



Marsville South Residential Subdivision

Transportation Impact Study

Township of East Garafraxa

Prepared for:
Thomasfield Homes

May 2022
Updated October 2024



SALVINI
CONSULTING
Transportation Engineering and Planning

Salvini Consulting Inc.
185 Deer Ridge Drive
Kitchener, ON · N2P 2K5
519-591-0426
julia@salviniconsulting.com

October 30, 2024

Charlotte Lewington
GSP Group
72 Victoria Street South
Kitchener, ON · N2G 4Y9

Re: Updated Transportation Impact Study, October 2024
Marsville South Residential Subdivision, Township of East Garafraxa

Dear Charlotte,

This Updated Transportation Impact Study has been undertaken in support of the proposed Marsville South residential subdivision in the Township of East Garafraxa. All of the analyses and the report were prepared by me.

The updated study was prepared in response to comments received from both the Township and the County of Dufferin and reflects an updated Draft Plan. The following changes are included in the study:

- The Street A connection to CR3 has been shifted west to align opposite Maple Street.
- Access from the subdivision is proposed to both CR3 and 13th Line and so the alternate access scenario has been removed.
- The revised draft plan includes 91 units.
- Updated turning movement counts were undertaken in September of 2024. The volumes are similar to, but slightly higher than the adjusted volumes in our original report. Base traffic data has been updated to reflect the new traffic count data. Background traffic has also been updated to reflect a 2034 horizon year.

If you have any questions about the Transportation Impact Study, please contact me to discuss.

Sincerely,

Julia Salvini, MEng, PEng, FITE
President



Attach: Transportation Impact Study, Marsville South Residential Subdivision

Table of Contents

1	Introduction	1
2	Proposal and Site Transportation Context.....	1
3	Existing Traffic.....	2
3.1	Existing Traffic Volumes	2
4	Background Traffic	3
4.1	Background Traffic Forecasts.....	3
5	Site Traffic	4
6	Future Total Traffic	4
6.1	Turn Lane Assessment – New Road Intersections.....	4
6.2	Turn Lane Assessment – CR 3 and Line 13 Intersection	6
6.3	Traffic Operations Assessment	6
7	Conclusions and Recommendations	7

Table 1: Existing Traffic Operations

Table 2: Future Background Traffic Operations

Table 3: Site Traffic Generation Rates and Estimated Trips

Table 4: Future Total Traffic Operations

Figure 1: Future Total Westbound Left Turn Lane Warrant – CR 3/Street A, PM Peak Hour

Figure 2: Future Total Westbound Left Turn Lane Warrant – CR 3/Line 13, PM Peak Hour

Appendix A: Figures

Appendix B: Turning Movement Counts

Appendix C: Existing Capacity Analysis

Appendix D: Future Background Capacity Analysis

Appendix E: ITE Trip Generation Manual Excerpts

Appendix F: Future Total Capacity Analysis

1 Introduction

This Transportation Impact Study (“TIS”) has been prepared in support of applications for Zoning By-law Amendment and Draft Plan of Subdivision for the lands owned by Thomasfield Homes in Marsville in the Township of East Garafraxa. The site is located west of Township Line 13 (13th Line) and south of Dufferin County Road 3 (CR 3) and is referred to as Marsville South. The study was undertaken as a submission requirement in accordance with pre-submission consultation with Township and County staff and is based on a Draft Plan of Subdivision prepared by GSP Group. The scope of the TIS was discussed and agreed upon with staff.

Thomasfield Homes owns a second land parcel located north of CR 3 and west of 13th Line known as Marsville North. The Marsville North lands are the subject of separate, previously submitted planning applications, but have been included in this study since a TIS was not required or prepared for those applications.

The primary purpose of this study is to assess the impact of the proposal on the transportation network in the area and identify any improvements that are needed to support the proposal. The Township has already identified, and Thomasfield Homes has agreed, that 13th Line will be upgraded between the CR 3 intersection and the new street to a paved road standard. The study area includes the CR 3/Line 13 intersection and the two new proposed intersections where the new public roads from the Marsville South subdivision connect to both CR 3 (Street A) opposite Maple Street and 13th Line (also Street A).

It is the finding of this study that the proposal will generate about 64 and 86 trips in the weekday morning and afternoon peak hours, respectively. Site traffic can be accommodated at the three study area intersections. No additional changes beyond the paving of 13th Line are recommended to the area road network as a result of the proposal.

2 Proposal and Site Transportation Context

The application proposes the construction of a new residential subdivision on the south side of Marsville. The site is about 28 hectares in size and is presently used for agricultural purposes. The subdivision includes 91 residential units along with blocks for a park, stormwater management and roads. Two new public road connections are proposed as part of the development, connecting to both CR 3 and 13th Line. A Site Location Plan and the proposed Draft Plan of Subdivision are attached to this report as figures in Appendix A.

The draft plan was developed with access to both CR 3 and 13th Line so that site traffic can access both roads. Traffic cutting through the new draft plan using the new roads is not likely given that the CR 3/13th Line intersection operates with good levels of service and low delays for turning traffic. Cut through traffic typically occurs when delays on the main roads encourage drivers to find alternate routes.

In consultation with Township and County staff, this study is focused on the operation of the CR 3/13th Line intersection along with the two new public road intersections during the weekday morning and afternoon peak hours when both street traffic and residential traffic will peak.

CR 3 is a public road under the jurisdiction of Dufferin County; it has two lanes and a rural cross-section in the study area. The posted speed limit is 50 kph in the vicinity of the site. 13th Line is a

public road under the jurisdiction of the Township of East Garafraxa; it has two lanes and a rural cross-section in the study area. The speed limit is unmarked at 80 kph. 13th Line is paved near the intersection with CR 3 but turns to gravel both north and south of the intersection.

The proposed new intersection on CR 3 is located opposite Maple Street. The County's Entrance Policy provides a minimum separation distance of 300 metres between side roads on County roads with a speed limit of less than 80 kph. The new Street A intersection is located about 630 metres from the 13th Line intersection.

Sight distances were reviewed at the two proposed new intersections to CR 3 and 13th Line. CR 3 has a posted speed limit of 50 kph, and speed data from the County collected just east of 13th Line suggests that the 85th percentile speeds are about 68 kph in the westbound direction (entering Marsville) and about 78 kph in the eastbound direction (exiting Marsville).

The County's Entrance Policy requires sight distance of 160 metres for commercial entrances (or new public road connections to residential draft plans) for a speed limit of 50 kph. For a speed limit of 80 kph, the sight distance requirement is 230 metres. The County's policy uses a driver's eye location of 3 metres from the outer edge of the traffic lane, and eye level of 1.05 metres and an object height of 0.60 metres.

Figures illustrating the available sight distance at both new road connections are attached in Appendix A. Both new road connections meet the County's sight distance requirements.

The new public roads in the draft plan are intended to include an asphalt path on one side of the road. The path will provide for pedestrian connections throughout the subdivision, including to the park where a trail connection is proposed out toward Line 13 as requested by staff.

3 Existing Traffic

3.1 Existing Traffic Volumes

Traffic count data was collected at the 13th Line and Maple Street intersections with CR 3 on Tuesday, September 17, 2024 during the morning and afternoon peak periods. The data was compared to volumes in the previous version of this report that were collected in 2020 and adjusted to reflect lower travel levels due to the COVID-19 pandemic at the time. The 2024 data is similar to or slightly higher than the adjusted volumes in the previous version of this report. The 2024 volumes were carried through this updated analysis. The turning movement count data is included in Appendix B.

Existing traffic volumes in the weekday morning and afternoon peak hours are illustrated in the figures attached in Appendix A.

Traffic capacity analysis was undertaken using Synchro 11 software to assess the intersection operations at the 13th Line and Maple Street intersections with CR 3 in both peak hours. The detailed Synchro worksheets are attached in Appendix C and summarized in the table below.

Table 1: Existing Traffic Operations

Intersection	Measure of Effectiveness	Approach Lane							
		AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
CR 3/ 13 th Line	Level of Service	A	A	B	B	A	A	B	B
	Delay (s)	0.1	-	11.8	14.6	0.2	0.1	13.9	15.0
	Volume/Capacity	-	-	0.02	0.01	-	-	0.01	0.01
	95 th Percentile Q (m)	-	-	0.6	0.2	0.1	-	0.2	0.2
CR 3/Maple /Street A	Level of Service	-	-	-	B	A	-	-	B
	Delay (s)	-	-	-	14.0	-	-	-	14.8
	Volume/Capacity	-	-	-	0.01	-	-	-	-
	95 th Percentile Q (m)	-	-	-	0.3	-	-	-	0.1

The assessment indicates that the two study area intersections are currently operating at acceptable levels.

