, Toronto, Kingston, North Bay and Thunder Bay. Contact MTO INFO at 1-800-268-4686 for the appropriate regional phone number.

The statistics contained herein have been prepared based on data (both electronic and otherwise) obtained from sources considered to be reliable. The Ministry makes no representation or warranty, expressed or implied with respect to its accuracy or completeness. This publication also supersedes any previously published publications.

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	- The 400 series (Highways 400 to Highway 427)	941
The Secondary Highways	- Highway 502 to Highway 673	1250
The Tertiary Roads	- Highway 802 to Highway 811	1484
Selected 7000 Series Highways	- Highway 7025 to Highway 7910	1489

INTRODUCTION

This publication contains information pertaining to traffic volumes on roads under Provincial jurisdiction as of December 31, 2016. The publication is divided into two parts.

OVERALL SYSTEM SUMMARIES

The information in this section is included for policy analysis and program planning purposes. It includes summaries about the overall Provincial Highways system. The system indicators are developed from travel experience, accident data and highway geometrics.

TRAFFIC VOLUME INFORMATION

A detailed listing outlining the 26 year history (1988-2013) of traffic volumes on Provincial Highways (King's, Secondary, Tertiary Roads and the 7000 series highways) is provided.

The highway network is divided into approximately 1831 sections for reporting purposes. Seasonal traffic volume variations are estimated for each section reported. Although local conditions cause variations in the volume within the sections, the volumes shown are considered to adequately represent the section.

On highways that overlap another highway, for instance Highway 35 and Highway 115, the volume information is referenced to the lower number highway. When an overlap occurs between a freeway and non-freeway, reference is made to the freeway route number. The freeways are Highway 400 to Highway 427 and the QEW.

The following are definitions to reading the listings:

Location Description: A statement identifying the start or ending point of a section. Some frequently used abbreviations include:

BDY	boundary
BR	bridge
C	concession
CTY	county
DIST	district
KM	kilometres
AVE	avenue
REG	regional
HWY	highway
IC	interchange
JCT	junction
L	lot
LN	line
LTS	limits
NA	non assumed*
OH	overhead
OP	overpass
PKWY	parkway
R	river
RD	road
ST	street
TWP	township
UP	underpass

*Non Assumed – indicates that the roadway is not under provincial jurisdiction therefore contact the corresponding regional municipality for traffic volume information.

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.

NOTES:

(a) The user of this publication should realize that the reported data are 'estimated values'. Since traffic volumes are not static, direct field measurements are accurate only for the time of the count. Also, the size of the Provincial Highway network makes it impractical to measure each section annually. Thus, approximately one third of the reported sections are counted each year. The following three methods of measuring traffic volumes are employed:

1. Permanent Counting Stations: At designated locations across the Province counts are taken for each hour of the year.
2. Inventory Counting Stations: Each unique volume section has a set location where traffic volumes are sampled on a cyclical basis by season and year.
3. Request Counting Stations: Traffic volumes are measured at random locations as needed to address operational or planning concerns.

Using the available traffic volume information and historical trends, estimates are made for each highway section.

- (b) The abbreviation "N/A" (Not Available) refers to a new volume section or where no data is available. Data for these sections should be available in future publication once collected.
- (c) There may be some missing or incorrect traffic sections, and distances, due to highway realignment, highway transfers, renumbering, or sections which have been recently built.

AR

Accident Rate is defined as the number of reportable accidents occurring annually on a particular highway section for every million vehicle kilometres (MVKM) travelled on that section during the same period. "Reportable Accidents" are those causing any death, injury or property damage exceeding a certain established amount.

The accident rate is calculated as follows:

AR = the number of accidents for a given year divided by the MVKM, noting the following:

$$= \frac{\text{The MVKM is calculated as follows: AADT x 365 x Section Length (DIST-km)}}{1,000,000}$$

Notes:

- (a) Multiple vehicle collisions (i.e., chain reactions are generally considered as one accident unless the reporting police officer decides otherwise).
- (b) Accidents on freeway ramps are totally excluded from sectional and total system accident rate calculations. After 1996, highway ramps have also been excluded.
- (c) If no accidents have occurred on a given section, the accident rate is shown as zero.

TRAFFIC VOLUME INFORMATION

The King's Highways	- Queen Elizabeth Way (Q.E.W.) - Highway 2 to Highway 148 - The 400 series (Highway 400 to Highway 427)
The Secondary Highways	- Highway 502 to Highway 673
The Tertiary Roads	- Highway 802 to Highway 811
Selected 7000 Series Highways	- Highway 7025 to Highway 7910

NOTE:

Highway 407 ETR is maintained by 407 ETR Concession Company Ltd. For information contact the 407 ETR Traffic Department at (905) 265-4070.

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1997	CTR	14,800	18,900	18,200	12,500	0.7
			1998	CTR	15,500	19,700	18,900	13,100	0.5
			1999	CTR	15,200	19,200	18,400	12,800	0.3
			2000	CTR	15,500	19,500	18,800	13,100	0.7
			2001	CTR	15,900	20,000	19,200	13,400	0.6
			2002	CTR	18,100	22,800	21,900	15,300	0.5
			2003	CTR	16,600	20,900	20,100	14,100	0.6
			2004	CTR	16,300	20,300	19,500	13,800	0.5
			2005	CTR	16,500	20,400	19,600	14,000	0.5
			2006	CTR	16,100	17,900	18,100	14,300	0.7
			2007	CTR	16,800	18,700	19,200	14,800	0.6
			2008	CTR	16,100	17,800	17,300	14,200	0.6
			2009	CTR	17,200	19,100	19,200	15,200	0.3
			2010	CTR	16,600	18,400	18,500	14,700	0.5
			2011	CTR	15,500	17,100	17,700	14,000	N/A
			2012	CTR	15,300	17,000	16,400	13,600	N/A
			2013	CTR	17,100	19,000	18,800	15,200	N/A
			2014	CTR	15,000	18,300	18,500	12,800	N/A
			2015	CTR	15,300	18,700	18,800	13,000	N/A
			2016	CTR	16,800	20,500	20,600	14,300	N/A
89	ALLISTON E LTS-C 1-2 - START OF NA	5.2							
89	TOWN OF NEW TECUMSETH W LTS - END OF N/A	2.0	1988	IC	7,500	9,700	9,000	6,200	1.3
			1989	IC	7,900	10,100	9,400	6,600	2.8
			1990	IC	8,300	10,300	9,700	7,200	1.5
			1991	IC	8,550	10,700	10,600	7,400	0.8
			1992	IC	8,900	10,900	10,500	7,700	1.2
			1993	IC	9,300	11,700	11,200	7,900	0.9
			1994	IC	9,450	12,100	11,500	7,950	0.9
			1995	IC	9,750	12,500	12,000	8,200	2.5
			1996	IC	9,900	12,700	12,200	8,350	0.7
			1997	IC	10,400	13,300	12,800	8,750	0.5
			1998	IC	10,700	13,600	13,100	9,000	0.9
			1999	IC	11,000	13,900	13,300	9,300	0.4

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2000	IC	11,300	14,200	13,700	9,550	0.1
			2001	IC	11,600	14,600	14,000	9,750	0.2
			2002	IC	11,900	15,000	14,400	10,000	1.0
			2003	IC	12,100	15,200	14,600	10,300	0.5
			2004	IC	12,400	15,400	14,800	10,500	0.7
			2005	IC	12,900	14,600	14,000	11,700	0.6
			2006	IC	12,500	15,100	13,700	10,600	0.5
			2007	IC	13,100	15,900	15,800	11,100	0.6
			2008	IC	13,000	15,700	15,500	11,100	0.2
			2009	IC	11,800	14,200	13,700	10,000	0.1
			2010	IC	13,400	16,100	15,500	11,300	0.4
			2011	IC	11,200	13,100	13,200	9,950	N/A
			2012	IC	11,500	13,800	13,600	9,800	N/A
			2013	IC	11,900	14,300	14,700	10,100	N/A
			2014	IC	11,900	13,300	13,100	10,600	N/A
			2015	IC	13,000	14,400	14,300	11,600	N/A
			2016	IC	13,100	14,500	14,400	11,700	N/A
89	SIMCOE RD 50	6.8	1988	IC	6,300	8,100	6,900	5,000	1.3
			1989	IC	6,600	8,500	7,300	5,400	1.5
			1990	IC	7,000	8,800	7,700	5,700	1.4
			1991	IC	7,200	9,000	7,900	5,900	0.7
			1992	IC	7,400	9,100	8,100	6,200	1.4
			1993	IC	6,800	8,500	7,500	5,500	0.8
			1994	IC	7,000	8,750	7,700	5,650	0.9
			1995	IC	7,500	9,450	8,400	6,050	1.2
			1996	IC	8,000	10,500	9,300	6,450	0.7
			1997	IC	8,400	11,000	10,800	6,950	0.7
			1998	IC	8,800	15,000	11,200	7,150	0.5
			1999	IC	9,200	11,900	11,700	7,450	0.8
			2000	IC	9,700	12,500	12,400	7,900	0.5
			2001	IC	10,100	13,200	12,800	8,200	0.5
			2002	IC	10,600	13,800	13,500	8,750	0.4
			2003	IC	11,000	14,300	14,100	9,000	0.6

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2004	IC	11,400	14,500	14,500	9,350	0.6
			2005	IC	11,900	15,100	15,100	9,900	0.7
			2006	IC	11,200	13,900	13,300	9,500	0.5
			2007	IC	11,500	14,200	14,100	9,750	0.3
			2008	IC	11,800	14,600	14,300	10,000	0.7
			2009	IC	12,100	14,800	14,200	10,300	0.7
			2010	IC	10,300	11,400	11,500	9,150	0.6
			2011	IC	10,500	11,600	12,000	9,450	N/A
			2012	IC	10,500	11,700	11,200	9,350	N/A
			2013	IC	10,500	11,700	11,600	9,350	N/A
			2014	IC	10,800	12,000	11,900	9,600	N/A
			2015	IC	11,000	12,200	12,100	9,800	N/A
			2016	IC	11,200	12,400	12,300	9,950	N/A
89	MONO-ADJALA TOWNLINE RD (S)	11.9	1988	CTR	6,300	8,100	6,900	5,000	1.2
			1989	CTR	6,600	8,500	7,300	5,400	0.9
			1990	CTR	7,000	8,800	7,700	5,700	0.8
			1991	CTR	7,200	9,000	7,900	5,900	0.9
			1992	CTR	7,400	9,100	8,100	6,200	0.9
			1993	CTR	6,800	8,500	7,500	5,500	1.3
			1994	CTR	7,000	8,750	7,700	5,650	1.2
			1995	CTR	7,500	9,450	8,400	6,050	1.1
			1996	CTR	8,000	10,500	9,300	6,450	0.5
			1997	CTR	8,400	11,000	10,800	6,950	0.6
			1998	CTR	8,800	15,000	11,200	7,150	0.7
			1999	CTR	9,200	11,900	11,700	7,450	0.5
			2000	CTR	9,700	12,500	12,400	7,900	0.5
			2001	CTR	10,100	13,200	12,800	8,200	0.6
			2002	CTR	10,600	13,800	13,500	8,750	0.8
			2003	CTR	10,900	14,200	14,000	8,950	0.5
			2004	CTR	9,150	11,700	11,700	7,500	0.9
			2005	CTR	8,750	11,100	11,100	7,250	0.7
			2006	CTR	8,350	10,300	9,900	7,100	0.8
			2007	CTR	8,050	9,950	9,900	6,800	1.0

APPENDIX E

TTS Data

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of origin - pd_orig

Column: Planning district of destination - pd_dest

Filters:

(Primary travel mode of trip - mode_prime In D

and

Planning district of destination - pd_dest In 85,

and

2006 GTA zone of destination - gta06_dest In 8585,8553

and

Start time of trip - start_time In 1600-1900

and

Trip purpose of destination - purp_dest In W,M)

Trip 2011

Table:

Adjala-Tosoront Direction

New Tecumseth	18 East 89
Mulmur	28 West 89
Adjala-Tosorontio	3 North CR 7
	6 North CR 6
	18 West 89

PM	Row Labels	Sum of Adjala-Tosorontio	Percent
	From East 89	18	25%
	From North CR 6	6	8%
	From North CR 7	3	4%
	From West 89	46	63%
	Grand Total	73	100.00%

AM

To East 89	18	25%
To North CR 6	6	8%
To North CR 7	3	4%
To West 89	46	63%

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of destination - pd_dest

Column: Planning district of origin - pd_orig

Filters:

(Primary travel mode of trip - mode_prime In D

and

Planning district of origin - pd_orig In 85

and

2006 GTA zone of origin - gta06_orig In 8585,8553

and

Start time of trip - start_time In 1600-1900

and

Trip purpose of origin - purp_orig In W, M)

Trip 2011

Table:

	Adjala-Tosorontio	Direction
Uxbridge		15 South CR 7
Caledon		18 West 89
Brampton		24 West 89
Erin		8 South CR 50
Orangeville		23 West 89
Barrie		64 East 89
New Tecum:	154	East 89
Essa	65	East 89
Clearview	41	West 89
Springwater	17	East 89
Ramara	23	East 89
Mulmur	15	West 89
Adjala-Tosoi	10	North CR 7
		19 North CR 6
		68 West 89
		22 South CR 7
		6 South Industrial Parkway
		28 West 89

PM	Row Labels	Sum of Adjala-Tosorontio	%
	To East 89	323	52%
	To North CR 6	19	3%
	To North CR 7	10	2%

To South CR 50	8	1%
To South CR 7	37	6%
To South Industrial Parkway	6	1%
To West 89	217	35%
Grand Total	620	100.00%

AM

From East 89	323	52%
From North CR 6	19	3%
From North CR 7	10	2%
From South CR 50	8	1%
From South CR 7	37	6%
From South Industrial Parkway	6	1%
From West 89	217	35%

Thu Sep 21 2017 15:10:03 GMT-0400 (Eastern Daylight Time) - Run Time: 2798ms

Cross Tabulation Query Form - Trip - 2011

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

(Primary travel mode of trip - mode_prime In D

and

Planning district of origin - pd_orig In 85

and

2006 GTA zone of destination - gta06_dest In 8585,8553

and

Start time of trip - start_time In 1600-1900

and

Trip purpose of destination - purp_dest In W,M)

Trip 2011

Table:

	8553
8553	27

10% 3 North CR 7

20% 6 North CR 6

70% 18 West 89

27

Thu Sep 21 2017 15:08:55 GMT-0400 (Eastern Daylight Time) - Run Time: 2197ms

Cross Tabulation Query Form - Trip - 2011

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

(Primary travel mode of trip - mode_prime In D

and

Planning district of destination - pd_dest In 85

and

2006 GTA zone of origin - gta06_orig In 8585,8553

and

Start time of trip - start_time In 1600-1900

and

Trip purpose of origin - purp_orig In W,M)

Trip 2011

Table:

	8553	8585	
8553	97	0	97
8585	43	13	56
			153
10%		10 North CR 7	
20%		19 North CR 6	
70%		68 West 89	
40%		22 South CR 7	
10%		6 South Industrial Parkway	
50%		28 West 89	
		153	

APPENDIX F

Detailed Capacity Analysis

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2017 Existing Traffic - AM
8/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	238	121	205	222	46	106
Future Volume (vph)	238	121	205	222	46	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.949					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2969	0	1620	3093	1471	1426
Flt Permitted			0.495		0.950	
Satd. Flow (perm)	2969	0	844	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	133					116
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	262	133	225	244	51	116
Shared Lane Traffic (%)						
Lane Group Flow (vph)	395	0	225	244	51	116
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

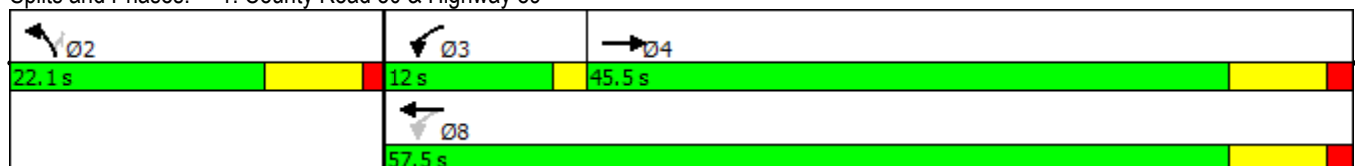
2017 Existing Traffic - AM
8/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.8		56.1	52.4	10.3	10.3
Actuated g/C Ratio	0.57		0.79	0.73	0.14	0.14
v/c Ratio	0.23		0.30	0.11	0.24	0.38
Control Delay	6.4		3.9	4.4	32.1	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	6.4		3.9	4.4	32.1	10.5
LOS	A		A	A	C	B
Approach Delay	6.4			4.1	17.1	
Approach LOS	A			A	B	
Queue Length 50th (m)	9.0		7.2	5.4	6.5	0.0
Queue Length 95th (m)	17.5		13.7	9.4	16.0	13.0
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1752		773	2271	312	394
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.23		0.29	0.11	0.16	0.29

Intersection Summary	
Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	71.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.38
Intersection Signal Delay:	7.1
Intersection LOS:	A
Intersection Capacity Utilization:	64.4%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2017 Existing Traffic - AM
8/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	9	321	394	10	18	42
Future Volume (Veh/h)	9	321	394	10	18	42
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	357	438	11	20	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	449				642	224
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	449				642	224
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				95	94
cM capacity (veh/h)	1047				407	785
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	129	238	292	157	67	
Volume Left	10	0	0	0	20	
Volume Right	0	0	0	11	47	
cSH	1047	1700	1700	1700	615	
Volume to Capacity	0.01	0.14	0.17	0.09	0.11	
Queue Length 95th (m)	0.2	0.0	0.0	0.0	2.8	
Control Delay (s)	0.7	0.0	0.0	0.0	11.6	
Lane LOS	A				B	
Approach Delay (s)	0.3		0.0		11.6	
Approach LOS					B	
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			25.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2017 Existing Traffic - AM
8/21/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	384	22	31	309	53	5	7	33	49	6	21
Future Volume (Veh/h)	21	384	22	31	309	53	5	7	33	49	6	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	417	24	34	336	58	5	8	36	53	7	23
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	394			441			738	937	220	728	920	197
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	394			441			738	937	220	728	920	197
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	98			97			98	97	95	81	97	97
cM capacity (veh/h)	1176			1108			284	254	790	282	259	787
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	23	278	163	34	224	170	49	83				
Volume Left	23	0	0	34	0	0	5	53				
Volume Right	0	0	24	0	0	58	36	23				
cSH	1176	1700	1700	1108	1700	1700	517	340				
Volume to Capacity	0.02	0.16	0.10	0.03	0.13	0.10	0.09	0.24				
Queue Length 95th (m)	0.5	0.0	0.0	0.7	0.0	0.0	2.4	7.1				
Control Delay (s)	8.1	0.0	0.0	8.4	0.0	0.0	12.7	19.0				
Lane LOS	A			A			B	C				
Approach Delay (s)	0.4			0.7			12.7	19.0				
Approach LOS							B	C				
Intersection Summary												
Average Delay	2.6											
Intersection Capacity Utilization	35.6%			ICU Level of Service				A				
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2017 Existing Traffic - AM
 8/21/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	446	1	6	345	49	0	1	1	37	2	29
Future Volume (Veh/h)	27	446	1	6	345	49	0	1	1	37	2	29
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	28	469	1	6	363	52	0	1	1	39	2	31
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	363			474			724	904	239	667	905	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	363			474			724	904	239	667	905	182
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	98			99			100	100	100	88	99	96
cM capacity (veh/h)	1130			891			294	269	765	328	269	785

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	28	313	157	6	182	182	52	2	72
Volume Left	28	0	0	6	0	0	0	0	39
Volume Right	0	0	1	0	0	0	52	1	31
cSH	1130	1700	1700	891	1700	1700	1700	398	571
Volume to Capacity	0.02	0.18	0.09	0.01	0.11	0.11	0.03	0.01	0.13
Queue Length 95th (m)	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.1	3.3
Control Delay (s)	8.3	0.0	0.0	9.1	0.0	0.0	0.0	14.1	14.3
Lane LOS	A			A				B	B
Approach Delay (s)	0.5			0.1				14.1	14.3
Approach LOS								B	B

Intersection Summary

Average Delay	1.4
Intersection Capacity Utilization	34.6%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2017 Existing Traffic - AM
8/21/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	496	1	2	412	0	11
Future Volume (Veh/h)	496	1	2	412	0	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	533	1	2	443	0	12
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	534			759	267	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	534			759	267	
tC, single (s)	4.1			6.8	7.1	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.4	
p0 queue free %	100			100	98	
cM capacity (veh/h)	1044			346	710	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	355	179	150	295	12	
Volume Left	0	0	2	0	0	
Volume Right	0	1	0	0	12	
cSH	1700	1700	1044	1700	710	
Volume to Capacity	0.21	0.11	0.00	0.17	0.02	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.4	
Control Delay (s)	0.0	0.0	0.1	0.0	10.2	
Lane LOS	A			B		
Approach Delay (s)	0.0	0.0		10.2		
Approach LOS				B		
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	23.7%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - AM
8/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	394	123	180	275	7	127	17	69	7	24	14
Future Volume (vph)	25	394	123	180	275	7	127	17	69	7	24	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.964			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3145	0	1807	3455	0	1387	1474	1617	1825	1779	1633
Flt Permitted	0.567			0.408			0.740	0.758		0.704		
Satd. Flow (perm)	1089	3145	0	776	3455	0	1080	1160	1617	1352	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			5				88			88
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		23.3			27.8			28.0			5.1	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	27	424	132	194	296	8	137	18	74	8	26	15
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	27	556	0	194	304	0	77	78	74	8	26	15
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - AM
8/21/2017

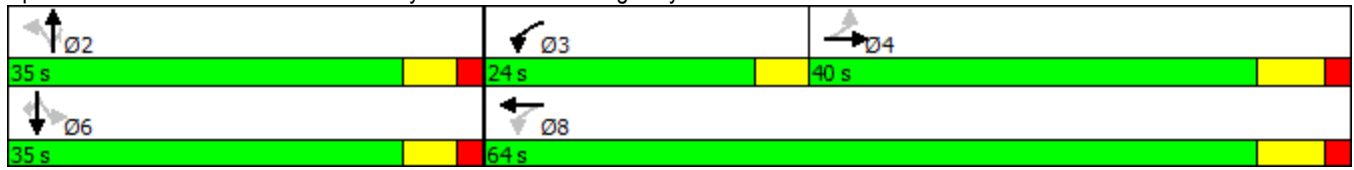


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	45.1	45.1		60.8	59.5		12.8	12.8	12.8	12.8	12.8	12.8
Actuated g/C Ratio	0.57	0.57		0.76	0.75		0.16	0.16	0.16	0.16	0.16	0.16
v/c Ratio	0.04	0.31		0.28	0.12		0.45	0.42	0.22	0.04	0.09	0.04
Control Delay	10.7	10.3		4.8	4.5		40.3	38.8	7.3	29.3	30.2	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	10.3		4.8	4.5		40.3	38.8	7.3	29.3	30.2	0.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		10.3			4.6			29.1			20.9	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	1.8	21.1		7.4	6.9		11.7	11.8	0.0	1.1	3.6	0.0
Queue Length 95th (m)	6.5	37.6		17.0	13.6		25.1	25.2	8.6	4.7	10.2	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	616	1800		853	2579		398	427	651	498	655	657
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	0.04	0.31		0.23	0.12		0.19	0.18	0.11	0.02	0.04	0.02

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	79.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.45
Intersection Signal Delay:	11.8
Intersection Capacity Utilization:	57.3%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2017 Existing Traffic - PM
8/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	291	46	135	468	164	255
Future Volume (vph)	291	46	135	468	164	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.511		0.950	
Satd. Flow (perm)	3205	0	824	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					274
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	313	49	145	503	176	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	362	0	145	503	176	274
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.8		55.5	50.0	12.9	12.9
Actuated g/C Ratio	0.53		0.72	0.65	0.17	0.17
v/c Ratio	0.21		0.22	0.23	0.64	0.72
Control Delay	9.8		4.6	6.3	41.2	16.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	9.8		4.6	6.3	41.2	16.2
LOS	A		A	A	D	B
Approach Delay	9.8			5.9	26.0	
Approach LOS	A			A	C	
Queue Length 50th (m)	12.7		5.6	14.5	24.4	0.0
Queue Length 95th (m)	22.1		11.4	22.1	43.6	#30.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1702		681	2222	322	399
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.21		0.21	0.23	0.55	0.69

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 77.5

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 13.1

Intersection LOS: B

Intersection Capacity Utilization 61.2%

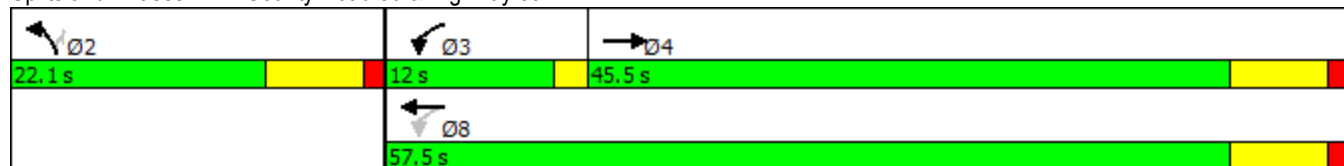
ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2017 Existing Traffic - PM
8/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	34	511	583	30	13	18
Future Volume (Veh/h)	34	511	583	30	13	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	37	549	627	32	14	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)		200				
pX, platoon unblocked					0.98	
vC, conflicting volume	659				992	330
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	659				953	330
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	96				94	97
cM capacity (veh/h)	939				232	672
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	220	366	418	241	33	
Volume Left	37	0	0	0	14	
Volume Right	0	0	0	32	19	
cSH	939	1700	1700	1700	373	
Volume to Capacity	0.04	0.22	0.25	0.14	0.09	
Queue Length 95th (m)	0.9	0.0	0.0	0.0	2.2	
Control Delay (s)	1.8	0.0	0.0	0.0	15.6	
Lane LOS	A				C	
Approach Delay (s)	0.7		0.0		15.6	
Approach LOS					C	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			45.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2017 Existing Traffic - PM
8/21/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	504	15	60	583	43	22	10	56	32	6	25
Future Volume (Veh/h)	20	504	15	60	583	43	22	10	56	32	6	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	531	16	63	614	45	23	11	59	34	6	26
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	659			547			1043	1366	274	1134	1352	330
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	659			547			1043	1366	274	1134	1352	330
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			85	92	92	74	96	96
cM capacity (veh/h)	939			1033			152	136	730	129	139	672

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	21	354	193	63	409	250	93	66
Volume Left	21	0	0	63	0	0	23	34
Volume Right	0	0	16	0	0	45	59	26
cSH	939	1700	1700	1033	1700	1700	297	191
Volume to Capacity	0.02	0.21	0.11	0.06	0.24	0.15	0.31	0.34
Queue Length 95th (m)	0.5	0.0	0.0	1.5	0.0	0.0	9.9	11.0
Control Delay (s)	8.9	0.0	0.0	8.7	0.0	0.0	22.5	33.4
Lane LOS	A			A			C	D
Approach Delay (s)	0.3			0.8			22.5	33.4
Approach LOS							C	D

Intersection Summary

Average Delay	3.5
Intersection Capacity Utilization	37.7%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2017 Existing Traffic - PM
8/21/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	564	6	12	614	80	0	0	7	67	1	40
Future Volume (Veh/h)	46	564	6	12	614	80	0	0	7	67	1	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	48	594	6	13	646	84	0	0	7	71	1	42
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	646			600			1042	1365	300	1072	1368	323
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	646			600			1042	1365	300	1072	1368	323
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			100	100	99	57	99	94
cM capacity (veh/h)	902			987			165	139	702	166	138	679
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	48	396	204	13	323	323	84	7	114			
Volume Left	48	0	0	13	0	0	0	0	71			
Volume Right	0	0	6	0	0	0	84	7	42			
cSH	902	1700	1700	987	1700	1700	1700	702	262			
Volume to Capacity	0.05	0.23	0.12	0.01	0.19	0.19	0.05	0.01	0.44			
Queue Length 95th (m)	1.3	0.0	0.0	0.3	0.0	0.0	0.0	0.2	15.8			
Control Delay (s)	9.2	0.0	0.0	8.7	0.0	0.0	0.0	10.2	30.8			
Lane LOS	A			A				B	D			
Approach Delay (s)	0.7			0.2				10.2	30.8			
Approach LOS								B	D			
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			40.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2017 Existing Traffic - PM
8/21/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	618	3	4	740	0	10
Future Volume (Veh/h)	618	3	4	740	0	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	637	3	4	763	0	10
Pedestrians					3	
Lane Width (m)					3.7	
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			643		1031	323
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			643		1031	323
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	98
cM capacity (veh/h)			949		231	595
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	425	215	258	509	10	
Volume Left	0	0	4	0	0	
Volume Right	0	3	0	0	10	
cSH	1700	1700	949	1700	595	
Volume to Capacity	0.25	0.13	0.00	0.30	0.02	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.4	
Control Delay (s)	0.0	0.0	0.2	0.0	11.1	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		11.1	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			33.2%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - PM
8/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	420	208	183	428	20	282	30	134	18	36	54
Future Volume (vph)	36	420	208	183	428	20	282	30	134	18	36	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.950			0.993				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3208	0	1825	3553	0	1534	1579	1617	1722	1921	1601
Fl _t Permitted	0.484			0.339			0.732	0.741		0.600		
Satd. Flow (perm)	929	3208	0	649	3553	0	1179	1214	1588	1082	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		92			8				140			88
Link Speed (k/h)		80			80			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		23.3			27.8			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	38	438	217	191	446	21	294	31	140	19	38	56
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	38	655	0	191	467	0	162	163	140	19	38	56
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - PM
8/21/2017



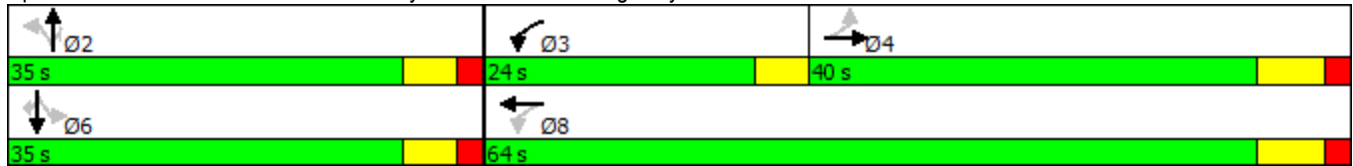
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	44.2	44.2		60.3	57.3		18.7	18.7	18.7	18.7	18.7	18.7
Actuated g/C Ratio	0.50	0.50		0.68	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.08	0.40		0.34	0.20		0.66	0.64	0.32	0.08	0.09	0.14
Control Delay	15.4	14.1		8.0	7.5		44.8	43.6	6.9	27.7	27.5	3.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	14.1		8.0	7.5		44.8	43.6	6.9	27.7	27.5	3.1
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		14.1			7.7			32.9			15.4	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	3.1	28.4		9.9	14.7		26.7	26.8	0.0	2.6	5.3	0.0
Queue Length 95th (m)	10.9	55.7		24.6	29.2		47.2	47.2	13.1	8.0	12.6	4.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	461	1638		704	2288		385	397	613	354	628	575
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	0.08	0.40		0.27	0.20		0.42	0.41	0.23	0.05	0.06	0.10

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	16.5
Intersection Capacity Utilization	76.0%
Intersection LOS:	B
ICU Level of Service	D

Analysis Period (min) 15

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2017 Existing Traffic - SAT
8/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	368	58	145	400	108	156
Future Volume (vph)	368	58	145	400	108	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.979					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3457	0	1668	3544	1713	949
Flt Permitted			0.474		0.950	
Satd. Flow (perm)	3457	0	832	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					161
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	379	60	149	412	111	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	439	0	149	412	111	161
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		







Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	41.1		55.5	50.0	11.4	11.4
Actuated g/C Ratio	0.54		0.73	0.66	0.15	0.15
v/c Ratio	0.23		0.22	0.18	0.43	0.58
Control Delay	9.3		4.1	5.5	34.9	14.3
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	9.3		4.1	5.5	34.9	14.3
LOS	A		A	A	C	B
Approach Delay	9.3			5.1	22.7	
Approach LOS	A			A	C	
Queue Length 50th (m)	14.0		4.6	9.7	14.7	0.0
Queue Length 95th (m)	26.4		11.5	18.0	28.8	16.2
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1884		718	2332	338	316
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.23		0.21	0.18	0.33	0.51

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	76
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.58
Intersection Signal Delay:	10.3
Intersection LOS:	B
Intersection Capacity Utilization:	61.0%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

 Ø2 22.1 s	 Ø3 12 s	 Ø4 45.5 s
	 Ø8 57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2017 Existing Traffic - SAT
8/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↕	↕↔		↔↕	
Traffic Volume (veh/h)	11	544	495	22	21	10
Future Volume (Veh/h)	11	544	495	22	21	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	591	538	24	23	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.96	
vC, conflicting volume	562				870	281
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562				791	281
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				93	98
cM capacity (veh/h)	1019				316	722
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	209	394	359	203	34	
Volume Left	12	0	0	0	23	
Volume Right	0	0	0	24	11	
cSH	1019	1700	1700	1700	386	
Volume to Capacity	0.01	0.23	0.21	0.12	0.09	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	2.2	
Control Delay (s)	0.6	0.0	0.0	0.0	15.2	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		15.2	
Approach LOS					C	
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			32.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89





















2017 Existing Traffic - SAT
 8/21/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	486	16	55	517	111	12	9	78	88	22	31
Future Volume (Veh/h)	29	486	16	55	517	111	12	9	78	88	22	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	31	512	17	58	544	117	13	9	82	93	23	33
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	661			529			1015			1360		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	661			529			1015			1360		
tC, single (s)	4.1			4.1			7.5			6.5		
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	97			94			91			93		
cM capacity (veh/h)	937			1034			153			137		
Direction, Lane #												
	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	31	341	188	58	363	298	104	149				
Volume Left	31	0	0	58	0	0	13	93				
Volume Right	0	0	17	0	0	117	82	33				
cSH	937	1700	1700	1034	1700	1700	397	159				
Volume to Capacity	0.03	0.20	0.11	0.06	0.21	0.18	0.26	0.94				
Queue Length 95th (m)	0.8	0.0	0.0	1.4	0.0	0.0	7.9	52.2				
Control Delay (s)	9.0	0.0	0.0	8.7	0.0	0.0	17.2	111.8				
Lane LOS	A			A			C	F				
Approach Delay (s)	0.5			0.7			17.2	111.8				
Approach LOS							C	F				
Intersection Summary												
Average Delay				12.6								
Intersection Capacity Utilization				45.8%			ICU Level of Service			A		
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2017 Existing Traffic - SAT
8/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	644	4	18	656	106	1	4	7	103	3	42
Future Volume (Veh/h)	45	644	4	18	656	106	1	4	7	103	3	42
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	47	678	4	19	691	112	1	4	7	108	3	44
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	691			683			1160	1504	342	1171	1506	346
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	691			683			1160	1504	342	1171	1506	346
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			99	96	99	19	97	93
cM capacity (veh/h)	900			919			132	114	659	133	113	642
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	47	452	230	19	346	346	112	12	155			
Volume Left	47	0	0	19	0	0	0	1	108			
Volume Right	0	0	4	0	0	0	112	7	44			
cSH	900	1700	1700	919	1700	1700	1700	225	186			
Volume to Capacity	0.05	0.27	0.14	0.02	0.20	0.20	0.07	0.05	0.84			
Queue Length 95th (m)	1.3	0.0	0.0	0.5	0.0	0.0	0.0	1.3	45.2			
Control Delay (s)	9.2	0.0	0.0	9.0	0.0	0.0	0.0	21.9	76.6			
Lane LOS	A			A				C	F			
Approach Delay (s)	0.6			0.2				21.9	76.6			
Approach LOS								C	F			
Intersection Summary												
Average Delay			7.4									
Intersection Capacity Utilization			44.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89























2017 Existing Traffic - SAT
8/21/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	770	2	4	776	0	6
Future Volume (Veh/h)	770	2	4	776	0	6
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)	819	2	4	826	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			821	1241	410	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			821	1241	410	
tC, single (s)			4.1	6.8	7.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.5	
p0 queue free %			100	100	99	
cM capacity (veh/h)			817	169	550	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	546	275	279	551	6	
Volume Left	0	0	4	0	0	
Volume Right	0	2	0	0	6	
cSH	1700	1700	817	1700	550	
Volume to Capacity	0.32	0.16	0.00	0.32	0.01	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.3	
Control Delay (s)	0.0	0.0	0.2	0.0	11.6	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		11.6	
Approach LOS				B		
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			34.2%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - SAT
8/21/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	557	123	298	532	23	169	37	172	34	81	66
Future Volume (vph)	96	557	123	298	532	23	169	37	172	34	81	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.973			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3500	0	1825	3590	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.426			0.307			0.701	0.751		0.679		
Satd. Flow (perm)	809	3500	0	590	3590	0	1238	1341	1593	1263	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			7				185			88
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		23.3			27.8			28.0			5.1	
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	103	599	132	320	572	25	182	40	185	37	87	71
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	103	731	0	320	597	0	107	115	185	37	87	71
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2017 Existing Traffic - SAT
8/21/2017



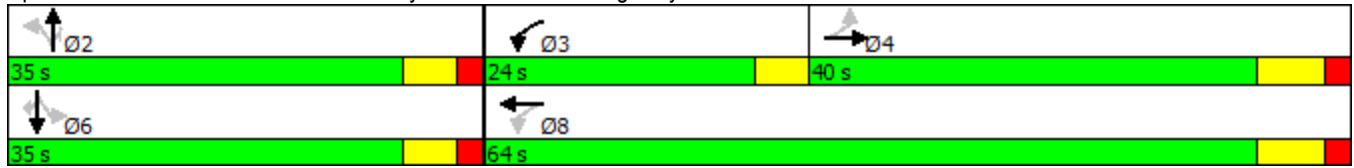
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	42.6	42.6		60.2	57.2		14.4	14.4	14.4	14.4	14.4	14.4
Actuated g/C Ratio	0.50	0.50		0.71	0.68		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.25	0.41		0.56	0.25		0.51	0.50	0.44	0.17	0.27	0.21
Control Delay	16.6	14.7		8.9	6.0		40.4	39.6	8.2	31.1	32.0	6.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	14.7		8.9	6.0		40.4	39.6	8.2	31.1	32.0	6.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		15.0			7.0			25.5			22.5	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	8.5	33.2		14.3	16.0		16.6	17.8	0.0	5.2	12.3	0.0
Queue Length 95th (m)	24.9	63.8		32.5	30.3		32.5	34.0	15.7	13.1	24.4	7.6
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	407	1777		712	2427		425	461	668	434	660	610
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	0.25	0.41		0.45	0.25		0.25	0.25	0.28	0.09	0.13	0.12

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	84.6
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.56
Intersection Signal Delay:	14.3
Intersection Capacity Utilization	72.6%
Intersection LOS:	B
ICU Level of Service	C

Analysis Period (min) 15

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	315	158	267	293	60	138
Future Volume (vph)	315	158	267	293	60	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.437		0.950	
Satd. Flow (perm)	2972	0	745	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	151					152
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	346	174	293	322	66	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	520	0	293	322	66	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

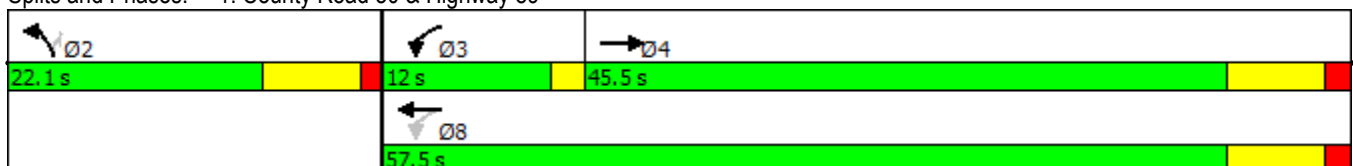


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.4		55.5	50.0	10.5	10.5
Actuated g/C Ratio	0.52		0.74	0.67	0.14	0.14
v/c Ratio	0.32		0.45	0.16	0.32	0.46
Control Delay	7.9		5.6	5.0	33.7	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	7.9		5.6	5.0	33.7	10.5
LOS	A		A	A	C	B
Approach Delay	7.9			5.3	17.5	
Approach LOS	A			A	B	
Queue Length 50th (m)	13.7		9.9	7.4	8.6	0.0
Queue Length 95th (m)	24.8		19.6	13.0	19.3	14.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1632		666	2059	293	406
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.32		0.44	0.16	0.23	0.37

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.1
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	8.3
Intersection LOS:	A
Intersection Capacity Utilization:	67.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Background - AM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	12	423	517	13	23	55
Future Volume (Veh/h)	12	423	517	13	23	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	470	574	14	26	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	588				842	294
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	588				842	294
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				91	91
cM capacity (veh/h)	924				303	708
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	170	313	383	205	87	
Volume Left	13	0	0	0	26	
Volume Right	0	0	0	14	61	
cSH	924	1700	1700	1700	506	
Volume to Capacity	0.01	0.18	0.23	0.12	0.17	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	4.7	
Control Delay (s)	0.8	0.0	0.0	0.0	13.6	
Lane LOS	A				B	
Approach Delay (s)	0.3		0.0		13.6	
Approach LOS					B	
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			31.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	499	35	51	401	69	12	9	53	64	8	27
Future Volume (Veh/h)	27	499	35	51	401	69	12	9	53	64	8	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	542	38	55	436	75	13	10	58	70	9	29
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	511			580			980	1240	290	976	1222	256
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	511			580			980	1240	290	976	1222	256
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	97			94			93	94	92	59	95	96
cM capacity (veh/h)	1065			983			179	162	713	171	166	720

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	29	361	219	55	291	220	81	108
Volume Left	29	0	0	55	0	0	13	70
Volume Right	0	0	38	0	0	75	58	29
cSH	1065	1700	1700	983	1700	1700	375	215
Volume to Capacity	0.03	0.21	0.13	0.06	0.17	0.13	0.22	0.50
Queue Length 95th (m)	0.6	0.0	0.0	1.3	0.0	0.0	6.1	19.4
Control Delay (s)	8.5	0.0	0.0	8.9	0.0	0.0	17.2	37.6
Lane LOS	A			A			C	E
Approach Delay (s)	0.4			0.9			17.2	37.6
Approach LOS							C	E

Intersection Summary

Average Delay	4.5
Intersection Capacity Utilization	40.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2026 Future Background - AM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	59	76	18
Future Volume (Veh/h)	15	2	1	59	76	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	66	84	20
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	162	94	104			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	162	94	104			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	828	963	1488			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	67	104			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	841	1488	1700			
Volume to Capacity	0.02	0.00	0.06			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	9.4	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.4	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			15.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	590	1	8	459	64	0	1	1	48	3	38
Future Volume (Veh/h)	35	590	1	8	459	64	0	1	1	48	3	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	621	1	8	483	67	0	1	1	51	3	40
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	483			626			958	1198	315	885	1199	242
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	483			626			958	1198	315	885	1199	242
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	96			99			100	99	100	77	98	94
cM capacity (veh/h)	1015			766			192	178	684	224	178	716
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	37	414	208	8	242	242	67	2	94			
Volume Left	37	0	0	8	0	0	0	0	51			
Volume Right	0	0	1	0	0	0	67	1	40			
cSH	1015	1700	1700	766	1700	1700	1700	282	386			
Volume to Capacity	0.04	0.24	0.12	0.01	0.14	0.14	0.04	0.01	0.24			
Queue Length 95th (m)	0.9	0.0	0.0	0.2	0.0	0.0	0.0	0.2	7.2			
Control Delay (s)	8.7	0.0	0.0	9.8	0.0	0.0	0.0	17.9	19.5			
Lane LOS	A			A				C	C			
Approach Delay (s)	0.5			0.1				17.9	19.5			
Approach LOS								C	C			
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			39.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Background - AM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	
Traffic Volume (veh/h)	655	1	3	547	0	14
Future Volume (Veh/h)	655	1	3	547	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	704	1	3	588	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			705	1004	352	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			705	1004	352	
tC, single (s)			4.1	6.8	7.1	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.4	
p0 queue free %			100	100	98	
cM capacity (veh/h)			902	241	624	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	469	236	199	392	15	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	15	
cSH	1700	1700	902	1700	624	
Volume to Capacity	0.28	0.14	0.00	0.23	0.02	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.6	
Control Delay (s)	0.0	0.0	0.2	0.0	10.9	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1	10.9		
Approach LOS					B	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			28.1%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - AM

9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	522	160	235	367	9	167	22	90	9	31	18
Future Volume (vph)	33	522	160	235	367	9	167	22	90	9	31	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3150	0	1807	3455	0	1387	1475	1617	1825	1779	1633
Flt Permitted	0.514			0.309			0.736	0.754		0.687		
Satd. Flow (perm)	987	3150	0	588	3455	0	1075	1155	1617	1320	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				97			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	35	561	172	253	395	10	180	24	97	10	33	19
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	35	733	0	253	405	0	101	103	97	10	33	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - AM
9/7/2017

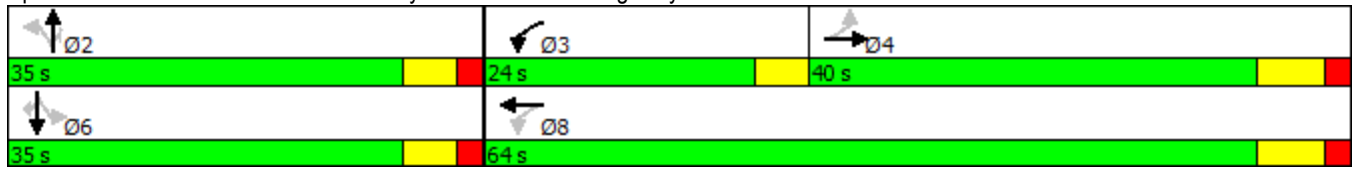


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	43.7	43.7		60.2	57.2		14.7	14.7	14.7	14.7	14.7	14.7
Actuated g/C Ratio	0.51	0.51		0.71	0.67		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.07	0.45		0.46	0.17		0.54	0.52	0.27	0.04	0.11	0.05
Control Delay	13.2	14.2		7.7	5.8		43.0	41.1	8.5	28.4	29.4	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	14.2		7.7	5.8		43.0	41.1	8.5	28.4	29.4	0.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		14.2			6.5			31.2			20.3	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	2.6	33.1		11.3	10.6		15.8	16.1	0.0	1.4	4.6	0.0
Queue Length 95th (m)	9.1	62.0		26.0	20.9		31.5	31.5	11.5	5.4	11.8	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	508	1643		704	2327		368	395	617	452	609	617
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	0.45		0.36	0.17		0.27	0.26	0.16	0.02	0.05	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	84.9
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	14.4
Intersection Capacity Utilization	58.6%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	B

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	391	60	176	630	214	333
Future Volume (vph)	391	60	176	630	214	333
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.453		0.950	
Satd. Flow (perm)	3205	0	730	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					358
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	420	65	189	677	230	358
Shared Lane Traffic (%)						
Lane Group Flow (vph)	485	0	189	677	230	358
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.1		55.5	50.0	13.9	13.9
Actuated g/C Ratio	0.51		0.71	0.64	0.18	0.18
v/c Ratio	0.29		0.32	0.31	0.78	0.78
Control Delay	11.4		5.6	7.1	50.9	17.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.4		5.6	7.1	50.9	17.5
LOS	B		A	A	D	B
Approach Delay	11.4			6.7	30.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	19.7		8.2	22.1	33.1	0.0
Queue Length 95th (m)	30.9		14.7	30.4	#64.3	#40.3
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1651		618	2195	318	465
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.29		0.31	0.31	0.72	0.77

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 78.5

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 15.1

Intersection LOS: B

Intersection Capacity Utilization 66.3%

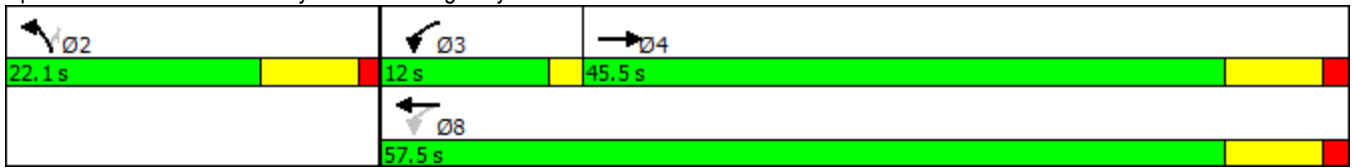
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

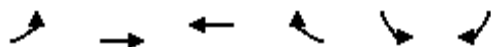


HCM Unsignalized Intersection Capacity Analysis

2: Highway 89 & Concession Road 6

2026 Future Background - PM

9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	44	678	780	42	17	23
Future Volume (Veh/h)	44	678	780	42	17	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	47	729	839	45	18	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.95	
vC, conflicting volume	884				1320	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884				1228	442
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	94				88	96
cM capacity (veh/h)	774				144	569
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	290	486	559	325	43	
Volume Left	47	0	0	0	18	
Volume Right	0	0	0	45	25	
cSH	774	1700	1700	1700	255	
Volume to Capacity	0.06	0.29	0.33	0.19	0.17	
Queue Length 95th (m)	1.5	0.0	0.0	0.0	4.5	
Control Delay (s)	2.2	0.0	0.0	0.0	22.0	
Lane LOS	A				C	
Approach Delay (s)	0.8		0.0		22.0	
Approach LOS					C	
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			56.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2026 Future Background - PM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	72	4	4	114	104	79
Future Volume (Veh/h)	72	4	4	114	104	79
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	80	4	4	127	116	88
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	295	160	204			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295	160	204			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	100	100			
cM capacity (veh/h)	694	885	1368			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	84	131	204			
Volume Left	80	4	0			
Volume Right	4	0	88			
cSH	701	1368	1700			
Volume to Capacity	0.12	0.00	0.12			
Queue Length 95th (m)	3.1	0.1	0.0			
Control Delay (s)	10.8	0.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.8	0.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization		21.2%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR												
Lane Configurations																								
Traffic Volume (veh/h)	26	649	40	135	751	56	60	13	112	42	8	33												
Future Volume (Veh/h)	26	649	40	135	751	56	60	13	112	42	8	33												
Sign Control		Free			Free			Stop			Stop													
Grade		0%			0%			0%			0%													
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95												
Hourly flow rate (vph)	27	683	42	142	791	59	63	14	118	44	8	35												
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	850			725			1476			1892			362			1625			1884			425		
vC1, stage 1 conf vol																								
vC2, stage 2 conf vol																								
vCu, unblocked vol	850			725			1476			1892			362			1625			1884			425		
tC, single (s)	4.1			4.1			7.7			6.5			6.9			7.5			6.5			6.9		
tC, 2 stage (s)																								
tF (s)	2.2			2.2			3.6			4.0			3.3			3.5			4.0			3.3		
p0 queue free %	97			84			0			76			82			0			86			94		
cM capacity (veh/h)	797			887			59			57			640			40			58			583		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1																
Volume Total	27	455	270	142	527	323	195	87																
Volume Left	27	0	0	142	0	0	63	44																
Volume Right	0	0	42	0	0	59	118	35																
cSH	797	1700	1700	887	1700	1700	131	66																
Volume to Capacity	0.03	0.27	0.16	0.16	0.31	0.19	1.49	1.31																
Queue Length 95th (m)	0.8	0.0	0.0	4.3	0.0	0.0	102.3	54.3																
Control Delay (s)	9.7	0.0	0.0	9.8	0.0	0.0	318.3	321.3																
Lane LOS	A			A			F			F														
Approach Delay (s)	0.3			1.4			318.3			321.3														
Approach LOS							F			F														
Intersection Summary																								
Average Delay	45.3																							
Intersection Capacity Utilization	48.7%			ICU Level of Service					A															
Analysis Period (min)	15																							

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Background - PM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	765	8	16	847	104	0	0	9	87	1	53
Future Volume (Veh/h)	62	765	8	16	847	104	0	0	9	87	1	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	65	805	8	17	892	109	0	0	9	92	1	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	892			813			1420	1865	406	1468	1869	446
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	892			813			1420	1865	406	1468	1869	446
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			98			100	100	98	0	98	90
cM capacity (veh/h)	725			823			80	66	600	81	65	565

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	65	537	276	17	446	446	109	9	149
Volume Left	65	0	0	17	0	0	0	0	92
Volume Right	0	0	8	0	0	0	109	9	56
cSH	725	1700	1700	823	1700	1700	1700	600	130
Volume to Capacity	0.09	0.32	0.16	0.02	0.26	0.26	0.06	0.02	1.15
Queue Length 95th (m)	2.2	0.0	0.0	0.5	0.0	0.0	0.0	0.3	66.6
Control Delay (s)	10.5	0.0	0.0	9.5	0.0	0.0	0.0	11.1	152.8
Lane LOS	B			A				B	F
Approach Delay (s)	0.8			0.2				11.1	152.8
Approach LOS								B	F

Intersection Summary

Average Delay	11.5
Intersection Capacity Utilization	48.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Background - PM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	
Traffic Volume (veh/h)	835	4	5	1012	0	13
Future Volume (Veh/h)	835	4	5	1012	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	861	4	5	1043	0	13
Pedestrians					3	
Lane Width (m)					3.7	
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			868		1398	436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			868		1398	436
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			782		133	496
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	574	291	353	695	13	
Volume Left	0	0	5	0	0	
Volume Right	0	4	0	0	13	
cSH	1700	1700	782	1700	496	
Volume to Capacity	0.34	0.17	0.01	0.41	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.6	
Control Delay (s)	0.0	0.0	0.2	0.0	12.4	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		12.4	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			41.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	577	272	239	603	26	369	39	175	23	47	70
Future Volume (vph)	47	577	272	239	603	26	369	39	175	23	47	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.952			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3221	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Flt Permitted	0.403			0.221			0.725	0.734		0.505		
Satd. Flow (perm)	774	3221	0	424	3557	0	1168	1203	1588	911	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			7				182			88
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		31.1			44.5			28.0			5.1	
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	49	601	283	249	628	27	384	41	182	24	49	73
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	49	884	0	249	655	0	211	214	182	24	49	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - PM

9/7/2017

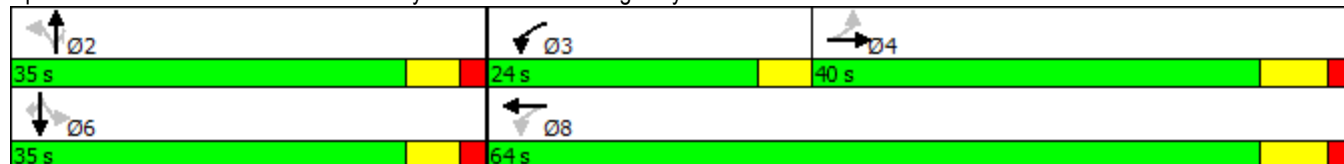


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	42.3	42.3		60.3	57.3		22.4	22.4	22.4	22.4	22.4	22.4
Actuated g/C Ratio	0.46	0.46		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.14	0.58		0.56	0.30		0.75	0.74	0.35	0.11	0.11	0.16
Control Delay	19.9	20.4		12.8	9.4		49.3	48.0	6.2	27.5	26.8	5.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	20.4		12.8	9.4		49.3	48.0	6.2	27.5	26.8	5.3
LOS	B	C		B	A		D	D	A	C	C	A
Approach Delay		20.4			10.3			35.9			16.2	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	4.9	53.4		16.8	26.8		36.6	37.0	0.0	3.3	6.8	0.0
Queue Length 95th (m)	14.9	91.7		31.8	42.1		62.7	62.7	14.7	9.6	15.2	7.6
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	352	1514		579	2200		367	378	623	286	603	556
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	0.14	0.58		0.43	0.30		0.57	0.57	0.29	0.08	0.08	0.13

Intersection Summary	
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	20.3
Intersection Capacity Utilization	78.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	507	76	189	565	141	204
Future Volume (vph)	507	76	189	565	141	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3466	0	1668	3544	1713	949
Flt Permitted			0.402		0.950	
Satd. Flow (perm)	3466	0	706	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					210
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	523	78	195	582	145	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	195	582	145	210
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.4		55.5	50.0	12.1	12.1
Actuated g/C Ratio	0.53		0.72	0.65	0.16	0.16
v/c Ratio	0.33		0.32	0.25	0.54	0.64
Control Delay	11.0		5.1	6.1	37.6	14.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.0		5.1	6.1	37.6	14.6
LOS	B		A	A	D	B
Approach Delay	11.0			5.8	24.0	
Approach LOS	B			A	C	
Queue Length 50th (m)	22.6		6.9	15.7	19.6	0.0
Queue Length 95th (m)	38.5		14.8	25.5	36.2	19.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1839		636	2311	335	354
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.31	0.25	0.43	0.59

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	76.7
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	11.4
Intersection Capacity Utilization:	63.5%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Background - SAT
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	13	677	635	34	28	12
Future Volume (Veh/h)	13	677	635	34	28	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	736	690	37	30	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	727				1104	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	727				949	364
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				87	98
cM capacity (veh/h)	886				238	639
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	259	491	460	267	43	
Volume Left	14	0	0	0	30	
Volume Right	0	0	0	37	13	
cSH	886	1700	1700	1700	294	
Volume to Capacity	0.02	0.29	0.27	0.16	0.15	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	3.8	
Control Delay (s)	0.7	0.0	0.0	0.0	19.3	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		19.3	
Approach LOS					C	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			38.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2026 Future Background - SAT
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	124	117	187
Future Volume (Veh/h)	161	8	13	124	117	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	138	130	208
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	400	234	338			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	400	234	338			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	99	99			
cM capacity (veh/h)	599	805	1221			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	152	338			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	606	1221	1700			
Volume to Capacity	0.31	0.01	0.20			
Queue Length 95th (m)	10.0	0.3	0.0			
Control Delay (s)	13.6	0.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.6	0.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			33.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - SAT
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	613	72	204	653	145	86	12	189	115	29	40
Future Volume (Veh/h)	38	613	72	204	653	145	86	12	189	115	29	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	40	645	76	215	687	153	91	13	199	121	31	42
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	840			721			1594	2033	360	1802	1994	420
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	840			721			1594	2033	360	1802	1994	420
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			75			0	69	69	0	29	93
cM capacity (veh/h)	804			877			23	41	642	21	44	588

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	40	430	291	215	458	382	303	194
Volume Left	40	0	0	215	0	0	91	121
Volume Right	0	0	76	0	0	153	199	42
cSH	804	1700	1700	877	1700	1700	67	30
Volume to Capacity	0.05	0.25	0.17	0.25	0.27	0.22	4.50	6.56
Queue Length 95th (m)	1.2	0.0	0.0	7.3	0.0	0.0	Err	Err
Control Delay (s)	9.7	0.0	0.0	10.4	0.0	0.0	Err	Err
Lane LOS	A			B			F	F
Approach Delay (s)	0.5			2.1			Err	Err
Approach LOS							F	F

Intersection Summary

Average Delay		2149.6						
Intersection Capacity Utilization		60.5%		ICU Level of Service			B	
Analysis Period (min)		15						

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Background - SAT
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	905	5	23	965	138	1	5	9	134	4	56
Future Volume (Veh/h)	63	905	5	23	965	138	1	5	9	134	4	56
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	66	953	5	24	1016	145	1	5	9	141	4	59
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1016			959			1646	2152	480	1684	2155	508
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1016			959			1646	2152	480	1684	2155	508
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			97			98	88	98	0	91	88
cM capacity (veh/h)	678			725			49	42	537	49	42	502

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	66	635	323	24	508	508	145	15	204
Volume Left	66	0	0	24	0	0	0	1	141
Volume Right	0	0	5	0	0	0	145	9	59
cSH	678	1700	1700	725	1700	1700	1700	97	67
Volume to Capacity	0.10	0.37	0.19	0.03	0.30	0.30	0.09	0.15	3.06
Queue Length 95th (m)	2.4	0.0	0.0	0.8	0.0	0.0	0.0	4.0	Err
Control Delay (s)	10.9	0.0	0.0	10.1	0.0	0.0	0.0	48.9	Err
Lane LOS	B			B				E	F
Approach Delay (s)	0.7			0.2				48.9	Err
Approach LOS								E	F

Intersection Summary

Average Delay	840.8
Intersection Capacity Utilization	54.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Background - SAT
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↔	
Traffic Volume (veh/h)	1070	3	5	1122	0	8
Future Volume (Veh/h)	1070	3	5	1122	0	8
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)	1138	3	5	1194	0	9
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			1141		1746	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1141		1746	570
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	98
cM capacity (veh/h)			620		78	428
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	759	382	403	796	9	
Volume Left	0	0	5	0	0	
Volume Right	0	3	0	0	9	
cSH	1700	1700	620	1700	428	
Volume to Capacity	0.45	0.22	0.01	0.47	0.02	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.5	
Control Delay (s)	0.0	0.0	0.2	0.0	13.6	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		13.6	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			44.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	791	161	389	802	30	222	48	224	44	106	86
Future Volume (vph)	125	791	161	389	802	30	222	48	224	44	106	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.975			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3510	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.318			0.140			0.684	0.735		0.628		
Satd. Flow (perm)	604	3510	0	269	3594	0	1208	1313	1593	1168	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			6				241			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	134	851	173	418	862	32	239	52	241	47	114	92
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	134	1024	0	418	894	0	141	150	241	47	114	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	34.9	34.9		60.3	57.2		17.2	17.2	17.2	17.2	17.2	17.2
Actuated g/C Ratio	0.40	0.40		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.56	0.72		0.82	0.38		0.59	0.58	0.48	0.21	0.30	0.24
Control Delay	34.7	26.9		31.4	8.2		42.3	40.9	7.2	30.6	31.3	7.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	26.9		31.4	8.2		42.3	40.9	7.2	30.6	31.3	7.8
LOS	C	C		C	A		D	D	A	C	C	A
Approach Delay		27.8			15.6			26.0			22.6	
Approach LOS		C			B			C			C	
Queue Length 50th (m)	17.5	75.1		40.5	31.6		22.7	24.1	0.0	6.6	16.4	0.0
Queue Length 95th (m)	#47.9	116.2		#102.4	57.4		41.3	43.0	16.9	15.4	30.0	10.9
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	240	1417		542	2353		402	437	691	388	639	596
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	0.56	0.72		0.77	0.38		0.35	0.34	0.35	0.12	0.18	0.15

Intersection Summary

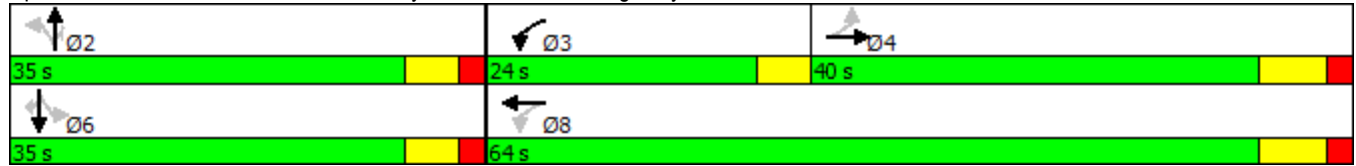
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.5
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	22.2
Intersection Capacity Utilization	78.3%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Background - AM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	365	183	310	339	70	160
Future Volume (vph)	365	183	310	339	70	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.401		0.950	
Satd. Flow (perm)	2972	0	684	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	150					176
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	401	201	341	373	77	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	602	0	341	373	77	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

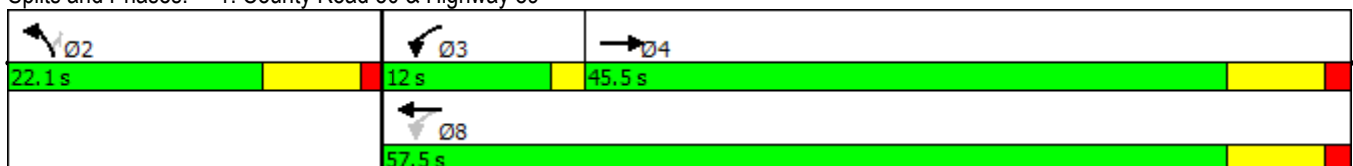
Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.0		55.5	50.0	10.8	10.8
Actuated g/C Ratio	0.52		0.74	0.66	0.14	0.14
v/c Ratio	0.37		0.55	0.18	0.36	0.50
Control Delay	9.1		7.2	5.3	34.5	10.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	9.1		7.2	5.3	34.5	10.4
LOS	A		A	A	C	B
Approach Delay	9.1			6.2	17.7	
Approach LOS	A			A	B	
Queue Length 50th (m)	17.8		11.9	8.7	10.1	0.0
Queue Length 95th (m)	31.4		24.5	15.5	21.9	15.6
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1608		627	2050	292	424
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.37		0.54	0.18	0.26	0.42

Intersection Summary	
Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	9.1
Intersection LOS:	A
Intersection Capacity Utilization:	70.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Background - AM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↕	↔↕		↔↕	
Traffic Volume (veh/h)	14	490	599	15	27	64
Future Volume (Veh/h)	14	490	599	15	27	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	16	544	666	17	30	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	683				978	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	683				978	342
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				88	89
cM capacity (veh/h)	848				246	660
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	197	363	444	239	101	
Volume Left	16	0	0	0	30	
Volume Right	0	0	0	17	71	
cSH	848	1700	1700	1700	440	
Volume to Capacity	0.02	0.21	0.26	0.14	0.23	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	6.6	
Control Delay (s)	0.9	0.0	0.0	0.0	15.6	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		15.6	
Approach LOS					C	
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			35.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2031 Future Background - AM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	68	88	18
Future Volume (Veh/h)	15	2	1	68	88	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	76	98	20
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	186	108	118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186	108	118			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	803	946	1470			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	77	118			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	816	1470	1700			
Volume to Capacity	0.02	0.00	0.07			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	9.5	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.5	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			15.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	579	40	57	465	80	13	10	60	74	9	31
Future Volume (Veh/h)	31	579	40	57	465	80	13	10	60	74	9	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	629	43	62	505	87	14	11	65	80	10	34
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	592			672			1134	1434	336	1126	1412	296
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	592			672			1134	1434	336	1126	1412	296
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	97			93			89	91	90	36	92	95
cM capacity (veh/h)	994			908			132	122	666	126	125	677
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	34	419	253	62	337	255	90	124				
Volume Left	34	0	0	62	0	0	14	80				
Volume Right	0	0	43	0	0	87	65	34				
cSH	994	1700	1700	908	1700	1700	306	162				
Volume to Capacity	0.03	0.25	0.15	0.07	0.20	0.15	0.29	0.77				
Queue Length 95th (m)	0.8	0.0	0.0	1.7	0.0	0.0	9.1	36.8				
Control Delay (s)	8.8	0.0	0.0	9.3	0.0	0.0	21.6	76.6				
Lane LOS	A			A			C	F				
Approach Delay (s)	0.4			0.9			21.6	76.6				
Approach LOS							C	F				
Intersection Summary												
Average Delay			7.8									
Intersection Capacity Utilization			43.7%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	683	1	9	531	74	0	1	1	56	3	44
Future Volume (Veh/h)	41	683	1	9	531	74	0	1	1	56	3	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	43	719	1	9	559	78	0	1	1	59	3	46
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	559			724			1108	1386	364	1024	1387	280
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	559			724			1108	1386	364	1024	1387	280
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	95			99			100	99	100	66	98	93
cM capacity (veh/h)	948			694			145	136	636	175	135	675

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	43	479	241	9	280	280	78	2	108
Volume Left	43	0	0	9	0	0	0	0	59
Volume Right	0	0	1	0	0	0	78	1	46
cSH	948	1700	1700	694	1700	1700	1700	223	302
Volume to Capacity	0.05	0.28	0.14	0.01	0.16	0.16	0.05	0.01	0.36
Queue Length 95th (m)	1.1	0.0	0.0	0.3	0.0	0.0	0.0	0.2	11.9
Control Delay (s)	9.0	0.0	0.0	10.3	0.0	0.0	0.0	21.3	25.7
Lane LOS	A			B				C	D
Approach Delay (s)	0.5			0.1				21.3	25.7
Approach LOS								C	D

Intersection Summary

Average Delay	2.2
Intersection Capacity Utilization	42.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Background - AM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	
Traffic Volume (veh/h)	758	1	3	633	0	16
Future Volume (Veh/h)	758	1	3	633	0	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	815	1	3	681	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			816	1162	408	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			816	1162	408	
tC, single (s)			4.1	6.8	7.1	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.4	
p0 queue free %			100	100	97	
cM capacity (veh/h)			820	190	573	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	543	273	230	454	17	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	17	
cSH	1700	1700	820	1700	573	
Volume to Capacity	0.32	0.16	0.00	0.27	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.7	
Control Delay (s)	0.0	0.0	0.2	0.0	11.5	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		11.5	
Approach LOS			B			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			31.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	604	185	272	424	10	193	26	104	10	36	21
Future Volume (vph)	38	604	185	272	424	10	193	26	104	10	36	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3150	0	1807	3455	0	1387	1475	1617	1825	1779	1633
Flt Permitted	0.484			0.250			0.732	0.750		0.676		
Satd. Flow (perm)	930	3150	0	476	3455	0	1069	1149	1617	1299	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				112			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	41	649	199	292	456	11	208	28	112	11	39	23
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	41	848	0	292	467	0	116	120	112	11	39	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - AM
9/7/2017

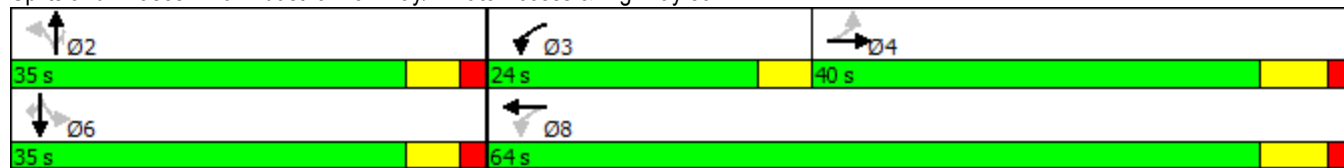


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	42.1	42.1		60.2	57.2		15.9	15.9	15.9	15.9	15.9	15.9
Actuated g/C Ratio	0.49	0.49		0.70	0.66		0.18	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.09	0.54		0.58	0.20		0.59	0.57	0.29	0.05	0.12	0.06
Control Delay	16.2	17.9		10.3	6.4		44.5	42.4	7.9	27.9	29.1	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	17.9		10.3	6.4		44.5	42.4	7.9	27.9	29.1	0.3
LOS	B	B		B	A		D	D	A	C	C	A
Approach Delay		17.8			7.9			32.0			19.8	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	3.3	43.3		14.3	13.3		18.5	19.0	0.0	1.5	5.4	0.0
Queue Length 95th (m)	12.0	86.8		32.3	25.8		35.6	36.1	12.3	5.7	13.3	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	454	1562		643	2295		361	388	620	439	601	610
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	0.09	0.54		0.45	0.20		0.32	0.31	0.18	0.03	0.06	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	86.1
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.59
Intersection Signal Delay:	16.6
Intersection Capacity Utilization	64.5%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	452	70	204	727	248	386
Future Volume (vph)	452	70	204	727	248	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.418		0.950	
Satd. Flow (perm)	3205	0	674	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					415
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	486	75	219	782	267	415
Shared Lane Traffic (%)						
Lane Group Flow (vph)	561	0	219	782	267	415
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	14.6	14.6
Actuated g/C Ratio	0.50		0.70	0.63	0.18	0.18
v/c Ratio	0.35		0.39	0.36	0.87	0.82
Control Delay	12.3		6.4	7.6	61.0	18.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.3		6.4	7.6	61.0	18.5
LOS	B		A	A	E	B
Approach Delay	12.3			7.3	35.1	
Approach LOS	B			A	D	
Queue Length 50th (m)	24.2		9.8	26.5	39.4	0.0
Queue Length 95th (m)	36.3		17.1	36.0	#78.6	#46.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1620		580	2175	315	510
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.35		0.38	0.36	0.85	0.81

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 79.2

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 17.0

Intersection LOS: B

Intersection Capacity Utilization 69.7%

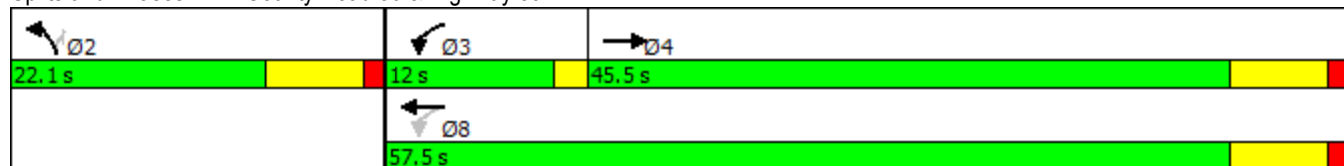
ICU Level of Service C

Analysis Period (min) 15

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

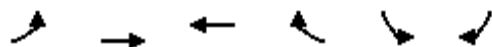
Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Background - PM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	51	784	901	48	20	27
Future Volume (Veh/h)	51	784	901	48	20	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	55	843	969	52	22	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.93	
vC, conflicting volume	1021				1526	510
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1021				1411	510
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	92				79	94
cM capacity (veh/h)	688				104	513
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	336	562	646	375	51	
Volume Left	55	0	0	0	22	
Volume Right	0	0	0	52	29	
cSH	688	1700	1700	1700	191	
Volume to Capacity	0.08	0.33	0.38	0.22	0.27	
Queue Length 95th (m)	2.0	0.0	0.0	0.0	7.9	
Control Delay (s)	2.6	0.0	0.0	0.0	30.6	
Lane LOS	A				D	
Approach Delay (s)	1.0		0.0		30.6	
Approach LOS					D	
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			62.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Background - PM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	80	4	4	114	104	72
Future Volume (Veh/h)	80	4	4	114	104	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	89	4	4	127	116	80
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	291	156	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	291	156	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	698	890	1377			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	93	131	196			
Volume Left	89	4	0			
Volume Right	4	0	80			
cSH	704	1377	1700			
Volume to Capacity	0.13	0.00	0.12			
Queue Length 95th (m)	3.4	0.1	0.0			
Control Delay (s)	10.9	0.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.9	0.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			21.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	754	43	147	872	65	65	15	124	49	9	38
Future Volume (Veh/h)	30	754	43	147	872	65	65	15	124	49	9	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	794	45	155	918	68	68	16	131	52	9	40
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	986			839			1694	2176	420	1862	2165	493
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	986			839			1694	2176	420	1862	2165	493
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			81			0	56	78	0	76	92
cM capacity (veh/h)	709			804			35	36	588	20	37	527

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	32	529	310	155	612	374	215	101
Volume Left	32	0	0	155	0	0	68	52
Volume Right	0	0	45	0	0	68	131	40
cSH	709	1700	1700	804	1700	1700	82	34
Volume to Capacity	0.05	0.31	0.18	0.19	0.36	0.22	2.62	2.98
Queue Length 95th (m)	1.1	0.0	0.0	5.4	0.0	0.0	156.0	88.4
Control Delay (s)	10.3	0.0	0.0	10.5	0.0	0.0	840.8	1138.4
Lane LOS	B			B			F	F
Approach Delay (s)	0.4			1.4			840.8	1138.4
Approach LOS							F	F

Intersection Summary

Average Delay	127.9
Intersection Capacity Utilization	53.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Background - PM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	882	9	19	975	121	0	0	10	101	1	61
Future Volume (Veh/h)	72	882	9	19	975	121	0	0	10	101	1	61
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	76	928	9	20	1026	127	0	0	11	106	1	64
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1026			937			1638	2150	468	1693	2155	513
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1026			937			1638	2150	468	1693	2155	513
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			97			100	100	98	0	98	87
cM capacity (veh/h)	643			739			52	42	547	53	42	512
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	76	619	318	20	513	513	127	11	171			
Volume Left	76	0	0	20	0	0	0	0	106			
Volume Right	0	0	9	0	0	0	127	11	64			
cSH	643	1700	1700	739	1700	1700	1700	547	82			
Volume to Capacity	0.12	0.36	0.19	0.03	0.30	0.30	0.07	0.02	2.08			
Queue Length 95th (m)	3.0	0.0	0.0	0.6	0.0	0.0	0.0	0.5	116.2			
Control Delay (s)	11.3	0.0	0.0	10.0	0.0	0.0	0.0	11.7	608.4			
Lane LOS	B			B				B	F			
Approach Delay (s)	0.9			0.2				11.7	608.4			
Approach LOS								B	F			
Intersection Summary												
Average Delay			44.4									
Intersection Capacity Utilization			53.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Background - PM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	963	5	6	1166	0	15
Future Volume (Veh/h)	963	5	6	1166	0	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	993	5	6	1202	0	15
Pedestrians					3	
Lane Width (m)					3.7	
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			1001		1612	502
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1001		1612	502
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			698		96	446
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	662	336	407	801	15	
Volume Left	0	0	6	0	0	
Volume Right	0	5	0	0	15	
cSH	1700	1700	698	1700	446	
Volume to Capacity	0.39	0.20	0.01	0.47	0.03	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.8	
Control Delay (s)	0.0	0.0	0.3	0.0	13.4	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		13.4	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			46.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	664	315	277	692	30	428	45	203	27	54	81
Future Volume (vph)	54	664	315	277	692	30	428	45	203	27	54	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.952			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3220	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Flt Permitted	0.366			0.147			0.720	0.728		0.456		
Satd. Flow (perm)	703	3220	0	282	3557	0	1160	1193	1588	823	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		86			7				211			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	56	692	328	289	721	31	446	47	211	28	56	84
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	56	1020	0	289	752	0	245	248	211	28	56	84
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	39.3	39.3		60.2	57.2		24.9	24.9	24.9	24.9	24.9	24.9
Actuated g/C Ratio	0.41	0.41		0.63	0.60		0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.19	0.74		0.72	0.35		0.81	0.79	0.37	0.13	0.11	0.18
Control Delay	24.2	27.7		23.2	10.7		53.9	52.0	5.8	27.7	26.5	6.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	27.7		23.2	10.7		53.9	52.0	5.8	27.7	26.5	6.5
LOS	C	C		C	B		D	D	A	C	C	A
Approach Delay		27.5			14.1			38.8				16.7
Approach LOS		C			B			D				B
Queue Length 50th (m)	7.0	81.4		24.5	37.4		44.2	44.5	0.0	3.9	7.8	0.0
Queue Length 95th (m)	17.8	#128.6		51.3	49.3		#80.3	#80.0	15.8	10.7	16.8	9.9
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	290	1379		504	2141		354	364	632	251	587	543
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	0.74		0.57	0.35		0.69	0.68	0.33	0.11	0.10	0.15

Intersection Summary

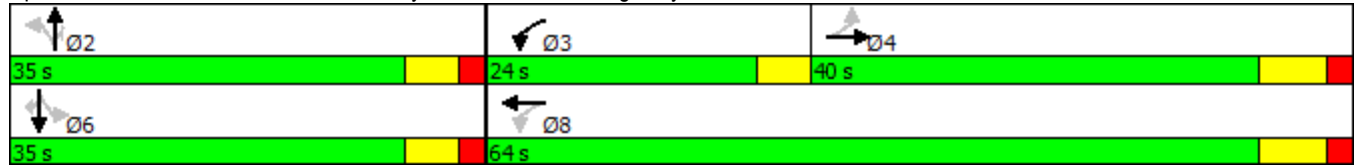
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	95.1
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	24.9
Intersection Capacity Utilization	79.7%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Background - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	583	88	219	648	163	236
Future Volume (vph)	583	88	219	648	163	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3462	0	1668	3544	1713	949
Flt Permitted			0.352		0.950	
Satd. Flow (perm)	3462	0	618	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					243
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	601	91	226	668	168	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	692	0	226	668	168	243
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.0		55.5	50.0	12.7	12.7
Actuated g/C Ratio	0.52		0.72	0.65	0.16	0.16
v/c Ratio	0.38		0.41	0.29	0.60	0.68
Control Delay	12.0		6.2	6.6	39.5	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.0		6.2	6.6	39.5	14.8
LOS	B		A	A	D	B
Approach Delay	12.0			6.5	24.9	
Approach LOS	B			A	C	
Queue Length 50th (m)	28.6		8.8	19.5	23.1	0.0
Queue Length 95th (m)	45.3		17.1	29.7	41.4	21.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1806		579	2294	332	380
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.38		0.39	0.29	0.51	0.64

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	77.3
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	12.2
Intersection LOS:	B
Intersection Capacity Utilization:	65.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Background - SAT
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	14	745	697	37	31	13
Future Volume (Veh/h)	14	745	697	37	31	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	810	758	40	34	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	798				1213	399
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	798				1023	399
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				84	98
cM capacity (veh/h)	833				209	606
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	285	540	505	293	48	
Volume Left	15	0	0	0	34	
Volume Right	0	0	0	40	14	
cSH	833	1700	1700	1700	258	
Volume to Capacity	0.02	0.32	0.30	0.17	0.19	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	5.1	
Control Delay (s)	0.7	0.0	0.0	0.0	22.1	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		22.1	
Approach LOS					C	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			40.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Background - SAT
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	145	136	187
Future Volume (Veh/h)	161	8	13	145	136	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	161	151	208
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	444	255	359			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	444	255	359			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	68	99	99			
cM capacity (veh/h)	565	784	1200			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	175	359			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	572	1200	1700			
Volume to Capacity	0.33	0.01	0.21			
Queue Length 95th (m)	10.8	0.3	0.0			
Control Delay (s)	14.3	0.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.3	0.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			34.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - SAT
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	714	75	215	761	168	89	14	205	133	34	46
Future Volume (Veh/h)	44	714	75	215	761	168	89	14	205	133	34	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	46	752	79	226	801	177	94	15	216	140	36	48
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	978			831			1802	2314	416	2033	2264	489
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	978			831			1802	2314	416	2033	2264	489
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			72			0	42	63	0	0	91
cM capacity (veh/h)	714			797			0	26	592	9	28	530
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	46	501	330	226	534	444	325	224				
Volume Left	46	0	0	226	0	0	94	140				
Volume Right	0	0	79	0	0	177	216	48				
cSH	714	1700	1700	797	1700	1700	0	13				
Volume to Capacity	0.06	0.29	0.19	0.28	0.31	0.26	Err	17.17				
Queue Length 95th (m)	1.6	0.0	0.0	8.9	0.0	0.0	Err	Err				
Control Delay (s)	10.4	0.0	0.0	11.3	0.0	0.0	Err	Err				
Lane LOS	B			B			F	F				
Approach Delay (s)	0.5			2.1			Err	Err				
Approach LOS							F	F				
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			67.7%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Background - SAT
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	1039	6	27	1101	160	1	6	10	155	5	65
Future Volume (Veh/h)	72	1039	6	27	1101	160	1	6	10	155	5	65
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	76	1094	6	28	1159	168	1	6	11	163	5	68
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1159			1101			1888	2465	551	1928	2468	580
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1159			1101			1888	2465	551	1928	2468	580
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	87			96			96	77	98	0	80	85
cM capacity (veh/h)	599			641			28	26	483	28	26	451

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	76	729	371	28	580	580	168	18	236
Volume Left	76	0	0	28	0	0	0	1	163
Volume Right	0	0	6	0	0	0	168	11	68
cSH	599	1700	1700	641	1700	1700	1700	62	38
Volume to Capacity	0.13	0.43	0.22	0.04	0.34	0.34	0.10	0.29	6.19
Queue Length 95th (m)	3.3	0.0	0.0	1.0	0.0	0.0	0.0	7.9	Err
Control Delay (s)	11.9	0.0	0.0	10.9	0.0	0.0	0.0	86.1	Err
Lane LOS	B			B				F	F
Approach Delay (s)	0.8			0.2				86.1	Err
Approach LOS								F	F

Intersection Summary

Average Delay		848.3							
Intersection Capacity Utilization		59.9%		ICU Level of Service				B	
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Background - SAT
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	
Traffic Volume (veh/h)	1230	3	6	1283	0	9
Future Volume (Veh/h)	1230	3	6	1283	0	9
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)	1309	3	6	1365	0	10
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			1312		2005	656
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1312		2005	656
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	97
cM capacity (veh/h)			534		52	374
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	873	439	461	910	10	
Volume Left	0	0	6	0	0	
Volume Right	0	3	0	0	10	
cSH	1700	1700	534	1700	374	
Volume to Capacity	0.51	0.26	0.01	0.54	0.03	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.6	
Control Delay (s)	0.0	0.0	0.3	0.0	14.9	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		14.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			49.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	907	186	451	913	35	257	56	260	51	123	100
Future Volume (vph)	145	907	186	451	913	35	257	56	260	51	123	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.974			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3506	0	1825	3590	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.281			0.108			0.673	0.724		0.578		
Satd. Flow (perm)	534	3506	0	207	3590	0	1188	1293	1593	1076	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			7				280			97
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	156	975	200	485	982	38	276	60	280	55	132	108
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	156	1175	0	485	1020	0	163	173	280	55	132	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		19.1	19.1	19.1	19.1	19.1	19.1
Actuated g/C Ratio	0.37	0.37		0.67	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.79	0.89		0.96	0.44		0.64	0.63	0.50	0.24	0.32	0.26
Control Delay	57.3	37.3		58.2	9.7		43.7	42.0	6.8	30.7	31.0	8.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	37.3		58.2	9.7		43.7	42.0	6.8	30.7	31.0	8.9
LOS	E	D		E	A		D	D	A	C	C	A
Approach Delay		39.6			25.3			26.5			22.9	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	23.3	96.0		64.2	41.0		26.9	28.4	0.0	7.8	19.2	1.5
Queue Length 95th (m)	#65.4	#161.7		#147.3	71.9		47.5	49.2	17.7	17.6	33.8	13.4
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	198	1316		503	2301		387	421	707	350	625	588
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	0.79	0.89		0.96	0.44		0.42	0.41	0.40	0.16	0.21	0.18

Intersection Summary

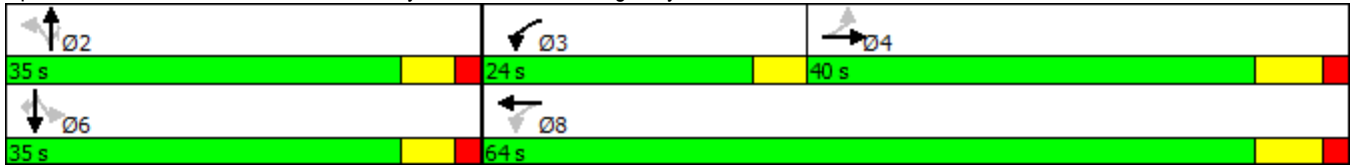
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89.5
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	30.4
Intersection Capacity Utilization	95.6%
Intersection LOS:	C
ICU Level of Service	F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	422	212	359	393	81	185
Future Volume (vph)	422	212	359	393	81	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.348		0.950	
Satd. Flow (perm)	2972	0	593	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	150					203
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	464	233	395	432	89	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	697	0	395	432	89	203
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

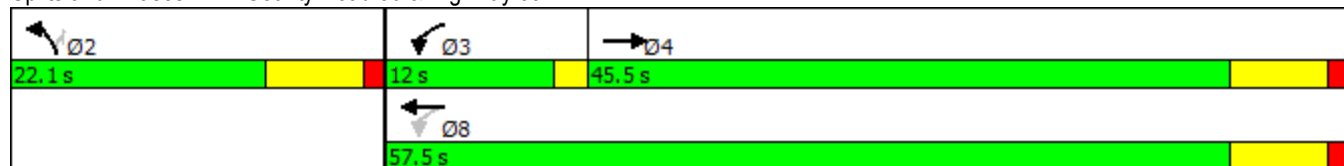


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	38.4		55.5	50.0	11.2	11.2
Actuated g/C Ratio	0.51		0.73	0.66	0.15	0.15
v/c Ratio	0.44		0.70	0.21	0.41	0.53
Control Delay	10.4		11.8	5.6	35.4	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	10.4		11.8	5.6	35.4	10.2
LOS	B		B	A	D	B
Approach Delay	10.4			8.6	17.9	
Approach LOS	B			A	B	
Queue Length 50th (m)	23.0		14.5	10.3	11.7	0.0
Queue Length 95th (m)	39.6		#32.2	18.8	24.6	16.5
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1581		569	2042	291	444
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.44		0.69	0.21	0.31	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	10.8
Intersection LOS:	B
Intersection Capacity Utilization:	72.9%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Background - AM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	16	567	694	17	31	74
Future Volume (Veh/h)	16	567	694	17	31	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	630	771	19	34	82
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	790				1132	395
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790				1132	395
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				83	87
cM capacity (veh/h)	770				195	610
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	228	420	514	276	116	
Volume Left	18	0	0	0	34	
Volume Right	0	0	0	19	82	
cSH	770	1700	1700	1700	376	
Volume to Capacity	0.02	0.25	0.30	0.16	0.31	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	9.8	
Control Delay (s)	1.0	0.0	0.0	0.0	18.8	
Lane LOS	A				C	
Approach Delay (s)	0.4		0.0		18.8	
Approach LOS					C	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2036 Future Background - AM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	79	102	18
Future Volume (Veh/h)	15	2	1	79	102	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	88	113	20
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	213	123	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	213	123	133			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	775	928	1452			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	89	133			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	788	1452	1700			
Volume to Capacity	0.02	0.00	0.08			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	9.7	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			16.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	672	45	64	539	93	14	12	68	86	10	36
Future Volume (Veh/h)	36	672	45	64	539	93	14	12	68	86	10	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	730	49	70	586	101	15	13	74	93	11	39
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	687			779			1310	1660	390	1300	1634	344
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	687			779			1310	1660	390	1300	1634	344
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	96			92			84	85	88	0	88	94
cM capacity (veh/h)	916			827			92	86	615	85	90	630