4 Background Traffic

4.1 Background Traffic Forecasts

A future horizon year of 2034 was chosen for study. Background traffic for this study was estimated by including a simple growth rate for traffic in the study area of two (2) percent per year over the ten-year horizon for a growth factor of 1.2. In addition, traffic from the Marsville Estates subdivision was included in future background traffic based on site traffic projections contained in the January 2021 Transportation Impact Study Update Letter prepared by LEA Consulting Ltd. The Marsville Estates Subdivision is located at the southwest corner of County Roads 3 and 24 to the east of the subject site.

Future background traffic volumes in the weekday morning and afternoon peak hours are illustrated in the figures attached in Appendix A.

Traffic capacity analysis was undertaken to assess the intersection operations at the two existing study area intersections in both peak hours under future background traffic conditions. The detailed Synchro worksheets are attached in Appendix D and summarized in the table below.

Table 2: Future Background Traffic Operations

Intersection	Measure of Effectiveness	Approach Lane							
		AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
CR 3/ 13 th Line	Level of Service	A	A	B	C	A	A	C	C
	Delay (s)	0.1	-	13.0	16.5	0.2	0.1	16.6	17.5
	Volume/Capacity	-	-	0.03	0.02	0.01	-	0.02	0.01
	95 th Percentile Q (m)	-	-	0.8	0.4	0.1	-	0.4	0.2
CR 3/Maple /Street A	Level of Service	-	-	-	C	A	-	-	C
	Delay (s)	-	-	-	16.0	-	-	-	17.4
	Volume/Capacity	-	-	-	0.02	-	-	-	-
	95 th Percentile Q (m)	-	-	-	0.5	-	-	-	0.1

The assessment indicates that the two existing study area intersections are expected to continue to operate at acceptable levels under future background traffic conditions.

5 Site Traffic

The amount of traffic generated by the proposed subdivision was estimated based on information in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition.

The ITE Single-Family Detached Housing category was chosen to best represent the proposed subdivision. The traffic generation estimates for the Marsville South and North sites are summarized in the table below. Excerpts from the ITE Trip Generation Manual are included in Appendix E.

Table 3: Site Traffic Generation Rates and Estimated Trips

Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached (ITE LU 210) Trips/unit	-	0.18	0.53	0.70	0.59	0.35	0.94
Marsville South Trips	91	16	48	64	54	32	86
Marsville North Trips	30	5	16	21	18	10	28

NOTE: ITE Trip Generation Manual 11th Edition

The resulting estimated site traffic for the Marsville South lands is 64 and 86 vehicle trips measured in both directions (inbound and outbound) in the weekday morning and afternoon peak hours, respectively. The Marsville North site is expected to generate 21 and 28 weekday morning and afternoon peak hour trips, respectively.

The site traffic trips were distributed in accordance with local traffic patterns along CR 3 in the study area. In the morning, site traffic was assigned 60 percent in the eastbound direction and 40 percent in the westbound direction. In the afternoon peak hour, site traffic was assigned 45 percent in the eastbound direction and 55 percent in the westbound direction. The existing distribution of traffic in the area and the site traffic volumes for the weekday morning and afternoon peak hours are illustrated in the figures in Appendix A for both the Marsville South and North lands. The traffic diagrams focus on the study area intersections and do not illustrate traffic from the Marsville North lands turning to and from Grand Crescent.

6 Future Total Traffic

Future total traffic was determined by adding site traffic for both the Marsville South and North lands to future background traffic. The future total traffic volumes for the two study peak hours are illustrated in the figures in Appendix A.

6.1 Turn Lane Assessment – New Road Intersections

Turn lanes can be provided at intersections to minimize delay to through traffic and to provide additional capacity where they are needed. Typically, in locations like Marsville, right turn lanes

are considered when peak hour right turn volumes reach about 60 vehicles in one or both peak hours. None of the right turn volumes in the study area are expected to reach the levels where a right turn lane would be considered.

The need for a left turn lane is typically assessed using information from the Ministry of Transportation Geometric Design Guide for Ontario Highways. The assessment is based on the design speed of the road, the percent left turns in the stream of traffic and the traffic volumes at the intersection. Turn lanes are considered when the left turning volume exceeds 2.5 percent of the stream of traffic.

Both through traffic volumes on 13th Line and turning traffic to the new subdivision are expected to be low at the new road connection and left turn lanes will not be needed.

Turning traffic to the new subdivision on CR 3 is also expected to be low (less than 15 vehicles turning left in the peak hours), however the traffic volumes on CR 3 are higher than on 13th Line, so a warrant analysis was undertaken for the westbound left turn to Street A in the afternoon peak hour, the only time the left turn volume is expected to exceed 2.5 percent of the total traffic, and is outlined below.

A design speed of 70 kph was chosen for CR 3 given the posted speed of 50 kph and measured speeds in the area. In the afternoon peak hour, the westbound left turn volume to the new road is expected to be four percent of the westbound traffic. Traffic volumes advancing with and opposing the left turns were plotted on the chosen nomograph as illustrated in the following figure to confirm that a left turn lane will not be warranted westbound at the Street A intersection with CR 3.

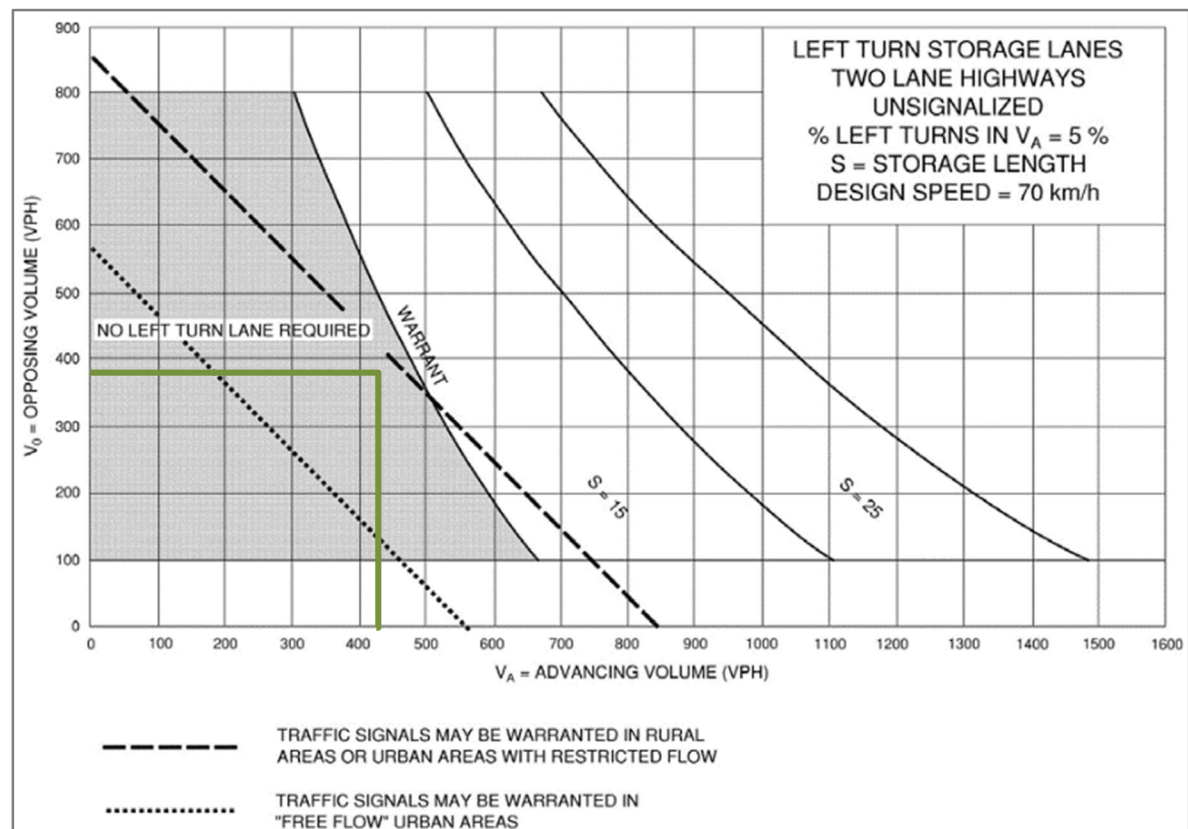


Figure 1: Future Total Westbound Left Turn Lane Warrant – CR 3/Street A, PM Peak Hour

6.2 Turn Lane Assessment – CR 3 and Line 13 Intersection

A turn lane warrant assessment was also undertaken at the CR 3 and Line 13 intersection for the westbound left turn movements in the weekday afternoon peak hour. Again, a 70 kph design speed was chosen for CR 3. In the weekday afternoon peak hour, the percentage of left turn traffic in the westbound traffic stream is four percent, so the advancing and opposing volumes were plotted on the appropriate nomograph to confirm that a left turn lane will not be warranted.

The figure below illustrates the warrant assessment for the westbound left turn movement in the weekday afternoon peak hour. Left turn lanes on CR 3 to Line 13 are not warranted in the future under weekday morning or afternoon peak hour conditions.

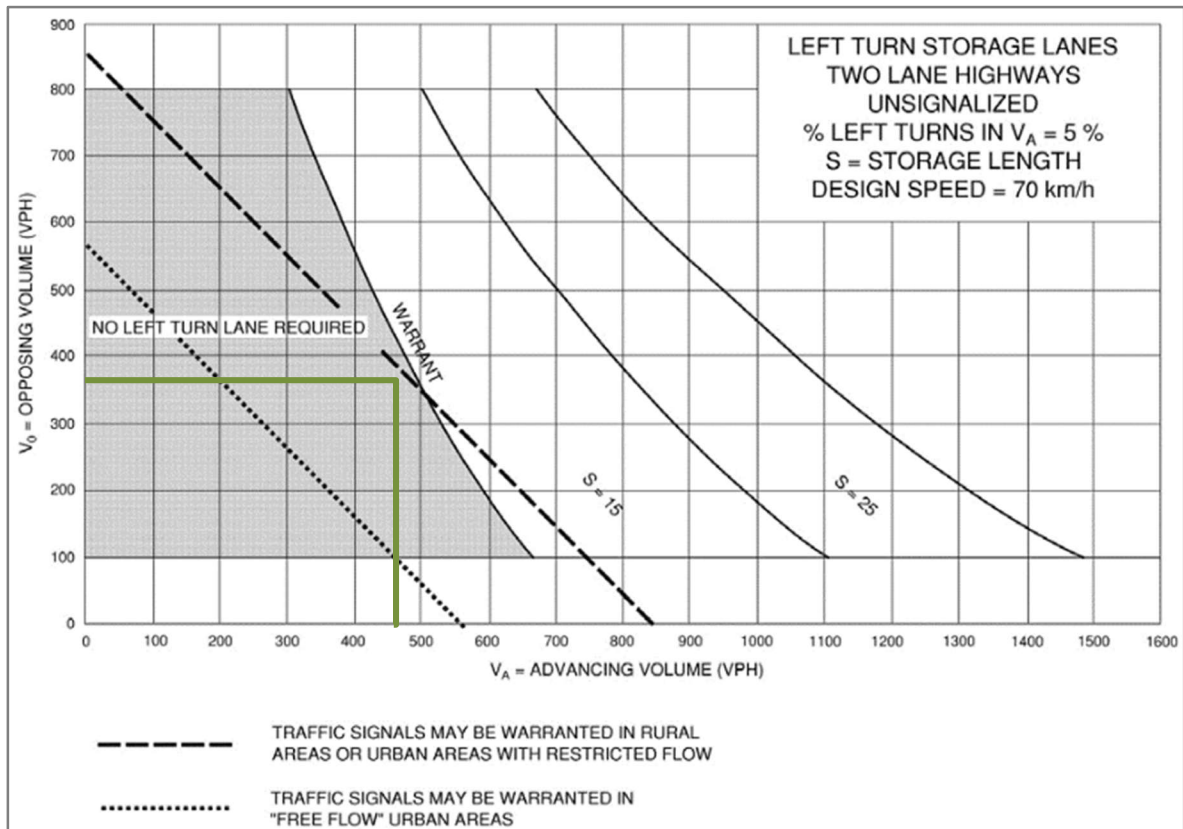


Figure 2: Future Total Westbound Left Turn Lane Warrant – CR 3/Line 13, PM Peak Hour

6.3 Traffic Operations Assessment

A traffic operations assessment was undertaken for the two new road connections along with the CR 3/13th Line intersection in both the weekday morning and afternoon peak hours for future total traffic conditions. The results of the analysis are summarized in the table below and the detailed worksheets are included in Appendix F.

Table 4: Future Total Traffic Operations

Intersection	Measure of Effectiveness	Approach Lane							
		AM Peak Hour				PM Peak Hour			
		EB	WB	NB	SB	EB	WB	NB	SB
CR 3/ 13 th Line	Level of Service	A	A	B	C	A	A	B	C
	Delay (s)	0.1	0.1	12.8	16.1	0.4	0.5	13.6	17.1
	Volume/Capacity	-	-	0.06	0.04	0.01	0.02	0.03	0.03
	95 th Percentile Q (m)	0.1	0.1	1.5	1.0	0.3	0.4	0.7	0.7
13 th Line/ Street A	Level of Service	A	-	-	-	A	-	-	-
	Delay (s)	8.7	-	-	-	8.6	-	-	-
	Volume/Capacity	0.02	-	-	-	0.01	-	-	-
	95 th Percentile Q (m)	0.4	-	-	-	0.2	-	-	-
CR 3/Maple /Street A	Level of Service	A	A	B	B	A	A	C	B
	Delay (s)	0.1	0.1	14.3	14.8	0.1	0.4	17.4	12.9
	Volume/Capacity	-	-	0.09	0.03	-	0.01	0.08	0.01
	95 th Percentile Q (m)	-	0.1	2.1	0.6	0.1	0.3	2.0	0.2

The analysis indicates that the three study area intersections are expected to operate at acceptable levels in both weekday peak hours under future total traffic conditions without auxiliary turn lanes.

7 Conclusions and Recommendations

This Transportation Impact Study has been undertaken in accordance with Township and County requirements in order to understand the transportation context and infrastructure required to support the proposed Draft Plan of Subdivision. The conclusions of this study are as follows:

- The Marsville South Site is estimated to generate 64 and 86 vehicle trips in each of the weekday morning and afternoon peak hours, respectively.
- The concept includes new public road connections to both CR 3 and 13th Line. The proposed Street A connection has been aligned opposite Maple Street.
- Traffic cutting through the new draft plan using the new roads is not likely given that the CR 3/13th Line intersection operates with good levels of service and low delays for turning traffic.
- Turn lanes from both CR 3 and 13th Line to the new roads will not be needed or warranted.
- The CR 3/13th Line intersection is currently operating at acceptable levels and is expected to continue to do so under 2034 future traffic conditions with and without the proposal. Turn lanes are not warranted or needed at the intersection under future total traffic conditions.
- The two new road intersections with CR 3 and 13th Line are expected to operate at acceptable levels of service under future total traffic conditions in both weekday peak hours.