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	39	487	292	70	391	296	102	143
Volume Left	39	0	0	70	0	0	15	93
Volume Right	0	0	49	0	0	101	74	39
cSH	916	1700	1700	827	1700	1700	235	112
Volume to Capacity	0.04	0.29	0.17	0.08	0.23	0.17	0.43	1.28
Queue Length 95th (m)	1.0	0.0	0.0	2.1	0.0	0.0	15.6	72.2
Control Delay (s)	9.1	0.0	0.0	9.8	0.0	0.0	31.6	248.2
Lane LOS	A			A			D	F
Approach Delay (s)	0.4			0.9			31.6	248.2
Approach LOS							D	F

Intersection Summary

Average Delay	21.8
Intersection Capacity Utilization	47.7%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Background - AM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗		↕			↗	↗
Traffic Volume (veh/h)	48	791	1	10	614	86	0	1	1	65	3	51
Future Volume (Veh/h)	48	791	1	10	614	86	0	1	1	65	3	51
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	51	833	1	11	646	91	0	1	1	68	3	54
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	646			838			1286	1608	421	1188	1608	323
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	646			838			1286	1608	421	1188	1608	323
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	94			98			100	99	100	48	97	91
cM capacity (veh/h)	877			619			103	98	585	131	98	631

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	51	555	279	11	323	323	91	2	125
Volume Left	51	0	0	11	0	0	0	0	68
Volume Right	0	0	1	0	0	0	91	1	54
cSH	877	1700	1700	619	1700	1700	1700	167	227
Volume to Capacity	0.06	0.33	0.16	0.02	0.19	0.19	0.05	0.01	0.55
Queue Length 95th (m)	1.4	0.0	0.0	0.4	0.0	0.0	0.0	0.3	22.6
Control Delay (s)	9.4	0.0	0.0	10.9	0.0	0.0	0.0	26.8	40.4
Lane LOS	A			B				D	E
Approach Delay (s)	0.5			0.2				26.8	40.4
Approach LOS								D	E

Intersection Summary

Average Delay		3.2							
Intersection Capacity Utilization		45.7%		ICU Level of Service				A	
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Background - AM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	877	1	3	732	0	19
Future Volume (Veh/h)	877	1	3	732	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	943	1	3	787	0	20
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	944			1343	472	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	944			1343	472	
tC, single (s)	4.1			6.8	7.1	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.4	
p0 queue free %	100			100	96	
cM capacity (veh/h)	735			145	520	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	629	315	265	525	20	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	20	
cSH	1700	1700	735	1700	520	
Volume to Capacity	0.37	0.19	0.00	0.31	0.04	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.9	
Control Delay (s)	0.0	0.0	0.2	0.0	12.2	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		12.2	
Approach LOS				B		
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	34.3%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	699	214	315	490	12	224	30	121	12	42	24
Future Volume (vph)	44	699	214	315	490	12	224	30	121	12	42	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3151	0	1807	3455	0	1387	1474	1617	1825	1779	1633
Flt Permitted	0.451			0.175			0.728	0.746		0.658		
Satd. Flow (perm)	866	3151	0	333	3455	0	1063	1142	1617	1264	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				130			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	47	752	230	339	527	13	241	32	130	13	45	26
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	47	982	0	339	540	0	135	138	130	13	45	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	38.4	38.4		60.3	57.3		17.6	17.6	17.6	17.6	17.6	17.6
Actuated g/C Ratio	0.44	0.44		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.12	0.70		0.71	0.24		0.64	0.61	0.30	0.05	0.13	0.07
Control Delay	20.5	25.2		19.0	7.4		45.8	43.1	7.2	27.2	28.5	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	25.2		19.0	7.4		45.8	43.1	7.2	27.2	28.5	0.3
LOS	C	C		B	A		D	D	A	C	C	A
Approach Delay		24.9			11.9			32.4				19.6
Approach LOS		C			B			C				B
Queue Length 50th (m)	4.6	65.7		19.3	17.0		22.0	22.3	0.0	1.8	6.3	0.0
Queue Length 95th (m)	14.5	#124.4		57.7	32.7		40.8	40.9	12.9	6.2	14.5	0.0
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	378	1401		565	2251		352	378	622	418	589	600
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	0.12	0.70		0.60	0.24		0.38	0.37	0.21	0.03	0.08	0.04

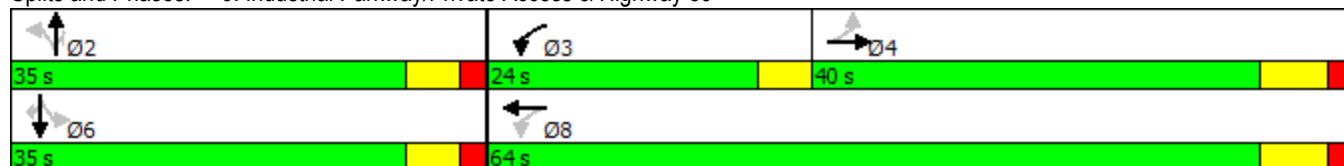
Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.9
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	21.2
Intersection LOS:	C
Intersection Capacity Utilization:	71.4%
ICU Level of Service:	C
Analysis Period (min):	15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	522	81	236	840	287	447
Future Volume (vph)	522	81	236	840	287	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.367		0.950	
Satd. Flow (perm)	3205	0	592	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					378
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	561	87	254	903	309	481
Shared Lane Traffic (%)						
Lane Group Flow (vph)	648	0	254	903	309	481
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.2		55.5	50.0	15.0	15.0
Actuated g/C Ratio	0.49		0.70	0.63	0.19	0.19
v/c Ratio	0.41		0.49	0.42	0.99	1.00
Control Delay	13.3		7.8	8.2	83.1	52.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.3		7.8	8.2	83.1	52.7
LOS	B		A	A	F	D
Approach Delay	13.3			8.1	64.6	
Approach LOS	B			A	E	
Queue Length 50th (m)	29.7		11.6	32.1	47.0	~17.1
Queue Length 95th (m)	42.9		19.8	43.2	#94.6	#81.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1594		530	2163	313	480
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.41		0.48	0.42	0.99	1.00

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 79.6

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 26.6

Intersection LOS: C

Intersection Capacity Utilization 73.6%

ICU Level of Service D

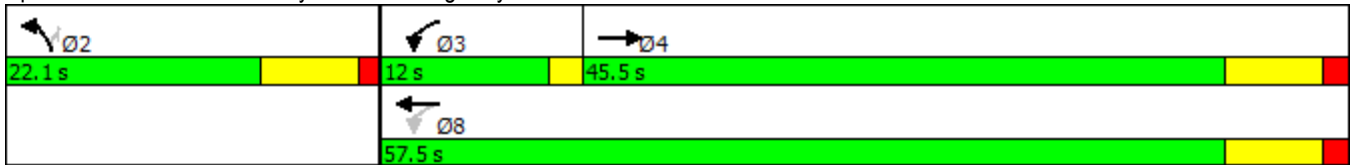
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Background - PM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	59	907	1041	55	23	31
Future Volume (Veh/h)	59	907	1041	55	23	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	63	975	1119	59	25	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	1178				1762	589
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1178				1629	589
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	90				64	93
cM capacity (veh/h)	600				70	457
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	388	650	746	432	58	
Volume Left	63	0	0	0	25	
Volume Right	0	0	0	59	33	
cSH	600	1700	1700	1700	136	
Volume to Capacity	0.10	0.38	0.44	0.25	0.43	
Queue Length 95th (m)	2.7	0.0	0.0	0.0	14.3	
Control Delay (s)	3.2	0.0	0.0	0.0	50.0	
Lane LOS	A				F	
Approach Delay (s)	1.2		0.0		50.0	
Approach LOS					F	
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			70.6%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Background - PM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	72	4	4	153	141	79
Future Volume (Veh/h)	72	4	4	153	141	79
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	80	4	4	170	157	88
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	379	201	245			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	379	201	245			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	621	840	1321			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	84	174	245			
Volume Left	80	4	0			
Volume Right	4	0	88			
cSH	629	1321	1700			
Volume to Capacity	0.13	0.00	0.14			
Queue Length 95th (m)	3.5	0.1	0.0			
Control Delay (s)	11.6	0.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	0.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization		23.1%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	876	47	161	1012	75	70	17	138	57	10	44
Future Volume (Veh/h)	35	876	47	161	1012	75	70	17	138	57	10	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	922	49	169	1065	79	74	18	145	60	11	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	1144			971			1942	2502	486	2132	2488	572
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1144			971			1942	2502	486	2132	2488	572
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			76			0	14	73	0	49	90
cM capacity (veh/h)	618			718			15	21	533	5	21	468

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	37	615	356	169	710	434	237	117
Volume Left	37	0	0	169	0	0	74	60
Volume Right	0	0	49	0	0	79	145	46
cSH	618	1700	1700	718	1700	1700	40	9
Volume to Capacity	0.06	0.36	0.21	0.24	0.42	0.26	5.91	13.48
Queue Length 95th (m)	1.4	0.0	0.0	6.9	0.0	0.0	Err	Err
Control Delay (s)	11.2	0.0	0.0	11.6	0.0	0.0	Err	Err
Lane LOS	B			B			F	F
Approach Delay (s)	0.4			1.5			Err	Err
Approach LOS							F	F

Intersection Summary

Average Delay		1324.1						
Intersection Capacity Utilization		59.1%		ICU Level of Service			B	
Analysis Period (min)		15						

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Background - PM
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	1018	10	22	1123	140	0	0	12	117	1	71
Future Volume (Veh/h)	83	1018	10	22	1123	140	0	0	12	117	1	71
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	87	1072	11	23	1182	147	0	0	13	123	1	75
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1182			1083			1889	2480	542	1951	2485	591
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1182			1083			1889	2480	542	1951	2485	591
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	84			96			100	100	97	0	96	84
cM capacity (veh/h)	559			652			30	25	490	33	24	455

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	87	715	368	23	591	591	147	13	199
Volume Left	87	0	0	23	0	0	0	0	123
Volume Right	0	0	11	0	0	0	147	13	75
cSH	559	1700	1700	652	1700	1700	1700	490	50
Volume to Capacity	0.16	0.42	0.22	0.04	0.35	0.35	0.09	0.03	3.96
Queue Length 95th (m)	4.2	0.0	0.0	0.8	0.0	0.0	0.0	0.6	Err
Control Delay (s)	12.6	0.0	0.0	10.7	0.0	0.0	0.0	12.5	Err
Lane LOS	B			B				B	F
Approach Delay (s)	0.9			0.2				12.5	Err
Approach LOS								B	F

Intersection Summary

Average Delay		728.3							
Intersection Capacity Utilization		58.8%		ICU Level of Service				B	
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Background - PM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1112	6	7	1344	0	17
Future Volume (Veh/h)	1112	6	7	1344	0	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1146	6	7	1386	0	18
Pedestrians					3	
Lane Width (m)					3.7	
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			1155		1859	579
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1155		1859	579
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	95
cM capacity (veh/h)			610		65	393
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	764	388	469	924	18	
Volume Left	0	0	7	0	0	
Volume Right	0	6	0	0	18	
cSH	1700	1700	610	1700	393	
Volume to Capacity	0.45	0.23	0.01	0.54	0.05	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.1	
Control Delay (s)	0.0	0.0	0.3	0.0	14.6	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		14.6	
Approach LOS					B	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			52.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Future Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.952			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3219	0	1825	3557	0	1534	1578	1617	1722	1921	1601
Flt Permitted	0.328			0.097			0.714	0.721		0.403		
Satd. Flow (perm)	630	3219	0	186	3557	0	1150	1182	1588	728	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		87			7				245			98
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	66	797	380	334	828	36	517	54	245	32	66	98
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	66	1177	0	334	864	0	284	287	245	32	66	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	37.2	37.2		60.1	57.1		27.1	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.38	0.38		0.62	0.59		0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.27	0.92		0.87	0.41		0.89	0.87	0.40	0.16	0.12	0.19
Control Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
LOS	C	D		D	B		E	E	A	C	C	A
Approach Delay		39.8			21.5			45.0				16.9
Approach LOS		D			C			D				B
Queue Length 50th (m)	9.0	108.8		44.8	45.2		53.5	53.8	0.0	4.5	9.2	0.0
Queue Length 95th (m)	21.1	#163.5		#81.6	58.4		#100.4	#100.1	16.8	12.0	19.2	11.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	241	1285		452	2091		343	353	646	217	573	540
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	0.27	0.92		0.74	0.41		0.83	0.81	0.38	0.15	0.12	0.18

Intersection Summary

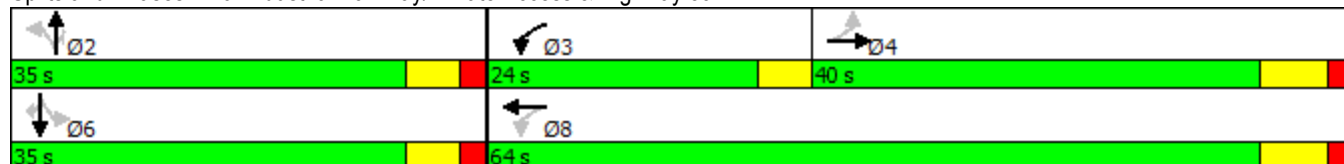
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	97.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	33.4
Intersection Capacity Utilization	87.3%
Intersection LOS:	C
ICU Level of Service	E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	672	102	245	744	189	274
Future Volume (vph)	672	102	245	744	189	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.980					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3462	0	1668	3544	1713	949
Fl _t Permitted			0.299		0.950	
Satd. Flow (perm)	3462	0	525	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					282
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	693	105	253	767	195	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	798	0	253	767	195	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	13.2	13.2
Actuated g/C Ratio	0.51		0.71	0.64	0.17	0.17
v/c Ratio	0.45		0.51	0.34	0.67	0.72
Control Delay	13.2		7.8	7.0	42.6	15.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.2		7.8	7.0	42.6	15.5
LOS	B		A	A	D	B
Approach Delay	13.2			7.2	26.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	37.0		10.9	24.8	27.2	0.0
Queue Length 95th (m)	53.8		19.2	34.8	47.6	#31.0
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1779		521	2279	330	410
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.45		0.49	0.34	0.59	0.69

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	77.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	13.3
Intersection LOS:	B
Intersection Capacity Utilization:	68.7%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Background - SAT
09/18/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	15	820	765	40	34	14
Future Volume (Veh/h)	15	820	765	40	34	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	891	832	43	37	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)		200				
pX, platoon unblocked					0.88	
vC, conflicting volume	875				1331	438
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	875				1109	438
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				79	97
cM capacity (veh/h)	780				179	573
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	313	594	555	320	52	
Volume Left	16	0	0	0	37	
Volume Right	0	0	0	43	15	
cSH	780	1700	1700	1700	223	
Volume to Capacity	0.02	0.35	0.33	0.19	0.23	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	6.7	
Control Delay (s)	0.7	0.0	0.0	0.0	26.0	
Lane LOS	A				D	
Approach Delay (s)	0.3		0.0		26.0	
Approach LOS					D	
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			43.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Background - SAT
 09/18/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	169	158	187
Future Volume (Veh/h)	161	8	13	169	158	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	188	176	208
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	496	280	384			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496	280	384			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	99	99			
cM capacity (veh/h)	527	759	1174			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	202	384			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	535	1174	1700			
Volume to Capacity	0.35	0.01	0.23			
Queue Length 95th (m)	11.9	0.3	0.0			
Control Delay (s)	15.3	0.7	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.3	0.7	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			35.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - SAT
 09/18/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR												
Lane Configurations																								
Traffic Volume (veh/h)	51	831	79	228	886	195	92	16	224	154	39	53												
Future Volume (Veh/h)	51	831	79	228	886	195	92	16	224	154	39	53												
Sign Control		Free			Free			Stop			Stop													
Grade		0%			0%			0%			0%													
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95												
Hourly flow rate (vph)	54	875	83	240	933	205	97	17	236	162	41	56												
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	1138			958			2048			2642			479			2306			2582			569		
vC1, stage 1 conf vol																								
vC2, stage 2 conf vol																								
vCu, unblocked vol	1138			958			2048			2642			479			2306			2582			569		
tC, single (s)	4.1			4.1			7.5			6.5			6.9			7.5			6.5			6.9		
tC, 2 stage (s)																								
tF (s)	2.2			2.2			3.5			4.0			3.3			3.5			4.0			3.3		
p0 queue free %	91			66			0			0			56			0			0			88		
cM capacity (veh/h)	621			714			0			14			538			0			16			470		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1																
Volume Total	54	583	375	240	622	516	350	259																
Volume Left	54	0	0	240	0	0	97	162																
Volume Right	0	0	83	0	0	205	236	56																
cSH	621	1700	1700	714	1700	1700	0	0																
Volume to Capacity	0.09	0.34	0.22	0.34	0.37	0.30	Err	Err																
Queue Length 95th (m)	2.2	0.0	0.0	11.3	0.0	0.0	Err	Err																
Control Delay (s)	11.3	0.0	0.0	12.6	0.0	0.0	Err	Err																
Lane LOS	B			B			F			F														
Approach Delay (s)	0.6			2.2			Err			Err														
Approach LOS							F			F														
Intersection Summary																								
Average Delay				Err																				
Intersection Capacity Utilization				76.3%			ICU Level of Service			D														
Analysis Period (min)				15																				

HCM Unsignalized Intersection Capacity Analysis
4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Background - SAT
09/18/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	1194	7	31	1259	185	1	7	12	180	6	75
Future Volume (Veh/h)	83	1194	7	31	1259	185	1	7	12	180	6	75
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	87	1257	7	33	1325	195	1	7	13	189	6	79
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1325			1265			2167	2826	633	2210	2830	662
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1325			1265			2167	2826	633	2210	2830	662
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			94			92	50	97	0	57	80
cM capacity (veh/h)	517			556			12	14	427	12	14	397

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	87	838	426	33	662	662	195	21	274
Volume Left	87	0	0	33	0	0	0	1	189
Volume Right	0	0	7	0	0	0	195	13	79
cSH	517	1700	1700	556	1700	1700	1700	34	17
Volume to Capacity	0.17	0.49	0.25	0.06	0.39	0.39	0.11	0.61	16.35
Queue Length 95th (m)	4.6	0.0	0.0	1.4	0.0	0.0	0.0	15.9	Err
Control Delay (s)	13.4	0.0	0.0	11.9	0.0	0.0	0.0	213.6	Err
Lane LOS	B			B				F	F
Approach Delay (s)	0.9			0.3				213.6	Err
Approach LOS								F	F

Intersection Summary

Average Delay		858.3							
Intersection Capacity Utilization		66.4%		ICU Level of Service				C	
Analysis Period (min)		15							

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Background - SAT
09/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1416	3	7	1470	0	10
Future Volume (Veh/h)	1416	3	7	1470	0	10
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)	1506	3	7	1564	0	11
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			1509		2304	754
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1509		2304	754
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			98		100	97
cM capacity (veh/h)			449		33	320
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1004	505	528	1043	11	
Volume Left	0	0	7	0	0	
Volume Right	0	3	0	0	11	
cSH	1700	1700	449	1700	320	
Volume to Capacity	0.59	0.30	0.02	0.61	0.03	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.8	
Control Delay (s)	0.0	0.0	0.5	0.0	16.6	
Lane LOS			A			C
Approach Delay (s)	0.0		0.2		16.6	
Approach LOS						C
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			55.5%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1041	215	523	1041	41	298	65	301	59	143	116
Future Volume (vph)	168	1041	215	523	1041	41	298	65	301	59	143	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.974			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3506	0	1825	3590	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.244			0.108			0.642	0.694		0.529		
Satd. Flow (perm)	464	3506	0	207	3590	0	1134	1240	1593	985	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			7				324			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	181	1119	231	562	1119	44	320	70	324	63	154	125
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	181	1350	0	562	1163	0	189	201	324	63	154	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		21.7	21.7	21.7	21.7	21.7	21.7
Actuated g/C Ratio	0.36	0.36		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	1.08	1.06		1.15	0.52		0.71	0.69	0.52	0.27	0.34	0.28
Control Delay	128.1	71.4		115.7	11.6		46.9	44.4	6.4	30.9	30.6	11.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	128.1	71.4		115.7	11.6		46.9	44.4	6.4	30.9	30.6	11.7
LOS	F	E		F	B		D	D	A	C	C	B
Approach Delay		78.1			45.5			27.8				23.8
Approach LOS		E			D			C				C
Queue Length 50th (m)	~37.0	~140.7		~103.8	56.7		32.3	34.2	0.0	9.1	22.7	5.1
Queue Length 95th (m)	#82.5	#200.3		#181.7	86.2		56.2	58.3	19.0	19.9	38.7	18.2
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	167	1279		488	2236		359	392	725	311	607	568
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	1.08	1.06		1.15	0.52		0.53	0.51	0.45	0.20	0.25	0.22

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.1
Natural Cycle:	130
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.15
Intersection Signal Delay:	52.4
Intersection Capacity Utilization	105.4%
Intersection LOS:	D
ICU Level of Service	G

Analysis Period (min) 15

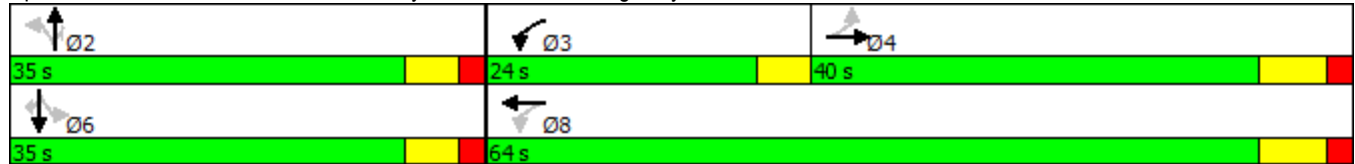
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	315	158	267	293	60	138
Future Volume (vph)	315	158	267	293	60	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.437		0.950	
Satd. Flow (perm)	2972	0	745	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	151					152
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	346	174	293	322	66	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	520	0	293	322	66	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

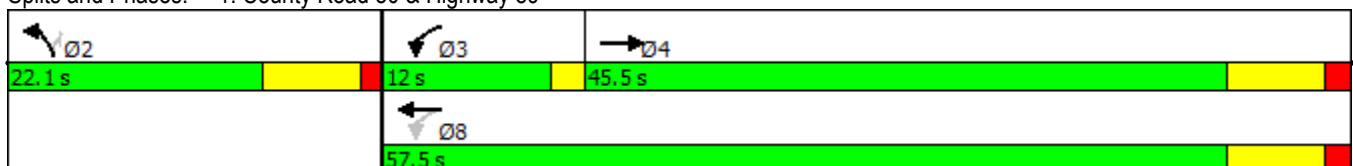


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.4		55.5	50.0	10.5	10.5
Actuated g/C Ratio	0.52		0.74	0.67	0.14	0.14
v/c Ratio	0.32		0.45	0.16	0.32	0.46
Control Delay	7.9		5.6	5.0	33.7	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	7.9		5.6	5.0	33.7	10.5
LOS	A		A	A	C	B
Approach Delay	7.9			5.3	17.5	
Approach LOS	A			A	B	
Queue Length 50th (m)	13.7		9.9	7.4	8.6	0.0
Queue Length 95th (m)	24.8		19.6	13.0	19.3	14.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1632		666	2059	293	406
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.32		0.44	0.16	0.23	0.37

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.1
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	8.3
Intersection LOS:	A
Intersection Capacity Utilization:	67.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - AM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	12	423	517	13	23	55
Future Volume (Veh/h)	12	423	517	13	23	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	470	574	14	26	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	588				842	294
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	588				842	294
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				91	91
cM capacity (veh/h)	924				303	708
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	170	313	383	205	87	
Volume Left	13	0	0	0	26	
Volume Right	0	0	0	14	61	
cSH	924	1700	1700	1700	506	
Volume to Capacity	0.01	0.18	0.23	0.12	0.17	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	4.7	
Control Delay (s)	0.8	0.0	0.0	0.0	13.6	
Lane LOS	A				B	
Approach Delay (s)	0.3		0.0		13.6	
Approach LOS					B	
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			31.7%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	499	35	51	401	69	12	9	53	64	8	27
Future Volume (vph)	27	499	35	51	401	69	12	9	53	64	8	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.978			0.903				0.964
Flt Protected	0.950			0.950				0.992				0.969
Satd. Flow (prot)	1825	3153	0	1772	3164	0	0	1721	0	0	1748	0
Flt Permitted	0.464			0.434				0.937				0.775
Satd. Flow (perm)	891	3153	0	809	3164	0	0	1625	0	0	1398	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			42			58				19
Link Speed (k/h)		60			60			60				50
Link Distance (m)		314.7			133.1			224.3				107.2
Travel Time (s)		18.9			8.0			13.5				7.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	29	542	38	55	436	75	13	10	58	70	9	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	580	0	55	511	0	0	81	0	0	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - AM: Add'l Signals

09/21/2017

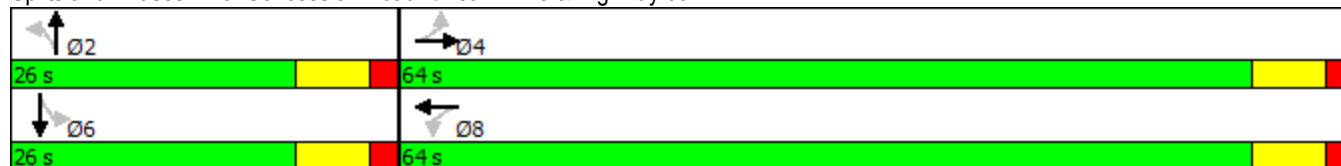


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	62.5	62.5		62.5	62.5			10.7			10.8	
Actuated g/C Ratio	0.75	0.75		0.75	0.75			0.13			0.13	
v/c Ratio	0.04	0.24		0.09	0.21			0.31			0.55	
Control Delay	5.0	4.8		5.3	4.4			16.5			37.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.0	4.8		5.3	4.4			16.5			37.9	
LOS	A	A		A	A			B			D	
Approach Delay		4.8			4.5			16.5			37.9	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.2	14.3		2.4	11.4			3.2			13.0	
Queue Length 95th (m)	4.3	25.9		7.2	21.4			14.6			28.0	
Internal Link Dist (m)		290.7			109.1			200.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	669	2374		608	2389			416			334	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.04	0.24		0.09	0.21			0.19			0.32	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.1
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	8.0
Intersection LOS:	A
Intersection Capacity Utilization:	48.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - AM: Add'l Signals
 21: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	59	76	18
Future Volume (Veh/h)	15	2	1	59	76	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	66	84	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					224	
pX, platoon unblocked						
vC, conflicting volume	162	94	104			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	162	94	104			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	828	963	1488			
Direction, Lane #						
	EB 1	NB 1	SB 1			
Volume Total	19	67	104			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	841	1488	1700			
Volume to Capacity	0.02	0.00	0.06			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	9.4	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.4	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization		15.1%		ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	590	1	8	459	64	0	1	1	48	3	38
Future Volume (vph)	35	590	1	8	459	64	0	1	1	48	3	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.955	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1752	1396
Fl _t Permitted	0.476			0.416							0.737	
Satd. Flow (perm)	824	3259	0	598	3230	1570	0	1790	0	0	1352	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	37	621	1	8	483	67	0	1	1	51	3	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	622	0	8	483	67	0	2	0	0	54	40
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	67.1	67.1		67.1	67.1	80.8		8.3			8.6	80.8
Actuated g/C Ratio	0.83	0.83		0.83	0.83	1.00		0.10			0.11	1.00
v/c Ratio	0.05	0.23		0.02	0.18	0.04		0.01			0.38	0.03
Control Delay	3.8	3.4		3.9	3.2	0.0		28.5			41.7	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	3.8	3.4		3.9	3.2	0.0		28.5			41.7	0.0
LOS	A	A		A	A	A		C			D	A
Approach Delay		3.4			2.9			28.5			24.0	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.4	14.3		0.3	10.5	0.0		0.1			8.8	0.0
Queue Length 95th (m)	4.4	23.5		1.6	18.0	0.0		m1.8			17.8	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	683	2704		496	2680	1570		558			421	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.05	0.23		0.02	0.18	0.04		0.00			0.13	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.8
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.38
Intersection Signal Delay:	4.7
Intersection Capacity Utilization:	47.5%
Intersection LOS:	A
ICU Level of Service:	A

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - AM: Add'l Signals
5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	655	1	3	547	0	14
Future Volume (Veh/h)	655	1	3	547	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	704	1	3	588	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)	249					
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			705		1004	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			678		981	322
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	98
cM capacity (veh/h)			913		246	646
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	469	236	199	392	15	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	15	
cSH	1700	1700	913	1700	646	
Volume to Capacity	0.28	0.14	0.00	0.23	0.02	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.5	
Control Delay (s)	0.0	0.0	0.2	0.0	10.7	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		10.7	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			28.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - AM

9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	522	160	235	367	9	167	22	90	9	31	18
Future Volume (vph)	33	522	160	235	367	9	167	22	90	9	31	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3150	0	1807	3455	0	1387	1475	1617	1825	1779	1633
Flt Permitted	0.514			0.309			0.736	0.754		0.687		
Satd. Flow (perm)	987	3150	0	588	3455	0	1075	1155	1617	1320	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				97			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	35	561	172	253	395	10	180	24	97	10	33	19
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	35	733	0	253	405	0	101	103	97	10	33	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - AM
9/7/2017

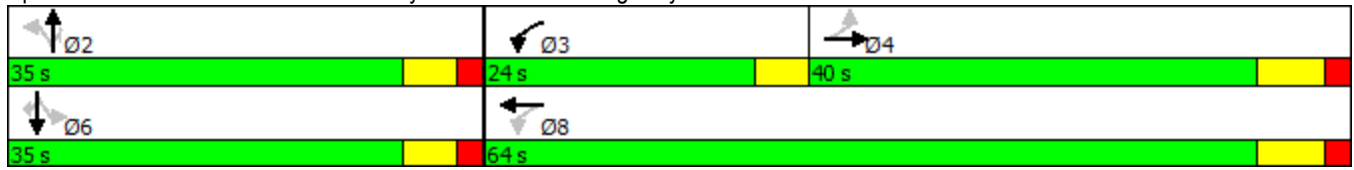


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	43.7	43.7		60.2	57.2		14.7	14.7	14.7	14.7	14.7	14.7
Actuated g/C Ratio	0.51	0.51		0.71	0.67		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.07	0.45		0.46	0.17		0.54	0.52	0.27	0.04	0.11	0.05
Control Delay	13.2	14.2		7.7	5.8		43.0	41.1	8.5	28.4	29.4	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	14.2		7.7	5.8		43.0	41.1	8.5	28.4	29.4	0.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		14.2			6.5			31.2			20.3	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	2.6	33.1		11.3	10.6		15.8	16.1	0.0	1.4	4.6	0.0
Queue Length 95th (m)	9.1	62.0		26.0	20.9		31.5	31.5	11.5	5.4	11.8	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	508	1643		704	2327		368	395	617	452	609	617
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	0.45		0.36	0.17		0.27	0.26	0.16	0.02	0.05	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	84.9
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	14.4
Intersection Capacity Utilization	58.6%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	B

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	391	60	176	630	214	333
Future Volume (vph)	391	60	176	630	214	333
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.453		0.950	
Satd. Flow (perm)	3205	0	730	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					358
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	420	65	189	677	230	358
Shared Lane Traffic (%)						
Lane Group Flow (vph)	485	0	189	677	230	358
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.1		55.5	50.0	13.9	13.9
Actuated g/C Ratio	0.51		0.71	0.64	0.18	0.18
v/c Ratio	0.29		0.32	0.31	0.78	0.78
Control Delay	11.4		5.6	7.1	50.9	17.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.4		5.6	7.1	50.9	17.5
LOS	B		A	A	D	B
Approach Delay	11.4			6.7	30.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	19.7		8.2	22.1	33.1	0.0
Queue Length 95th (m)	30.9		14.7	30.4	#64.3	#40.3
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1651		618	2195	318	465
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.29		0.31	0.31	0.72	0.77

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 78.5

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 15.1

Intersection LOS: B

Intersection Capacity Utilization 66.3%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - PM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	44	678	780	42	17	23
Future Volume (Veh/h)	44	678	780	42	17	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	47	729	839	45	18	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.95	
vC, conflicting volume	884				1320	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884				1228	442
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	94				88	96
cM capacity (veh/h)	774				144	569
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	290	486	559	325	43	
Volume Left	47	0	0	0	18	
Volume Right	0	0	0	45	25	
cSH	774	1700	1700	1700	255	
Volume to Capacity	0.06	0.29	0.33	0.19	0.17	
Queue Length 95th (m)	1.5	0.0	0.0	0.0	4.5	
Control Delay (s)	2.2	0.0	0.0	0.0	22.0	
Lane LOS	A				C	
Approach Delay (s)	0.8		0.0		22.0	
Approach LOS					C	
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			56.3%		ICU Level of Service	B
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - PM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	649	40	135	751	56	60	13	112	42	8	33
Future Volume (vph)	26	649	40	135	751	56	60	13	112	42	8	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.990			0.918			0.946	
Flt Protected	0.950			0.950				0.984			0.975	
Satd. Flow (prot)	1825	3271	0	1825	3393	0	0	1686	0	0	1772	0
Flt Permitted	0.323			0.376				0.865			0.683	
Satd. Flow (perm)	621	3271	0	722	3393	0	0	1482	0	0	1241	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			16			80			35	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			226.8			107.2	
Travel Time (s)		18.6			8.0			13.6			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	27	683	42	142	791	59	63	14	118	44	8	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	725	0	142	850	0	0	195	0	0	87	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - PM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	62.0	62.0		62.0	62.0		28.0	28.0		28.0	28.0	
Total Split (%)	68.9%	68.9%		68.9%	68.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	55.0	55.0		55.0	55.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	57.2	57.2		57.2	57.2			12.1			12.1	
Actuated g/C Ratio	0.69	0.69		0.69	0.69			0.15			0.15	
v/c Ratio	0.06	0.32		0.29	0.36			0.69			0.41	
Control Delay	6.2	6.2		8.1	6.5			31.8			25.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.2	6.2		8.1	6.5			31.8			25.8	
LOS	A	A		A	A			C			C	
Approach Delay		6.2			6.7			31.8			25.8	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.2	20.1		7.5	24.4			16.6			7.2	
Queue Length 95th (m)	4.9	37.6		20.9	45.0			37.0			19.8	
Internal Link Dist (m)		286.5			109.1			202.8			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	426	2248		495	2333			433			339	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.06	0.32		0.29	0.36			0.45			0.26	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.4
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.69
Intersection Signal Delay:	9.8
Intersection Capacity Utilization	56.2%
Analysis Period (min)	15
Intersection LOS:	A
ICU Level of Service	B

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - PM: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	72	4	4	114	104	79
Future Volume (Veh/h)	72	4	4	114	104	79
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	80	4	4	127	116	88
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					227	
pX, platoon unblocked						
vC, conflicting volume	295	160	204			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295	160	204			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	100	100			
cM capacity (veh/h)	694	885	1368			
Direction, Lane #						
	EB 1	NB 1	SB 1			
Volume Total	84	131	204			
Volume Left	80	4	0			
Volume Right	4	0	88			
cSH	701	1368	1700			
Volume to Capacity	0.12	0.00	0.12			
Queue Length 95th (m)	3.1	0.1	0.0			
Control Delay (s)	10.8	0.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.8	0.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization		21.2%		ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	765	8	16	847	104	0	0	9	87	1	53
Future Volume (vph)	62	765	8	16	847	104	0	0	9	87	1	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.999				0.850		0.865				0.850
Fl _t Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3379	0	1825	3444	1633	0	1662	0	0	1813	1633
Fl _t Permitted	0.312			0.343							0.722	
Satd. Flow (perm)	560	3379	0	659	3444	1633	0	1662	0	0	1373	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		213				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	65	805	8	17	892	109	0	0	9	92	1	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	813	0	17	892	109	0	9	0	0	93	56
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	67.8	67.8		67.8	67.8	88.6		11.1			11.3	88.6
Actuated g/C Ratio	0.77	0.77		0.77	0.77	1.00		0.13			0.13	1.00
v/c Ratio	0.15	0.31		0.03	0.34	0.07		0.02			0.53	0.03
Control Delay	6.0	5.1		4.9	5.2	0.1		0.1			46.9	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	6.0	5.1		4.9	5.2	0.1		0.1			46.9	0.0
LOS	A	A		A	A	A		A			D	A
Approach Delay		5.2			4.7			0.1			29.3	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	3.0	23.1		0.7	26.1	0.0		0.0			15.7	0.0
Queue Length 95th (m)	9.0	37.9		3.0	42.2	0.0		m0.0			28.0	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	428	2585		504	2634	1633		508			279	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.15	0.31		0.03	0.34	0.07		0.02			0.33	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	88.6
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.53
Intersection Signal Delay:	6.7
Intersection LOS:	A
Intersection Capacity Utilization:	56.6%
ICU Level of Service:	B
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - PM: Add'l Signals
 5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	835	4	5	1012	0	13
Future Volume (Veh/h)	835	4	5	1012	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	861	4	5	1043	0	13
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.94		0.94	0.94
vC, conflicting volume			868		1398	436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			740		1301	281
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	98
cM capacity (veh/h)			824		145	600
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	574	291	353	695	13	
Volume Left	0	0	5	0	0	
Volume Right	0	4	0	0	13	
cSH	1700	1700	824	1700	600	
Volume to Capacity	0.34	0.17	0.01	0.41	0.02	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.5	
Control Delay (s)	0.0	0.0	0.2	0.0	11.1	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1	11.1		
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			41.5%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	577	272	239	603	26	369	39	175	23	47	70
Future Volume (vph)	47	577	272	239	603	26	369	39	175	23	47	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.952			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3221	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Fl _t Permitted	0.403			0.221			0.725	0.734		0.505		
Satd. Flow (perm)	774	3221	0	424	3557	0	1168	1203	1588	911	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			7				182			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	49	601	283	249	628	27	384	41	182	24	49	73
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	49	884	0	249	655	0	211	214	182	24	49	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - PM
9/7/2017

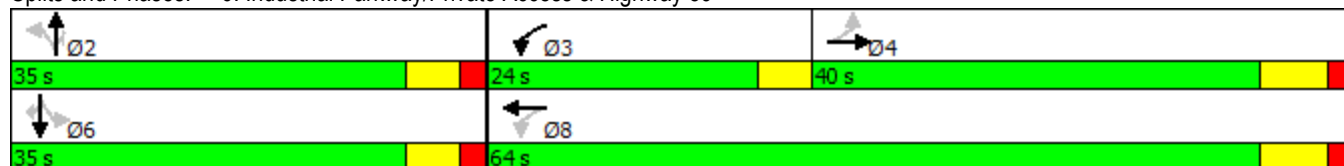


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	42.3	42.3		60.3	57.3		22.4	22.4	22.4	22.4	22.4	22.4
Actuated g/C Ratio	0.46	0.46		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.14	0.58		0.56	0.30		0.75	0.74	0.35	0.11	0.11	0.16
Control Delay	19.9	20.4		12.8	9.4		49.3	48.0	6.2	27.5	26.8	5.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	20.4		12.8	9.4		49.3	48.0	6.2	27.5	26.8	5.3
LOS	B	C		B	A		D	D	A	C	C	A
Approach Delay		20.4			10.3			35.9			16.2	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	4.9	53.4		16.8	26.8		36.6	37.0	0.0	3.3	6.8	0.0
Queue Length 95th (m)	14.9	91.7		31.8	42.1		62.7	62.7	14.7	9.6	15.2	7.6
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	352	1514		579	2200		367	378	623	286	603	556
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	0.14	0.58		0.43	0.30		0.57	0.57	0.29	0.08	0.08	0.13

Intersection Summary	
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	20.3
Intersection Capacity Utilization	78.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	507	76	189	565	141	204
Future Volume (vph)	507	76	189	565	141	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3466	0	1668	3544	1713	949
Flt Permitted			0.402		0.950	
Satd. Flow (perm)	3466	0	706	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					210
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	523	78	195	582	145	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	195	582	145	210
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.4		55.5	50.0	12.1	12.1
Actuated g/C Ratio	0.53		0.72	0.65	0.16	0.16
v/c Ratio	0.33		0.32	0.25	0.54	0.64
Control Delay	11.0		5.1	6.1	37.6	14.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.0		5.1	6.1	37.6	14.6
LOS	B		A	A	D	B
Approach Delay	11.0			5.8	24.0	
Approach LOS	B			A	C	
Queue Length 50th (m)	22.6		6.9	15.7	19.6	0.0
Queue Length 95th (m)	38.5		14.8	25.5	36.2	19.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1839		636	2311	335	354
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.31	0.25	0.43	0.59

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	76.7
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	11.4
Intersection LOS:	B
Intersection Capacity Utilization:	63.5%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - SAT: Add'l Signals
 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	13	677	635	34	28	12
Future Volume (Veh/h)	13	677	635	34	28	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	736	690	37	30	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	727				1104	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	727				949	364
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				87	98
cM capacity (veh/h)	886				238	639
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	259	491	460	267	43	
Volume Left	14	0	0	0	30	
Volume Right	0	0	0	37	13	
cSH	886	1700	1700	1700	294	
Volume to Capacity	0.02	0.29	0.27	0.16	0.15	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	3.8	
Control Delay (s)	0.7	0.0	0.0	0.0	19.3	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		19.3	
Approach LOS					C	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			38.0%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - SAT: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	613	72	204	653	145	86	12	189	115	29	40
Future Volume (vph)	38	613	72	204	653	145	86	12	189	115	29	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.984			0.973			0.911			0.971	
Flt Protected	0.950			0.950				0.985			0.970	
Satd. Flow (prot)	1825	3529	0	1789	3467	0	0	1724	0	0	1798	0
Flt Permitted	0.336			0.296				0.845			0.573	
Satd. Flow (perm)	645	3529	0	557	3467	0	0	1479	0	0	1062	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			35			115			17	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			226.7			107.2	
Travel Time (s)		18.7			8.0			13.6			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	40	645	76	215	687	153	91	13	199	121	31	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	721	0	215	840	0	0	303	0	0	194	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Background - SAT: Add'l Signals

09/21/2017

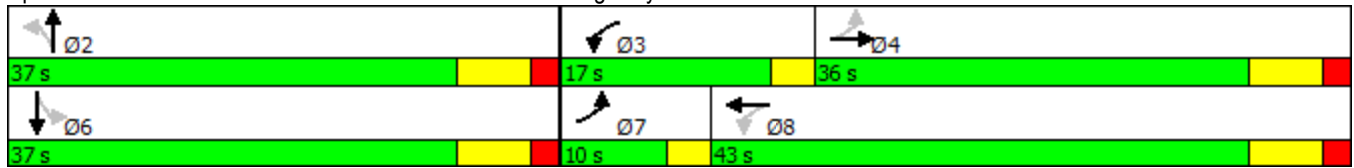


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	7.0	29.0		14.0	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	41.0	30.8		47.4	38.1			17.0			17.0	
Actuated g/C Ratio	0.55	0.41		0.64	0.51			0.23			0.23	
v/c Ratio	0.09	0.49		0.42	0.47			0.71			0.76	
Control Delay	7.6	18.9		9.5	14.5			25.9			44.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	7.6	18.9		9.5	14.5			25.9			44.1	
LOS	A	B		A	B			C			D	
Approach Delay		18.3			13.5			25.9			44.1	
Approach LOS		B			B			C			D	
Queue Length 50th (m)	1.8	36.6		10.9	40.1			24.7			24.0	
Queue Length 95th (m)	6.8	69.7		27.3	71.4			50.3			46.2	
Internal Link Dist (m)		288.3			109.1			202.7			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	475	1466		589	1787			673			444	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.08	0.49		0.37	0.47			0.45			0.44	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	74.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	19.3
Intersection LOS:	B
Intersection Capacity Utilization:	65.5%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - SAT: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	124	117	187
Future Volume (Veh/h)	161	8	13	124	117	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	138	130	208
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					227	
pX, platoon unblocked	0.96	0.96	0.96			
vC, conflicting volume	400	234	338			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	187	295			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	71	99	99			
cM capacity (veh/h)	610	824	1221			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	152	338			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	617	1221	1700			
Volume to Capacity	0.30	0.01	0.20			
Queue Length 95th (m)	9.8	0.3	0.0			
Control Delay (s)	13.4	0.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.4	0.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			33.7%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	905	5	23	965	138	1	5	9	134	4	56
Future Volume (vph)	63	905	5	23	965	138	1	5	9	134	4	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.999				0.850		0.919				0.850
Flt Protected	0.950			0.950				0.997			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1760	0	0	1781	1555
Flt Permitted	0.258			0.278				0.978			0.721	
Satd. Flow (perm)	486	3575	0	534	3579	1601	0	1727	0	0	1346	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				145		9				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	66	953	5	24	1016	145	1	5	9	141	4	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	958	0	24	1016	145	0	15	0	0	145	59
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	56.1	56.1		56.1	56.1	84.2		14.0			14.0	84.2
Actuated g/C Ratio	0.67	0.67		0.67	0.67	1.00		0.17			0.17	1.00
v/c Ratio	0.20	0.40		0.07	0.43	0.09		0.05			0.65	0.04
Control Delay	8.5	7.5		6.7	7.7	0.1		19.0			46.5	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	8.5	7.5		6.7	7.7	0.1		19.0			46.5	0.1
LOS	A	A		A	A	A		B			D	A
Approach Delay		7.6			6.8			19.0			33.0	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	3.6	32.2		1.2	35.0	0.0		0.8			22.0	0.0
Queue Length 95th (m)	11.2	52.8		4.6	57.2	0.0		m5.3			40.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	324	2384		356	2386	1601		418			320	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.20	0.40		0.07	0.43	0.09		0.04			0.45	0.04

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 84.2

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 9.4

Intersection LOS: A

Intersection Capacity Utilization 62.6%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2026 Future Background - SAT: Add'l Signals
 5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1070	3	5	1122	0	8
Future Volume (Veh/h)	1070	3	5	1122	0	8
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)	1138	3	5	1194	0	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			1141		1746	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			890		1577	242
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	99
cM capacity (veh/h)			678		89	630
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	759	382	403	796	9	
Volume Left	0	0	5	0	0	
Volume Right	0	3	0	0	9	
cSH	1700	1700	678	1700	630	
Volume to Capacity	0.45	0.22	0.01	0.47	0.01	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.3	
Control Delay (s)	0.0	0.0	0.2	0.0	10.8	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		10.8	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			44.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	791	161	389	802	30	222	48	224	44	106	86
Future Volume (vph)	125	791	161	389	802	30	222	48	224	44	106	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.975			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3510	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.318			0.140			0.684	0.735		0.628		
Satd. Flow (perm)	604	3510	0	269	3594	0	1208	1313	1593	1168	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			6				241			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	134	851	173	418	862	32	239	52	241	47	114	92
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	134	1024	0	418	894	0	141	150	241	47	114	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	34.9	34.9		60.3	57.2		17.2	17.2	17.2	17.2	17.2	17.2
Actuated g/C Ratio	0.40	0.40		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.56	0.72		0.82	0.38		0.59	0.58	0.48	0.21	0.30	0.24
Control Delay	34.7	26.9		31.4	8.2		42.3	40.9	7.2	30.6	31.3	7.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	26.9		31.4	8.2		42.3	40.9	7.2	30.6	31.3	7.8
LOS	C	C		C	A		D	D	A	C	C	A
Approach Delay		27.8			15.6			26.0			22.6	
Approach LOS		C			B			C			C	
Queue Length 50th (m)	17.5	75.1		40.5	31.6		22.7	24.1	0.0	6.6	16.4	0.0
Queue Length 95th (m)	#47.9	116.2		#102.4	57.4		41.3	43.0	16.9	15.4	30.0	10.9
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	240	1417		542	2353		402	437	691	388	639	596
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	0.56	0.72		0.77	0.38		0.35	0.34	0.35	0.12	0.18	0.15

Intersection Summary

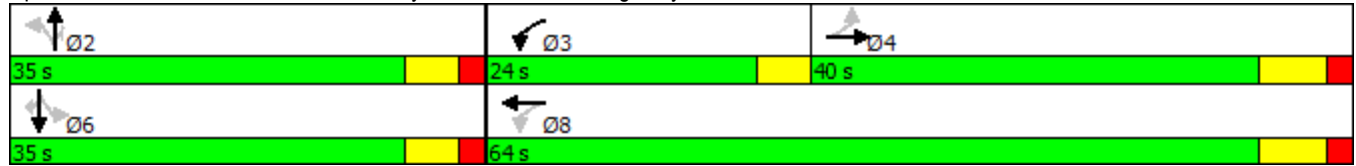
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.5
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	22.2
Intersection Capacity Utilization	78.3%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Background - AM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	365	183	310	339	70	160
Future Volume (vph)	365	183	310	339	70	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.401		0.950	
Satd. Flow (perm)	2972	0	684	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	150					176
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	401	201	341	373	77	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	602	0	341	373	77	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

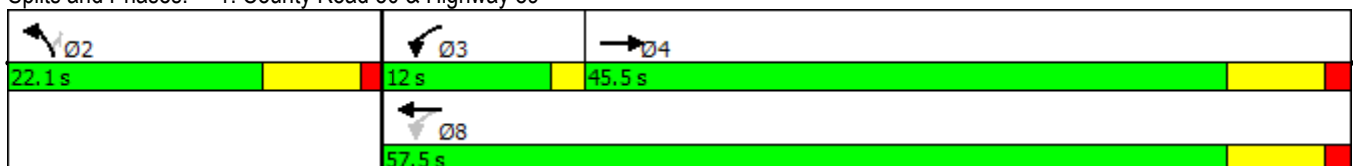
Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.0		55.5	50.0	10.8	10.8
Actuated g/C Ratio	0.52		0.74	0.66	0.14	0.14
v/c Ratio	0.37		0.55	0.18	0.36	0.50
Control Delay	9.1		7.2	5.3	34.5	10.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	9.1		7.2	5.3	34.5	10.4
LOS	A		A	A	C	B
Approach Delay	9.1			6.2	17.7	
Approach LOS	A			A	B	
Queue Length 50th (m)	17.8		11.9	8.7	10.1	0.0
Queue Length 95th (m)	31.4		24.5	15.5	21.9	15.6
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1608		627	2050	292	424
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.37		0.54	0.18	0.26	0.42

Intersection Summary	
Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	9.1
Intersection LOS:	A
Intersection Capacity Utilization:	70.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - AM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	14	490	599	15	27	64
Future Volume (Veh/h)	14	490	599	15	27	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	16	544	666	17	30	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	683				978	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	683				978	342
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				88	89
cM capacity (veh/h)	848				246	660
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	197	363	444	239	101	
Volume Left	16	0	0	0	30	
Volume Right	0	0	0	17	71	
cSH	848	1700	1700	1700	440	
Volume to Capacity	0.02	0.21	0.26	0.14	0.23	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	6.6	
Control Delay (s)	0.9	0.0	0.0	0.0	15.6	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		15.6	
Approach LOS					C	
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			35.7%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - AM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	579	40	57	465	80	13	10	60	74	9	31
Future Volume (vph)	31	579	40	57	465	80	13	10	60	74	9	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.978			0.902				0.963
Flt Protected	0.950			0.950				0.992				0.969
Satd. Flow (prot)	1825	3153	0	1772	3164	0	0	1719	0	0	1745	0
Flt Permitted	0.428			0.396				0.937				0.802
Satd. Flow (perm)	822	3153	0	739	3164	0	0	1624	0	0	1444	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			42			65				19
Link Speed (k/h)		60			60			60				50
Link Distance (m)		314.7			133.1			218.7				107.2
Travel Time (s)		18.9			8.0			13.1				7.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	34	629	43	62	505	87	14	11	65	80	10	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	672	0	62	592	0	0	90	0	0	124	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - AM: Add'l Signals

09/21/2017

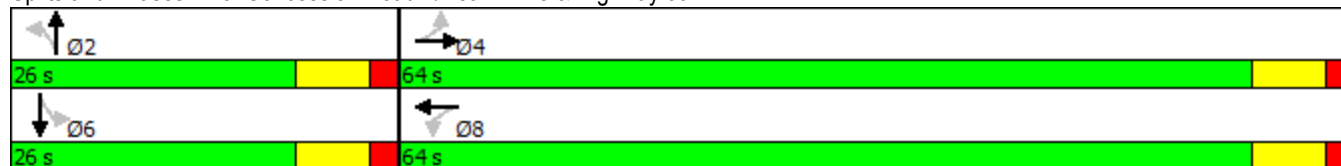


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	60.1	60.1		60.1	60.1			11.9			11.9	
Actuated g/C Ratio	0.70	0.70		0.70	0.70			0.14			0.14	
v/c Ratio	0.06	0.30		0.12	0.27			0.32			0.57	
Control Delay	5.5	5.8		6.0	5.2			15.5			38.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.5	5.8		6.0	5.2			15.5			38.8	
LOS	A	A		A	A			B			D	
Approach Delay		5.7			5.3			15.5			38.8	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.5	18.0		2.8	14.5			3.5			15.6	
Queue Length 95th (m)	5.2	32.6		8.6	26.8			15.4			31.7	
Internal Link Dist (m)		290.7			109.1			194.7			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	574	2207		516	2223			410			334	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.06	0.30		0.12	0.27			0.22			0.37	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	86
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	8.7
Intersection LOS:	A
Intersection Capacity Utilization:	52.1%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



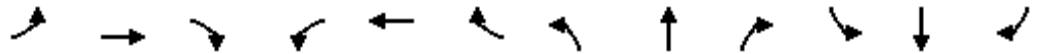
HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - AM: Add'l Signals
 21: Concession Road 7 & Street A 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	68	88	18
Future Volume (Veh/h)	15	2	1	68	88	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	76	98	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						219
pX, platoon unblocked						
vC, conflicting volume	186	108	118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186	108	118			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	803	946	1470			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	77	118			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	816	1470	1700			
Volume to Capacity	0.02	0.00	0.07			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	9.5	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.5	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			15.7%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	683	1	9	531	74	0	1	1	56	3	44
Future Volume (vph)	41	683	1	9	531	74	0	1	1	56	3	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.955	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1751	1396
Fl _t Permitted	0.442			0.378							0.735	
Satd. Flow (perm)	765	3259	0	544	3230	1570	0	1790	0	0	1348	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	43	719	1	9	559	78	0	1	1	59	3	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	720	0	9	559	78	0	2	0	0	62	46
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	66.0	66.0		66.0	66.0	80.2		8.6			9.0	80.2
Actuated g/C Ratio	0.82	0.82		0.82	0.82	1.00		0.11			0.11	1.00
v/c Ratio	0.07	0.27		0.02	0.21	0.05		0.01			0.41	0.03
Control Delay	4.2	3.8		4.2	3.5	0.1		27.0			41.6	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	4.2	3.8		4.2	3.5	0.1		27.0			41.6	0.0
LOS	A	A		A	A	A		C			D	A
Approach Delay		3.8			3.1			27.0			23.9	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.7	17.7		0.3	13.0	0.0		0.1			10.2	0.0
Queue Length 95th (m)	5.2	29.0		1.8	21.7	0.0		m1.8			19.2	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	630	2684		448	2660	1570		562			423	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.07	0.27		0.02	0.21	0.05		0.00			0.15	0.03

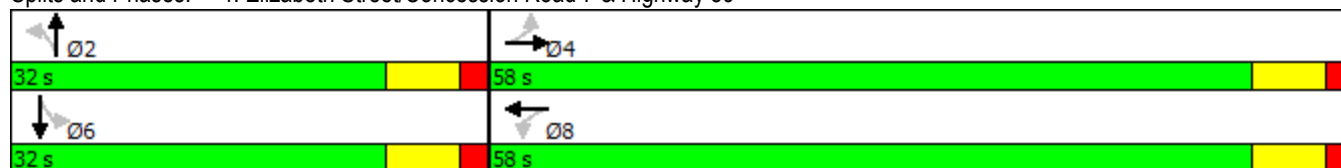
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.2
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	5.0
Intersection LOS:	A
Intersection Capacity Utilization:	50.5%
ICU Level of Service:	A

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - AM: Add'l Signals
5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	758	1	3	633	0	16
Future Volume (Veh/h)	758	1	3	633	0	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	815	1	3	681	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)	249					
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			816		1162	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			742		1100	320
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	97
cM capacity (veh/h)			846		202	634
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	543	273	230	454	17	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	17	
cSH	1700	1700	846	1700	634	
Volume to Capacity	0.32	0.16	0.00	0.27	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.6	
Control Delay (s)	0.0	0.0	0.2	0.0	10.8	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1	10.8		
Approach LOS						B
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			31.0%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	604	185	272	424	10	193	26	104	10	36	21
Future Volume (vph)	38	604	185	272	424	10	193	26	104	10	36	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3150	0	1807	3455	0	1387	1475	1617	1825	1779	1633
Flt Permitted	0.484			0.250			0.732	0.750		0.676		
Satd. Flow (perm)	930	3150	0	476	3455	0	1069	1149	1617	1299	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				112			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	41	649	199	292	456	11	208	28	112	11	39	23
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	41	848	0	292	467	0	116	120	112	11	39	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - AM
9/7/2017

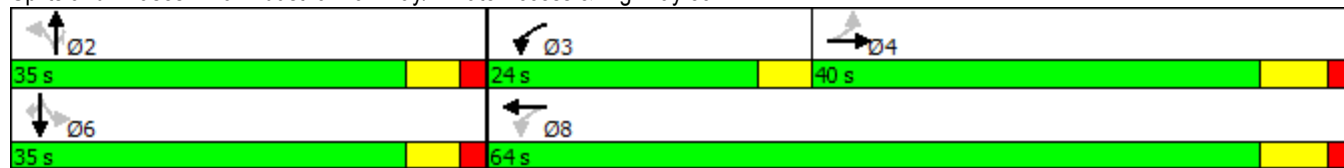


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	42.1	42.1		60.2	57.2		15.9	15.9	15.9	15.9	15.9	15.9
Actuated g/C Ratio	0.49	0.49		0.70	0.66		0.18	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.09	0.54		0.58	0.20		0.59	0.57	0.29	0.05	0.12	0.06
Control Delay	16.2	17.9		10.3	6.4		44.5	42.4	7.9	27.9	29.1	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	17.9		10.3	6.4		44.5	42.4	7.9	27.9	29.1	0.3
LOS	B	B		B	A		D	D	A	C	C	A
Approach Delay		17.8			7.9			32.0			19.8	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	3.3	43.3		14.3	13.3		18.5	19.0	0.0	1.5	5.4	0.0
Queue Length 95th (m)	12.0	86.8		32.3	25.8		35.6	36.1	12.3	5.7	13.3	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	454	1562		643	2295		361	388	620	439	601	610
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	0.09	0.54		0.45	0.20		0.32	0.31	0.18	0.03	0.06	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	86.1
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.59
Intersection Signal Delay:	16.6
Intersection Capacity Utilization	64.5%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	452	70	204	727	248	386
Future Volume (vph)	452	70	204	727	248	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.418		0.950	
Satd. Flow (perm)	3205	0	674	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					415
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	486	75	219	782	267	415
Shared Lane Traffic (%)						
Lane Group Flow (vph)	561	0	219	782	267	415
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	14.6	14.6
Actuated g/C Ratio	0.50		0.70	0.63	0.18	0.18
v/c Ratio	0.35		0.39	0.36	0.87	0.82
Control Delay	12.3		6.4	7.6	61.0	18.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.3		6.4	7.6	61.0	18.5
LOS	B		A	A	E	B
Approach Delay	12.3			7.3	35.1	
Approach LOS	B			A	D	
Queue Length 50th (m)	24.2		9.8	26.5	39.4	0.0
Queue Length 95th (m)	36.3		17.1	36.0	#78.6	#46.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1620		580	2175	315	510
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.35		0.38	0.36	0.85	0.81

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	79.2
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	17.0
Intersection LOS:	B
Intersection Capacity Utilization:	69.7%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - PM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	51	784	901	48	20	27
Future Volume (Veh/h)	51	784	901	48	20	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	55	843	969	52	22	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.93	
vC, conflicting volume	1021				1526	510
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1021				1411	510
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	92				79	94
cM capacity (veh/h)	688				104	513
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	336	562	646	375	51	
Volume Left	55	0	0	0	22	
Volume Right	0	0	0	52	29	
cSH	688	1700	1700	1700	191	
Volume to Capacity	0.08	0.33	0.38	0.22	0.27	
Queue Length 95th (m)	2.0	0.0	0.0	0.0	7.9	
Control Delay (s)	2.6	0.0	0.0	0.0	30.6	
Lane LOS	A				D	
Approach Delay (s)	1.0		0.0		30.6	
Approach LOS					D	
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			62.9%		ICU Level of Service	B
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - PM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	754	43	147	872	65	65	15	124	49	9	38
Future Volume (vph)	30	754	43	147	872	65	65	15	124	49	9	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.990			0.918				0.947
Flt Protected	0.950			0.950				0.984				0.975
Satd. Flow (prot)	1825	3276	0	1825	3393	0	0	1687	0	0	1774	0
Flt Permitted	0.270			0.325				0.877				0.657
Satd. Flow (perm)	519	3276	0	624	3393	0	0	1504	0	0	1195	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			16			81				34
Link Speed (k/h)		60			60			60				50
Link Distance (m)		310.5			133.1			218.4				107.2
Travel Time (s)		18.6			8.0			13.1				7.7
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	32	794	45	155	918	68	68	16	131	52	9	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	839	0	155	986	0	0	215	0	0	101	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - PM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	62.0	62.0		62.0	62.0		28.0	28.0		28.0	28.0	
Total Split (%)	68.9%	68.9%		68.9%	68.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	55.0	55.0		55.0	55.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	56.2	56.2		56.2	56.2			13.1			13.1	
Actuated g/C Ratio	0.67	0.67		0.67	0.67			0.16			0.16	
v/c Ratio	0.09	0.38		0.37	0.43			0.71			0.47	
Control Delay	7.0	7.1		10.3	7.5			32.9			28.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	7.0	7.1		10.3	7.5			32.9			28.4	
LOS	A	A		B	A			C			C	
Approach Delay		7.1			7.9			32.9			28.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.5	25.8		9.1	31.7			19.6			9.5	
Queue Length 95th (m)	6.0	47.4		26.8	57.4			41.3			23.3	
Internal Link Dist (m)		286.5			109.1			194.4			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	350	2213		420	2293			440			326	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.09	0.38		0.37	0.43			0.49			0.31	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.4
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	10.8
Intersection LOS:	B
Intersection Capacity Utilization:	61.0%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - PM: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	80	4	4	132	121	72
Future Volume (Veh/h)	80	4	4	132	121	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	89	4	4	147	134	80
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)				219		
pX, platoon unblocked						
vC, conflicting volume	329	174	214			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	329	174	214			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	664	869	1356			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	93	151	214			
Volume Left	89	4	0			
Volume Right	4	0	80			
cSH	670	1356	1700			
Volume to Capacity	0.14	0.00	0.13			
Queue Length 95th (m)	3.6	0.1	0.0			
Control Delay (s)	11.2	0.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.2	0.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			22.1%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	882	9	19	975	121	0	0	10	101	1	61
Future Volume (vph)	72	882	9	19	975	121	0	0	10	101	1	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3379	0	1825	3444	1633	0	1662	0	0	1813	1633
Flt Permitted	0.264			0.294							0.721	
Satd. Flow (perm)	474	3379	0	565	3444	1633	0	1662	0	0	1372	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		165				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	76	928	9	20	1026	127	0	0	11	106	1	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	76	937	0	20	1026	127	0	11	0	0	107	64
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	66.9	66.9		66.9	66.9	88.5		11.9			12.1	88.5
Actuated g/C Ratio	0.76	0.76		0.76	0.76	1.00		0.13			0.14	1.00
v/c Ratio	0.21	0.37		0.05	0.39	0.08		0.03			0.57	0.04
Control Delay	7.5	5.8		5.4	6.0	0.1		0.2			47.1	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	7.5	5.8		5.4	6.0	0.1		0.2			47.1	0.0
LOS	A	A		A	A	A		A			D	A
Approach Delay		5.9			5.4			0.2			29.5	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	3.9	29.0		0.9	32.8	0.0		0.0			17.4	0.0
Queue Length 95th (m)	11.8	47.9		3.6	53.9	0.0		m0.0			31.5	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	358	2553		427	2602	1633		470			280	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.21	0.37		0.05	0.39	0.08		0.02			0.38	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	88.5
Natural Cycle:	55
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	7.3
Intersection LOS:	A
Intersection Capacity Utilization:	60.9%
ICU Level of Service:	B
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - PM: Add'l Signals
5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	963	5	6	1166	0	15
Future Volume (Veh/h)	963	5	6	1166	0	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	993	5	6	1202	0	15
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			1001		1612	502
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			816		1483	270
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			749		107	593
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	662	336	407	801	15	
Volume Left	0	0	6	0	0	
Volume Right	0	5	0	0	15	
cSH	1700	1700	749	1700	593	
Volume to Capacity	0.39	0.20	0.01	0.47	0.03	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.6	
Control Delay (s)	0.0	0.0	0.2	0.0	11.2	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		11.2	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			46.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	664	315	277	692	30	428	45	203	27	54	81
Future Volume (vph)	54	664	315	277	692	30	428	45	203	27	54	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.952			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3220	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Flt Permitted	0.366			0.147			0.720	0.728		0.456		
Satd. Flow (perm)	703	3220	0	282	3557	0	1160	1193	1588	823	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		86			7				211			88
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		31.1			44.5			28.0			5.1	
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	56	692	328	289	721	31	446	47	211	28	56	84
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	56	1020	0	289	752	0	245	248	211	28	56	84
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	39.3	39.3		60.2	57.2		24.9	24.9	24.9	24.9	24.9	24.9
Actuated g/C Ratio	0.41	0.41		0.63	0.60		0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.19	0.74		0.72	0.35		0.81	0.79	0.37	0.13	0.11	0.18
Control Delay	24.2	27.7		23.2	10.7		53.9	52.0	5.8	27.7	26.5	6.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	27.7		23.2	10.7		53.9	52.0	5.8	27.7	26.5	6.5
LOS	C	C		C	B		D	D	A	C	C	A
Approach Delay		27.5			14.1			38.8				16.7
Approach LOS		C			B			D				B
Queue Length 50th (m)	7.0	81.4		24.5	37.4		44.2	44.5	0.0	3.9	7.8	0.0
Queue Length 95th (m)	17.8	#128.6		51.3	49.3		#80.3	#80.0	15.8	10.7	16.8	9.9
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	290	1379		504	2141		354	364	632	251	587	543
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	0.74		0.57	0.35		0.69	0.68	0.33	0.11	0.10	0.15

Intersection Summary

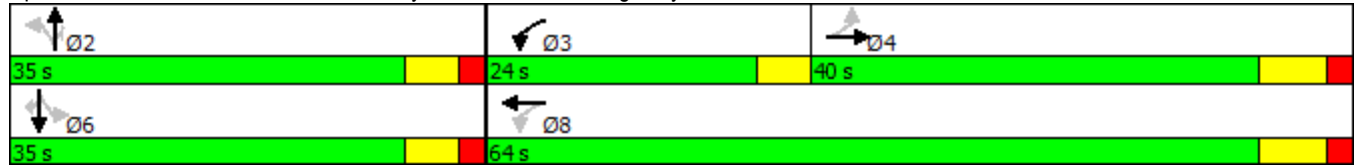
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	95.1
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	24.9
Intersection Capacity Utilization	79.7%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	583	88	219	648	163	236
Future Volume (vph)	583	88	219	648	163	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3462	0	1668	3544	1713	949
Flt Permitted			0.352		0.950	
Satd. Flow (perm)	3462	0	618	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					243
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	601	91	226	668	168	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	692	0	226	668	168	243
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.0		55.5	50.0	12.7	12.7
Actuated g/C Ratio	0.52		0.72	0.65	0.16	0.16
v/c Ratio	0.38		0.41	0.29	0.60	0.68
Control Delay	12.0		6.2	6.6	39.5	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.0		6.2	6.6	39.5	14.8
LOS	B		A	A	D	B
Approach Delay	12.0			6.5	24.9	
Approach LOS	B			A	C	
Queue Length 50th (m)	28.6		8.8	19.5	23.1	0.0
Queue Length 95th (m)	45.3		17.1	29.7	41.4	21.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1806		579	2294	332	380
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.38		0.39	0.29	0.51	0.64

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	77.3
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	12.2
Intersection LOS:	B
Intersection Capacity Utilization:	65.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - SAT: Add'l Signals
 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↑	↔↑		↔↑	
Traffic Volume (veh/h)	14	745	697	37	31	13
Future Volume (Veh/h)	14	745	697	37	31	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	810	758	40	34	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	798				1213	399
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	798				1023	399
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				84	98
cM capacity (veh/h)	833				209	606
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	285	540	505	293	48	
Volume Left	15	0	0	0	34	
Volume Right	0	0	0	40	14	
cSH	833	1700	1700	1700	258	
Volume to Capacity	0.02	0.32	0.30	0.17	0.19	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	5.1	
Control Delay (s)	0.7	0.0	0.0	0.0	22.1	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		22.1	
Approach LOS					C	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			40.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - SAT: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	714	75	215	761	168	89	14	205	133	34	46
Future Volume (vph)	44	714	75	215	761	168	89	14	205	133	34	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986			0.973			0.910			0.971	
Flt Protected	0.950			0.950				0.986			0.970	
Satd. Flow (prot)	1825	3535	0	1789	3466	0	0	1724	0	0	1798	0
Flt Permitted	0.267			0.232				0.838			0.560	
Satd. Flow (perm)	513	3535	0	437	3466	0	0	1465	0	0	1038	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			35			119			16	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			219.3			107.2	
Travel Time (s)		18.7			8.0			13.2			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	46	752	79	226	801	177	94	15	216	140	36	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	831	0	226	978	0	0	325	0	0	224	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Background - SAT: Add'l Signals

09/21/2017

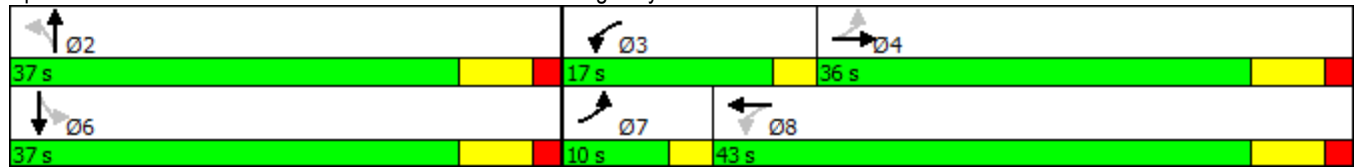


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	7.0	29.0		14.0	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		Min	Min		Min	Min	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	41.0	30.6		47.6	38.2			19.6			19.6	
Actuated g/C Ratio	0.53	0.40		0.61	0.49			0.25			0.25	
v/c Ratio	0.12	0.59		0.51	0.57			0.71			0.82	
Control Delay	8.9	22.2		12.2	17.3			25.2			48.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	8.9	22.2		12.2	17.3			25.2			48.7	
LOS	A	C		B	B			C			D	
Approach Delay		21.5			16.3			25.2			48.7	
Approach LOS		C			B			C			D	
Queue Length 50th (m)	2.4	48.6		13.2	54.4			27.9			29.6	
Queue Length 95th (m)	8.0	86.1		30.6	91.3			55.0			55.2	
Internal Link Dist (m)		288.3			109.1			195.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	397	1403		518	1729			649			418	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.12	0.59		0.44	0.57			0.50			0.54	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	77.4
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	21.9
Intersection LOS:	C
Intersection Capacity Utilization:	72.7%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - SAT: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	145	136	187
Future Volume (Veh/h)	161	8	13	145	136	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	161	151	208
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					219	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	444	255	359			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	389	190	300			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	69	99	99			
cM capacity (veh/h)	577	809	1199			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	175	359			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	585	1199	1700			
Volume to Capacity	0.32	0.01	0.21			
Queue Length 95th (m)	10.5	0.3	0.0			
Control Delay (s)	14.0	0.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.0	0.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization		34.7%		ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1039	6	27	1101	160	1	6	10	155	5	65
Future Volume (vph)	72	1039	6	27	1101	160	1	6	10	155	5	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.999				0.850		0.917				0.850
Flt Protected	0.950			0.950				0.997			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1756	0	0	1781	1555
Flt Permitted	0.210			0.228				0.981			0.719	
Satd. Flow (perm)	396	3575	0	438	3579	1601	0	1728	0	0	1342	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				156		11				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	76	1094	6	28	1159	168	1	6	11	163	5	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	76	1100	0	28	1159	168	0	18	0	0	168	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	56.1	56.1		56.1	56.1	85.3		15.2			15.2	85.3
Actuated g/C Ratio	0.66	0.66		0.66	0.66	1.00		0.18			0.18	1.00
v/c Ratio	0.29	0.47		0.10	0.49	0.10		0.06			0.71	0.04
Control Delay	11.1	8.5		7.5	8.8	0.1		17.9			49.2	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	11.1	8.5		7.5	8.8	0.1		17.9			49.2	0.0
LOS	B	A		A	A	A		B			D	A
Approach Delay		8.7			7.7			17.9			35.1	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	4.7	42.0		1.5	45.3	0.0		1.0			25.9	0.0
Queue Length 95th (m)	14.3	63.6		5.4	68.4	0.0		m5.9			46.3	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	260	2351		287	2353	1601		414			315	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.29	0.47		0.10	0.49	0.10		0.04			0.53	0.04

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 85.3

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 10.5

Intersection LOS: B

Intersection Capacity Utilization 67.6%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2031 Future Background - SAT: Add'l Signals
 5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1230	3	6	1283	0	9
Future Volume (Veh/h)	1230	3	6	1283	0	9
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)	1309	3	6	1365	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			1312		2005	656
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			997		1820	219
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	98
cM capacity (veh/h)			592		59	624
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	873	439	461	910	10	
Volume Left	0	0	6	0	0	
Volume Right	0	3	0	0	10	
cSH	1700	1700	592	1700	624	
Volume to Capacity	0.51	0.26	0.01	0.54	0.02	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.4	
Control Delay (s)	0.0	0.0	0.3	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1	10.9		
Approach LOS						B
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			49.6%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	907	186	451	913	35	257	56	260	51	123	100
Future Volume (vph)	145	907	186	451	913	35	257	56	260	51	123	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.974			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3506	0	1825	3590	0	1683	1733	1617	1772	1921	1633
Fl _t Permitted	0.281			0.108			0.673	0.724		0.578		
Satd. Flow (perm)	534	3506	0	207	3590	0	1188	1293	1593	1076	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			7				280			97
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	156	975	200	485	982	38	276	60	280	55	132	108
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	156	1175	0	485	1020	0	163	173	280	55	132	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Background - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		19.1	19.1	19.1	19.1	19.1	19.1
Actuated g/C Ratio	0.37	0.37		0.67	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.79	0.89		0.96	0.44		0.64	0.63	0.50	0.24	0.32	0.26
Control Delay	57.3	37.3		58.2	9.7		43.7	42.0	6.8	30.7	31.0	8.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	37.3		58.2	9.7		43.7	42.0	6.8	30.7	31.0	8.9
LOS	E	D		E	A		D	D	A	C	C	A
Approach Delay		39.6			25.3			26.5			22.9	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	23.3	96.0		64.2	41.0		26.9	28.4	0.0	7.8	19.2	1.5
Queue Length 95th (m)	#65.4	#161.7		#147.3	71.9		47.5	49.2	17.7	17.6	33.8	13.4
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	198	1316		503	2301		387	421	707	350	625	588
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	0.79	0.89		0.96	0.44		0.42	0.41	0.40	0.16	0.21	0.18

Intersection Summary

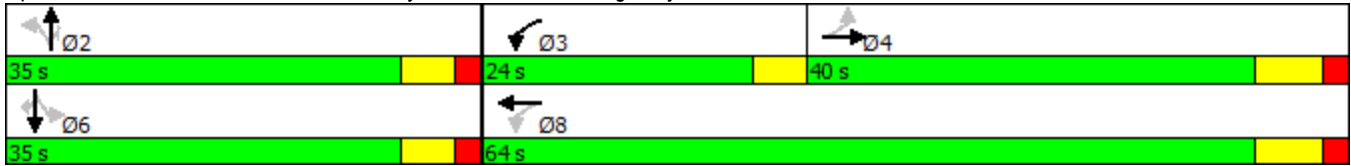
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89.5
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	30.4
Intersection Capacity Utilization	95.6%
Intersection LOS:	C
ICU Level of Service	F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	422	212	359	393	81	185
Future Volume (vph)	422	212	359	393	81	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2972	0	1620	3093	1471	1426
Flt Permitted			0.348		0.950	
Satd. Flow (perm)	2972	0	593	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	150					203
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	464	233	395	432	89	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	697	0	395	432	89	203
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

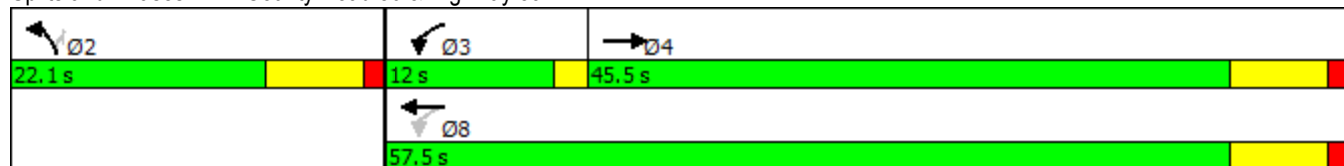


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	38.4		55.5	50.0	11.2	11.2
Actuated g/C Ratio	0.51		0.73	0.66	0.15	0.15
v/c Ratio	0.44		0.70	0.21	0.41	0.53
Control Delay	10.4		11.8	5.6	35.4	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	10.4		11.8	5.6	35.4	10.2
LOS	B		B	A	D	B
Approach Delay	10.4			8.6	17.9	
Approach LOS	B			A	B	
Queue Length 50th (m)	23.0		14.5	10.3	11.7	0.0
Queue Length 95th (m)	39.6		#32.2	18.8	24.6	16.5
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1581		569	2042	291	444
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.44		0.69	0.21	0.31	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	10.8
Intersection LOS:	B
Intersection Capacity Utilization:	72.9%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - AM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	16	567	694	17	31	74
Future Volume (Veh/h)	16	567	694	17	31	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	630	771	19	34	82
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	790				1132	395
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790				1132	395
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				83	87
cM capacity (veh/h)	770				195	610
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	228	420	514	276	116	
Volume Left	18	0	0	0	34	
Volume Right	0	0	0	19	82	
cSH	770	1700	1700	1700	376	
Volume to Capacity	0.02	0.25	0.30	0.16	0.31	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	9.8	
Control Delay (s)	1.0	0.0	0.0	0.0	18.8	
Lane LOS	A				C	
Approach Delay (s)	0.4		0.0		18.8	
Approach LOS					C	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - AM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	672	45	64	539	93	14	12	68	86	10	36
Future Volume (vph)	36	672	45	64	539	93	14	12	68	86	10	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.978			0.902			0.963	
Flt Protected	0.950			0.950				0.993			0.969	
Satd. Flow (prot)	1825	3156	0	1772	3164	0	0	1721	0	0	1745	0
Flt Permitted	0.390			0.351				0.939			0.797	
Satd. Flow (perm)	749	3156	0	655	3164	0	0	1627	0	0	1435	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			42			74			19	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		314.7			133.1			218.1			107.2	
Travel Time (s)		18.9			8.0			13.1			7.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	39	730	49	70	586	101	15	13	74	93	11	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	779	0	70	687	0	0	102	0	0	143	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - AM: Add'l Signals

09/21/2017

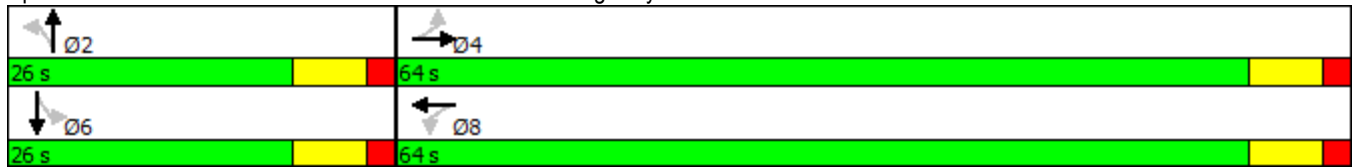


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	59.9	59.9		59.9	59.9			12.9			12.9	
Actuated g/C Ratio	0.69	0.69		0.69	0.69			0.15			0.15	
v/c Ratio	0.08	0.36		0.16	0.31			0.34			0.62	
Control Delay	6.0	6.5		6.8	5.9			14.8			41.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.0	6.5		6.8	5.9			14.8			41.2	
LOS	A	A		A	A			B			D	
Approach Delay		6.5			6.0			14.8			41.2	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.8	23.2		3.4	18.6			3.9			18.6	
Queue Length 95th (m)	6.1	40.7		10.3	33.5			16.5			36.2	
Internal Link Dist (m)		290.7			109.1			194.1			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	516	2181		451	2195			414			329	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.08	0.36		0.16	0.31			0.25			0.43	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	86.9
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.62
Intersection Signal Delay:	9.5
Intersection LOS:	A
Intersection Capacity Utilization:	55.8%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - AM: Add'l Signals
 21: Concession Road 7 & Street A 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	2	1	79	102	18
Future Volume (Veh/h)	15	2	1	79	102	18
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	2	1	88	113	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						218
pX, platoon unblocked						
vC, conflicting volume	213	123	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	213	123	133			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	775	928	1452			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	89	133			
Volume Left	17	1	0			
Volume Right	2	0	20			
cSH	788	1452	1700			
Volume to Capacity	0.02	0.00	0.08			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	9.7	0.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.7	0.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			16.5%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	791	1	10	614	86	0	1	1	65	3	51
Future Volume (vph)	48	791	1	10	614	86	0	1	1	65	3	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.954	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1749	1396
Fl _t Permitted	0.406			0.337							0.734	
Satd. Flow (perm)	703	3259	0	485	3230	1570	0	1790	0	0	1346	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	51	833	1	11	646	91	0	1	1	68	3	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	834	0	11	646	91	0	2	0	0	71	54
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	63.5	63.5		63.5	63.5	82.8		9.6			9.7	82.8
Actuated g/C Ratio	0.77	0.77		0.77	0.77	1.00		0.12			0.12	1.00
v/c Ratio	0.09	0.33		0.03	0.26	0.06		0.01			0.46	0.04
Control Delay	4.9	4.9		4.7	4.5	0.1		26.0			42.9	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	4.9	4.9		4.7	4.5	0.1		26.0			42.9	0.1
LOS	A	A		A	A	A		C			D	A
Approach Delay		4.9			4.0			26.0			24.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	2.1	22.4		0.4	16.2	0.0		0.1			11.7	0.0
Queue Length 95th (m)	6.3	36.0		2.1	26.6	0.0		m1.5			21.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	539	2499		372	2477	1570		544			408	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.09	0.33		0.03	0.26	0.06		0.00			0.17	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	82.8
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	5.9
Intersection Capacity Utilization	54.0%
Intersection LOS:	A
ICU Level of Service	A

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - AM: Add'l Signals
 5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	877	1	3	732	0	19
Future Volume (Veh/h)	877	1	3	732	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	943	1	3	787	0	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.93		0.93	0.93
vC, conflicting volume			944		1343	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			797		1225	292
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	97
cM capacity (veh/h)			778		162	639
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	629	315	265	525	20	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	20	
cSH	1700	1700	778	1700	639	
Volume to Capacity	0.37	0.19	0.00	0.31	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.7	
Control Delay (s)	0.0	0.0	0.2	0.0	10.8	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		10.8	
Approach LOS						B
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			34.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	699	214	315	490	12	224	30	121	12	42	24
Future Volume (vph)	44	699	214	315	490	12	224	30	121	12	42	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.965			0.996				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3151	0	1807	3455	0	1387	1474	1617	1825	1779	1633
Flt Permitted	0.451			0.175			0.728	0.746		0.658		
Satd. Flow (perm)	866	3151	0	333	3455	0	1063	1142	1617	1264	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			4				130			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	47	752	230	339	527	13	241	32	130	13	45	26
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	47	982	0	339	540	0	135	138	130	13	45	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	38.4	38.4		60.3	57.3		17.6	17.6	17.6	17.6	17.6	17.6
Actuated g/C Ratio	0.44	0.44		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.12	0.70		0.71	0.24		0.64	0.61	0.30	0.05	0.13	0.07
Control Delay	20.5	25.2		19.0	7.4		45.8	43.1	7.2	27.2	28.5	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	25.2		19.0	7.4		45.8	43.1	7.2	27.2	28.5	0.3
LOS	C	C		B	A		D	D	A	C	C	A
Approach Delay		24.9			11.9			32.4				19.6
Approach LOS		C			B			C				B
Queue Length 50th (m)	4.6	65.7		19.3	17.0		22.0	22.3	0.0	1.8	6.3	0.0
Queue Length 95th (m)	14.5	#124.4		57.7	32.7		40.8	40.9	12.9	6.2	14.5	0.0
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	378	1401		565	2251		352	378	622	418	589	600
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	0.12	0.70		0.60	0.24		0.38	0.37	0.21	0.03	0.08	0.04

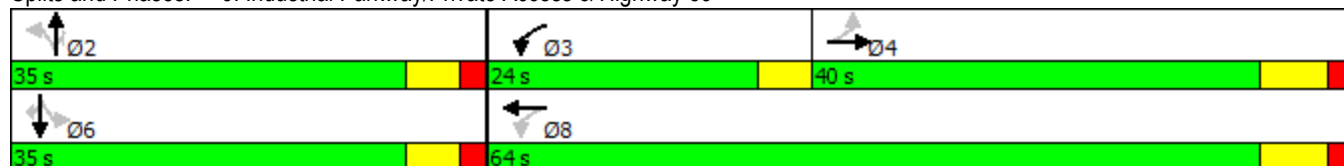
Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.9
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	21.2
Intersection LOS:	C
Intersection Capacity Utilization:	71.4%
ICU Level of Service:	C
Analysis Period (min):	15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	522	81	236	840	287	447
Future Volume (vph)	522	81	236	840	287	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Flt Permitted			0.367		0.950	
Satd. Flow (perm)	3205	0	592	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					378
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	561	87	254	903	309	481
Shared Lane Traffic (%)						
Lane Group Flow (vph)	648	0	254	903	309	481
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.2		55.5	50.0	15.0	15.0
Actuated g/C Ratio	0.49		0.70	0.63	0.19	0.19
v/c Ratio	0.41		0.49	0.42	0.99	1.00
Control Delay	13.3		7.8	8.2	83.1	52.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.3		7.8	8.2	83.1	52.7
LOS	B		A	A	F	D
Approach Delay	13.3			8.1	64.6	
Approach LOS	B			A	E	
Queue Length 50th (m)	29.7		11.6	32.1	47.0	~17.1
Queue Length 95th (m)	42.9		19.8	43.2	#94.6	#81.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1594		530	2163	313	480
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.41		0.48	0.42	0.99	1.00