Appendix A: Figures

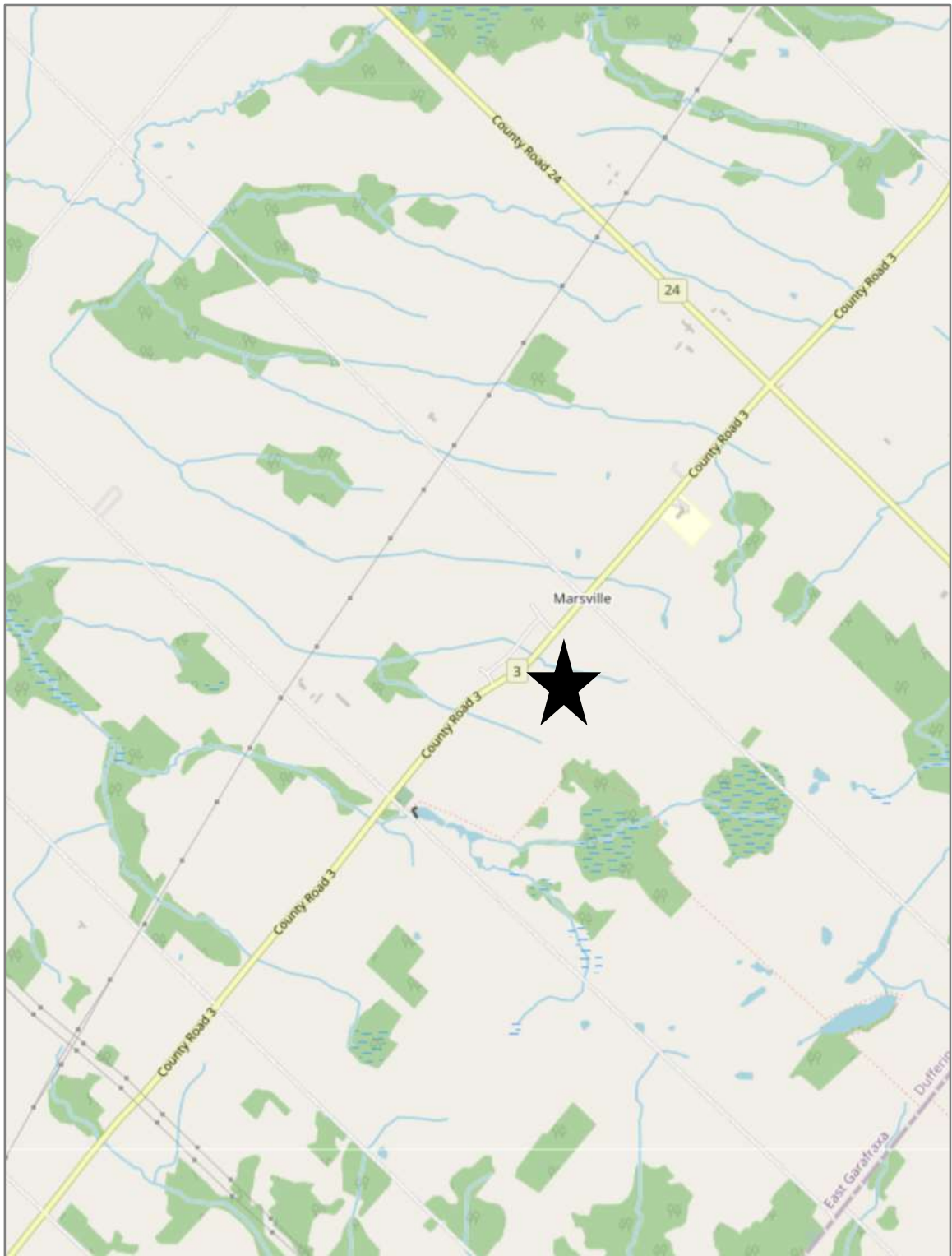


Figure A1: Site Location Plan

© OpenStreetMap contributors 2024

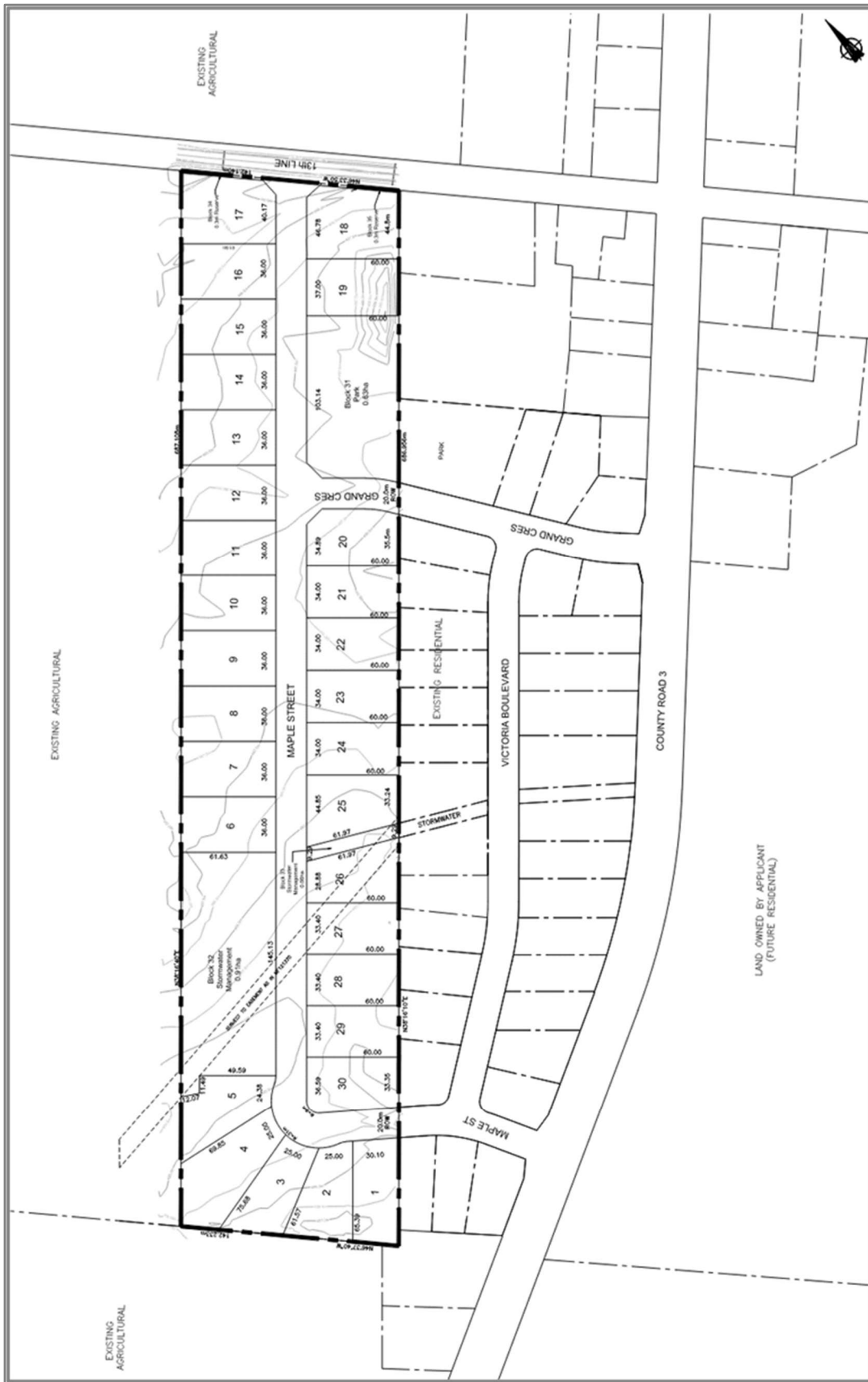


Figure A2: Marsville North Draft Plan

Source: GSP Group



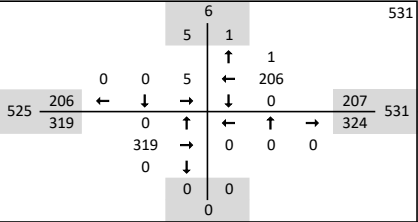
Figure A3: Marsville South Draft Plan

Source: GSP Group

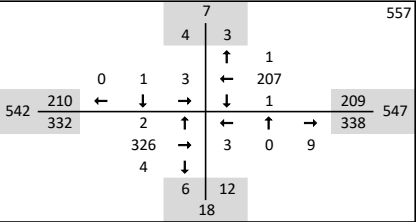
Figure A4 - Traffic Volume Diagrams
Thomasfield Marsville South Subdivision
updated October 2024

AM Peak Hour

Existing Traffic (2024)

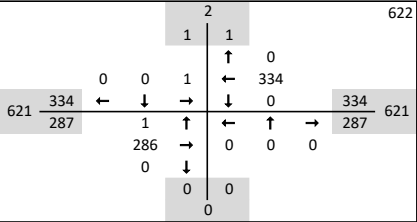


Tuesday, September 17, 2024, 7:45 AM

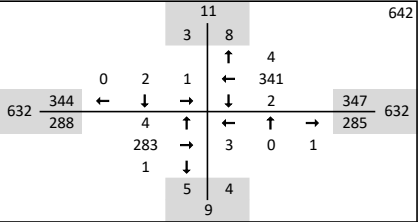


PM Peak Hour

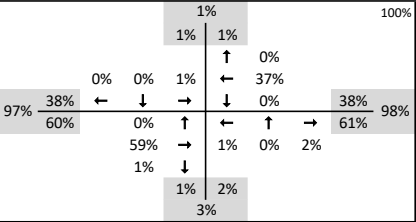
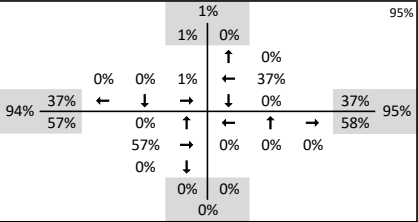
Existing Traffic (2024)