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 79.6

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 26.6

Intersection LOS: C

Intersection Capacity Utilization 73.6%

ICU Level of Service D

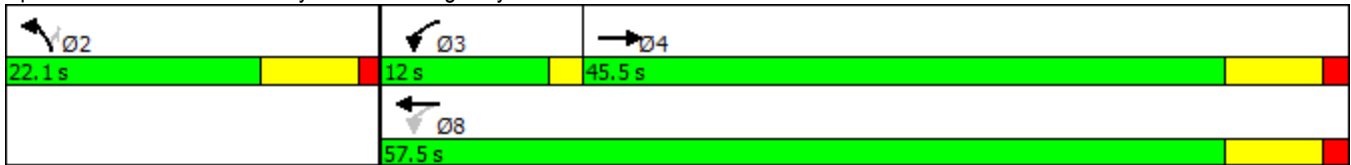
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - PM: Add'l Signals 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	59	907	1041	55	23	31
Future Volume (Veh/h)	59	907	1041	55	23	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	63	975	1119	59	25	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	1178				1762	589
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1178				1629	589
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	90				64	93
cM capacity (veh/h)	600				70	457
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	388	650	746	432	58	
Volume Left	63	0	0	0	25	
Volume Right	0	0	0	59	33	
cSH	600	1700	1700	1700	136	
Volume to Capacity	0.10	0.38	0.44	0.25	0.43	
Queue Length 95th (m)	2.7	0.0	0.0	0.0	14.3	
Control Delay (s)	3.2	0.0	0.0	0.0	50.0	
Lane LOS	A				F	
Approach Delay (s)	1.2		0.0		50.0	
Approach LOS					F	
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			70.6%		ICU Level of Service	C
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - PM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	876	47	161	1012	75	70	17	138	57	10	44
Future Volume (vph)	35	876	47	161	1012	75	70	17	138	57	10	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.990			0.917			0.947	
Flt Protected	0.950			0.950				0.985			0.975	
Satd. Flow (prot)	1825	3277	0	1825	3393	0	0	1688	0	0	1774	0
Flt Permitted	0.217			0.273				0.874			0.634	
Satd. Flow (perm)	417	3277	0	524	3393	0	0	1498	0	0	1153	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			16			82			34	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			220.4			107.2	
Travel Time (s)		18.6			8.0			13.2			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	37	922	49	169	1065	79	74	18	145	60	11	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	971	0	169	1144	0	0	237	0	0	117	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - PM: Add'l Signals

09/21/2017

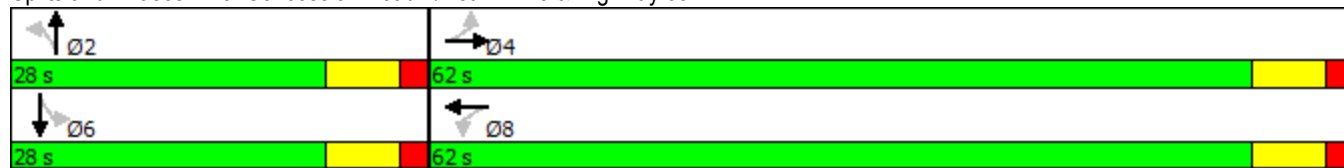


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	62.0	62.0		62.0	62.0		28.0	28.0		28.0	28.0	
Total Split (%)	68.9%	68.9%		68.9%	68.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	55.0	55.0		55.0	55.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	55.5	55.5		55.5	55.5			14.0			14.0	
Actuated g/C Ratio	0.66	0.66		0.66	0.66			0.17			0.17	
v/c Ratio	0.13	0.45		0.49	0.51			0.74			0.53	
Control Delay	8.1	8.1		14.4	8.7			35.6			31.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	8.1	8.1		14.4	8.7			35.6			31.2	
LOS	A	A		B	A			D			C	
Approach Delay		8.1			9.4			35.6			31.2	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	1.9	33.6		11.8	42.0			23.3			11.9	
Queue Length 95th (m)	7.1	57.6		35.2	70.9			46.7			27.5	
Internal Link Dist (m)		286.5			109.1			196.4			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	276	2180		348	2259			438			316	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.13	0.45		0.49	0.51			0.54			0.37	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.6
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.74
Intersection Signal Delay:	12.2
Intersection LOS:	B
Intersection Capacity Utilization:	66.6%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - PM: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	72	4	4	153	141	79
Future Volume (Veh/h)	72	4	4	153	141	79
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	80	4	4	170	157	88
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					220	
pX, platoon unblocked						
vC, conflicting volume	379	201	245			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	379	201	245			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	621	840	1321			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	84	174	245			
Volume Left	80	4	0			
Volume Right	4	0	88			
cSH	629	1321	1700			
Volume to Capacity	0.13	0.00	0.14			
Queue Length 95th (m)	3.5	0.1	0.0			
Control Delay (s)	11.6	0.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	0.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			23.1%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	1018	10	22	1123	140	0	0	12	117	1	71
Future Volume (vph)	83	1018	10	22	1123	140	0	0	12	117	1	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.998				0.850		0.865				0.850
Fl _t Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3376	0	1825	3444	1633	0	1662	0	0	1813	1633
Fl _t Permitted	0.211			0.241							0.719	
Satd. Flow (perm)	379	3376	0	463	3444	1633	0	1662	0	0	1368	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				134		121				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	87	1072	11	23	1182	147	0	0	13	123	1	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1083	0	23	1182	147	0	13	0	0	124	75
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	63.8	63.8		63.8	63.8	91.0		13.2			13.2	91.0
Actuated g/C Ratio	0.70	0.70		0.70	0.70	1.00		0.15			0.15	1.00
v/c Ratio	0.33	0.46		0.07	0.49	0.09		0.04			0.63	0.05
Control Delay	10.6	7.2		6.1	7.6	0.1		0.2			49.2	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	10.6	7.2		6.1	7.6	0.1		0.2			49.2	0.1
LOS	B	A		A	A	A		A			D	A
Approach Delay		7.5			6.7			0.2			30.7	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	5.0	37.3		1.1	42.2	0.0		0.0			19.6	0.0
Queue Length 95th (m)	16.2	59.7		4.2	67.0	0.0		m0.0			35.8	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	265	2366		324	2412	1633		426			271	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.33	0.46		0.07	0.49	0.09		0.03			0.46	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	91
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	8.8
Intersection LOS:	A
Intersection Capacity Utilization:	66.3%
ICU Level of Service:	C
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - PM: Add'l Signals
 5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1112	6	7	1344	0	17
Future Volume (Veh/h)	1112	6	7	1344	0	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1146	6	7	1386	0	18
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.87		0.87	0.87
vC, conflicting volume			1155		1859	579
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			884		1691	223
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			673		74	609
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	764	388	469	924	18	
Volume Left	0	0	7	0	0	
Volume Right	0	6	0	0	18	
cSH	1700	1700	673	1700	609	
Volume to Capacity	0.45	0.23	0.01	0.54	0.03	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.7	
Control Delay (s)	0.0	0.0	0.3	0.0	11.1	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		11.1	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			52.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Future Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.952			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3219	0	1825	3557	0	1534	1578	1617	1722	1921	1601
Flt Permitted	0.328			0.097			0.714	0.721		0.403		
Satd. Flow (perm)	630	3219	0	186	3557	0	1150	1182	1588	728	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		87			7				245			98
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	66	797	380	334	828	36	517	54	245	32	66	98
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	66	1177	0	334	864	0	284	287	245	32	66	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	37.2	37.2		60.1	57.1		27.1	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.38	0.38		0.62	0.59		0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.27	0.92		0.87	0.41		0.89	0.87	0.40	0.16	0.12	0.19
Control Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
LOS	C	D		D	B		E	E	A	C	C	A
Approach Delay		39.8			21.5			45.0				16.9
Approach LOS		D			C			D				B
Queue Length 50th (m)	9.0	108.8		44.8	45.2		53.5	53.8	0.0	4.5	9.2	0.0
Queue Length 95th (m)	21.1	#163.5		#81.6	58.4		#100.4	#100.1	16.8	12.0	19.2	11.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	241	1285		452	2091		343	353	646	217	573	540
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	0.27	0.92		0.74	0.41		0.83	0.81	0.38	0.15	0.12	0.18

Intersection Summary

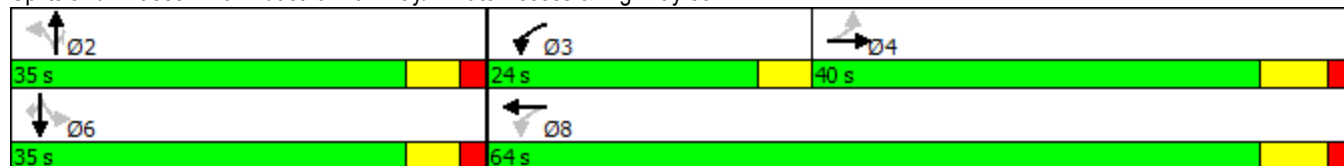
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	97.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	33.4
Intersection Capacity Utilization	87.3%
Intersection LOS:	C
ICU Level of Service	E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	672	102	245	744	189	274
Future Volume (vph)	672	102	245	744	189	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.980					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3462	0	1668	3544	1713	949
Fl _t Permitted			0.299		0.950	
Satd. Flow (perm)	3462	0	525	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					282
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	693	105	253	767	195	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	798	0	253	767	195	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	13.2	13.2
Actuated g/C Ratio	0.51		0.71	0.64	0.17	0.17
v/c Ratio	0.45		0.51	0.34	0.67	0.72
Control Delay	13.2		7.8	7.0	42.6	15.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.2		7.8	7.0	42.6	15.5
LOS	B		A	A	D	B
Approach Delay	13.2			7.2	26.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	37.0		10.9	24.8	27.2	0.0
Queue Length 95th (m)	53.8		19.2	34.8	47.6	#31.0
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1779		521	2279	330	410
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.45		0.49	0.34	0.59	0.69

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 77.8

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 68.7%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - SAT: Add'l Signals
 2: Highway 89 & Concession Road 6

10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↘↘	
Traffic Volume (veh/h)	15	820	765	40	34	14
Future Volume (Veh/h)	15	820	765	40	34	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	891	832	43	37	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)		200				
pX, platoon unblocked					0.88	
vC, conflicting volume	875				1331	438
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	875				1109	438
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				79	97
cM capacity (veh/h)	780				179	573
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	313	594	555	320	52	
Volume Left	16	0	0	0	37	
Volume Right	0	0	0	43	15	
cSH	780	1700	1700	1700	223	
Volume to Capacity	0.02	0.35	0.33	0.19	0.23	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	6.7	
Control Delay (s)	0.7	0.0	0.0	0.0	26.0	
Lane LOS	A				D	
Approach Delay (s)	0.3	0.0		26.0		
Approach LOS					D	
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			43.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - SAT: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	831	79	228	886	195	92	16	224	154	39	53
Future Volume (vph)	51	831	79	228	886	195	92	16	224	154	39	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.973			0.909			0.971	
Flt Protected	0.950			0.950				0.986			0.970	
Satd. Flow (prot)	1825	3538	0	1789	3466	0	0	1722	0	0	1798	0
Flt Permitted	0.187			0.162				0.833			0.550	
Satd. Flow (perm)	359	3538	0	305	3466	0	0	1455	0	0	1020	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			35			124			17	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			218.3			107.2	
Travel Time (s)		18.7			8.0			13.1			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	54	875	83	240	933	205	97	17	236	162	41	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	958	0	240	1138	0	0	350	0	0	259	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Background - SAT: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	7.0	29.0		14.0	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	40.4	29.9		47.9	38.4			23.1			23.1	
Actuated g/C Ratio	0.50	0.37		0.59	0.47			0.28			0.28	
v/c Ratio	0.18	0.73		0.63	0.69			0.70			0.86	
Control Delay	10.7	27.7		18.5	21.3			24.3			52.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	10.7	27.7		18.5	21.3			24.3			52.4	
LOS	B	C		B	C			C			D	
Approach Delay		26.8			20.8			24.3			52.4	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	3.4	68.0		17.1	77.5			31.6			36.5	
Queue Length 95th (m)	9.0	#103.8		37.8	113.2			60.9			#73.4	
Internal Link Dist (m)		288.3			109.1			194.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	310	1312		440	1658			623			393	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.17	0.73		0.55	0.69			0.56			0.66	

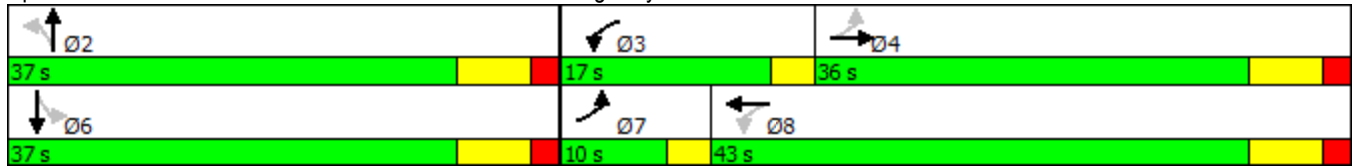
Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 81.1
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 25.9
 Intersection LOS: C
 Intersection Capacity Utilization 81.3%
 ICU Level of Service D
 Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - SAT: Add'l Signals
 22: Concession Road 7 & Street A

10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	8	13	169	158	187
Future Volume (Veh/h)	161	8	13	169	158	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	179	9	14	188	176	208
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)				218		
pX, platoon unblocked	0.94	0.94	0.94			
vC, conflicting volume	496	280	384			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	197	308			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	67	99	99			
cM capacity (veh/h)	540	790	1173			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	188	202	384			
Volume Left	179	14	0			
Volume Right	9	0	208			
cSH	549	1173	1700			
Volume to Capacity	0.34	0.01	0.23			
Queue Length 95th (m)	11.5	0.3	0.0			
Control Delay (s)	14.9	0.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.9	0.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			35.8%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	1194	7	31	1259	185	1	7	12	180	6	75
Future Volume (vph)	83	1194	7	31	1259	185	1	7	12	180	6	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t		0.999				0.850		0.916				0.850
Fl _t Protected	0.950			0.950				0.998			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1756	0	0	1781	1555
Fl _t Permitted	0.163			0.178				0.984			0.717	
Satd. Flow (perm)	307	3575	0	342	3579	1601	0	1732	0	0	1339	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				158		13				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	87	1257	7	33	1325	195	1	7	13	189	6	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1264	0	33	1325	195	0	21	0	0	195	79
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	58.8	58.8		58.8	58.8	89.7		16.9			16.9	89.7
Actuated g/C Ratio	0.66	0.66		0.66	0.66	1.00		0.19			0.19	1.00
v/c Ratio	0.43	0.54		0.15	0.57	0.12		0.06			0.77	0.05
Control Delay	17.1	9.8		8.9	10.1	0.2		17.4			54.9	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	17.1	9.8		8.9	10.1	0.2		17.4			54.9	0.1
LOS	B	A		A	B	A		B			D	A
Approach Delay		10.2			8.8			17.4			39.1	
Approach LOS		B			A			B			D	
Queue Length 50th (m)	6.7	56.4		2.0	60.8	0.0		1.1			30.9	0.0
Queue Length 95th (m)	21.4	77.8		6.6	83.5	0.0		m6.5			#57.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	201	2343		224	2345	1601		396			298	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.43	0.54		0.15	0.57	0.12		0.05			0.65	0.05

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 89.7

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 12.1

Intersection LOS: B

Intersection Capacity Utilization 73.9%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Background - SAT: Add'l Signals
5: Elizabeth Street & Highway 89

10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1416	3	7	1470	0	10
Future Volume (Veh/h)	1416	3	7	1470	0	10
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)	1506	3	7	1564	0	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.80		0.80	0.80
vC, conflicting volume			1509		2304	754
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1133		2128	188
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	98
cM capacity (veh/h)			498		34	621
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1004	505	528	1043	11	
Volume Left	0	0	7	0	0	
Volume Right	0	3	0	0	11	
cSH	1700	1700	498	1700	621	
Volume to Capacity	0.59	0.30	0.01	0.61	0.02	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.4	
Control Delay (s)	0.0	0.0	0.4	0.0	10.9	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		10.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			55.5%	ICU Level of Service	B	
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1041	215	523	1041	41	298	65	301	59	143	116
Future Volume (vph)	168	1041	215	523	1041	41	298	65	301	59	143	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.974			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3506	0	1825	3590	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.244			0.108			0.642	0.694		0.529		
Satd. Flow (perm)	464	3506	0	207	3590	0	1134	1240	1593	985	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			7				324			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	181	1119	231	562	1119	44	320	70	324	63	154	125
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	181	1350	0	562	1163	0	189	201	324	63	154	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Background - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		21.7	21.7	21.7	21.7	21.7	21.7
Actuated g/C Ratio	0.36	0.36		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	1.08	1.06		1.15	0.52		0.71	0.69	0.52	0.27	0.34	0.28
Control Delay	128.1	71.4		115.7	11.6		46.9	44.4	6.4	30.9	30.6	11.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	128.1	71.4		115.7	11.6		46.9	44.4	6.4	30.9	30.6	11.7
LOS	F	E		F	B		D	D	A	C	C	B
Approach Delay		78.1			45.5			27.8				23.8
Approach LOS		E			D			C				C
Queue Length 50th (m)	~37.0	~140.7		~103.8	56.7		32.3	34.2	0.0	9.1	22.7	5.1
Queue Length 95th (m)	#82.5	#200.3		#181.7	86.2		56.2	58.3	19.0	19.9	38.7	18.2
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	167	1279		488	2236		359	392	725	311	607	568
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	1.08	1.06		1.15	0.52		0.53	0.51	0.45	0.20	0.25	0.22

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.1
Natural Cycle:	130
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.15
Intersection Signal Delay:	52.4
Intersection Capacity Utilization	105.4%
Intersection LOS:	D
ICU Level of Service	G

Analysis Period (min) 15

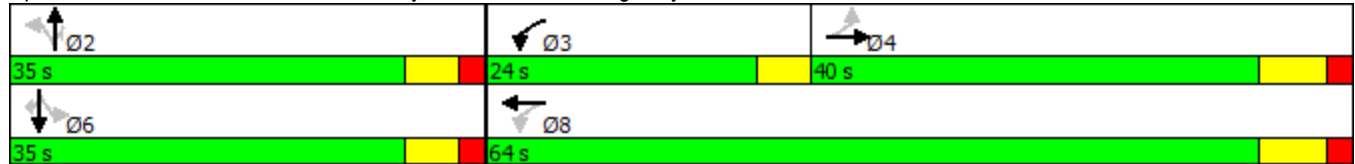
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - AM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	438	158	267	315	60	138
Future Volume (vph)	438	158	267	315	60	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.960					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3002	0	1620	3093	1471	1426
Flt Permitted			0.374		0.950	
Satd. Flow (perm)	3002	0	638	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	88					152
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	481	174	293	346	66	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	655	0	293	346	66	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - AM
9/7/2017

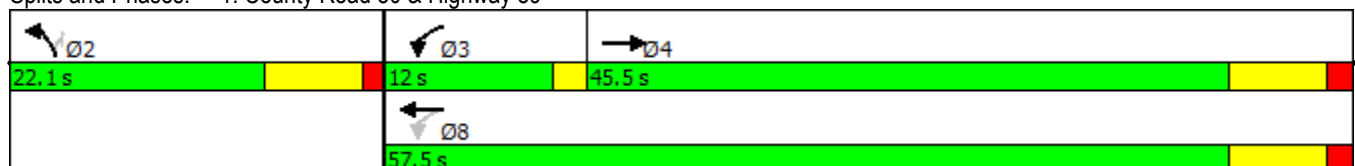


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.4		55.5	50.0	10.5	10.5
Actuated g/C Ratio	0.52		0.74	0.67	0.14	0.14
v/c Ratio	0.41		0.50	0.17	0.32	0.46
Control Delay	10.4		6.4	5.1	33.7	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	10.4		6.4	5.1	33.7	10.5
LOS	B		A	A	C	B
Approach Delay	10.4			5.7	17.5	
Approach LOS	B			A	B	
Queue Length 50th (m)	22.8		9.9	8.0	8.6	0.0
Queue Length 95th (m)	38.1		19.6	14.0	19.3	14.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1617		602	2059	293	406
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.41		0.49	0.17	0.23	0.37

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.1
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.50
Intersection Signal Delay:	9.4
Intersection Capacity Utilization	67.8%
Analysis Period (min)	15
Intersection LOS:	A
ICU Level of Service	C

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Total - AM
9/8/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	12	546	539	16	36	55
Future Volume (Veh/h)	12	546	539	16	36	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	607	599	18	40	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.96	
vC, conflicting volume	617				938	308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	617				857	308
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				86	91
cM capacity (veh/h)	900				285	693
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	215	405	399	218	101	
Volume Left	13	0	0	0	40	
Volume Right	0	0	0	18	61	
cSH	900	1700	1700	1700	442	
Volume to Capacity	0.01	0.24	0.23	0.13	0.23	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	6.6	
Control Delay (s)	0.7	0.0	0.0	0.0	15.5	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		15.5	
Approach LOS					C	
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			35.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2026 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	555	142	137	540	14	34
Future Volume (Veh/h)	555	142	137	540	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	617	158	152	600	16	38
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			775		1300	388
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			775		1300	388
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		87	94
cM capacity (veh/h)			837		125	611
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	411	364	352	400	54	
Volume Left	0	0	152	0	16	
Volume Right	0	158	0	0	38	
cSH	1700	1700	837	1700	284	
Volume to Capacity	0.24	0.21	0.18	0.24	0.19	
Queue Length 95th (m)	0.0	0.0	5.0	0.0	5.2	
Control Delay (s)	0.0	0.0	5.6	0.0	20.6	
Lane LOS			A	C		
Approach Delay (s)	0.0		2.6		20.6	
Approach LOS					C	
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			52.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - AM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	499	35	51	401	69	12	9	53	64	8	27
Future Volume (Veh/h)	27	499	35	51	401	69	12	9	53	64	8	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	542	38	55	436	75	13	10	58	70	9	29
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	511			580			980	1240	290	976	1222	256
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	511			580			980	1240	290	976	1222	256
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	97			94			93	94	92	59	95	96
cM capacity (veh/h)	1065			983			179	162	713	171	166	720

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	29	361	219	55	291	220	81	108
Volume Left	29	0	0	55	0	0	13	70
Volume Right	0	0	38	0	0	75	58	29
cSH	1065	1700	1700	983	1700	1700	375	215
Volume to Capacity	0.03	0.21	0.13	0.06	0.17	0.13	0.22	0.50
Queue Length 95th (m)	0.6	0.0	0.0	1.3	0.0	0.0	6.1	19.4
Control Delay (s)	8.5	0.0	0.0	8.9	0.0	0.0	17.2	37.6
Lane LOS	A			A			C	E
Approach Delay (s)	0.4			0.9			17.2	37.6
Approach LOS							C	E

Intersection Summary

Average Delay	4.5
Intersection Capacity Utilization	40.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
7: Concession Road 7 & Street A

2026 Future Total - AM
9/8/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	59	76	143
Future Volume (Veh/h)	51	6	22	59	76	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	66	84	159
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	278	164	243			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	278	164	243			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	99	98			
cM capacity (veh/h)	699	881	1323			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	90	243			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	715	1323	1700			
Volume to Capacity	0.09	0.02	0.14			
Queue Length 95th (m)	2.2	0.4	0.0			
Control Delay (s)	10.5	2.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.5	2.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			30.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - AM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	648	1	8	718	64	0	1	1	48	3	47
Future Volume (Veh/h)	36	648	1	8	718	64	0	1	1	48	3	47
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	38	682	1	8	756	67	0	1	1	51	3	49
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	756			687			1158	1534	346	1190	1535	378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	756			687			1158	1534	346	1190	1535	378
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	95			99			100	99	100	61	97	92
cM capacity (veh/h)	794			721			131	110	654	132	110	579
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	38	455	228	8	378	378	67	2	103			
Volume Left	38	0	0	8	0	0	0	0	51			
Volume Right	0	0	1	0	0	0	67	1	49			
cSH	794	1700	1700	721	1700	1700	1700	189	249			
Volume to Capacity	0.05	0.27	0.13	0.01	0.22	0.22	0.04	0.01	0.41			
Queue Length 95th (m)	1.1	0.0	0.0	0.3	0.0	0.0	0.0	0.2	14.5			
Control Delay (s)	9.8	0.0	0.0	10.1	0.0	0.0	0.0	24.3	32.2			
Lane LOS	A			B				C	D			
Approach Delay (s)	0.5			0.1				24.3	32.2			
Approach LOS								C	D			
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			42.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	713	1	3	806	0	14
Future Volume (Veh/h)	713	1	3	806	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	767	1	3	867	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			768	1207	384	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			768	1207	384	
tC, single (s)			4.1	6.8	7.1	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.4	
p0 queue free %			100	100	97	
cM capacity (veh/h)			855	178	595	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	511	257	292	578	15	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	15	
cSH	1700	1700	855	1700	595	
Volume to Capacity	0.30	0.15	0.00	0.34	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.6	
Control Delay (s)	0.0	0.0	0.1	0.0	11.2	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.0		11.2	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			34.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	579	161	235	622	9	171	22	90	9	31	18
Future Volume (vph)	33	579	161	235	622	9	171	22	90	9	31	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3171	0	1807	3465	0	1387	1473	1617	1825	1779	1633
Flt Permitted	0.393			0.281			0.736	0.753		0.686		
Satd. Flow (perm)	755	3171	0	534	3465	0	1075	1152	1617	1318	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			2				97			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	35	623	173	253	669	10	184	24	97	10	33	19
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	35	796	0	253	679	0	103	105	97	10	33	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - AM
9/7/2017

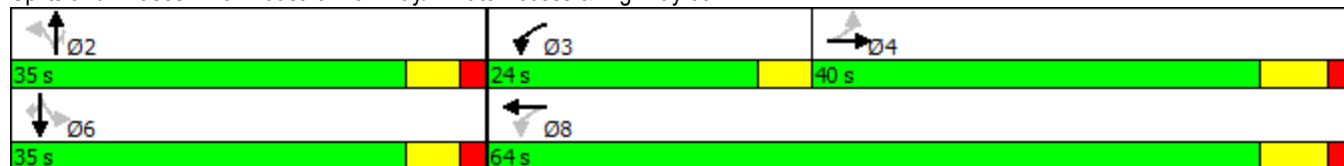


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	43.6	43.6		60.1	57.1		14.8	14.8	14.8	14.8	14.8	14.8
Actuated g/C Ratio	0.51	0.51		0.71	0.67		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.09	0.48		0.49	0.29		0.55	0.52	0.27	0.04	0.11	0.05
Control Delay	13.9	15.1		8.2	6.6		43.2	41.3	8.4	28.3	29.4	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	15.1		8.2	6.6		43.2	41.3	8.4	28.3	29.4	0.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		15.0			7.0			31.5			20.3	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	2.6	37.5		11.3	19.8		16.2	16.4	0.0	1.4	4.6	0.0
Queue Length 95th (m)	9.6	70.2		26.2	36.6		32.0	32.1	11.5	5.4	11.8	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	387	1644		677	2329		367	393	616	450	608	616
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	0.09	0.48		0.37	0.29		0.28	0.27	0.16	0.02	0.05	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	85
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	14.0
Intersection Capacity Utilization:	61.1%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	410	60	176	766	214	333
Future Volume (vph)	410	60	176	766	214	333
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3208	0	1532	3444	1665	921
Flt Permitted			0.444		0.950	
Satd. Flow (perm)	3208	0	716	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					358
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	441	65	189	824	230	358
Shared Lane Traffic (%)						
Lane Group Flow (vph)	506	0	189	824	230	358
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.1		55.5	50.0	13.9	13.9
Actuated g/C Ratio	0.51		0.71	0.64	0.18	0.18
v/c Ratio	0.31		0.32	0.38	0.78	0.78
Control Delay	11.6		5.6	7.6	50.9	17.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.6		5.6	7.6	50.9	17.5
LOS	B		A	A	D	B
Approach Delay	11.6			7.2	30.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	20.8		8.2	28.4	33.1	0.0
Queue Length 95th (m)	32.5		14.7	38.4	#64.3	#40.3
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1651		610	2195	318	465
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.31		0.31	0.38	0.72	0.77

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	78.5
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.78
Intersection Signal Delay:	14.8
Intersection LOS:	B
Intersection Capacity Utilization:	66.3%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Total - PM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↔↔		↔↔	
Traffic Volume (veh/h)	44	697	916	66	19	23
Future Volume (Veh/h)	44	697	916	66	19	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	47	749	985	71	20	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.94	
vC, conflicting volume	1056				1489	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1056				1397	528
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	93				82	95
cM capacity (veh/h)	667				110	500
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	297	499	657	399	45	
Volume Left	47	0	0	0	20	
Volume Right	0	0	0	71	25	
cSH	667	1700	1700	1700	193	
Volume to Capacity	0.07	0.29	0.39	0.23	0.23	
Queue Length 95th (m)	1.7	0.0	0.0	0.0	6.6	
Control Delay (s)	2.5	0.0	0.0	0.0	29.2	
Lane LOS	A				D	
Approach Delay (s)	0.9		0.0		29.2	
Approach LOS					D	
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			61.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Street B & Highway 89

2026 Future Total - PM
10/19/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	694	42	68	886	95	132
Future Volume (Veh/h)	694	42	68	886	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	771	47	76	984	106	147
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		1438	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			818		1438	409
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		6	75
cM capacity (veh/h)			806		112	592
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	514	304	76	492	492	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	806	1700	1700	212
Volume to Capacity	0.30	0.18	0.09	0.29	0.29	1.19
Queue Length 95th (m)	0.0	0.0	2.4	0.0	0.0	96.0
Control Delay (s)	0.0	0.0	9.9	0.0	0.0	170.4
Lane LOS			A			F
Approach Delay (s)	0.0		0.7			170.4
Approach LOS						F
Intersection Summary						
Average Delay			20.6			
Intersection Capacity Utilization			47.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - PM
 10/19/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	↗
Traffic Volume (veh/h)	26	782	20	148	819	56	125	13	201	42	8	33
Future Volume (Veh/h)	26	782	20	148	819	56	125	13	201	42	8	33
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	823	21	156	862	59	132	14	212	44	8	35
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	921			844			1670	2120	422	1888	2102	460
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	921			844			1670	2120	422	1888	2102	460
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			81			0	65	64	0	80	94
cM capacity (veh/h)	750			801			39	40	586	17	41	553

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	27	549	295	156	575	346	358	87
Volume Left	27	0	0	156	0	0	132	44
Volume Right	0	0	21	0	0	59	212	35
cSH	750	1700	1700	801	1700	1700	87	31
Volume to Capacity	0.04	0.32	0.17	0.19	0.34	0.20	4.13	2.84
Queue Length 95th (m)	0.9	0.0	0.0	5.5	0.0	0.0	Err	77.8
Control Delay (s)	10.0	0.0	0.0	10.6	0.0	0.0	Err	1104.0
Lane LOS	A			B			F	F
Approach Delay (s)	0.3			1.5			Err	1104.0
Approach LOS							F	F

Intersection Summary

Average Delay		1536.8	
Intersection Capacity Utilization		63.1%	ICU Level of Service
Analysis Period (min)		15	B

HCM Unsignalized Intersection Capacity Analysis
 24: Concession Road 7 & Street A

2026 Future Total - PM
 09/26/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	114	104	72
Future Volume (Veh/h)	226	24	9	114	104	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	127	116	80
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	303	156	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	303	156	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	97	99			
cM capacity (veh/h)	684	890	1377			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	137	196			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	699	1377	1700			
Volume to Capacity	0.40	0.01	0.12			
Queue Length 95th (m)	14.5	0.2	0.0			
Control Delay (s)	13.5	0.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.5	0.6	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization		34.1%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	974	8	16	926	104	0	0	9	87	1	55
Future Volume (Veh/h)	74	974	8	16	926	104	0	0	9	87	1	55
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	78	1025	8	17	975	109	0	0	9	92	1	58
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	975			1033			1707	2194	516	1686	2198	488
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	975			1033			1707	2194	516	1686	2198	488
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			98			100	100	98	0	97	89
cM capacity (veh/h)	673			681			47	39	509	54	39	531

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	78	683	350	17	488	488	109	9	151
Volume Left	78	0	0	17	0	0	0	0	92
Volume Right	0	0	8	0	0	0	109	9	58
cSH	673	1700	1700	681	1700	1700	1700	509	86
Volume to Capacity	0.12	0.40	0.21	0.02	0.29	0.29	0.06	0.02	1.76
Queue Length 95th (m)	3.0	0.0	0.0	0.6	0.0	0.0	0.0	0.4	96.0
Control Delay (s)	11.0	0.0	0.0	10.4	0.0	0.0	0.0	12.2	467.6
Lane LOS	B			B				B	F
Approach Delay (s)	0.8			0.2				12.2	467.6
Approach LOS								B	F

Intersection Summary		
Average Delay		30.3
Intersection Capacity Utilization	52.1%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - PM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1044	4	5	1091	0	13
Future Volume (Veh/h)	1044	4	5	1091	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1076	4	5	1125	0	13
Pedestrians					3	
Lane Width (m)					3.7	
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			1083		1654	543
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1083		1654	543
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			650		90	417
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	717	363	380	750	13	
Volume Left	0	0	5	0	0	
Volume Right	0	4	0	0	13	
cSH	1700	1700	650	1700	417	
Volume to Capacity	0.42	0.21	0.01	0.44	0.03	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.7	
Control Delay (s)	0.0	0.0	0.2	0.0	13.9	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		13.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			43.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	782	276	239	681	26	370	39	175	23	47	70
Future Volume (vph)	47	782	276	239	681	26	370	39	175	23	47	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.961			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3284	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Fl _t Permitted	0.372			0.135			0.725	0.734		0.506		
Satd. Flow (perm)	714	3284	0	259	3557	0	1168	1203	1588	913	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54			6				182			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	49	815	288	249	709	27	385	41	182	24	49	73
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	49	1103	0	249	736	0	212	214	182	24	49	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	41.1	41.1		60.3	57.3		22.4	22.4	22.4	22.4	22.4	22.4
Actuated g/C Ratio	0.44	0.44		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.16	0.74		0.67	0.33		0.75	0.74	0.35	0.11	0.11	0.16
Control Delay	21.6	26.7		20.5	9.8		49.5	47.9	6.2	27.5	26.8	5.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	26.7		20.5	9.8		49.5	47.9	6.2	27.5	26.8	5.3
LOS	C	C		C	A		D	D	A	C	C	A
Approach Delay		26.4			12.5			35.9			16.1	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	5.1	79.9		16.9	31.2		36.8	37.0	0.0	3.3	6.8	0.0
Queue Length 95th (m)	15.6	#147.4		43.1	48.2		62.7	62.7	14.7	9.6	15.2	7.6
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	316	1485		507	2199		367	377	623	286	603	556
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	0.16	0.74		0.49	0.33		0.58	0.57	0.29	0.08	0.08	0.13

Intersection Summary

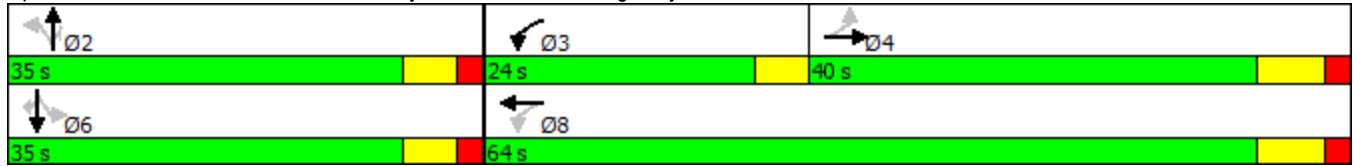
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	23.2
Intersection Capacity Utilization	78.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	527	76	189	645	141	204
Future Volume (vph)	527	76	189	645	141	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3468	0	1668	3544	1713	949
Flt Permitted			0.391		0.950	
Satd. Flow (perm)	3468	0	687	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	27					210
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	543	78	195	665	145	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	621	0	195	665	145	210
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.4		55.5	50.0	12.1	12.1
Actuated g/C Ratio	0.53		0.72	0.65	0.16	0.16
v/c Ratio	0.34		0.33	0.29	0.54	0.64
Control Delay	11.1		5.2	6.3	37.6	14.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		5.2	6.3	37.6	14.6
LOS	B		A	A	D	B
Approach Delay	11.1			6.1	24.0	
Approach LOS	B			A	C	
Queue Length 50th (m)	23.6		6.9	18.5	19.6	0.0
Queue Length 95th (m)	39.9		14.8	29.5	36.2	19.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1840		625	2311	335	354
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.34		0.31	0.29	0.43	0.59

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	76.7
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	11.2
Intersection LOS:	B
Intersection Capacity Utilization:	63.5%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Total - SAT
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	13	697	715	48	30	12
Future Volume (Veh/h)	13	697	715	48	30	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	758	777	52	33	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	829				1210	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	829				1053	414
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				84	98
cM capacity (veh/h)	811				203	592
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	267	505	518	311	46	
Volume Left	14	0	0	0	33	
Volume Right	0	0	0	52	13	
cSH	811	1700	1700	1700	250	
Volume to Capacity	0.02	0.30	0.30	0.18	0.18	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	5.0	
Control Delay (s)	0.7	0.0	0.0	0.0	22.7	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		22.7	
Approach LOS					C	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			38.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
8: Street B & Highway 89

2026 Future Total - SAT
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	672	73	107	736	81	109
Future Volume (Veh/h)	672	73	107	736	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	747	81	119	818	90	121
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			828		1434	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			828		1434	414
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		15	79
cM capacity (veh/h)			799		106	587
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	498	330	392	545	211	
Volume Left	0	0	119	0	90	
Volume Right	0	81	0	0	121	
cSH	1700	1700	799	1700	200	
Volume to Capacity	0.29	0.19	0.15	0.32	1.05	
Queue Length 95th (m)	0.0	0.0	4.0	0.0	73.0	
Control Delay (s)	0.0	0.0	4.4	0.0	128.5	
Lane LOS	A			F		
Approach Delay (s)	0.0		1.8	128.5		
Approach LOS				F		
Intersection Summary						
Average Delay			14.6			
Intersection Capacity Utilization			65.5%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - SAT
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Volume (veh/h)	38	725	21	180	760	145	98	12	208	115	29	40
Future Volume (Veh/h)	38	725	21	180	760	145	98	12	208	115	29	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	40	763	22	189	800	153	103	13	219	121	31	42
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	953			785			1690	2185	392	1942	2120	476
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	953			785			1690	2185	392	1942	2120	476
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			77			0	62	64	0	17	92
cM capacity (veh/h)	729			829			14	34	612	14	37	540

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	40	509	276	189	533	420	335	194
Volume Left	40	0	0	189	0	0	103	121
Volume Right	0	0	22	0	0	153	219	42
cSH	729	1700	1700	829	1700	1700	42	21
Volume to Capacity	0.05	0.30	0.16	0.23	0.31	0.25	7.95	9.34
Queue Length 95th (m)	1.3	0.0	0.0	6.7	0.0	0.0	Err	Err
Control Delay (s)	10.2	0.0	0.0	10.6	0.0	0.0	Err	Err
Lane LOS	B			B			F	F
Approach Delay (s)	0.5			1.8			Err	Err
Approach LOS							F	F

Intersection Summary

Average Delay		2120.1	
Intersection Capacity Utilization		60.3%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Concession Road 7 & Street A

2026 Future Total - SAT
9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	124	117	112
Future Volume (Veh/h)	192	21	18	124	117	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	138	130	124
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	370	192	254			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	370	192	254			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	97	98			
cM capacity (veh/h)	621	850	1311			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	158	254			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	637	1311	1700			
Volume to Capacity	0.37	0.02	0.15			
Queue Length 95th (m)	13.0	0.4	0.0			
Control Delay (s)	13.9	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.9	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization		40.3%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - SAT
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕↗		↖	↕↖	↖		↕			↕↖	↖
Traffic Volume (veh/h)	69	1027	5	23	1046	138	1	5	9	134	4	58
Future Volume (Veh/h)	69	1027	5	23	1046	138	1	5	9	134	4	58
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	73	1081	5	24	1101	145	1	5	9	141	4	61
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1101			1087			1831	2380	544	1847	2382	550
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1101			1087			1831	2380	544	1847	2382	550
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			96			97	83	98	0	86	87
cM capacity (veh/h)	630			649			34	30	488	35	30	471

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	73	721	365	24	550	550	145	15	206
Volume Left	73	0	0	24	0	0	0	1	141
Volume Right	0	0	5	0	0	0	145	9	61
cSH	630	1700	1700	649	1700	1700	1700	69	48
Volume to Capacity	0.12	0.42	0.21	0.04	0.32	0.32	0.09	0.22	4.31
Queue Length 95th (m)	3.0	0.0	0.0	0.9	0.0	0.0	0.0	5.7	Err
Control Delay (s)	11.5	0.0	0.0	10.8	0.0	0.0	0.0	70.9	Err
Lane LOS	B			B				F	F
Approach Delay (s)	0.7			0.2				70.9	Err
Approach LOS								F	F

Intersection Summary		
Average Delay		778.1
Intersection Capacity Utilization	57.0%	ICU Level of Service
Analysis Period (min)	15	B

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - SAT
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1192	3	5	1203	0	8
Future Volume (Veh/h)	1192	3	5	1203	0	8
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)	1268	3	5	1280	0	9
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			1271		1920	636
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1271		1920	636
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	98
cM capacity (veh/h)			553		60	387
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	845	426	432	853	9	
Volume Left	0	0	5	0	0	
Volume Right	0	3	0	0	9	
cSH	1700	1700	553	1700	387	
Volume to Capacity	0.50	0.25	0.01	0.50	0.02	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.5	
Control Delay (s)	0.0	0.0	0.3	0.0	14.5	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.1		14.5	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			46.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	911	163	389	882	30	223	48	224	44	106	86
Future Volume (vph)	125	911	163	389	882	30	223	48	224	44	106	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.977			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3523	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.292			0.103			0.684	0.735		0.628		
Satd. Flow (perm)	555	3523	0	198	3594	0	1208	1313	1593	1168	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			6				241			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	134	980	175	418	948	32	240	52	241	47	114	92
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	134	1155	0	418	980	0	142	150	241	47	114	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	35.0	35.0		60.3	57.3		17.3	17.3	17.3	17.3	17.3	17.3
Actuated g/C Ratio	0.40	0.40		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.61	0.81		0.88	0.42		0.60	0.58	0.48	0.20	0.30	0.24
Control Delay	38.5	30.5		42.5	8.6		42.3	40.8	7.2	30.5	31.3	7.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	30.5		42.5	8.6		42.3	40.8	7.2	30.5	31.3	7.8
LOS	D	C		D	A		D	D	A	C	C	A
Approach Delay		31.4			18.7			26.0			22.6	
Approach LOS		C			B			C			C	
Queue Length 50th (m)	18.0	90.1		48.4	36.0		22.9	24.1	0.0	6.6	16.4	0.0
Queue Length 95th (m)	#51.3	#151.9		#114.6	64.7		41.5	43.0	16.9	15.4	30.0	10.9
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	221	1419		509	2352		401	436	690	388	638	595
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	0.61	0.81		0.82	0.42		0.35	0.34	0.35	0.12	0.18	0.15

Intersection Summary

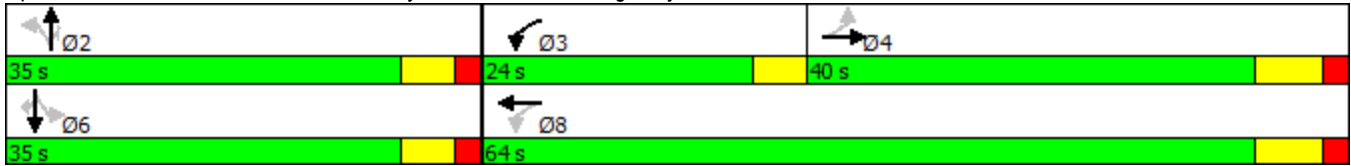
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.6
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	24.8
Intersection Capacity Utilization	81.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - AM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	488	183	310	361	70	160
Future Volume (vph)	488	183	310	361	70	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.959					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2999	0	1620	3093	1471	1426
Flt Permitted			0.331		0.950	
Satd. Flow (perm)	2999	0	564	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	93					176
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	536	201	341	397	77	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	737	0	341	397	77	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - AM
9/7/2017

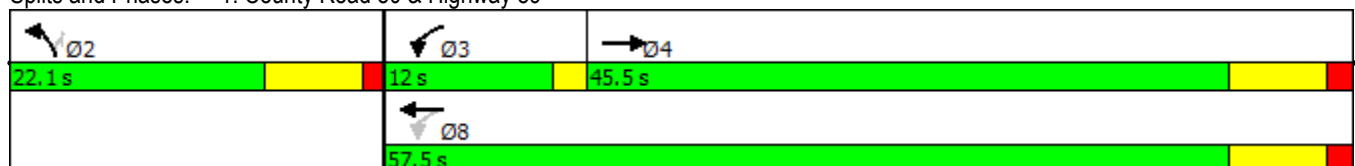


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.0		55.5	50.0	10.8	10.8
Actuated g/C Ratio	0.52		0.74	0.66	0.14	0.14
v/c Ratio	0.46		0.63	0.19	0.36	0.50
Control Delay	11.4		9.1	5.3	34.5	10.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.4		9.1	5.3	34.5	10.4
LOS	B		A	A	C	B
Approach Delay	11.4			7.1	17.7	
Approach LOS	B			A	B	
Queue Length 50th (m)	27.8		11.9	9.4	10.1	0.0
Queue Length 95th (m)	45.3		24.5	16.5	21.9	15.6
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1595		555	2050	292	424
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.46		0.61	0.19	0.26	0.42

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	10.5
Intersection Capacity Utilization	70.2%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - AM
9/8/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	14	613	621	18	40	64
Future Volume (Veh/h)	14	613	621	18	40	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	16	681	690	20	44	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.94	
vC, conflicting volume	710				1072	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	710				956	355
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				82	89
cM capacity (veh/h)	828				240	647
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	243	454	460	250	115	
Volume Left	16	0	0	0	44	
Volume Right	0	0	0	20	71	
cSH	828	1700	1700	1700	393	
Volume to Capacity	0.02	0.27	0.27	0.15	0.29	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	9.1	
Control Delay (s)	0.8	0.0	0.0	0.0	17.9	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		17.9	
Approach LOS					C	
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			39.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2031 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	
Traffic Volume (veh/h)	644	142	137	540	14	34
Future Volume (Veh/h)	644	142	137	540	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	716	158	152	600	16	38
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			874		1399	437
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			874		1399	437
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		85	93
cM capacity (veh/h)			768		105	567
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	477	397	352	400	54	
Volume Left	0	0	152	0	16	
Volume Right	0	158	0	0	38	
cSH	1700	1700	768	1700	247	
Volume to Capacity	0.28	0.23	0.20	0.24	0.22	
Queue Length 95th (m)	0.0	0.0	5.6	0.0	6.2	
Control Delay (s)	0.0	0.0	6.1	0.0	23.6	
Lane LOS			A	C		
Approach Delay (s)	0.0		2.8		23.6	
Approach LOS					C	
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			54.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - PM
 10/19/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	887	23	160	940	65	130	15	213	49	9	38
Future Volume (Veh/h)	30	887	23	160	940	65	130	15	213	49	9	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	934	24	168	989	68	137	16	224	52	9	40
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	1057			958			1885	2403	479	2122	2381	528
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1057			958			1885	2403	479	2122	2381	528
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			77			0	35	58	0	65	92
cM capacity (veh/h)	667			726			21	25	538	7	25	500

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	32	623	335	168	659	398	377	101
Volume Left	32	0	0	168	0	0	137	52
Volume Right	0	0	24	0	0	68	224	40
cSH	667	1700	1700	726	1700	1700	51	12
Volume to Capacity	0.05	0.37	0.20	0.23	0.39	0.23	7.46	8.20
Queue Length 95th (m)	1.1	0.0	0.0	6.8	0.0	0.0	Err	Err
Control Delay (s)	10.7	0.0	0.0	11.4	0.0	0.0	Err	Err
Lane LOS	B			B			F	F
Approach Delay (s)	0.3			1.6			Err	Err
Approach LOS							F	F

Intersection Summary

Average Delay		1775.6	
Intersection Capacity Utilization		67.9%	ICU Level of Service C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2031 Future Total - AM
 9/8/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	68	88	143
Future Volume (Veh/h)	51	6	22	68	88	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	76	98	159
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	302	178	257			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	302	178	257			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	99	98			
cM capacity (veh/h)	677	866	1308			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	100	257			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	694	1308	1700			
Volume to Capacity	0.09	0.02	0.15			
Queue Length 95th (m)	2.3	0.4	0.0			
Control Delay (s)	10.7	2.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.7	2.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			31.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - AM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗		↕			↖	↗
Traffic Volume (veh/h)	42	741	1	9	790	74	0	1	1	56	3	53
Future Volume (Veh/h)	42	741	1	9	790	74	0	1	1	56	3	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	44	780	1	9	832	78	0	1	1	59	3	56
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	832			785			1308	1722	394	1330	1723	416
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	832			785			1308	1722	394	1330	1723	416
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	94			99			100	99	100	42	96	90
cM capacity (veh/h)	741			653			98	83	608	102	83	546

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	44	520	261	9	416	416	78	2	118
Volume Left	44	0	0	9	0	0	0	0	59
Volume Right	0	0	1	0	0	0	78	1	56
cSH	741	1700	1700	653	1700	1700	1700	146	193
Volume to Capacity	0.06	0.31	0.15	0.01	0.24	0.24	0.05	0.01	0.61
Queue Length 95th (m)	1.4	0.0	0.0	0.3	0.0	0.0	0.0	0.3	26.2
Control Delay (s)	10.2	0.0	0.0	10.6	0.0	0.0	0.0	29.9	50.4
Lane LOS	B			B				D	F
Approach Delay (s)	0.5			0.1				29.9	50.4
Approach LOS								D	F

Intersection Summary

Average Delay	3.5
Intersection Capacity Utilization	45.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	816	1	3	892	0	16
Future Volume (Veh/h)	816	1	3	892	0	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	877	1	3	959	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			878	1363	439	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			878	1363	439	
tC, single (s)			4.1	6.8	7.1	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.4	
p0 queue free %			100	100	97	
cM capacity (veh/h)			778	141	547	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	585	293	323	639	17	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	17	
cSH	1700	1700	778	1700	547	
Volume to Capacity	0.34	0.17	0.00	0.38	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.7	
Control Delay (s)	0.0	0.0	0.1	0.0	11.8	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.0		11.8	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			36.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	661	186	272	679	10	197	26	104	10	36	21
Future Volume (vph)	38	661	186	272	679	10	197	26	104	10	36	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3169	0	1807	3465	0	1387	1474	1617	1825	1779	1633
Flt Permitted	0.370			0.221			0.732	0.750		0.675		
Satd. Flow (perm)	711	3169	0	420	3465	0	1069	1148	1617	1297	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			2				112			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	41	711	200	292	730	11	212	28	112	11	39	23
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	41	911	0	292	741	0	119	121	112	11	39	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - AM
9/7/2017

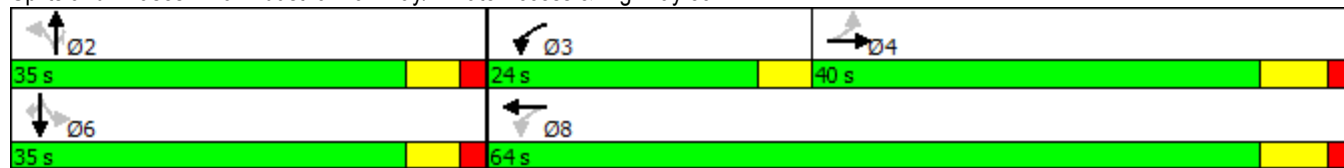


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	41.2	41.2		60.2	57.2		16.1	16.1	16.1	16.1	16.1	16.1
Actuated g/C Ratio	0.48	0.48		0.70	0.66		0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.12	0.59		0.60	0.32		0.60	0.57	0.29	0.05	0.12	0.06
Control Delay	18.1	19.9		11.2	7.3		44.7	42.3	7.8	27.8	28.9	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	19.9		11.2	7.3		44.7	42.3	7.8	27.8	28.9	0.3
LOS	B	B		B	A		D	D	A	C	C	A
Approach Delay		19.8			8.4			32.1			19.8	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	3.4	50.2		14.5	23.6		19.0	19.2	0.0	1.5	5.4	0.0
Queue Length 95th (m)	12.8	99.1		32.9	43.4		36.5	36.5	12.1	5.7	13.1	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	339	1534		615	2296		360	386	619	437	599	608
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	0.12	0.59		0.47	0.32		0.33	0.31	0.18	0.03	0.07	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	86.3
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	16.7
Intersection Capacity Utilization:	66.3%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	C

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	471	70	204	863	248	386
Future Volume (vph)	471	70	204	863	248	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3208	0	1532	3444	1665	921
Flt Permitted			0.406		0.950	
Satd. Flow (perm)	3208	0	655	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					409
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	506	75	219	928	267	415
Shared Lane Traffic (%)						
Lane Group Flow (vph)	581	0	219	928	267	415
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	14.6	14.6
Actuated g/C Ratio	0.50		0.70	0.63	0.18	0.18
v/c Ratio	0.36		0.40	0.43	0.87	0.83
Control Delay	12.5		6.5	8.2	61.0	19.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.5		6.5	8.2	61.0	19.5
LOS	B		A	A	E	B
Approach Delay	12.5			7.8	35.8	
Approach LOS	B			A	D	
Queue Length 50th (m)	25.4		9.8	33.3	39.4	0.8
Queue Length 95th (m)	37.9		17.1	44.7	#78.6	#48.1
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1620		569	2175	315	506
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.36		0.38	0.43	0.85	0.82

Intersection Summary

Area Type: Other
 Cycle Length: 79.6
 Actuated Cycle Length: 79.2
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 16.9
 Intersection LOS: B
 Intersection Capacity Utilization 69.7%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - PM
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	51	803	1037	72	22	27
Future Volume (Veh/h)	51	803	1037	72	22	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	55	863	1115	77	24	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	1192				1695	596
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1192				1584	596
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	91				69	94
cM capacity (veh/h)	593				78	452
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	343	575	743	449	53	
Volume Left	55	0	0	0	24	
Volume Right	0	0	0	77	29	
cSH	593	1700	1700	1700	143	
Volume to Capacity	0.09	0.34	0.44	0.26	0.37	
Queue Length 95th (m)	2.3	0.0	0.0	0.0	11.8	
Control Delay (s)	3.0	0.0	0.0	0.0	44.4	
Lane LOS	A				E	
Approach Delay (s)	1.1		0.0		44.4	
Approach LOS					E	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2031 Future Total - PM
 10/19/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (veh/h)	806	42	68	1013	95	132
Future Volume (Veh/h)	806	42	68	1013	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	896	47	76	1126	106	147
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			943		1634	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			943		1634	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		0	73
cM capacity (veh/h)			723		82	539
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	597	346	76	563	563	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	723	1700	1700	162
Volume to Capacity	0.35	0.20	0.11	0.33	0.33	1.56
Queue Length 95th (m)	0.0	0.0	2.7	0.0	0.0	129.1
Control Delay (s)	0.0	0.0	10.6	0.0	0.0	332.1
Lane LOS			B			F
Approach Delay (s)	0.0		0.7			332.1
Approach LOS						F
Intersection Summary						
Average Delay			35.4			
Intersection Capacity Utilization			50.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	775	23	119	900	65	50	15	104	49	9	38
Future Volume (Veh/h)	30	775	23	119	900	65	50	15	104	49	9	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	816	24	125	947	68	53	16	109	52	9	40
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	1015			840			1660	2157	420	1820	2135	508
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1015			840			1660	2157	420	1820	2135	508
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			84			0	59	81	0	78	92
cM capacity (veh/h)	691			804			39	39	588	24	40	516

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	32	544	296	125	631	384	178	101
Volume Left	32	0	0	125	0	0	53	52
Volume Right	0	0	24	0	0	68	109	40
cSH	691	1700	1700	804	1700	1700	91	40
Volume to Capacity	0.05	0.32	0.17	0.16	0.37	0.23	1.96	2.51
Queue Length 95th (m)	1.1	0.0	0.0	4.2	0.0	0.0	116.1	83.8
Control Delay (s)	10.5	0.0	0.0	10.3	0.0	0.0	547.1	898.2
Lane LOS	B			B			F	F
Approach Delay (s)	0.4			1.1			547.1	898.2
Approach LOS							F	F

Intersection Summary

Average Delay	82.8
Intersection Capacity Utilization	51.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Total - PM
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	132	121	72
Future Volume (Veh/h)	226	24	9	132	121	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	147	134	80
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	341	174	214			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	174	214			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	61	97	99			
cM capacity (veh/h)	650	869	1356			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	157	214			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	667	1356	1700			
Volume to Capacity	0.42	0.01	0.13			
Queue Length 95th (m)	15.7	0.2	0.0			
Control Delay (s)	14.2	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.2	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			35.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - PM
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘	↗		↕			↖	↖
Traffic Volume (veh/h)	84	1091	9	19	1054	121	0	0	10	101	1	63
Future Volume (Veh/h)	84	1091	9	19	1054	121	0	0	10	101	1	63
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	88	1148	9	20	1109	127	0	0	11	106	1	66
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1109			1157			1924	2478	578	1910	2482	554
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1109			1157			1924	2478	578	1910	2482	554
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			97			100	100	98	0	96	86
cM capacity (veh/h)	597			611			30	25	464	35	25	481

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	88	765	392	20	554	554	127	11	173
Volume Left	88	0	0	20	0	0	0	0	106
Volume Right	0	0	9	0	0	0	127	11	66
cSH	597	1700	1700	611	1700	1700	1700	464	55
Volume to Capacity	0.15	0.45	0.23	0.03	0.33	0.33	0.07	0.02	3.14
Queue Length 95th (m)	3.9	0.0	0.0	0.8	0.0	0.0	0.0	0.6	Err
Control Delay (s)	12.1	0.0	0.0	11.1	0.0	0.0	0.0	13.0	Err
Lane LOS	B			B				B	F
Approach Delay (s)	0.9			0.2				13.0	Err
Approach LOS								B	F

Intersection Summary		
Average Delay		644.8
Intersection Capacity Utilization	56.1%	ICU Level of Service
Analysis Period (min)	15	B

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89























2031 Future Total - PM
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1172	5	6	1245	0	15
Future Volume (Veh/h)	1172	5	6	1245	0	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1208	5	6	1284	0	15
Pedestrians					3	
Lane Width (m)					3.7	
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			1216		1868	610
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1216		1868	610
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	96
cM capacity (veh/h)			579		65	374
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	805	408	434	856	15	
Volume Left	0	0	6	0	0	
Volume Right	0	5	0	0	15	
cSH	1700	1700	579	1700	374	
Volume to Capacity	0.47	0.24	0.01	0.50	0.04	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.9	
Control Delay (s)	0.0	0.0	0.3	0.0	15.0	
Lane LOS	A			C		
Approach Delay (s)	0.0		0.1		15.0	
Approach LOS					C	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			48.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - PM
9/7/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	869	319	277	770	30	429	45	203	27	54	81
Future Volume (vph)	54	869	319	277	770	30	429	45	203	27	54	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.960			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3277	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Flt Permitted	0.338			0.092			0.720	0.728		0.456		
Satd. Flow (perm)	649	3277	0	177	3557	0	1160	1193	1588	823	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57			7				211			88
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		31.1			44.5			28.0			5.1	
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	56	905	332	289	802	31	447	47	211	28	56	84
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	56	1237	0	289	833	0	246	248	211	28	56	84
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	39.3	39.3		60.2	57.2		25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.41	0.41		0.63	0.60		0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.21	0.89		0.82	0.39		0.81	0.79	0.37	0.13	0.11	0.18
Control Delay	24.8	36.9		40.0	11.1		54.1	51.9	5.8	27.7	26.5	6.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	36.9		40.0	11.1		54.1	51.9	5.8	27.7	26.5	6.5
LOS	C	D		D	B		D	D	A	C	C	A
Approach Delay		36.3			18.5			38.8				16.7
Approach LOS		D			B			D				B
Queue Length 50th (m)	7.0	113.6		36.6	42.8		44.4	44.5	0.0	3.9	7.8	0.0
Queue Length 95th (m)	18.1	#179.1		62.8	55.6		#81.1	#80.0	15.8	10.7	16.8	9.9
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	267	1385		459	2139		354	364	632	251	587	543
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	0.89		0.63	0.39		0.69	0.68	0.33	0.11	0.10	0.15

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	95.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	29.8
Intersection Capacity Utilization	84.5%
Intersection LOS:	C
ICU Level of Service	E

Lanes, Volumes, Timings
 6: Industrial Parkway/Private Access & Highway 89

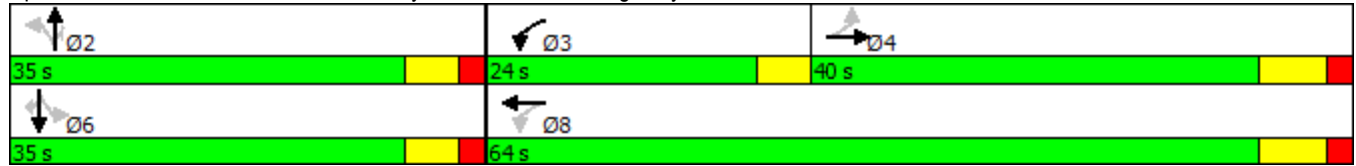
2031 Future Total - PM
 9/7/2017

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	603	88	219	728	163	236
Future Volume (vph)	603	88	219	728	163	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3467	0	1668	3544	1713	949
Flt Permitted			0.341		0.950	
Satd. Flow (perm)	3467	0	599	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					243
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	622	91	226	751	168	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	713	0	226	751	168	243
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.0		55.5	50.0	12.7	12.7
Actuated g/C Ratio	0.52		0.72	0.65	0.16	0.16
v/c Ratio	0.39		0.42	0.33	0.60	0.68
Control Delay	12.2		6.3	6.8	39.5	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.2		6.3	6.8	39.5	14.8
LOS	B		A	A	D	B
Approach Delay	12.2			6.7	24.9	
Approach LOS	B			A	C	
Queue Length 50th (m)	29.9		8.8	22.6	23.1	0.0
Queue Length 95th (m)	46.8		17.1	34.0	41.4	21.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1808		568	2294	332	380
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.39		0.40	0.33	0.51	0.64

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	77.3
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	12.1
Intersection LOS:	B
Intersection Capacity Utilization:	65.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - SAT
9/7/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	14	765	777	51	33	13
Future Volume (Veh/h)	14	765	777	51	33	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	832	845	55	36	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	900				1318	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	900				1128	450
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				80	98
cM capacity (veh/h)	763				177	562
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	292	555	563	337	50	
Volume Left	15	0	0	0	36	
Volume Right	0	0	0	55	14	
cSH	763	1700	1700	1700	219	
Volume to Capacity	0.02	0.33	0.33	0.20	0.23	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	6.5	
Control Delay (s)	0.7	0.0	0.0	0.0	26.2	
Lane LOS	A				D	
Approach Delay (s)	0.2		0.0		26.2	
Approach LOS					D	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			41.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2031 Future Total - SAT
 9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	782	73	107	844	81	109
Future Volume (Veh/h)	782	73	107	844	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	869	81	119	938	90	121
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			950		1616	475
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			950		1616	475
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		0	77
cM capacity (veh/h)			719		79	536
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	579	371	432	625	211	
Volume Left	0	0	119	0	90	
Volume Right	0	81	0	0	121	
cSH	1700	1700	719	1700	154	
Volume to Capacity	0.34	0.22	0.17	0.37	1.37	
Queue Length 95th (m)	0.0	0.0	4.5	0.0	99.8	
Control Delay (s)	0.0	0.0	4.6	0.0	257.2	
Lane LOS			A			F
Approach Delay (s)	0.0		1.9		257.2	
Approach LOS					F	
Intersection Summary						
Average Delay			25.4			
Intersection Capacity Utilization			71.6%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - SAT
9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	826	24	191	868	168	101	14	224	133	34	46
Future Volume (Veh/h)	44	826	24	191	868	168	101	14	224	133	34	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	46	869	25	201	914	177	106	15	236	140	36	48
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	1091			894			1898	2466	447	2174	2390	546
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1091			894			1898	2466	447	2174	2390	546
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			73			0	28	58	0	0	90
cM capacity (veh/h)	647			755			0	21	564	5	23	487
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	46	579	315	201	609	482	357	224				
Volume Left	46	0	0	201	0	0	106	140				
Volume Right	0	0	25	0	0	177	236	48				
cSH	647	1700	1700	755	1700	1700	0	8				
Volume to Capacity	0.07	0.34	0.19	0.27	0.36	0.28	Err	29.49				
Queue Length 95th (m)	1.7	0.0	0.0	8.2	0.0	0.0	Err	Err				
Control Delay (s)	11.0	0.0	0.0	11.5	0.0	0.0	Err	Err				
Lane LOS	B			B			F	F				
Approach Delay (s)	0.5			1.8			Err	Err				
Approach LOS							F	F				
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			67.4%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Total - SAT
 9/7/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	145	136	112
Future Volume (Veh/h)	192	21	18	145	136	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	161	151	124
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	414	213	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	414	213	275			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	97	98			
cM capacity (veh/h)	585	827	1288			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	181	275			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	603	1288	1700			
Volume to Capacity	0.39	0.02	0.16			
Queue Length 95th (m)	14.1	0.4	0.0			
Control Delay (s)	14.8	1.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.8	1.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			41.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - SAT
 9/7/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	1161	6	27	1182	160	1	6	10	155	5	67
Future Volume (Veh/h)	78	1161	6	27	1182	160	1	6	10	155	5	67
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	82	1222	6	28	1244	168	1	6	11	163	5	71
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1244			1229			2070	2690	615	2089	2693	622
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1244			1229			2070	2690	615	2089	2693	622
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			95			94	66	97	0	72	83
cM capacity (veh/h)	555			573			18	18	439	19	18	422
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1			
Volume Total	82	815	413	28	622	622	168	18	239			
Volume Left	82	0	0	28	0	0	0	1	163			
Volume Right	0	0	6	0	0	0	168	11	71			
cSH	555	1700	1700	573	1700	1700	1700	43	26			
Volume to Capacity	0.15	0.48	0.24	0.05	0.37	0.37	0.10	0.42	9.23			
Queue Length 95th (m)	3.9	0.0	0.0	1.2	0.0	0.0	0.0	11.1	Err			
Control Delay (s)	12.6	0.0	0.0	11.6	0.0	0.0	0.0	138.6	Err			
Lane LOS	B			B				F	F			
Approach Delay (s)	0.8			0.2				138.6	Err			
Approach LOS								F	F			
Intersection Summary												
Average Delay			796.0									
Intersection Capacity Utilization			62.5%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Total - SAT
9/7/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1352	3	6	1364	0	9
Future Volume (Veh/h)	1352	3	6	1364	0	9
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)	1438	3	6	1451	0	10
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			1441		2177	720
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1441		2177	720
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	97
cM capacity (veh/h)			477		40	338
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	959	482	490	967	10	
Volume Left	0	0	6	0	0	
Volume Right	0	3	0	0	10	
cSH	1700	1700	477	1700	338	
Volume to Capacity	0.56	0.28	0.01	0.57	0.03	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.7	
Control Delay (s)	0.0	0.0	0.4	0.0	16.0	
Lane LOS			A			C
Approach Delay (s)	0.0		0.1		16.0	
Approach LOS					C	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			51.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	1027	188	451	993	35	258	56	260	51	123	100
Future Volume (vph)	145	1027	188	451	993	35	258	56	260	51	123	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.977			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3522	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.258			0.108			0.673	0.724		0.576		
Satd. Flow (perm)	490	3522	0	207	3594	0	1188	1293	1593	1072	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			6				280			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	156	1104	202	485	1068	38	277	60	280	55	132	108
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	156	1306	0	485	1106	0	163	174	280	55	132	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		19.1	19.1	19.1	19.1	19.1	19.1
Actuated g/C Ratio	0.37	0.37		0.67	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.86	0.99		0.96	0.48		0.64	0.63	0.50	0.24	0.32	0.26
Control Delay	70.2	51.9		58.2	10.1		43.7	42.2	6.8	30.8	31.0	9.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.2	51.9		58.2	10.1		43.7	42.2	6.8	30.8	31.0	9.7
LOS	E	D		E	B		D	D	A	C	C	A
Approach Delay		53.9			24.8			26.5			23.2	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	24.2	113.2		64.2	46.0		26.9	28.6	0.0	7.8	19.2	2.2
Queue Length 95th (m)	#68.4	#190.4		#147.3	80.3		47.5	49.6	17.7	17.6	33.8	14.1
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	181	1320		503	2303		387	421	707	349	625	585
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	0.86	0.99		0.96	0.48		0.42	0.41	0.40	0.16	0.21	0.18

Intersection Summary

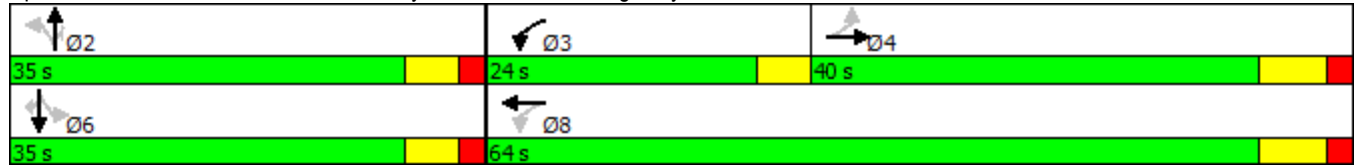
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89.5
Natural Cycle:	100
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.99
Intersection Signal Delay:	35.7
Intersection Capacity Utilization	99.0%
Intersection LOS:	D
ICU Level of Service	F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - AM
9/8/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	545	212	359	415	81	185
Future Volume (vph)	545	212	359	415	81	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.958					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2996	0	1620	3093	1471	1426
Flt Permitted			0.283		0.950	
Satd. Flow (perm)	2996	0	483	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	98					203
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	599	233	395	456	89	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	832	0	395	456	89	203
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	38.2		55.5	50.0	11.2	11.2
Actuated g/C Ratio	0.50		0.73	0.66	0.15	0.15
v/c Ratio	0.53		0.79	0.22	0.41	0.53
Control Delay	12.9		18.0	5.6	35.4	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.9		18.0	5.6	35.4	10.2
LOS	B		B	A	D	B
Approach Delay	12.9			11.4	17.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	33.6		14.5	11.1	11.7	0.0
Queue Length 95th (m)	54.8		#44.2	19.9	24.6	16.5
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1556		503	2042	291	444
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.53		0.79	0.22	0.31	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.79
Intersection Signal Delay:	13.0
Intersection LOS:	B
Intersection Capacity Utilization:	72.9%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Total - AM
9/8/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	16	690	716	20	44	74
Future Volume (Veh/h)	16	690	716	20	44	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	767	796	22	49	82
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	818				1226	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	818				1063	409
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				75	86
cM capacity (veh/h)	751				198	597
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	274	511	531	287	131	
Volume Left	18	0	0	0	49	
Volume Right	0	0	0	22	82	
cSH	751	1700	1700	1700	340	
Volume to Capacity	0.02	0.30	0.31	0.17	0.38	
Queue Length 95th (m)	0.6	0.0	0.0	0.0	13.4	
Control Delay (s)	0.9	0.0	0.0	0.0	22.0	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		22.0	
Approach LOS					C	
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			44.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2036 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	747	142	137	721	14	34
Future Volume (Veh/h)	747	142	137	721	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	830	158	152	801	16	38
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			988		1614	494
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			988		1614	494
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			78		78	93
cM capacity (veh/h)			695		74	521
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	553	435	419	534	54	
Volume Left	0	0	152	0	16	
Volume Right	0	158	0	0	38	
cSH	1700	1700	695	1700	187	
Volume to Capacity	0.33	0.26	0.22	0.31	0.29	
Queue Length 95th (m)	0.0	0.0	6.3	0.0	8.7	
Control Delay (s)	0.0	0.0	6.1	0.0	31.9	
Lane LOS			A			D
Approach Delay (s)	0.0		2.7		31.9	
Approach LOS						D
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			62.4%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - AM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	706	39	195	676	93	24	12	93	86	10	36
Future Volume (Veh/h)	36	706	39	195	676	93	24	12	93	86	10	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	767	42	212	735	101	26	13	101	93	11	39
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	836			809			1702	2126	404	1778	2096	418
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	836			809			1702	2126	404	1778	2096	418
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.4
p0 queue free %	95			74			23	63	83	0	70	93
cM capacity (veh/h)	807			806			34	35	601	25	37	562

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	39	511	298	212	490	346	140	143
Volume Left	39	0	0	212	0	0	26	93
Volume Right	0	0	42	0	0	101	101	39
cSH	807	1700	1700	806	1700	1700	108	35
Volume to Capacity	0.05	0.30	0.18	0.26	0.29	0.20	1.30	4.12
Queue Length 95th (m)	1.2	0.0	0.0	8.0	0.0	0.0	72.6	Err
Control Delay (s)	9.7	0.0	0.0	11.1	0.0	0.0	262.0	Err
Lane LOS	A			B			F	F
Approach Delay (s)	0.4			2.2			262.0	Err
Approach LOS							F	F

Intersection Summary

Average Delay	674.3
Intersection Capacity Utilization	55.7%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2036 Future Total - AM
 9/8/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	79	102	143
Future Volume (Veh/h)	51	6	22	79	102	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	88	113	159
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	328	192	272			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	192	272			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	98			
cM capacity (veh/h)	654	849	1291			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	112	272			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	670	1291	1700			
Volume to Capacity	0.10	0.02	0.16			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	10.9	1.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.9	1.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			32.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Total - AM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕	↖		↕			↕	↖
Traffic Volume (veh/h)	49	849	1	10	873	86	0	1	1	65	3	60
Future Volume (Veh/h)	49	849	1	10	873	86	0	1	1	65	3	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	52	894	1	11	919	91	0	1	1	68	3	63
Pedestrians								4				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	919			899			1486	1944	452	1494	1944	460
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	919			899			1486	1944	452	1494	1944	460
tC, single (s)	4.3			4.8			7.5	6.5	6.9	7.6	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.5	4.0	3.5
p0 queue free %	92			98			100	98	100	10	95	88
cM capacity (veh/h)	685			583			68	59	559	76	59	510

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	52	596	299	11	460	460	91	2	134
Volume Left	52	0	0	11	0	0	0	0	68
Volume Right	0	0	1	0	0	0	91	1	63
cSH	685	1700	1700	583	1700	1700	1700	107	141
Volume to Capacity	0.08	0.35	0.18	0.02	0.27	0.27	0.05	0.02	0.95
Queue Length 95th (m)	1.9	0.0	0.0	0.4	0.0	0.0	0.0	0.4	50.5
Control Delay (s)	10.7	0.0	0.0	11.3	0.0	0.0	0.0	39.2	104.2
Lane LOS	B			B				E	F
Approach Delay (s)	0.6			0.1				39.2	104.2
Approach LOS								E	F

Intersection Summary

Average Delay	7.0
Intersection Capacity Utilization	47.9%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Total - AM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	935	1	3	991	0	19
Future Volume (Veh/h)	935	1	3	991	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1005	1	3	1066	0	20
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			1006		1544	503
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1006		1544	503
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	96
cM capacity (veh/h)			697		107	496
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	670	336	358	711	20	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	20	
cSH	1700	1700	697	1700	496	
Volume to Capacity	0.39	0.20	0.00	0.42	0.04	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	1.0	
Control Delay (s)	0.0	0.0	0.1	0.0	12.6	
Lane LOS			A	B		
Approach Delay (s)	0.0		0.0		12.6	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			39.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - AM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	756	215	315	745	12	228	30	121	12	42	24
Future Volume (vph)	44	756	215	315	745	12	228	30	121	12	42	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1643	2851	0	1626	3118	0	1248	1326	1455	1643	1601	1470
Flt Permitted	0.345			0.139			0.728	0.745		0.654		
Satd. Flow (perm)	597	2851	0	238	3118	0	957	1026	1455	1131	1601	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			3				130			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	47	813	231	339	801	13	245	32	130	13	45	26
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	47	1044	0	339	814	0	137	140	130	13	45	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - AM
9/8/2017



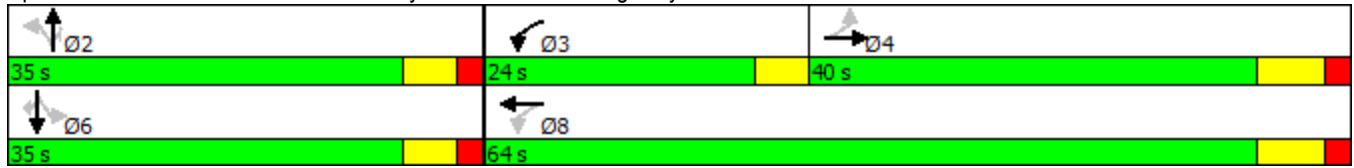
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	36.8	36.8		60.3	57.3		19.0	19.0	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.41	0.41		0.68	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.19	0.87		0.81	0.41		0.67	0.65	0.32	0.05	0.13	0.07
Control Delay	24.0	35.6		33.1	9.4		48.8	45.6	7.2	26.8	28.1	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	35.6		33.1	9.4		48.8	45.6	7.2	26.8	28.1	0.3
LOS	C	D		C	A		D	D	A	C	C	A
Approach Delay		35.1			16.4			34.4				19.3
Approach LOS		D			B			C				B
Queue Length 50th (m)	5.2	85.3		31.6	31.3		22.7	23.0	0.0	1.8	6.3	0.0
Queue Length 95th (m)	16.0	#154.5		#83.7	57.6		42.6	42.4	12.8	6.2	14.6	0.0
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	245	1197		472	2000		312	334	562	369	522	538
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	0.87		0.72	0.41		0.44	0.42	0.23	0.04	0.09	0.05

Intersection Summary

Area Type:	CBD
Cycle Length:	99
Actuated Cycle Length:	89.3
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	26.6
Intersection LOS:	C
Intersection Capacity Utilization:	79.0%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	541	81	236	976	287	447
Future Volume (vph)	541	81	236	976	287	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.980					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Fl _t Permitted			0.356		0.950	
Satd. Flow (perm)	3205	0	574	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					368
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	582	87	254	1049	309	481
Shared Lane Traffic (%)						
Lane Group Flow (vph)	669	0	254	1049	309	481
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



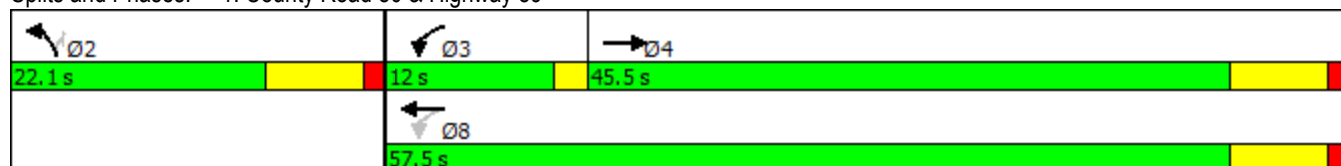
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.2		55.5	50.0	15.0	15.0
Actuated g/C Ratio	0.49		0.70	0.63	0.19	0.19
v/c Ratio	0.42		0.50	0.48	0.99	1.02
Control Delay	13.6		8.1	8.9	83.1	58.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.6		8.1	8.9	83.1	58.0
LOS	B		A	A	F	E
Approach Delay	13.6			8.7	67.8	
Approach LOS	B			A	E	
Queue Length 50th (m)	31.1		11.6	39.5	47.0	~22.7
Queue Length 95th (m)	44.7		19.8	52.6	#94.6	#84.2
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1593		520	2163	313	472
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.42		0.49	0.48	0.99	1.02

Intersection Summary

Area Type: Other
 Cycle Length: 79.6
 Actuated Cycle Length: 79.6
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 26.8
 Intersection LOS: C
 Intersection Capacity Utilization 73.6%
 ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

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

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Total - PM
9/8/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	59	926	1177	79	25	31
Future Volume (Veh/h)	59	926	1177	79	25	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	63	996	1266	85	27	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	1351				1932	676
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1351				1809	676
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	88				48	92
cM capacity (veh/h)	516				52	401
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	395	664	844	507	60	
Volume Left	63	0	0	0	27	
Volume Right	0	0	0	85	33	
cSH	516	1700	1700	1700	99	
Volume to Capacity	0.12	0.39	0.50	0.30	0.61	
Queue Length 95th (m)	3.1	0.0	0.0	0.0	22.0	
Control Delay (s)	3.7	0.0	0.0	0.0	85.8	
Lane LOS	A				F	
Approach Delay (s)	1.4		0.0		85.8	
Approach LOS					F	
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			75.7%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2036 Future Total - PM
 10/19/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	936	42	68	1161	95	132
Future Volume (Veh/h)	936	42	68	1161	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1040	47	76	1290	106	147
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			1087		1860	544
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1087		1860	544
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		0	70
cM capacity (veh/h)			638		57	484
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	693	394	76	645	645	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	638	1700	1700	117
Volume to Capacity	0.41	0.23	0.12	0.38	0.38	2.16
Queue Length 95th (m)	0.0	0.0	3.1	0.0	0.0	162.9
Control Delay (s)	0.0	0.0	11.4	0.0	0.0	611.0
Lane LOS			B			F
Approach Delay (s)	0.0		0.6			611.0
Approach LOS						F
Intersection Summary						
Average Delay			57.4			
Intersection Capacity Utilization			54.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - PM
 10/19/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	1009	27	174	1080	75	135	17	227	57	10	44
Future Volume (Veh/h)	35	1009	27	174	1080	75	135	17	227	57	10	44
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	1062	28	183	1137	79	142	18	239	60	11	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	1216			1090			2136	2732	545	2396	2706	608
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1216			1090			2136	2732	545	2396	2706	608
tC, single (s)	4.1			4.1			7.7	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			72			0	0	51	0	24	90
cM capacity (veh/h)	581			648			7	14	488	0	14	444
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	37	708	382	183	758	458	399	117				
Volume Left	37	0	0	183	0	0	142	60				
Volume Right	0	0	28	0	0	79	239	46				
cSH	581	1700	1700	648	1700	1700	17	0				
Volume to Capacity	0.06	0.42	0.22	0.28	0.45	0.27	23.03	Err				
Queue Length 95th (m)	1.5	0.0	0.0	8.8	0.0	0.0	Err	Err				
Control Delay (s)	11.6	0.0	0.0	12.7	0.0	0.0	Err	Err				
Lane LOS	B			B			F	F				
Approach Delay (s)	0.4			1.7			Err	Err				
Approach LOS							F	F				
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			73.4%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Total - PM
 9/8/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	153	141	72
Future Volume (Veh/h)	226	24	9	153	141	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	170	157	80
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	387	197	237			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	387	197	237			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	97	99			
cM capacity (veh/h)	612	844	1330			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	180	237			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	629	1330	1700			
Volume to Capacity	0.44	0.01	0.14			
Queue Length 95th (m)	17.2	0.2	0.0			
Control Delay (s)	15.2	0.5	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.2	0.5	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			36.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Total - PM
 9/8/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	1227	10	22	1202	140	0	0	12	117	1	73
Future Volume (Veh/h)	95	1227	10	22	1202	140	0	0	12	117	1	73
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	100	1292	11	23	1265	147	0	0	13	123	1	77
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1265			1303			2176	2808	652	2170	2814	632
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1265			1303			2176	2808	652	2170	2814	632
tC, single (s)	4.2			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			96			100	100	97	0	93	82
cM capacity (veh/h)	519			538			17	14	416	21	14	428

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	100	861	442	23	632	632	147	13	201
Volume Left	100	0	0	23	0	0	0	0	123
Volume Right	0	0	11	0	0	0	147	13	77
cSH	519	1700	1700	538	1700	1700	1700	416	33
Volume to Capacity	0.19	0.51	0.26	0.04	0.37	0.37	0.09	0.03	6.03
Queue Length 95th (m)	5.4	0.0	0.0	1.0	0.0	0.0	0.0	0.7	Err
Control Delay (s)	13.6	0.0	0.0	12.0	0.0	0.0	0.0	13.9	Err
Lane LOS	B			B				B	F
Approach Delay (s)	1.0			0.2				13.9	Err
Approach LOS								B	F

Intersection Summary		
Average Delay		659.1
Intersection Capacity Utilization	61.7%	ICU Level of Service
Analysis Period (min)	15	B

HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Total - PM
9/8/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1321	6	7	1423	0	17
Future Volume (Veh/h)	1321	6	7	1423	0	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1362	6	7	1467	0	18
Pedestrians					3	
Lane Width (m)					3.7	
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			1371		2116	687
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1371		2116	687
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	95
cM capacity (veh/h)			506		44	330
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	908	460	496	978	18	
Volume Left	0	0	7	0	0	
Volume Right	0	6	0	0	18	
cSH	1700	1700	506	1700	330	
Volume to Capacity	0.53	0.27	0.01	0.58	0.05	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	1.3	
Control Delay (s)	0.0	0.0	0.4	0.0	16.6	
Lane LOS	A			C		
Approach Delay (s)	0.0		0.1		16.6	
Approach LOS					C	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			54.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Future Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.952			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3219	0	1825	3557	0	1534	1578	1617	1722	1921	1601
Fl _t Permitted	0.328			0.097			0.714	0.721		0.403		
Satd. Flow (perm)	630	3219	0	186	3557	0	1150	1182	1588	728	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		87			7				245			98
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	66	797	380	334	828	36	517	54	245	32	66	98
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	66	1177	0	334	864	0	284	287	245	32	66	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	37.2	37.2		60.1	57.1		27.1	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.38	0.38		0.62	0.59		0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.27	0.92		0.87	0.41		0.89	0.87	0.40	0.16	0.12	0.19
Control Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
LOS	C	D		D	B		E	E	A	C	C	A
Approach Delay		39.8			21.5			45.0				16.9
Approach LOS		D			C			D				B
Queue Length 50th (m)	9.0	108.8		44.8	45.2		53.5	53.8	0.0	4.5	9.2	0.0
Queue Length 95th (m)	21.1	#163.5		#81.6	58.4		#100.4	#100.1	16.8	12.0	19.2	11.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	241	1285		452	2091		343	353	646	217	573	540
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	0.27	0.92		0.74	0.41		0.83	0.81	0.38	0.15	0.12	0.18

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	97.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	33.4
Intersection Capacity Utilization	87.3%
Intersection LOS:	C
ICU Level of Service	E

Lanes, Volumes, Timings
 6: Industrial Parkway/Private Access & Highway 89

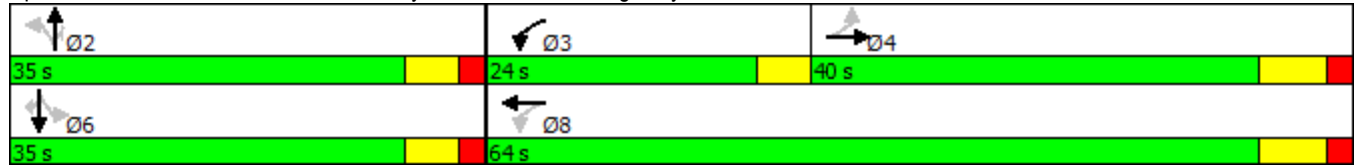
2036 Future Total - PM
 9/8/2017

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	692	102	254	824	189	274
Future Volume (vph)	692	102	254	824	189	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.981					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3467	0	1668	3544	1713	949
Fl _t Permitted			0.289		0.950	
Satd. Flow (perm)	3467	0	507	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					282
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	713	105	262	849	195	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	818	0	262	849	195	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.6		55.5	50.0	13.2	13.2
Actuated g/C Ratio	0.51		0.71	0.64	0.17	0.17
v/c Ratio	0.46		0.54	0.37	0.67	0.72
Control Delay	13.4		8.3	7.3	42.6	15.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.4		8.3	7.3	42.6	15.5
LOS	B		A	A	D	B
Approach Delay	13.4			7.5	26.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	38.5		11.4	28.2	27.2	0.0
Queue Length 95th (m)	55.3		19.9	39.4	47.6	#31.0
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1776		511	2279	330	410
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.46		0.51	0.37	0.59	0.69

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 77.8

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 69.2%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Total - SAT
09/18/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	15	840	845	54	36	14
Future Volume (Veh/h)	15	840	845	54	36	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	913	918	59	39	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)		200				
pX, platoon unblocked					0.88	
vC, conflicting volume	977				1436	488
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977				1215	488
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				74	97
cM capacity (veh/h)	714				151	531
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	320	609	612	365	54	
Volume Left	16	0	0	0	39	
Volume Right	0	0	0	59	15	
cSH	714	1700	1700	1700	189	
Volume to Capacity	0.02	0.36	0.36	0.21	0.29	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	8.6	
Control Delay (s)	0.8	0.0	0.0	0.0	31.5	
Lane LOS	A				D	
Approach Delay (s)	0.3	0.0		31.5		
Approach LOS					D	
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			43.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2036 Future Total - SAT
 09/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	910	73	107	869	81	109
Future Volume (Veh/h)	910	73	107	869	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1011	81	119	966	90	121
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			1092		1772	546
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1092		1772	546
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		0	75
cM capacity (veh/h)			635		60	482
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	674	418	441	644	211	
Volume Left	0	0	119	0	90	
Volume Right	0	81	0	0	121	
cSH	1700	1700	635	1700	121	
Volume to Capacity	0.40	0.25	0.19	0.38	1.74	
Queue Length 95th (m)	0.0	0.0	5.2	0.0	122.7	
Control Delay (s)	0.0	0.0	5.3	0.0	428.7	
Lane LOS			A			F
Approach Delay (s)	0.0		2.1		428.7	
Approach LOS					F	
Intersection Summary						
Average Delay			38.9			
Intersection Capacity Utilization			75.8%	ICU Level of Service	D	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - SAT
 09/18/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	943	28	204	993	195	104	16	243	154	39	53
Future Volume (Veh/h)	51	943	28	204	993	195	104	16	243	154	39	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	54	993	29	215	1045	205	109	17	256	162	41	56
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	1250			1022			2144	2796	511	2446	2708	625
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1250			1022			2144	2796	511	2446	2708	625
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			68			0	0	50	0	0	87
cM capacity (veh/h)	564			675			0	12	513	0	13	433

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	54	662	360	215	697	553	382	259
Volume Left	54	0	0	215	0	0	109	162
Volume Right	0	0	29	0	0	205	256	56
cSH	564	1700	1700	675	1700	1700	0	0
Volume to Capacity	0.10	0.39	0.21	0.32	0.41	0.33	Err	Err
Queue Length 95th (m)	2.4	0.0	0.0	10.4	0.0	0.0	Err	Err
Control Delay (s)	12.1	0.0	0.0	12.8	0.0	0.0	Err	Err
Lane LOS	B			B			F	F
Approach Delay (s)	0.6			1.9			Err	Err
Approach LOS							F	F

Intersection Summary

Average Delay		Err	
Intersection Capacity Utilization		75.8%	ICU Level of Service
Analysis Period (min)		15	D

HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Total - SAT
 09/18/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	169	158	112
Future Volume (Veh/h)	192	21	18	169	158	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	188	176	124
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	466	238	300			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466	238	300			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	61	97	98			
cM capacity (veh/h)	546	801	1261			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	208	300			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	564	1261	1700			
Volume to Capacity	0.42	0.02	0.18			
Queue Length 95th (m)	15.6	0.4	0.0			
Control Delay (s)	15.9	0.9	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.9	0.9	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization		42.5%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Total - SAT
 09/18/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕↗		↖	↕↖	↗		↕↗			↖	↗
Traffic Volume (veh/h)	89	1316	7	31	1340	185	1	7	12	180	6	77
Future Volume (Veh/h)	89	1316	7	31	1340	185	1	7	12	180	6	77
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	94	1385	7	33	1411	195	1	7	13	189	6	81
Pedestrians								1				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.1				
Percent Blockage								0				
Right turn flare (veh)												9
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1411			1393			2352	3054	697	2374	3058	706
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1411			1393			2352	3054	697	2374	3058	706
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	80			93			84	27	97	0	37	78
cM capacity (veh/h)	479			497			6	10	388	6	9	372

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	94	923	469	33	706	706	195	21	276
Volume Left	94	0	0	33	0	0	0	1	189
Volume Right	0	0	7	0	0	0	195	13	81
cSH	479	1700	1700	497	1700	1700	1700	23	8
Volume to Capacity	0.20	0.54	0.28	0.07	0.41	0.41	0.11	0.93	33.26
Queue Length 95th (m)	5.5	0.0	0.0	1.6	0.0	0.0	0.0	20.6	Err
Control Delay (s)	14.3	0.0	0.0	12.8	0.0	0.0	0.0	405.7	Err
Lane LOS	B			B				F	F
Approach Delay (s)	0.9			0.3				405.7	Err
Approach LOS								F	F

Intersection Summary		
Average Delay		809.5
Intersection Capacity Utilization	68.9%	ICU Level of Service
Analysis Period (min)	15	C

HCM Unsignalized Intersection Capacity Analysis
 5: Elizabeth Street & Highway 89

2036 Future Total - SAT
 09/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1538	3	7	1551	0	10
Future Volume (Veh/h)	1538	3	7	1551	0	10
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)	1636	3	7	1650	0	11
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			1639		2476	820
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1639		2476	820
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			98		100	96
cM capacity (veh/h)			401		25	289
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1091	548	557	1100	11	
Volume Left	0	0	7	0	0	
Volume Right	0	3	0	0	11	
cSH	1700	1700	401	1700	289	
Volume to Capacity	0.64	0.32	0.02	0.65	0.04	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.9	
Control Delay (s)	0.0	0.0	0.5	0.0	18.0	
Lane LOS			A	C		
Approach Delay (s)	0.0		0.2		18.0	
Approach LOS					C	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			57.8%	ICU Level of Service	B	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1161	217	523	1121	41	299	65	301	59	143	116
Future Volume (vph)	168	1161	217	523	1121	41	299	65	301	59	143	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.976			0.995				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3517	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Fl _t Permitted	0.223			0.108			0.642	0.693		0.527		
Satd. Flow (perm)	424	3517	0	207	3594	0	1134	1238	1593	981	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			6				324			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	181	1248	233	562	1205	44	322	70	324	63	154	125
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	181	1481	0	562	1249	0	190	202	324	63	154	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	33.1	33.1		60.3	57.2		21.8	21.8	21.8	21.8	21.8	21.8
Actuated g/C Ratio	0.36	0.36		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	1.19	1.16		1.15	0.56		0.71	0.69	0.52	0.27	0.34	0.28
Control Delay	164.6	109.1		116.1	12.2		46.9	44.5	6.4	30.9	30.6	11.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	164.6	109.1		116.1	12.2		46.9	44.5	6.4	30.9	30.6	11.7
LOS	F	F		F	B		D	D	A	C	C	B
Approach Delay		115.1			44.4			27.9				23.7
Approach LOS		F			D			C				C
Queue Length 50th (m)	~39.8	~167.5		~104.0	63.4		32.4	34.3	0.0	9.1	22.7	5.1
Queue Length 95th (m)	#85.2	#229.2		#181.7	95.7		56.5	58.5	19.0	19.9	38.7	18.2
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	152	1280		488	2236		358	391	725	310	607	568
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	1.19	1.16		1.15	0.56		0.53	0.52	0.45	0.20	0.25	0.22

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.1
Natural Cycle:	150
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.19
Intersection Signal Delay:	66.2
Intersection Capacity Utilization	108.8%
Intersection LOS:	E
ICU Level of Service	G

Analysis Period (min) 15

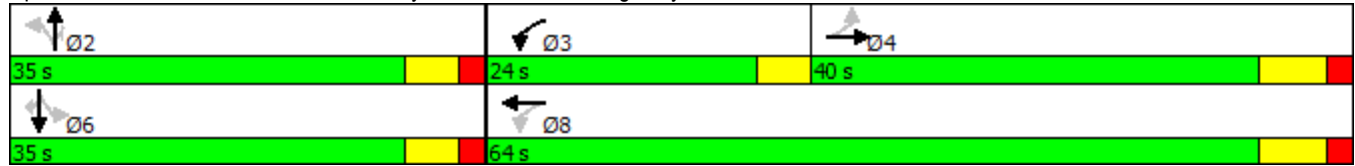
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - AM
9/7/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	438	158	267	315	60	138
Future Volume (vph)	438	158	267	315	60	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.960					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3002	0	1620	3093	1471	1426
Flt Permitted			0.374		0.950	
Satd. Flow (perm)	3002	0	638	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	88					152
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	481	174	293	346	66	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	655	0	293	346	66	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - AM
9/7/2017

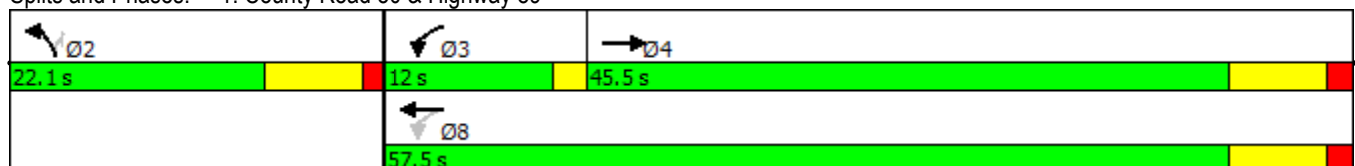


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.4		55.5	50.0	10.5	10.5
Actuated g/C Ratio	0.52		0.74	0.67	0.14	0.14
v/c Ratio	0.41		0.50	0.17	0.32	0.46
Control Delay	10.4		6.4	5.1	33.7	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	10.4		6.4	5.1	33.7	10.5
LOS	B		A	A	C	B
Approach Delay	10.4			5.7	17.5	
Approach LOS	B			A	B	
Queue Length 50th (m)	22.8		9.9	8.0	8.6	0.0
Queue Length 95th (m)	38.1		19.6	14.0	19.3	14.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1617		602	2059	293	406
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.41		0.49	0.17	0.23	0.37

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.1
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.50
Intersection Signal Delay:	9.4
Intersection Capacity Utilization:	67.8%
Analysis Period (min):	15
Intersection LOS:	A
ICU Level of Service:	C

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

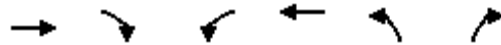
2026 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	12	546	539	16	36	55
Future Volume (Veh/h)	12	546	539	16	36	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	607	599	18	40	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.96	
vC, conflicting volume	617				938	308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	617				857	308
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	99				86	91
cM capacity (veh/h)	900				285	693
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	215	405	399	218	101	
Volume Left	13	0	0	0	40	
Volume Right	0	0	0	18	61	
cSH	900	1700	1700	1700	442	
Volume to Capacity	0.01	0.24	0.23	0.13	0.23	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	6.6	
Control Delay (s)	0.7	0.0	0.0	0.0	15.5	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		15.5	
Approach LOS					C	
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			35.7%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2026 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	555	142	137	540	14	34
Future Volume (vph)	555	142	137	540	14	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.969				0.905	
Flt Protected			0.950		0.985	
Satd. Flow (prot)	3468	0	1789	3579	1679	0
Flt Permitted			0.329		0.985	
Satd. Flow (perm)	3468	0	620	3579	1679	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	46				38	
Link Speed (k/h)	80			80	50	
Link Distance (m)	647.5			74.9	107.1	
Travel Time (s)	29.1			3.4	7.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	617	158	152	600	16	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	775	0	152	600	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2026 Future Total - AM: Add'l Signals
09/21/2017

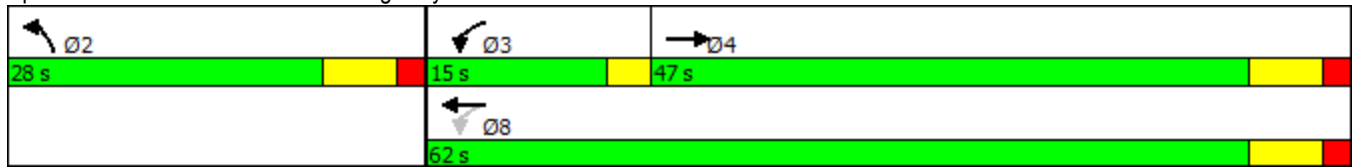


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		15.0	62.0	28.0	
Total Split (%)	52.2%		16.7%	68.9%	31.1%	
Maximum Green (s)	40.0		12.0	55.0	21.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	49.6		63.4	62.3	6.6	
Actuated g/C Ratio	0.66		0.85	0.83	0.09	
v/c Ratio	0.34		0.24	0.20	0.30	
Control Delay	6.9		2.8	2.8	20.0	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	6.9		2.8	2.8	20.0	
LOS	A		A	A	C	
Approach Delay	6.9			2.8	20.0	
Approach LOS	A			A	C	
Queue Length 50th (m)	24.8		3.6	11.3	2.2	
Queue Length 95th (m)	40.5		8.4	18.9	11.8	
Internal Link Dist (m)	623.5			50.9	83.1	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2312		712	2977	499	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.34		0.21	0.20	0.11	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	74.9
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.34
Intersection Signal Delay:	5.4
Intersection LOS:	A
Intersection Capacity Utilization:	46.6%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	499	35	51	401	69	12	9	53	64	8	27
Future Volume (vph)	27	499	35	51	401	69	12	9	53	64	8	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.978			0.903				0.964
Flt Protected	0.950			0.950				0.992				0.969
Satd. Flow (prot)	1825	3153	0	1772	3164	0	0	1721	0	0	1748	0
Flt Permitted	0.464			0.434				0.937				0.775
Satd. Flow (perm)	891	3153	0	809	3164	0	0	1625	0	0	1398	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			42			58				19
Link Speed (k/h)		60			60			60				50
Link Distance (m)		314.7			133.1			224.3				107.2
Travel Time (s)		18.9			8.0			13.5				7.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	29	542	38	55	436	75	13	10	58	70	9	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	580	0	55	511	0	0	81	0	0	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - AM: Add'l Signals

09/21/2017

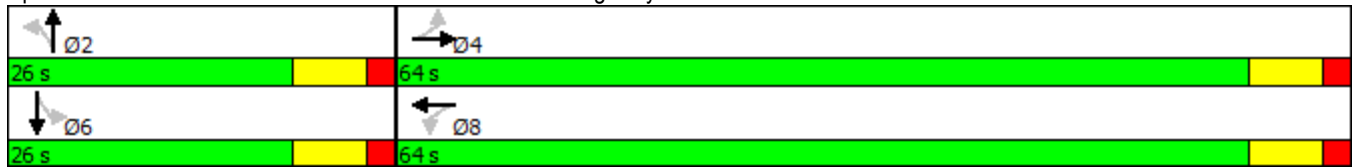


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	62.5	62.5		62.5	62.5			10.7			10.8	
Actuated g/C Ratio	0.75	0.75		0.75	0.75			0.13			0.13	
v/c Ratio	0.04	0.24		0.09	0.21			0.31			0.55	
Control Delay	5.0	4.8		5.3	4.4			16.5			37.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.0	4.8		5.3	4.4			16.5			37.9	
LOS	A	A		A	A			B			D	
Approach Delay		4.8			4.5			16.5			37.9	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.2	14.3		2.4	11.4			3.2			13.0	
Queue Length 95th (m)	4.3	25.9		7.2	21.4			14.6			28.0	
Internal Link Dist (m)		290.7			109.1			200.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	669	2374		608	2389			416			334	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.04	0.24		0.09	0.21			0.19			0.32	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.1
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	8.0
Intersection LOS:	A
Intersection Capacity Utilization:	48.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
7: Concession Road 7 & Street A

2026 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	59	76	143
Future Volume (Veh/h)	51	6	22	59	76	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	66	84	159
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					224	
pX, platoon unblocked						
vC, conflicting volume	278	164	243			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	278	164	243			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	99	98			
cM capacity (veh/h)	699	881	1323			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	90	243			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	715	1323	1700			
Volume to Capacity	0.09	0.02	0.14			
Queue Length 95th (m)	2.2	0.4	0.0			
Control Delay (s)	10.5	2.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.5	2.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			30.4%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	648	1	8	718	64	0	1	1	48	3	47
Future Volume (vph)	36	648	1	8	718	64	0	1	1	48	3	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.955	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1752	1396
Fl _t Permitted	0.365			0.392							0.737	
Satd. Flow (perm)	632	3259	0	564	3230	1570	0	1790	0	0	1352	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	38	682	1	8	756	67	0	1	1	51	3	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	683	0	8	756	67	0	2	0	0	54	49
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	67.1	67.1		67.1	67.1	80.8		8.3			8.6	80.8
Actuated g/C Ratio	0.83	0.83		0.83	0.83	1.00		0.10			0.11	1.00
v/c Ratio	0.07	0.25		0.02	0.28	0.04		0.01			0.38	0.04
Control Delay	4.1	3.5		4.0	3.6	0.0		28.5			41.7	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	4.1	3.5		4.0	3.6	0.0		28.5			41.7	0.0
LOS	A	A		A	A	A		C			D	A
Approach Delay		3.5			3.3			28.5			21.9	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.4	16.1		0.3	18.4	0.0		0.1			8.8	0.0
Queue Length 95th (m)	4.7	26.2		1.6	29.6	0.0		m1.8			17.8	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	524	2704		468	2680	1570		558			421	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.07	0.25		0.02	0.28	0.04		0.00			0.13	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.8
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.38
Intersection Signal Delay:	4.6
Intersection Capacity Utilization	51.0%
Intersection LOS:	A
ICU Level of Service	A

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	713	1	3	806	0	14
Future Volume (Veh/h)	713	1	3	806	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	767	1	3	867	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)	249					
pX, platoon unblocked			0.98	0.98	0.98	
vC, conflicting volume			768	1207	384	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			715	1164	322	
tC, single (s)			4.1	6.8	7.1	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.4	
p0 queue free %			100	100	98	
cM capacity (veh/h)			874	185	639	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	511	257	292	578	15	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	15	
cSH	1700	1700	874	1700	639	
Volume to Capacity	0.30	0.15	0.00	0.34	0.02	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.5	
Control Delay (s)	0.0	0.0	0.1	0.0	10.8	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.0		10.8	
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			34.4%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	579	161	235	622	9	171	22	90	9	31	18
Future Volume (vph)	33	579	161	235	622	9	171	22	90	9	31	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3171	0	1807	3465	0	1387	1473	1617	1825	1779	1633
Flt Permitted	0.393			0.281			0.736	0.753		0.686		
Satd. Flow (perm)	755	3171	0	534	3465	0	1075	1152	1617	1318	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			2				97			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	35	623	173	253	669	10	184	24	97	10	33	19
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	35	796	0	253	679	0	103	105	97	10	33	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - AM
9/7/2017

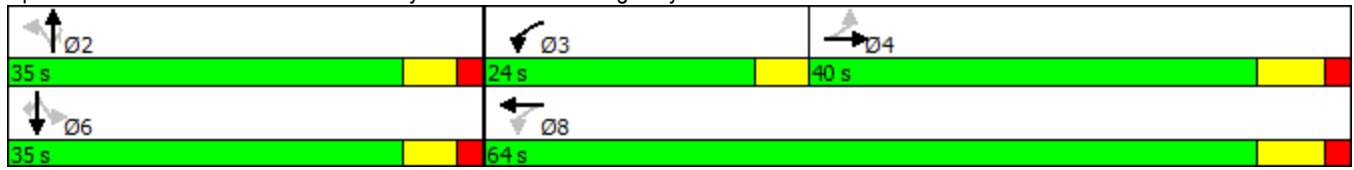


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	43.6	43.6		60.1	57.1		14.8	14.8	14.8	14.8	14.8	14.8
Actuated g/C Ratio	0.51	0.51		0.71	0.67		0.17	0.17	0.17	0.17	0.17	0.17
v/c Ratio	0.09	0.48		0.49	0.29		0.55	0.52	0.27	0.04	0.11	0.05
Control Delay	13.9	15.1		8.2	6.6		43.2	41.3	8.4	28.3	29.4	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	15.1		8.2	6.6		43.2	41.3	8.4	28.3	29.4	0.3
LOS	B	B		A	A		D	D	A	C	C	A
Approach Delay		15.0			7.0			31.5			20.3	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	2.6	37.5		11.3	19.8		16.2	16.4	0.0	1.4	4.6	0.0
Queue Length 95th (m)	9.6	70.2		26.2	36.6		32.0	32.1	11.5	5.4	11.8	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	387	1644		677	2329		367	393	616	450	608	616
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	0.09	0.48		0.37	0.29		0.28	0.27	0.16	0.02	0.05	0.03

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	85
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	14.0
Intersection Capacity Utilization	61.1%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	B

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	410	60	176	766	214	333
Future Volume (vph)	410	60	176	766	214	333
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3208	0	1532	3444	1665	921
Flt Permitted			0.444		0.950	
Satd. Flow (perm)	3208	0	716	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					358
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	441	65	189	824	230	358
Shared Lane Traffic (%)						
Lane Group Flow (vph)	506	0	189	824	230	358
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.1		55.5	50.0	13.9	13.9
Actuated g/C Ratio	0.51		0.71	0.64	0.18	0.18
v/c Ratio	0.31		0.32	0.38	0.78	0.78
Control Delay	11.6		5.6	7.6	50.9	17.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.6		5.6	7.6	50.9	17.5
LOS	B		A	A	D	B
Approach Delay	11.6			7.2	30.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	20.8		8.2	28.4	33.1	0.0
Queue Length 95th (m)	32.5		14.7	38.4	#64.3	#40.3
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1651		610	2195	318	465
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.31		0.31	0.38	0.72	0.77

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	78.5
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.78
Intersection Signal Delay:	14.8
Intersection LOS:	B
Intersection Capacity Utilization:	66.3%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	44	697	916	66	19	23
Future Volume (Veh/h)	44	697	916	66	19	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	47	749	985	71	20	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.94	
vC, conflicting volume	1056				1489	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1056				1397	528
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	93				82	95
cM capacity (veh/h)	667				110	500
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	297	499	657	399	45	
Volume Left	47	0	0	0	20	
Volume Right	0	0	0	71	25	
cSH	667	1700	1700	1700	193	
Volume to Capacity	0.07	0.29	0.39	0.23	0.23	
Queue Length 95th (m)	1.7	0.0	0.0	0.0	6.6	
Control Delay (s)	2.5	0.0	0.0	0.0	29.2	
Lane LOS	A				D	
Approach Delay (s)	0.9		0.0		29.2	
Approach LOS					D	
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			61.3%		ICU Level of Service	B
Analysis Period (min)			15			

Lanes, Volumes, Timings
7: Street B & Highway 89

2026 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	694	42	68	886	95	132
Future Volume (vph)	694	42	68	886	95	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.991				0.922	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3546	0	1789	3579	1700	0
Flt Permitted			0.290		0.979	
Satd. Flow (perm)	3546	0	546	3579	1700	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	9				77	
Link Speed (k/h)	80			80	50	
Link Distance (m)	648.3			78.2	116.9	
Travel Time (s)	29.2			3.5	8.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	771	47	76	984	106	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	818	0	76	984	253	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
7: Street B & Highway 89

2026 Future Total - PM: Add'l Signals
09/21/2017

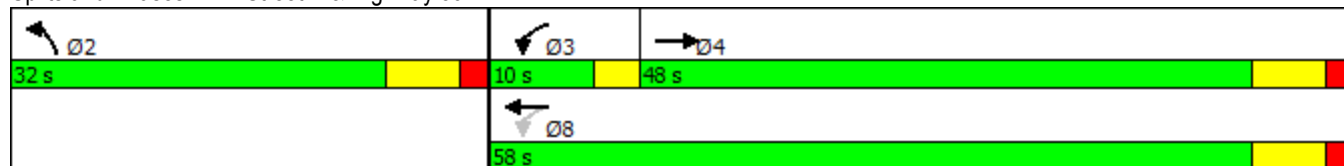


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	48.0		10.0	58.0	32.0	
Total Split (%)	53.3%		11.1%	64.4%	35.6%	
Maximum Green (s)	41.0		7.0	51.0	25.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	44.5		56.2	52.1	13.8	
Actuated g/C Ratio	0.56		0.70	0.65	0.17	
v/c Ratio	0.41		0.16	0.42	0.71	
Control Delay	12.4		5.5	8.0	32.3	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	12.4		5.5	8.0	32.3	
LOS	B		A	A	C	
Approach Delay	12.4			7.8	32.3	
Approach LOS	B			A	C	
Queue Length 50th (m)	36.4		3.0	32.8	24.7	
Queue Length 95th (m)	60.7		8.8	57.2	47.4	
Internal Link Dist (m)	624.3			54.2	92.9	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1976		492	2332	585	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.41		0.15	0.42	0.43	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	12.5
Intersection LOS:	B
Intersection Capacity Utilization:	53.1%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 7: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - PM: Add'l Signals
10/19/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	782	20	148	819	56	125	13	201	42	8	33
Future Volume (vph)	26	782	20	148	819	56	125	13	201	42	8	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.990			0.920			0.946	
Flt Protected	0.950			0.950				0.982			0.975	
Satd. Flow (prot)	1825	3298	0	1825	3391	0	0	1680	0	0	1772	0
Flt Permitted	0.272			0.304				0.842			0.657	
Satd. Flow (perm)	523	3298	0	584	3391	0	0	1440	0	0	1194	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			84			35	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			226.8			107.2	
Travel Time (s)		18.6			8.0			13.6			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	27	823	21	156	862	59	132	14	212	44	8	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	844	0	156	921	0	0	358	0	0	87	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - PM: Add'l Signals
10/19/2017

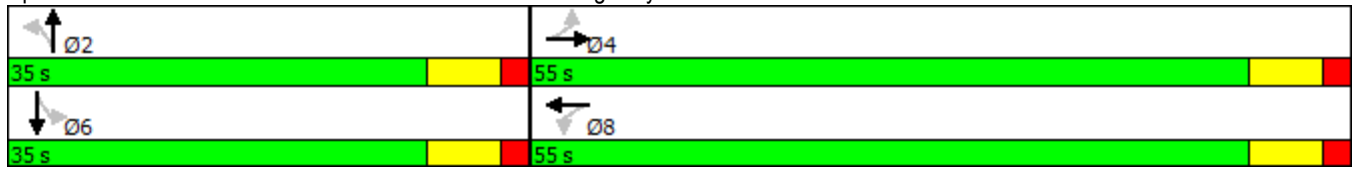


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	55.0	55.0		55.0	55.0		35.0	35.0		35.0	35.0	
Total Split (%)	61.1%	61.1%		61.1%	61.1%		38.9%	38.9%		38.9%	38.9%	
Maximum Green (s)	48.0	48.0		48.0	48.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	48.2	48.2		48.2	48.2			20.9			20.9	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.25			0.25	
v/c Ratio	0.09	0.44		0.46	0.47			0.84			0.27	
Control Delay	10.7	11.6		17.5	11.8			40.8			17.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	10.7	11.6		17.5	11.8			40.8			17.8	
LOS	B	B		B	B			D			B	
Approach Delay		11.6			12.7			40.8			17.8	
Approach LOS		B			B			D			B	
Queue Length 50th (m)	1.8	37.5		13.5	41.4			41.7			6.4	
Queue Length 95th (m)	6.5	59.7		34.9	65.4			73.7			17.5	
Internal Link Dist (m)		286.5			109.1			202.8			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	303	1913		338	1971			542			427	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.09	0.44		0.46	0.47			0.66			0.20	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.2
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	16.7
Intersection Capacity Utilization	70.6%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 24: Concession Road 7 & Street A

2026 Future Total - PM: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	114	104	72
Future Volume (Veh/h)	226	24	9	114	104	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	127	116	80
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					227	
pX, platoon unblocked						
vC, conflicting volume	303	156	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	303	156	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	97	99			
cM capacity (veh/h)	684	890	1377			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	137	196			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	699	1377	1700			
Volume to Capacity	0.40	0.01	0.12			
Queue Length 95th (m)	14.5	0.2	0.0			
Control Delay (s)	13.5	0.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.5	0.6	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization		34.1%		ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - PM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	974	8	16	926	104	0	0	9	87	1	55
Future Volume (vph)	74	974	8	16	926	104	0	0	9	87	1	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3378	0	1825	3444	1633	0	1662	0	0	1813	1633
Flt Permitted	0.283			0.263							0.722	
Satd. Flow (perm)	508	3378	0	505	3444	1633	0	1662	0	0	1373	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		134				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	78	1025	8	17	975	109	0	0	9	92	1	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	1033	0	17	975	109	0	9	0	0	93	58
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	67.8	67.8		67.8	67.8	88.6		11.1			11.3	88.6
Actuated g/C Ratio	0.77	0.77		0.77	0.77	1.00		0.13			0.13	1.00
v/c Ratio	0.20	0.40		0.04	0.37	0.07		0.03			0.53	0.04
Control Delay	6.7	5.7		5.1	5.5	0.1		0.1			46.9	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	6.7	5.7		5.1	5.5	0.1		0.1			46.9	0.0
LOS	A	A		A	A	A		A			D	A
Approach Delay		5.8			4.9			0.1			28.9	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	3.8	32.2		0.7	29.5	0.0		0.0			15.7	0.0
Queue Length 95th (m)	11.2	51.8		3.1	47.5	0.0		m0.0			28.0	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	388	2584		386	2634	1633		445			279	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.20	0.40		0.04	0.37	0.07		0.02			0.33	0.04

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 88.6
 Natural Cycle: 55
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 6.8
 Intersection Capacity Utilization 60.4%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1044	4	5	1091	0	13
Future Volume (Veh/h)	1044	4	5	1091	0	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1076	4	5	1125	0	13
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.90		0.90	0.90
vC, conflicting volume			1083		1654	543
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			867		1502	266
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	98
cM capacity (veh/h)			704		102	586
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	717	363	380	750	13	
Volume Left	0	0	5	0	0	
Volume Right	0	4	0	0	13	
cSH	1700	1700	704	1700	586	
Volume to Capacity	0.42	0.21	0.01	0.44	0.02	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.5	
Control Delay (s)	0.0	0.0	0.2	0.0	11.3	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		11.3	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			43.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	782	276	239	681	26	370	39	175	23	47	70
Future Volume (vph)	47	782	276	239	681	26	370	39	175	23	47	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.961			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3284	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Fl _t Permitted	0.372			0.135			0.725	0.734		0.506		
Satd. Flow (perm)	714	3284	0	259	3557	0	1168	1203	1588	913	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54			6				182			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	49	815	288	249	709	27	385	41	182	24	49	73
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	49	1103	0	249	736	0	212	214	182	24	49	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	41.1	41.1		60.3	57.3		22.4	22.4	22.4	22.4	22.4	22.4
Actuated g/C Ratio	0.44	0.44		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.16	0.74		0.67	0.33		0.75	0.74	0.35	0.11	0.11	0.16
Control Delay	21.6	26.7		20.5	9.8		49.5	47.9	6.2	27.5	26.8	5.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	26.7		20.5	9.8		49.5	47.9	6.2	27.5	26.8	5.3
LOS	C	C		C	A		D	D	A	C	C	A
Approach Delay		26.4			12.5			35.9			16.1	
Approach LOS		C			B			D			B	
Queue Length 50th (m)	5.1	79.9		16.9	31.2		36.8	37.0	0.0	3.3	6.8	0.0
Queue Length 95th (m)	15.6	#147.4		43.1	48.2		62.7	62.7	14.7	9.6	15.2	7.6
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	316	1485		507	2199		367	377	623	286	603	556
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	0.16	0.74		0.49	0.33		0.58	0.57	0.29	0.08	0.08	0.13

Intersection Summary

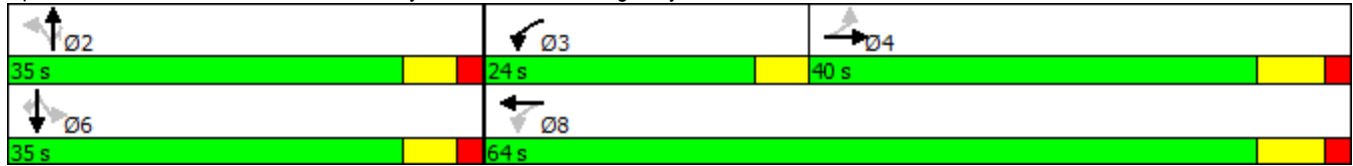
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	23.2
Intersection Capacity Utilization	78.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	527	76	189	645	141	204
Future Volume (vph)	527	76	189	645	141	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3468	0	1668	3544	1713	949
Flt Permitted			0.391		0.950	
Satd. Flow (perm)	3468	0	687	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	27					210
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	543	78	195	665	145	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	621	0	195	665	145	210
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.4		55.5	50.0	12.1	12.1
Actuated g/C Ratio	0.53		0.72	0.65	0.16	0.16
v/c Ratio	0.34		0.33	0.29	0.54	0.64
Control Delay	11.1		5.2	6.3	37.6	14.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		5.2	6.3	37.6	14.6
LOS	B		A	A	D	B
Approach Delay	11.1			6.1	24.0	
Approach LOS	B			A	C	
Queue Length 50th (m)	23.6		6.9	18.5	19.6	0.0
Queue Length 95th (m)	39.9		14.8	29.5	36.2	19.4
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1840		625	2311	335	354
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.34		0.31	0.29	0.43	0.59

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	76.7
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	11.2
Intersection LOS:	B
Intersection Capacity Utilization:	63.5%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2026 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	13	697	715	48	30	12
Future Volume (Veh/h)	13	697	715	48	30	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	758	777	52	33	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	829				1210	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	829				1053	414
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				84	98
cM capacity (veh/h)	811				203	592
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	267	505	518	311	46	
Volume Left	14	0	0	0	33	
Volume Right	0	0	0	52	13	
cSH	811	1700	1700	1700	250	
Volume to Capacity	0.02	0.30	0.30	0.18	0.18	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	5.0	
Control Delay (s)	0.7	0.0	0.0	0.0	22.7	
Lane LOS	A				C	
Approach Delay (s)	0.2		0.0		22.7	
Approach LOS					C	
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			38.5%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
8: Street B & Highway 89

2026 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	672	73	107	736	81	109
Future Volume (vph)	672	73	107	736	81	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.985				0.923	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3525	0	1789	3579	1702	0
Flt Permitted			0.290		0.979	
Satd. Flow (perm)	3525	0	546	3579	1702	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	16				72	
Link Speed (k/h)	80			80	50	
Link Distance (m)	648.9			75.8	107.5	
Travel Time (s)	29.2			3.4	7.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	747	81	119	818	90	121
Shared Lane Traffic (%)						
Lane Group Flow (vph)	828	0	119	818	211	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
8: Street B & Highway 89

2026 Future Total - SAT: Add'l Signals
09/21/2017

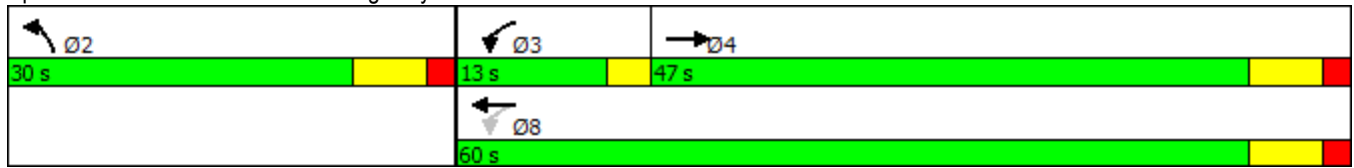


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		13.0	60.0	30.0	
Total Split (%)	52.2%		14.4%	66.7%	33.3%	
Maximum Green (s)	40.0		10.0	53.0	23.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	46.1		58.6	54.6	12.1	
Actuated g/C Ratio	0.57		0.73	0.68	0.15	
v/c Ratio	0.41		0.23	0.34	0.67	
Control Delay	11.7		5.1	6.5	31.2	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	11.7		5.1	6.5	31.2	
LOS	B		A	A	C	
Approach Delay	11.7			6.3	31.2	
Approach LOS	B			A	C	
Queue Length 50th (m)	35.2		4.3	23.5	19.5	
Queue Length 95th (m)	60.7		11.4	41.5	39.9	
Internal Link Dist (m)	624.9			51.8	83.5	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2020		550	2420	537	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.41		0.22	0.34	0.39	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.7
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	11.2
Intersection LOS:	B
Intersection Capacity Utilization:	53.0%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 8: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	725	21	180	760	145	98	12	208	115	29	40
Future Volume (vph)	38	725	21	180	760	145	98	12	208	115	29	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.976			0.912			0.971	
Flt Protected	0.950			0.950				0.985			0.970	
Satd. Flow (prot)	1825	3566	0	1789	3475	0	0	1726	0	0	1798	0
Flt Permitted	0.281			0.249				0.841			0.545	
Satd. Flow (perm)	540	3566	0	469	3475	0	0	1473	0	0	1010	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			29			113			17	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			226.7			107.2	
Travel Time (s)		18.7			8.0			13.6			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	40	763	22	189	800	153	103	13	219	121	31	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	785	0	189	953	0	0	335	0	0	194	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2026 Future Total - SAT: Add'l Signals

09/21/2017

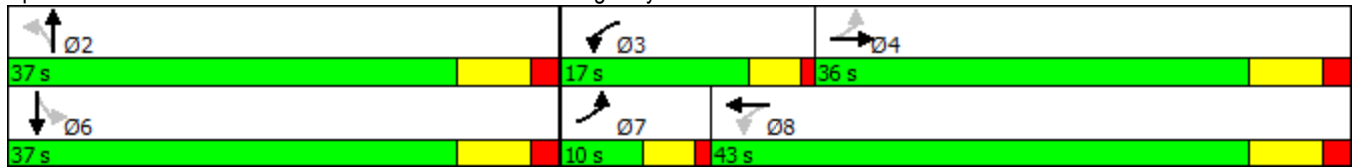


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	5.5	29.0		12.5	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.5	5.0		3.5	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0		4.5	7.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	38.7	30.5		46.5	38.6			17.7			17.7	
Actuated g/C Ratio	0.51	0.40		0.61	0.51			0.23			0.23	
v/c Ratio	0.11	0.55		0.43	0.54			0.78			0.78	
Control Delay	9.1	20.9		10.8	16.1			31.0			46.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	9.1	20.9		10.8	16.1			31.0			46.7	
LOS	A	C		B	B			C			D	
Approach Delay		20.3			15.2			31.0			46.7	
Approach LOS		C			B			C			D	
Queue Length 50th (m)	2.0	43.7		10.4	50.5			31.0			24.7	
Queue Length 95th (m)	7.3	79.7		26.3	87.0			58.4			47.0	
Internal Link Dist (m)		288.3			109.1			202.7			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	368	1432		507	1778			657			414	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.11	0.55		0.37	0.54			0.51			0.47	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	76.1
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.78
Intersection Signal Delay:	21.5
Intersection Capacity Utilization:	65.7%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
7: Concession Road 7 & Street A

2026 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	124	117	112
Future Volume (Veh/h)	192	21	18	124	117	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	138	130	124
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					227	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	370	192	254			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	344	162	226			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	97	98			
cM capacity (veh/h)	628	863	1313			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	158	254			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	645	1313	1700			
Volume to Capacity	0.37	0.02	0.15			
Queue Length 95th (m)	12.7	0.4	0.0			
Control Delay (s)	13.8	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.8	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			5.3			
Intersection Capacity Utilization			40.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

2026 Future Total - SAT: Add'l Signals

4: Elizabeth Street/Concession Road 7 & Highway 89

09/26/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	1027	5	23	1046	138	1	5	9	134	4	58
Future Volume (vph)	69	1027	5	23	1046	138	1	5	9	134	4	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t		0.999				0.850		0.919				0.850
Fl _t Protected	0.950			0.950				0.997			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1760	0	0	1781	1555
Fl _t Permitted	0.231			0.236				0.978			0.721	
Satd. Flow (perm)	435	3575	0	453	3579	1601	0	1727	0	0	1346	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				142		9				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	73	1081	5	24	1101	145	1	5	9	141	4	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	1086	0	24	1101	145	0	15	0	0	145	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2026 Future Total - SAT: Add'l Signals

09/26/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	60.4	60.4		60.4	60.4	88.9		14.5			14.5	88.9
Actuated g/C Ratio	0.68	0.68		0.68	0.68	1.00		0.16			0.16	1.00
v/c Ratio	0.25	0.45		0.08	0.45	0.09		0.05			0.66	0.04
Control Delay	9.4	7.8		6.9	7.9	0.1		18.6			48.6	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	9.4	7.8		6.9	7.9	0.1		18.6			48.6	0.1
LOS	A	A		A	A	A		B			D	A
Approach Delay		7.9			7.0			18.6			34.2	
Approach LOS		A			A			B			C	
Queue Length 50th (m)	4.1	38.4		1.2	39.3	0.0		0.8			22.0	0.0
Queue Length 95th (m)	13.0	62.4		4.8	63.6	0.0		m5.3			40.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	295	2429		307	2431	1601		396			303	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.25	0.45		0.08	0.45	0.09		0.04			0.48	0.04

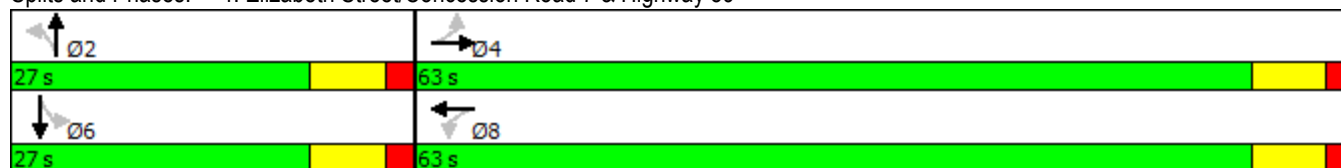
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	88.9
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	9.6
Intersection Capacity Utilization	64.9%
Intersection LOS:	A
ICU Level of Service	C

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2026 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1192	3	5	1203	0	8
Future Volume (Veh/h)	1192	3	5	1203	0	8
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)	1268	3	5	1280	0	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.86		0.86	0.86
vC, conflicting volume			1271		1920	636
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			981		1738	238
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	99
cM capacity (veh/h)			610		68	616
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	845	426	432	853	9	
Volume Left	0	0	5	0	0	
Volume Right	0	3	0	0	9	
cSH	1700	1700	610	1700	616	
Volume to Capacity	0.50	0.25	0.01	0.50	0.01	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.3	
Control Delay (s)	0.0	0.0	0.2	0.0	10.9	
Lane LOS			A			B
Approach Delay (s)	0.0		0.1		10.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			46.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	911	163	389	882	30	223	48	224	44	106	86
Future Volume (vph)	125	911	163	389	882	30	223	48	224	44	106	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.977			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3523	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.292			0.103			0.684	0.735		0.628		
Satd. Flow (perm)	555	3523	0	198	3594	0	1208	1313	1593	1168	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			6				241			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	134	980	175	418	948	32	240	52	241	47	114	92
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	134	1155	0	418	980	0	142	150	241	47	114	92
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2026 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	35.0	35.0		60.3	57.3		17.3	17.3	17.3	17.3	17.3	17.3
Actuated g/C Ratio	0.40	0.40		0.69	0.65		0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.61	0.81		0.88	0.42		0.60	0.58	0.48	0.20	0.30	0.24
Control Delay	38.5	30.5		42.5	8.6		42.3	40.8	7.2	30.5	31.3	7.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	30.5		42.5	8.6		42.3	40.8	7.2	30.5	31.3	7.8
LOS	D	C		D	A		D	D	A	C	C	A
Approach Delay		31.4			18.7			26.0			22.6	
Approach LOS		C			B			C			C	
Queue Length 50th (m)	18.0	90.1		48.4	36.0		22.9	24.1	0.0	6.6	16.4	0.0
Queue Length 95th (m)	#51.3	#151.9		#114.6	64.7		41.5	43.0	16.9	15.4	30.0	10.9
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	221	1419		509	2352		401	436	690	388	638	595
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	0.61	0.81		0.82	0.42		0.35	0.34	0.35	0.12	0.18	0.15

Intersection Summary

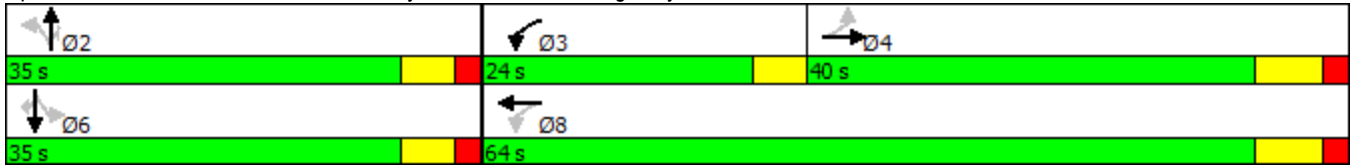
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	87.6
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	24.8
Intersection Capacity Utilization	81.2%
Intersection LOS:	C
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - AM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	488	183	310	361	70	160
Future Volume (vph)	488	183	310	361	70	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.959					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2999	0	1620	3093	1471	1426
Flt Permitted			0.331		0.950	
Satd. Flow (perm)	2999	0	564	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	93					176
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	536	201	341	397	77	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	737	0	341	397	77	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - AM
9/7/2017

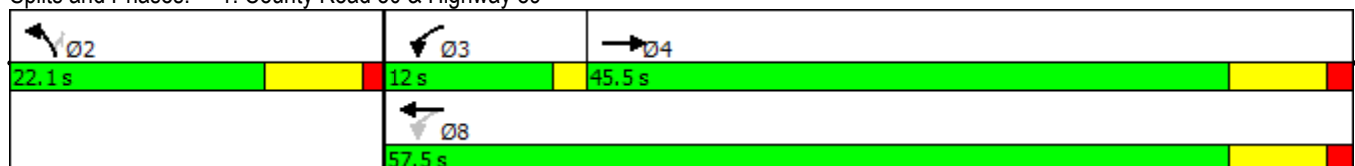


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.0		55.5	50.0	10.8	10.8
Actuated g/C Ratio	0.52		0.74	0.66	0.14	0.14
v/c Ratio	0.46		0.63	0.19	0.36	0.50
Control Delay	11.4		9.1	5.3	34.5	10.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.4		9.1	5.3	34.5	10.4
LOS	B		A	A	C	B
Approach Delay	11.4			7.1	17.7	
Approach LOS	B			A	B	
Queue Length 50th (m)	27.8		11.9	9.4	10.1	0.0
Queue Length 95th (m)	45.3		24.5	16.5	21.9	15.6
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1595		555	2050	292	424
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.46		0.61	0.19	0.26	0.42

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	10.5
Intersection Capacity Utilization	70.2%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↕	↔↕		↔↕	
Traffic Volume (veh/h)	14	613	621	18	40	64
Future Volume (Veh/h)	14	613	621	18	40	64
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	16	681	690	20	44	71
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.94	
vC, conflicting volume	710				1072	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	710				956	355
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				82	89
cM capacity (veh/h)	828				240	647
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	243	454	460	250	115	
Volume Left	16	0	0	0	44	
Volume Right	0	0	0	20	71	
cSH	828	1700	1700	1700	393	
Volume to Capacity	0.02	0.27	0.27	0.15	0.29	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	9.1	
Control Delay (s)	0.8	0.0	0.0	0.0	17.9	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		17.9	
Approach LOS					C	
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			39.8%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2031 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	644	142	137	540	14	34
Future Volume (vph)	644	142	137	540	14	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.973				0.905	
Flt Protected			0.950		0.985	
Satd. Flow (prot)	3482	0	1789	3579	1679	0
Flt Permitted			0.281		0.985	
Satd. Flow (perm)	3482	0	529	3579	1679	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	38				38	
Link Speed (k/h)	80			80	50	
Link Distance (m)	649.1			73.4	107.5	
Travel Time (s)	29.2			3.3	7.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	716	158	152	600	16	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	874	0	152	600	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2031 Future Total - AM: Add'l Signals
09/21/2017

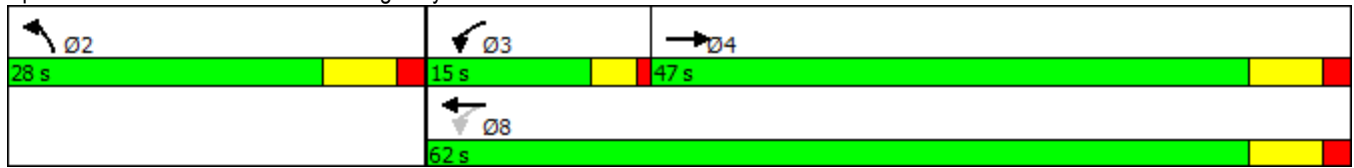


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		15.0	62.0	28.0	
Total Split (%)	52.2%		16.7%	68.9%	31.1%	
Maximum Green (s)	40.0		11.0	55.0	21.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		1.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		4.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	48.3		62.2	62.1	6.6	
Actuated g/C Ratio	0.65		0.83	0.83	0.09	
v/c Ratio	0.39		0.27	0.20	0.29	
Control Delay	7.9		3.3	2.8	20.0	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	7.9		3.3	2.8	20.0	
LOS	A		A	A	C	
Approach Delay	7.9			2.9	20.0	
Approach LOS	A			A	C	
Queue Length 50th (m)	31.0		3.9	11.3	2.2	
Queue Length 95th (m)	49.6		9.0	18.9	11.8	
Internal Link Dist (m)	625.1			49.4	83.5	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2267		626	2977	500	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.39		0.24	0.20	0.11	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	74.7
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.39
Intersection Signal Delay:	6.1
Intersection LOS:	A
Intersection Capacity Utilization:	49.1%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - AM: Add'l Signals

09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	584	34	52	470	80	11	10	55	74	9	31
Future Volume (vph)	31	584	34	52	470	80	11	10	55	74	9	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.978			0.902				0.963
Flt Protected	0.950			0.950				0.993				0.969
Satd. Flow (prot)	1825	3158	0	1772	3164	0	0	1721	0	0	1745	0
Flt Permitted	0.426			0.396				0.944				0.773
Satd. Flow (perm)	818	3158	0	739	3164	0	0	1636	0	0	1392	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			42			60				19
Link Speed (k/h)		60			60			60				50
Link Distance (m)		314.7			133.1			218.7				107.2
Travel Time (s)		18.9			8.0			13.1				7.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	34	635	37	57	511	87	12	11	60	80	10	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	672	0	57	598	0	0	83	0	0	124	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - AM: Add'l Signals

09/21/2017

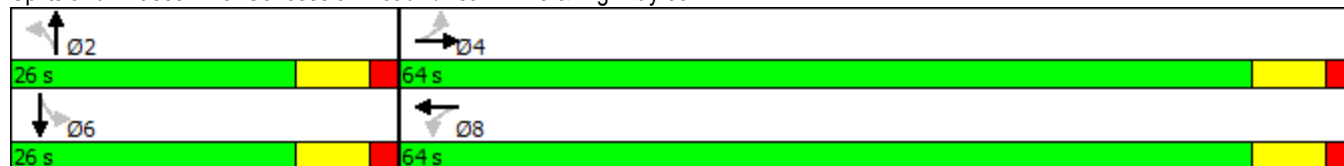


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	60.3	60.3		60.3	60.3			12.0			12.0	
Actuated g/C Ratio	0.70	0.70		0.70	0.70			0.14			0.14	
v/c Ratio	0.06	0.30		0.11	0.27			0.30			0.59	
Control Delay	5.5	5.8		6.0	5.3			15.5			39.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.5	5.8		6.0	5.3			15.5			39.9	
LOS	A	A		A	A			B			D	
Approach Delay		5.8			5.4			15.5			39.9	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.5	18.2		2.6	14.7			3.2			15.6	
Queue Length 95th (m)	5.3	32.8		8.0	27.4			14.6			31.9	
Internal Link Dist (m)		290.7			109.1			194.7			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	570	2208		516	2221			407			322	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.06	0.30		0.11	0.27			0.20			0.39	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	86.3
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.59
Intersection Signal Delay:	8.8
Intersection LOS:	A
Intersection Capacity Utilization:	52.0%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2031 Future Total - AM: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	68	88	143
Future Volume (Veh/h)	51	6	22	68	88	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	76	98	159
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	219					
pX, platoon unblocked						
vC, conflicting volume	302	178	257			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	302	178	257			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	99	98			
cM capacity (veh/h)	677	866	1308			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	100	257			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	694	1308	1700			
Volume to Capacity	0.09	0.02	0.15			
Queue Length 95th (m)	2.3	0.4	0.0			
Control Delay (s)	10.7	2.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.7	2.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	2.1					
Intersection Capacity Utilization	31.5%			ICU Level of Service	A	
Analysis Period (min)	15					



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	741	1	9	790	74	0	1	1	56	3	53
Future Volume (vph)	42	741	1	9	790	74	0	1	1	56	3	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.955	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1751	1396
Fl _t Permitted	0.339			0.356							0.735	
Satd. Flow (perm)	587	3259	0	513	3230	1570	0	1790	0	0	1348	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	44	780	1	9	832	78	0	1	1	59	3	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	781	0	9	832	78	0	2	0	0	62	56
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	66.0	66.0		66.0	66.0	80.2		8.6			9.0	80.2
Actuated g/C Ratio	0.82	0.82		0.82	0.82	1.00		0.11			0.11	1.00
v/c Ratio	0.09	0.29		0.02	0.31	0.05		0.01			0.41	0.04
Control Delay	4.5	3.9		4.3	4.0	0.1		27.0			41.6	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	4.5	3.9		4.3	4.0	0.1		27.0			41.6	0.1
LOS	A	A		A	A	A		C			D	A
Approach Delay		3.9			3.7			27.0			21.9	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	1.7	19.7		0.3	21.5	0.0		0.1			10.2	0.0
Queue Length 95th (m)	5.5	32.1		1.8	34.8	0.0		m1.7			19.2	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	483	2684		422	2660	1570		562			423	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.09	0.29		0.02	0.31	0.05		0.00			0.15	0.04

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.2

Natural Cycle: 50

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 4.9

Intersection LOS: A

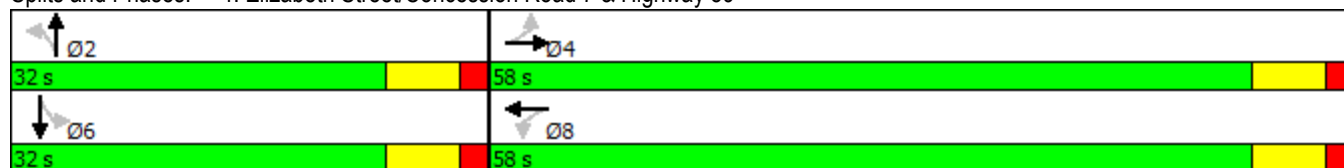
Intersection Capacity Utilization 53.4%

ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	816	1	3	892	0	16
Future Volume (Veh/h)	816	1	3	892	0	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	877	1	3	959	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)	249					
pX, platoon unblocked			0.96		0.96	0.96
vC, conflicting volume			878		1363	439
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			778		1286	319
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	97
cM capacity (veh/h)			809		151	627
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	585	293	323	639	17	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	17	
cSH	1700	1700	809	1700	627	
Volume to Capacity	0.34	0.17	0.00	0.38	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.6	
Control Delay (s)	0.0	0.0	0.1	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.0		10.9	
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			36.7%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - AM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	661	186	272	679	10	197	26	104	10	36	21
Future Volume (vph)	38	661	186	272	679	10	197	26	104	10	36	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1825	3169	0	1807	3465	0	1387	1474	1617	1825	1779	1633
Flt Permitted	0.370			0.221			0.732	0.750		0.675		
Satd. Flow (perm)	711	3169	0	420	3465	0	1069	1148	1617	1297	1779	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			2				112			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	41	711	200	292	730	11	212	28	112	11	39	23
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	41	911	0	292	741	0	119	121	112	11	39	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - AM
9/7/2017

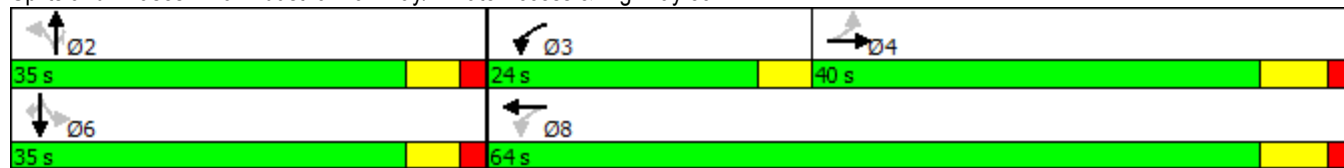


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	41.2	41.2		60.2	57.2		16.1	16.1	16.1	16.1	16.1	16.1
Actuated g/C Ratio	0.48	0.48		0.70	0.66		0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.12	0.59		0.60	0.32		0.60	0.57	0.29	0.05	0.12	0.06
Control Delay	18.1	19.9		11.2	7.3		44.7	42.3	7.8	27.8	28.9	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	19.9		11.2	7.3		44.7	42.3	7.8	27.8	28.9	0.3
LOS	B	B		B	A		D	D	A	C	C	A
Approach Delay		19.8			8.4			32.1			19.8	
Approach LOS		B			A			C			B	
Queue Length 50th (m)	3.4	50.2		14.5	23.6		19.0	19.2	0.0	1.5	5.4	0.0
Queue Length 95th (m)	12.8	99.1		32.9	43.4		36.5	36.5	12.1	5.7	13.1	0.0
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	339	1534		615	2296		360	386	619	437	599	608
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	0.12	0.59		0.47	0.32		0.33	0.31	0.18	0.03	0.07	0.04

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	86.3
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	16.7
Intersection Capacity Utilization:	66.3%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	C

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - PM
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	471	70	204	863	248	386
Future Volume (vph)	471	70	204	863	248	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3208	0	1532	3444	1665	921
Flt Permitted			0.406		0.950	
Satd. Flow (perm)	3208	0	655	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					409
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	506	75	219	928	267	415
Shared Lane Traffic (%)						
Lane Group Flow (vph)	581	0	219	928	267	415
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.7		55.5	50.0	14.6	14.6
Actuated g/C Ratio	0.50		0.70	0.63	0.18	0.18
v/c Ratio	0.36		0.40	0.43	0.87	0.83
Control Delay	12.5		6.5	8.2	61.0	19.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.5		6.5	8.2	61.0	19.5
LOS	B		A	A	E	B
Approach Delay	12.5			7.8	35.8	
Approach LOS	B			A	D	
Queue Length 50th (m)	25.4		9.8	33.3	39.4	0.8
Queue Length 95th (m)	37.9		17.1	44.7	#78.6	#48.1
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1620		569	2175	315	506
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.36		0.38	0.43	0.85	0.82

Intersection Summary

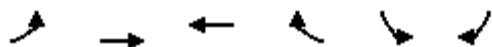
Area Type: Other
 Cycle Length: 79.6
 Actuated Cycle Length: 79.2
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 16.9
 Intersection LOS: B
 Intersection Capacity Utilization 69.7%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	51	803	1037	72	22	27
Future Volume (Veh/h)	51	803	1037	72	22	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	55	863	1115	77	24	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	1192				1695	596
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1192				1584	596
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	91				69	94
cM capacity (veh/h)	593				78	452
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	343	575	743	449	53	
Volume Left	55	0	0	0	24	
Volume Right	0	0	0	77	29	
cSH	593	1700	1700	1700	143	
Volume to Capacity	0.09	0.34	0.44	0.26	0.37	
Queue Length 95th (m)	2.3	0.0	0.0	0.0	11.8	
Control Delay (s)	3.0	0.0	0.0	0.0	44.4	
Lane LOS	A				E	
Approach Delay (s)	1.1		0.0		44.4	
Approach LOS					E	
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			68.0%		ICU Level of Service	C
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

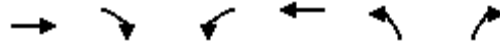
2031 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	806	42	68	1013	95	132
Future Volume (vph)	806	42	68	1013	95	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.993				0.922	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3553	0	1789	3579	1700	0
Flt Permitted			0.232		0.979	
Satd. Flow (perm)	3553	0	437	3579	1700	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	8				77	
Link Speed (k/h)	80			80	50	
Link Distance (m)	648.3			78.2	150.4	
Travel Time (s)	29.2			3.5	10.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	896	47	76	1126	106	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	943	0	76	1126	253	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2031 Future Total - PM: Add'l Signals
09/21/2017

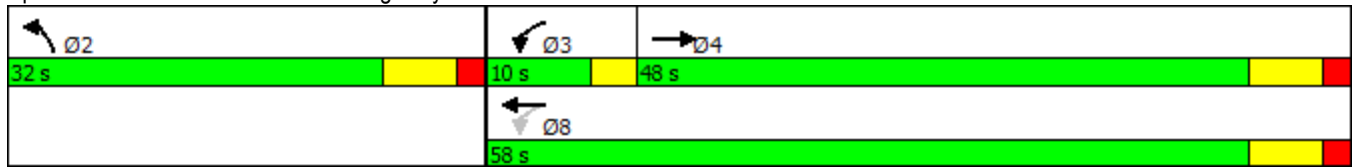


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	48.0		10.0	58.0	32.0	
Total Split (%)	53.3%		11.1%	64.4%	35.6%	
Maximum Green (s)	41.0		7.0	51.0	25.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	None	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	41.2		55.2	51.2	13.7	
Actuated g/C Ratio	0.52		0.70	0.65	0.17	
v/c Ratio	0.51		0.18	0.49	0.70	
Control Delay	14.1		5.7	8.7	32.0	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	14.1		5.7	8.7	32.0	
LOS	B		A	A	C	
Approach Delay	14.1			8.5	32.0	
Approach LOS	B			A	C	
Queue Length 50th (m)	44.8		3.0	39.7	24.7	
Queue Length 95th (m)	72.6		8.8	68.8	47.4	
Internal Link Dist (m)	624.3			54.2	126.4	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1855		425	2319	592	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.51		0.18	0.49	0.43	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	79
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	13.2
Intersection LOS:	B
Intersection Capacity Utilization:	56.2%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - PM: Add'l Signals
10/19/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	887	23	160	940	65	130	15	213	49	9	38
Future Volume (vph)	30	887	23	160	940	65	130	15	213	49	9	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.990			0.920			0.947	
Flt Protected	0.950			0.950				0.982			0.975	
Satd. Flow (prot)	1825	3297	0	1825	3391	0	0	1681	0	0	1774	0
Flt Permitted	0.219			0.255				0.838			0.633	
Satd. Flow (perm)	421	3297	0	490	3391	0	0	1434	0	0	1152	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			85			38	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			218.4			107.2	
Travel Time (s)		18.6			8.0			13.1			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	32	934	24	168	989	68	137	16	224	52	9	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	958	0	168	1057	0	0	377	0	0	101	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - PM: Add'l Signals
10/19/2017



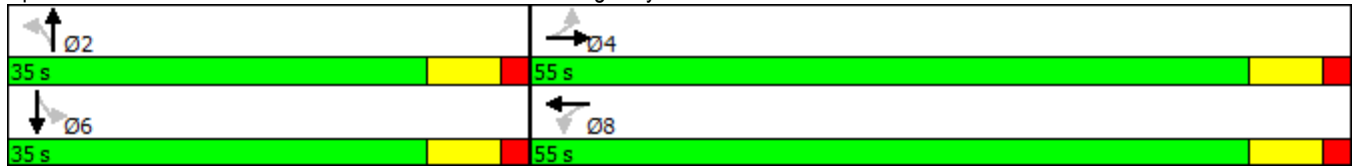
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	55.0	55.0		55.0	55.0		35.0	35.0		35.0	35.0	
Total Split (%)	61.1%	61.1%		61.1%	61.1%		38.9%	38.9%		38.9%	38.9%	
Maximum Green (s)	48.0	48.0		48.0	48.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	48.2	48.2		48.2	48.2			22.2			22.2	
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.26			0.26	
v/c Ratio	0.13	0.51		0.60	0.54			0.86			0.31	
Control Delay	12.0	13.0		25.4	13.3			42.4			18.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.0	13.0		25.4	13.3			42.4			18.4	
LOS	B	B		C	B			D			B	
Approach Delay		12.9			15.0			42.4			18.4	
Approach LOS		B			B			D			B	
Queue Length 50th (m)	2.3	47.6		17.2	53.6			45.4			7.9	
Queue Length 95th (m)	7.8	70.5		#51.7	78.9			#86.6			20.2	
Internal Link Dist (m)		286.5			109.1			194.4			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	240	1884		279	1941			534			409	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.13	0.51		0.60	0.54			0.71			0.25	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	84.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	18.2
Intersection LOS:	B
Intersection Capacity Utilization:	75.4%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Total - PM: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	132	121	72
Future Volume (Veh/h)	226	24	9	132	121	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	147	134	80
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)				219		
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	341	174	214			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	333	164	205			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	97	99			
cM capacity (veh/h)	653	874	1357			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	157	214			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	669	1357	1700			
Volume to Capacity	0.42	0.01	0.13			
Queue Length 95th (m)	15.6	0.2	0.0			
Control Delay (s)	14.1	0.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.1	0.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			35.0%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	1091	9	19	1054	121	0	0	10	101	1	63
Future Volume (vph)	84	1091	9	19	1054	121	0	0	10	101	1	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.999				0.850		0.865				0.850
Fl _t Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3378	0	1825	3444	1633	0	1662	0	0	1813	1633
Fl _t Permitted	0.238			0.224							0.721	
Satd. Flow (perm)	427	3378	0	430	3444	1633	0	1662	0	0	1372	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		103				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	88	1148	9	20	1109	127	0	0	11	106	1	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	88	1157	0	20	1109	127	0	11	0	0	107	66
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	66.9	66.9		66.9	66.9	88.5		11.9			12.1	88.5
Actuated g/C Ratio	0.76	0.76		0.76	0.76	1.00		0.13			0.14	1.00
v/c Ratio	0.27	0.45		0.06	0.43	0.08		0.04			0.57	0.04
Control Delay	8.7	6.5		5.7	6.3	0.1		0.2			47.1	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	8.7	6.5		5.7	6.3	0.1		0.2			47.1	0.0
LOS	A	A		A	A	A		A			D	A
Approach Delay		6.7			5.7			0.2			29.2	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	4.7	39.4		0.9	36.7	0.0		0.0			17.4	0.0
Queue Length 95th (m)	14.8	64.5		3.8	59.8	0.0		m0.0			31.5	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	322	2552		324	2602	1633		421			280	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.27	0.45		0.06	0.43	0.08		0.03			0.38	0.04

Intersection Summary

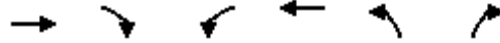
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	88.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	7.6
Intersection LOS:	A
Intersection Capacity Utilization:	64.4%
ICU Level of Service:	C
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89























2031 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1172	5	6	1245	0	15
Future Volume (Veh/h)	1172	5	6	1245	0	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1208	5	6	1284	0	15
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.87		0.87	0.87
vC, conflicting volume			1216		1868	610
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			942		1693	242
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			636		73	588
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	805	408	434	856	15	
Volume Left	0	0	6	0	0	
Volume Right	0	5	0	0	15	
cSH	1700	1700	636	1700	588	
Volume to Capacity	0.47	0.24	0.01	0.50	0.03	
Queue Length 95th (m)	0.0	0.0	0.2	0.0	0.6	
Control Delay (s)	0.0	0.0	0.3	0.0	11.3	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1	11.3		
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			48.6%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - PM
9/7/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	869	319	277	770	30	429	45	203	27	54	81
Future Volume (vph)	54	869	319	277	770	30	429	45	203	27	54	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.960			0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3277	0	1825	3557	0	1534	1579	1617	1722	1921	1601
Flt Permitted	0.338			0.092			0.720	0.728		0.456		
Satd. Flow (perm)	649	3277	0	177	3557	0	1160	1193	1588	823	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57			7				211			88
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		31.1			44.5			28.0			5.1	
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	56	905	332	289	802	31	447	47	211	28	56	84
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	56	1237	0	289	833	0	246	248	211	28	56	84
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - PM
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	39.3	39.3		60.2	57.2		25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.41	0.41		0.63	0.60		0.26	0.26	0.26	0.26	0.26	0.26
v/c Ratio	0.21	0.89		0.82	0.39		0.81	0.79	0.37	0.13	0.11	0.18
Control Delay	24.8	36.9		40.0	11.1		54.1	51.9	5.8	27.7	26.5	6.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	36.9		40.0	11.1		54.1	51.9	5.8	27.7	26.5	6.5
LOS	C	D		D	B		D	D	A	C	C	A
Approach Delay		36.3			18.5			38.8			16.7	
Approach LOS		D			B			D			B	
Queue Length 50th (m)	7.0	113.6		36.6	42.8		44.4	44.5	0.0	3.9	7.8	0.0
Queue Length 95th (m)	18.1	#179.1		62.8	55.6		#81.1	#80.0	15.8	10.7	16.8	9.9
Internal Link Dist (m)		493.5			593.4			364.4			46.8	
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	267	1385		459	2139		354	364	632	251	587	543
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	0.89		0.63	0.39		0.69	0.68	0.33	0.11	0.10	0.15

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	95.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	29.8
Intersection Capacity Utilization	84.5%
Intersection LOS:	C
ICU Level of Service	E

Lanes, Volumes, Timings
 6: Industrial Parkway/Private Access & Highway 89

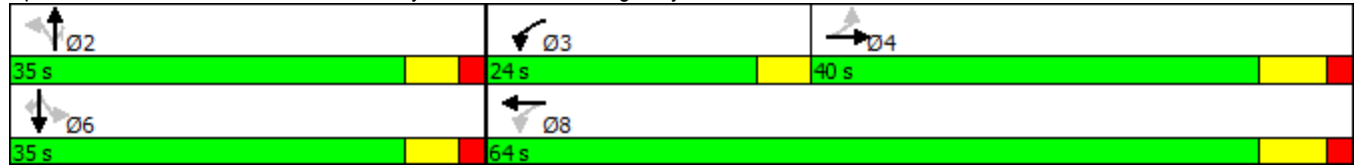
2031 Future Total - PM
 9/7/2017

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	↵
Traffic Volume (vph)	603	88	219	728	163	236
Future Volume (vph)	603	88	219	728	163	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.981					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3467	0	1668	3544	1713	949
Fl _t Permitted			0.341		0.950	
Satd. Flow (perm)	3467	0	599	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					243
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	622	91	226	751	168	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	713	0	226	751	168	243
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	40.0		55.5	50.0	12.7	12.7
Actuated g/C Ratio	0.52		0.72	0.65	0.16	0.16
v/c Ratio	0.39		0.42	0.33	0.60	0.68
Control Delay	12.2		6.3	6.8	39.5	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.2		6.3	6.8	39.5	14.8
LOS	B		A	A	D	B
Approach Delay	12.2			6.7	24.9	
Approach LOS	B			A	C	
Queue Length 50th (m)	29.9		8.8	22.6	23.1	0.0
Queue Length 95th (m)	46.8		17.1	34.0	41.4	21.8
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1808		568	2294	332	380
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.39		0.40	0.33	0.51	0.64

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	77.3
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	12.1
Intersection LOS:	B
Intersection Capacity Utilization:	65.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2031 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↕	↕↔		↔↕	
Traffic Volume (veh/h)	14	765	777	51	33	13
Future Volume (Veh/h)	14	765	777	51	33	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	832	845	55	36	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	900				1318	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	900				1128	450
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				80	98
cM capacity (veh/h)	763				177	562
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	292	555	563	337	50	
Volume Left	15	0	0	0	36	
Volume Right	0	0	0	55	14	
cSH	763	1700	1700	1700	219	
Volume to Capacity	0.02	0.33	0.33	0.20	0.23	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	6.5	
Control Delay (s)	0.7	0.0	0.0	0.0	26.2	
Lane LOS	A				D	
Approach Delay (s)	0.2		0.0		26.2	
Approach LOS					D	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			41.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2031 Future Total - SAT: Add'l Signals

09/26/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	782	73	107	844	81	109
Future Volume (vph)	782	73	107	844	81	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.987				0.923	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3532	0	1789	3579	1702	0
Flt Permitted			0.243		0.979	
Satd. Flow (perm)	3532	0	458	3579	1702	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	14				72	
Link Speed (k/h)	80			80	50	
Link Distance (m)	649.7			75.0	97.7	
Travel Time (s)	29.2			3.4	7.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	869	81	119	938	90	121
Shared Lane Traffic (%)						
Lane Group Flow (vph)	950	0	119	938	211	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2031 Future Total - SAT: Add'l Signals

09/26/2017

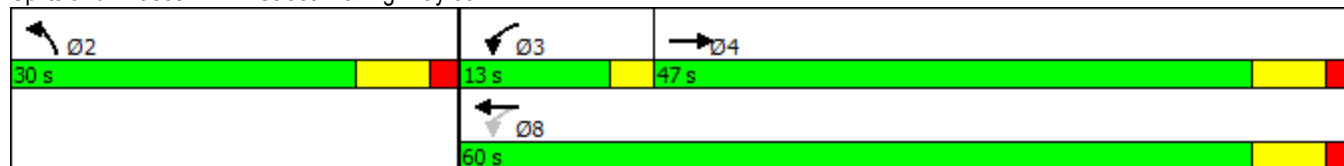


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		13.0	60.0	30.0	
Total Split (%)	52.2%		14.4%	66.7%	33.3%	
Maximum Green (s)	40.0		10.0	53.0	23.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	46.1		58.6	54.6	12.1	
Actuated g/C Ratio	0.57		0.73	0.68	0.15	
v/c Ratio	0.47		0.26	0.39	0.67	
Control Delay	12.5		5.5	6.8	31.2	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	12.5		5.5	6.8	31.2	
LOS	B		A	A	C	
Approach Delay	12.5			6.7	31.2	
Approach LOS	B			A	C	
Queue Length 50th (m)	42.4		4.3	28.1	19.5	
Queue Length 95th (m)	72.4		11.4	49.1	39.9	
Internal Link Dist (m)	625.7			51.0	73.7	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2023		497	2420	537	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.47		0.24	0.39	0.39	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.7
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	11.5
Intersection LOS:	B
Intersection Capacity Utilization:	56.0%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	826	24	191	868	168	101	14	224	133	34	46
Future Volume (vph)	44	826	24	191	868	168	101	14	224	133	34	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.976			0.911			0.971	
Flt Protected	0.950			0.950				0.985			0.970	
Satd. Flow (prot)	1825	3566	0	1789	3475	0	0	1724	0	0	1798	0
Flt Permitted	0.191			0.153				0.835			0.551	
Satd. Flow (perm)	367	3566	0	288	3475	0	0	1461	0	0	1021	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			30			117			16	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			219.3			107.2	
Travel Time (s)		18.7			8.0			13.2			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	46	869	25	201	914	177	106	15	236	140	36	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	894	0	201	1091	0	0	357	0	0	224	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2031 Future Total - SAT: Add'l Signals
09/21/2017

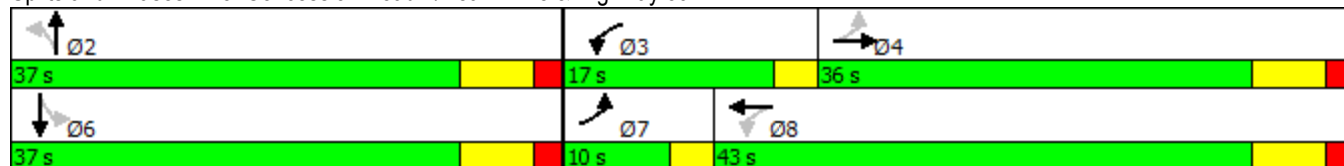


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	7.0	29.0		14.0	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	None		Max	None		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	35.7	24.4		45.9	31.6			20.1			20.1	
Actuated g/C Ratio	0.47	0.32		0.60	0.41			0.26			0.26	
v/c Ratio	0.15	0.78		0.44	0.75			0.76			0.80	
Control Delay	9.7	29.8		12.1	23.1			28.3			46.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	9.7	29.8		12.1	23.1			28.3			46.0	
LOS	A	C		B	C			C			D	
Approach Delay		28.8			21.4			28.3			46.0	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	2.5	60.8		12.0	66.9			32.7			28.8	
Queue Length 95th (m)	8.0	95.1		29.7	106.9			63.9			55.6	
Internal Link Dist (m)		288.3			109.1			195.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	308	1392		455	1697			659			421	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.15	0.64		0.44	0.64			0.54			0.53	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 76.3
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 26.7
 Intersection Capacity Utilization 72.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2031 Future Total - SAT: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	145	136	112
Future Volume (Veh/h)	192	21	18	145	136	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	161	151	124
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					219	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	414	213	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	361	150	215			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	97	98			
cM capacity (veh/h)	599	854	1292			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	181	275			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	617	1292	1700			
Volume to Capacity	0.38	0.02	0.16			
Queue Length 95th (m)	13.6	0.4	0.0			
Control Delay (s)	14.4	1.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.4	1.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization			41.3%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	1161	6	27	1182	160	1	6	10	155	5	67
Future Volume (vph)	78	1161	6	27	1182	160	1	6	10	155	5	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.999				0.850		0.917				0.850
Flt Protected	0.950			0.950				0.997			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1756	0	0	1781	1555
Flt Permitted	0.187			0.192				0.982			0.719	
Satd. Flow (perm)	352	3575	0	369	3579	1601	0	1730	0	0	1342	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				145		11				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	82	1222	6	28	1244	168	1	6	11	163	5	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	1228	0	28	1244	168	0	18	0	0	168	71
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2031 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	59.6	59.6		59.6	59.6	89.2		15.6			15.6	89.2
Actuated g/C Ratio	0.67	0.67		0.67	0.67	1.00		0.17			0.17	1.00
v/c Ratio	0.35	0.51		0.11	0.52	0.10		0.06			0.71	0.05
Control Delay	12.9	9.0		8.0	9.1	0.1		17.8			51.0	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	12.9	9.0		8.0	9.1	0.1		17.8			51.0	0.1
LOS	B	A		A	A	A		B			D	A
Approach Delay		9.2			8.0			17.8			35.9	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	5.4	49.4		1.5	50.5	0.0		1.0			25.9	0.0
Queue Length 95th (m)	17.0	74.4		5.6	75.9	0.0		m5.9			46.3	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	235	2387		246	2389	1601		396			301	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.35	0.51		0.11	0.52	0.10		0.05			0.56	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	89.2
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	10.8
Intersection Capacity Utilization:	70.0%
Intersection LOS:	B
ICU Level of Service:	C

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2031 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1352	3	6	1364	0	9
Future Volume (Veh/h)	1352	3	6	1364	0	9
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)	1438	3	6	1451	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			1441		2177	720
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1088		1990	204
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			99		100	98
cM capacity (veh/h)			529		44	618
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	959	482	490	967	10	
Volume Left	0	0	6	0	0	
Volume Right	0	3	0	0	10	
cSH	1700	1700	529	1700	618	
Volume to Capacity	0.56	0.28	0.01	0.57	0.02	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.4	
Control Delay (s)	0.0	0.0	0.3	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1	10.9		
Approach LOS						B
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			51.9%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	1027	188	451	993	35	258	56	260	51	123	100
Future Volume (vph)	145	1027	188	451	993	35	258	56	260	51	123	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.977			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3522	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Flt Permitted	0.258			0.108			0.673	0.724		0.576		
Satd. Flow (perm)	490	3522	0	207	3594	0	1188	1293	1593	1072	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			6				280			92
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	156	1104	202	485	1068	38	277	60	280	55	132	108
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	156	1306	0	485	1106	0	163	174	280	55	132	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2031 Future Total - SAT
9/7/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		19.1	19.1	19.1	19.1	19.1	19.1
Actuated g/C Ratio	0.37	0.37		0.67	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.86	0.99		0.96	0.48		0.64	0.63	0.50	0.24	0.32	0.26
Control Delay	70.2	51.9		58.2	10.1		43.7	42.2	6.8	30.8	31.0	9.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.2	51.9		58.2	10.1		43.7	42.2	6.8	30.8	31.0	9.7
LOS	E	D		E	B		D	D	A	C	C	A
Approach Delay		53.9			24.8			26.5				23.2
Approach LOS		D			C			C				C
Queue Length 50th (m)	24.2	113.2		64.2	46.0		26.9	28.6	0.0	7.8	19.2	2.2
Queue Length 95th (m)	#68.4	#190.4		#147.3	80.3		47.5	49.6	17.7	17.6	33.8	14.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	181	1320		503	2303		387	421	707	349	625	585
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	0.86	0.99		0.96	0.48		0.42	0.41	0.40	0.16	0.21	0.18

Intersection Summary

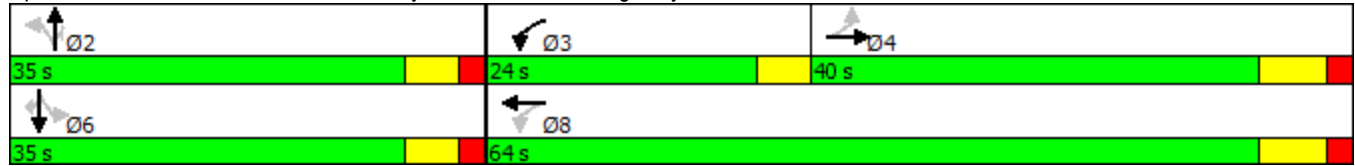
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89.5
Natural Cycle:	100
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.99
Intersection Signal Delay:	35.7
Intersection Capacity Utilization	99.0%
Intersection LOS:	D
ICU Level of Service	F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - AM
9/8/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	545	212	359	415	81	185
Future Volume (vph)	545	212	359	415	81	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.958					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2996	0	1620	3093	1471	1426
Flt Permitted			0.283		0.950	
Satd. Flow (perm)	2996	0	483	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	98					203
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	599	233	395	456	89	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	832	0	395	456	89	203
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm







Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	38.2		55.5	50.0	11.2	11.2
Actuated g/C Ratio	0.50		0.73	0.66	0.15	0.15
v/c Ratio	0.53		0.79	0.22	0.41	0.53
Control Delay	12.9		18.0	5.6	35.4	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	12.9		18.0	5.6	35.4	10.2
LOS	B		B	A	D	B
Approach Delay	12.9			11.4	17.9	
Approach LOS	B			B	B	
Queue Length 50th (m)	33.6		14.5	11.1	11.7	0.0
Queue Length 95th (m)	54.8		#44.2	19.9	24.6	16.5
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1556		503	2042	291	444
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.53		0.79	0.22	0.31	0.46

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	75.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.79
Intersection Signal Delay:	13.0
Intersection LOS:	B
Intersection Capacity Utilization:	72.9%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89

 Ø2 22.1 s	 Ø3 12 s	 Ø4 45.5 s
	 Ø8 57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

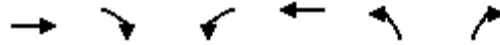
2036 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	16	690	716	20	44	74
Future Volume (Veh/h)	16	690	716	20	44	74
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	767	796	22	49	82
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.92	
vC, conflicting volume	818				1226	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	818				1063	409
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	98				75	86
cM capacity (veh/h)	751				198	597
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	274	511	531	287	131	
Volume Left	18	0	0	0	49	
Volume Right	0	0	0	22	82	
cSH	751	1700	1700	1700	340	
Volume to Capacity	0.02	0.30	0.31	0.17	0.38	
Queue Length 95th (m)	0.6	0.0	0.0	0.0	13.4	
Control Delay (s)	0.9	0.0	0.0	0.0	22.0	
Lane LOS	A				C	
Approach Delay (s)	0.3		0.0		22.0	
Approach LOS					C	
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			44.2%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	747	142	137	721	14	34
Future Volume (vph)	747	142	137	721	14	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.976				0.905	
Flt Protected			0.950		0.985	
Satd. Flow (prot)	3143	0	1610	3221	1511	0
Flt Permitted			0.248		0.985	
Satd. Flow (perm)	3143	0	420	3221	1511	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	31				38	
Link Speed (k/h)	80			80	50	
Link Distance (m)	650.1			72.2	109.1	
Travel Time (s)	29.3			3.2	7.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	830	158	152	801	16	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	988	0	152	801	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.13	1.13	1.13	1.13	1.13	1.13
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - AM: Add'l Signals
09/21/2017

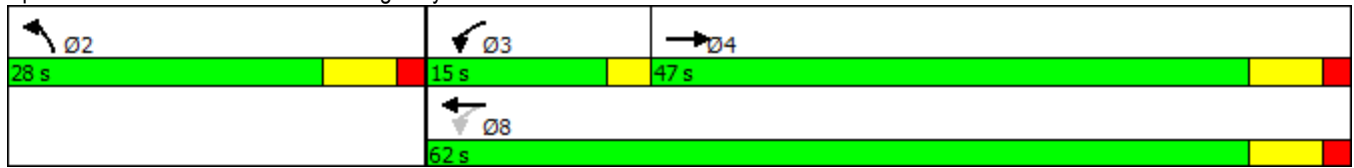


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		15.0	62.0	28.0	
Total Split (%)	52.2%		16.7%	68.9%	31.1%	
Maximum Green (s)	40.0		12.0	55.0	21.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	49.4		63.4	62.3	6.8	
Actuated g/C Ratio	0.66		0.85	0.83	0.09	
v/c Ratio	0.47		0.33	0.30	0.32	
Control Delay	8.7		3.8	3.3	20.8	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	8.7		3.8	3.3	20.8	
LOS	A		A	A	C	
Approach Delay	8.7			3.4	20.8	
Approach LOS	A			A	C	
Queue Length 50th (m)	37.4		3.6	16.8	2.2	
Queue Length 95th (m)	61.6		8.8	28.1	11.9	
Internal Link Dist (m)	626.1			48.2	85.1	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2082		546	2675	451	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.47		0.28	0.30	0.12	

Intersection Summary

Area Type:	CBD
Cycle Length:	90
Actuated Cycle Length:	75
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	6.5
Intersection LOS:	A
Intersection Capacity Utilization:	55.6%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - AM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	706	39	195	676	93	24	12	93	86	10	36
Future Volume (vph)	36	706	39	195	676	93	24	12	93	86	10	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.982			0.903				0.963
Flt Protected	0.950			0.950				0.991				0.969
Satd. Flow (prot)	1825	3157	0	1772	3171	0	0	1719	0	0	1745	0
Flt Permitted	0.327			0.338				0.912				0.720
Satd. Flow (perm)	628	3157	0	630	3171	0	0	1582	0	0	1297	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			33			101				19
Link Speed (k/h)		60			60			60				50
Link Distance (m)		314.7			133.1			218.1				107.2
Travel Time (s)		18.9			8.0			13.1				7.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	39	767	42	212	735	101	26	13	101	93	11	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	809	0	212	836	0	0	140	0	0	143	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - AM: Add'l Signals

09/21/2017

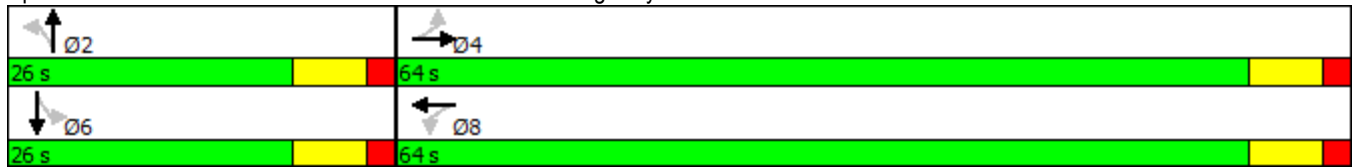


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	64.0	64.0		64.0	64.0		26.0	26.0		26.0	26.0	
Total Split (%)	71.1%	71.1%		71.1%	71.1%		28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	57.0	57.0		57.0	57.0		19.0	19.0		19.0	19.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	59.3	59.3		59.3	59.3			13.2			13.2	
Actuated g/C Ratio	0.69	0.69		0.69	0.69			0.15			0.15	
v/c Ratio	0.09	0.37		0.49	0.38			0.43			0.67	
Control Delay	6.4	6.8		12.5	6.7			15.2			44.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.4	6.8		12.5	6.7			15.2			44.7	
LOS	A	A		B	A			B			D	
Approach Delay		6.8			7.8			15.2			44.7	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.9	25.2		14.3	25.4			5.5			18.9	
Queue Length 95th (m)	6.3	43.0		38.8	43.6			20.5			37.0	
Internal Link Dist (m)		290.7			109.1			194.1			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	430	2167		431	2183			426			299	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.09	0.37		0.49	0.38			0.33			0.48	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	86.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	10.3
Intersection Capacity Utilization	63.2%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	B

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89

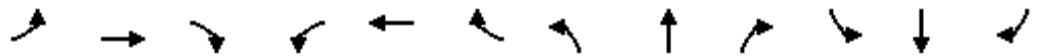


HCM Unsignalized Intersection Capacity Analysis
 21: Concession Road 7 & Street A