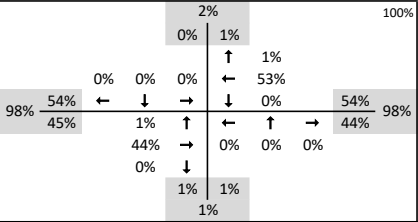
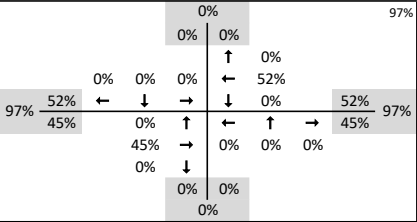
Tuesday, September 17, 2024, 4:45 PM



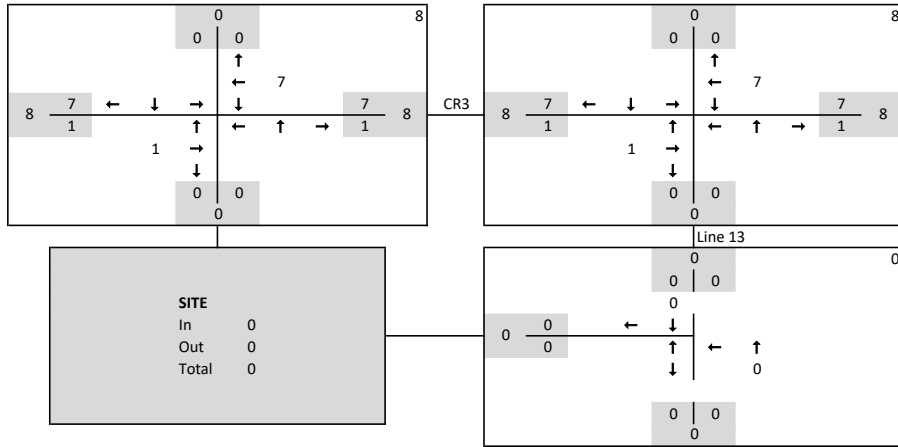
Distribution



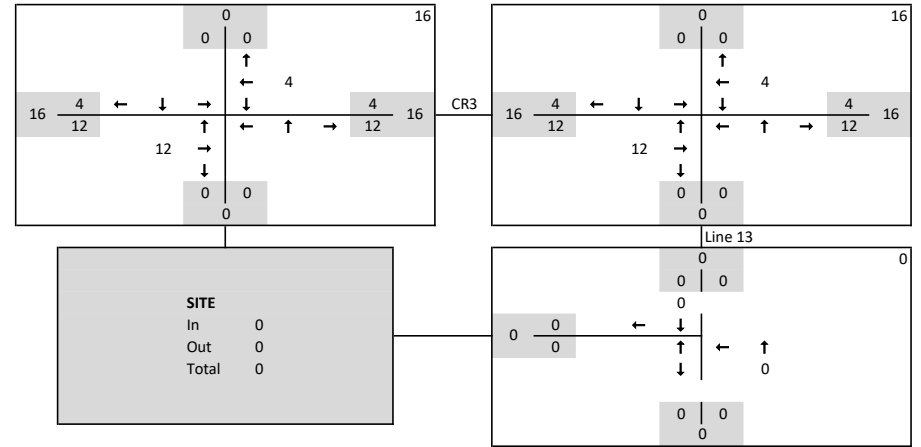
Distribution



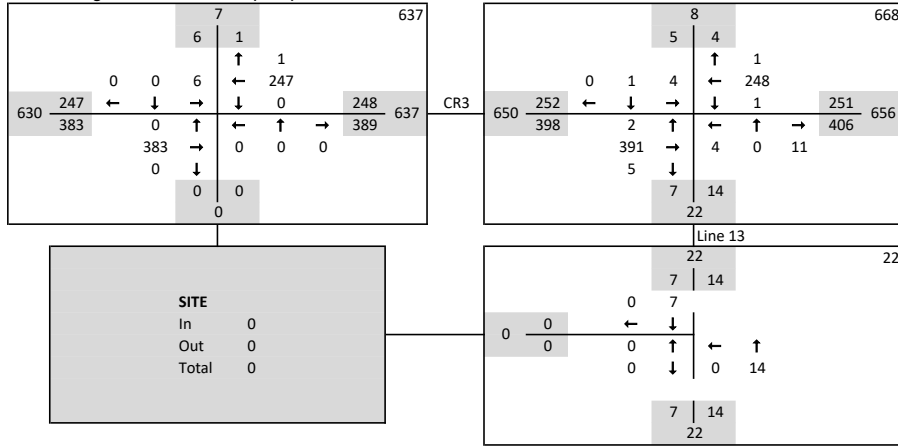
AM Peak Hour
Marsville Estates Traffic



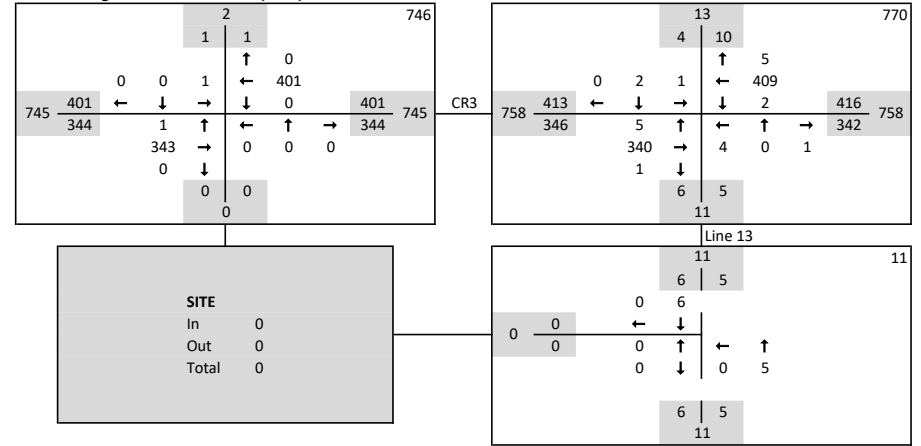
PM Peak Hour
Marsville Estates Traffic



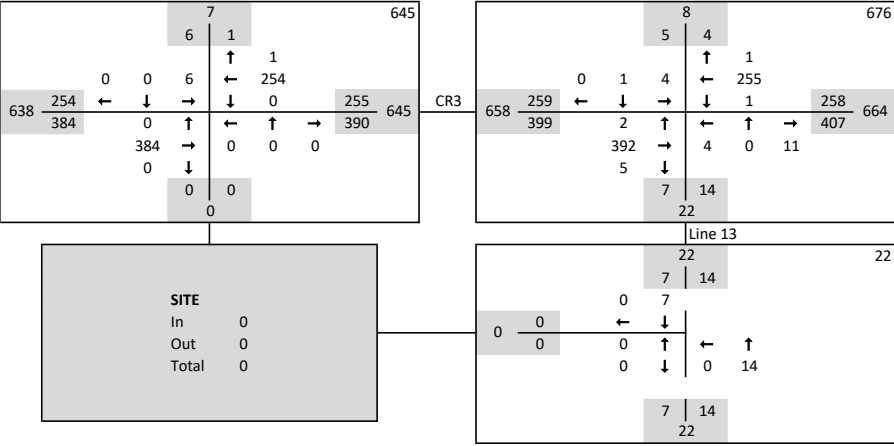
Future Background Traffic Growth (2034)



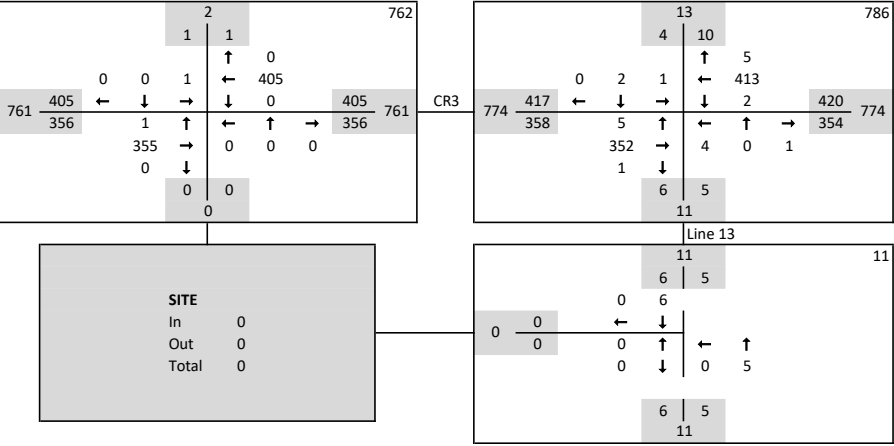
Future Background Traffic Growth (2034)