2036 Future Total - AM: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	22	79	102	143
Future Volume (Veh/h)	51	6	22	79	102	143
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	7	24	88	113	159
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					218	
pX, platoon unblocked	1.00	1.00	1.00			
vC, conflicting volume	328	192	272			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	324	187	267			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	98			
cM capacity (veh/h)	655	851	1292			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	64	112	272			
Volume Left	57	24	0			
Volume Right	7	0	159			
cSH	672	1292	1700			
Volume to Capacity	0.10	0.02	0.16			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	10.9	1.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.9	1.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			32.8%	ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	849	1	10	873	86	0	1	1	65	3	60
Future Volume (vph)	49	849	1	10	873	86	0	1	1	65	3	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.954	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1749	1396
Fl _t Permitted	0.304			0.313							0.734	
Satd. Flow (perm)	526	3259	0	451	3230	1570	0	1790	0	0	1346	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	52	894	1	11	919	91	0	1	1	68	3	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	895	0	11	919	91	0	2	0	0	71	63
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	58.0	58.0		58.0	58.0		32.0	32.0		32.0	32.0	
Total Split (%)	64.4%	64.4%		64.4%	64.4%		35.6%	35.6%		35.6%	35.6%	
Maximum Green (s)	51.0	51.0		51.0	51.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	63.5	63.5		63.5	63.5	82.8		9.6			9.7	82.8
Actuated g/C Ratio	0.77	0.77		0.77	0.77	1.00		0.12			0.12	1.00
v/c Ratio	0.13	0.36		0.03	0.37	0.06		0.01			0.46	0.05
Control Delay	5.4	5.0		4.7	5.1	0.1		26.0			42.9	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	5.4	5.0		4.7	5.1	0.1		26.0			42.9	0.1
LOS	A	A		A	A	A		C			D	A
Approach Delay		5.1			4.7			26.0			22.8	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	2.2	24.7		0.4	25.7	0.0		0.1			11.7	0.0
Queue Length 95th (m)	6.9	39.3		2.1	41.0	0.0		m1.5			21.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	403	2499		345	2477	1570		544			408	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.13	0.36		0.03	0.37	0.06		0.00			0.17	0.05

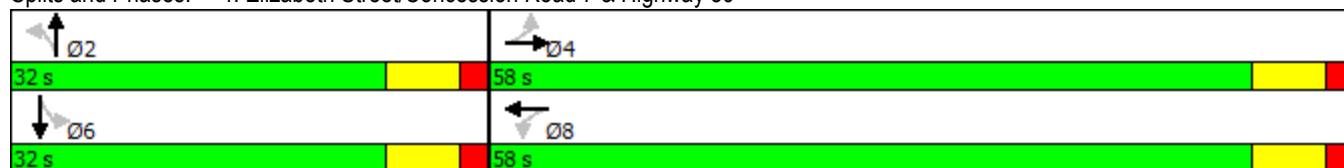
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	82.8
Natural Cycle:	50
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	6.0
Intersection Capacity Utilization:	56.2%
Intersection LOS:	A
ICU Level of Service:	B

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	935	1	3	991	0	19
Future Volume (Veh/h)	935	1	3	991	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1005	1	3	1066	0	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			1006		1544	503
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			834		1419	288
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	97
cM capacity (veh/h)			744		119	634
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	670	336	358	711	20	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	20	
cSH	1700	1700	744	1700	634	
Volume to Capacity	0.39	0.20	0.00	0.42	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.7	
Control Delay (s)	0.0	0.0	0.1	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.0		10.9	
Approach LOS	B					
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	39.5%			ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - AM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	756	215	315	745	12	228	30	121	12	42	24
Future Volume (vph)	44	756	215	315	745	12	228	30	121	12	42	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.967			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1643	2851	0	1626	3118	0	1248	1326	1455	1643	1601	1470
Flt Permitted	0.345			0.139			0.728	0.745		0.654		
Satd. Flow (perm)	597	2851	0	238	3118	0	957	1026	1455	1131	1601	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			3				130			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	47	813	231	339	801	13	245	32	130	13	45	26
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	47	1044	0	339	814	0	137	140	130	13	45	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - AM
9/8/2017



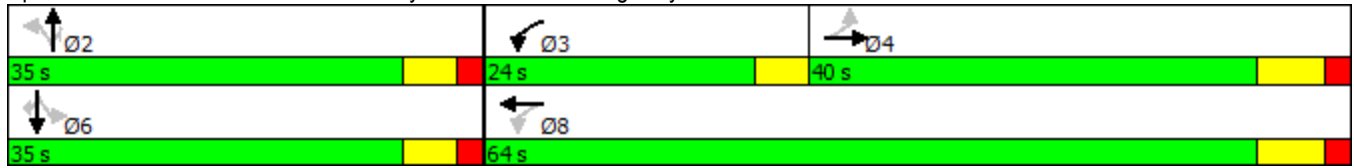
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	36.8	36.8		60.3	57.3		19.0	19.0	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.41	0.41		0.68	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	0.19	0.87		0.81	0.41		0.67	0.65	0.32	0.05	0.13	0.07
Control Delay	24.0	35.6		33.1	9.4		48.8	45.6	7.2	26.8	28.1	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	35.6		33.1	9.4		48.8	45.6	7.2	26.8	28.1	0.3
LOS	C	D		C	A		D	D	A	C	C	A
Approach Delay		35.1			16.4			34.4				19.3
Approach LOS		D			B			C				B
Queue Length 50th (m)	5.2	85.3		31.6	31.3		22.7	23.0	0.0	1.8	6.3	0.0
Queue Length 95th (m)	16.0	#154.5		#83.7	57.6		42.6	42.4	12.8	6.2	14.6	0.0
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	245	1197		472	2000		312	334	562	369	522	538
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	0.87		0.72	0.41		0.44	0.42	0.23	0.04	0.09	0.05

Intersection Summary

Area Type:	CBD
Cycle Length:	99
Actuated Cycle Length:	89.3
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	26.6
Intersection LOS:	C
Intersection Capacity Utilization:	79.0%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	541	81	236	976	287	447
Future Volume (vph)	541	81	236	976	287	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.980					0.850
Fl _t Protected			0.950		0.950	
Satd. Flow (prot)	3205	0	1532	3444	1665	921
Fl _t Permitted			0.356		0.950	
Satd. Flow (perm)	3205	0	574	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					368
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	582	87	254	1049	309	481
Shared Lane Traffic (%)						
Lane Group Flow (vph)	669	0	254	1049	309	481
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.2		55.5	50.0	15.0	15.0
Actuated g/C Ratio	0.49		0.70	0.63	0.19	0.19
v/c Ratio	0.42		0.50	0.48	0.99	1.02
Control Delay	13.6		8.1	8.9	83.1	58.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.6		8.1	8.9	83.1	58.0
LOS	B		A	A	F	E
Approach Delay	13.6			8.7	67.8	
Approach LOS	B			A	E	
Queue Length 50th (m)	31.1		11.6	39.5	47.0	~22.7
Queue Length 95th (m)	44.7		19.8	52.6	#94.6	#84.2
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1593		520	2163	313	472
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.42		0.49	0.48	0.99	1.02

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 79.6

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 26.8

Intersection LOS: C

Intersection Capacity Utilization 73.6%

ICU Level of Service D

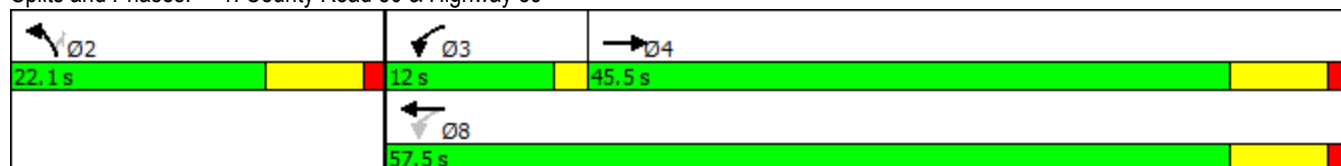
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕		↕↕	
Traffic Volume (veh/h)	59	926	1177	79	25	31
Future Volume (Veh/h)	59	926	1177	79	25	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	63	996	1266	85	27	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.90	
vC, conflicting volume	1351				1932	676
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1351				1809	676
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	88				48	92
cM capacity (veh/h)	516				52	401
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	395	664	844	507	60	
Volume Left	63	0	0	0	27	
Volume Right	0	0	0	85	33	
cSH	516	1700	1700	1700	99	
Volume to Capacity	0.12	0.39	0.50	0.30	0.61	
Queue Length 95th (m)	3.1	0.0	0.0	0.0	22.0	
Control Delay (s)	3.7	0.0	0.0	0.0	85.8	
Lane LOS	A				F	
Approach Delay (s)	1.4		0.0		85.8	
Approach LOS					F	
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			75.7%		ICU Level of Service	D
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

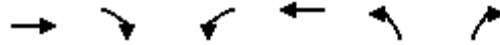
2036 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	936	42	68	1161	95	132
Future Volume (vph)	936	42	68	1161	95	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.994				0.922	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3557	0	1789	3579	1700	0
Flt Permitted			0.192		0.979	
Satd. Flow (perm)	3557	0	362	3579	1700	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7				77	
Link Speed (k/h)	80			80	50	
Link Distance (m)	648.5			78.0	78.8	
Travel Time (s)	29.2			3.5	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1040	47	76	1290	106	147
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1087	0	76	1290	253	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - PM: Add'l Signals
09/21/2017

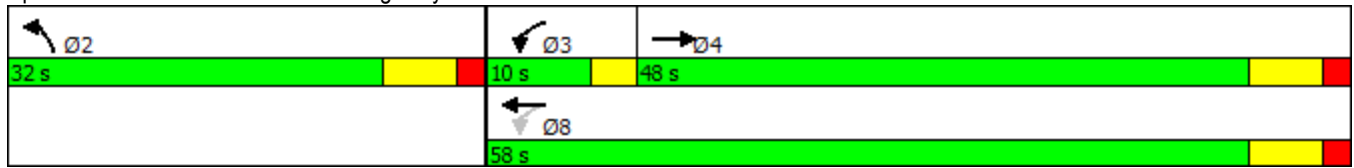


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	48.0		10.0	58.0	32.0	
Total Split (%)	53.3%		11.1%	64.4%	35.6%	
Maximum Green (s)	41.0		7.0	51.0	25.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	44.5		56.2	52.1	13.8	
Actuated g/C Ratio	0.56		0.70	0.65	0.17	
v/c Ratio	0.55		0.21	0.55	0.71	
Control Delay	14.1		6.1	9.4	32.3	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	14.1		6.1	9.4	32.3	
LOS	B		A	A	C	
Approach Delay	14.1			9.3	32.3	
Approach LOS	B			A	C	
Queue Length 50th (m)	53.8		3.0	48.6	24.7	
Queue Length 95th (m)	87.8		8.8	84.0	47.4	
Internal Link Dist (m)	624.5			54.0	54.8	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1981		379	2332	585	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.55		0.20	0.55	0.43	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	13.4
Intersection LOS:	B
Intersection Capacity Utilization:	59.7%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - PM: Add'l Signals
10/19/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	1009	27	133	1080	75	135	17	227	57	10	44
Future Volume (vph)	35	1009	27	133	1080	75	135	17	227	57	10	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.990			0.919			0.947	
Flt Protected	0.950			0.950				0.983			0.975	
Satd. Flow (prot)	1825	3297	0	1825	3392	0	0	1682	0	0	1774	0
Flt Permitted	0.165			0.204				0.847			0.614	
Satd. Flow (perm)	317	3297	0	392	3392	0	0	1449	0	0	1117	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			77			38	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			220.4			107.2	
Travel Time (s)		18.6			8.0			13.2			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	37	1062	28	140	1137	79	142	18	239	60	11	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	1090	0	140	1216	0	0	399	0	0	117	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - PM: Add'l Signals

10/19/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	55.0	55.0		55.0	55.0		35.0	35.0		35.0	35.0	
Total Split (%)	61.1%	61.1%		61.1%	61.1%		38.9%	38.9%		38.9%	38.9%	
Maximum Green (s)	48.0	48.0		48.0	48.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	48.1	48.1		48.1	48.1			23.6			23.6	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.28			0.28	
v/c Ratio	0.21	0.59		0.64	0.64			0.88			0.35	
Control Delay	14.7	14.7		31.4	15.4			45.4			19.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	14.7	14.7		31.4	15.4			45.4			19.9	
LOS	B	B		C	B			D			B	
Approach Delay		14.7			17.1			45.4			19.9	
Approach LOS		B			B			D			B	
Queue Length 50th (m)	3.1	62.3		15.9	72.1			51.3			10.1	
Queue Length 95th (m)	9.6	84.5		#48.1	96.9			#97.1			23.9	
Internal Link Dist (m)		286.5			109.1			196.4			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	178	1852		220	1908			526			390	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.21	0.59		0.64	0.64			0.76			0.30	

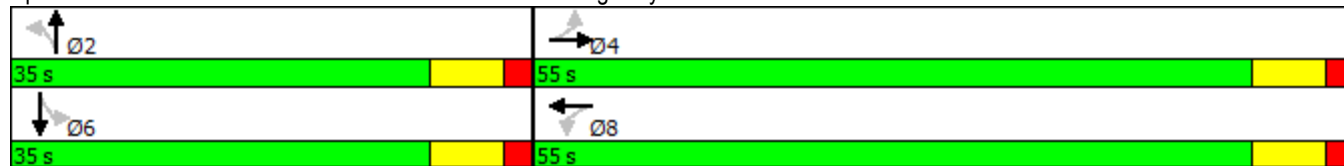
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	85.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	20.0
Intersection LOS:	C
Intersection Capacity Utilization:	78.9%
ICU Level of Service:	D
Analysis Period (min):	15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Total - PM: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	24	9	153	141	72
Future Volume (Veh/h)	226	24	9	153	141	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	251	27	10	170	157	80
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					220	
pX, platoon unblocked						
vC, conflicting volume	387	197	237			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	387	197	237			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	97	99			
cM capacity (veh/h)	612	844	1330			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	278	180	237			
Volume Left	251	10	0			
Volume Right	27	0	80			
cSH	629	1330	1700			
Volume to Capacity	0.44	0.01	0.14			
Queue Length 95th (m)	17.2	0.2	0.0			
Control Delay (s)	15.2	0.5	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.2	0.5	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			36.1%	ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1227	10	22	1202	140	0	0	12	117	1	73
Future Volume (vph)	95	1227	10	22	1202	140	0	0	12	117	1	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.999				0.850		0.865				0.850
Fl _t Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3378	0	1825	3444	1633	0	1662	0	0	1813	1633
Fl _t Permitted	0.189			0.179							0.719	
Satd. Flow (perm)	339	3378	0	344	3444	1633	0	1662	0	0	1368	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		75				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	100	1292	11	23	1265	147	0	0	13	123	1	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	1303	0	23	1265	147	0	13	0	0	124	77
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Total - PM: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	63.8	63.8		63.8	63.8	91.0		13.2			13.2	91.0
Actuated g/C Ratio	0.70	0.70		0.70	0.70	1.00		0.15			0.15	1.00
v/c Ratio	0.42	0.55		0.10	0.52	0.09		0.04			0.63	0.05
Control Delay	13.8	8.3		6.7	7.9	0.1		0.2			49.2	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	13.8	8.3		6.7	7.9	0.1		0.2			49.2	0.1
LOS	B	A		A	A	A		A			D	A
Approach Delay		8.7			7.1			0.3			30.4	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	6.3	49.6		1.1	47.0	0.0		0.0			19.6	0.0
Queue Length 95th (m)	22.1	78.9		4.5	74.3	0.0		m0.0			35.8	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	237	2367		241	2412	1633		389			271	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.42	0.55		0.10	0.52	0.09		0.03			0.46	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	91
Natural Cycle:	65
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	9.3
Intersection LOS:	A
Intersection Capacity Utilization:	69.2%
ICU Level of Service:	C
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1321	6	7	1423	0	17
Future Volume (Veh/h)	1321	6	7	1423	0	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1362	6	7	1467	0	18
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			1371		2116	687
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1001		1915	162
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			568		49	628
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	908	460	496	978	18	
Volume Left	0	0	7	0	0	
Volume Right	0	6	0	0	18	
cSH	1700	1700	568	1700	628	
Volume to Capacity	0.53	0.27	0.01	0.58	0.03	
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.7	
Control Delay (s)	0.0	0.0	0.4	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.1		10.9	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			54.2%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Future Volume (vph)	63	765	365	321	795	35	496	52	235	31	63	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.952			0.994				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3219	0	1825	3557	0	1534	1578	1617	1722	1921	1601
Fl _t Permitted	0.328			0.097			0.714	0.721		0.403		
Satd. Flow (perm)	630	3219	0	186	3557	0	1150	1182	1588	728	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		87			7				245			98
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	66	797	380	334	828	36	517	54	245	32	66	98
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	66	1177	0	334	864	0	284	287	245	32	66	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM
9/8/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	37.2	37.2		60.1	57.1		27.1	27.1	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.38	0.38		0.62	0.59		0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.27	0.92		0.87	0.41		0.89	0.87	0.40	0.16	0.12	0.19
Control Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	40.5		46.2	11.9		63.3	60.4	5.6	28.5	26.5	6.6
LOS	C	D		D	B		E	E	A	C	C	A
Approach Delay		39.8			21.5			45.0				16.9
Approach LOS		D			C			D				B
Queue Length 50th (m)	9.0	108.8		44.8	45.2		53.5	53.8	0.0	4.5	9.2	0.0
Queue Length 95th (m)	21.1	#163.5		#81.6	58.4		#100.4	#100.1	16.8	12.0	19.2	11.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	241	1285		452	2091		343	353	646	217	573	540
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	0.27	0.92		0.74	0.41		0.83	0.81	0.38	0.15	0.12	0.18

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	97.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	33.4
Intersection Capacity Utilization	87.3%
Intersection LOS:	C
ICU Level of Service	E

Lanes, Volumes, Timings
 6: Industrial Parkway/Private Access & Highway 89

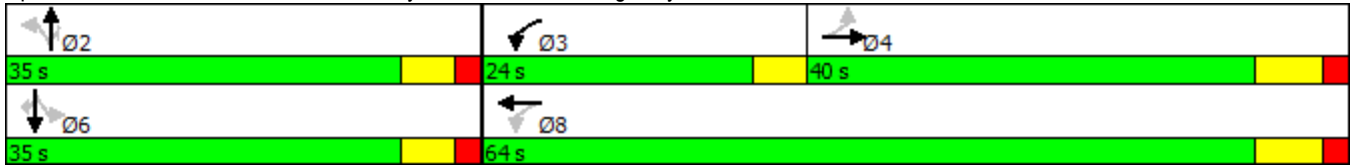
2036 Future Total - PM
 9/8/2017

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↙	↗
Traffic Volume (vph)	692	102	254	824	189	274
Future Volume (vph)	692	102	254	824	189	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.981					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3467	0	1668	3544	1713	949
Flt Permitted			0.289		0.950	
Satd. Flow (perm)	3467	0	507	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28					282
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	637.9	
Travel Time (s)	45.0			9.0	28.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	713	105	262	849	195	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	818	0	262	849	195	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	45.5		12.0	57.5	22.1	22.1
Total Split (%)	57.2%		15.1%	72.2%	27.8%	27.8%
Maximum Green (s)	38.0		10.0	50.0	15.0	15.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	39.6		55.5	50.0	13.2	13.2
Actuated g/C Ratio	0.51		0.71	0.64	0.17	0.17
v/c Ratio	0.46		0.54	0.37	0.67	0.72
Control Delay	13.4		8.3	7.3	42.6	15.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.4		8.3	7.3	42.6	15.5
LOS	B		A	A	D	B
Approach Delay	13.4			7.5	26.6	
Approach LOS	B			A	C	
Queue Length 50th (m)	38.5		11.4	28.2	27.2	0.0
Queue Length 95th (m)	55.3		19.9	39.4	47.6	#31.0
Internal Link Dist (m)	976.2			176.3	613.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1776		511	2279	330	410
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.46		0.51	0.37	0.59	0.69

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 77.8

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 69.2%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89

↙ Ø2	↙ Ø3	→ Ø4
22.1 s	12 s	45.5 s
	↙ Ø8	
	57.5 s	

HCM Unsignalized Intersection Capacity Analysis
2: Highway 89 & Concession Road 6

2036 Future Total - SAT: Add'l Signals
10/20/2017

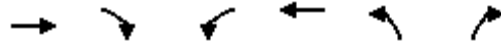


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	15	840	845	54	36	14
Future Volume (Veh/h)	15	840	845	54	36	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	913	918	59	39	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.88	
vC, conflicting volume	977				1436	488
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977				1215	488
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				74	97
cM capacity (veh/h)	714				151	531
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	320	609	612	365	54	
Volume Left	16	0	0	0	39	
Volume Right	0	0	0	59	15	
cSH	714	1700	1700	1700	189	
Volume to Capacity	0.02	0.36	0.36	0.21	0.29	
Queue Length 95th (m)	0.5	0.0	0.0	0.0	8.6	
Control Delay (s)	0.8	0.0	0.0	0.0	31.5	
Lane LOS	A				D	
Approach Delay (s)	0.3		0.0		31.5	
Approach LOS					D	
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			43.9%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - SAT: Add'l Signals

09/21/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	910	73	107	969	81	109
Future Volume (vph)	910	73	107	969	81	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.989				0.923	
Flt Protected			0.950		0.979	
Satd. Flow (prot)	3539	0	1789	3579	1702	0
Flt Permitted			0.195		0.979	
Satd. Flow (perm)	3539	0	367	3579	1702	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	12				72	
Link Speed (k/h)	80			80	50	
Link Distance (m)	647.5			77.2	111.5	
Travel Time (s)	29.1			3.5	8.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1011	81	119	1077	90	121
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1092	0	119	1077	211	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - SAT: Add'l Signals

09/21/2017

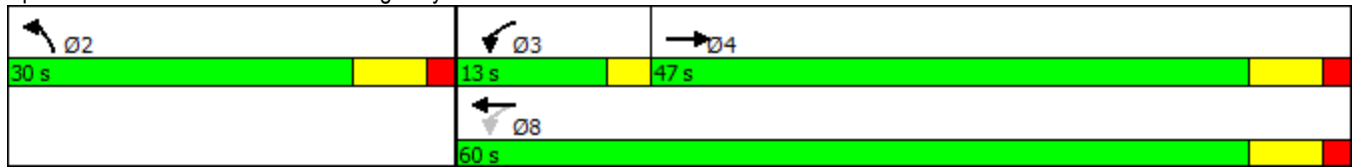


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		13.0	60.0	30.0	
Total Split (%)	52.2%		14.4%	66.7%	33.3%	
Maximum Green (s)	40.0		10.0	53.0	23.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	46.1		58.6	54.6	12.1	
Actuated g/C Ratio	0.57		0.73	0.68	0.15	
v/c Ratio	0.54		0.30	0.45	0.67	
Control Delay	13.4		6.0	7.3	31.2	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	13.4		6.0	7.3	31.2	
LOS	B		A	A	C	
Approach Delay	13.4			7.2	31.2	
Approach LOS	B			A	C	
Queue Length 50th (m)	51.7		4.3	34.0	19.5	
Queue Length 95th (m)	87.6		11.4	59.0	39.9	
Internal Link Dist (m)	623.5			53.2	87.5	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	2027		442	2420	537	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.54		0.27	0.45	0.39	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.7
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	11.9
Intersection LOS:	B
Intersection Capacity Utilization:	59.6%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	943	28	204	993	195	104	16	243	154	39	53
Future Volume (vph)	51	943	28	204	993	195	104	16	243	154	39	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.975			0.910			0.971	
Flt Protected	0.950			0.950				0.986			0.970	
Satd. Flow (prot)	1825	3566	0	1789	3472	0	0	1724	0	0	1798	0
Flt Permitted	0.138			0.136				0.828			0.532	
Satd. Flow (perm)	265	3566	0	256	3472	0	0	1448	0	0	986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			30			122			17	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			218.3			107.2	
Travel Time (s)		18.7			8.0			13.1			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	54	993	29	215	1045	205	109	17	256	162	41	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1022	0	215	1250	0	0	382	0	0	259	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - SAT: Add'l Signals

09/21/2017



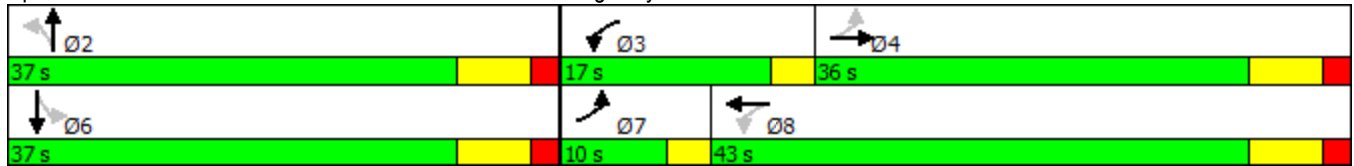
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	10.0	36.0		17.0	43.0		37.0	37.0		37.0	37.0	
Total Split (%)	11.1%	40.0%		18.9%	47.8%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	7.0	29.0		14.0	36.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	40.7	30.2		47.7	38.2			23.7			23.7	
Actuated g/C Ratio	0.50	0.37		0.59	0.47			0.29			0.29	
v/c Ratio	0.21	0.77		0.62	0.76			0.75			0.87	
Control Delay	11.4	29.4		19.7	24.0			27.8			54.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	11.4	29.4		19.7	24.0			27.8			54.4	
LOS	B	C		B	C			C			D	
Approach Delay		28.5			23.3			27.8			54.4	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	3.6	75.8		15.7	93.2			38.0			36.9	
Queue Length 95th (m)	9.0	#123.3		36.2	#142.3			70.2			#75.6	
Internal Link Dist (m)		288.3			109.1			194.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	270	1322		416	1642			617			378	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.20	0.77		0.52	0.76			0.62			0.69	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	81.5
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	28.2
Intersection LOS:	C
Intersection Capacity Utilization:	80.8%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis
 22: Concession Road 7 & Street A

2036 Future Total - SAT: Add'l Signals
 10/20/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	192	21	18	169	158	112
Future Volume (Veh/h)	192	21	18	169	158	112
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	213	23	20	188	176	124
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					218	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	466	238	300			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410	170	235			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	97	98			
cM capacity (veh/h)	558	829	1264			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	208	300			
Volume Left	213	20	0			
Volume Right	23	0	124			
cSH	576	1264	1700			
Volume to Capacity	0.41	0.02	0.18			
Queue Length 95th (m)	15.1	0.4	0.0			
Control Delay (s)	15.5	0.9	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.5	0.9	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization			42.5%	ICU Level of Service	A	
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	1316	7	31	1340	185	1	7	12	180	6	77
Future Volume (vph)	89	1316	7	31	1340	185	1	7	12	180	6	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t		0.999				0.850		0.916				0.850
Fl _t Protected	0.950			0.950				0.998			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1756	0	0	1781	1555
Fl _t Permitted	0.142			0.147				0.984			0.717	
Satd. Flow (perm)	267	3575	0	282	3579	1601	0	1732	0	0	1339	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				149		13				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	94	1385	7	33	1411	195	1	7	13	189	6	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	1392	0	33	1411	195	0	21	0	0	195	81
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Elizabeth Street/Concession Road 7 & Highway 89

2036 Future Total - SAT: Add'l Signals
09/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	63.0	63.0		63.0	63.0		27.0	27.0		27.0	27.0	
Total Split (%)	70.0%	70.0%		70.0%	70.0%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	58.8	58.8		58.8	58.8	89.7		16.9			16.9	89.7
Actuated g/C Ratio	0.66	0.66		0.66	0.66	1.00		0.19			0.19	1.00
v/c Ratio	0.54	0.59		0.18	0.60	0.12		0.06			0.77	0.05
Control Delay	24.2	10.5		10.0	10.7	0.2		17.2			54.9	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	24.2	10.5		10.0	10.7	0.2		17.2			54.9	0.1
LOS	C	B		B	B	A		B			D	A
Approach Delay		11.4			9.4			17.3			38.8	
Approach LOS		B			A			B			D	
Queue Length 50th (m)	8.0	65.7		2.1	67.3	0.0		1.1			30.9	0.0
Queue Length 95th (m)	#33.8	90.3		7.1	92.3	0.0		m6.1			#57.1	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	175	2343		184	2345	1601		396			298	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.54	0.59		0.18	0.60	0.12		0.05			0.65	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	89.7
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	12.7
Intersection Capacity Utilization	76.4%
Intersection LOS:	B
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis
5: Elizabeth Street & Highway 89

2036 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1538	3	7	1551	0	10
Future Volume (Veh/h)	1538	3	7	1551	0	10
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)	1636	3	7	1650	0	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.76		0.76	0.76
vC, conflicting volume			1639		2476	820
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1209		2311	131
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			98		100	98
cM capacity (veh/h)			444		25	645
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1091	548	557	1100	11	
Volume Left	0	0	7	0	0	
Volume Right	0	3	0	0	11	
cSH	1700	1700	444	1700	645	
Volume to Capacity	0.64	0.32	0.02	0.65	0.02	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.4	
Control Delay (s)	0.0	0.0	0.5	0.0	10.7	
Lane LOS			A			B
Approach Delay (s)	0.0		0.2		10.7	
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			57.8%	ICU Level of Service	B	
Analysis Period (min)	15					

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1161	217	523	1121	41	299	65	301	59	143	116
Future Volume (vph)	168	1161	217	523	1121	41	299	65	301	59	143	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.976			0.995				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.968		0.950		
Satd. Flow (prot)	1807	3517	0	1825	3594	0	1683	1733	1617	1772	1921	1633
Fl _t Permitted	0.223			0.108			0.642	0.693		0.527		
Satd. Flow (perm)	424	3517	0	207	3594	0	1134	1238	1593	981	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			6				324			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	181	1248	233	562	1205	44	322	70	324	63	154	125
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	181	1481	0	562	1249	0	190	202	324	63	154	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - SAT
09/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0		20.0			18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0		13.0			11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0			0	0	0	0	0	0
Act Effct Green (s)	33.1	33.1		60.3	57.2		21.8	21.8	21.8	21.8	21.8	21.8
Actuated g/C Ratio	0.36	0.36		0.65	0.62		0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	1.19	1.16		1.15	0.56		0.71	0.69	0.52	0.27	0.34	0.28
Control Delay	164.6	109.1		116.1	12.2		46.9	44.5	6.4	30.9	30.6	11.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	164.6	109.1		116.1	12.2		46.9	44.5	6.4	30.9	30.6	11.7
LOS	F	F		F	B		D	D	A	C	C	B
Approach Delay		115.1			44.4			27.9				23.7
Approach LOS		F			D			C				C
Queue Length 50th (m)	~39.8	~167.5		~104.0	63.4		32.4	34.3	0.0	9.1	22.7	5.1
Queue Length 95th (m)	#85.2	#229.2		#181.7	95.7		56.5	58.5	19.0	19.9	38.7	18.2
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	152	1280		488	2236		358	391	725	310	607	568
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	1.19	1.16		1.15	0.56		0.53	0.52	0.45	0.20	0.25	0.22

Intersection Summary	
Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	92.1
Natural Cycle:	150
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.19
Intersection Signal Delay:	66.2
Intersection Capacity Utilization	108.8%
Intersection LOS:	E
ICU Level of Service	G

Analysis Period (min) 15

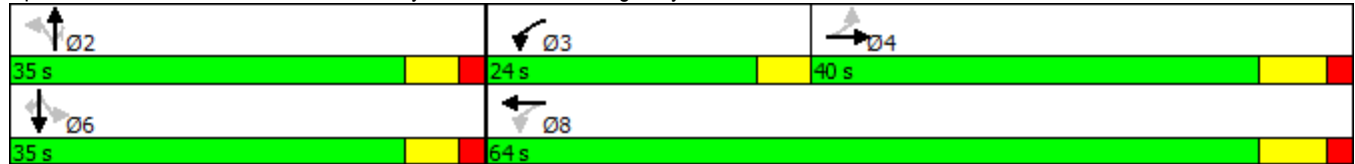
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - AM - Sensitivity Analysis
10/18/2017

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	545	295	428	415	96	200
Future Volume (vph)	545	295	428	415	96	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.947					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	2963	0	1620	3093	1471	1426
Flt Permitted			0.226		0.950	
Satd. Flow (perm)	2963	0	385	3093	1471	1426
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	161					220
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	311.5	
Travel Time (s)	45.0			9.0	14.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	17%	16%	4%	18%	20%	12%
Adj. Flow (vph)	599	324	470	456	105	220
Shared Lane Traffic (%)						
Lane Group Flow (vph)	923	0	470	456	105	220
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.01
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm

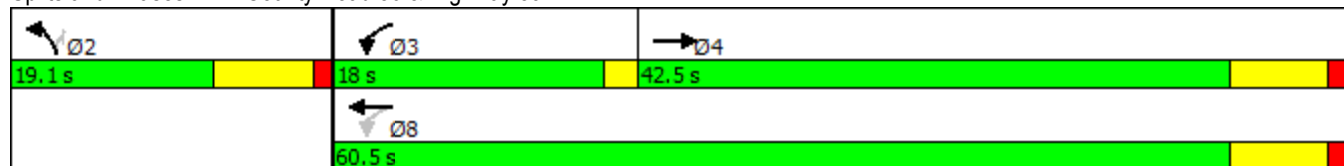


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	42.5		18.0	60.5	19.1	19.1
Total Split (%)	53.4%		22.6%	76.0%	24.0%	24.0%
Maximum Green (s)	35.0		16.0	53.0	12.0	12.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	36.1		58.5	53.0	11.0	11.0
Actuated g/C Ratio	0.46		0.74	0.67	0.14	0.14
v/c Ratio	0.64		0.90	0.22	0.51	0.57
Control Delay	15.9		33.5	5.3	40.8	11.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	15.9		33.5	5.3	40.8	11.1
LOS	B		C	A	D	B
Approach Delay	15.9			19.6	20.7	
Approach LOS	B			B	C	
Queue Length 50th (m)	44.5		30.4	11.6	14.7	0.0
Queue Length 95th (m)	65.7		#85.6	17.8	29.4	18.0
Internal Link Dist (m)	976.2			176.3	287.5	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1449		538	2086	224	404
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.64		0.87	0.22	0.47	0.54

Intersection Summary

Area Type:	Other
Cycle Length:	79.6
Actuated Cycle Length:	78.6
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	18.2
Intersection LOS:	B
Intersection Capacity Utilization:	76.7%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - AM - Sensitivity Analysis 2: Highway 89 & Concession Road 6

10/18/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	18	703	776	20	44	83
Future Volume (Veh/h)	18	703	776	20	44	83
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	20	781	862	22	49	92
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked						
vC, conflicting volume	884				1304	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884				1304	442
tC, single (s)	4.3				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	97				67	84
cM capacity (veh/h)	707				150	569
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	280	521	575	309	141	
Volume Left	20	0	0	0	49	
Volume Right	0	0	0	22	92	
cSH	707	1700	1700	1700	289	
Volume to Capacity	0.03	0.31	0.34	0.18	0.49	
Queue Length 95th (m)	0.7	0.0	0.0	0.0	19.1	
Control Delay (s)	1.0	0.0	0.0	0.0	28.8	
Lane LOS	A				D	
Approach Delay (s)	0.4		0.0		28.8	
Approach LOS					D	
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			46.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - AM - Sensitivity Analysis
10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	732	39	225	796	93	24	12	106	86	10	36
Future Volume (vph)	36	732	39	225	796	93	24	12	106	86	10	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.984			0.899			0.963	
Flt Protected	0.950			0.950				0.992			0.969	
Satd. Flow (prot)	1825	3157	0	1772	3174	0	0	1713	0	0	1745	0
Flt Permitted	0.278			0.326				0.919			0.683	
Satd. Flow (perm)	534	3157	0	608	3174	0	0	1587	0	0	1230	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			28			115			19	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		314.7			133.1			218.1			107.2	
Travel Time (s)		18.9			8.0			13.1			7.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	15%	9%	3%	14%	6%	0%	0%	0%	0%	0%	10%
Adj. Flow (vph)	39	796	42	245	865	101	26	13	115	93	11	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	838	0	245	966	0	0	154	0	0	143	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - AM - Sensitivity Analysis

10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	59.8	59.8		59.8	59.8			13.3			13.3	
Actuated g/C Ratio	0.69	0.69		0.69	0.69			0.15			0.15	
v/c Ratio	0.11	0.39		0.59	0.44			0.45			0.70	
Control Delay	6.5	6.8		15.6	7.2			14.9			48.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.5	6.8		15.6	7.2			14.9			48.3	
LOS	A	A		B	A			B			D	
Approach Delay		6.8			8.9			14.9			48.3	
Approach LOS		A			A			B			D	
Queue Length 50th (m)	1.9	27.0		18.8	32.2			5.6			19.3	
Queue Length 95th (m)	6.3	43.2		51.0	51.2			21.5			38.0	
Internal Link Dist (m)		290.7			109.1			194.1			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	366	2172		417	2188			419			269	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.11	0.39		0.59	0.44			0.37			0.53	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	87.1
Natural Cycle:	65
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	10.9
Intersection Capacity Utilization	65.6%
Analysis Period (min)	15
Intersection LOS:	B
ICU Level of Service	C

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	887	1	10	1047	86	0	1	1	65	3	66
Future Volume (vph)	50	887	1	10	1047	86	0	1	1	65	3	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Fr _t						0.850		0.932				0.850
Fl _t Protected	0.950			0.950							0.954	
Satd. Flow (prot)	1644	3259	0	1372	3230	1570	0	1790	0	0	1749	1396
Fl _t Permitted	0.244			0.299							0.734	
Satd. Flow (perm)	422	3259	0	431	3230	1570	0	1790	0	0	1346	1396
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133		1				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			4	4								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	11%	12%	0%	33%	13%	4%	0%	0%	0%	5%	0%	17%
Adj. Flow (vph)	53	934	1	11	1102	91	0	1	1	68	3	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	935	0	11	1102	91	0	2	0	0	71	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	60.0	60.0		60.0	60.0		30.0	30.0		30.0	30.0	
Total Split (%)	66.7%	66.7%		66.7%	66.7%		33.3%	33.3%		33.3%	33.3%	
Maximum Green (s)	53.0	53.0		53.0	53.0		23.0	23.0		23.0	23.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	65.5	65.5		65.5	65.5	84.9		9.8			9.8	84.9
Actuated g/C Ratio	0.77	0.77		0.77	0.77	1.00		0.12			0.12	1.00
v/c Ratio	0.16	0.37		0.03	0.44	0.06		0.01			0.46	0.05
Control Delay	6.1	5.1		4.7	5.6	0.1		27.0			44.1	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	6.1	5.1		4.7	5.6	0.1		27.0			44.1	0.1
LOS	A	A		A	A	A		C			D	A
Approach Delay		5.2			5.2			27.0			22.4	
Approach LOS		A			A			C			C	
Queue Length 50th (m)	2.3	26.5		0.4	33.8	0.0		0.2			12.0	0.0
Queue Length 95th (m)	7.6	42.1		2.1	53.2	0.0		m1.6			21.4	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	325	2512		332	2490	1570		488			366	1396
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.16	0.37		0.03	0.44	0.06		0.00			0.19	0.05

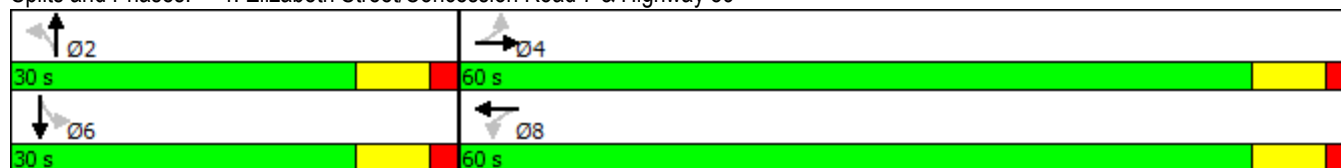
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	84.9
Natural Cycle:	55
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	6.2
Intersection Capacity Utilization	61.0%
Intersection LOS:	A
ICU Level of Service	B

Analysis Period (min) 15

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - AM - Sensitivity Analysis 5: Elizabeth Street & Highway 89

10/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	973	1	3	1163	0	19
Future Volume (Veh/h)	973	1	3	1163	0	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1046	1	3	1251	0	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	249					
pX, platoon unblocked			0.91		0.91	0.91
vC, conflicting volume			1047		1678	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			862		1553	289
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		100	97
cM capacity (veh/h)			720		97	627
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	697	350	420	834	20	
Volume Left	0	0	3	0	0	
Volume Right	0	1	0	0	20	
cSH	1700	1700	720	1700	627	
Volume to Capacity	0.41	0.21	0.00	0.49	0.03	
Queue Length 95th (m)	0.0	0.0	0.1	0.0	0.7	
Control Delay (s)	0.0	0.0	0.1	0.0	10.9	
Lane LOS	A			B		
Approach Delay (s)	0.0		0.0		10.9	
Approach LOS						B
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			44.2%		ICU Level of Service	
Analysis Period (min)			15			
					A	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	793	216	315	916	12	231	30	121	12	42	24
Future Volume (vph)	44	793	216	315	916	12	231	30	121	12	42	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.968			0.998				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.963		0.950		
Satd. Flow (prot)	1643	2860	0	1626	3119	0	1248	1326	1455	1643	1601	1470
Flt Permitted	0.287			0.124			0.728	0.745		0.655		
Satd. Flow (perm)	496	2860	0	212	3119	0	957	1026	1455	1132	1601	1470
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			2				130			88
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	34%	1%	5%	14%	25%	0%	1%	0%	8%	0%
Adj. Flow (vph)	47	853	232	339	985	13	248	32	130	13	45	26
Shared Lane Traffic (%)							44%					
Lane Group Flow (vph)	47	1085	0	339	998	0	139	141	130	13	45	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		2				6	

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - AM - Sensitivity Analysis

10/18/2017



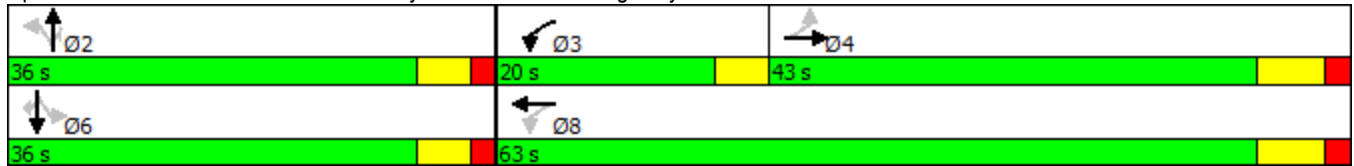
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	43.0	43.0		20.0	63.0		36.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	43.4%	43.4%		20.2%	63.6%		36.4%	36.4%	36.4%	36.4%	36.4%	36.4%
Maximum Green (s)	36.0	36.0		16.0	56.0		30.0	30.0	30.0	30.0	30.0	30.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	36.2	36.2		59.4	56.4		19.2	19.2	19.2	19.2	19.2	19.2
Actuated g/C Ratio	0.41	0.41		0.67	0.64		0.22	0.22	0.22	0.22	0.22	0.22
v/c Ratio	0.23	0.91		0.85	0.50		0.67	0.64	0.31	0.05	0.13	0.07
Control Delay	23.7	37.9		40.6	10.8		47.7	44.4	7.0	26.2	27.5	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	37.9		40.6	10.8		47.7	44.4	7.0	26.2	27.5	0.3
LOS	C	D		D	B		D	D	A	C	C	A
Approach Delay		37.3			18.3			33.7				18.9
Approach LOS		D			B			C				B
Queue Length 50th (m)	5.0	85.2		35.1	41.7		22.8	22.9	0.0	1.8	6.2	0.0
Queue Length 95th (m)	15.9	#154.1		#99.1	78.0		42.4	42.2	12.6	6.1	14.3	0.0
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	202	1192		398	1984		326	349	581	385	545	558
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	0.91		0.85	0.50		0.43	0.40	0.22	0.03	0.08	0.05

Intersection Summary

Area Type:	CBD
Cycle Length:	99
Actuated Cycle Length:	88.6
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	27.7
Intersection LOS:	C
Intersection Capacity Utilization:	80.2%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - AM - Sensitivity Analysis
 21: Concession Road 7 & Street A

10/18/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	6	22	79	102	203
Future Volume (Veh/h)	64	6	22	79	102	203
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	7	24	88	113	226
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					218	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	362	226	339			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	202	317			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	99	98			
cM capacity (veh/h)	631	823	1220			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	78	112	339			
Volume Left	71	24	0			
Volume Right	7	0	226			
cSH	644	1220	1700			
Volume to Capacity	0.12	0.02	0.20			
Queue Length 95th (m)	3.1	0.5	0.0			
Control Delay (s)	11.4	1.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.4	1.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			33.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - AM - Sensitivity Analysis

10/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	760	142	197	781	14	47
Future Volume (vph)	760	142	197	781	14	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.976				0.897	
Flt Protected			0.950		0.988	
Satd. Flow (prot)	3143	0	1610	3221	1502	0
Flt Permitted			0.235		0.988	
Satd. Flow (perm)	3143	0	398	3221	1502	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	31				52	
Link Speed (k/h)	80			80	50	
Link Distance (m)	650.1			72.2	109.1	
Travel Time (s)	29.3			3.2	7.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	844	158	219	868	16	52
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1002	0	219	868	68	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.13	1.13	1.13	1.13	1.13	1.13
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

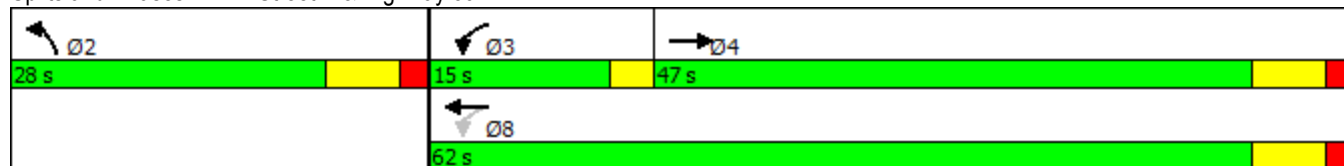


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		15.0	62.0	28.0	
Total Split (%)	52.2%		16.7%	68.9%	31.1%	
Maximum Green (s)	40.0		12.0	55.0	21.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	46.6		61.9	59.3	6.9	
Actuated g/C Ratio	0.61		0.81	0.78	0.09	
v/c Ratio	0.52		0.48	0.35	0.37	
Control Delay	10.9		5.9	4.1	19.7	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	10.9		5.9	4.1	19.7	
LOS	B		A	A	B	
Approach Delay	10.9			4.5	19.7	
Approach LOS	B			A	B	
Queue Length 50th (m)	39.6		5.5	18.7	2.2	
Queue Length 95th (m)	70.5		12.9	32.0	13.0	
Internal Link Dist (m)	626.1			48.2	85.1	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1929		513	2503	451	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.52		0.43	0.35	0.15	

Intersection Summary

Area Type:	CBD
Cycle Length:	90
Actuated Cycle Length:	76.3
Natural Cycle:	65
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.52
Intersection Signal Delay:	7.9
Intersection LOS:	A
Intersection Capacity Utilization:	59.7%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - AM - Sensitivity Analysis
 26: County Road 50 & Street C

10/18/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	30	266	14	152	571
Future Volume (Veh/h)	3	30	266	14	152	571
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	33	296	16	169	634
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1276	304			312	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1276	304			312	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	96			86	
cM capacity (veh/h)	159	736			1248	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	36	312	169	634		
Volume Left	3	0	169	0		
Volume Right	33	16	0	0		
cSH	565	1700	1248	1700		
Volume to Capacity	0.06	0.18	0.14	0.37		
Queue Length 95th (m)	1.5	0.0	3.6	0.0		
Control Delay (s)	11.8	0.0	8.3	0.0		
Lane LOS	B		A			
Approach Delay (s)	11.8	0.0	1.8			
Approach LOS	B					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - PM - Sensitivity Analysis
10/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	541	94	256	976	382	514
Future Volume (vph)	541	94	256	976	382	514
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.978					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3200	0	1532	3444	1665	921
Flt Permitted			0.332		0.950	
Satd. Flow (perm)	3200	0	535	3444	1665	921
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	32					299
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	433.6	
Travel Time (s)	45.0			9.0	19.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	9%	10%	6%	6%	4%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	582	101	275	1049	411	553
Shared Lane Traffic (%)						
Lane Group Flow (vph)	683	0	275	1049	411	553
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



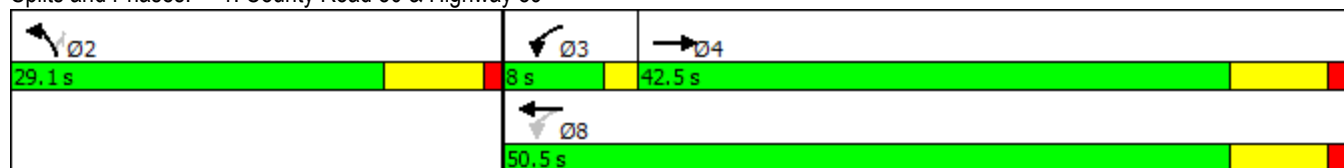
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	42.5		8.0	50.5	29.1	29.1
Total Split (%)	53.4%		10.1%	63.4%	36.6%	36.6%
Maximum Green (s)	35.0		6.0	43.0	22.0	22.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	35.0		48.5	43.0	22.0	22.0
Actuated g/C Ratio	0.44		0.61	0.54	0.28	0.28
v/c Ratio	0.48		0.69	0.56	0.89	1.18
Control Delay	16.4		18.6	13.6	52.2	116.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	16.4		18.6	13.6	52.2	116.1
LOS	B		B	B	D	F
Approach Delay	16.4			14.6	88.8	
Approach LOS	B			B	F	
Queue Length 50th (m)	35.2		17.8	51.3	59.5	~65.8
Queue Length 95th (m)	49.5		#32.0	68.1	#109.2	#124.4
Internal Link Dist (m)	976.2			176.3	409.6	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1424		401	1860	460	470
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.48		0.69	0.56	0.89	1.18

Intersection Summary

Area Type: Other
 Cycle Length: 79.6
 Actuated Cycle Length: 79.6
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 39.1
 Intersection LOS: D
 Intersection Capacity Utilization 80.0%
 ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

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

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - PM - Sensitivity Analysis
 26: County Road 50 & Street C 10/18/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	14	162	734	4	33	317
Future Volume (Veh/h)	14	162	734	4	33	317
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	16	180	816	4	37	352
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	1244	818			820	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1244	818			820	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	52			95	
cM capacity (veh/h)	184	376			809	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	196	820	37	352		
Volume Left	16	0	37	0		
Volume Right	180	4	0	0		
cSH	346	1700	809	1700		
Volume to Capacity	0.57	0.48	0.05	0.21		
Queue Length 95th (m)	25.3	0.0	1.1	0.0		
Control Delay (s)	28.1	0.0	9.7	0.0		
Lane LOS	D		A			
Approach Delay (s)	28.1	0.0	0.9			
Approach LOS	D					
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			56.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - PM - Sensitivity Analysis 2: Highway 89 & Concession Road 6

10/18/2017

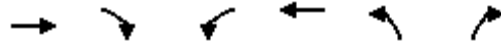


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	76	976	1196	79	25	32
Future Volume (Veh/h)	76	976	1196	79	25	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	82	1049	1286	85	27	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)		200				
pX, platoon unblocked					0.88	
vC, conflicting volume	1371				2017	686
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371				1884	686
tC, single (s)	4.1				7.0	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	84				37	91
cM capacity (veh/h)	507				43	395
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	432	699	857	514	61	
Volume Left	82	0	0	0	27	
Volume Right	0	0	0	85	34	
cSH	507	1700	1700	1700	85	
Volume to Capacity	0.16	0.41	0.50	0.30	0.71	
Queue Length 95th (m)	4.4	0.0	0.0	0.0	26.5	
Control Delay (s)	4.8	0.0	0.0	0.0	115.6	
Lane LOS	A				F	
Approach Delay (s)	1.8		0.0		115.6	
Approach LOS					F	
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			78.1%		ICU Level of Service	D
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - PM - Sensitivity Analysis

10/19/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (vph)	986	42	87	1180	95	182
Future Volume (vph)	986	42	87	1180	95	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.994				0.911	
Flt Protected			0.950		0.983	
Satd. Flow (prot)	3557	0	1789	3579	1687	0
Flt Permitted			0.168		0.983	
Satd. Flow (perm)	3557	0	316	3579	1687	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	6				107	
Link Speed (k/h)	80			80	50	
Link Distance (m)	648.5			78.0	78.8	
Travel Time (s)	29.2			3.5	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1096	47	97	1311	106	202
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1143	0	97	1311	308	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

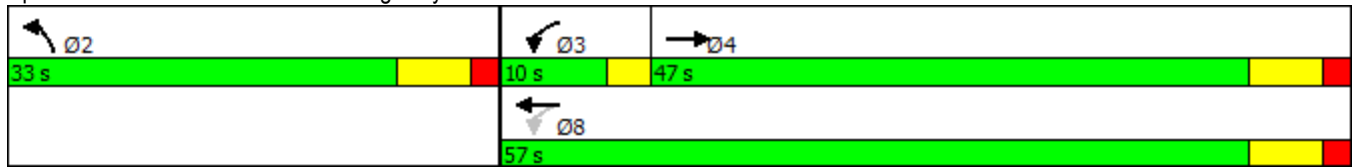


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	47.0		10.0	57.0	33.0	
Total Split (%)	52.2%		11.1%	63.3%	36.7%	
Maximum Green (s)	40.0		7.0	50.0	26.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	42.6		54.2	50.2	15.2	
Actuated g/C Ratio	0.54		0.68	0.63	0.19	
v/c Ratio	0.60		0.29	0.58	0.75	
Control Delay	16.1		7.7	10.7	31.4	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	16.1		7.7	10.7	31.4	
LOS	B		A	B	C	
Approach Delay	16.1			10.5	31.4	
Approach LOS	B			B	C	
Queue Length 50th (m)	61.4		4.2	53.2	28.5	
Queue Length 95th (m)	100.6		11.9	94.0	54.2	
Internal Link Dist (m)	624.5			54.0	54.8	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1906		345	2260	625	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.60		0.28	0.58	0.49	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	79.5
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	15.0
Intersection LOS:	B
Intersection Capacity Utilization:	64.9%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - PM - Sensitivity Analysis
10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	1109	27	192	1118	75	135	17	280	57	10	44
Future Volume (vph)	35	1109	27	192	1118	75	135	17	280	57	10	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.991			0.912			0.947	
Flt Protected	0.950			0.950				0.985			0.975	
Satd. Flow (prot)	1825	3298	0	1825	3395	0	0	1679	0	0	1774	0
Flt Permitted	0.158			0.175				0.864			0.556	
Satd. Flow (perm)	304	3298	0	336	3395	0	0	1472	0	0	1012	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			13			74			35	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		310.5			133.1			220.4			107.2	
Travel Time (s)		18.6			8.0			13.2			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	10%	20%	0%	7%	0%	9%	0%	0%	0%	0%	0%
Adj. Flow (vph)	37	1167	28	202	1177	79	142	18	295	60	11	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	1195	0	202	1256	0	0	455	0	0	117	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - PM - Sensitivity Analysis
10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	59.0	59.0		59.0	59.0		31.0	31.0		31.0	31.0	
Total Split (%)	65.6%	65.6%		65.6%	65.6%		34.4%	34.4%		34.4%	34.4%	
Maximum Green (s)	52.0	52.0		52.0	52.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	52.0	52.0		52.0	52.0			24.0			24.0	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.27			0.27	
v/c Ratio	0.21	0.63		1.04	0.64			1.02			0.40	
Control Delay	12.9	14.4		100.1	14.4			77.4			23.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.9	14.4		100.1	14.4			77.4			23.7	
LOS	B	B		F	B			E			C	
Approach Delay		14.3			26.3			77.4			23.7	
Approach LOS		B			C			E			C	
Queue Length 50th (m)	2.9	66.4		~38.1	70.0			~70.8			11.3	
Queue Length 95th (m)	8.6	86.2		#79.2	90.5			#131.2			26.9	
Internal Link Dist (m)		286.5			109.1			196.4			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	175	1907		194	1967			446			295	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.21	0.63		1.04	0.64			1.02			0.40	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.04
Intersection Signal Delay:	28.8
Intersection LOS:	C
Intersection Capacity Utilization:	87.6%
ICU Level of Service:	E
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite.	

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

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - PM - Sensitivity Analysis
 22: Concession Road 7 & Street A

10/19/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	279	24	9	153	141	90
Future Volume (Veh/h)	279	24	9	153	141	90
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	310	27	10	170	157	100
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					220	
pX, platoon unblocked	0.97	0.97	0.97			
vC, conflicting volume	397	207	257			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	367	171	223			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	49	97	99			
cM capacity (veh/h)	612	849	1310			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	337	180	257			
Volume Left	310	10	0			
Volume Right	27	0	100			
cSH	626	1310	1700			
Volume to Capacity	0.54	0.01	0.15			
Queue Length 95th (m)	24.4	0.2	0.0			
Control Delay (s)	17.3	0.5	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.3	0.5	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			7.6			
Intersection Capacity Utilization		39.0%		ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	1372	10	22	1257	140	0	0	12	117	1	74
Future Volume (vph)	103	1372	10	22	1257	140	0	0	12	117	1	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.865				0.850
Flt Protected	0.950			0.950							0.953	
Satd. Flow (prot)	1706	3378	0	1825	3444	1633	0	1662	0	0	1813	1633
Flt Permitted	0.174			0.144							0.719	
Satd. Flow (perm)	312	3378	0	277	3444	1633	0	1662	0	0	1368	1633
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				133		54				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	7%	8%	0%	0%	6%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	108	1444	11	23	1323	147	0	0	13	123	1	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	1455	0	23	1323	147	0	13	0	0	124	78
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		Perm	NA	Free		NA		Perm	NA	Free
Protected Phases		4			8			2				6

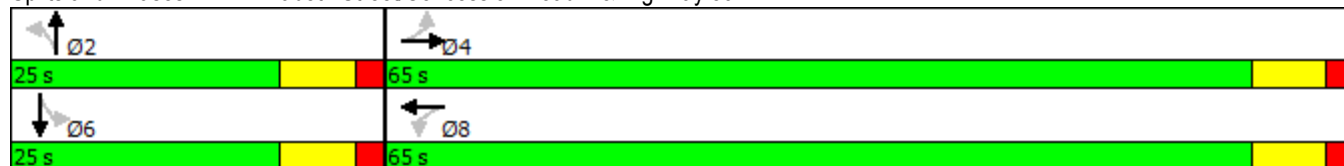


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	63.8	63.8		63.8	63.8	91.0		13.2			13.2	91.0
Actuated g/C Ratio	0.70	0.70		0.70	0.70	1.00		0.15			0.15	1.00
v/c Ratio	0.50	0.61		0.12	0.55	0.09		0.05			0.63	0.05
Control Delay	17.4	9.2		7.4	8.2	0.1		0.4			49.2	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	17.4	9.2		7.4	8.2	0.1		0.4			49.2	0.1
LOS	B	A		A	A	A		A			D	A
Approach Delay		9.7			7.4			0.4			30.3	
Approach LOS		A			A			A			C	
Queue Length 50th (m)	7.4	59.8		1.1	50.5	0.0		0.0			19.6	0.0
Queue Length 95th (m)	28.2	95.0		4.8	79.6	0.0		m0.0			35.8	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	218	2367		194	2412	1633		372			271	1633
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.50	0.61		0.12	0.55	0.09		0.03			0.46	0.05

Intersection Summary

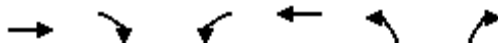
Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 91
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 9.9
 Intersection LOS: A
 Intersection Capacity Utilization 73.1%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - PM - Sensitivity Analysis 5: Elizabeth Street & Highway 89

10/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1466	6	7	1478	0	17
Future Volume (Veh/h)	1466	6	7	1478	0	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1511	6	7	1524	0	18
Pedestrians					3	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.77		0.77	0.77
vC, conflicting volume			1520		2293	762
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1075		2080	88
tC, single (s)			4.1		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			99		100	97
cM capacity (veh/h)			503		36	667

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	1007	510	515	1016	18
Volume Left	0	0	7	0	0
Volume Right	0	6	0	0	18
cSH	1700	1700	503	1700	667
Volume to Capacity	0.59	0.30	0.01	0.60	0.03
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.6
Control Delay (s)	0.0	0.0	0.4	0.0	10.6
Lane LOS			A	B	
Approach Delay (s)	0.0		0.1		10.6
Approach LOS					B

Intersection Summary					
Average Delay			0.1		
Intersection Capacity Utilization			55.7%	ICU Level of Service	B
Analysis Period (min)			15		

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM - Sensitivity Analysis

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	1112	372	321	927	35	498	52	235	31	63	94
Future Volume (vph)	63	1112	372	321	927	35	498	52	235	31	63	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99			1.00		1.00	1.00	0.98	1.00		0.98
Fr _t		0.962			0.995				0.850			0.850
Fl _t Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1825	3294	0	1825	3560	0	1534	1578	1617	1722	1921	1601
Fl _t Permitted	0.286			0.091			0.714	0.721		0.402		
Satd. Flow (perm)	549	3294	0	175	3560	0	1150	1181	1588	726	1921	1577
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		56			6				245			98
Link Speed (k/h)		60			50			50				50
Link Distance (m)		517.5			617.4			388.4				70.8
Travel Time (s)		31.1			44.5			28.0				5.1
Confl. Peds. (#/hr)	1		8	8		1	3		6	6		3
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	13%	3%	1%	6%	0%	2%
Adj. Flow (vph)	66	1158	388	334	966	36	519	54	245	32	66	98
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	66	1546	0	334	1002	0	285	288	245	32	66	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - PM - Sensitivity Analysis
10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	47.0	47.0		17.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	47.5%	47.5%		17.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	40.0	40.0		13.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	40.1	40.1		60.1	57.1		27.2	27.2	27.2	27.2	27.2	27.2
Actuated g/C Ratio	0.41	0.41		0.62	0.59		0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.29	1.11		1.02	0.48		0.89	0.88	0.40	0.16	0.12	0.19
Control Delay	24.6	89.6		81.1	12.7		63.5	60.8	5.6	28.5	26.5	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	89.6		81.1	12.7		63.5	60.8	5.6	28.5	26.5	6.6
LOS	C	F		F	B		E	E	A	C	C	A
Approach Delay		86.9			29.8			45.2				16.9
Approach LOS		F			C			D				B
Queue Length 50th (m)	8.4	~179.5		~52.0	55.4		53.8	54.2	0.0	4.5	9.2	0.0
Queue Length 95th (m)	19.4	#221.8		#105.3	70.6		#100.8	#100.1	16.8	12.0	19.2	11.1
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	225	1389		328	2091		343	352	646	216	573	539
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	0.29	1.11		1.02	0.48		0.83	0.82	0.38	0.15	0.12	0.18

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	97.3
Natural Cycle:	110
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.11
Intersection Signal Delay:	55.6
Intersection Capacity Utilization:	97.0%
Intersection LOS:	E
ICU Level of Service:	F

Analysis Period (min) 15

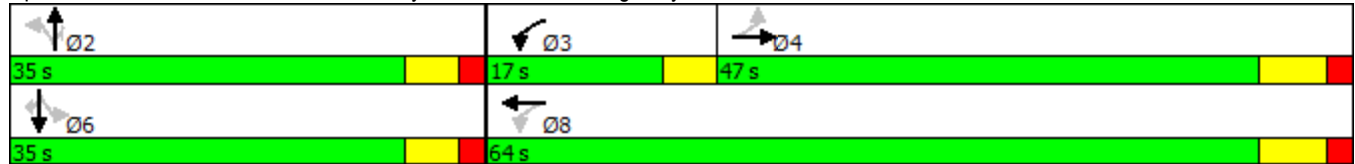
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



Lanes, Volumes, Timings
1: County Road 50 & Highway 89

2036 Future Total - SAT - Sensitivity Analysis
10/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	692	114	272	824	237	308
Future Volume (vph)	692	114	272	824	237	308
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.0	3.7	3.4	3.5
Storage Length (m)		0.0	180.0		90.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			80.0		80.0	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.979					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3455	0	1668	3544	1713	949
Flt Permitted			0.273		0.950	
Satd. Flow (perm)	3455	0	479	3544	1713	949
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	30					296
Link Speed (k/h)	80			80	80	
Link Distance (m)	1000.2			200.3	413.9	
Travel Time (s)	45.0			9.0	18.6	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	12%	1%	3%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	100
Adj. Flow (vph)	713	118	280	849	244	318
Shared Lane Traffic (%)						
Lane Group Flow (vph)	831	0	280	849	244	318
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.09	0.99	1.03	1.89
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru			Thru		Right
Leading Detector (m)	30.5		12.0	30.5	12.0	12.0
Trailing Detector (m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Position(m)	0.0		-1.0	0.0	-1.0	6.0
Detector 1 Size(m)	1.8		13.0	1.8	13.0	6.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	35.0		6.0	35.0	10.0	10.0
Minimum Split (s)	42.5		8.0	42.5	17.1	17.1
Total Split (s)	42.5		11.0	53.5	26.1	26.1
Total Split (%)	53.4%		13.8%	67.2%	32.8%	32.8%
Maximum Green (s)	35.0		9.0	46.0	19.0	19.0
Yellow Time (s)	5.9		2.0	5.9	5.9	5.9
All-Red Time (s)	1.6		0.0	1.6	1.2	1.2
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5		2.0	7.5	7.1	7.1
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	4.5		2.0	4.5	3.0	3.0
Recall Mode	Max		None	Max	None	None
Act Effct Green (s)	35.9		51.6	46.1	15.3	15.3
Actuated g/C Ratio	0.47		0.68	0.61	0.20	0.20
v/c Ratio	0.51		0.62	0.40	0.71	0.74
Control Delay	15.4		11.7	8.9	40.0	16.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	15.4		11.7	8.9	40.0	16.7
LOS	B		B	A	D	B
Approach Delay	15.4			9.6	26.8	
Approach LOS	B			A	C	
Queue Length 50th (m)	41.4		13.6	30.5	32.8	2.6
Queue Length 95th (m)	61.3		26.1	46.1	55.3	#34.7
Internal Link Dist (m)	976.2			176.3	389.9	
Turn Bay Length (m)			180.0		90.0	
Base Capacity (vph)	1645		465	2148	428	459
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.51		0.60	0.40	0.57	0.69

Intersection Summary

Area Type: Other

Cycle Length: 79.6

Actuated Cycle Length: 76.1

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 15.4

Intersection LOS: B

Intersection Capacity Utilization 72.9%

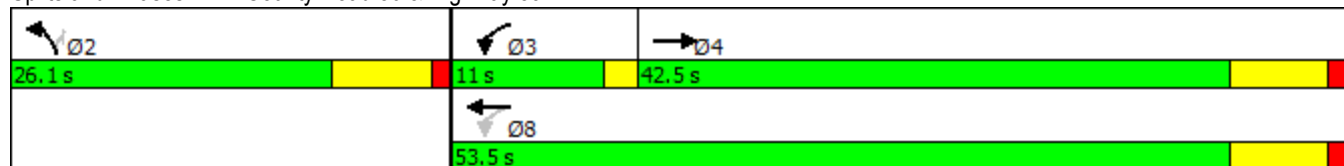
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: County Road 50 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - SAT - Sensitivity Analysis
 26: County Road 50 & Street C

10/18/2017



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	82	463	3	30	356
Future Volume (Veh/h)	17	82	463	3	30	356
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	91	514	3	33	396
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	978	516			517	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	978	516			517	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	84			97	
cM capacity (veh/h)	269	559			1049	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	110	517	33	396		
Volume Left	19	0	33	0		
Volume Right	91	3	0	0		
cSH	472	1700	1049	1700		
Volume to Capacity	0.23	0.30	0.03	0.23		
Queue Length 95th (m)	6.8	0.0	0.7	0.0		
Control Delay (s)	14.9	0.0	8.5	0.0		
Lane LOS	B		A			
Approach Delay (s)	14.9	0.0	0.7			
Approach LOS	B					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			37.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - SAT - Sensitivity Analysis 2: Highway 89 & Concession Road 6

10/18/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↔		↔↔	
Traffic Volume (veh/h)	23	866	862	54	36	15
Future Volume (Veh/h)	23	866	862	54	36	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	941	937	59	39	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)		200				
pX, platoon unblocked					0.86	
vC, conflicting volume	996				1487	498
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	996				1248	498
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				72	97
cM capacity (veh/h)	703				140	523
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	339	627	625	371	55	
Volume Left	25	0	0	0	39	
Volume Right	0	0	0	59	16	
cSH	703	1700	1700	1700	178	
Volume to Capacity	0.04	0.37	0.37	0.22	0.31	
Queue Length 95th (m)	0.8	0.0	0.0	0.0	9.4	
Control Delay (s)	1.2	0.0	0.0	0.0	34.0	
Lane LOS	A				D	
Approach Delay (s)	0.4	0.0		34.0		
Approach LOS					D	
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			50.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
24: Street B & Highway 89

2036 Future Total - SAT - Sensitivity Analysis

10/18/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (vph)	936	73	124	980	81	135
Future Volume (vph)	936	73	124	980	81	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	15.0		0.0	0.0
Storage Lanes		0	1		1	0
Taper Length (m)			60.0		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.989				0.916	
Flt Protected			0.950		0.982	
Satd. Flow (prot)	3539	0	1789	3579	1694	0
Flt Permitted			0.175		0.982	
Satd. Flow (perm)	3539	0	330	3579	1694	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	11				90	
Link Speed (k/h)	80			80	50	
Link Distance (m)	647.5			77.2	111.5	
Travel Time (s)	29.1			3.5	8.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1040	81	138	1089	90	150
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1121	0	138	1089	240	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	30.5		6.1	30.5	6.1	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	1.8		6.1	1.8	6.1	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	4		3	8	2	
Permitted Phases			8			

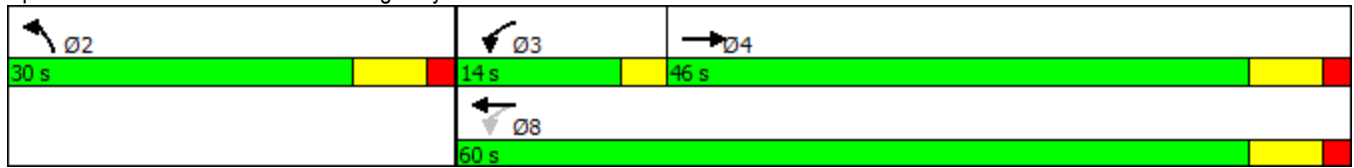


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		3	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	25.0		9.5	25.0	25.0	
Total Split (s)	46.0		14.0	60.0	30.0	
Total Split (%)	51.1%		15.6%	66.7%	33.3%	
Maximum Green (s)	39.0		11.0	53.0	23.0	
Yellow Time (s)	5.0		3.0	5.0	5.0	
All-Red Time (s)	2.0		0.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		3.0	7.0	7.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		None	Max	None	
Walk Time (s)	7.0			7.0	7.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	42.6		57.2	53.2	12.7	
Actuated g/C Ratio	0.53		0.72	0.67	0.16	
v/c Ratio	0.59		0.37	0.46	0.70	
Control Delay	15.3		7.2	7.8	30.5	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	15.3		7.2	7.8	30.5	
LOS	B		A	A	C	
Approach Delay	15.3			7.7	30.5	
Approach LOS	B			A	C	
Queue Length 50th (m)	55.6		5.2	35.8	21.2	
Queue Length 95th (m)	95.4		13.7	62.8	43.6	
Internal Link Dist (m)	623.5			53.2	87.5	
Turn Bay Length (m)			15.0			
Base Capacity (vph)	1893		437	2382	553	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.59		0.32	0.46	0.43	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	79.9
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	13.1
Intersection LOS:	B
Intersection Capacity Utilization:	62.9%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 24: Street B & Highway 89



Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89

2036 Future Total - SAT - Sensitivity Analysis

10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	995	28	221	1027	195	104	16	269	154	39	53
Future Volume (vph)	51	995	28	221	1027	195	104	16	269	154	39	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		0.0	70.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	100.0			100.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.976			0.907			0.971	
Flt Protected	0.950			0.950				0.987			0.970	
Satd. Flow (prot)	1825	3566	0	1789	3475	0	0	1720	0	0	1798	0
Flt Permitted	0.124			0.116				0.837			0.509	
Satd. Flow (perm)	238	3566	0	218	3475	0	0	1458	0	0	944	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			29			136			17	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		312.3			133.1			218.3			107.2	
Travel Time (s)		18.7			8.0			13.1			7.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	3%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	54	1047	29	233	1081	205	109	17	283	162	41	56
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1076	0	233	1286	0	0	409	0	0	259	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	

Lanes, Volumes, Timings
3: Concession Road 7/Dean Drive & Highway 89



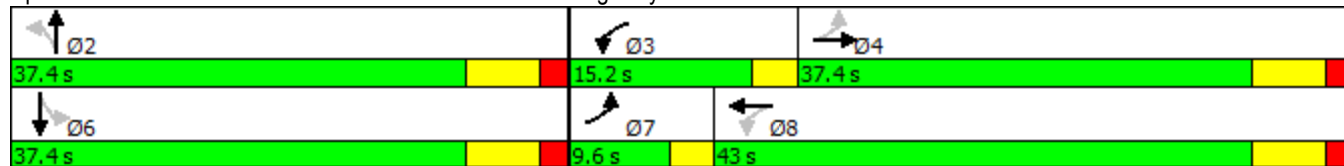
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	25.0		9.5	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	9.6	37.4		15.2	43.0		37.4	37.4		37.4	37.4	
Total Split (%)	10.7%	41.6%		16.9%	47.8%		41.6%	41.6%		41.6%	41.6%	
Maximum Green (s)	6.6	30.4		12.2	36.0		30.4	30.4		30.4	30.4	
Yellow Time (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			7.0			7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	41.1	30.8		48.3	38.9			24.6			24.6	
Actuated g/C Ratio	0.50	0.37		0.58	0.47			0.30			0.30	
v/c Ratio	0.23	0.81		0.72	0.78			0.78			0.89	
Control Delay	11.9	31.1		28.3	25.0			28.5			58.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	11.9	31.1		28.3	25.0			28.5			58.5	
LOS	B	C		C	C			C			E	
Approach Delay		30.2			25.5			28.5			58.5	
Approach LOS		C			C			C			E	
Queue Length 50th (m)	3.7	86.1		19.4	100.4			40.6			37.5	
Queue Length 95th (m)	9.1	#128.5		#50.7	#149.5			74.3			#77.5	
Internal Link Dist (m)		288.3			109.1			194.3			83.2	
Turn Bay Length (m)	100.0			70.0								
Base Capacity (vph)	246	1326		360	1645			625			360	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.22	0.81		0.65	0.78			0.65			0.72	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	30.0
Intersection LOS:	C
Intersection Capacity Utilization:	84.6%
ICU Level of Service:	E
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	

Queue shown is maximum after two cycles.

Splits and Phases: 3: Concession Road 7/Dean Drive & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - SAT - Sensitivity Analysis
 22: Concession Road 7 & Street A

10/19/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	218	21	18	169	158	129
Future Volume (Veh/h)	218	21	18	169	158	129
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	242	23	20	188	176	143
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					218	
pX, platoon unblocked	0.94	0.94	0.94			
vC, conflicting volume	476	248	319			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	165	241			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	56	97	98			
cM capacity (veh/h)	553	825	1243			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	265	208	319			
Volume Left	242	20	0			
Volume Right	23	0	143			
cSH	570	1243	1700			
Volume to Capacity	0.47	0.02	0.19			
Queue Length 95th (m)	18.6	0.4	0.0			
Control Delay (s)	16.7	0.9	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.7	0.9	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			5.8			
Intersection Capacity Utilization		43.9%		ICU Level of Service		A
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	1390	7	31	1389	185	1	7	12	180	6	78
Future Volume (vph)	93	1390	7	31	1389	185	1	7	12	180	6	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	35.0		100.0	0.0		0.0	0.0		70.0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (m)	100.0			70.0			7.6			7.6		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00								
Frt		0.999				0.850		0.916				0.850
Flt Protected	0.950			0.950				0.998			0.954	
Satd. Flow (prot)	1789	3575	0	1825	3579	1601	0	1756	0	0	1781	1555
Flt Permitted	0.134			0.132				0.984			0.717	
Satd. Flow (perm)	252	3575	0	254	3579	1601	0	1732	0	0	1339	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				144		13				133
Link Speed (k/h)		60			60			50				60
Link Distance (m)		204.7			248.7			28.0				126.5
Travel Time (s)		12.3			14.9			2.0				7.6
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	0%	0%	2%	2%	0%	0%	0%	3%	0%	5%
Adj. Flow (vph)	98	1463	7	33	1462	195	1	7	13	189	6	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	1470	0	33	1462	195	0	21	0	0	195	82
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0				0.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			4.9			4.9				4.9
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA	Free	Perm	NA		Perm	NA	Free
Protected Phases		4			8			2			6	
Permitted Phases	4			8		Free	2			6		Free
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		25.0	25.0		25.0	25.0	
Total Split (s)	65.0	65.0		65.0	65.0		25.0	25.0		25.0	25.0	
Total Split (%)	72.2%	72.2%		72.2%	72.2%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	58.0	58.0		58.0	58.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	60.8	60.8		60.8	60.8	91.2		16.4			16.4	91.2
Actuated g/C Ratio	0.67	0.67		0.67	0.67	1.00		0.18			0.18	1.00
v/c Ratio	0.58	0.62		0.20	0.61	0.12		0.07			0.81	0.05
Control Delay	27.3	10.4		10.0	10.3	0.2		18.4			61.3	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	27.3	10.4		10.0	10.3	0.2		18.4			61.3	0.1
LOS	C	B		A	B	A		B			E	A
Approach Delay		11.4			9.1			18.4			43.2	
Approach LOS		B			A			B			D	
Queue Length 50th (m)	8.8	72.2		2.1	71.4	0.0		1.1			31.8	0.0
Queue Length 95th (m)	#36.3	91.8		6.9	90.8	0.0		m6.2			#62.5	0.0
Internal Link Dist (m)		180.7			224.7			4.0			102.5	
Turn Bay Length (m)	110.0			35.0		100.0						70.0
Base Capacity (vph)	168	2382		169	2385	1601		352			264	1555
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.58	0.62		0.20	0.61	0.12		0.06			0.74	0.05

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	91.2
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	12.8
Intersection Capacity Utilization	78.0%
Intersection LOS:	B
ICU Level of Service	D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Elizabeth Street/Concession Road 7 & Highway 89



HCM Unsignalized Intersection Capacity Analysis 2036 Future Total - SAT - Sensitivity Analysis
 5: Elizabeth Street & Highway 89

10/18/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Traffic Volume (veh/h)	1612	3	7	1600	0	10
Future Volume (Veh/h)	1612	3	7	1600	0	10
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)	1715	3	7	1702	0	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	249					
pX, platoon unblocked			0.79		0.79	0.79
vC, conflicting volume			1718		2582	859
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1379		2471	293
tC, single (s)			4.1		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			98		100	98
cM capacity (veh/h)			398		20	522
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	1143	575	574	1135	11	
Volume Left	0	0	7	0	0	
Volume Right	0	3	0	0	11	
cSH	1700	1700	398	1700	522	
Volume to Capacity	0.67	0.34	0.02	0.67	0.02	
Queue Length 95th (m)	0.0	0.0	0.4	0.0	0.5	
Control Delay (s)	0.0	0.0	0.5	0.0	12.0	
Lane LOS			A			B
Approach Delay (s)	0.0	0.2				12.0
Approach LOS					B	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			59.1%	ICU Level of Service		B
Analysis Period (min)			15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1234	218	523	1169	41	230	65	301	59	143	116
Future Volume (vph)	168	1234	218	523	1169	41	230	65	301	59	143	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	95.0		0.0	25.0		0.0	15.0		10.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	100.0			7.6			10.0			5.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00		1.00	1.00	0.98	1.00		0.98
Frt		0.978			0.995				0.850			0.850
Flt Protected	0.950			0.950			0.950	0.972		0.950		
Satd. Flow (prot)	1807	3527	0	1825	3594	0	1683	1744	1617	1772	1921	1633
Flt Permitted	0.212			0.108			0.639	0.714		0.594		
Satd. Flow (perm)	403	3527	0	207	3594	0	1129	1278	1593	1105	1921	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			6				324			88
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		517.5			617.4			388.4			70.8	
Travel Time (s)		31.1			44.5			28.0			5.1	
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	6%	0%	1%	0%	3%	0%	1%	3%	0%	0%
Adj. Flow (vph)	181	1327	234	562	1257	44	247	70	324	63	154	125
Shared Lane Traffic (%)							39%					
Lane Group Flow (vph)	181	1561	0	562	1301	0	151	166	324	63	154	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	2		1	2		1	1	1	1	1	0
Detector Template		Thru			Thru							
Leading Detector (m)	0.0	30.5		13.5	30.5		12.5	12.5	13.0	13.5	13.5	0.0
Trailing Detector (m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	0.0
Detector 1 Position(m)	0.0	0.0		-1.5	0.0		-1.5	-1.5	6.0	-1.5	-1.5	-1.5
Detector 1 Size(m)	6.1	1.8		15.0	1.8		14.0	14.0	7.0	15.0	15.0	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7							
Detector 2 Size(m)		1.8			1.8							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							

Lanes, Volumes, Timings
6: Industrial Parkway/Private Access & Highway 89

2036 Future Total - SAT - Sensitivity Analysis
10/18/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	18.0	18.0		8.0	18.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	40.0	40.0		12.0	40.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (s)	40.0	40.0		24.0	64.0		35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	40.4%	40.4%		24.2%	64.6%		35.4%	35.4%	35.4%	35.4%	35.4%	35.4%
Maximum Green (s)	33.0	33.0		20.0	57.0		29.0	29.0	29.0	29.0	29.0	29.0
Yellow Time (s)	5.0	5.0		4.0	5.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0		4.0	7.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		2.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None
Walk Time (s)	20.0	20.0			20.0		18.0	18.0	18.0	18.0	18.0	18.0
Flash Dont Walk (s)	13.0	13.0			13.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	0
Act Effct Green (s)	33.2	33.2		60.3	57.3		18.9	18.9	18.9	18.9	18.9	18.9
Actuated g/C Ratio	0.37	0.37		0.68	0.64		0.21	0.21	0.21	0.21	0.21	0.21
v/c Ratio	1.21	1.18		1.12	0.56		0.63	0.61	0.55	0.27	0.38	0.31
Control Delay	172.2	116.8		101.9	11.1		43.8	41.5	7.0	31.4	32.1	12.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	172.2	116.8		101.9	11.1		43.8	41.5	7.0	31.4	32.1	12.4
LOS	F	F		F	B		D	D	A	C	C	B
Approach Delay		122.5			38.5			24.6				24.8
Approach LOS		F			D			C				C
Queue Length 50th (m)	~37.9	~168.4		~93.6	57.8		24.8	27.1	0.0	9.0	22.7	5.1
Queue Length 95th (m)	#86.6	#246.4		#181.7	101.8		44.8	47.5	19.0	19.6	38.7	18.2
Internal Link Dist (m)		493.5			593.4			364.4				46.8
Turn Bay Length (m)	80.0			95.0			25.0			15.0		10.0
Base Capacity (vph)	149	1324		504	2308		368	417	738	360	627	583
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	1.21	1.18		1.12	0.56		0.41	0.40	0.44	0.17	0.25	0.21

Intersection Summary

Area Type:	Other
Cycle Length:	99
Actuated Cycle Length:	89.3
Natural Cycle:	150
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.21
Intersection Signal Delay:	67.4
Intersection Capacity Utilization	109.4%
Intersection LOS:	E
ICU Level of Service	H

Analysis Period (min) 15

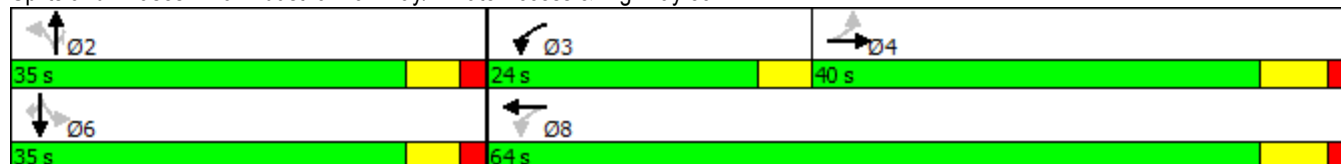
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Industrial Parkway/Private Access & Highway 89



HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2026 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	555	142	137	540	14	34
Future Volume (Veh/h)	555	142	137	540	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	617	158	152	600	16	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	390					
pX, platoon unblocked						
vC, conflicting volume			775		1300	388
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			775		1300	388
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		87	94
cM capacity (veh/h)			837		125	611
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	411	364	152	300	300	54
Volume Left	0	0	152	0	0	16
Volume Right	0	158	0	0	0	38
cSH	1700	1700	837	1700	1700	284
Volume to Capacity	0.24	0.21	0.18	0.18	0.18	0.19
Queue Length 95th (m)	0.0	0.0	5.0	0.0	0.0	5.2
Control Delay (s)	0.0	0.0	10.3	0.0	0.0	20.6
Lane LOS	B			C		
Approach Delay (s)	0.0		2.1			20.6
Approach LOS	C					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			40.8%	ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
7: Street B & Highway 89

2026 Future Total - PM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (veh/h)	694	42	68	886	95	132
Future Volume (Veh/h)	694	42	68	886	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	771	47	76	984	106	147
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	389					
pX, platoon unblocked					0.90	
vC, conflicting volume			818		1438	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			818		1263	409
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		19	75
cM capacity (veh/h)			806		132	592
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	514	304	76	492	492	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	806	1700	1700	240
Volume to Capacity	0.30	0.18	0.09	0.29	0.29	1.05
Queue Length 95th (m)	0.0	0.0	2.4	0.0	0.0	80.4
Control Delay (s)	0.0	0.0	9.9	0.0	0.0	117.3
Lane LOS			A	F		
Approach Delay (s)	0.0		0.7	117.3		
Approach LOS						F
Intersection Summary						
Average Delay			14.3			
Intersection Capacity Utilization			47.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
8: Street B & Highway 89

2026 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	672	73	107	736	81	109
Future Volume (Veh/h)	672	73	107	736	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	747	81	119	818	90	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	388					
pX, platoon unblocked					0.92	
vC, conflicting volume			828		1434	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			828		1304	414
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		25	79
cM capacity (veh/h)			799		119	587
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	498	330	119	409	409	211
Volume Left	0	0	119	0	0	90
Volume Right	0	81	0	0	0	121
cSH	1700	1700	799	1700	1700	220
Volume to Capacity	0.29	0.19	0.15	0.24	0.24	0.96
Queue Length 95th (m)	0.0	0.0	4.0	0.0	0.0	63.6
Control Delay (s)	0.0	0.0	10.3	0.0	0.0	97.0
Lane LOS			B			F
Approach Delay (s)	0.0		1.3			97.0
Approach LOS						F
Intersection Summary						
Average Delay			11.0			
Intersection Capacity Utilization			48.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2031 Future Total - AM: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	644	142	137	540	14	34
Future Volume (Veh/h)	644	142	137	540	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	716	158	152	600	16	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	388					
pX, platoon unblocked						
vC, conflicting volume			874	1399		437
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			874	1399		437
tC, single (s)			4.1	6.8		6.9
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			80	85		93
cM capacity (veh/h)			768	105		567
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	477	397	152	300	300	54
Volume Left	0	0	152	0	0	16
Volume Right	0	158	0	0	0	38
cSH	1700	1700	768	1700	1700	247
Volume to Capacity	0.28	0.23	0.20	0.18	0.18	0.22
Queue Length 95th (m)	0.0	0.0	5.6	0.0	0.0	6.2
Control Delay (s)	0.0	0.0	10.8	0.0	0.0	23.6
Lane LOS	B			C		
Approach Delay (s)	0.0		2.2		23.6	
Approach LOS	C					
Intersection Summary						
Average Delay	1.7					
Intersection Capacity Utilization	43.3%		ICU Level of Service			A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2031 Future Total - PM: Add'l Signals
 10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	806	42	68	1013	95	132
Future Volume (Veh/h)	806	42	68	1013	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	896	47	76	1126	106	147
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	389					
pX, platoon unblocked					0.85	
vC, conflicting volume			943		1634	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			943		1391	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		0	73
cM capacity (veh/h)			723		101	539
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	597	346	76	563	563	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	723	1700	1700	192
Volume to Capacity	0.35	0.20	0.11	0.33	0.33	1.32
Queue Length 95th (m)	0.0	0.0	2.7	0.0	0.0	108.8
Control Delay (s)	0.0	0.0	10.6	0.0	0.0	224.1
Lane LOS			B			F
Approach Delay (s)	0.0		0.7			224.1
Approach LOS						F
Intersection Summary						
Average Delay			24.0			
Intersection Capacity Utilization			50.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2031 Future Total - SAT: Add'l Signals
 10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Volume (veh/h)	782	73	107	844	81	109
Future Volume (Veh/h)	782	73	107	844	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	869	81	119	938	90	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	387					
pX, platoon unblocked					0.83	
vC, conflicting volume			950		1616	475
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			950		1335	475
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		10	77
cM capacity (veh/h)			719		100	536
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	579	371	119	469	469	211
Volume Left	0	0	119	0	0	90
Volume Right	0	81	0	0	0	121
cSH	1700	1700	719	1700	1700	188
Volume to Capacity	0.34	0.22	0.17	0.28	0.28	1.12
Queue Length 95th (m)	0.0	0.0	4.5	0.0	0.0	79.3
Control Delay (s)	0.0	0.0	11.0	0.0	0.0	153.5
Lane LOS			B			F
Approach Delay (s)	0.0		1.2			153.5
Approach LOS						F
Intersection Summary						
Average Delay			15.2			
Intersection Capacity Utilization			51.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2036 Future Total - AM: Add'l Signals
 10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	747	142	137	721	14	34
Future Volume (Veh/h)	747	142	137	721	14	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	830	158	152	801	16	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	387					
pX, platoon unblocked						
vC, conflicting volume			988			494
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			988			494
tC, single (s)			4.1			6.9
tC, 2 stage (s)						
tF (s)			2.2			3.3
p0 queue free %			78			93
cM capacity (veh/h)			695			521
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	553	435	152	400	400	54
Volume Left	0	0	152	0	0	16
Volume Right	0	158	0	0	0	38
cSH	1700	1700	695	1700	1700	187
Volume to Capacity	0.33	0.26	0.22	0.24	0.24	0.29
Queue Length 95th (m)	0.0	0.0	6.3	0.0	0.0	8.7
Control Delay (s)	0.0	0.0	11.6	0.0	0.0	31.9
Lane LOS	B			D		
Approach Delay (s)	0.0		1.9		31.9	
Approach LOS				D		
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			49.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 24: Street B & Highway 89

2036 Future Total - PM: Add'l Signals
 10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	936	42	68	1161	95	132
Future Volume (Veh/h)	936	42	68	1161	95	132
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1040	47	76	1290	106	147
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	389					
pX, platoon unblocked					0.79	
vC, conflicting volume			1087	1860	544	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1087	1550	544	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			88	0	70	
cM capacity (veh/h)			638	72	484	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	693	394	76	645	645	253
Volume Left	0	0	76	0	0	106
Volume Right	0	47	0	0	0	147
cSH	1700	1700	638	1700	1700	143
Volume to Capacity	0.41	0.23	0.12	0.38	0.38	1.77
Queue Length 95th (m)	0.0	0.0	3.1	0.0	0.0	142.9
Control Delay (s)	0.0	0.0	11.4	0.0	0.0	427.2
Lane LOS			B			F
Approach Delay (s)	0.0		0.6			427.2
Approach LOS						F
Intersection Summary						
Average Delay			40.3			
Intersection Capacity Utilization			54.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
24: Street B & Highway 89

2036 Future Total - SAT: Add'l Signals
10/20/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↙	↑↑	↘	
Traffic Volume (veh/h)	910	73	107	969	81	109
Future Volume (Veh/h)	910	73	107	969	81	109
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1011	81	119	1077	90	121
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	390					
pX, platoon unblocked					0.78	
vC, conflicting volume			1092		1828	546
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1092		1495	546
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		0	75
cM capacity (veh/h)			635		72	482
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	674	418	119	538	538	211
Volume Left	0	0	119	0	0	90
Volume Right	0	81	0	0	0	121
cSH	1700	1700	635	1700	1700	140
Volume to Capacity	0.40	0.25	0.19	0.32	0.32	1.50
Queue Length 95th (m)	0.0	0.0	5.2	0.0	0.0	109.0
Control Delay (s)	0.0	0.0	12.0	0.0	0.0	317.5
Lane LOS			B			F
Approach Delay (s)	0.0		1.2			317.5
Approach LOS						F
Intersection Summary						
Average Delay			27.4			
Intersection Capacity Utilization			54.6%	ICU Level of Service	A	
Analysis Period (min)			15			

APPENDIX G

Signal Warrants

Traffic Signal Warrant Summary

Highway 89 & Dean Dr/CR7				Highway 89 & Elizabeth St/CR7				Concession 7 & Street A				Highway 89 & Street B			
Year	Time Period	Warranted	Justification	Year	Time Period	Warranted?	Justification	Year	Time Period	Warranted	Justification	Year	Time Period	Warranted?	Justification
Existing	Weekday	x	-	Existing	Weekday	x	-	Existing	Weekday	x	-	Existing	Weekday	x	-
	Saturday	x	-		Saturday	x	-		Saturday	x	-		Saturday	x	-
FB 2026	Weekday	x	-	FB 2026	Weekday	x	-	FB 2026	Weekday	x	-	FB 2026	Weekday	x	-
	Saturday	✓	1, 3, 7		Saturday	x	-		Saturday	x	-		Saturday	x	-
FB 2031	Weekday	x	-	FB 2031	Weekday	x	-	FB 2031	Weekday	x	-	FB 2031	Weekday	x	-
	Saturday	✓	1-3, 7		Saturday	✓	2		Saturday	x	-		Saturday	x	-
FB 2036	Weekday	✓	3	FB 2036	Weekday	x	-	FB 2036	Weekday	x	-	FB 2036	Weekday	x	-
	Saturday	✓	1-4, 7		Saturday	✓	2-4		Saturday	x	-		Saturday	x	-
FT 2026	Weekday	x	-	FT 2026	Weekday	x	-	FT 2026	Weekday	x	-	FT 2026	Weekday	N/A	-
	Saturday	✓	1-3, 7		Saturday	x	-		Saturday	x	-		Saturday	N/A	-
FT 2031	Weekday	N/A	-	FT 2031	Weekday	x	-	FT 2031	Weekday	x	-	FT 2031	Weekday	N/A	-
	Saturday	N/A	-		Saturday	✓	2		Saturday	x	-		Saturday	N/A	-
FT 2036	Weekday	N/A	-	FT 2036	Weekday	x	-	FT 2036	Weekday	x	-	FT 2036	Weekday	x	-
	Saturday	N/A	-		Saturday	✓	2-4		Saturday	x	-		Saturday	x	-

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Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Existing Conditions - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	7	277	4	2	0	2	3	274	1	1	1	0	0
8:00	11	279	12	8	3	12	7	365	15	5	1	4	0
9:00	23	370	13	5	2	19	23	311	33	22	2	13	0
10:00	25	405	18	9	4	32	29	299	45	49	6	19	0
16:00	16	366	13	4	6	21	26	428	35	37	4	19	0
17:00	18	512	18	17	10	50	63	566	44	34	4	26	0
18:00	13	492	20	20	7	58	44	528	33	35	10	24	0
19:00	12	434	9	8	5	47	28	378	31	22	7	19	0
Total	125	3,135	107	73	37	241	223	3,149	237	205	35	124	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

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Proposed Collision

GO TO Justification:

Intersection: Highway 89 & Concession Rd 7/ Dean Dr

Count Date: Existing Conditions - Weekday

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	572	722	836	940	975	1,362	1,284	1,000		
	COMPLIANCE %				64	80	93	100	100	100	100	100	737	92
1B	120	170	120	170	6	33	63	119	91	141	154	108		
	COMPLIANCE %				4	19	37	70	54	83	91	64	421	53
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	566	689	773	821	884	1,221	1,130	892		
	COMPLIANCE %				63	77	86	91	98	100	100	99	714	89
2B	50	75	50	75	4	16	29	64	47	61	65	37		
	COMPLIANCE %				5	21	39	85	63	81	87	49	431	54
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	16:00	884	60	239	25 %	41 %
	17:00	1,221	77	133	58 %	
	18:00	1,130	85	154	55 %	
	19:00	892	60	236	25 %	

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					Justified
	1440 - 2600					
	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

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Intersection: Highway 89 & Concession Rd 7/ Dean Dr

Count Date: Existing Conditions - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	92 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	53 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	89 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	54 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	53 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	54 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		41 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Input Data Sheet

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GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Existing Conditions - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	18	243	0	0	0	2	1	262	9	17	0	17	0
8:00	24	277	0	0	0	2	0	392	23	36	1	40	0
9:00	32	371	0	1	0	3	5	331	29	29	3	34	0
10:00	27	446	1	0	1	1	6	345	49	37	2	29	0
16:00	29	399	3	2	1	4	11	447	60	32	1	22	0
17:00	41	561	3	1	2	2	15	618	94	43	2	41	0
18:00	39	564	4	1	0	8	13	558	69	56	1	36	0
19:00	21	472	0	3	2	5	15	404	79	52	1	20	0
Total	231	3,333	11	8	6	27	66	3,357	412	302	11	239	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	569	795	838	944	1,011	1,423	1,349	1,074	745	93
	COMPLIANCE %				63	88	93	100	100	100	100	100		
1B	120	170	120	170	36	79	70	70	62	91	102	83	349	44
	COMPLIANCE %				21	46	41	41	36	54	60	49		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	533	716	768	874	949	1,332	1,247	991	721	90
	COMPLIANCE %				59	80	85	97	100	100	100	100		
2B	50	75	50	75	17	37	33	39	35	46	58	57	429	54
	COMPLIANCE %				23	49	44	52	47	61	77	76		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	16:00	949	55	213	26 %	53 %
	17:00	1,332	86	115	75 %	
	18:00	1,247	93	127	73 %	
	19:00	991	73	198	37 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Existing Conditions - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	93 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	44 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	90 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	54 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	44 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	54 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		53 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Existing Conditions - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	15	243	8	6	5	39	28	259	56	44	11	16	0
8:00	15	243	8	6	5	39	28	259	56	44	11	16	0
9:00	15	243	8	6	5	39	28	259	56	44	11	16	0
10:00	15	243	8	6	5	39	28	259	56	44	11	16	0
16:00	15	243	8	6	5	39	28	259	56	44	11	16	0
17:00	15	243	8	6	5	39	28	259	56	44	11	16	0
18:00	15	243	8	6	5	39	28	259	56	44	11	16	0
19:00	15	243	8	6	5	39	28	259	56	44	11	16	0
Total	120	1,944	64	48	40	312	224	2,072	448	352	88	128	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	730	730	730	730	730	730	730	730	649	81
	COMPLIANCE %				81	81	81	81	81	81	81	81		
1B	120	170	120	170	121	121	121	121	121	121	121	121	569	71
	COMPLIANCE %				71	71	71	71	71	71	71	71		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	609	609	609	609	609	609	609	609	541	68
	COMPLIANCE %				68	68	68	68	68	68	68	68		
2B	50	75	50	75	61	61	61	61	61	61	61	61	651	81
	COMPLIANCE %				81	81	81	81	81	81	81	81		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	609	71	380	19 %	19 %
	8:00	609	71	380	19 %	
	9:00	609	71	380	19 %	
	10:00	609	71	380	19 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Existing Conditions - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	81 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	71 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	68 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	81 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	71 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	68 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		19 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Existing Conditions - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	23	322	2	1	2	4	9	328	53	52	2	21	0
8:00	23	322	2	1	2	4	9	328	53	52	2	21	0
9:00	23	322	2	1	2	4	9	328	53	52	2	21	0
10:00	23	322	2	1	2	4	9	328	53	52	2	21	0
16:00	23	322	2	1	2	4	9	328	53	52	2	21	0
17:00	23	322	2	1	2	4	9	328	53	52	2	21	0
18:00	23	322	2	1	2	4	9	328	53	52	2	21	0
19:00	23	322	2	1	2	4	9	328	53	52	2	21	0
Total	184	2,576	16	8	16	32	72	2,624	424	416	16	168	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	819	819	819	819	819	819	819	819	728	91
	COMPLIANCE %				91	91	91	91	91	91	91	91		
1B	120	170	120	170	82	82	82	82	82	82	82	82	386	48
	COMPLIANCE %				48	48	48	48	48	48	48	48		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	737	737	737	737	737	737	737	737	655	82
	COMPLIANCE %				82	82	82	82	82	82	82	82		
2B	50	75	50	75	55	55	55	55	55	55	55	55	587	73
	COMPLIANCE %				73	73	73	73	73	73	73	73		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	737	75	309	24 %	24 %
	8:00	737	75	309	24 %	
	9:00	737	75	309	24 %	
	10:00	737	75	309	24 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Existing Conditions - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	91 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	48 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	82 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	48 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		24 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2026 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	19	307	36	43	6	95	102	327	73	58	15	20	0
8:00	19	307	36	43	6	95	102	327	73	58	15	20	0
9:00	19	307	36	43	6	95	102	327	73	58	15	20	0
10:00	19	307	36	43	6	95	102	327	73	58	15	20	0
16:00	19	307	36	43	6	95	102	327	73	58	15	20	0
17:00	19	307	36	43	6	95	102	327	73	58	15	20	0
18:00	19	307	36	43	6	95	102	327	73	58	15	20	0
19:00	19	307	36	43	6	95	102	327	73	58	15	20	0
Total	152	2,456	288	344	48	760	816	2,616	584	464	120	160	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,101	1,101	1,101	1,101	1,101	1,101	1,101	1,101		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	237	237	237	237	237	237	237	237		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	864	864	864	864	864	864	864	864		
	COMPLIANCE %				96	96	96	96	96	96	96	96	768	96
2B	50	75	50	75	116	116	116	116	116	116	116	116		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	864	144	248	58 %	58 %
	8:00	864	144	248	58 %	
	9:00	864	144	248	58 %	
	10:00	864	144	248	58 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Background 2026 - Saturday

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	96	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	96	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		58	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1098	122%	122%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	236	139%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	862	96%	63%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	107	63%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2026 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	32	453	3	1	3	5	12	483	69	67	2	28	0
8:00	32	453	3	1	3	5	12	483	69	67	2	28	0
9:00	32	453	3	1	3	5	12	483	69	67	2	28	0
10:00	32	453	3	1	3	5	12	483	69	67	2	28	0
16:00	32	453	3	1	3	5	12	483	69	67	2	28	0
17:00	32	453	3	1	3	5	12	483	69	67	2	28	0
18:00	32	453	3	1	3	5	12	483	69	67	2	28	0
19:00	32	453	3	1	3	5	12	483	69	67	2	28	0
Total	256	3,624	24	8	24	40	96	3,864	552	536	16	224	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,158	1,158	1,158	1,158	1,158	1,158	1,158	1,158	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	106	106	106	106	106	106	106	106	499	62
	COMPLIANCE %				62	62	62	62	62	62	62	62		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	71	71	71	71	71	71	71	71	757	95
	COMPLIANCE %				95	95	95	95	95	95	95	95		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,052	97	177	55 %	55 %
	8:00	1,052	97	177	55 %	
	9:00	1,052	97	177	55 %	
	10:00	1,052	97	177	55 %	

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					Justified
	1440 - 2600					
	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

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Intersection: Highway 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Background 2026 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	62 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	62 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1154	128%	62%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	105	62%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1049	117%	41%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	41%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2031 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	16	334	21	20	7	46	51	335	37	31	5	18	0
8:00	16	334	21	20	7	46	51	335	37	31	5	18	0
9:00	16	334	21	20	7	46	51	335	37	31	5	18	0
10:00	16	334	21	20	7	46	51	335	37	31	5	18	0
16:00	16	334	21	20	7	46	51	335	37	31	5	18	0
17:00	16	334	21	20	7	46	51	335	37	31	5	18	0
18:00	16	334	21	20	7	46	51	335	37	31	5	18	0
19:00	16	334	21	20	7	46	51	335	37	31	5	18	0
Total	128	2,672	168	160	56	368	408	2,680	296	248	40	144	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	921	921	921	921	921	921	921	921	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	127	127	127	127	127	127	127	127	598	75
	COMPLIANCE %				75	75	75	75	75	75	75	75		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	794	794	794	794	794	794	794	794	706	88
	COMPLIANCE %				88	88	88	88	88	88	88	88		
2B	50	75	50	75	58	58	58	58	58	58	58	58	619	77
	COMPLIANCE %				77	77	77	77	77	77	77	77		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	794	73	280	26 %	26 %
	8:00	794	73	280	26 %	
	9:00	794	73	280	26 %	
	10:00	794	73	280	26 %	

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					Justified
	1440 - 2600					
	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

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[Proposed Collision](#)

Intersection: Highway 89 & Concession Rd 7/ Dean Dr

Count Date: Future Background 2031 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	75 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	88 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	77 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	75 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	77 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		26 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2031
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	915	102%	74%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	125	74%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	790	88%	44%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	75	44%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2031 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	29	392	3	0	1	3	7	377	49	40	1	27	0
8:00	29	392	3	0	1	3	7	377	49	40	1	27	0
9:00	29	392	3	0	1	3	7	377	49	40	1	27	0
10:00	29	392	3	0	1	3	7	377	49	40	1	27	0
16:00	29	392	3	0	1	3	7	377	49	40	1	27	0
17:00	29	392	3	0	1	3	7	377	49	40	1	27	0
18:00	29	392	3	0	1	3	7	377	49	40	1	27	0
19:00	29	392	3	0	1	3	7	377	49	40	1	27	0
Total	232	3,136	24	0	8	24	56	3,016	392	320	8	216	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	929	929	929	929	929	929	929	929	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	72	72	72	72	72	72	72	72	339	42
	COMPLIANCE %				42	42	42	42	42	42	42	42		
Restricted Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	857	857	857	857	857	857	857	857	762	95
	COMPLIANCE %				95	95	95	95	95	95	95	95		
2B	50	75	50	75	41	41	41	41	41	41	41	41	437	55
	COMPLIANCE %				55	55	55	55	55	55	55	55		
Restricted Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	857	68	251	27 %	27 %
	8:00	857	68	251	27 %	
	9:00	857	68	251	27 %	
	10:00	857	68	251	27 %	

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					Justified
	1440 - 2600					
	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](#)

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Intersection: Highway 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Background 2031 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		27 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2031
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	924	103%	41%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	70	41%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	854	95%	24%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	40	24%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2031 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	22	357	38	45	7	103	108	381	84	67	17	23	0
8:00	22	357	38	45	7	103	108	381	84	67	17	23	0
9:00	22	357	38	45	7	103	108	381	84	67	17	23	0
10:00	22	357	38	45	7	103	108	381	84	67	17	23	0
16:00	22	357	38	45	7	103	108	381	84	67	17	23	0
17:00	22	357	38	45	7	103	108	381	84	67	17	23	0
18:00	22	357	38	45	7	103	108	381	84	67	17	23	0
19:00	22	357	38	45	7	103	108	381	84	67	17	23	0
Total	176	2,856	304	360	56	824	864	3,048	672	536	136	184	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,252	1,252	1,252	1,252	1,252	1,252	1,252	1,252		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	262	262	262	262	262	262	262	262		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	990	990	990	990	990	990	990	990		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	129	129	129	129	129	129	129	129		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	990	155	198	78 %	78 %
	8:00	990	155	198	78 %	
	9:00	990	155	198	78 %	
	10:00	990	155	198	78 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Background 2031 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		78 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2031
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1249	139%	139%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	261	154%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	988	110%	101%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	172	101%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2031 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	36	520	3	1	3	5	14	551	80	78	3	33	0
8:00	36	520	3	1	3	5	14	551	80	78	3	33	0
9:00	36	520	3	1	3	5	14	551	80	78	3	33	0
10:00	36	520	3	1	3	5	14	551	80	78	3	33	0
16:00	36	520	3	1	3	5	14	551	80	78	3	33	0
17:00	36	520	3	1	3	5	14	551	80	78	3	33	0
18:00	36	520	3	1	3	5	14	551	80	78	3	33	0
19:00	36	520	3	1	3	5	14	551	80	78	3	33	0
Total	288	4,160	24	8	24	40	112	4,408	640	624	24	264	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	123	123	123	123	123	123	123	123	579	72
	COMPLIANCE %				72	72	72	72	72	72	72	72		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	82	82	82	82	82	82	82	82	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>		

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	1,204	114	136	84 %	84 %
	8:00	1,204	114	136	84 %	
	9:00	1,204	114	136	84 %	
	10:00	1,204	114	136	84 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Background 2031 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	72 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	72 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		84 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2031
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1324	147%	71%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	121	71%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1203	134%	48%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	81	48%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2036 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	18	387	23	21	8	52	57	388	42	36	5	20	0
8:00	18	387	23	21	8	52	57	388	42	36	5	20	0
9:00	18	387	23	21	8	52	57	388	42	36	5	20	0
10:00	18	387	23	21	8	52	57	388	42	36	5	20	0
16:00	18	387	23	21	8	52	57	388	42	36	5	20	0
17:00	18	387	23	21	8	52	57	388	42	36	5	20	0
18:00	18	387	23	21	8	52	57	388	42	36	5	20	0
19:00	18	387	23	21	8	52	57	388	42	36	5	20	0
Total	144	3,096	184	168	64	416	456	3,104	336	288	40	160	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	142	142	142	142	142	142	142	142		
	COMPLIANCE %				84	84	84	84	84	84	84	84	668	84
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	915	915	915	915	915	915	915	915		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	65	65	65	65	65	65	65	65		
	COMPLIANCE %				87	87	87	87	87	87	87	87	693	87
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	915	81	226	36 %	36 %
	8:00	915	81	226	36 %	
	9:00	915	81	226	36 %	
	10:00	915	81	226	36 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Background 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	84 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	87 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	84 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	87 %	<input type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		36 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience		0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1055	117%	83%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	141	83%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	914	102%	50%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	85	50%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2036 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	33	453	3	0	1	4	8	435	57	46	1	31	0
8:00	33	453	3	0	1	4	8	435	57	46	1	31	0
9:00	33	453	3	0	1	4	8	435	57	46	1	31	0
10:00	33	453	3	0	1	4	8	435	57	46	1	31	0
16:00	33	453	3	0	1	4	8	435	57	46	1	31	0
17:00	33	453	3	0	1	4	8	435	57	46	1	31	0
18:00	33	453	3	0	1	4	8	435	57	46	1	31	0
19:00	33	453	3	0	1	4	8	435	57	46	1	31	0
Total	264	3,624	24	0	8	32	64	3,480	456	368	8	248	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,072	1,072	1,072	1,072	1,072	1,072	1,072	1,072		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	83	83	83	83	83	83	83	83		
	COMPLIANCE %				49	49	49	49	49	49	49	49	391	49
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	989	989	989	989	989	989	989	989		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	47	47	47	47	47	47	47	47		
	COMPLIANCE %				63	63	63	63	63	63	63	63	501	63
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	989	78	198	39 %	39 %
	8:00	989	78	198	39 %	
	9:00	989	78	198	39 %	
	10:00	989	78	198	39 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Background 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	49 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	49 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		39 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1067	119%	48%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	81	48%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	986	110%	27%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	46	27%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2036 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	26	416	40	46	8	112	114	443	98	77	20	27	0
8:00	26	416	40	46	8	112	114	443	98	77	20	27	0
9:00	26	416	40	46	8	112	114	443	98	77	20	27	0
10:00	26	416	40	46	8	112	114	443	98	77	20	27	0
16:00	26	416	40	46	8	112	114	443	98	77	20	27	0
17:00	26	416	40	46	8	112	114	443	98	77	20	27	0
18:00	26	416	40	46	8	112	114	443	98	77	20	27	0
19:00	26	416	40	46	8	112	114	443	98	77	20	27	0
Total	208	3,328	320	368	64	896	912	3,544	784	616	160	216	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,427	1,427	1,427	1,427	1,427	1,427	1,427	1,427		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
1B	120	170	120	170	290	290	290	290	290	290	290	290		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,137		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
2B	50	75	50	75	143	143	143	143	143	143	143	143		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,137	166	152	100 %	100 %
	8:00	1,137	166	152	100 %	
	9:00	1,137	166	152	100 %	
	10:00	1,137	166	152	100 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Background 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1424	158%	158%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	289	170%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1135	126%	111%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	188	111%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Background 2036 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	42	597	4	1	4	6	16	630	93	90	3	38	0
8:00	42	597	4	1	4	6	16	630	93	90	3	38	0
9:00	42	597	4	1	4	6	16	630	93	90	3	38	0
10:00	42	597	4	1	4	6	16	630	93	90	3	38	0
16:00	42	597	4	1	4	6	16	630	93	90	3	38	0
17:00	42	597	4	1	4	6	16	630	93	90	3	38	0
18:00	42	597	4	1	4	6	16	630	93	90	3	38	0
19:00	42	597	4	1	4	6	16	630	93	90	3	38	0
Total	336	4,776	32	8	32	48	128	5,040	744	720	24	304	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,524	1,524	1,524	1,524	1,524	1,524	1,524	1,524		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	142	142	142	142	142	142	142	142		
	COMPLIANCE %				84	84	84	84	84	84	84	84	668	84
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	95	95	95	95	95	95	95	95		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,382	131	115	100 %	100 %
	8:00	1,382	131	115	100 %	
	9:00	1,382	131	115	100 %	
	10:00	1,382	131	115	100 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Background 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	84 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	84 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1520	169%	83%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	141	83%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1379	153%	55%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	94	55%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

CR 7 and Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2026 - Weekday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	8	44	0	70	0	8	0	45	54	0	0	0	0
8:00	8	44	0	70	0	8	0	45	54	0	0	0	0
9:00	8	44	0	70	0	8	0	45	54	0	0	0	0
10:00	8	44	0	70	0	8	0	45	54	0	0	0	0
16:00	8	44	0	70	0	8	0	45	54	0	0	0	0
17:00	8	44	0	70	0	8	0	45	54	0	0	0	0
18:00	8	44	0	70	0	8	0	45	54	0	0	0	0
19:00	8	44	0	70	0	8	0	45	54	0	0	0	0
Total	64	352	0	560	0	64	0	360	432	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	229	229	229	229	229	229	229	229	254	32
	COMPLIANCE %				32	32	32	32	32	32	32	32		
1B	180	255	180	255	78	78	78	78	78	78	78	78	245	31
	COMPLIANCE %				31	31	31	31	31	31	31	31		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	151	151	151	151	151	151	151	151	168	21
	COMPLIANCE %				21	21	21	21	21	21	21	21		
2B	50	75	50	75	70	70	70	70	70	70	70	70	747	93
	COMPLIANCE %				93	93	93	93	93	93	93	93		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	8:00	158	8	441	2 %	2 %
	9:00	158	8	441	2 %	
	10:00	158	8	441	2 %	
	16:00	158	8	441	2 %	

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					Justified
	1440 - 2600					
	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: CR 7 and Street A

Count Date: Future Total 2026 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	32 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	31 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	21 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	93 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	31 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	21 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		2 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: CR7 and Street A
 Horizon Year: 2026
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	227	32%	32%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	150	88%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	77	11%	11%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	93%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2026 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	14	301	13	17	6	43	73	330	32	27	4	15	0
8:00	14	301	13	17	6	43	73	330	32	27	4	15	0
9:00	14	301	13	17	6	43	73	330	32	27	4	15	0
10:00	14	301	13	17	6	43	73	330	32	27	4	15	0
16:00	14	301	13	17	6	43	73	330	32	27	4	15	0
17:00	14	301	13	17	6	43	73	330	32	27	4	15	0
18:00	14	301	13	17	6	43	73	330	32	27	4	15	0
19:00	14	301	13	17	6	43	73	330	32	27	4	15	0
Total	112	2,408	104	136	48	344	584	2,640	256	216	32	120	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	875	875	875	875	875	875	875	875	778	97
	COMPLIANCE %				97	97	97	97	97	97	97	97		
1B	120	170	120	170	112	112	112	112	112	112	112	112	527	66
	COMPLIANCE %				66	66	66	66	66	66	66	66		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	763	763	763	763	763	763	763	763	678	85
	COMPLIANCE %				85	85	85	85	85	85	85	85		
2B	50	75	50	75	50	50	50	50	50	50	50	50	533	67
	COMPLIANCE %				67	67	67	67	67	67	67	67		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	763	66	295	22 %	22 %
	8:00	763	66	295	22 %	
	9:00	763	66	295	22 %	
	10:00	763	66	295	22 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2026 - Weekday

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	97	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	66	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	85	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	67	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	66	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	67	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		22	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2026
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	870	97%	65%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	111	65%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	759	84%	29%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	49	29%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2026 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	28	406	3	0	1	3	6	411	42	34	1	26	0
8:00	28	406	3	0	1	3	6	411	42	34	1	26	0
9:00	28	406	3	0	1	3	6	411	42	34	1	26	0
10:00	28	406	3	0	1	3	6	411	42	34	1	26	0
16:00	28	406	3	0	1	3	6	411	42	34	1	26	0
17:00	28	406	3	0	1	3	6	411	42	34	1	26	0
18:00	28	406	3	0	1	3	6	411	42	34	1	26	0
19:00	28	406	3	0	1	3	6	411	42	34	1	26	0
Total	224	3,248	24	0	8	24	48	3,288	336	272	8	208	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	961	961	961	961	961	961	961	961	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	65	65	65	65	65	65	65	65	306	38
	COMPLIANCE %				38	38	38	38	38	38	38	38		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	896	896	896	896	896	896	896	896	796	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	35	35	35	35	35	35	35	35	373	47
	COMPLIANCE %				47	47	47	47	47	47	47	47		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	896	61	234	26 %	26 %
	8:00	896	61	234	26 %	
	9:00	896	61	234	26 %	
	10:00	896	61	234	26 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2026 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	38 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	47 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	38 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	47 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		26 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2026
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	958	106%	37%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	63	37%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	895	99%	20%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	34	20%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

CR7 & Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2026 - Saturday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	9	62	0	96	0	11	0	59	56	0	0	0	0
8:00	9	62	0	96	0	11	0	59	56	0	0	0	0
9:00	9	62	0	96	0	11	0	59	56	0	0	0	0
10:00	9	62	0	96	0	11	0	59	56	0	0	0	0
16:00	9	62	0	96	0	11	0	59	56	0	0	0	0
17:00	9	62	0	96	0	11	0	59	56	0	0	0	0
18:00	9	62	0	96	0	11	0	59	56	0	0	0	0
19:00	9	62	0	96	0	11	0	59	56	0	0	0	0
Total	72	496	0	768	0	88	0	472	448	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	293	293	293	293	293	293	293	293	326	41
	COMPLIANCE %				41	41	41	41	41	41	41	41		
1B	180	255	180	255	107	107	107	107	107	107	107	107	336	42
	COMPLIANCE %				42	42	42	42	42	42	42	42		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	186	186	186	186	186	186	186	186	207	26
	COMPLIANCE %				26	26	26	26	26	26	26	26		
2B	50	75	50	75	96	96	96	96	96	96	96	96	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	186	107	424	25 %	25 %
	8:00	186	107	424	25 %	
	9:00	186	107	424	25 %	
	10:00	186	107	424	25 %	

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					Justified
	1440 - 2600					
	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: CR7 & Street A

Count Date: Future Total 2026 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	41 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	26 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	41 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	26 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		25 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: CR7 and Street A
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	292	41%	41%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	186	109%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	106	15%	15%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	96	128%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2026 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	19	363	11	49	6	104	90	380	73	58	15	20	0
8:00	19	363	11	49	6	104	90	380	73	58	15	20	0
9:00	19	363	11	49	6	104	90	380	73	58	15	20	0
10:00	19	363	11	49	6	104	90	380	73	58	15	20	0
16:00	19	363	11	49	6	104	90	380	73	58	15	20	0
17:00	19	363	11	49	6	104	90	380	73	58	15	20	0
18:00	19	363	11	49	6	104	90	380	73	58	15	20	0
19:00	19	363	11	49	6	104	90	380	73	58	15	20	0
Total	152	2,904	88	392	48	832	720	3,040	584	464	120	160	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	252	252	252	252	252	252	252	252		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	936	936	936	936	936	936	936	936		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	122	122	122	122	122	122	122	122		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	936	159	218	73 %	73 %
	8:00	936	159	218	73 %	
	9:00	936	159	218	73 %	
	10:00	936	159	218	73 %	

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					Justified
	1440 - 2600					
	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

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[Proposed Collision](#)

Intersection: Highway 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2026 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1186	132%	132%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	251	148%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	935	104%	93%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	158	93%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

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[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2026 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	35	514	3	1	3	5	12	523	69	67	2	29	0
8:00	35	514	3	1	3	5	12	523	69	67	2	29	0
9:00	35	514	3	1	3	5	12	523	69	67	2	29	0
10:00	35	514	3	1	3	5	12	523	69	67	2	29	0
16:00	35	514	3	1	3	5	12	523	69	67	2	29	0
17:00	35	514	3	1	3	5	12	523	69	67	2	29	0
18:00	35	514	3	1	3	5	12	523	69	67	2	29	0
19:00	35	514	3	1	3	5	12	523	69	67	2	29	0
Total	280	4,112	24	8	24	40	96	4,184	552	536	16	232	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,263	1,263	1,263	1,263	1,263	1,263	1,263	1,263		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	107	107	107	107	107	107	107	107		
	COMPLIANCE %				63	63	63	63	63	63	63	63	504	63
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	71	71	71	71	71	71	71	71		
	COMPLIANCE %				95	95	95	95	95	95	95	95	757	95
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,156	98	148	66 %	66 %
	8:00	1,156	98	148	66 %	
	9:00	1,156	98	148	66 %	
	10:00	1,156	98	148	66 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2026 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		66 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1260	140%	62%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	106	62%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1154	128%	41%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	41%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2026 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	32	453	3	1	3	5	12	483	69	67	2	28	0
8:00	32	453	3	1	3	5	12	483	69	67	2	28	0
9:00	32	453	3	1	3	5	12	483	69	67	2	28	0
10:00	32	453	3	1	3	5	12	483	69	67	2	28	0
16:00	32	453	3	1	3	5	12	483	69	67	2	28	0
17:00	32	453	3	1	3	5	12	483	69	67	2	28	0
18:00	32	453	3	1	3	5	12	483	69	67	2	28	0
19:00	32	453	3	1	3	5	12	483	69	67	2	28	0
Total	256	3,624	24	8	24	40	96	3,864	552	536	16	224	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
1A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,158	1,158	1,158	1,158	1,158	1,158	1,158	1,158		
	480	720	600	900	COMPLIANCE %								800	100
1B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	106	106	106	106	106	106	106	106		
	120	170	120	170	COMPLIANCE %								499	62
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
2A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052		
	480	720	600	900	COMPLIANCE %								800	100
2B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	71	71	71	71	71	71	71	71		
	50	75	50	75	COMPLIANCE %								757	95
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,052	97	177	55 %	55 %
	8:00	1,052	97	177	55 %	
	9:00	1,052	97	177	55 %	
	10:00	1,052	97	177	55 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2026 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	62 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	62 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	95 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2026
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1154	128%	62%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	105	62%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1049	117%	41%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	41%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

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Proposed Collision

GO TO Justification:

What are the intersecting roadways?

CR 7 and Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2031 - Weekday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	8	50	0	70	0	8	0	53	54	0	0	0	0
8:00	8	50	0	70	0	8	0	53	54	0	0	0	0
9:00	8	50	0	70	0	8	0	53	54	0	0	0	0
10:00	8	50	0	70	0	8	0	53	54	0	0	0	0
16:00	8	50	0	70	0	8	0	53	54	0	0	0	0
17:00	8	50	0	70	0	8	0	53	54	0	0	0	0
18:00	8	50	0	70	0	8	0	53	54	0	0	0	0
19:00	8	50	0	70	0	8	0	53	54	0	0	0	0
Total	64	400	0	560	0	64	0	424	432	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	243	243	243	243	243	243	243	243	270	34
	COMPLIANCE %				34	34	34	34	34	34	34	34		
1B	180	255	180	255	78	78	78	78	78	78	78	78	245	31
	COMPLIANCE %				31	31	31	31	31	31	31	31		
Restricted Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	165	165	165	165	165	165	165	165	183	23
	COMPLIANCE %				23	23	23	23	23	23	23	23		
2B	50	75	50	75	70	70	70	70	70	70	70	70	747	93
	COMPLIANCE %				93	93	93	93	93	93	93	93		
Restricted Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	165	78	436	18 %	18 %
	8:00	165	78	436	18 %	
	9:00	165	78	436	18 %	
	10:00	165	78	436	18 %	

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					Justified
	1440 - 2600					
	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: CR 7 and Street A

Count Date: Future Total 2031 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	34 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	31 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	23 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	93 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	31 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	23 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		18 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: CR 7 and Street A
 Horizon Year: 2031
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	241	33%	33%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	164	96%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	77	11%	11%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	93%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2031 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	16	334	21	20	7	46	51	335	37	31	5	18	0
8:00	16	334	21	20	7	46	51	335	37	31	5	18	0
9:00	16	334	21	20	7	46	51	335	37	31	5	18	0
10:00	16	334	21	20	7	46	51	335	37	31	5	18	0
16:00	16	334	21	20	7	46	51	335	37	31	5	18	0
17:00	16	334	21	20	7	46	51	335	37	31	5	18	0
18:00	16	334	21	20	7	46	51	335	37	31	5	18	0
19:00	16	334	21	20	7	46	51	335	37	31	5	18	0
Total	128	2,672	168	160	56	368	408	2,680	296	248	40	144	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	921	921	921	921	921	921	921	921	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	127	127	127	127	127	127	127	127	598	75
	COMPLIANCE %				75	75	75	75	75	75	75	75		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	794	794	794	794	794	794	794	794	706	88
	COMPLIANCE %				88	88	88	88	88	88	88	88		
2B	50	75	50	75	58	58	58	58	58	58	58	58	619	77
	COMPLIANCE %				77	77	77	77	77	77	77	77		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	794	73	280	26 %	26 %
	8:00	794	73	280	26 %	
	9:00	794	73	280	26 %	
	10:00	794	73	280	26 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2031 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	75 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	88 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	77 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	75 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	77 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		26 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2031
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	915	102%	74%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	125	74%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	790	88%	44%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	75	44%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2031 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	32	458	3	0	1	3	7	461	49	40	1	29	0
8:00	32	458	3	0	1	3	7	461	49	40	1	29	0
9:00	32	458	3	0	1	3	7	461	49	40	1	29	0
10:00	32	458	3	0	1	3	7	461	49	40	1	29	0
16:00	32	458	3	0	1	3	7	461	49	40	1	29	0
17:00	32	458	3	0	1	3	7	461	49	40	1	29	0
18:00	32	458	3	0	1	3	7	461	49	40	1	29	0
19:00	32	458	3	0	1	3	7	461	49	40	1	29	0
Total	256	3,664	24	0	8	24	56	3,688	392	320	8	232	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,084	1,084	1,084	1,084	1,084	1,084	1,084	1,084	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	120	170	120	170	74	74	74	74	74	74	74	74	348	44
	COMPLIANCE %				44	44	44	44	44	44	44	44		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	41	41	41	41	41	41	41	41	437	55
	COMPLIANCE %				55	55	55	55	55	55	55	55		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	1,010	70	191	37 %	37 %
	8:00	1,010	70	191	37 %	
	9:00	1,010	70	191	37 %	
	10:00	1,010	70	191	37 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2031 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	44 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	44 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		37 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2031
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1081	120%	43%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	73	43%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1008	112%	24%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	40	24%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

CR7 & Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2031 - Saturday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	9	73	0	96	0	11	0	68	56	0	0	0	0
8:00	9	73	0	96	0	11	0	68	56	0	0	0	0
9:00	9	73	0	96	0	11	0	68	56	0	0	0	0
10:00	9	73	0	96	0	11	0	68	56	0	0	0	0
16:00	9	73	0	96	0	11	0	68	56	0	0	0	0
17:00	9	73	0	96	0	11	0	68	56	0	0	0	0
18:00	9	73	0	96	0	11	0	68	56	0	0	0	0
19:00	9	73	0	96	0	11	0	68	56	0	0	0	0
Total	72	584	0	768	0	88	0	544	448	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	313	313	313	313	313	313	313	313	348	43
	COMPLIANCE %				43	43	43	43	43	43	43	43		
1B	180	255	180	255	107	107	107	107	107	107	107	107	336	42
	COMPLIANCE %				42	42	42	42	42	42	42	42		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	206	206	206	206	206	206	206	206	229	29
	COMPLIANCE %				29	29	29	29	29	29	29	29		
2B	50	75	50	75	96	96	96	96	96	96	96	96	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	206	107	412	26 %	25 %
	8:00	186	107	424	25 %	
	9:00	186	107	424	25 %	
	10:00	186	107	424	25 %	

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					Justified
	1440 - 2600					
	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: CR7 & Street A

Count Date: Future Total 2031 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	43 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	29 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	29 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		25 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: CR7
 Minor Road: CR7 and Street A
 Horizon Year: 2031
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	312	43%	43%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	206	121%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	106	15%	15%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	96	128%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2031 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	22	357	38	45	7	103	108	381	84	67	17	23	0
8:00	22	357	38	45	7	103	108	381	84	67	17	23	0
9:00	22	357	38	45	7	103	108	381	84	67	17	23	0
10:00	22	357	38	45	7	103	108	381	84	67	17	23	0
16:00	22	357	38	45	7	103	108	381	84	67	17	23	0
17:00	22	357	38	45	7	103	108	381	84	67	17	23	0
18:00	22	357	38	45	7	103	108	381	84	67	17	23	0
19:00	22	357	38	45	7	103	108	381	84	67	17	23	0
Total	176	2,856	304	360	56	824	864	3,048	672	536	136	184	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,252	1,252	1,252	1,252	1,252	1,252	1,252	1,252		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
1B	120	170	120	170	262	262	262	262	262	262	262	262		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	990	990	990	990	990	990	990	990		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
2B	50	75	50	75	129	129	129	129	129	129	129	129		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	990	155	198	78 %	78 %
	8:00	990	155	198	78 %	
	9:00	990	155	198	78 %	
	10:00	990	155	198	78 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2031 - Saturday

Summary Results

Justification		Compliance		Signal Justified?	
				YES	NO
1. Minimum Vehicular Volume	A Total Volume	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100	%	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		78	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0	%	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2031
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1249	139%	139%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	261	154%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	988	110%	101%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	172	101%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2031 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	39	581	3	1	3	5	14	591	80	78	3	34	0
8:00	39	581	3	1	3	5	14	591	80	78	3	34	0
9:00	39	581	3	1	3	5	14	591	80	78	3	34	0
10:00	39	581	3	1	3	5	14	591	80	78	3	34	0
16:00	39	581	3	1	3	5	14	591	80	78	3	34	0
17:00	39	581	3	1	3	5	14	591	80	78	3	34	0
18:00	39	581	3	1	3	5	14	591	80	78	3	34	0
19:00	39	581	3	1	3	5	14	591	80	78	3	34	0
Total	312	4,648	24	8	24	40	112	4,728	640	624	24	272	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00			
1A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	480	720	600	900	1,432	1,432	1,432	1,432	1,432	1,432	1,432
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800	100
1B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	120	170	120	170	124	124	124	124	124	124	124
	COMPLIANCE %				73	73	73	73	73	73	73	73	73	584	73
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00			
2A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	480	720	600	900	1,308	1,308	1,308	1,308	1,308	1,308	1,308
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800	100
2B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	75	50	75	82	82	82	82	82	82	82
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,308	115	117	98 %	98 %
	8:00	1,308	115	117	98 %	
	9:00	1,308	115	117	98 %	
	10:00	1,308	115	117	98 %	

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					Justified
	1440 - 2600					
	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](#)

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[Proposed Collision](#)

Intersection: Highway 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2031 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		98 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2031
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1429	159%	72%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	122	72%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1307	145%	48%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	81	48%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

CR 7 and Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2036 - Weekday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	8	58	0	70	0	8	0	61	54	0	0	0	0
8:00	8	58	0	0	0	8	0	61	54	0	0	0	0
9:00	8	58	0	0	0	8	0	61	54	0	0	0	0
10:00	8	58	0	0	0	8	0	61	54	0	0	0	0
16:00	8	58	0	0	0	8	0	61	54	0	0	0	0
17:00	8	58	0	0	0	8	0	61	54	0	0	0	0
18:00	8	58	0	0	0	8	0	61	54	0	0	0	0
19:00	8	58	0	0	0	8	0	61	54	0	0	0	0
Total	64	464	0	70	0	64	0	488	432	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	259	189	189	189	189	189	189	189	220	27
	COMPLIANCE %				36	26	26	26	26	26	26	26		
1B	180	255	180	255	78	8	8	8	8	8	8	8	53	7
	COMPLIANCE %				31	3	3	3	3	3	3	3		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	181	181	181	181	181	181	181	181	201	25
	COMPLIANCE %				25	25	25	25	25	25	25	25		
2B	50	75	50	75	70	0	0	0	0	0	0	0	93	12
	COMPLIANCE %				93	0	0	0	0	0	0	0		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	181	78	427	18 %	6 %
	8:00	181	8	427	2 %	
	9:00	181	8	427	2 %	
	10:00	181	8	427	2 %	

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					Justified
	1440 - 2600					
	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](#)

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[Proposed Collision](#)

Intersection: CR 7 and Street A

Count Date: Future Total 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	27 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	7 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	25 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	12 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	7 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	12 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		6 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: CR 7 and Street A
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	254	35%	35%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	181	106%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	76	11%	11%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	70	93%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

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[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	18	387	23	21	8	52	57	388	42	36	5	20	0
8:00	18	387	23	21	8	52	57	388	42	36	5	20	0
9:00	18	387	23	21	8	52	57	388	42	36	5	20	0
10:00	18	387	23	21	8	52	57	388	42	36	5	20	0
16:00	18	387	23	21	8	52	57	388	42	36	5	20	0
17:00	18	387	23	21	8	52	57	388	42	36	5	20	0
18:00	18	387	23	21	8	52	57	388	42	36	5	20	0
19:00	18	387	23	21	8	52	57	388	42	36	5	20	0
Total	144	3,096	184	168	64	416	456	3,104	336	288	40	160	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	142	142	142	142	142	142	142	142		
	COMPLIANCE %				84	84	84	84	84	84	84	84	668	84
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	915	915	915	915	915	915	915	915		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	65	65	65	65	65	65	65	65		
	COMPLIANCE %				87	87	87	87	87	87	87	87	693	87
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	915	81	226	36 %	36 %
	8:00	915	81	226	36 %	
	9:00	915	81	226	36 %	
	10:00	915	81	226	36 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	84 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	87 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	84 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	87 %	<input type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		36 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1055	117%	83%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	141	83%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	914	102%	50%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	85	50%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	36	519	3	0	1	4	8	519	57	46	1	34	0
8:00	36	519	3	0	1	4	8	519	57	46	1	34	0
9:00	36	519	3	0	1	4	8	519	57	46	1	34	0
10:00	36	519	3	0	1	4	8	519	57	46	1	34	0
16:00	36	519	3	0	1	4	8	519	57	46	1	34	0
17:00	36	519	3	0	1	4	8	519	57	46	1	34	0
18:00	36	519	3	0	1	4	8	519	57	46	1	34	0
19:00	36	519	3	0	1	4	8	519	57	46	1	34	0
Total	288	4,152	24	0	8	32	64	4,152	456	368	8	272	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	86	86	86	86	86	86	86	86		
	COMPLIANCE %				51	51	51	51	51	51	51	51	405	51
Restricted Flow					Both 1A and 1B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,142	1,142	1,142	1,142	1,142	1,142	1,142	1,142		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	47	47	47	47	47	47	47	47		
	COMPLIANCE %				63	63	63	63	63	63	63	63	501	63
Restricted Flow					Both 2A and 2B 100% Fullfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	1,142	81	151	54 %	54 %
	8:00	1,142	81	151	54 %	
	9:00	1,142	81	151	54 %	
	10:00	1,142	81	151	54 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	51 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	51 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	63 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		54 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1225	136%	49%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	84	49%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1141	127%	27%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	46	27%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Hwy 89 and Street B

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Weekday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

3

d.- What is the operating environment?

Urban

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	421	46	28	0	42	52	471	0	0	0	0	0
8:00	0	421	46	28	0	42	52	471	0	0	0	0	0
9:00	0	421	46	28	0	42	52	471	0	0	0	0	0
10:00	0	421	46	28	0	42	52	471	0	0	0	0	0
16:00	0	421	46	28	0	42	52	471	0	0	0	0	0
17:00	0	421	46	28	0	42	52	471	0	0	0	0	0
18:00	0	421	46	28	0	42	52	471	0	0	0	0	0
19:00	0	421	46	28	0	42	52	471	0	0	0	0	0
Total	0	3,368	368	224	0	336	416	3,768	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
1B	180	255	180	255	70	70	70	70	70	70	70	70	220	27
	COMPLIANCE %				27	27	27	27	27	27	27	27		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	990	990	990	990	990	990	990	990	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
2B	50	75	50	75	28	28	28	28	28	28	28	28	299	37
	COMPLIANCE %				37	37	37	37	37	37	37	37		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	990	70	198	35 %	35 %
	8:00	990	70	198	35 %	
	9:00	990	70	198	35 %	
	10:00	990	70	198	35 %	

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					Justified
	1440 - 2600					
	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: Hwy 89 and Street B

Count Date: Future Total 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	27 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	37 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	27 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	37 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		35 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Hwy 89
 Minor Road: Street B
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Proposed

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1058	118%	41%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	69	41%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	989	110%	21%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	36	21%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

CR7 & Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Future Total 2036 - Saturday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	9	85	0	96	0	11	0	79	56	0	0	0	0
8:00	9	85	0	96	0	11	0	79	56	0	0	0	0
9:00	9	85	0	96	0	11	0	79	56	0	0	0	0
10:00	9	85	0	96	0	11	0	79	56	0	0	0	0
16:00	9	85	0	96	0	11	0	79	56	0	0	0	0
17:00	9	85	0	96	0	11	0	79	56	0	0	0	0
18:00	9	85	0	96	0	11	0	79	56	0	0	0	0
19:00	9	85	0	96	0	11	0	79	56	0	0	0	0
Total	72	680	0	768	0	88	0	632	448	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	336	336	336	336	336	336	336	336	373	47
	COMPLIANCE %				47	47	47	47	47	47	47	47		
1B	180	255	180	255	107	107	107	107	107	107	107	107	336	42
	COMPLIANCE %				42	42	42	42	42	42	42	42		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	229	229	229	229	229	229	229	229	254	32
	COMPLIANCE %				32	32	32	32	32	32	32	32		
2B	50	75	50	75	96	96	96	96	96	96	96	96	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	229	107	399	27 %	27 %
	8:00	229	107	399	27 %	
	9:00	229	107	399	27 %	
	10:00	229	107	399	27 %	

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					Justified
	1440 - 2600					
	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: CR7 & Street A

Count Date: Future Total 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	47 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	32 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	42 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	32 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		27 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: CR7
 Minor Road: CR7 and Street A
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	335	47%	47%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	229	135%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	106	15%	15%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	96	128%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Dean Dr

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	26	416	40	46	8	112	114	443	98	77	20	27	0
8:00	26	416	40	46	8	112	114	443	98	77	20	27	0
9:00	26	416	40	46	8	112	114	443	98	77	20	27	0
10:00	26	416	40	46	8	112	114	443	98	77	20	27	0
16:00	26	416	40	46	8	112	114	443	98	77	20	27	0
17:00	26	416	40	46	8	112	114	443	98	77	20	27	0
18:00	26	416	40	46	8	112	114	443	98	77	20	27	0
19:00	26	416	40	46	8	112	114	443	98	77	20	27	0
Total	208	3,328	320	368	64	896	912	3,544	784	616	160	216	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,427	1,427	1,427	1,427	1,427	1,427	1,427	1,427		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
1B	120	170	120	170	290	290	290	290	290	290	290	290		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,137		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
2B	50	75	50	75	143	143	143	143	143	143	143	143		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,137	166	152	100 %	100 %
	8:00	1,137	166	152	100 %	
	9:00	1,137	166	152	100 %	
	10:00	1,137	166	152	100 %	

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					Justified
	1440 - 2600					
	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 89 & Concession Rd 7/ Dean Dr

Count Date: Future Total 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Volume	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Dean Drive and Concession Road 7
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1424	158%	158%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	289	170%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1135	126%	111%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	188	111%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

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[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

Highway 89 & Concession Rd 7/ Elizabeth St

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Urban

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	45	658	4	1	4	6	16	670	93	90	3	39	0
8:00	45	658	4	1	4	6	16	670	93	90	3	39	0
9:00	45	658	4	1	4	6	16	670	93	90	3	39	0
10:00	45	658	4	1	4	6	16	670	93	90	3	39	0
16:00	45	658	4	1	4	6	16	670	93	90	3	39	0
17:00	45	658	4	1	4	6	16	670	93	90	3	39	0
18:00	45	658	4	1	4	6	16	670	93	90	3	39	0
19:00	45	658	4	1	4	6	16	670	93	90	3	39	0
Total	360	5,264	32	8	32	48	128	5,360	744	720	24	312	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
1A	480	720	600	900	1,629	1,629	1,629	1,629	1,629	1,629	1,629	1,629		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	120	170	120	170	143	143	143	143	143	143	143	143		
	COMPLIANCE %				84	84	84	84	84	84	84	84	673	84
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
2A	480	720	600	900	1,486	1,486	1,486	1,486	1,486	1,486	1,486	1,486		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	95	95	95	95	95	95	95	95		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	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	1,486	132	115	100 %	100 %
	8:00	1,486	132	115	100 %	
	9:00	1,486	132	115	100 %	
	10:00	1,486	132	115	100 %	

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					Justified
	1440 - 2600					
	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](#)

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[Proposed Collision](#)

Intersection: Highway 89 & Concession Rd 7/ Elizabeth St

Count Date: Future Total 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	84 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Crossing Road	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Combination	A Justificaton 1	84 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B Justification 2	100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. 4-Hr Volume		100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: Elizabeth Street and Concession Road 7
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Existing

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1626	181%	84%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	142	84%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1484	165%	55%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	94	55%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

Hwy 89 and Street B

What is the direction of the Main Road street?

East-West

When was the data collected?

Future Total 2036 - Saturday

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

2 or more

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

3

d.- What is the operating environment?

Urban

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	455	37	41	0	55	54	485	0	0	0	0	0
8:00	0	455	37	41	0	55	54	485	0	0	0	0	0
9:00	0	455	37	41	0	55	54	485	0	0	0	0	0
10:00	0	455	37	41	0	55	54	485	0	0	0	0	0
16:00	0	455	37	41	0	55	54	485	0	0	0	0	0
17:00	0	455	37	41	0	55	54	485	0	0	0	0	0
18:00	0	455	37	41	0	55	54	485	0	0	0	0	0
19:00	0	455	37	41	0	55	54	485	0	0	0	0	0
Total	0	3,640	296	328	0	440	432	3,880	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
1A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,127	1,127	1,127	1,127	1,127	1,127	1,127	1,127		
	480	720	600	900	COMPLIANCE %								800	100
1B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	96	96	96	96	96	96	96	96		
	180	255	180	255	COMPLIANCE %								301	38
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
2A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031		
	480	720	600	900	COMPLIANCE %								800	100
2B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	41	41	41	41	41	41	41	41		
	50	75	50	75	COMPLIANCE %								437	55
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	1,031	96	184	52 %	52 %
	8:00	1,031	96	184	52 %	
	9:00	1,031	96	184	52 %	
	10:00	1,031	96	184	52 %	

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					Justified
	1440 - 2600					
	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: Hwy 89 and Street B

Count Date: Future Total 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	38 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	38 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	55 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		52 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Hwy 89
 Minor Road: Street B
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 2
 Intersection Type: Proposed

Date: 5-Sep-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	1125	125%	56%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	95	56%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	1030	114%	40%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	68	40%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

CR 7 and Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Sensitivity Analysis 2036 - Weekday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	8	58	0	86	0	8	0	61	74	0	0	0	0
8:00	8	58	0	86	0	8	0	61	74	0	0	0	0
9:00	8	58	0	86	0	8	0	61	74	0	0	0	0
10:00	8	58	0	86	0	8	0	61	74	0	0	0	0
16:00	8	58	0	86	0	8	0	61	74	0	0	0	0
17:00	8	58	0	86	0	8	0	61	74	0	0	0	0
18:00	8	58	0	86	0	8	0	61	74	0	0	0	0
19:00	8	58	0	86	0	8	0	61	74	0	0	0	0
Total	64	464	0	688	0	64	0	488	592	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	295	295	295	295	295	295	295	295	328	41
	COMPLIANCE %				41	41	41	41	41	41	41	41		
1B	180	255	180	255	94	94	94	94	94	94	94	94	295	37
	COMPLIANCE %				37	37	37	37	37	37	37	37		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	201	201	201	201	201	201	201	201	223	28
	COMPLIANCE %				28	28	28	28	28	28	28	28		
2B	50	75	50	75	86	86	86	86	86	86	86	86	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	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	201	94	415	23 %	23 %
	8:00	201	94	415	23 %	
	9:00	201	94	415	23 %	
	10:00	201	94	415	23 %	

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					Justified
	1440 - 2600					
	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: CR 7 and Street A

Count Date: Sensitivity Analysis 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	41 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	37 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	28 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	37 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	28 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		23 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: Highway 89
 Minor Road: CR 7 and Street A
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Existing

Date: 18-Oct-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	293	41%	41%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	200	118%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	93	13%	13%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	86	115%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

County Road 50 and Street C

What is the direction of the Main Road street?

North-South

When was the data collected?

Sensitivity Analysis 2036 - Weekday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	250	5	0	0	0	47	222	0	5	0	48	0
8:00	0	250	5	0	0	0	47	222	0	5	0	48	0
9:00	0	250	5	0	0	0	47	222	0	5	0	48	0
10:00	0	250	5	0	0	0	47	222	0	5	0	48	0
16:00	0	250	5	0	0	0	47	222	0	5	0	48	0
17:00	0	250	5	0	0	0	47	222	0	5	0	48	0
18:00	0	250	5	0	0	0	47	222	0	5	0	48	0
19:00	0	250	5	0	0	0	47	222	0	5	0	48	0
Total	0	2,000	40	0	0	0	376	1,776	0	40	0	384	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	577	577	577	577	577	577	577	577	641	80
	COMPLIANCE %				80	80	80	80	80	80	80	80		
1B	180	255	180	255	53	53	53	53	53	53	53	53	166	21
	COMPLIANCE %				21	21	21	21	21	21	21	21		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	524	524	524	524	524	524	524	524	582	73
	COMPLIANCE %				73	73	73	73	73	73	73	73		
2B	50	75	50	75	5	5	5	5	5	5	5	5	53	7
	COMPLIANCE %				7	7	7	7	7	7	7	7		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	524	53	252	21 %	21 %
	8:00	524	53	252	21 %	
	9:00	524	53	252	21 %	
	10:00	524	53	252	21 %	

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					Justified
	1440 - 2600					
	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: County Road 50 and Street C

Count Date: Sensitivity Analysis 2036 - Weekday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	80 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	21 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	73 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	7 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	21 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	7 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		21 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: County Road 50
 Minor Road: Street C
 Horizon Year: 2036
 Weekday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 18-Oct-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	575	80%	80%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	523	308%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	52	7%	7%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	5	7%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

CR7 & Street A

What is the direction of the Main Road street?

North-South

When was the data collected?

Sensitivity Analysis 2036 - Saturday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	9	85	0	109	0	11	0	79	65	0	0	0	0
8:00	9	85	0	109	0	11	0	79	65	0	0	0	0
9:00	9	85	0	109	0	11	0	79	65	0	0	0	0
10:00	9	85	0	109	0	11	0	79	65	0	0	0	0
16:00	9	85	0	109	0	11	0	79	65	0	0	0	0
17:00	9	85	0	109	0	11	0	79	65	0	0	0	0
18:00	9	85	0	109	0	11	0	79	65	0	0	0	0
19:00	9	85	0	109	0	11	0	79	65	0	0	0	0
Total	72	680	0	872	0	88	0	632	520	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	358	358	358	358	358	358	358	358	398	50
	COMPLIANCE %				50	50	50	50	50	50	50	50		
1B	180	255	180	255	120	120	120	120	120	120	120	120	376	47
	COMPLIANCE %				47	47	47	47	47	47	47	47		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	238	238	238	238	238	238	238	238	264	33
	COMPLIANCE %				33	33	33	33	33	33	33	33		
2B	50	75	50	75	109	109	109	109	109	109	109	109	800	100
	COMPLIANCE %				100	100	100	100	100	100	100	100		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	238	120	394	30 %	30 %
	8:00	238	120	394	30 %	
	9:00	238	120	394	30 %	
	10:00	238	120	394	30 %	

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					Justified
	1440 - 2600					
	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: CR7 & Street A

Count Date: Sensitivity Analysis 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	50 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	47 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	33 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	47 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	33 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		30 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: CR7
 Minor Road: CR7 and Street A
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 18-Oct-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	357	50%	50%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	237	139%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	120	17%	17%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	109	145%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

Input Data Sheet

Analysis Sheet

Results Sheet

Proposed Collision

GO TO Justification:

What are the intersecting roadways?

County Road 50 and Street C

What is the direction of the Main Road street?

North-South

When was the data collected?

Sensitivity Analysis 2036 - Saturday

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?

Urban

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 Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	232	2	0	0	0	15	178	0	9	0	41	0
8:00	0	232	2	0	0	0	15	178	0	9	0	41	0
9:00	0	232	2	0	0	0	15	178	0	9	0	41	0
10:00	0	232	2	0	0	0	15	178	0	9	0	41	0
16:00	0	232	2	0	0	0	15	178	0	9	0	41	0
17:00	0	232	2	0	0	0	15	178	0	9	0	41	0
18:00	0	232	2	0	0	0	15	178	0	9	0	41	0
19:00	0	232	2	0	0	0	15	178	0	9	0	41	0
Total	0	1,856	16	0	0	0	120	1,424	0	72	0	328	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

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	477	477	477	477	477	477	477	477	530	66
	COMPLIANCE %				66	66	66	66	66	66	66	66		
1B	180	255	180	255	50	50	50	50	50	50	50	50	157	20
	COMPLIANCE %				20	20	20	20	20	20	20	20		
Restricted Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 2: Delay to Cross Traffic

Restricted Flow Urban 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	10:00	16:00	17:00	18:00	19:00		
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	427	427	427	427	427	427	427	427	474	59
	COMPLIANCE %				59	59	59	59	59	59	59	59		
2B	50	75	50	75	9	9	9	9	9	9	9	9	96	12
	COMPLIANCE %				12	12	12	12	12	12	12	12		
Restricted Flow					Both 2A and 2B 100% Fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicular Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>		

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	427	50	295	17 %	17 %
	8:00	427	50	295	17 %	
	9:00	427	50	295	17 %	
	10:00	427	50	295	17 %	

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					Justified
	1440 - 2600					
	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: County Road 50 and Street C

Count Date: Sensitivity Analysis 2036 - Saturday

Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	66 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	20 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	59 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	12 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	20 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	12 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		17 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

5. Collision Experience	0 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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6. Pedestrians	A Volume	Justification met	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Delay	Justification not met	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Major Road: County Road 50
 Minor Road: Street C
 Horizon Year: 2036
 Saturday

Condition: Restricted Flow
 Major Rd. Lanes: 1
 Intersection Type: Proposed

Date: 18-Oct-17
 Project No.: 1101-4125
 Analyst: Madeleine Ferguson

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		COMPLIANCE		Entire Percentage
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	480	720	600	900	476	66%	66%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	426	251%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	50	7%	7%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	120	170	9	12%	

Existing Intersection Requires 120 % Justification
 Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: Yes No

APPENDIX H

Relevant TAC GDGCR / The County of Simcoe By-Law No 5544 Excerpts

BY-LAW NO. 5544

OF

THE CORPORATION OF THE COUNTY OF SIMCOE

Being a by-law to regulate the construction, alteration or change in the use of any private or public entranceway, gate or other structure or facility that permits access to a County road.

WHEREAS Section 9 of the *Municipal Act, 2001*, S.O. 2001, c.25 as amended ("*Municipal Act, 2001*") provides that the Corporation of the County of Simcoe ("County") has the capacity, rights, powers and privileges of a natural person for the purpose of exercising its authority under this or any other Act;

AND WHEREAS Section 10(2) of the *Municipal Act, 2001*, provides that County Council may regulate matters for purposes related to health, safety and well-being of the inhabitants of the County;

AND WHEREAS Sections 27 and 35 of the *Municipal Act, 2001*, authorize County Council to pass a by-law to prohibit or regulate the construction, alteration or change in use of any entranceway, gate or other structure or facility that permits access to a County road in respect of highways in its jurisdiction or under joint jurisdiction;

AND WHEREAS pursuant to section 227 of the *Municipal Act, 2001*, it is the role of the officers and employees of the County to establish administrative practices and procedures to implement County Council's decisions;

AND WHEREAS Section 391 of the *Municipal Act, 2001*, authorizes the municipality to impose fees and charges on persons for services or activities provided or done by or on behalf of it; for costs payable by it for services or activities provided or done by or on behalf of any other municipality or any local board; and for the use of its property including property under its control;

AND WHEREAS Sections 398 and 446 of the *Municipal Act, 2001*, authorizes the County to request that the lower-tier municipalities add the costs of completing any matter or thing it has authority to direct to be done in this By-law if the person directed to do so is in default, to the tax roll and collect the amount due in the same manner as property taxes;

AND WHEREAS pursuant to section 425 of the *Municipal Act, 2001*, the County may pass by-laws providing that a person who contravenes a by-law of the municipality is guilty of an offence;

AND WHEREAS pursuant to section 15(1) of the *Police Services Act, R.S.O. 1990, c.P.15* County Council may appoint persons to enforce the by-laws of the County;

AND WHEREAS by adoption of Corporate Services Committee Report No. CS 07-204, County Council deems it necessary to repeal By-law No. 4206 as amended and to enact a new entrance by-law to regulate the construction, alteration or change in the use of any private or public entranceway, gate or other structure or facility that permits access to a County road and to provide for the issuing of permits related thereto.

NOW THEREFORE be it resolved that Council of the Corporation of the County of Simcoe enacts as follows:

SECTION 1 - INTERPRETATION

1.1 SHORT TITLE

This by-law will be known and may be cited as the Entrance By-law.

1.2 HEADING

The headings inserted in this by-law are inserted for convenience only and are not to be used as a means of interpretation.

1.3 SCHEDULES

Schedules attached to this by-law form part of this by-law and have the same force and effect as if the information in them were contained in the body of this by-law.

1.4 SINGULAR, ETC

The necessary grammatical changes required to make the provisions hereof apply to corporations, partnerships, trusts and individuals, male or female, and to include singular or plural meaning where the context so requires, will in all cases be assumed as though fully expressed.

1.5 DEFINITIONS

For the purpose of this by-law, the following words shall have the meaning ascribed herein:

1.5.1 **“Boulevard”** means that portion of the highway, paved or unpaved between the County property line and the Curb Line but does not include the sidewalk.

1.5.2 **“Bridge”** means a public bridge forming part of a highway or on, over or across which a highway passes.

By-law No. 5544

- 1.5.3 “**Commercial Entrance**” means an Entrance opening on to a County Road from a retail or service business.
- 1.5.4 “**County**” means The Corporation of the County of Simcoe.
- 1.5.5 “**County Road**” means all common and public highways, any part of which is intended for or used by general public for the passage of vehicles and pedestrians and includes the area between the lateral property lines thereof within the geographical limits of the County of Simcoe over which the County has jurisdiction, including where jurisdiction is obtained by agreement with the lower-tier municipality.
- 1.5.6 “**Curb Line**” means the line of the curb, or, where no curb is constructed, the edge of the traveled portion of the highway.
- 1.5.7 “**Entrance**” means an area of ingress and egress to a privately or publicly owned parcel from a County Road.
- 1.5.8 “**Entrance Permit**” means a permit issued by the Transportation Maintenance Manager of the County.
- 1.5.9 “**Farm Entrance**” means an Entrance opening on to a County Road from an active farm and is to be used for access to one or more barns, out-buildings and/or a farm residence.
- 1.5.10 “**Field Entrance**” means an Entrance opening on to a County Road from an agricultural field.
- 1.5.11 “**Industrial Entrance**” means an Entrance opening on to a County Road from an industrial facility.
- 1.5.12 “**Institutional Entrance**” means an Entrance opening on to a County Road from an institutional facility.
- 1.5.13 “**Intersection**” means an intersection of a County Road with another Public Road.
- 1.5.14 “**Local Road**” means a public highway under the jurisdiction of a lower-tier municipality within the County of Simcoe.
- 1.5.15 “**Minimum Sight Distance**” means the distance measured from the centre line of the entrance at a height of 1.05 metres above grade, which represents the driver’s eye level, and at an offset of 3.0 metres from the edge of pavement, to a point on the centre of the upstream and downstream lane of the County Road at a height of 1.05 metres, which represents the object height.

- 1.5.16 “**Multi-Unit Residential Entrance**” means an Entrance opening on to a County Road from a multi-unit residential dwelling containing more than two separate, self-contained dwelling units and includes apartment buildings, condominiums and all other forms of multi-unit ownership.
- 1.5.17 “**Municipal Law Enforcement Officer**” includes a person appointed pursuant to section 15(1) of the *Police Services Act* by the County Council for the purpose of carrying out the enforcement of this by-law.
- 1.5.18 “**Mutual Entrance**” means an Entrance opening on to a County Road that provides shared access to serve separate existing lots or for two or more main buildings on one lot.
- 1.5.19 “**Owner**” shall mean the Person that is the owner of the property abutting the County Road that is accessed by an Entrance.
- 1.5.20 “**Person**” includes the applicant whether an individual or a corporation and the successors, assigns, heirs, executors, administrators, or other legal representatives of a person to whom the context may apply according to law.
- 1.5.21 “**Public Road**” means all common and public highways, any part of which is intended for or used by the general public for the passage of vehicles and pedestrians and includes the area between the lateral property lines thereof.
- 1.5.22 “**Residential Entrance**” means an Entrance opening on to a County Road from a private residence or from a multi-unit residential dwelling containing not more than two separate, self-contained dwelling units.
- 1.5.23 “**Temporary Entrance**” means an Entrance opening on to a County Road that provides access to property for a limited period, not to exceed 6 months, for the purpose of construction, repairs or improvements to that property or to facilitate a staged development.

SECTION 2 - PERMITS AND ENTRANCES

2.1 GENERAL CONSIDERATIONS

The staff of the County administering this by-law will consider the following criteria when reviewing applications for new Entrances or alterations to Entrances:

- 2.1.1 public safety;
- 2.1.2 protection of the public through the orderly control of traffic movements onto and from County Roads, including possible requirements for left and/or right turn lanes;
- 2.1.3 providing legal access onto County Roads from adjacent private or public property;
- 2.1.4 required sight distance, safe grade, and alignment conditions for all traffic using the proposed Entrance;
- 2.1.5 maintaining the orderly flow of the traffic traveling on the County Roads;
- 2.1.6 no undue interference with the safe movement of through traffic;
- 2.1.7 protection of the public investment in the County Roads and minimizing County expenditures on the maintenance of private or public Entrances; and
- 2.1.8 reducing future maintenance problems and reconstruction costs.

2.2 PERMITS REQUIRED

- 2.2.1 Entrance Permits are required for:
 - 2.2.1.1 construction of a new Entrance;
 - 2.2.1.2 changing the design of an existing Entrance;
 - 2.2.1.3 changing the location of an existing Entrance;
 - 2.2.1.4 changing the use of or classification of an existing Entrance;
 - 2.2.1.5 paving an existing entrance; and

- 2.2.1.6 construction of a Temporary Entrance for the use of any part of the highway right-of-way as a means of temporary access.

2.3 ENTRANCE PERMIT APPLICATION

- 2.3.1 The Entrance Permit Application Form is available at the County's Administration Building and at www.county.simcoe.on.ca.
- 2.3.2 All applications are to be completed and delivered or mailed to the office of the County c/o the Transportation and Engineering Department, Transportation Construction Manager with the applicable application fee, in the Fees and Charges By-law, and detailed plans and specifications to the satisfaction of the Transportation Maintenance Manager of the Transportation and Engineering Department.
- 2.3.3 For Commercial, Industrial, Institutional and Multi-Unit Residential Entrances and Public Road Intersections, engineering drawings (plan and profile) of the Entrance, including related grading and drainage details, shall be submitted to the County c/o the Transportation and Engineering Department, Transportation Construction Manager as part of the application for an Entrance Permit.
- 2.3.4 A sketch of the proposed location of the Entrance must accompany every application. The sketch must provide enough information to enable staff to locate the Entrance in the field i.e. dimensions to buildings and/or landmarks such as fences, hedgerows, tree lines, property lines, etc. In addition, the applicant shall stake out or suitably mark the location of the proposed Entrance for inspection by County staff.
- 2.3.5 Upon approval, the Entrance Permit will be forwarded to the applicant. Entrance Permits will expire six months following the date of issue if the Entrance is not completed. An Entrance Permit may be extended for one year from the date of issue upon written request. In the event of a plan of subdivision for which draft approval has lapsed, any Entrance Permit issued applicable to the plan will become null and void.
- 2.3.6 The applicant or their contractor shall notify the Transportation Maintenance Manager of the Transportation and Engineering Department at least 48 hours prior to commencement of construction of the Entrance.

By-law No. 5544

- 2.3.7 It is the responsibility of the applicant to ensure that the construction of the Entrance is in accordance with the requirements of all applicable regulatory agencies having jurisdiction.
- 2.3.8 Applicants are bound by the conditions contained in the Entrance Permit.

2.4 EXISTING ENTRANCES

One legally existing Entrance to each lot of record at the time of the passage of this by-law will be permitted.

2.5 NEW ENTRANCES

- 2.5.1 Subject to section 2.5.2, Entrance Permits may be issued:
 - 2.5.1.1 for existing lots where no access has been previously established;
 - 2.5.1.2 for new Public Roads which intersect with County Roads; and
 - 2.5.1.3 where a new Entrance replacing an existing Entrance can be shown to establish superior Entrance standards and specifications.
- 2.5.2 New Entrances shall not be permitted to individual residential lots created on County Roads following June 30, 1996, except in urban settlement areas designated in Official Plans.
- 2.5.3 Where a subdivision or individual lot fronts on both a County Road and a Local Road, the Entrance will be from the Local Road, where feasible.
- 2.5.4 Direct access from single lots on to County Roads from a new plan of subdivision or condominium is not permitted.
- 2.5.5 Only one new Entrance will be permitted for each existing lot of record, if no alternate access exists and required safety measures can be provided.

2.6 TEMPORARY ENTRANCES

- 2.6.1 Entrance Permits may be issued for the construction of an Entrance for a specified period of time. Entrance Permits, when issued will be clearly marked as "temporary" and will specify the

date of expiry. In the event that the applicant requires an extension to the expiry date of a Temporary Entrance Permit, the applicant may apply in writing requesting an extension, provided this application is made at least 15 days prior to the current expiry date. The applicant will be required to submit the applicable fee for the entrance classification. The Transportation Maintenance Manager and/or the Transportation Construction Manager may require a security deposit for Temporary Entrances as a condition of approval. The amount of the security will vary with the circumstances.

- 2.6.2 Upon the expiry of a Temporary Entrance Permit, the applicant will be required to remove the Entrance and to restore the Boulevard to its original condition. Security deposits may be returned at such time as the County staff has inspected the site and are satisfied that the work is properly complete.
- 2.6.3 If at the expiry of a Temporary Entrance Permit, the applicant fails to remove the Entrance and restore the Boulevard to its original condition, the County may use the security deposit to perform the work on the applicant's behalf. If additional funds are required above and beyond the security deposit to complete the work, the County may request that the Treasurer of the local municipality include any part of the fees and charges imposed by the County to the tax roll pursuant to the provisions of sections 398 and 446 of the *Municipal Act, 2001*.

2.7 MUTUAL ENTRANCES

- 2.7.1 Mutual Entrances are discouraged due to potential ownership problems and should only be considered if individual Entrances are not possible due to physical constraints or because it is impractical to build a road due to the small number of lots involved. Entrance Permits may be issued for new Mutual Entrances, the conversion of an existing Entrance to serve separate existing lots, or for two or more main buildings on one lot provided that:
 - 2.7.1.1 the main buildings have the same use and qualify for the same entrance standard as set out in Section 3;
 - 2.7.1.2 the County Road frontage to the combined lots is 50 metres or greater;
 - 2.7.1.3 Minimum Sight Distance requirements are met; and

- 2.7.1.4 the proposed Mutual Entrance will not adversely affect traffic safety on the County Road.

2.8 ENTRANCE LOCATIONS

- 2.8.1 Generally, Entrances onto County Roads must be a minimum of:
 - 2.8.1.1 55 metres from an Intersection for residential, farm or field lots;
 - 2.8.1.2 100 metres from an Intersection for commercial, institutional, industrial or multi-unit residential lots; and
 - 2.8.1.3 15 metres from an “at grade” railway crossing (measured from centre-line of Entrance to the property line abutting the railway right-of-way).
- 2.8.2 Generally, Entrances onto County Roads are not permitted:
 - 2.8.2.1 adjacent to a lane which is identified for the purpose of an exclusive turning movement including, but not limited to, channelization, acceleration or deceleration;
 - 2.8.2.2 where Minimum Sight Distance requirements are not met; and
 - 2.8.2.3 where the Entrance would violate the design guidelines of the Ministry of Transportation, Transportation Association of Canada and County, whichever guideline is more restrictive.
- 2.8.3 The County may restrict the placement of an Entrance onto a County Road in the interest of public safety. New Entrances must be located so as to provide, in the opinion of the Transportation Maintenance Manager or Transportation Construction Manager of the Transportation and Engineering Department:
 - 2.8.3.1 no undue interference with the safe movement of public traffic, pedestrians, or other users of the County Roads; and
 - 2.8.3.2 favourable vision, grade, and alignment conditions for all traffic using the proposed Entrance to the County Road.

2.9 ENTRANCES ADJACENT TO BRIDGES

An Entrance adjacent to a Bridge or other structure which may interfere with the clear vision of traffic using the Entrance must be located so that it meets the minimum stopping sight distance requirements identified in section E.3 of the MTO Geometric Design Standards for Ontario Highways Manual, as amended.

2.10 EXCEPTIONS

- 2.10.1 Exceptions may be granted for proposed Entrances on existing lots where Minimum Sight Distance requirements cannot be met, subject to approval being granted by the General Manager of Corporate Services including the review and recommendation of the Transportation Maintenance Manager.
- 2.10.2 The applicant is required to submit a written request (with the applicable fee) to the General Manager of Corporate Services which sets out the reason an exception is requested.
- 2.10.3 If an exception is granted, it may be granted with conditions and the applicant may be required to enter into a Development Agreement with the County to be prepared and registered on title to the property in question at the applicant's expense.
- 2.10.4 The applicant is entitled to an appeal of the General Manager of Corporate Services decision which appeal will be to the Corporate Services Committee.
- 2.10.5 An appeal must be submitted in writing within 20 days of the date of the notice of decision to the County Clerk, with the applicable filing fee, as set out in the Fees and Charges By-law.
- 2.10.6 The Corporate Services Committee will hold a hearing and provide an opportunity for the applicant to be heard. No new evidence can be submitted to this Committee.
- 2.10.7 The decision of the Corporate Services Committee will be provided in writing to the applicant within 30 days of the hearing.
- 2.10.8 The Corporate Services Committee can attach such conditions as are reasonable to its decision including the entering into a Development Agreement with the County to be prepared and registered on title to the property in question at the applicant's expense. This decision is final and binding.

SECTION 3 - ENTRANCE STANDARDS AND SIGHT DISTANCES:

3.1 ENTRANCE STANDARDS

- 3.1.1 The maximum width of a Commercial, Industrial, Institutional, Multi-Unit Residential or Farm Entrance is 9.0 metres, unless otherwise approved by the Transportation Maintenance Manager or Transportation Construction Manager or his or her designate.
- 3.1.2 Residential Entrances must have a width of 5.0 to 6.0 metres and be constructed in accordance with Schedule "A" and Schedule "B" of this by-law.
- 3.1.3 The minimum turning radius for a Residential Entrance is 3.0 metres. The minimum turning radius for a Commercial Entrance is 15.0 metres. The turning radius at Intersections must be either 20 metres; or a 12.5/20 metre or 16/80 metre compound curve.
- 3.1.4 The minimum size of Entrance culvert is 450 mm in diameter. The length and diameter of the culvert will be based on site conditions and drainage flow volumes.
- 3.1.5 Entrance construction materials must meet Ontario Provincial Standards or be approved by the Transportation Maintenance Manager or Transportation Construction Manager or his or her designate.
- 3.1.6 If the Entrance requires a Bridge, the design of the Bridge must be prepared by a qualified professional engineer and is subject to the approval of the Transportation Maintenance Manager or Transportation Construction Manager or his or her designate.
- 3.1.7 All Entrance culverts must be constructed to the proper grade to provide the free and unimpeded flow of water through the culvert.
- 3.1.8 Concrete headwalls must not be higher than the level of the road shoulder at the rounding and must meet Ontario Provincial Standards unless otherwise approved by the Transportation Maintenance Manager or Transportation Construction Manager or his or her designate.
- 3.1.9 Each Entrance to a County Road must be designed, constructed and maintained in a manner that will prevent surface water from being discharged via the Entrance or adjoining property onto the County Road.

3.2 SIGHT DISTANCES

3.2.1 Where the posted speed limit is 80 km/h, new Entrances must meet all of the following minimum requirements:

- 3.2.1.1 Minimum Sight Distance as per Table 1 and Table 2, as applicable;
- 3.2.1.2 horizontal curve is 400 metre radius or greater; and
- 3.2.1.3 maximum grade on the County Road is 3% or less.

3.2.2 Where the posted speed limit is less than 80km/h, new Entrances must meet all of the following minimum requirements:

- 3.2.2.1 Minimum Sight Distance as per Table 1 and Table 2, as applicable;
- 3.2.2.2 horizontal curve is 300m radius or greater; and
- 3.2.2.3 maximum grade on the County Road is 6% or less.

TABLE 1

Speed Limit - km/h	Minimum Sight Distance (Metres)*
50	135
60	170
70	200
80	230

TABLE 2

Posted Speed Limit - km/h	Decrease for Upgrade		Increase for Downgrade	
	3%	6%	3%	6%
50	- 5m.	- 5m.	nil	+5m.
60	- 5m.	- 5m.	+5m.	+10m.
70	- 5m.	- 10m.	+5m.	+10m.
80	-10m.	- 15m.	+10m.	+15m.

* Table 2 provides factors (in metres) where the Entrance is located on a grade on the County Road.

SECTION 4 - INSPECTION AND MAINTANENCE

4.1 INSPECTION

4.1.1 A field inspection may be carried out by County staff upon completion of the Entrance.

By-law No. 5544

- 4.1.2 The County may require that modifications be performed if the installation of the Entrance does not conform to the plans and specifications submitted to obtain the Entrance Permit.
- 4.1.3 In the event that modifications are required, the County shall provide written notice of the modifications to the applicant at the applicant's address as shown on the Entrance Permit application. The applicant shall carry out the required modifications within 45 days of the date of the written notice and is responsible for the cost of the inspection and any modifications required.
- 4.1.4 If the applicant fails to carry out the required modifications within 45 days, as set out above, the County may have the required modifications completed by employees or agents of the County. The County may request that the Treasurer of the local municipality include any part of the fees and charges incurred by the County to the tax roll pursuant to the provisions of sections 398 and 446 of the *Municipal Act, 2001*.

4.2 MAINTENANCE

- 4.2.1 Upon approval of a culvert installation, the culvert will become the property of the County and all subsequent maintenance and repairs will be the responsibility of the County.
- 4.2.2 The Owner of a property, served by an Entrance, shall be responsible for maintaining the surface of each Entrance for a distance extending from the property line to the shoulder of the County Road.
- 4.2.3 The County shall maintain only that portion of the Entrance from the traveled portion of the road to the outer edge of the shoulder.

SECTION 5 - REVOCATION, APPEAL AND COSTS

5.1 REVOCATION OF PERMITS

- 5.1.1 The County may revoke an Entrance Permit issued under this by-law for the following reasons:
 - 5.1.1.1 it was issued based on mistaken, false or incorrect information;
 - 5.1.1.2 in the opinion of the Transportation Maintenance Manager of the Transportation and Engineering Department, the construction is substantially

suspended or discontinued for a period of more than one year;

5.1.1.3 it was issued in error;

5.1.1.4 the applicant requests in writing that it be revoked; or

5.1.1.5 a condition of the Entrance Permit has not been complied with.

5.1.2 In the event that the applicant breaches any of the conditions contained in the Entrance Permit, the County may use its own employees or agents to complete the work required under the Entrance Permit or to remove the Entrance works and re-instate the prior roadway condition and may collect the cost of the work pursuant to the provisions of sections 398 and 446 of the *Municipal Act, 2001*.

5.2 APPEALS

5.2.1 An applicant may appeal the decision of the Transportation Maintenance Manager of the Transportation and Engineering Department with respect to the issuance of the Entrance Permit or any of its conditions to the Corporate Services Committee.

5.2.2. The applicant is required to submit a written notice of appeal to the Transportation Maintenance Manager of the Transportation and Engineering Department which sets out the reasons for the appeal and must be accompanied by the applicable fee prescribed in Schedule "C" and the Fees and Charges By-law.

5.2.3 The decision by the Corporate Services Committee is final and binding.

5.3 COSTS

5.3.1 All costs associated with an Entrance Permit are the responsibility of the applicant. These costs may include, but are not limited to, applicable Entrance Permit application fees, construction materials and labour, utilities, traffic control devices, layout, surveying, legal costs and removal of non-conforming works. Refer to current Fees and Charges By-law for applicable fees.

5.3.2 Where an applicant fails to comply with the requirements or provisions of this by-law, the County may recover the expense by requesting that the Treasurer of the local municipality include any part of the fees and charges incurred by the County to the tax roll

pursuant to the provisions of sections 398 and 446 of the *Municipal Act, 2001*.

SECTION 6 - ADMINISTRATION AND ENFORCEMENT

- 6.1** This by-law will be administered by the General Manager of Corporate Services and his or her designate except the provisions regarding recovery of costs which will be administered by the County's Treasurer and his or her designate.
- 6.2** This by-law shall be enforced by the persons appointed pursuant to section 15 of the *Police Services Act* and referred to in this by-law as Municipal Law Enforcement Officers.
- 6.3** No Person shall create or alter an Entrance or change the classification or use of an Entrance onto a County Road without first having applied for and obtained an Entrance Permit from the County.
- 6.4** Any Person who contravenes any of the provisions of this by-law is guilty of an offence and upon conviction is liable to a fine as provided for in the *Provincial Offences Act*, R.S.O. 1990, as amended, and such fine is recoverable under the *Provincial Offences Act*, R.S.O. 1990, as amended.
- 6.5** If a Person has been convicted of an offence under this by-law, pursuant to section 431 of the *Municipal Act, 2001*, the court in which the conviction has been entered may, in addition to any other penalty or other remedy imposed, make an order prohibiting the continuation or repetition of the offence.

SECTION 7 - GENERAL

7.1 SEVERABILITY

If any provision of this by-law is declared invalid for any reason by a court of competent jurisdiction, the remainder of this by-law shall still continue in force.

7.2 REPEAL

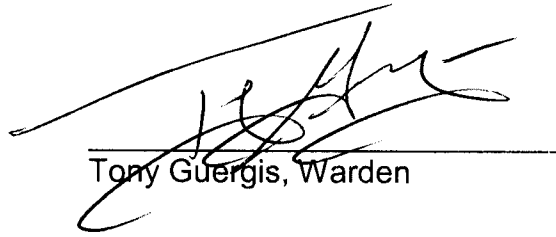
By-law No. 4206 as amended is hereby repealed.

7.3 EFFECTIVE DATE

This by-law will come into force and take effect on the date it is passed by the Council of the County.

By-law No. 5544

By-law read a first, second and third time and finally enacted this 25th day of September, 2007.