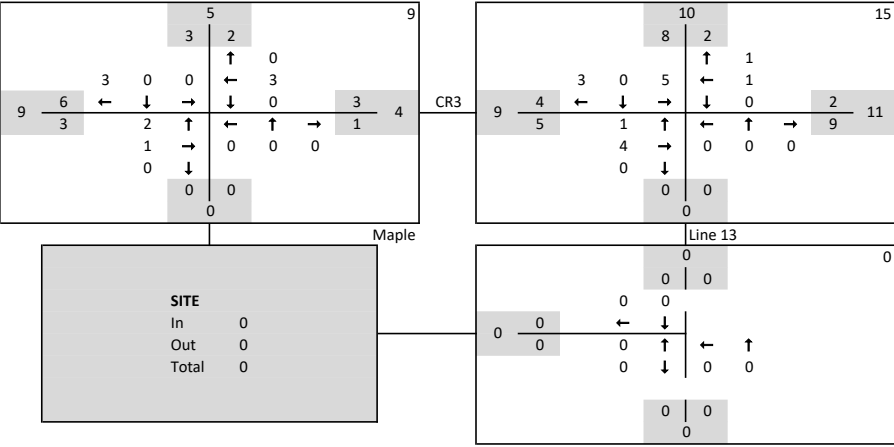
AM Peak Hour
Future Background Traffic (2034)



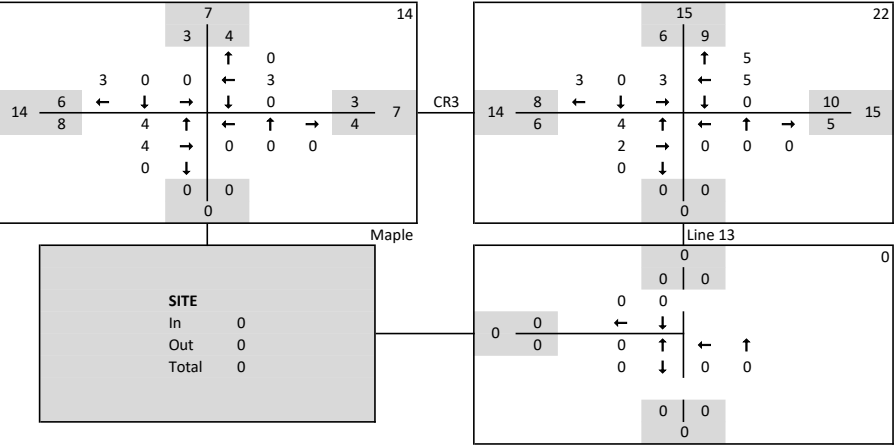
PM Peak Hour
Future Background Traffic



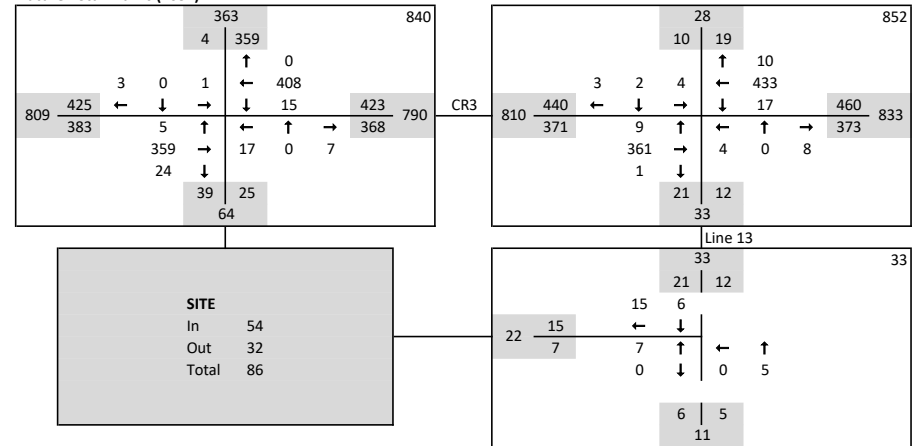
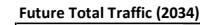
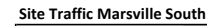
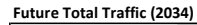
Site Traffic Marsville North



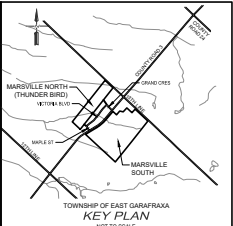
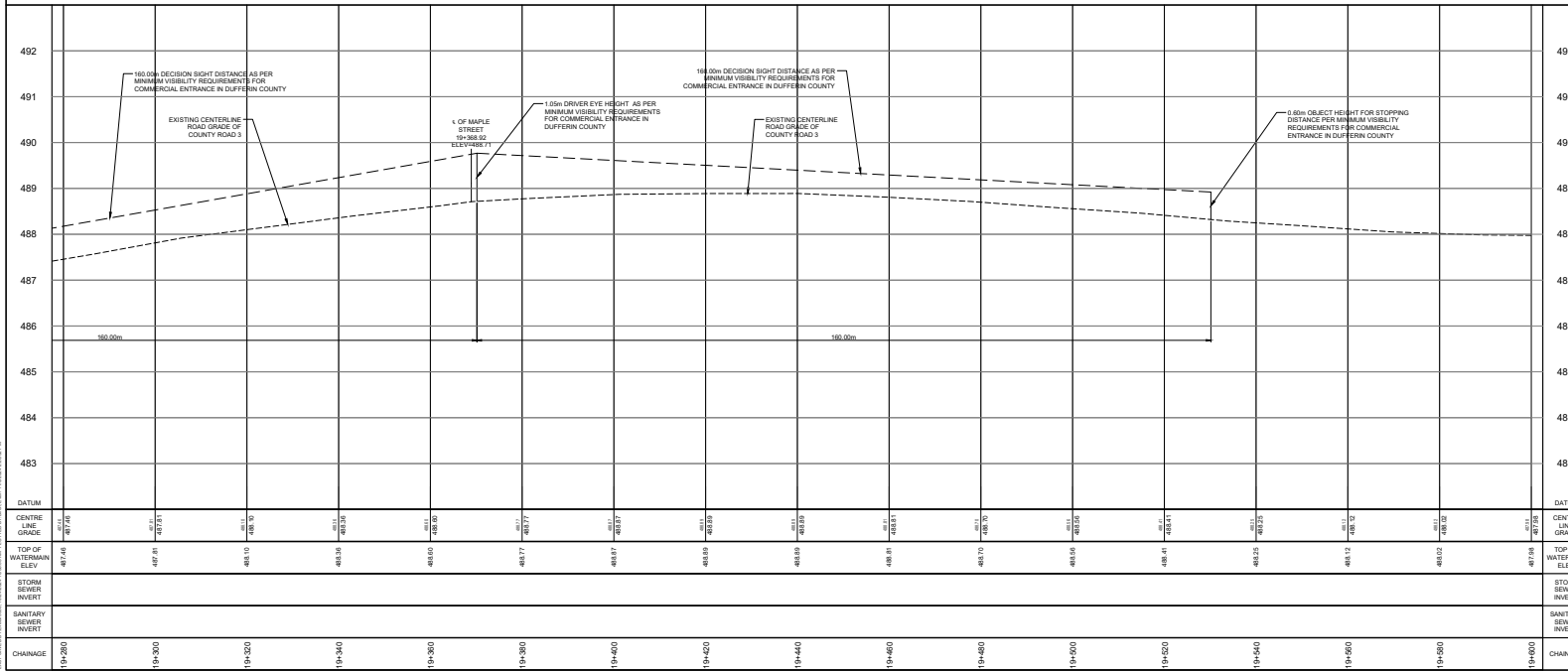
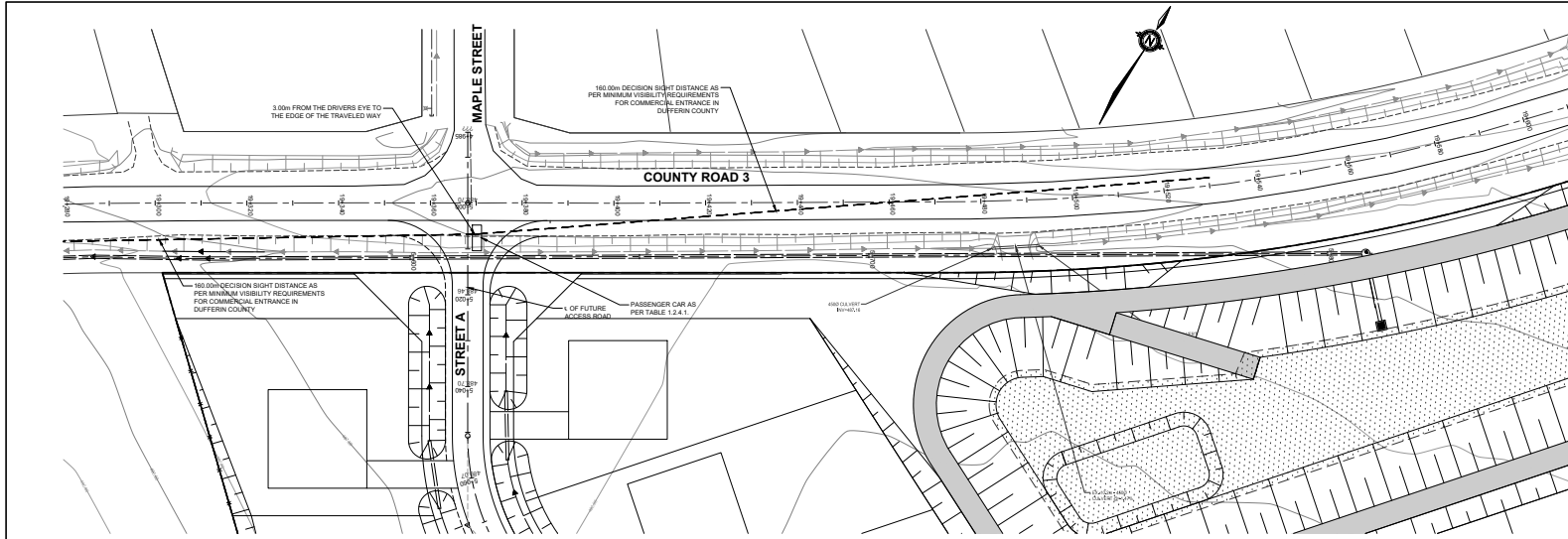
Site Traffic Marsville North