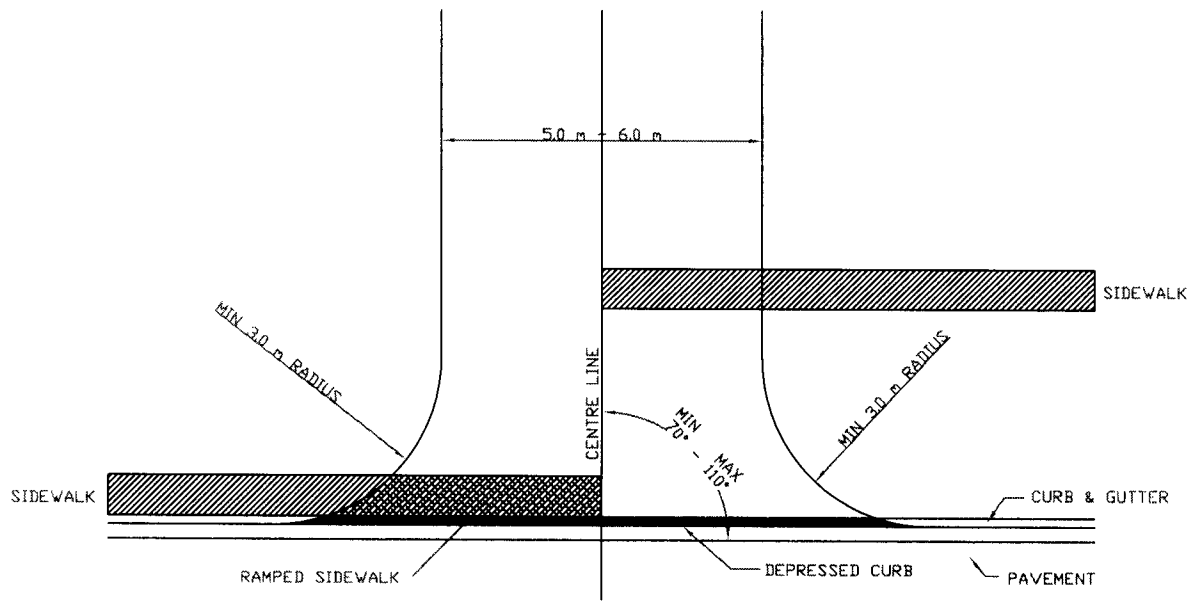


Tony Guergis, Warden

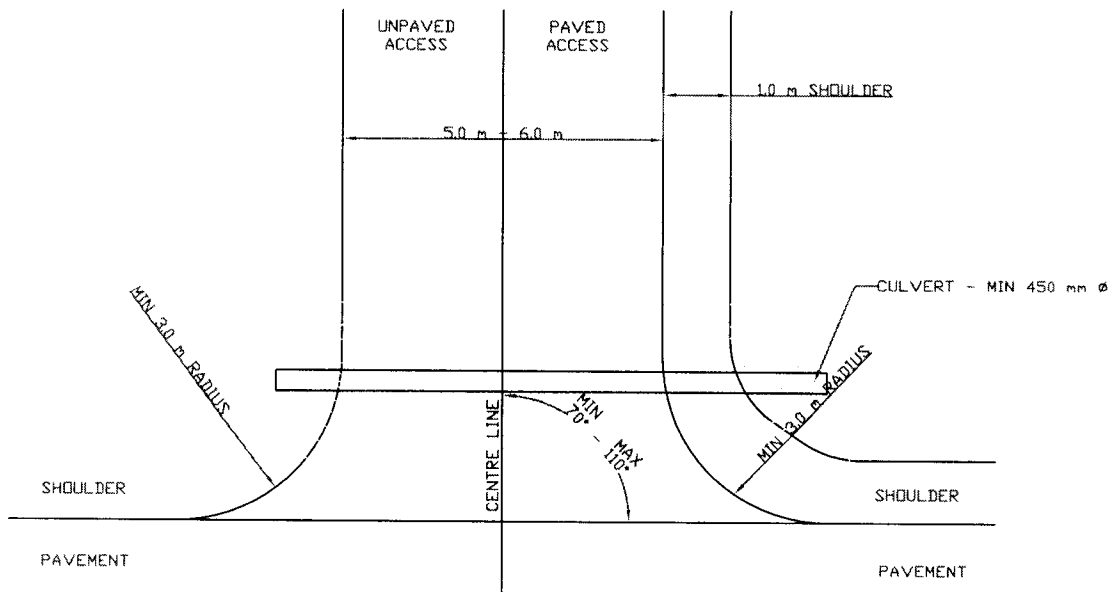


Glen Knox, County Clerk

SCHEDULE "A"
NON-COMMERCIAL ACCESS REQUIREMENTS DRAWING



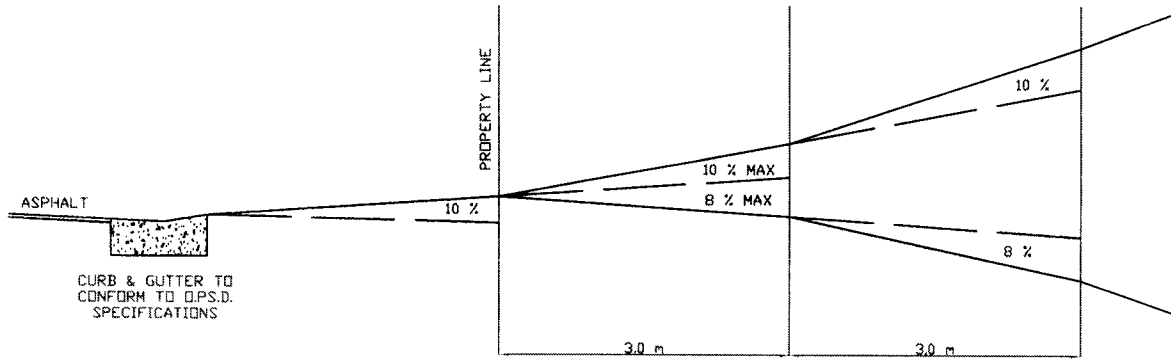
EXISTING CURB & GUTTER



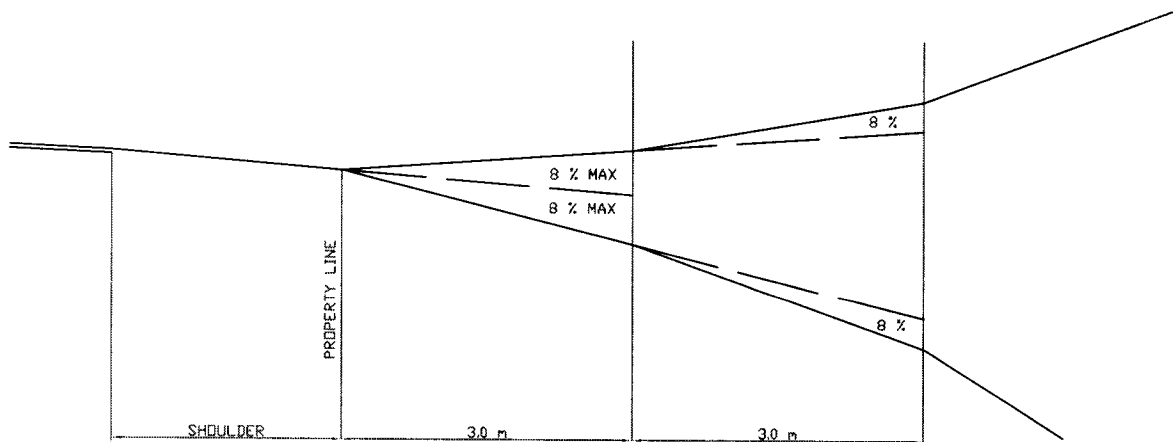
NO CURB & GUTTER WITH OPEN DITCH

<p>Notes:</p> <p>1. MINIMUM RADIUS SHALL BE NO LESS THEN 3.0m</p> <p>2. ACCESS WIDTH SHOULD BE A MINIMUM OF 5.0m</p> <p>3. THE ANGLE IN WHICH AN ACCESS SHALL APPROACH THE COUNTY ROAD SHALL BE A MINIMUM OF 70° AND A MAXIMUM OF 110°</p> <p>4. MINIMUM DITCH SLOPE OF 2 : 1</p>	<p>County of Simcoe Transportation Department Administration Centre Midhurst, ON L0L 1X0</p>		<p>Drawing Title: Simcoe County Non-Commercial Access Requirements</p> <p>Scale: NTS Date: March 13, 2006 Transportation Construction Manager: James E. Hunter</p>	<p>Drawing No: ST-002</p>
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SCHEDULE "B" STANDARD ACCESS PROFILE DRAWING



EXISTING GUTTER



EXISTING DITCH

	County of Simcoe Transportation Department Administration Centre Midhurst, ON L0L 1X0		Drawing Title: Simcoe County Standard Access Profile
			Scale: NTS Date: March 14, 2006
			Transportation Construction Manager: James E. Hunter
			Drawing No: ST-003

**ENTRANCE BY-LAW #5544
SCHEDULE "C"
ENTRANCE PERMIT APPLICATION FEE SCHEDULE**



THE CORPORATION OF THE COUNTY OF SIMCOE
TRANSPORTATION AND ENGINEERING DEPARTMENT
1110 HIGHWAY 26, COUNTY ADMINISTRATION CENTRE
MIDHURST, ONTARIO L0L 1X0
PH: 705-726-9300 FAX: 705-727-7984

ENTRANCE PERMIT APPLICATION FEE SCHEDULE

<u>Entrance Classification</u>	<u>Fees</u>
Residential, Farm, Field	\$100.00
Commercial, Industrial, Institutional, Multi-unit Residential, Mutual Access, Public Road, Temporary	\$150.00
All Classifications Pave an Existing Entrance	\$100.00

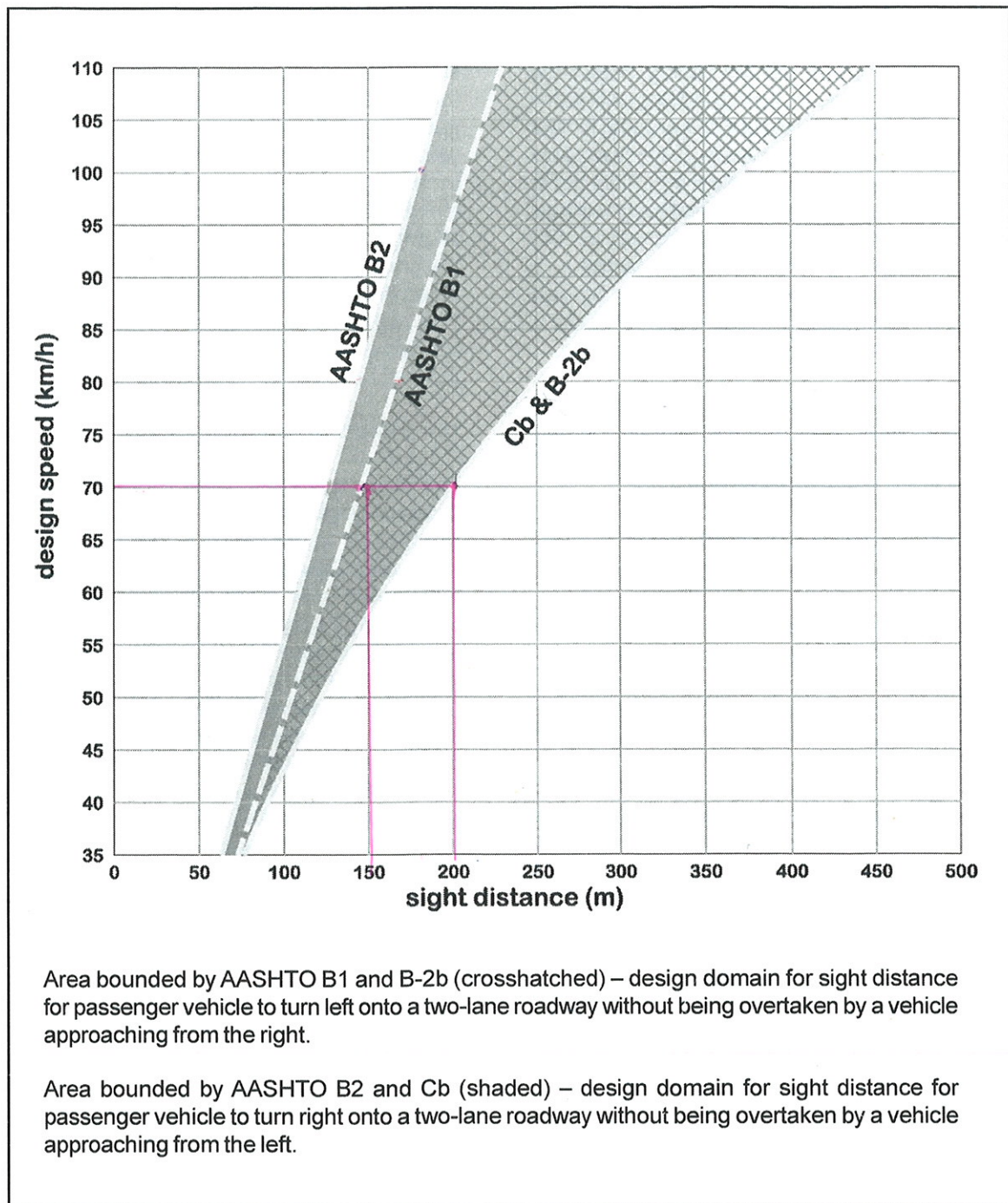
<u>Exception Requests</u>	<u>Fees</u>
Requests to Corporate Services Committee for an Exception to the By-law's Minimum Sight Distance requirements - Development Agreement required	\$100 (*plus actual costs)

<u>Appeals</u>	<u>Fees</u>
Appeals to Corporate Services Committee for an Exception to the By-law Requirements	\$125.00

Notes:

- Entrances to municipally owned properties are exempt from the above-noted fees.
- Temporary Entrance applications will require a security deposit (minimum \$2,000 to a maximum of \$10,000) depending on the circumstances.
- Completed applications should be returned to the address identified above.
- Application fees are payable by cash, cheque or money order payable to: **The Corporation of the County of Simcoe**

Figure 2.3.3.4b Sight Distance for Turning Movements with Vehicles approaching in the Intended Direction of Travel



APPENDIX I

MTO GDSOH Auxiliary Lane Warrants

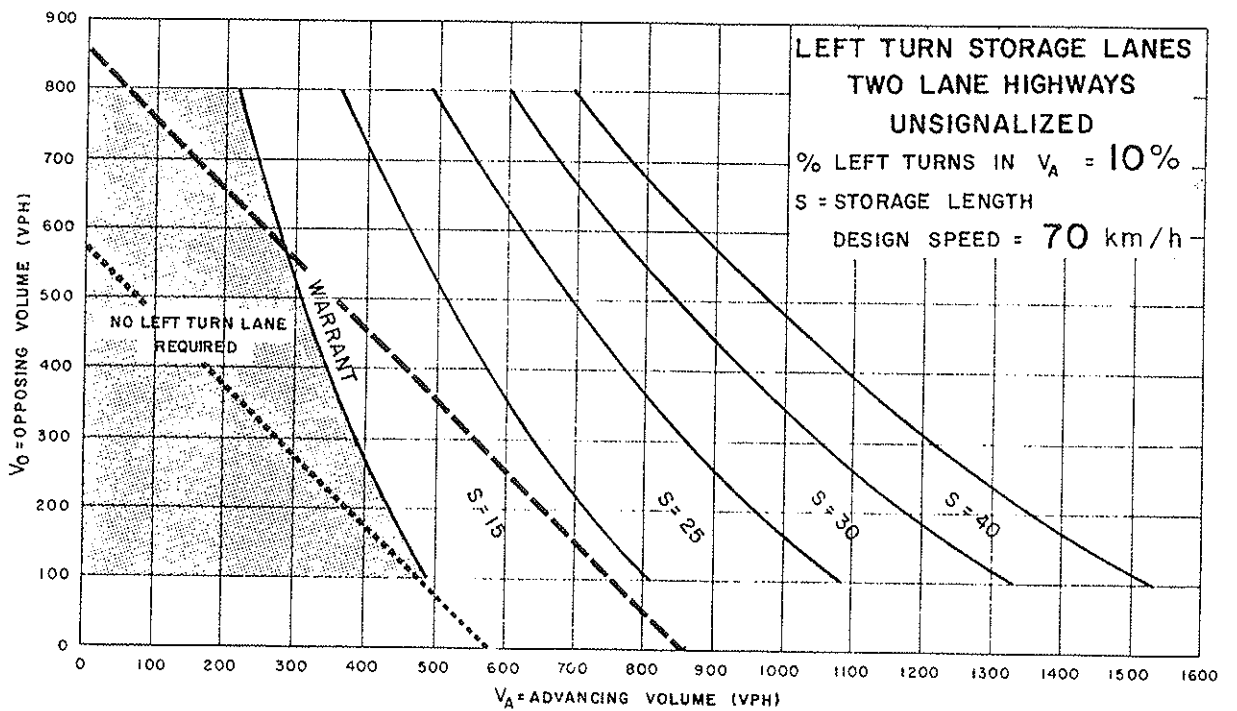
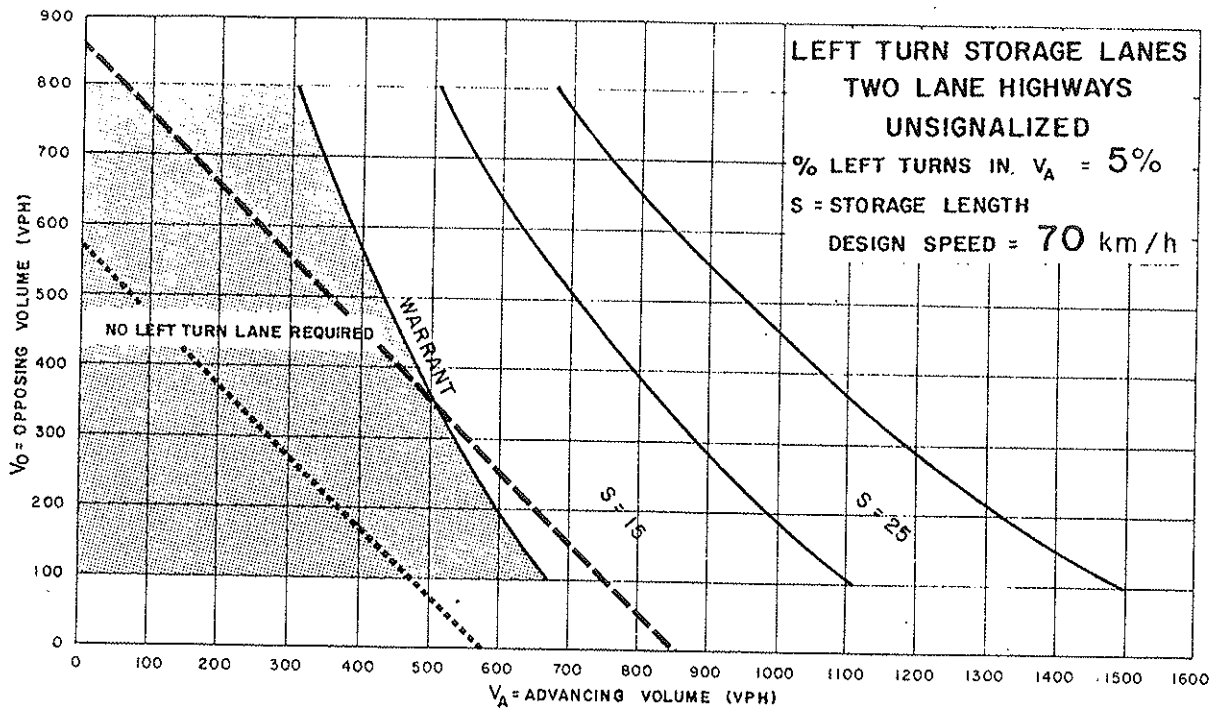
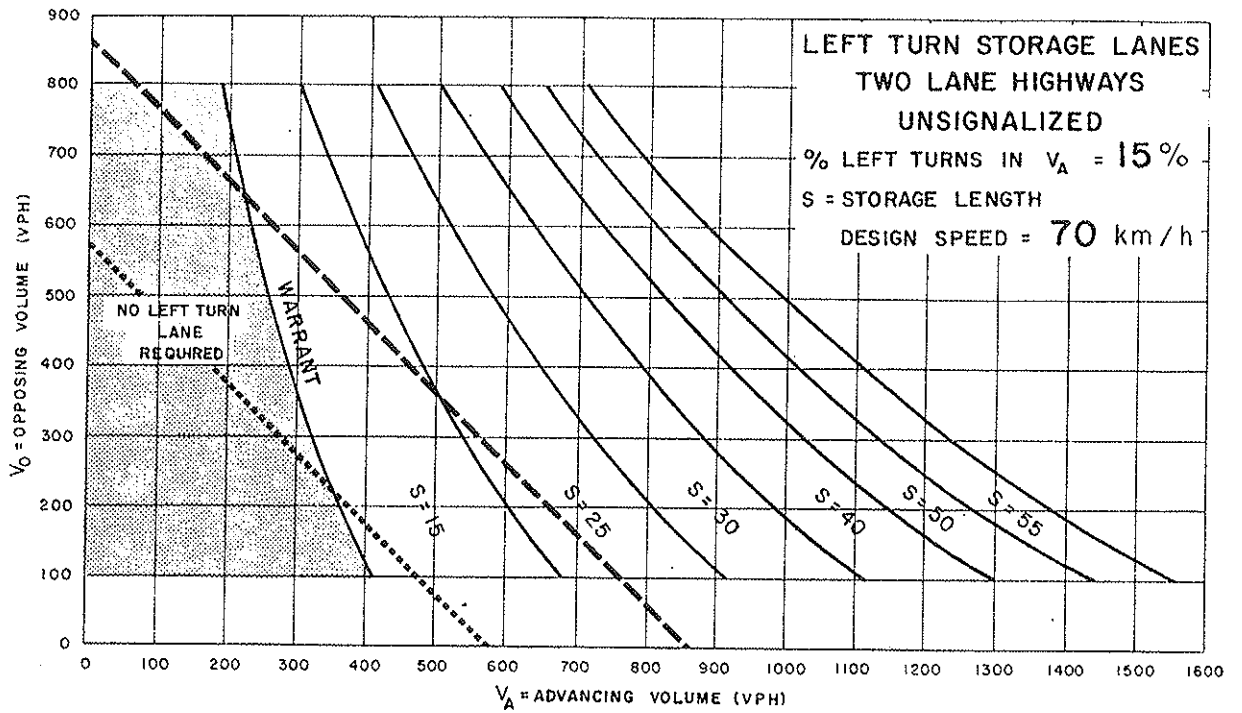


Figure EA-10



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

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

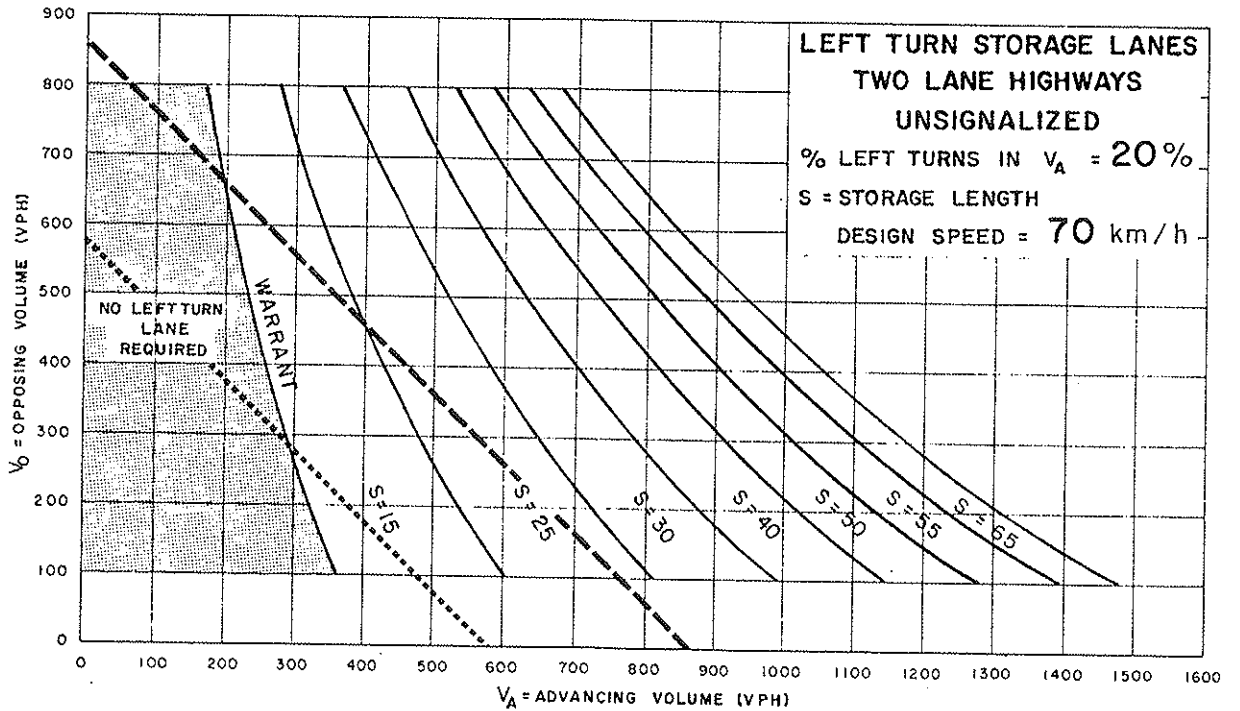
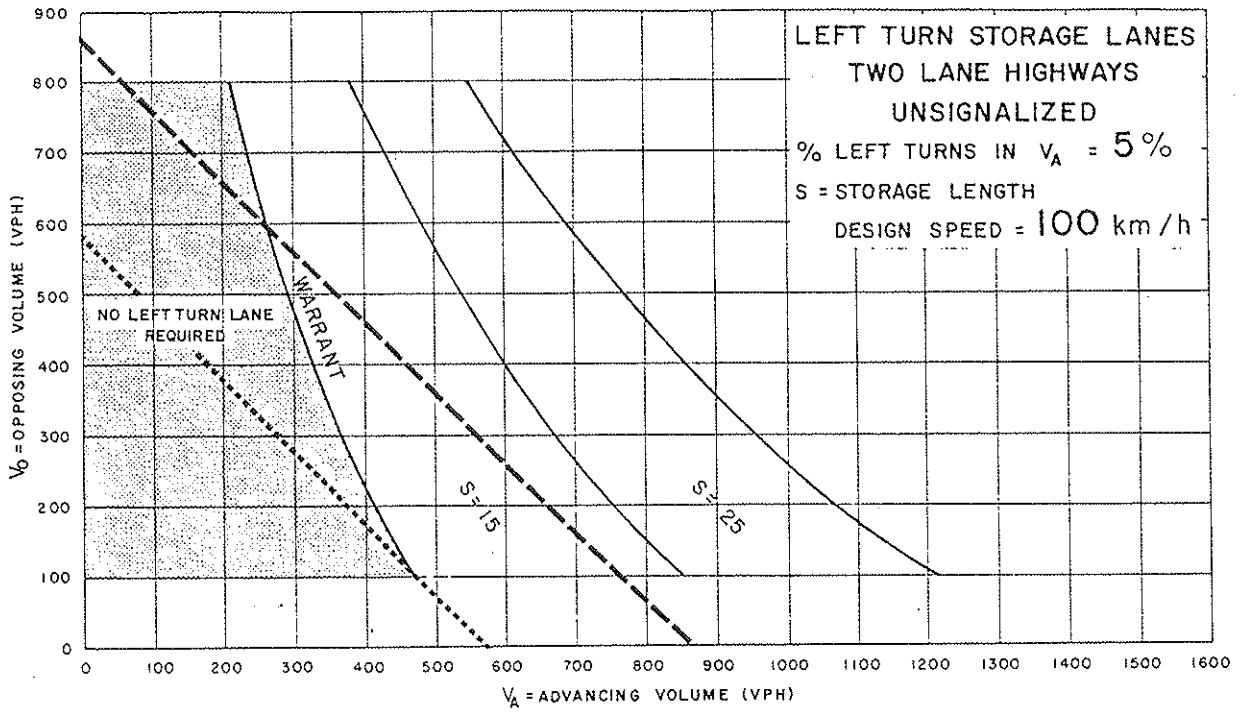


Figure EA-11



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

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

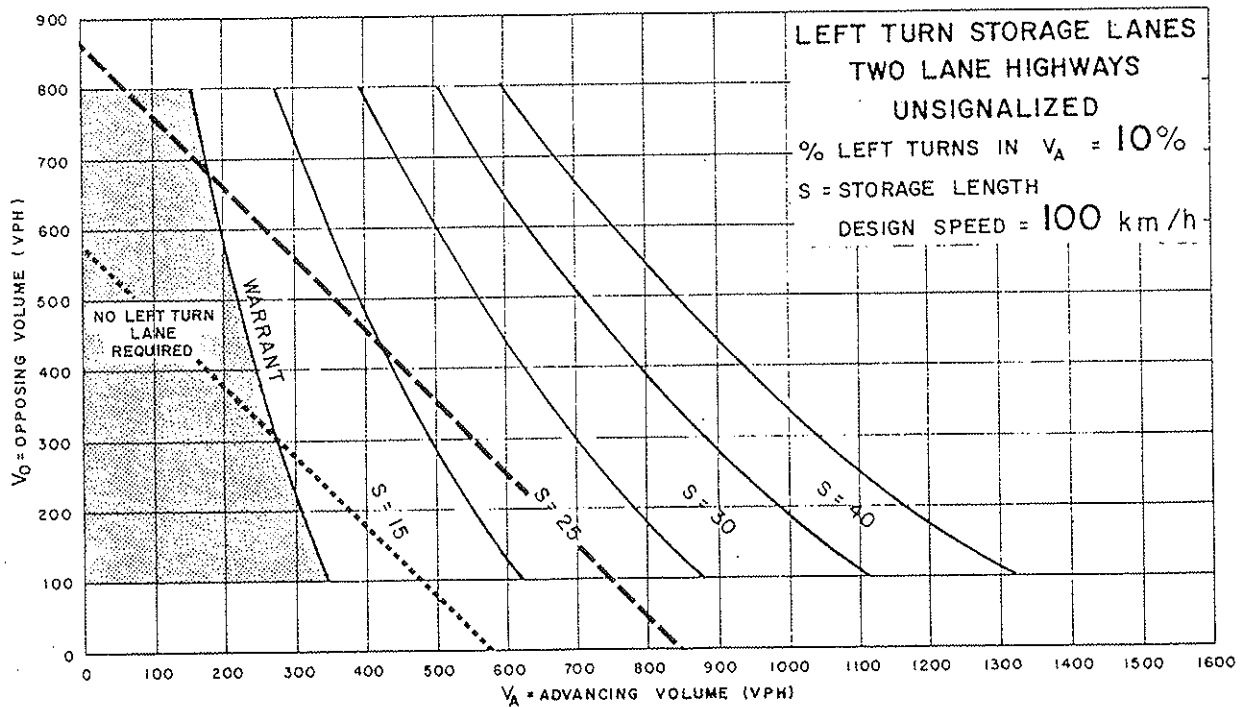


Figure EA-22

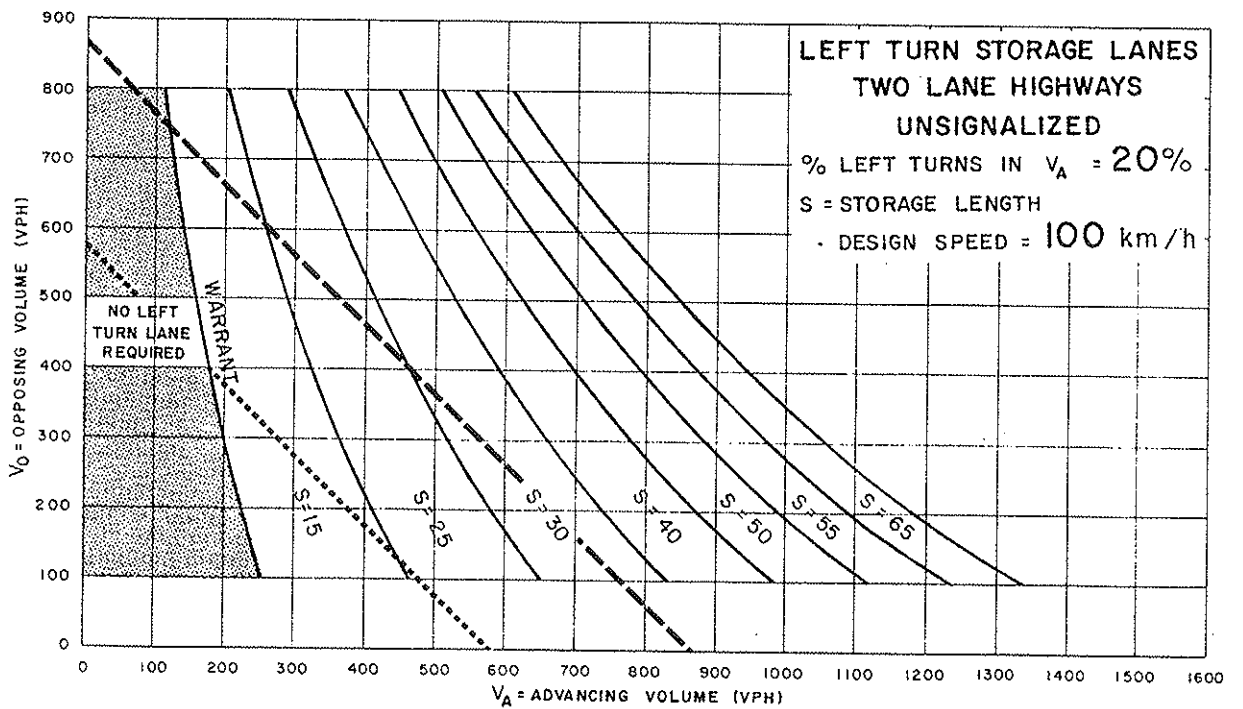
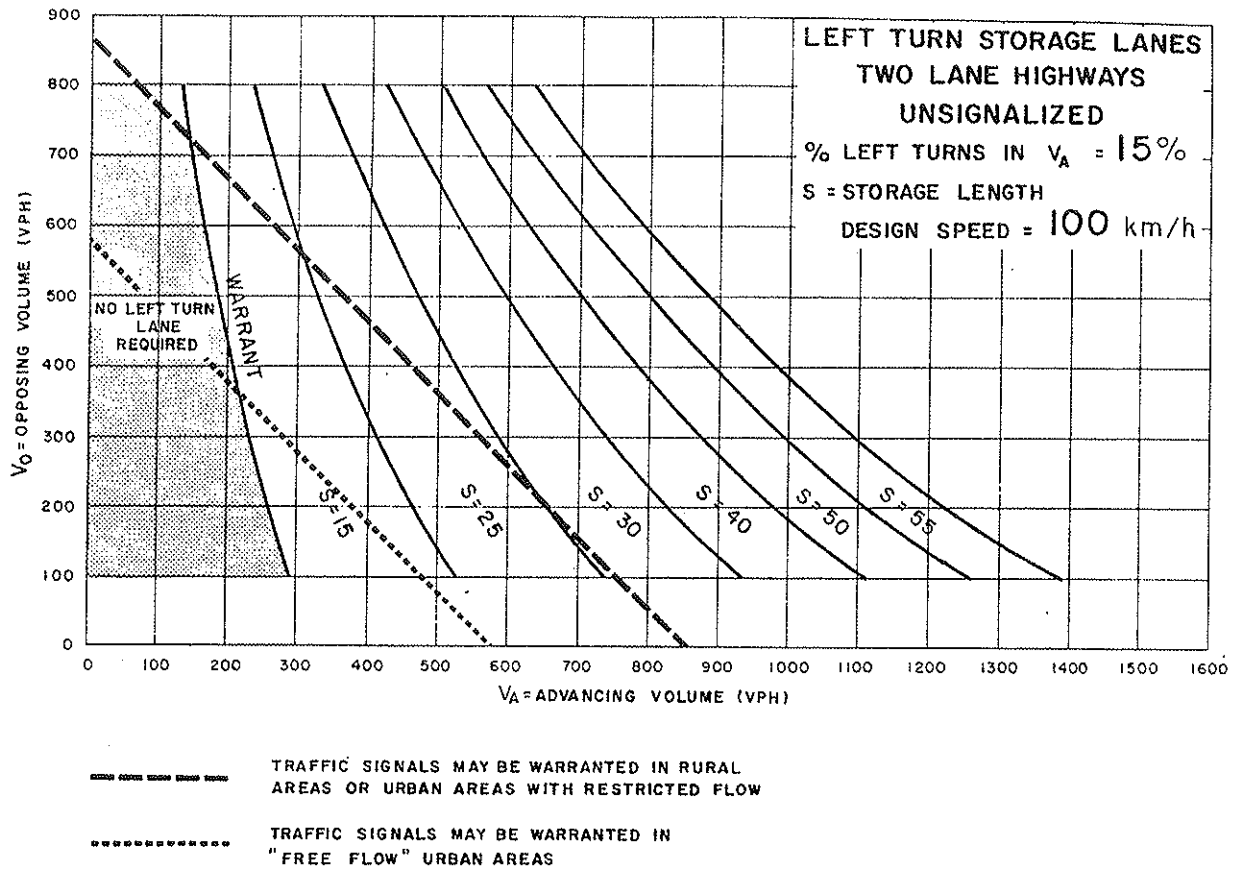


Figure EA-23

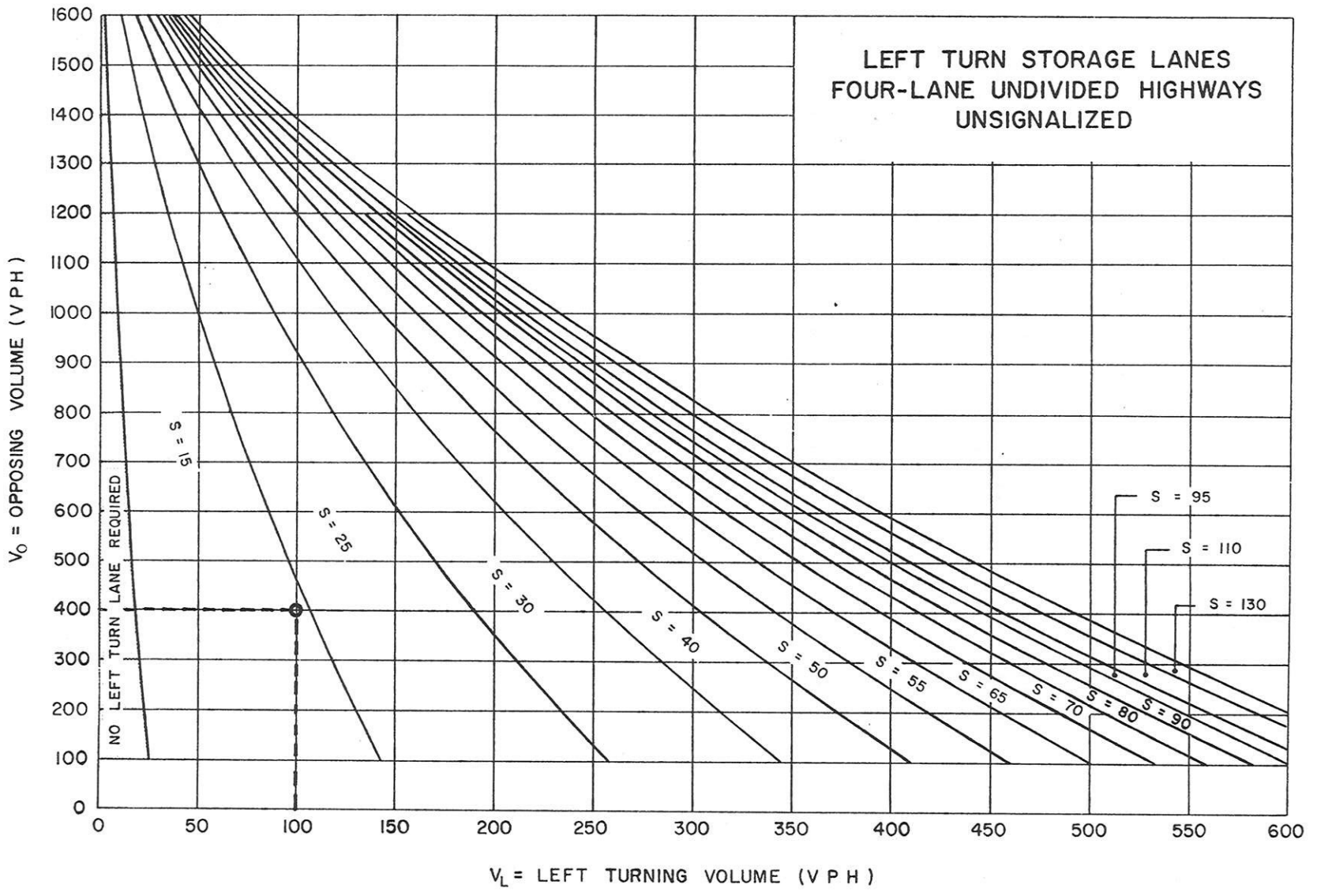


Figure EB-1

APPENDIX J

Adjala-Tosorontio By-Law Excerpts

THE CORPORATION OF THE TOWNSHIP OF ADJALA-TOSORONTIO

BY-LAW NO. 13-14

A BY-LAW TO AMEND ZONING BY-LAW NO. 03-57, AS AMENDED OF THE TOWNSHIP OF ADJALA-TOSORONTIO TO REZONE CERTAIN LANDS ALONG BOTH NORTH AND SOUTH SIDES OF HIGHWAY 89 BETWEEN COUNTY ROAD #50 AND THE LANDS BORDERING THE TOWN OF NEW TECUMSETH SITUATED AT LOT 32 CONCESSIONS 6 & 7 IN THE FORMER TOWNSHIP OF ADJALA AND PART OF LOT 1 CONCESSIONS 6 & 7 IN THE FORMER TOWNSHIP OF TOSORONTIO FOR THE PURPOSES OF IMPLEMENTING AN EMPLOYMENT CORRIDOR

WHEREAS Zoning By-law No. 03-57, as amended, constitutes the comprehensive Zoning By-law for the Township of Adjala-Tosorontio save and except those lands within the Oak Ridges Moraine area and regulates the use of lands and the character, location and the use of buildings and structures within the Township of Adjala-Tosorontio;

AND WHEREAS it is deemed necessary and desirable to further amend By-law No. 03-57, as amended by rezoning the lands described above from their existing zone to the Employment (E) Zone;

AND WHEREAS authority to pass this By-law is provided pursuant to Section 34 of the Planning Act, R.S.O. 1990 c.P. 13, as amended;

AND WHEREAS this By-law amendment will conform to the Official Plan of the Township of Adjala-Tosorontio;

NOW THEREFORE the Council of the Corporation of the Township of Adjala-Tosorontio enacts as follows:

1. **THAT** Schedule "B-8" to By-law 03-57, as amended, is hereby further amended by changing the zoning of Lot 32 Concession 6 and Lot 32 Concession 7 in the former Adjala Township and in Part of Lot 1 Concession 6 and Part of Lot 1 Concession 7 in the former Tosorontio Township from Agriculture (A) Zone, General Commercial (C1) Zone, General Commercial Exceptions 1, 4, and 7 (C1-1, C1-4, C1-7), Highway Service Commercial (C2) Zone, Institutional (I) Zone, Hamlet Residential (HR1) Zone, Hamlet Residential Exceptions 10, 11, and 13 (HR1-10, HR1-11, HR1-13), Estate Residential Zone, General Industrial (M1) Zone, and General Industrial Exceptions 1, 4, and 9 (M1-1, M1-4, M1-9) Zone to Employment (E) Zone, subzone E1, E1 Exceptions (E1-1, E1-2, E1-3) Zone, E-1 Hold (E1(H-1)) Zone, subzone E2, (E2 Exception E2-1) Zone and E-2 Hold (E2(H-1)) on Schedule "A", attached hereto.

2. **THAT** Section 2 Definitions, of By-law 03-57, as amended, is hereby further amended by adding the following:

"2.4 a) Agricultural Supply Outlet shall mean wholesale sales and/or service of agricultural-related products in support of the farming community."

"2.5 a) Animal Hospital or Veterinary Clinic shall mean an office use for the temporary accommodation, care and impoundment of animals within an enclosed building but does not include a kennel."

"2.7 a) Auction Facility shall mean the premises used for the sale of items from time to time, in which the price is determined through bidding and may include a staging area for large items on the day of the sale."

"2.14 a) Cardlock Facility means an unmanned premise where petroleum and propane products are purchased for the use of fleet and/or professional drivers."

"2.29 a) Distribution Facility means a building or structure used to store products for re-distribution, and may include facilities for the service and repair of the vehicles used for distribution."

"2.30 a) Dry Use means a use which uses water for domestic purposes only and results only in the production of domestic sewage. Domestic Sewage includes waste from toilet, kitchen, shower and sink waste from offices, factories, institutions, retail or other similar places of employment and restaurants and banquet halls. Domestic sewage does not include chemical or industrial plant effluent that is used in the manufacturing, fabricating, production or assembly processes nor waste as a result of the wholesale processing of food (such as canning or meat packing)."

"2.44 a) Greenhouses shall mean a building with a glass or plastic roof used for the growing of flowers, fruit, vegetables, plants, shrubs, trees and similar vegetation for any purpose which may include associated retail of plants, supplies and seasonal items."

"2.68 a) Machinery and Equipment Sales and Service shall mean the use of any lot, structure or building where new and/or used equipment for agricultural or construction uses are stored or displayed for sale, rent, or repair."

"2.68 b) Manufacturing, fabricating, assembling and/or processing and operations of materials shall mean the creation or assembling of standardized material by skill or labour for the making or treatment of a product but shall not mean an outdoor bulk storage yard used for materials for storage or sale."

"2.89 a) A Self-Storage Facility shall mean a facility for the temporary storage of household, recreational, commercial or seasonal equipment, vehicles or boats and will generally have a secured storage unit or locker with access by way of a loading door."

"2.90 a) Service Station shall mean a building or structure used for the servicing and repairing of motorized vehicles and trailers, but does not include the sale of petroleum or hydrogen products."

"2.104 a) Wholesale Establishment shall mean the building and premises for the wholesale distribution of products or goods to other wholesale or retail establishments but not including wholesale directly for public retail."

3. **THAT** By-law 03-57, as amended, be further amended by adding Section 21 – Employment (E) Zone comprised of subzones E1 and E2. The E1 Zone is comprised of commercial industrial uses and the E2 Zone is comprised of light industrial park uses :

"Section 21 Employment (E) Zone

21.1 Permitted Uses within the Employment Zone are identified on the following Table 1. Permitted uses in a zone are marked with a letter 'x' in the column for that zone corresponding with the row for that permitted use.

Within the Employment Zone, no person shall use any lot or erect, alter or use any building or structure for any purpose except one or more of the following uses:

Zone	E1 Zone	E2 Zone
Agricultural and Related Uses		
An agricultural supply outlet	X	
An animal hospital or veterinary clinic	X	X
A farm produce storage facility	X	
A feed mill	X	X
Greenhouses	X	
A welding or machine shop	X	
Machinery & equipment sales and service establishment	X	
A seed cleaning plant	X	
Automotive and Related Uses		
A bus or trucking operation	X	X
Cardlock Facility	X	X
Distribution Facility		X
A parking lot, parking structure or commuter lot	X	X
Service Station	X	X
Building Trades and Related Uses		
A contractor or trades shop	X	
A saw mill	X	X
General Industrial and Related Uses		
An auction facility	X	
Manufacturing, fabricating, assembling and/or processing of materials and operations		X
A self storage facility	X	X
A warehouse	X	X
A wholesale establishment	X	
Existing uses at the time of passage of the By-law	X	X

21.2 Zone Requirements

Within the Employment (E) Zone, no person shall use any lot, or erect, alter, or use any building or structure for any purpose except in accordance with the following provisions:

Zone	Use	Lot Standard (m)			Yard Standard (m)			
		Frontage (metres)	Area (ha)	Maximum Coverage	Front	Int Side	Ex Side	Rear
E1	Private services	60m	.8	25%	15.0	5.0	15.0	7.5
	Municipal Services	30m	.4	50%	10.0	5.0	10.0	7.5
E2	Private Services	60m	.8	30%	15.0	5.0	15.0	5.0
	Municipal Services	30m	.4	50%	10.0	5.0	10.0	5.0

21.2.1 All development is subject to Ministry of Transportation review and approval within the required MTO setbacks. All development fronting County Road #50 is subject to County of Simcoe review and approval within their required setbacks;

21.2.2 Building Heights shall correspond with provisions set out in Section 3 General Provisions of By-law 03-57.

21.3 Parking and Loading Spaces shall be provided in accordance with Section 3.12 and 3.24 of By-law 03-57, and the following:

21.3.1 All entrances, aisles, loading and parking areas shall be surfaced with a hard surface such as asphalt, concrete or interlock paving stone so as to provide a surface that is durable and dust free.

21.3.2 Parking and loading areas shall not be located between Highway 89 and the closest building exterior. Parking and loading areas located on the interior or exterior side yards shall be effectively screened with suitable landscaping.

21.3.3 Minimum parking requirements for the E1 and E2 zones are set out in Table 2 below. In the event of a conflict with Section 3.24 of Zoning By-law 03-57, the more stringent parking standard shall apply:

.1	Agricultural Supply Outlet, Greenhouses and Self-Storage Facility	1 space per 35m ² (377 ft ²) of total gross floor area with a minimum of 25 spaces
.2	Auction Facility	1 space per 30m ² (323 ft ²) of gross floor area
.3	Service Station	3 spaces / service bay plus one space for every 20m ² (215 ft ²) of net floor space for office uses
.4	Cardlock Facility	3 spaces (minimum)
.5	Distribution Facility	1 space per 20m ² (215ft ²) of gross floor area plus 1 space for every 150m ² (1615ft ²) of gross floor area of non-office component
.6	Bus or Trucking Operation	1 parking space per 100m ² (1076 ft ²) of gross floor area or 1.5 spaces per employee per shift, whichever is more stringent
.7	Contractor, Trades Shop including a Welding or Machine Shop	1 parking space per 35m ² (377 ft ²) of gross floor area
.8	Farm Produce Storage Facility, Feed Mill, Saw Mill and Seed Cleaning Plant	1 parking space per 50m ² (538 ft ²) of gross floor area
.9	Animal Hospital or Veterinary Clinic	5 spaces per practitioner
.10	Machinery and Equipment Sales and Service Establishment	1 parking space per 19m ² (204.5 ft ²) of gross floor area
.11	Manufacturing, Fabricating, Assembling and/or Processing of Material and Operations	1 parking space per 50m ² (538 ft ²) of gross floor area or 1.5 spaces per employee per shift, whichever is more stringent
.12	Parking Lot, Parking Structure	1.5 spaces per employee
.13	Warehouse or Wholesale Establishment	1 parking space per 100 m ² (1076 ft ²) of gross floor area or 1.5 parking spaces per employee per shift, whichever is more stringent

21.4 Special Provisions

- 21.4.1 Where development abuts a zone permitting residential uses, either a continuous landscape buffer having a minimum width of 2.0 metre (6.6 feet) or a continuous 2.0 metre (6.6 feet) high tight board fence shall be provided on all common lot lines shall be provided as a minimum treatment.
- 21.4.2 Generally, no outside storage or inventory is to be permitted within any yard located between Highway 89 and the closest building exterior. Outside storage may be permitted through Site Plan so long as visual screening, using a combination of berming, opaque fencing and/or effective landscape treatment, is provided. The maximum height for permitted storage shall not exceed 5 m (16.4 ft).
- 21.4.3 In addition to landscape treatment required under Site Plan approval, a continuous 5.0m landscape buffer shall be provided to the satisfaction of the Township on all lots abutting Highway 89.
- 21.4.4 All development shall provide structures to contain garbage or refuse and be approved under Site Plan Control.
- 21.4.5 All development is subject to Site Plan Control as approved by Council or as delegated. Each site plan shall provide the appropriate Site Plan Layout, Site Grading/Serviceing, Landscape and Architectural Plans by their respective qualified professional in accordance with By-law 01-17 as amended.
- 21.4.6 The continuation of existing residential uses are permitted.
- 21.4.7 Site Plan approval shall be subject to the completion and acceptance by the Township of a Market Study if the size of any single use structure proposed within the Employment (E) Zone is greater than 3,252m² (35,000 ft²) in area. The Market Study shall be peer reviewed in accordance with Township Official Plan policies.
- 21.4.8 Uses permitted under the Employment (E) Zone are permitted accessory retail for products created on-site.

21.5 Holding Provisions

- 21.5.1 The Holding provision, indicated by the symbol 'H' preceding a zone classification sets out that a holding by-law is in force and further development is held until Council is satisfied that certain conditions have been met. To remove the holding symbol 'H', it is necessary to amend this Zoning By-law.
- 21.5.2 Where an existing dwelling unit is located on lands subject to the Holding symbol 'H', an addition or alteration to that dwelling is permitted while the holding symbol is in effect. Such addition or alteration shall be undertaken in conformity with the provisions of Employment Lands (E) Zone.

21.5.3 Any land that is subject to the Holding symbol 'H' shall maintain its lot area and lot frontage as it existed on the day of passing of this zoning by-law.

21.5.4 All lands within the Employment Lands (E) Zone are subject to a Hold (H) provision which may only be considered for removal following the approval and registration of a Site Plan Agreement.

21.5.5 All lands abutting an Open Space Conservation (OSC) Zone or an Open Space Recreation (OSR) Zone will require the preparation and acceptance of Floodplain mapping and/or Meanderbelt or similar studies, as required, to the satisfaction of the Nottawasaga Valley Conservation Authority and the Township of Adjala-Tosorontio prior to the removal of any Hold (H-1).

21.6 Zone Exceptions:

21.6.1 Schedule B-8, Part of the West Part of Lot 32, Concession 7, Highway 89 (Adjala), PIF: 010-003-123-00

Notwithstanding anything to the contrary found in this By-law, the lands zoned E1-1 shall be used for an Ambulance Service and accessory uses in addition to the permitted uses in the E Zone.

All other provisions of the Employment (E) Zone shall apply.

21.6.2 Schedule B-8, Part Lot 1, Concession 7, Tosorontio By-law 91-49, PIF: 020-002-073-00

Notwithstanding anything to the contrary found in this By-law, the lands zoned E1-2 shall be subject to the following provisions:

- i) The minimum lot frontage shall be 20 metres;
- ii) The minimum lot area shall be 800 square metres;
- iii) The minimum lot depth shall be 39 metres;
- iv) The buildings existing on the property on the date of passage of this By-law shall be deemed to comply with the interior side yard and rear setback requirements of the Employment Lands (E) Zone.

All other provisions of the Employment (E) Zone shall apply.

21.6.3 Schedule B-8, Part of the East Half of Lot 1, Concession 6 being Block 16 on Plan 51M-502, 4936 Dean Drive, Tosorontio By-law 00-5, PIF: 020-002-030-16-00

Notwithstanding anything to the contrary found in this By-law, the following provisions shall apply to lands zoned E2-1:

The minimum distance between a light industrial use and any residential use shall be 30 metres.

All other requirements of the Employment (E) Zone shall apply.

21.6.4 Schedule B-8, Part of the West Part Lot 32, Concession 6 (Adjala) PIF: 010-003-086-00

Notwithstanding anything to the contrary found in this By-law, the following provisions shall apply to the lands zoned E1-3:

A ready-mix concrete batching plant and portable asphalt plant shall be permitted uses on this site along with the necessary ancillary uses such as truck storage and outdoor storage of aggregate materials.

All other provisions of the Employment (E) Zoning shall apply.

21.7 **THAT** Schedule "A" is hereby declared to form part of this By-law.

21.8 **THAT** this By-law shall come into force on the date of passage and take effect the day after the last date for filing a notice of appeal where no notice of appeal is received, or, where a notice of appeal is received, upon the approval of the Ontario Municipal Board, and, in either case, in accordance with the provisions of the Planning Act, R.S.O. 1990, Ch. P.13, as amended.

21.9 **THAT**, notwithstanding anything contrary to the rules of procedure, this By-law, having been introduced and read a first and second time this 2nd day of April, 2013.

AS AMENDED BY ONTARIO MUNICIPAL BOARD DECISION PL130594 DATED OCTOBER 30, 2013

MAYOR TOM WALSH

AS AMENDED BY ONTARIO MUNICIPAL BOARD DECISION PL130594 DATED OCTOBER 30, 2013

CLERK BARBARA KANE

21.10 Read and considered a third time and finally passed this 6th day of May, 2013.

AS AMENDED BY ONTARIO MUNICIPAL BOARD DECISION PL130594 DATED OCTOBER 30, 2013

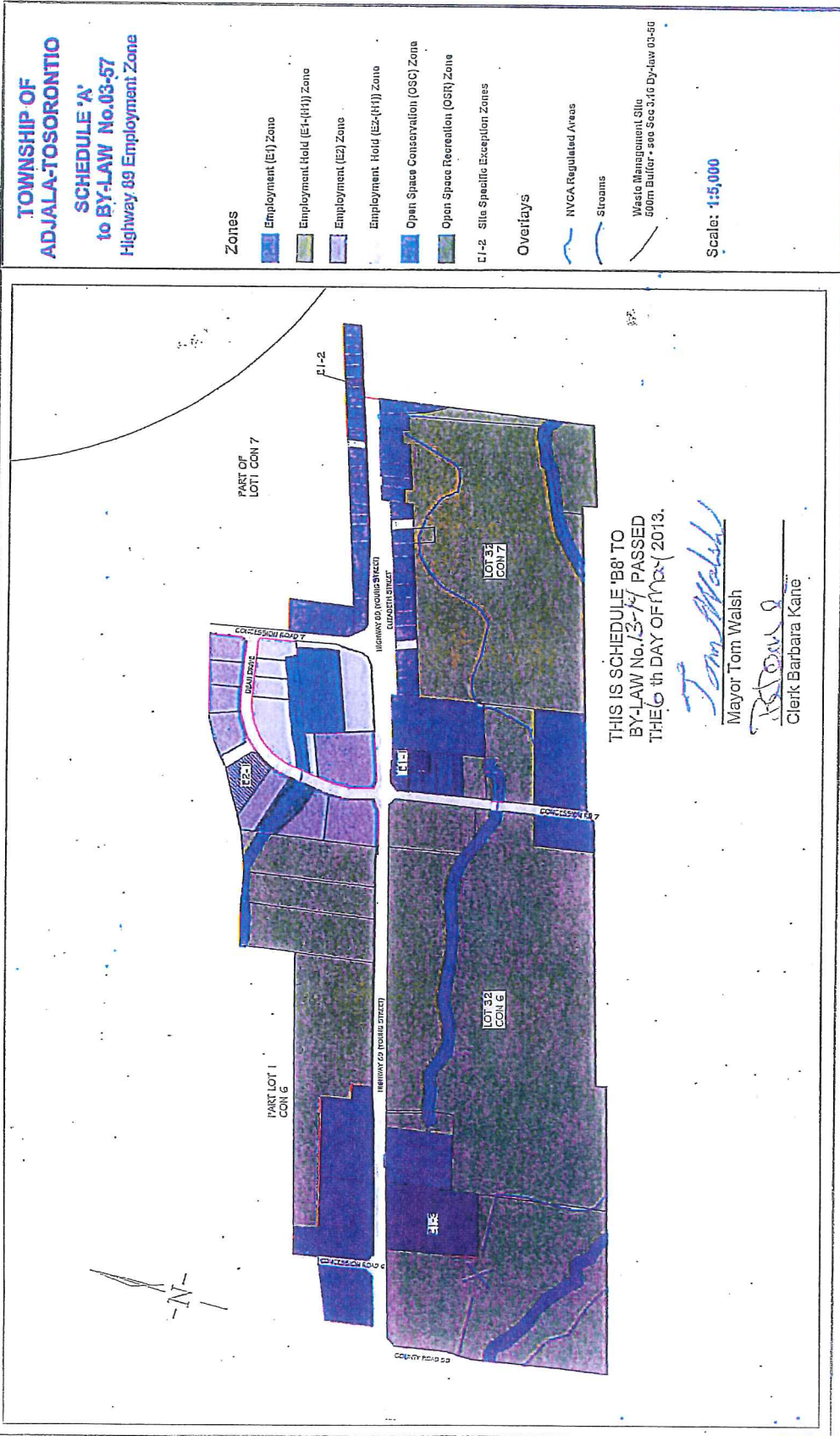
MAYOR TOM WALSH

AS AMENDED BY ONTARIO MUNICIPAL BOARD DECISION PL130594 DATED OCTOBER 30, 2013

CLERK BARBARA KANE

AS AMENDED BY ONTARIO MUNICIPAL BOARD DECISION PL130594
 DATED OCTOBER 30, 2013

Schedule 'A' to By-law No. 13-14



APPENDIX K

MTO Highway Access Management Guidelines Excerpts

Figure 5: Highways in the Access Management Classification System - Southern Ontario

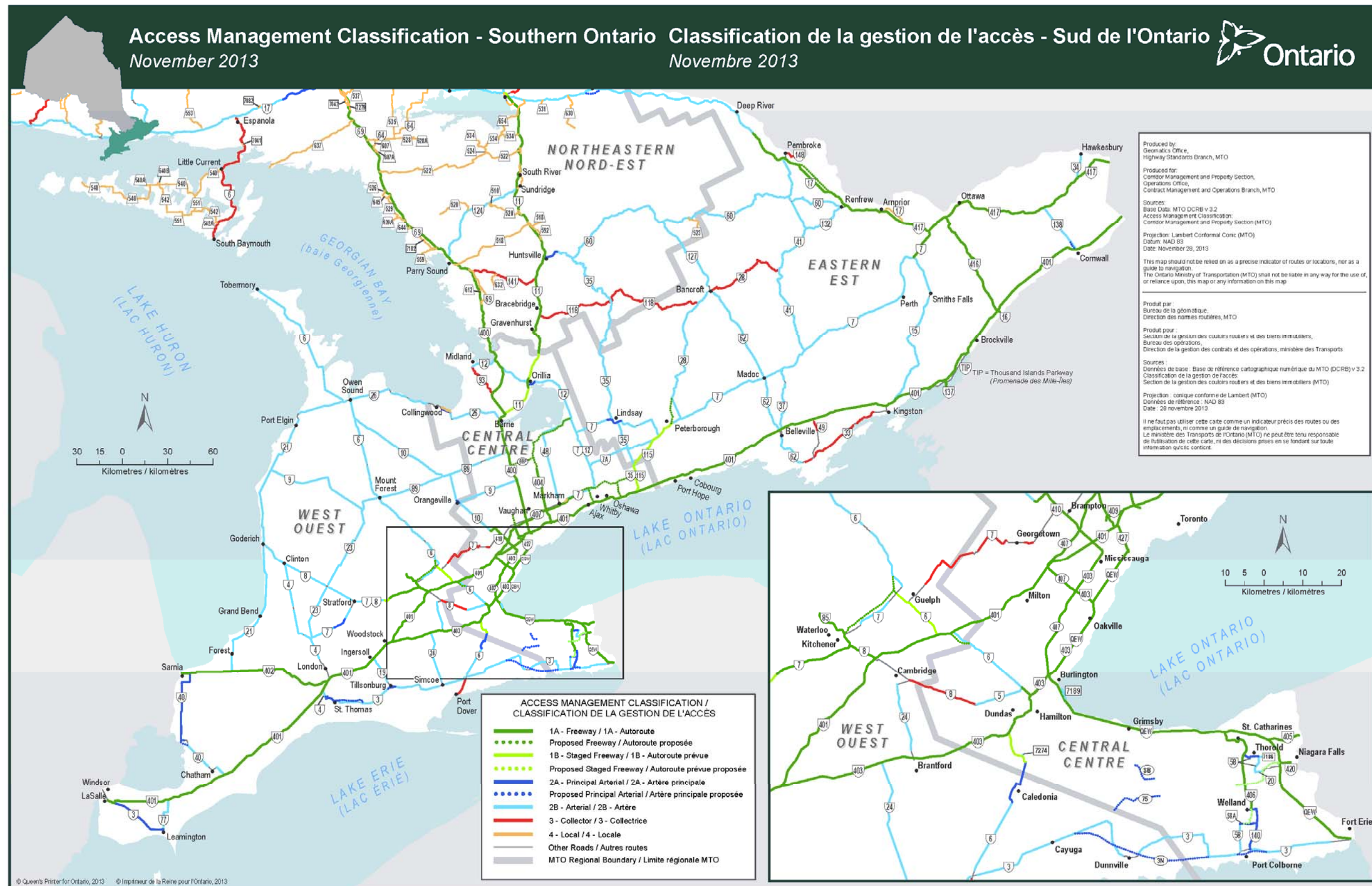


Table 4: Summary of standards for the spacing and density of various access connection types

Highway Access Management Classification System Category		Controlled-Access Highway (CAH) or King's Highway (KH)	Minimum Interchange Spacing*	Public Road Intersection Spacing Signalized / Unsignalized	Commercial / Private Road Access Spacing Signalized / Unsignalized**	Total Private Access Density*** / km / side	Minimum Total Pre-Severance Frontage Requirement for the Creation of a New Lot of Record****	
							New Access Connection	Mutual Access
1A -	Freeway	Fully CAH	3.0 - 8.0 km - Desirable 2.0 km - Minimum	N/A	N/A	N/A	N/A	N/A
1B -	Staged Freeway			3.0 - 8.0 km - Desirable ^a 2.0 km - Minimum ^a	N/A	N/A	N/A	N/A
2A -	Principal Arterial	Fully CAH	3.0 - 8.0 km - Desirable 2.0 km - Minimum	3.0 - 8.0 km - Desirable ^a 2.0 km - Minimum ^a	N/A	N/A	N/A	N/A
2B -	Arterial	CAH / KH	N/A	1600 m – Desirable ^b 800 m - Minimum ^c	1600 m – Desirable ^b 800 m - Minimum ^c	4	500 m	250 m
3 -	Collector	KH	N/A	800 m - Minimum ^c	800 m - Minimum ^c	6	300 m	150 m
4 -	Local	KH	N/A	400 m - Minimum ^c	400 m - Minimum ^c	8	250 m	125 m

(The colours shown above correspond to the colour for each Access Management Classification system category of the proposed highway on the maps in [Figure 6](#) and [Figure 7](#).)

All existing access connections to legal lots of record are permitted to remain. Creation of a new access connection for the creation of a new lot (e.g. severance by consent) or change in access connection use (e.g. land use change – Residential / Farmstead to Commercial) is strictly controlled in accordance with this chart and the Highway Access Management Guideline.

* *Desirable or minimum* spacing between interchanges is measured from the centre point of the crossing road from one interchange to the centre point of the crossing road of the next interchange

** New Commercial / Private Road access connections will only be considered if there is no existing Public Road or other Commercial / Private Road access located within the specified spacing requirement, regardless of which side of the highway it is located. New Commercial / Private Road access connections shall be located in accordance with the specified spacing requirement, which is measured from the centreline of the existing Public Road or other Commercial / Private Road.

***Total Private Access Density per km per side is the maximum density for any one side of the highway. The creation of a new access connection for the creation of a new lot (e.g. severance by consent) will only be considered if the Access Density can accommodate the new access connection, regardless if the Minimum Total Pre-Severance Frontage Requirement is met. Should the Access Density be maximized, but the total frontage of the lot of record equals or exceeds the Minimum Total Frontage Requirement for a new access connection, a Mutual Access may be considered provided it meets all other requirements outlined in the Mutual Access section of this guideline.

**** The creation of a new access connection for the creation of a new lot (e.g. severance by consent) requires that the lot of record meet the Minimum Total Pre-Severance Frontage Requirements for a new access connection, in addition to the Access Density requirement. Where the total pre-severance frontage is less than the minimum for a new access connection, a Mutual Access may be considered provided it meets the Minimum Total Pre-Severance Frontage Requirements for a Mutual Access and all other requirements outlined in the Mutual Access section of this guideline.

^a New Public Road connections will only be considered at approved locations for future grade-separated interchanges.

^b MTO requires all requests for new Public Roads or new Commercial / Private Roads to meet the 1600 m desirable spacing as indicated. Consideration by MTO to reduce the spacing below 1600 m to any point down to and including the 800 m minimum will only be considered based on the submission of a Traffic Impact Study. The Traffic Impact Study shall clearly indicate and support a reduction in spacing that will not affect the overall role, function, mobility and design characteristics of the highway corridor.

^c Minimum spacing is based on a 70 km/h posted speed limit or greater on the highway. MTO will consider a reduction in the Public Road or Commercial / Private Road spacing requirement where the posted speed limit is lower than 70 km/h based on the submission of a Traffic Impact Study and the recommended reduction meets the requirements of Ontario Traffic Manual Book 12. MTO will work cooperatively with municipalities/developers to determine appropriate intersection spacing and other roadway characteristics where needed to support intensification and more compact development within communities.

5.4.4 Number of private access connections permitted per kilometre (Access Density)



The access density calculation determines the maximum number of private access connections permitted per kilometre on each side of the highway. If there are already a maximum number of private access connections, MTO will typically decline the permit application (although it may consider a [mutual access](#) connection, discussed in section [5.5.8](#)).

Access density refers to the number of private access connections per kilometre on each side of a highway. The higher the Access Management Classification of the highway, the lower the access density permitted.

To determine the total access density permitted for a class of highway, MTO measures the distance in metres between existing intersections from centreline to centreline, and then multiplies this distance by the Access Density Factor from [Table 5](#). Each class of highway has its own Access Density Factor.

Table 5: Access density factors for creating a new lot of record

Access Management Classification System Category	Access Density /km/side	Access Density Factor
2A – Principal Arterial	N/A	N/A
2B – Arterial	4/km/side (4/1000 m)	.004
3 – Collector	6/km/side (6/1000 m)	.006
4 – Local	8/km/side (8/1000 m)	.008

Figure 11: Functional Intersection Area - Desirable Offset Spacing Criteria - Private Access Connections

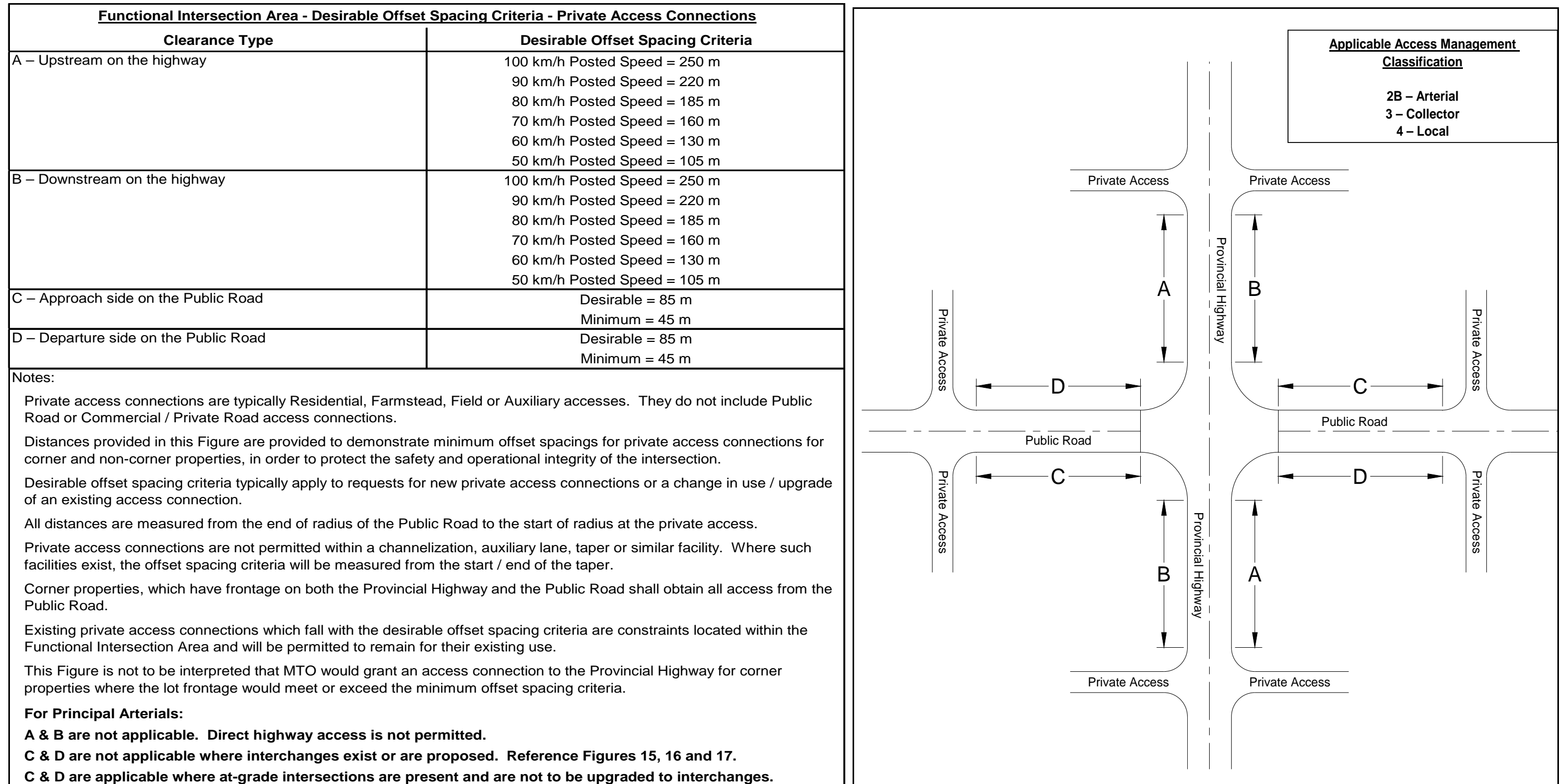
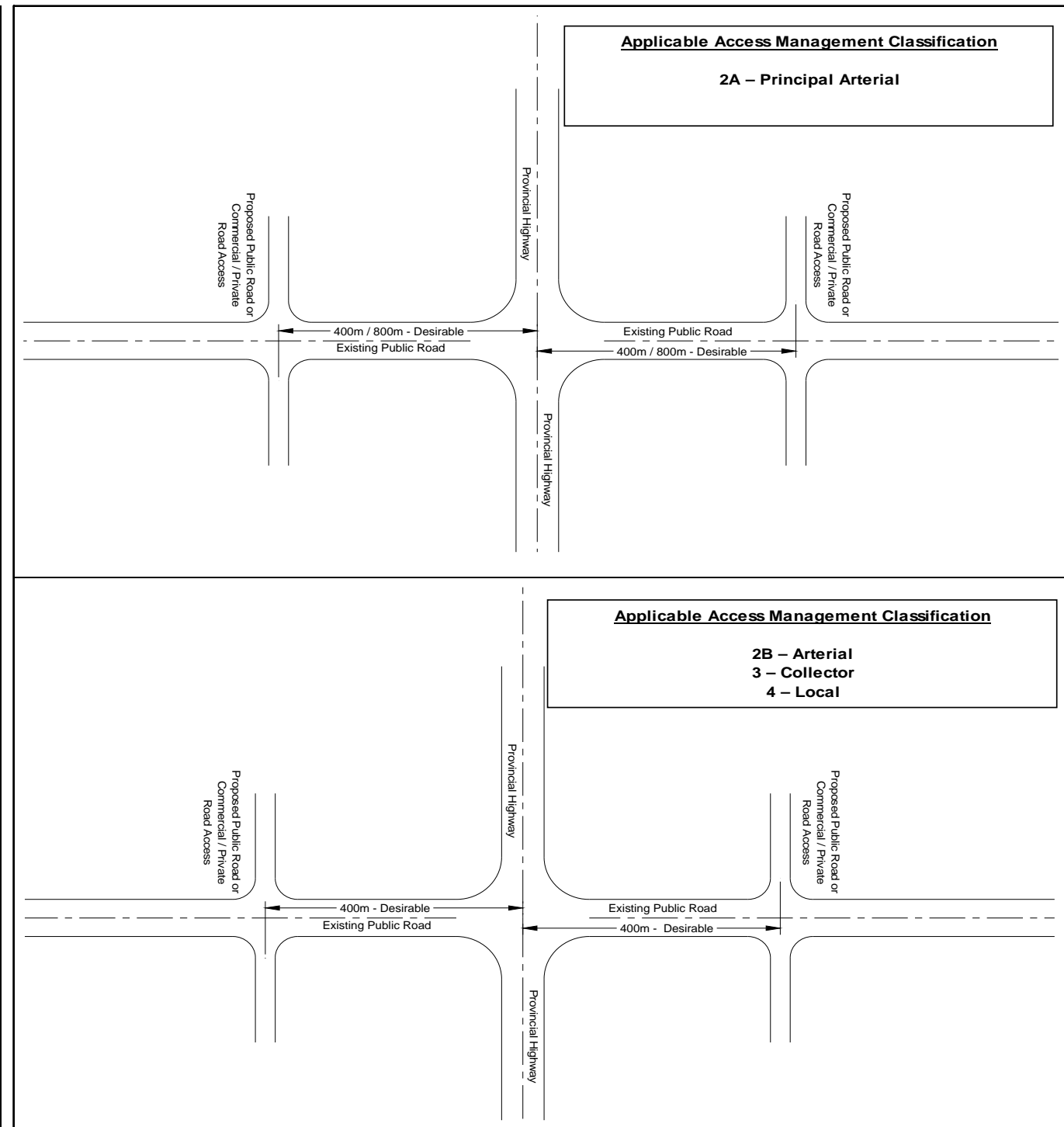
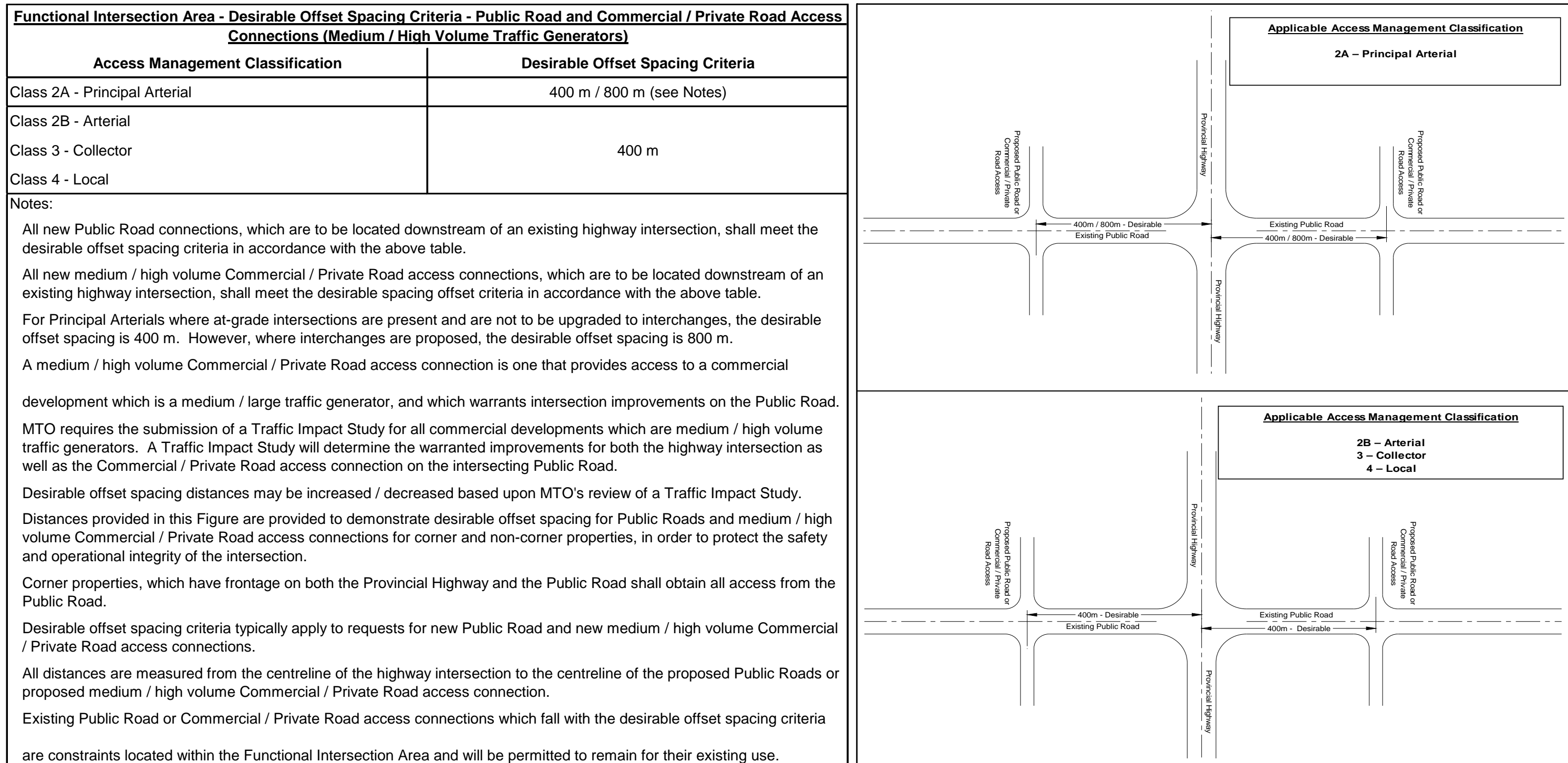
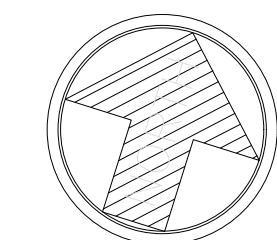


Figure 13: Functional Intersection Area - Desirable Offset Spacing Criteria – Public Road and Medium / High Volume Commercial / Private Road Access Connections



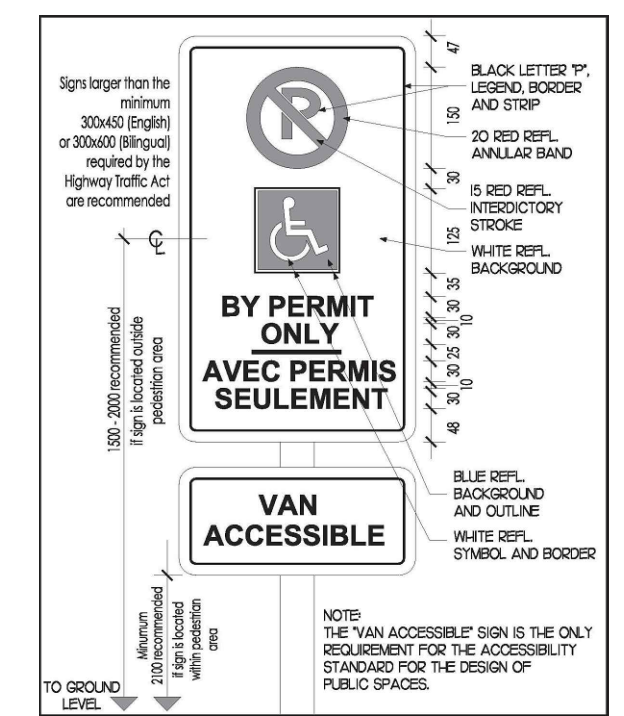
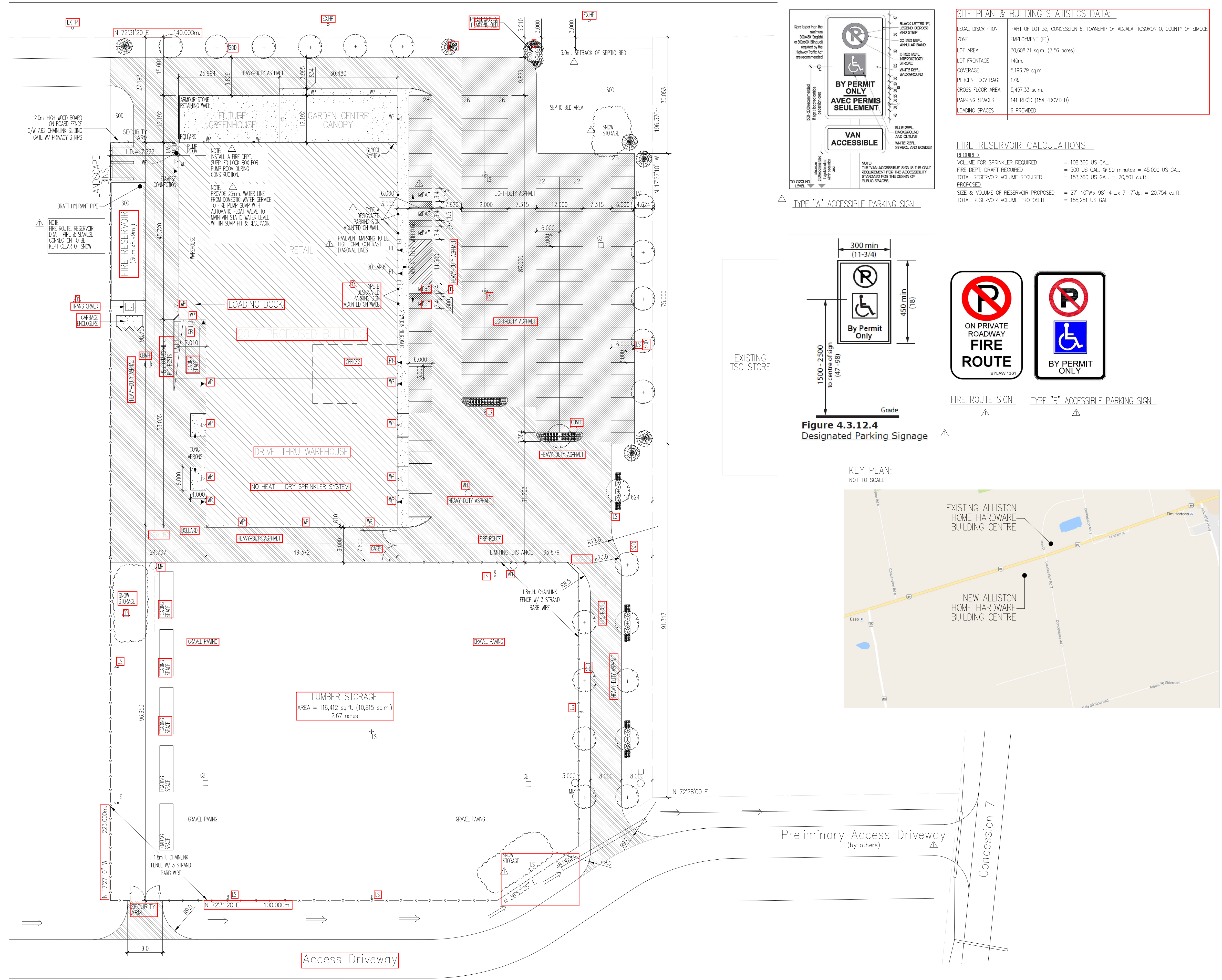
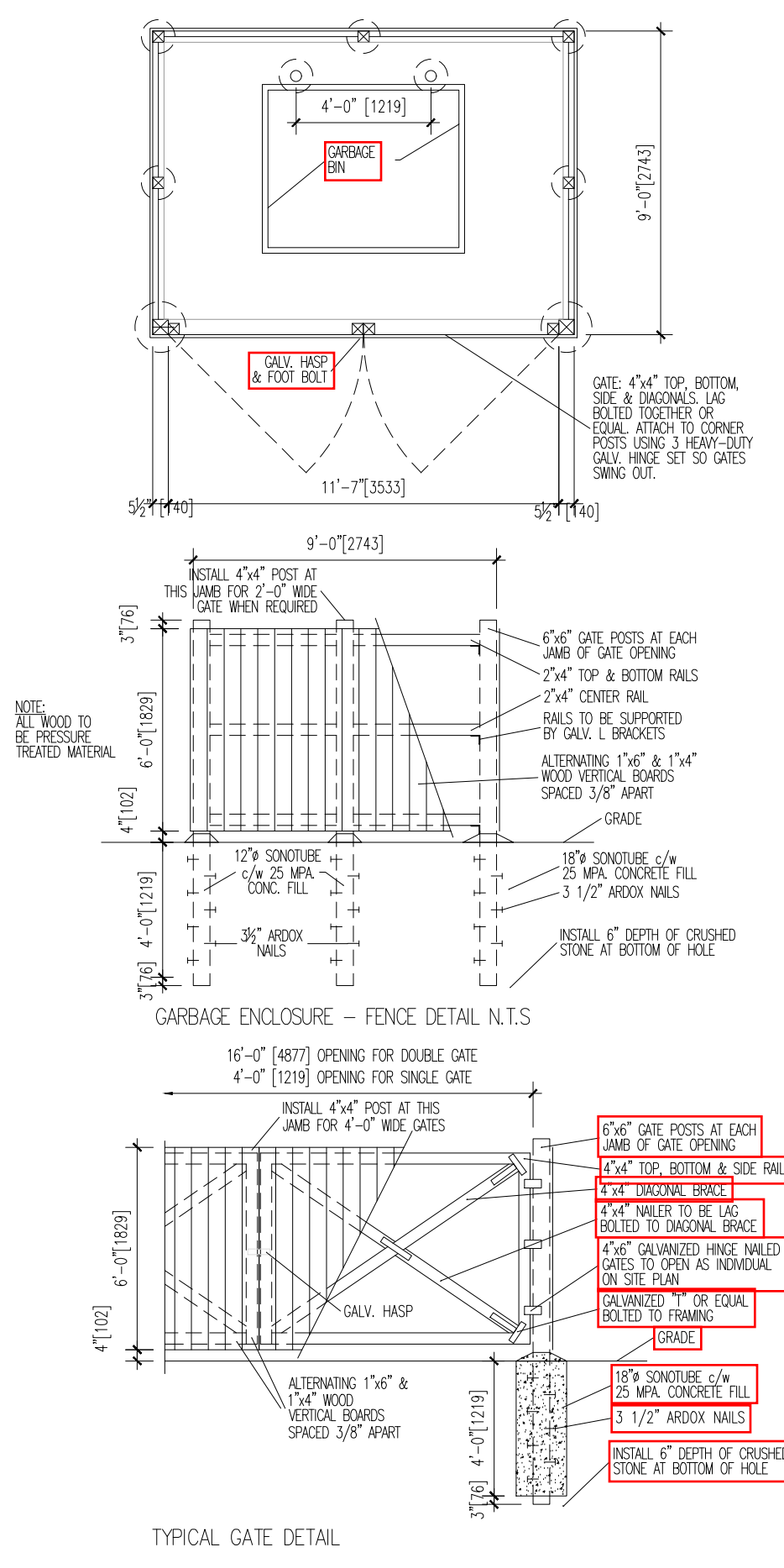
APPENDIX L

Home Hardware Site Plan



Part 1 of Lot 32
(Lot Adjacent to TSC Store)
Concession 6
TOWNSHIP of ADJALA-TOSORONTO
COUNTY of SIMCOE

Kings Highway #81



TYPE "A" ACCESSIBLE PARKING SIGN

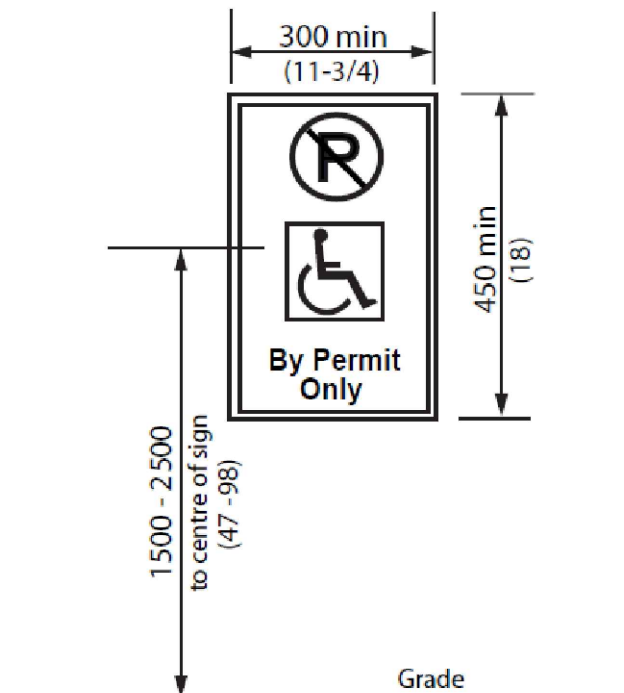
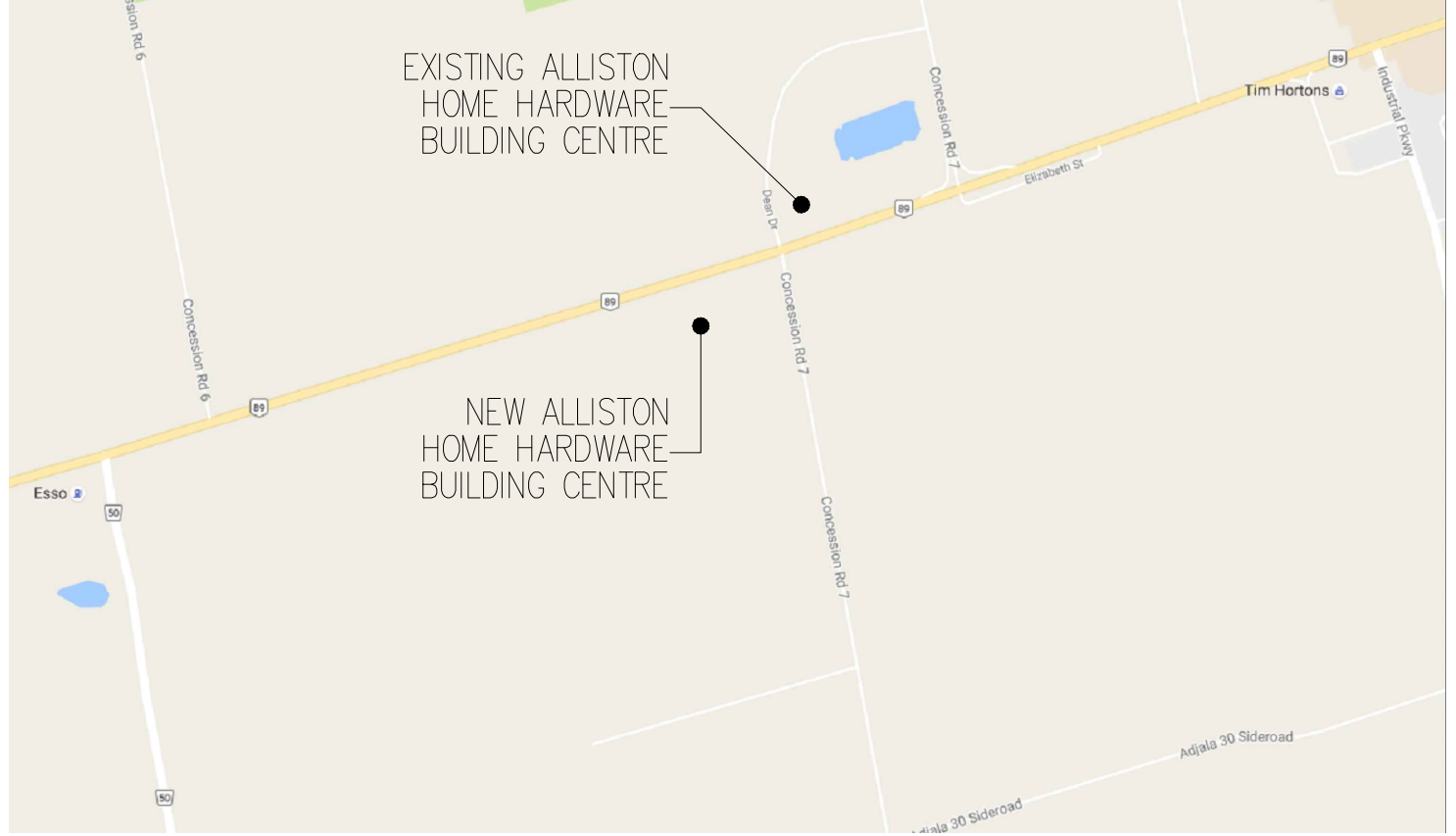


Figure 4.3.12.4 Designated Parking Signage

KEY PLAN:
NOT TO SCALE

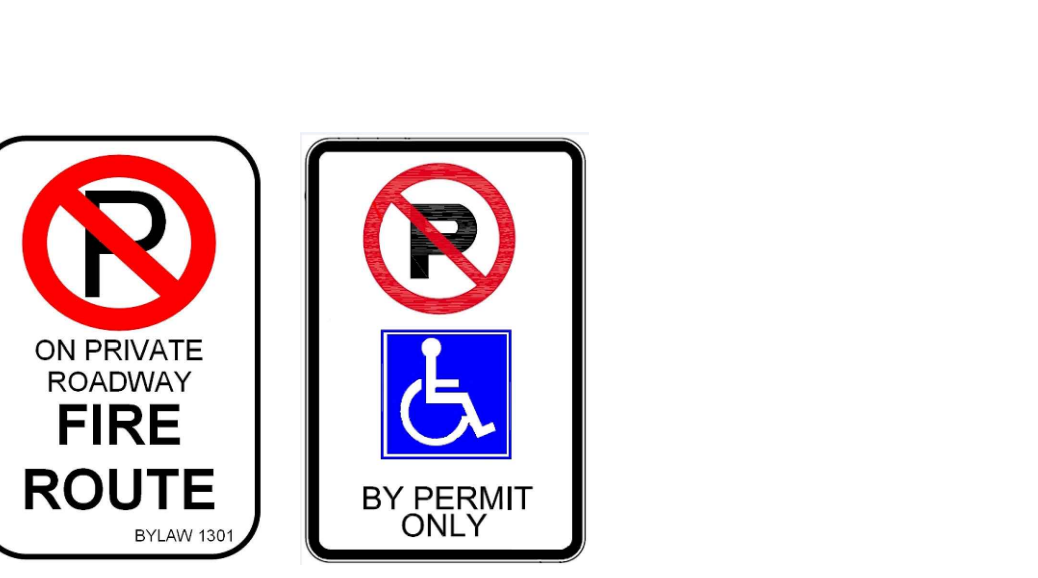


SITE PLAN & BUILDING STATISTICS DATA:

LEGAL DESCRIPTION	PART OF LOT 32, CONCESSION 6, TOWNSHIP OF ADJALA-TOSORONTO, COUNTY OF SIMCOE	
EMPLOYMENT (E1)	5	
LOT AREA	30,608.71 sq.m. (7.56 acres)	
LOT FRONTAGE	140m	
COVERAGE	5,196.79 sq.m.	
PERCENT COVERAGE	17%	
GROSS FLOOR AREA	5,457.33 sq.m.	
PARKING SPACES	141 REOD (154 PROVIDED)	
LOADING SPACES	6 PROVIDED	

FIRE RESERVOIR CALCULATIONS

REQUIRED:		
VOLUME FOR SPRINKLER REQUIRED	= 108,360 US GAL	
FIRE DEPT. DRAFT REQUIRED	= 500 US GAL @ 90 minutes = 45,000 US GAL	
TOTAL RESERVOIR VOLUME REQUIRED	= 153,360 US GAL = 20,501 cu.ft.	
PROPOSED:		
SIZE & VOLUME OF RESERVOIR PROPOSED	= 27'-10" W x 98'-4" L x 7'-7" Dp. = 20,754 cu.ft.	
TOTAL RESERVOIR VOLUME PROPOSED	= 155,251 US GAL	



FIRE ROUTE SIGN TYPE "B" ACCESSIBLE PARKING SIGN

LEGEND:

- ENTRANCE / EXIT DOOR
- OH DOOR / DOCK DOOR
- FENCE
- LIGHT-DUTY ASPHALT
- HEAVY-DUTY ASPHALT
- CONCRETE
- SOD
- LS LIGHT STANDARD
- WP WALL PACK LIGHT

SITE DATA:

SITE AREA	30,608.71 sq.m. = 329,469.41 sq.ft.
BUILDING AREA	5,196.79 sq.m. = 55,937.78 sq.ft.
HEAVY-DUTY ASPHALT AREA	6,483.04 sq.m. = 69,782.86 sq.ft.
LIGHT-DUTY ASPHALT AREA	4,059.26 sq.m. = 43,633.51 sq.ft.
CONCRETE AREA	1,163.49 sq.m. = 12,545.12 sq.ft.
GRAVEL AREA	10,501.67 sq.m. = 113,039.04 sq.ft.
SOD & LANDSCAPING	3,202.47 sq.m. = 34,471.10 sq.ft.