Site Traffic Marsville South



1:1000 Scale Drawing of County Road 3 at Street A, Dufferin County, Ontario. This drawing is a technical drawing and should not be used for any other purpose. All dimensions are in meters. The drawing is a technical drawing and should not be used for any other purpose. All dimensions are in meters. The drawing is a technical drawing and should not be used for any other purpose. All dimensions are in meters.



- NOTES:
1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING ON FEBRUARY 13, 2020 AND MARCH 5 AND 13, 2020.
 2. EXISTING PROPERTY BOUNDARY AND DRAFT PLAN OF SUBDIVISION PROVIDED BY ASTRO J. CLOS PLANNING CONSULTANTS, DATED FEBRUARY 4, 2022.
 3. ALL TOPOGRAPHIC CONTOUR INFORMATION EXTERNAL TO THE TUNO (MARSHVILLE NORTH AND GRAHAM (MARSHVILLE SOUTH)) PROPERTIES ARE BASED ON GRCA CONTOURS AND ARE TO BE CONFIRMED AT A LATER DATE.

BENCH MARKS:

THE PORTION OF PUBLIC LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THIS PLAN. THE LOCATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

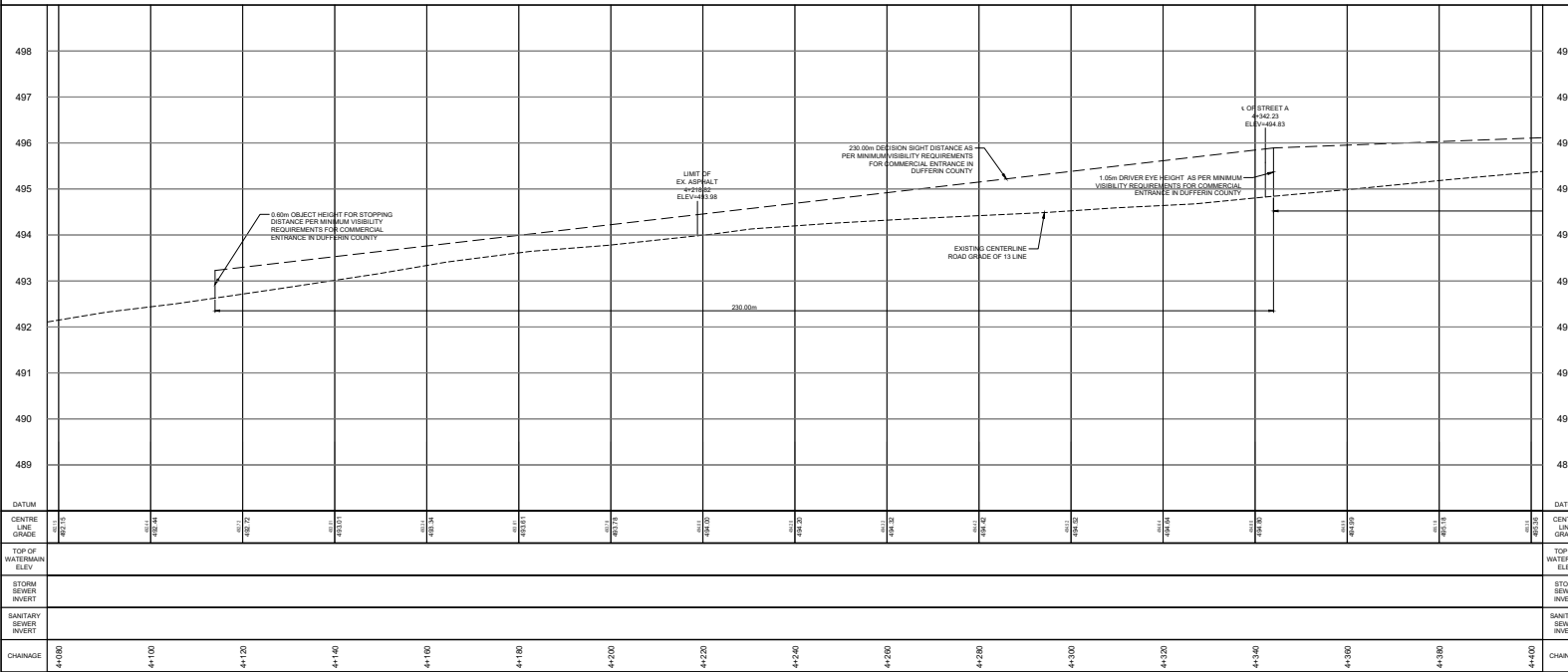
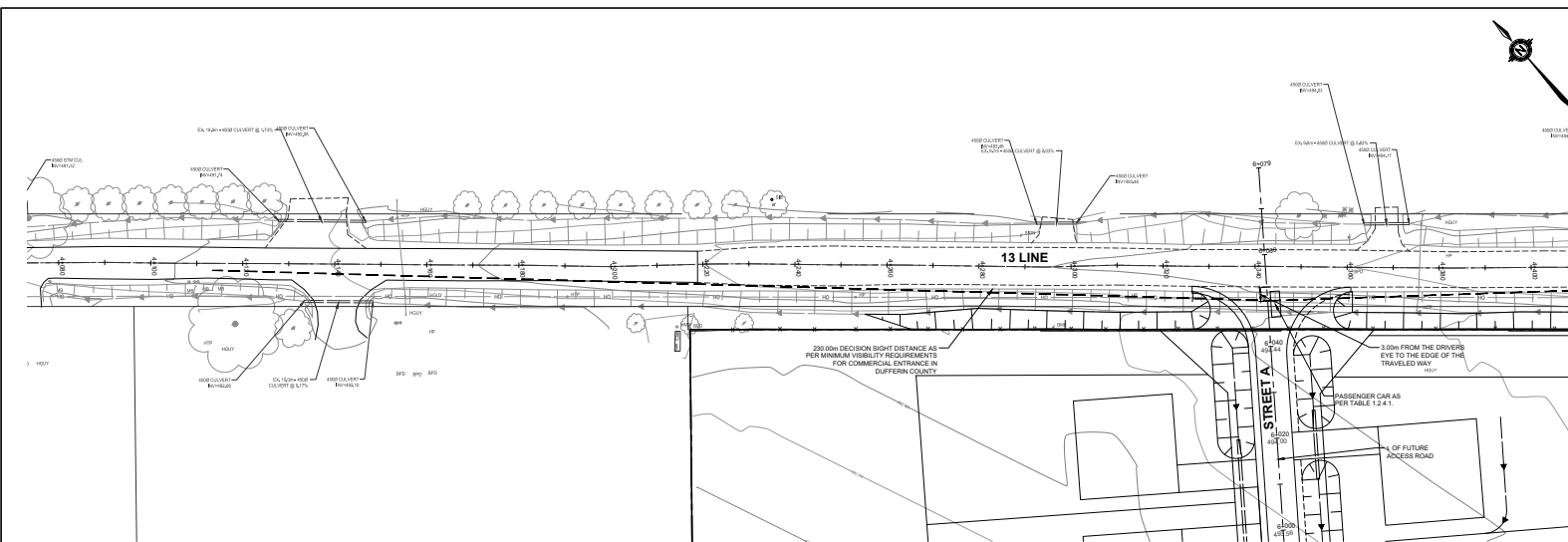
BEFORE CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN EVIDENCE OF THE EXISTING LOCATION OF ALL UTILITIES AND STRUCTURES AND SHALL OBTAIN ALL NECESSARY PERMITS TO THEM.