BUILDING DATA:

BUILDING AREA	= 5,196.79 sq.m.
RETAIL AREA	= 2,802.86 sq.m.
GROUND FLOOR OFFICE AREA	= 196.57 sq.m.
OFFICE MEZZANINE AREA	= 2,197.36 sq.m.
WAREHOUSE AREA	= 70.48 sq.m.
GROSS FLOOR AREA	= 5,457.33 sq.m.
GARDEN CENTRE AREA UNDER CANOPY	= 371.61 sq.m.

O.B.C. DATA:
BUILDING CLASSIFIED AS GROUP E
CONFORMING TO SECTION 3.2.2.6B
ONE STREET PARALLEL PARKING 1 STREET
COMBUSTIBLE OR NON-COMBUSTIBLE CONSTRUCTION PERMITTED
SPRINKLED

PARKING:

PARKING REQUIRED	1/30 sqm of GROSS FLOOR AREA
RETAIL	2,802.82/30 = 94
OFFICE	1/30 sqm of G.F.A.
WAREHOUSE	2,802.84/30 = 94
GARDEN CENTRE	1/30 sqm
	371.61/30 = 12
TOTAL REQUIRED	= 141 SPACES
PARKING PROVIDED	= 147 SPACES INCL. 5 BARRIER-FREE
PARKING SPACE	= 3,066.0m
H.C. PARKING SPACE	
TYPE A	= 3.4m x 5.5m (3)
TYPE B	= 2.4m x 5.5m (2)
LOADING SPACE	= 3.5m x 12m
1 SPACE PER 1000 sqm	= 5,457.33/1000 = 6 SPACES REOD
6 SPACES PROVIDED	

GARAGE:
GARAGE IS BEING STORED OUTSIDE OF BUILDING IN AN ENCLOSURE AWAY FROM PUBLIC VIEW

BARRIER-FREE ACCESS:
BARRIER-FREE ACCESS FROM PARKING AREA TO PRINCIPAL ENTRANCE IS PROVIDED. EXTERIOR WALKS SHALL HAVE A FIRM SLIP RESISTANT SURFACE, WITH AN UNINTERRUPTED WIDTH OF NOT LESS THAN 1.5m, & A GRADIENT NOT EXCEEDING 1% OR BE FREE FROM OBSTRUCTIONS FOR THE FULL WIDTH & HAVE A 1.67m x 1.67m LEVEL AREA ADJACENT TO THE ENTRANCE DOORWAY.

LANDSCAPING:
REFER TO LANDSCAPE PLAN DRAWING L1

SIGNAGE:
DESIGN & LOCATION OF BUILDING SIGNAGE TO BE DETERMINED AND THEN APPROVED BY THE TOWNSHIP OF ADJALA-TOSORONTO PRIOR TO INSTALLATION

SITE SERVING & GRADING:
REFER TO SITE SERVING & GRADING PLAN DRAWING FOR SITE SERVICES AND GRADING BY K-SMART & ASSOCIATES

SITE LIGHTING:
REFER TO SITE LIGHTING PLAN DRAWING S1 FOR SITE LIGHTING BY MIGHTON ENGINEERING

02/28/2017	ADJUSTED PROPERTY TO MATCH SURVEY, FIRE ROUTE ADJUSTED, SIGN RELOCATED, SEPTIC AREA ENLARGED & SETBACK ADDED, BARRIER-FREE PARKING SPACE ADJUSTED, PRELIMINARY ACCESS DRIVEWAY SHOWN, FIRE NOTES ADDED, SNOW STORAGE ADDED, HYDRO TRANSFORMER ADDED
------------	---

NO.	DATE	REVISION

SCHIEDEL
CONSTRUCTION INCORPORATED
GENERAL CONTRACTORS - PROJECT MANAGERS
405 QUEEN ST. W. CAMBRIDGE ONT. N3C 1G6 519-658-9317
email address: reception@schiedelconst.com

PROJECT
2017 NEW FACILITY
MOULTON PROPERTIES INC.
(ALLISTON HOME HARDWARE BUILDING CENTRE)
Highway #89
Alliston, Ontario

SCALE	DATE	DRAWN BY	PROJECT NO.
1:500	Dec./2016	AS	2016-15

DRAWING	DRAWING NO.
SITE PLAN	1

FIGURES

Figure 1: Site Location Plan

Figure 2: Boundary Road Network

Figure 3: Existing Entrances (1/2)

Figure 4: Existing Entrances (2/2)

Figure 5: 2017 Existing Traffic Volumes

Figure 6: Background Primary Trip Distribution – Home Hardware

Figure 7: Background Pass-By Trip Distribution – Home Hardware

Figure 8: Background Primary Trip Assignment – Home Hardware

Figure 9: Background Pass-By Trip Assignment – Home Hardware

Figure 10: Background Total Trip Assignment – Home Hardware

Figure 11: 2026 Future Background Traffic Volumes – Home Hardware

Figure 12: 2031 Future Background Traffic Volumes – Home Hardware

Figure 13: 2036 Future Background Traffic Volumes – Home Hardware

Figure 14: Total Primary Trip Distribution – Home Hardware + Industrial

Figure 15: Total Pass-By Trip Distribution – Home Hardware

Figure 16: Total Primary Trip Assignment – Home Hardware

Figure 17: Total Pass-By Assignment – Home Hardware

Figure 18: Total Trip Assignment – Industrial

Figure 19: 2026 Future Total

Figure 20: 2031 Future Total

Figure 21: 2036 Future Total

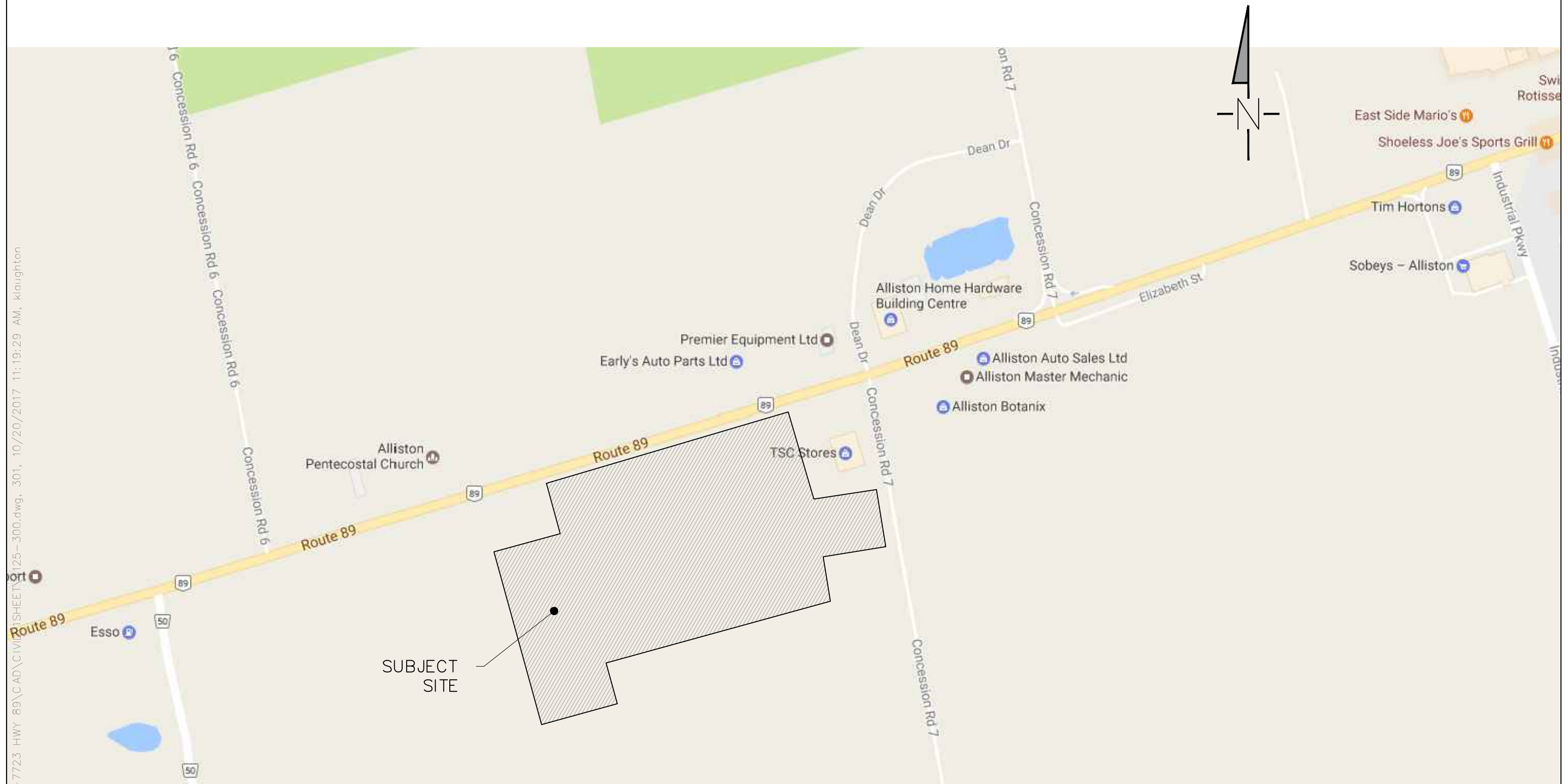
Figure 22: Sensitivity Analysis Trip Distribution

Figure 23: Sensitivity Analysis Trip Assignment

Figure 24: Sensitivity Analysis 2036 Future Total

Figure 25: Potential Access Locations

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SUBJECT SITE

Legend

 = SUBJECT LANDS

Project

7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTO

Drawing

SITE LOCATION PLAN



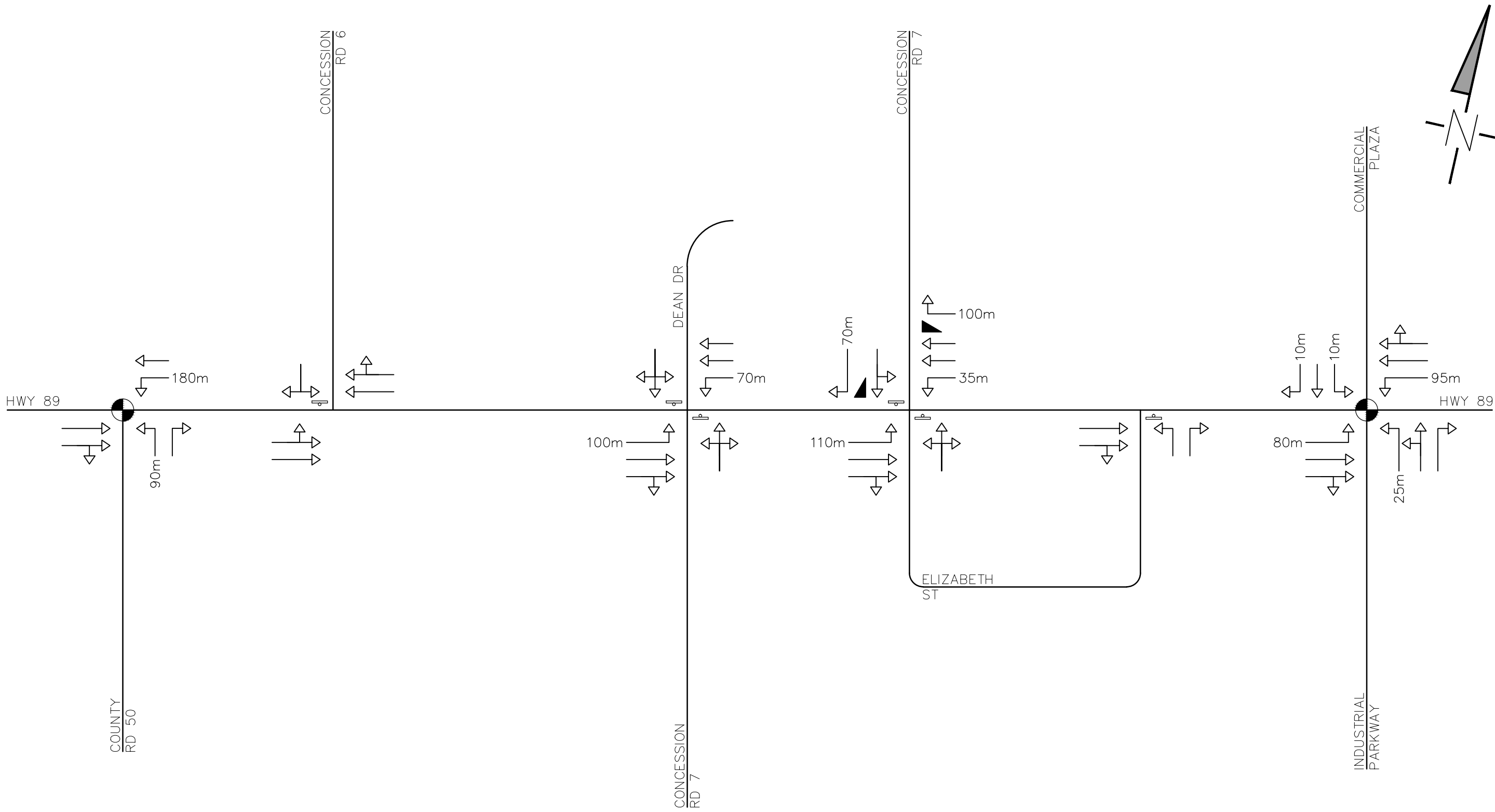
CROZIER & ASSOCIATES
Consulting Engineers

THE HARBOUREEDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3



705-446-3510 T
705-446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 1

P:\1101\1101-JUL-17\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 302, 10/20/2017 11:19:34 AM, klaughton



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

	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	BOUNDARY ROAD NETWORK		

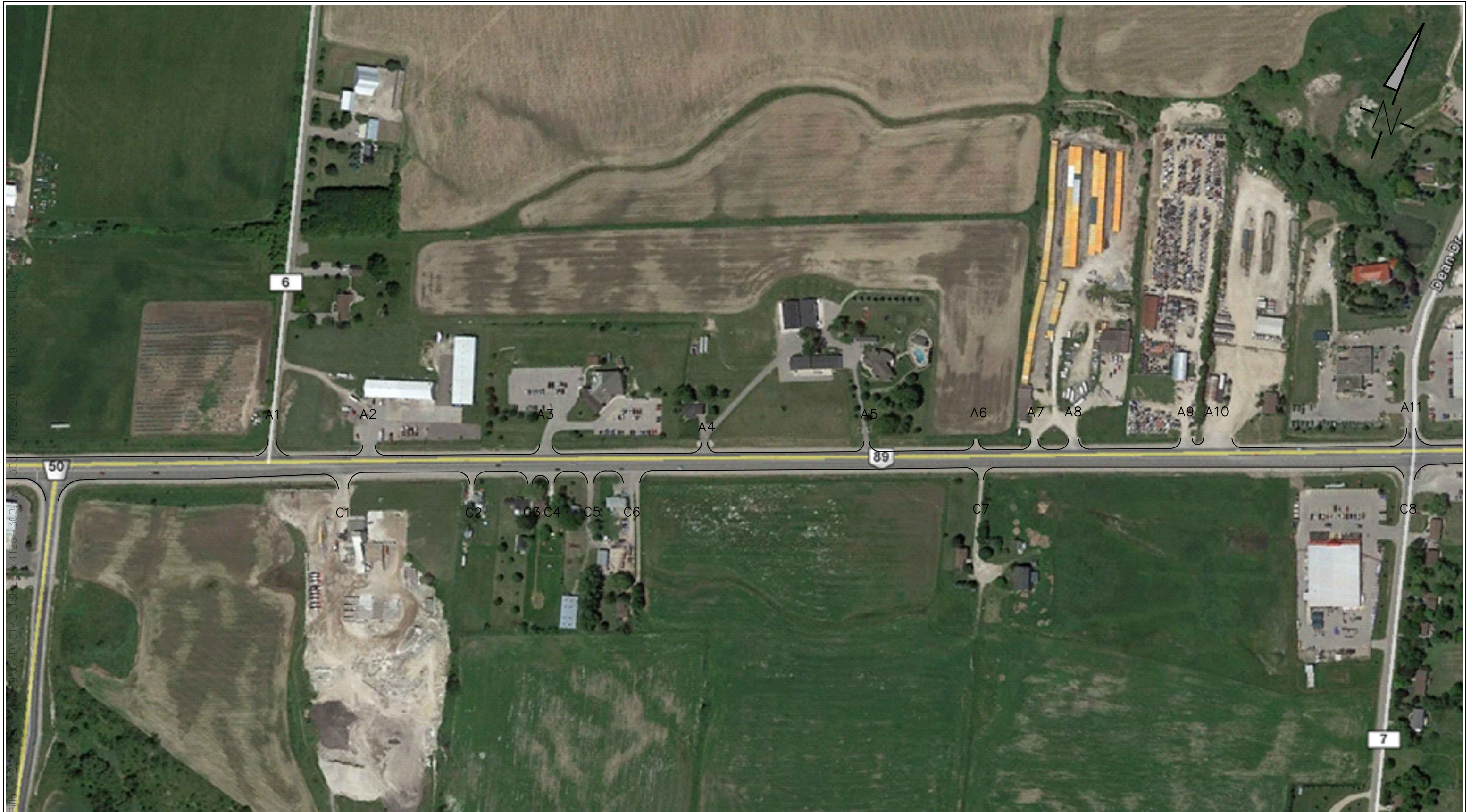


CROZIER & ASSOCIATES
Consulting Engineers

THE HARBOUREEDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

705-446-3510 T
705-446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 2




Legend

J:\1100\1101-JUL

Project
 7723 HIGHWAY 89
 TOWN OF ADJALA-TOSORONTIO


Drawing
 EXISTING ACCESS LOCATIONS
 COUNTY ROAD 50
 TO DEAN DRIVE

 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.CFCROZIER.CA INFO@CFCROZIER.CA		
Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 3



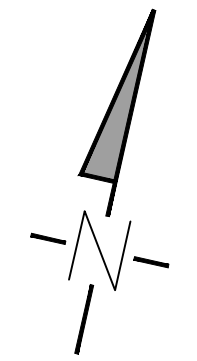
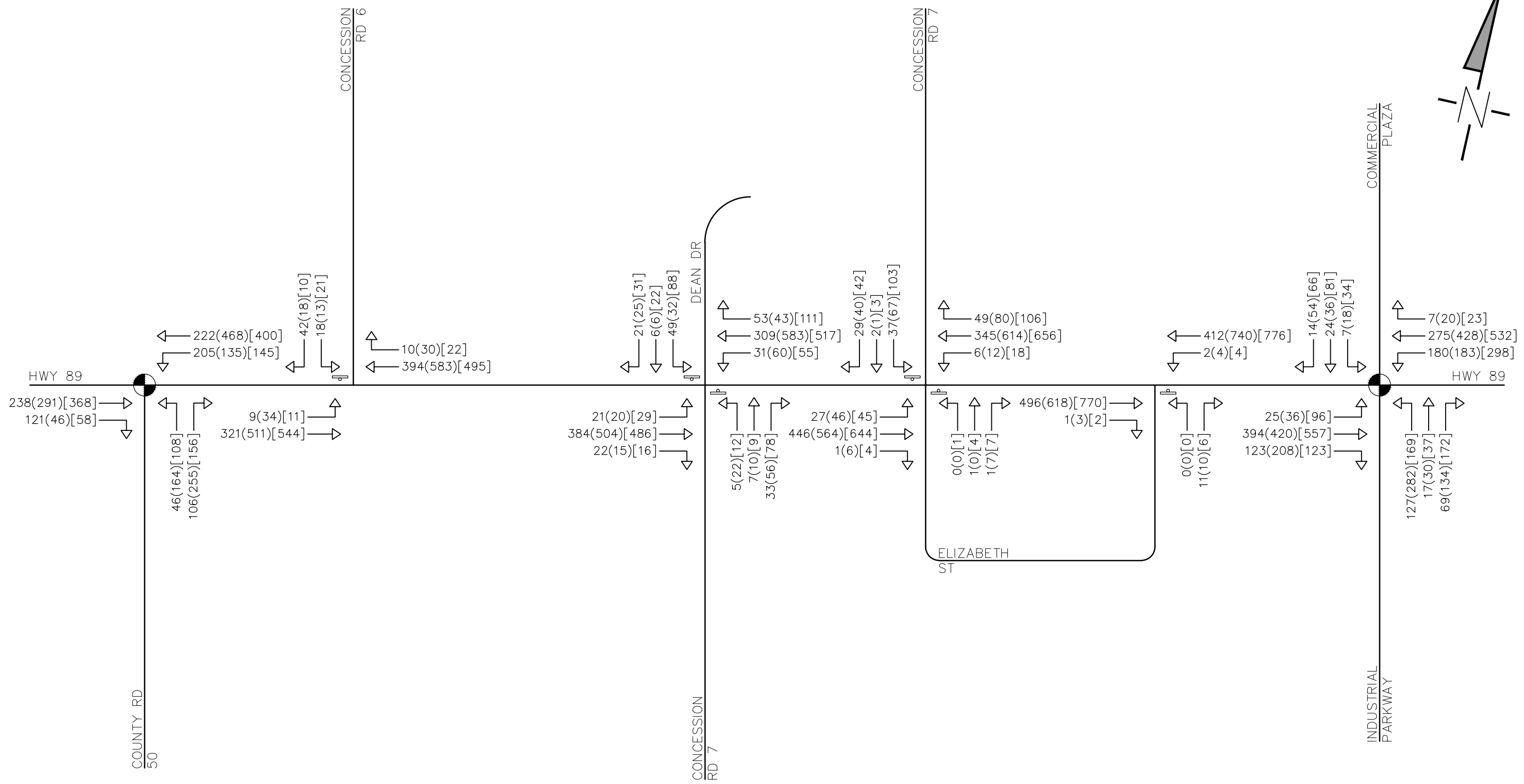
Legend

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO
Drawing	EXISTING ACCESS LOCATIONS DEAN DRIVE TO INDUSTRIAL PARKWAY

 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.CFCROZIER.CA INFO@CFCROZIER.CA
Drawn By	K..J.L.	Design By	M.F.
Project	1101-4125		
Scale	N.T.S.	Date	SEPT. 7, 2017
Check By	A.F.	Drawing	FIG. 4

J:\1100\1101-JUL

P:\1100\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 305, 10/20/2017 11:19:49 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO	
Drawing	2017 EXISTING TRAFFIC VOLUMES	

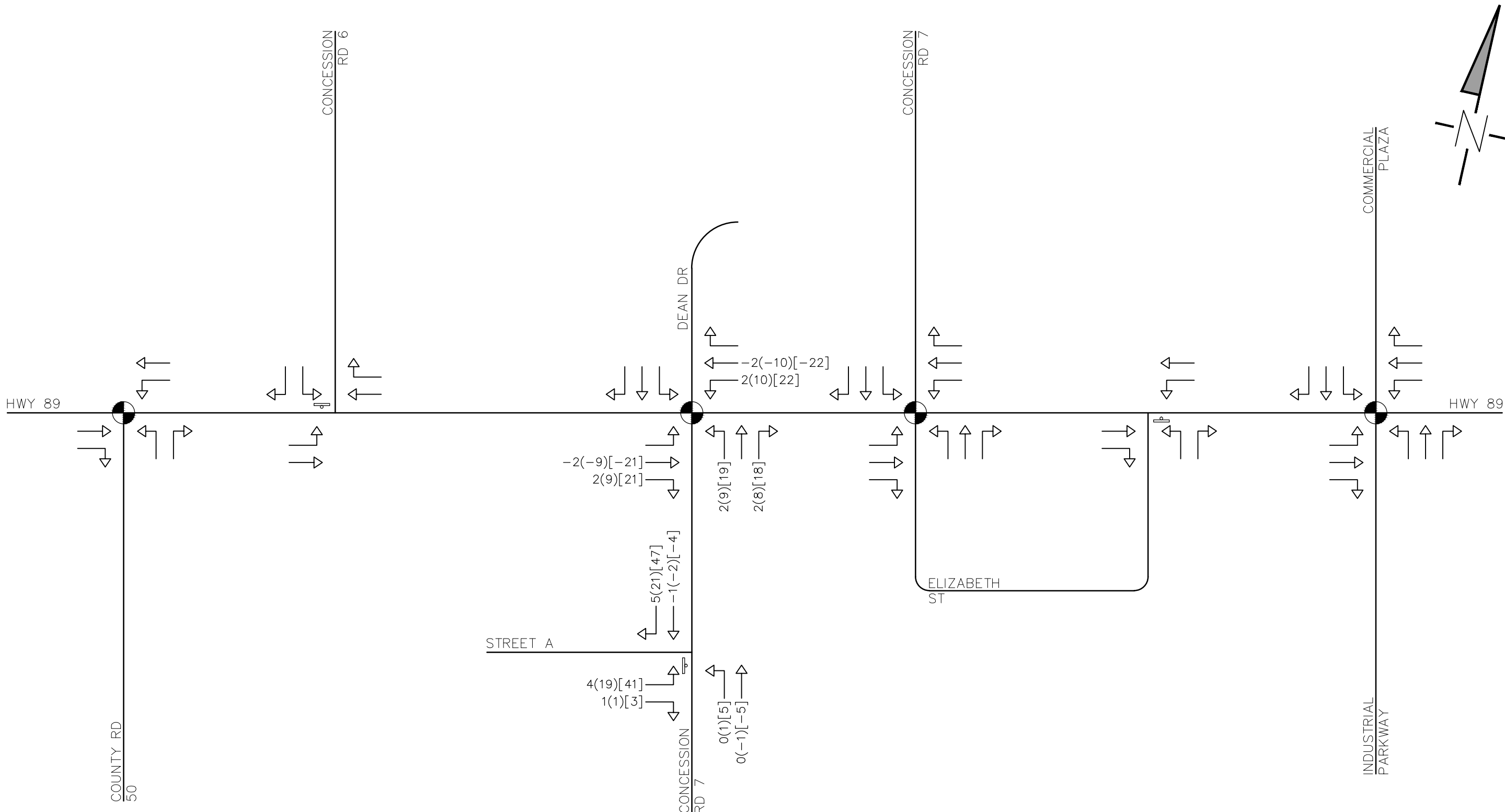
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THE HARBOUREdge BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 5

P:\1100\1101-JUL\1100\1101-JUL\HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 309, 10/20/2017 11:20:09 AM, klaughton



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

	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO

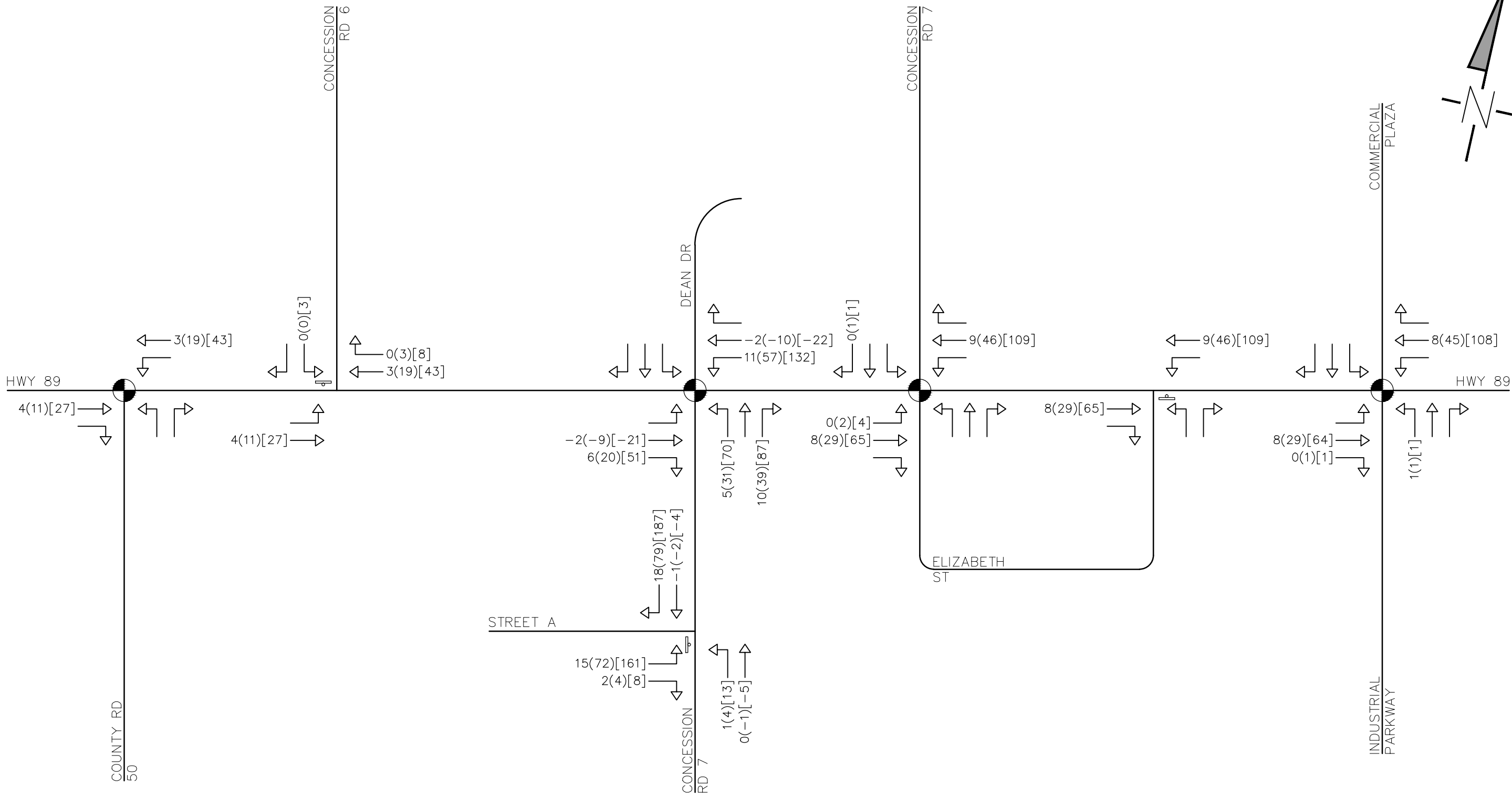
Drawing
BACKGROUND PASS-BY TRIP ASSIGNMENT
HOME HARDWARE

THE HARBOUREDGE BUILDING,
 40 HURON STREET, SUITE
 301, COLLINGWOOD, ON
 L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 9

P:\1100\1101-JUL\1100\1101-JUL\HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 310, 10/20/2017 11:20:14 AM, klaughton



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

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO

Drawing
BACKGROUND TOTAL TRIP ASSIGNMENT
HOME HARDWARE

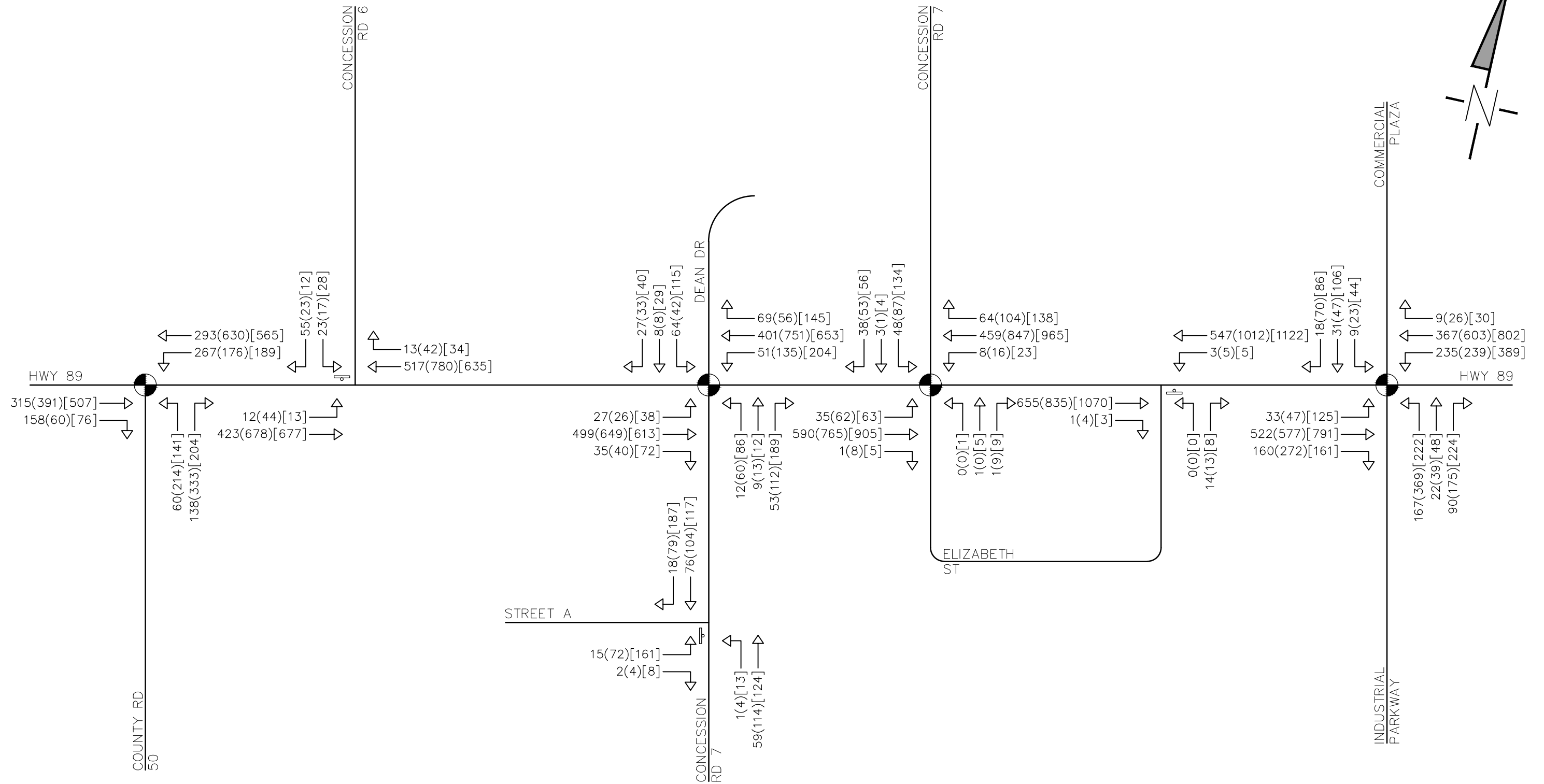
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 L9Y 4R3

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Drawn By K..J.L.	Design By M.F.	Project 1101-4125
Scale N.T.S.	Date SEPT. 7, 2017	Check By A.F.
		Drawing FIG. 10

P:\1101\1101-JUL\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 311, 10/20/2017 11:20:19 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	2026 FUTURE BACKGROUND TRAFFIC VOLUMES HOME HARDWARE		

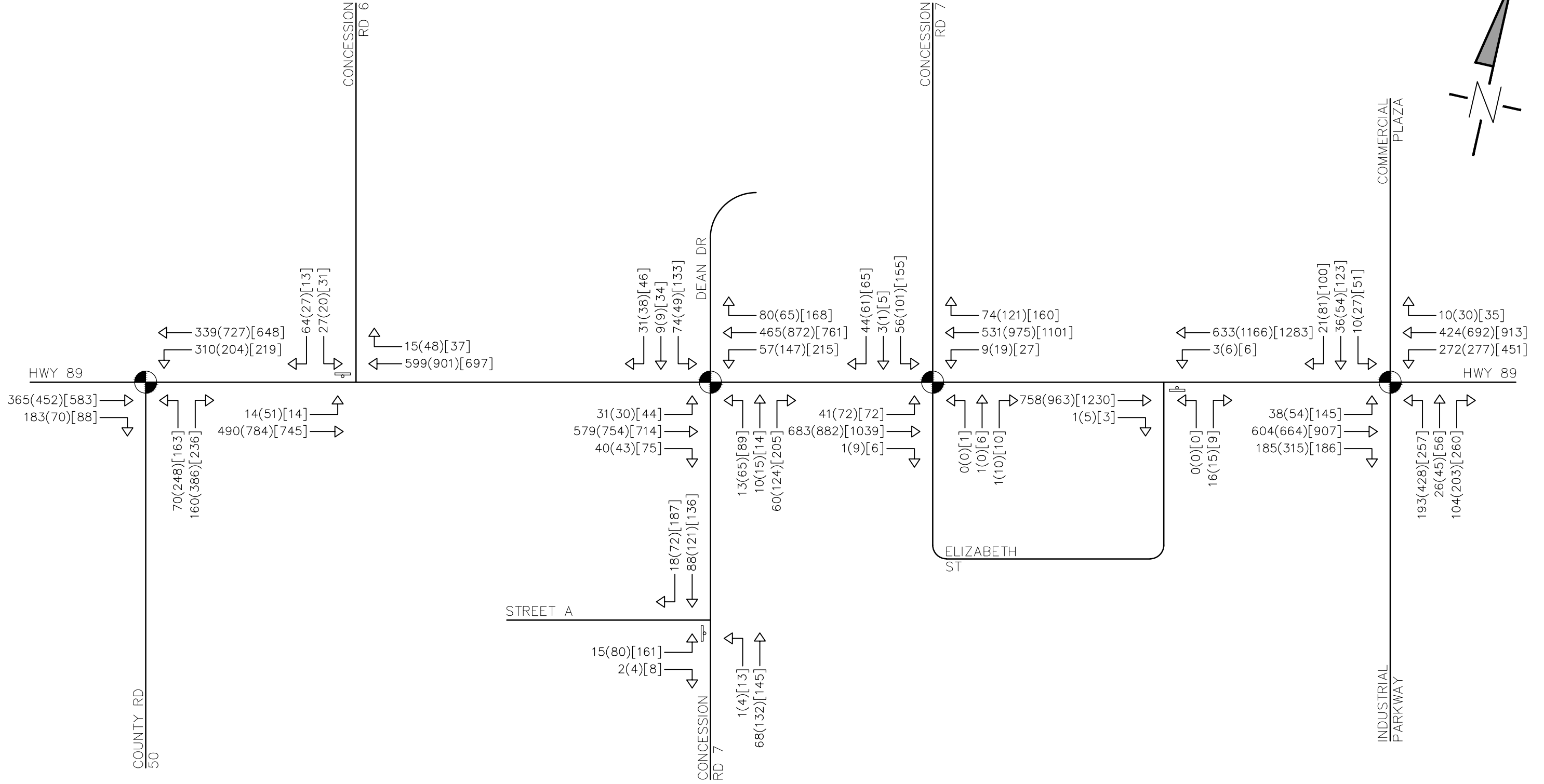
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THE HARBOUREDGE BUILDING,
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L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.
Project	1101-4125		
Scale	N.T.S.	Date	SEPT. 7, 2017
Check By	A.F.	Drawing	FIG. 11

P:\1101\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 312, 10/20/2017 11:20:24 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	2031 FUTURE BACKGROUND TRAFFIC VOLUMES HOME HARDWARE		

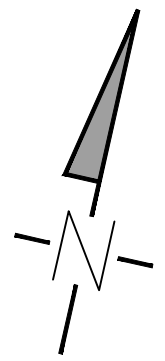
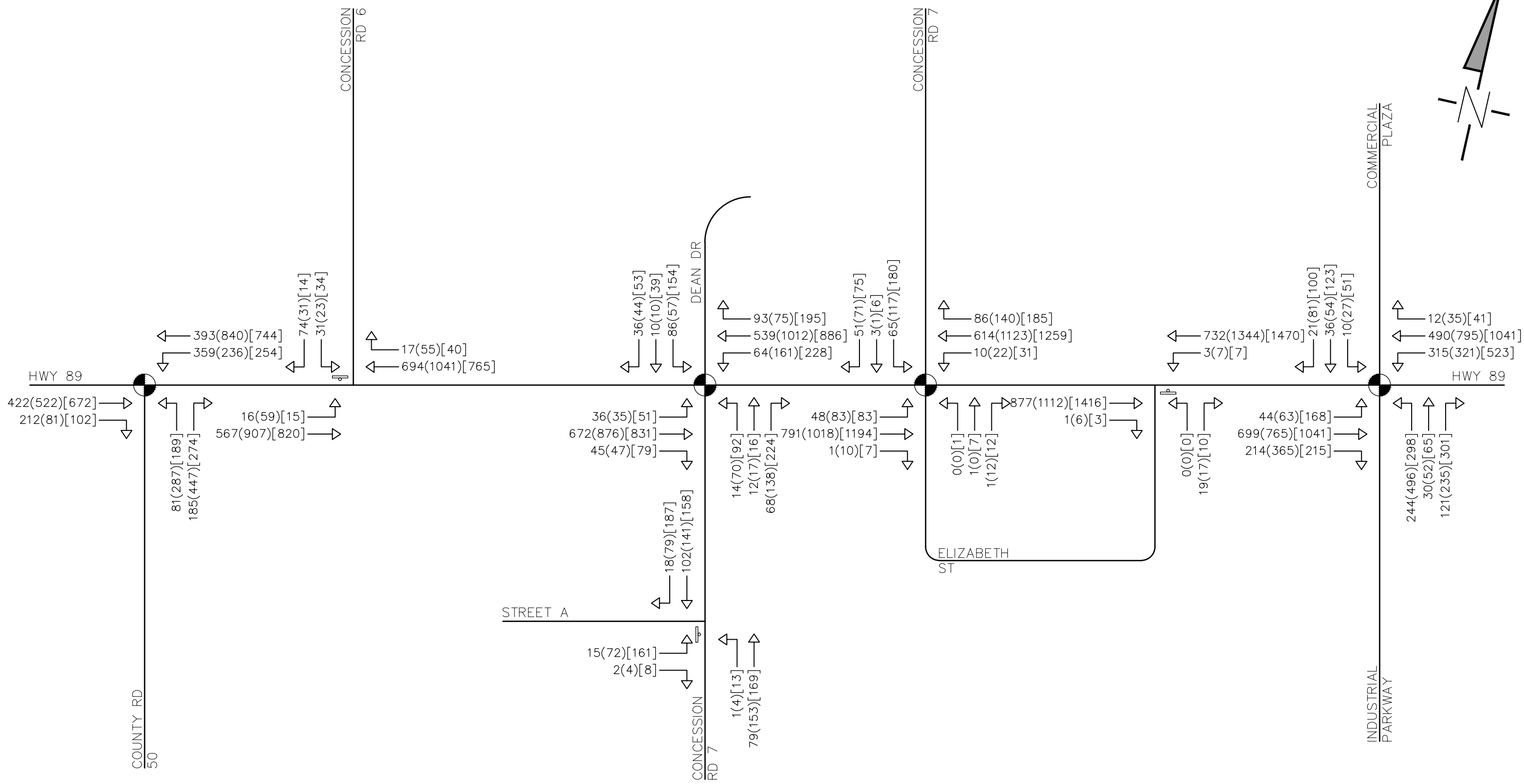
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THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 12

P:\1101\1101-JUL\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 313, 10/20/2017 11:20:29 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	2036 FUTURE BACKGROUND TRAFFIC VOLUMES HOME HARDWARE		

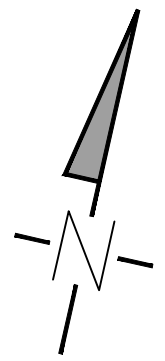
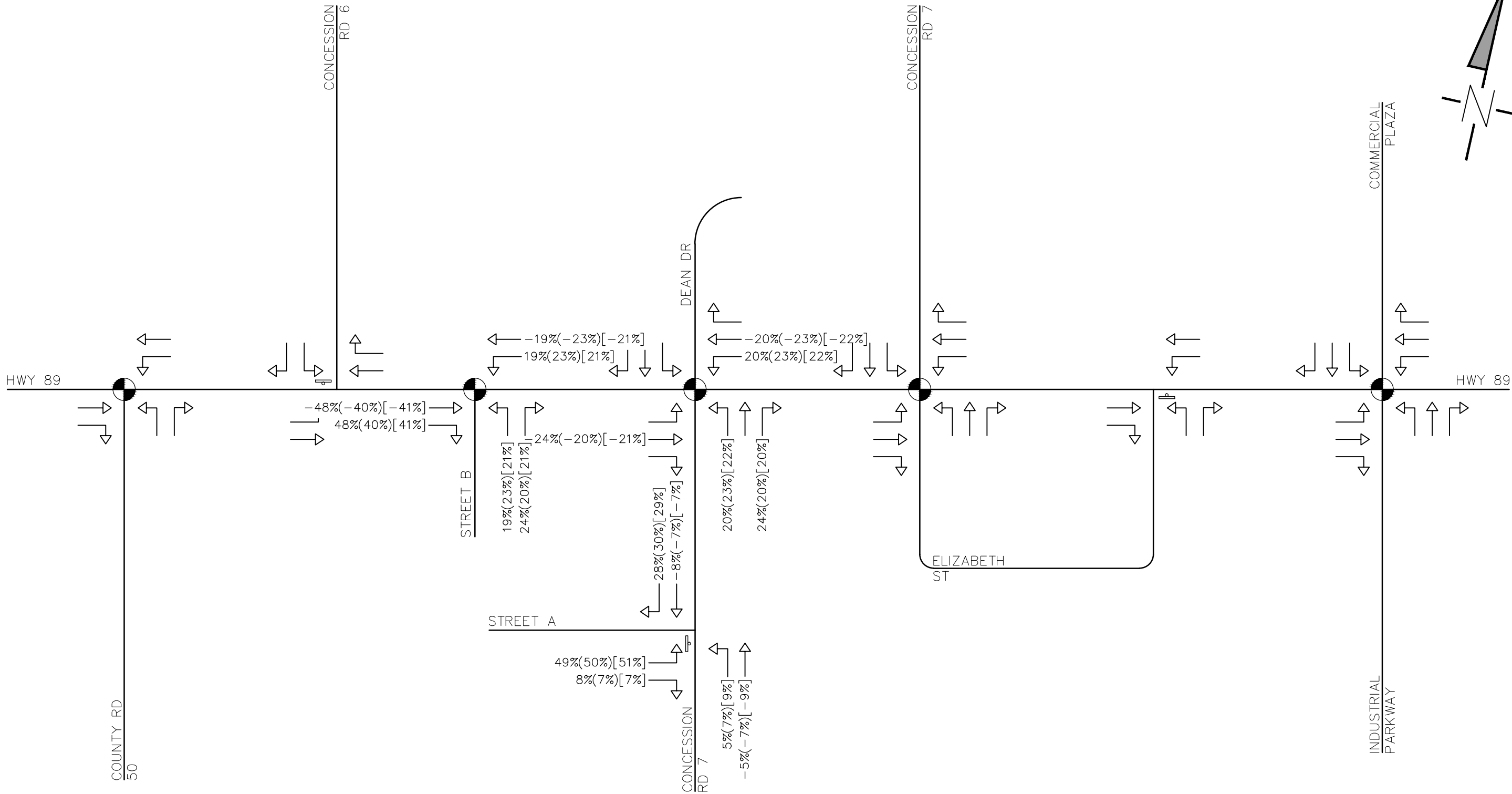
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THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

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Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 13

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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
XX%(YY%)[ZZ%]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	TOTAL PASS-BY TRIP DISTRIBUTION HOME HARDWARE		

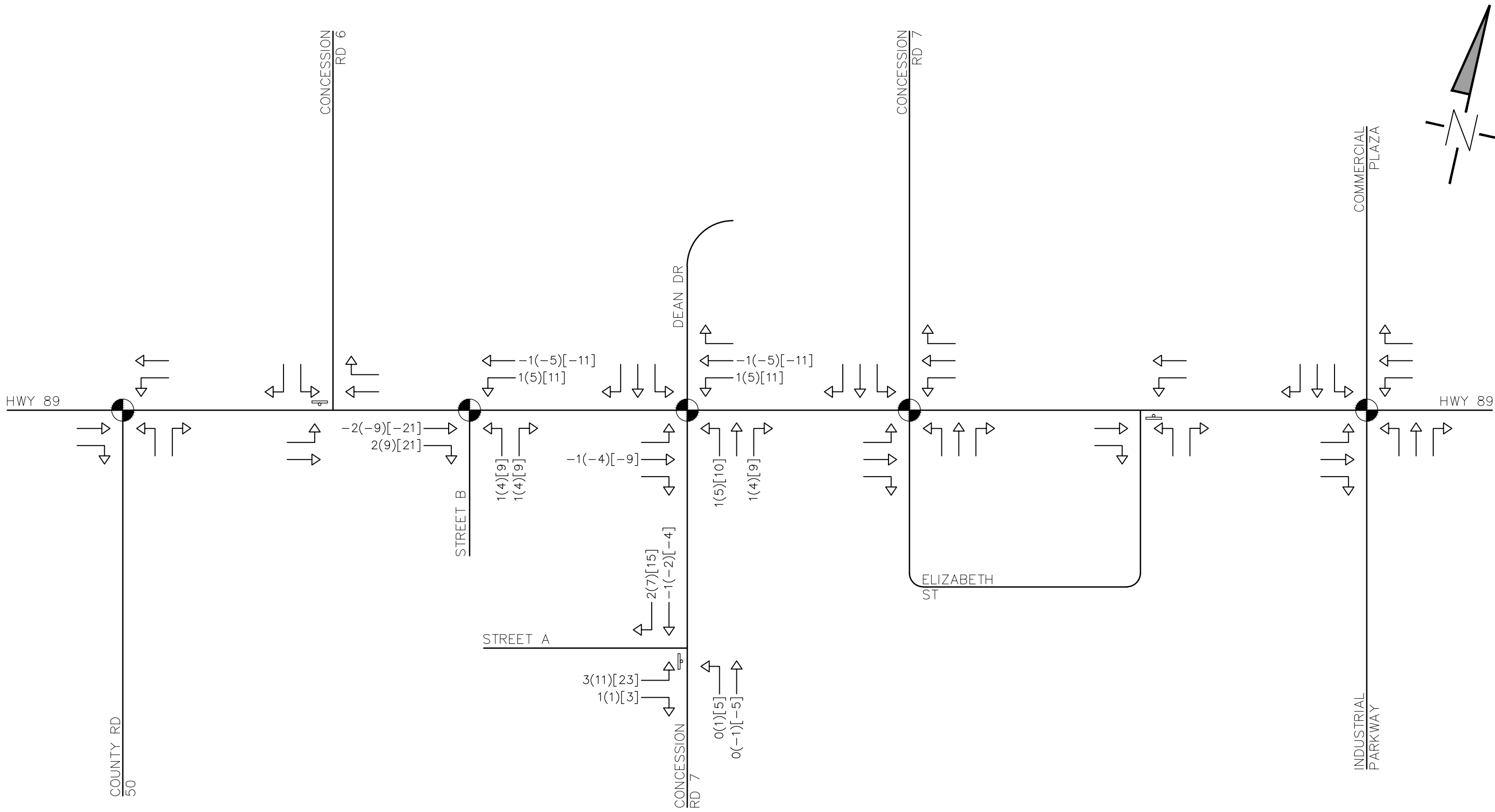
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L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 15

P:\1100\1101-JUL\1100\1101\1100\1101\CIVIL\1SHEET\4125-300.dwg, 317, 10/20/2017 11:20:49 AM, klaughton



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

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO

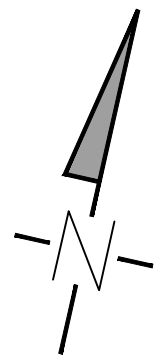
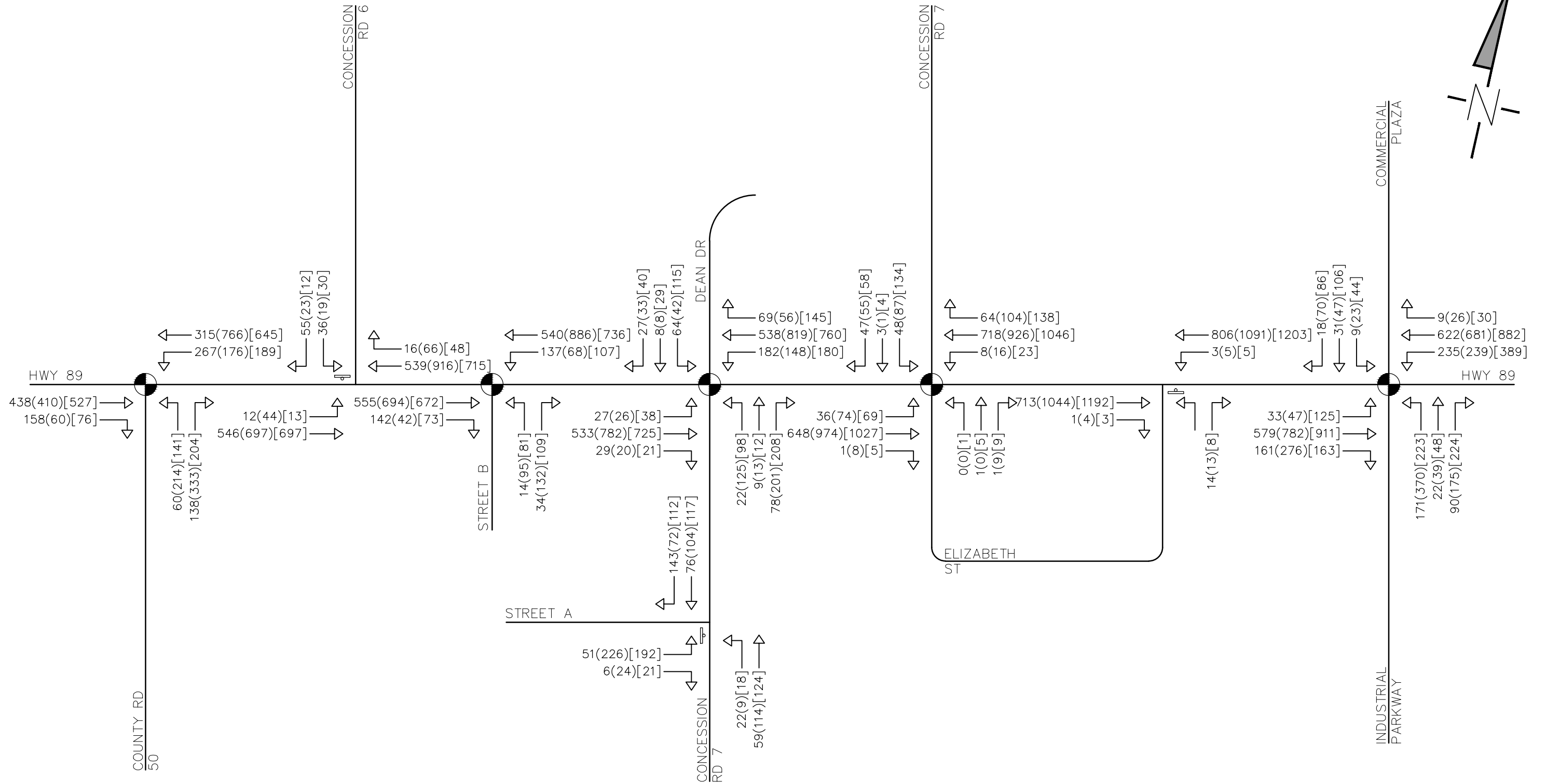
Drawing
TOTAL PASS-BY ASSIGNMENT
HOME HARDWARE

THE HARBOUREDGE BUILDING,
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301, COLLINGWOOD, ON
L9Y 4R3

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Scale N.T.S.	Date SEPT. 7, 2017	Check By A.F.
		Drawing FIG. 17

P:\1100\1101-JUL\1100\1101-4125-300.dwg, 319, 10/20/2017 11:20:59 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
**7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO**

Drawing
2026 FUTURE TOTAL

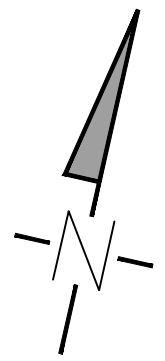
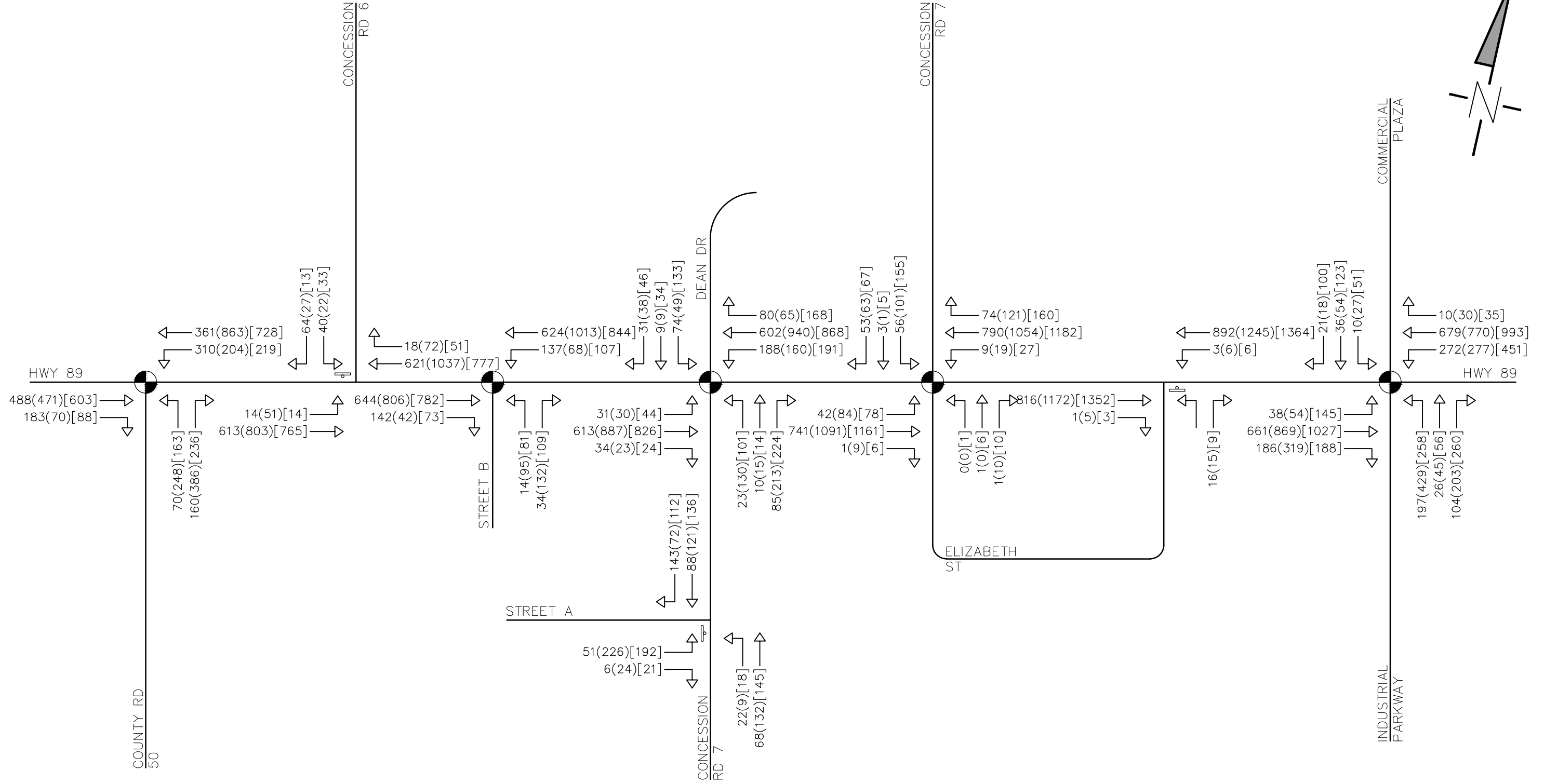
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THE HARBOUREDGE BUILDING,
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301, COLLINGWOOD, ON
L9Y 4R3

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Scale N.T.S.	Date SEPT. 7, 2017	Check By A.F.
		Drawing FIG. 19

P:\1101\1101-JUL\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 320, 10/20/2017 11:21:04 AM, klaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	2031 FUTURE TOTAL		

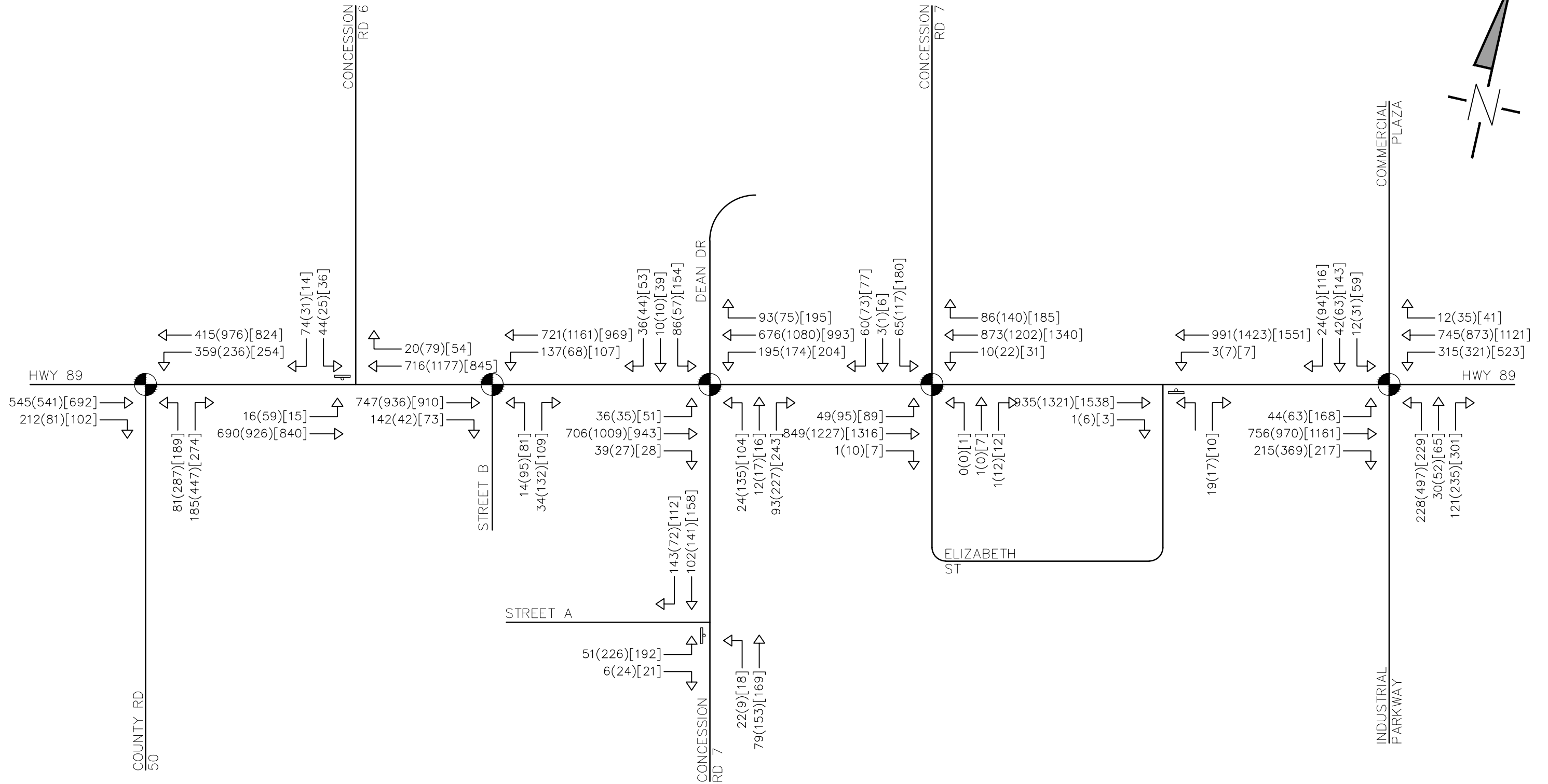
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40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3



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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 20

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Legend

	SIGNAL CONTROL
	STOP CONTROL
xx(yy)[zz]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	2036 FUTURE TOTAL		



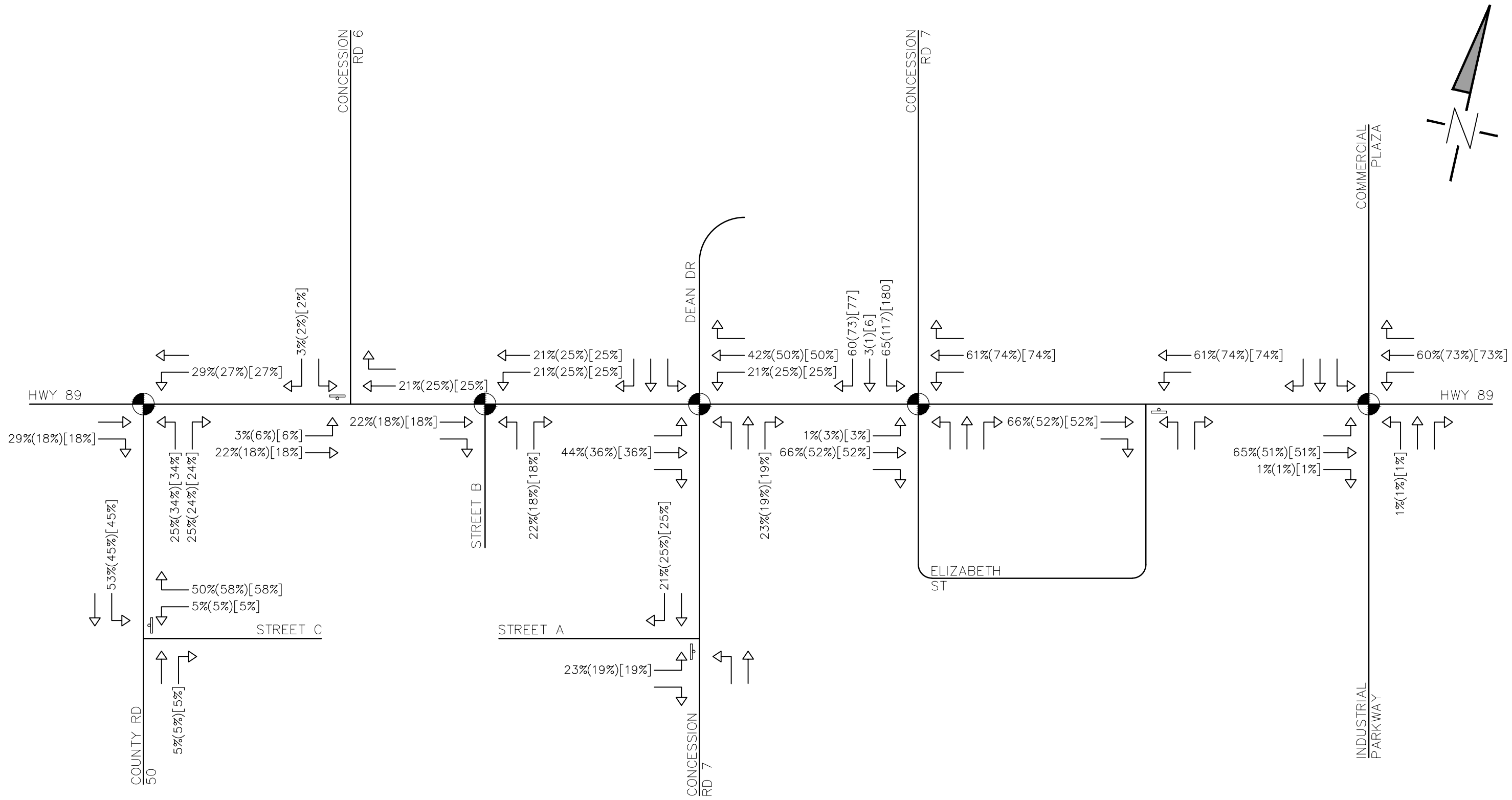
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THE HARBOUREEDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 21

P:\1100\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 322, 10/20/2017 11:21:14 AM, klaughton



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

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO

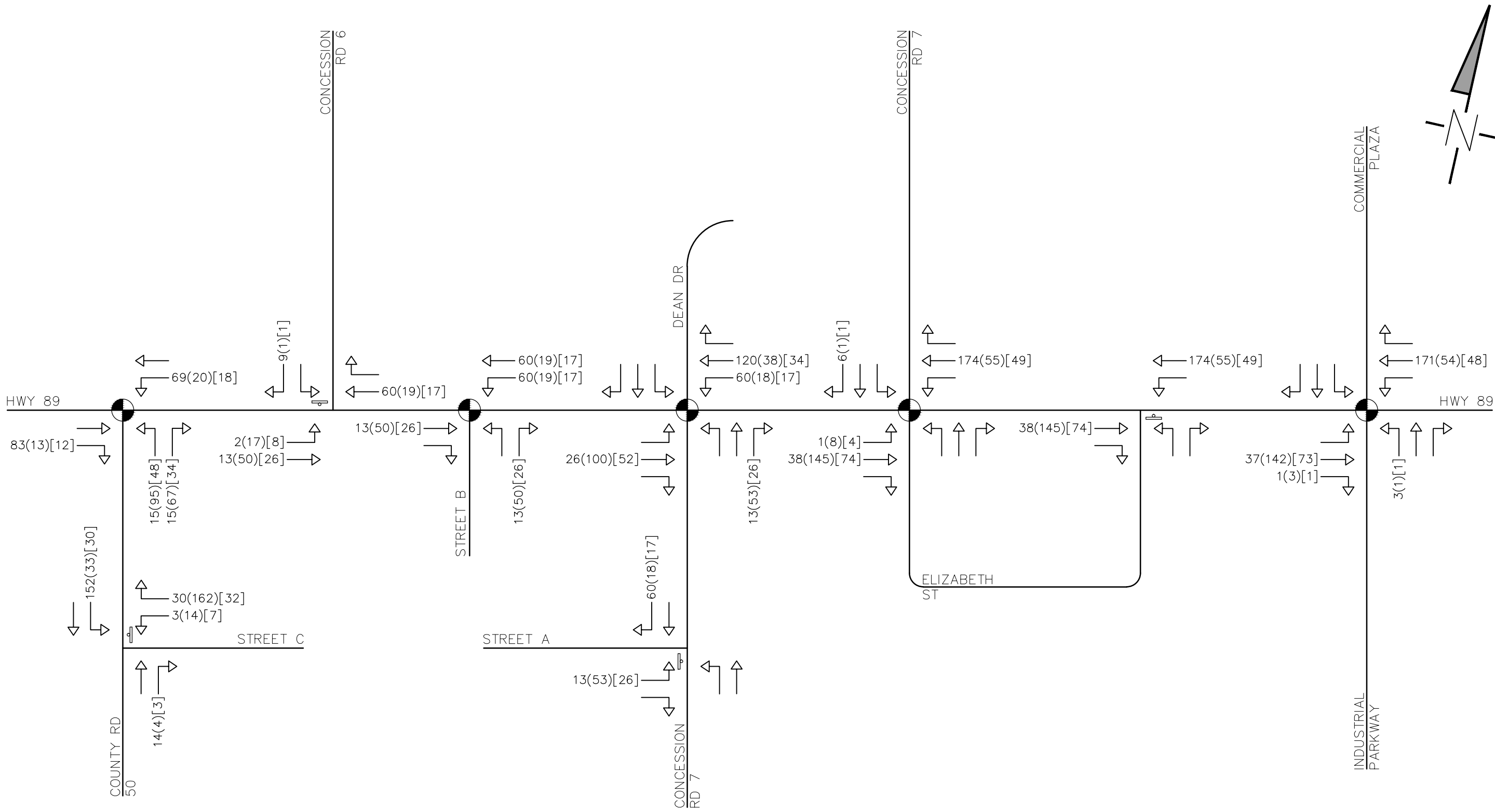
Drawing
SENSITIVITY ANALYSIS
TRIP DISTRIBUTION

THE HARBOUREEDGE BUILDING,
40 HURON STREET, SUITE
301, COLLINGWOOD, ON
L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.
				Drawing	FIG. 22

P:\1100\1101-4125-7723 HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 323, 10/20/2017 11:21:19 AM, kilaughton



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

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project
7723 HIGHWAY 89
TOWN OF ADJALA-TOSORONTIO

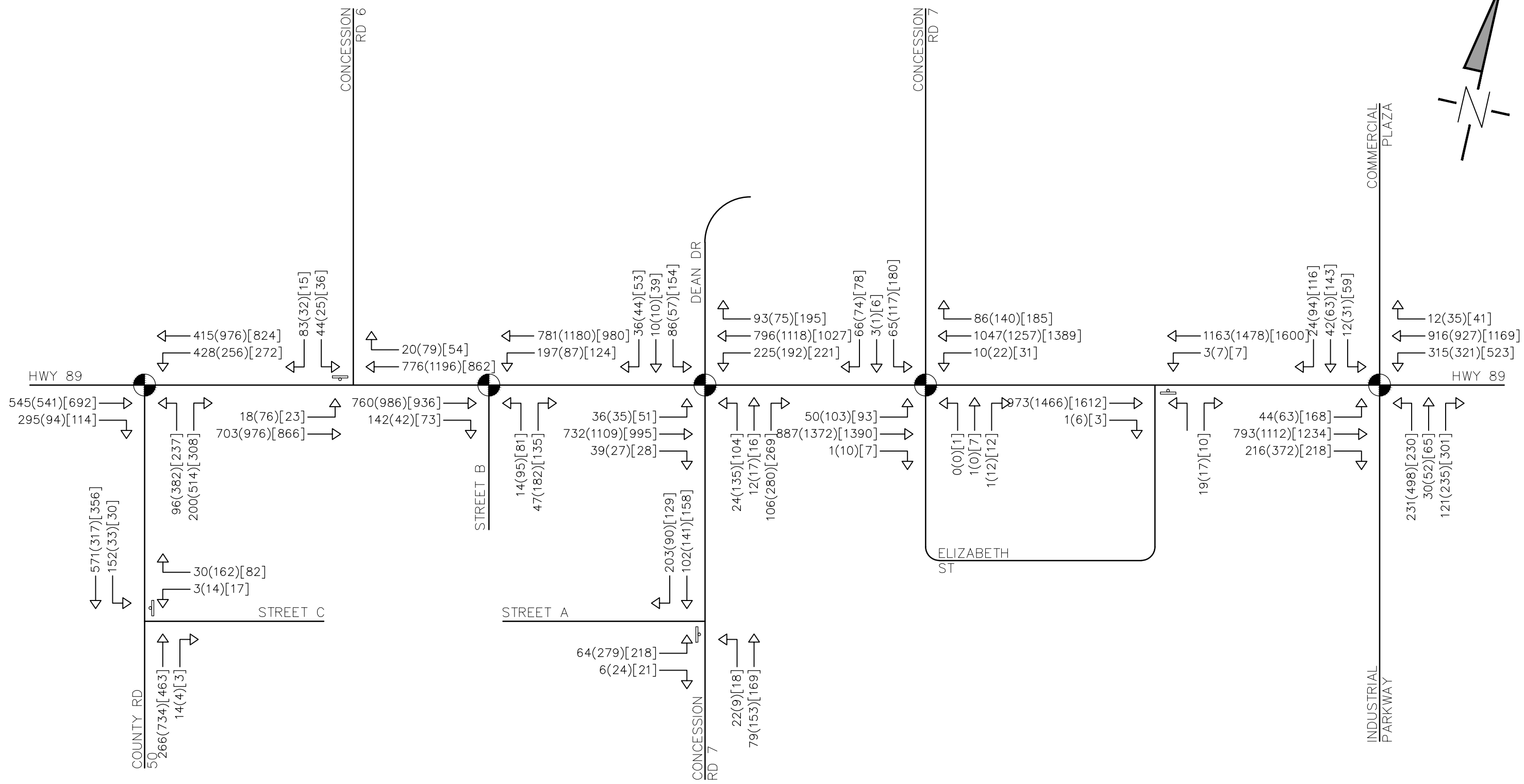
Drawing
SENSITIVITY ANALYSIS
TRIP ASSIGNMENT

THE HARBOUREdge BUILDING,
 40 HURON STREET, SUITE
 301, COLLINGWOOD, ON
 L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 23

P:\1101\1101-JUL\1100\1101-JUL\HWY 89\CAD\CIVIL\1SHEET\4125-300.dwg, 324, 10/20/2017 11:21:23 AM, kilaughton



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

Legend	
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)[ZZ]	A.M. (P.M.) [SAT] PEAK HOUR TRAFFIC VOLUMES

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO		
Drawing	SENSITIVITY ANALYSIS 2036 FUTURE TOTAL		

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301, COLLINGWOOD, ON
L9Y 4R3

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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125	
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.	
					Drawing	FIG. 24

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Legend

Project	7723 HIGHWAY 89 TOWN OF ADJALA-TOSORONTIO	
Drawing	POTENTIAL ACCESS CONFIGURATION	

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301, COLLINGWOOD, ON
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Drawn By	K..J.L.	Design By	M.F.	Project	1101-4125
Scale	N.T.S.	Date	SEPT. 7, 2017	Check By	A.F.
				Drawing	FIG. 25