NO.	DATE	REVISION DESCRIPTION	APPROVED
1.	09/12/2022	ISSUED FOR APPROVAL	A.E.K.



MARSVILLE SOUTH SUBDIVISION	
TOWNSHIP OF EAST GARAFRAXA	
THOMASFIELD HOMES LTD.	
EAST SIGHTLINE ANALYSIS OF COUNTY ROAD 3 AT STREET A	
DRAWN BY: E.B.	PROJECT NO.: 420004
DESIGNED BY: A.E.K.	DATE: MAY 2022
	SCALE: H 1:500 V 1:50
CHANGING	A6

13 LINE SIGHTLINE ANALYSIS OF 13 LINE AT STREET A
PROJECT NO. 2020-001
DATE: 13/05/2022
DRAWN BY: A.E.K.
DESIGNED BY: A.E.K.
APPROVED BY: A.E.K.
PROJECT NO. 2020-001
DATE: 13/05/2022
DRAWN BY: A.E.K.
DESIGNED BY: A.E.K.
APPROVED BY: A.E.K.



KEY PLAN
NOT TO SCALE

MAP OF TOWNSHIP OF EAST GARAFRAXA
MARSHVILLE NORTH (THUNDER BIRD)
MARSHVILLE SOUTH

NOTES:

- TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING ON FEBRUARY 13, 2020 AND MARCH 5 AND 13, 2020.
- EXISTING PROPERTY BOUNDARY AND DRAFT PLAN OF SUBDIVISION PROVIDED BY ASTRO J. CLOS PLANNING CONSULTANTS, DATED FEBRUARY 4, 2022.
- ALL TOPOGRAPHIC CONTOUR INFORMATION EXTERNAL TO THE TUNO (MARSHVILLE NORTH AND GRAHAM (MARSHVILLE SOUTH)) PROPERTIES ARE BASED ON GRCA CONTOURS AND ARE TO BE CONFIRMED AT A LATER DATE.

BENCH MARKS:

THE PORTION OF PUBLIC LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER INFRASTRUCTURE AND CONSTRUCTION FEATURES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTOURS AND ARE BASED ON GRCA CONTOURS AND ARE TO BE CONFIRMED AT A LATER DATE.

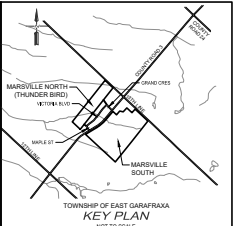
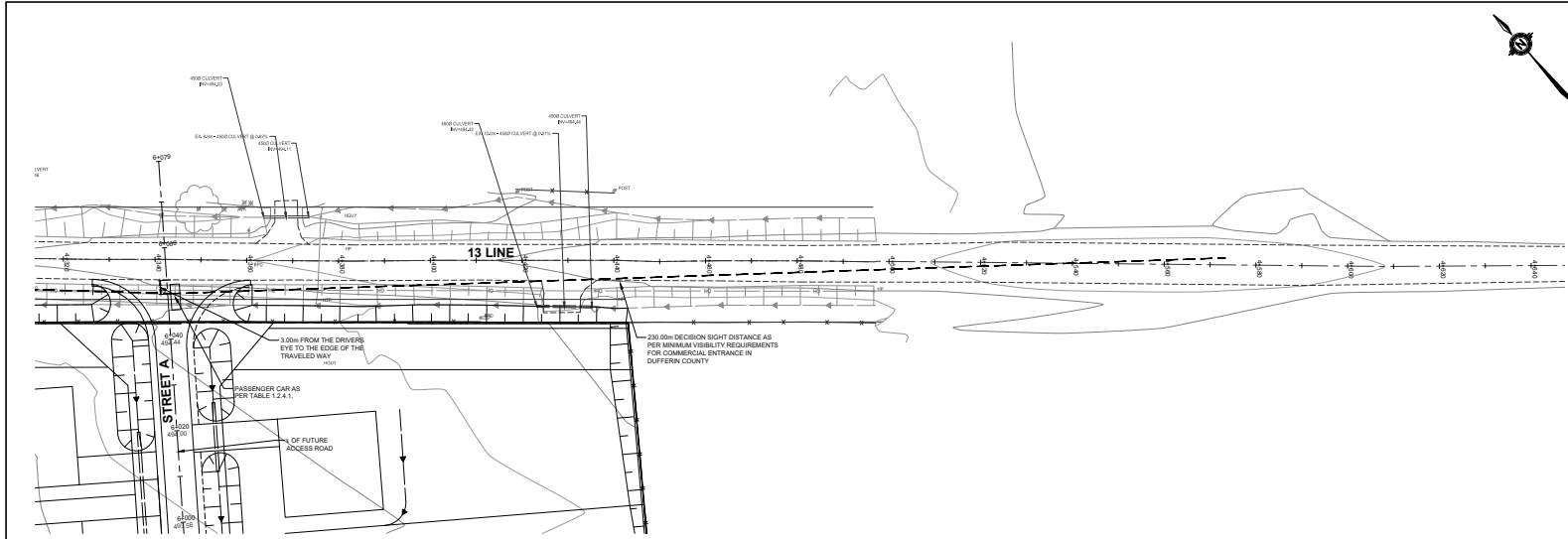
1.	05/12/2022	ISSUED FOR APPROVAL	A.E.K.
NO.	DATE	REVISION DESCRIPTION	DYND

GM BluePlan
ENGINEERING

GRCA (P) | GORAN BOKUNIC | LONDON | KITCHENER | LONDON | HAMILTON | GTA
330 TULLYHAW DRIVE, UNIT 2, KITCHENER, ON N2E 2J7
TEL: 249-740-1001
www.gmblueplan.ca

MARSHVILLE SOUTH SUBDIVISION
TOWNSHIP OF EAST GARAFRAXA
THOMASFIELD HOMES LTD.
NORTH SIGHTLINE ANALYSIS OF
13 LINE AT STREET A

DRAWN BY	APPROVED BY	PROJECT NO.	DRAWING NO.
A.E.K.	A.E.K.	2020-001	A7
DESIGNED BY	DATE	SCALE	
A.E.K.	MAY 2022	1:150 V:150	



- NOTES:
1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING ON FEBRUARY 13, 2020 AND MARCH 5 AND 13, 2020.
 2. EXISTING PROPERTY BOUNDARY AND DRAFT PLAN OF SUBDIVISION PROVIDED BY ASTRO J CLOS PLANNING CONSULTANTS, DATED FEBRUARY 4, 2022.
 3. ALL TOPOGRAPHIC CONTOUR INFORMATION EXTERNAL TO THE TUNO (MARSHVILLE NORTH AND GRAHAM (MARSHVILLE SOUTH)) PROPERTIES ARE BASED ON GRCA CONTOURS AND ARE TO BE CONFIRMED AT A LATER DATE.

BENCH MARKS:

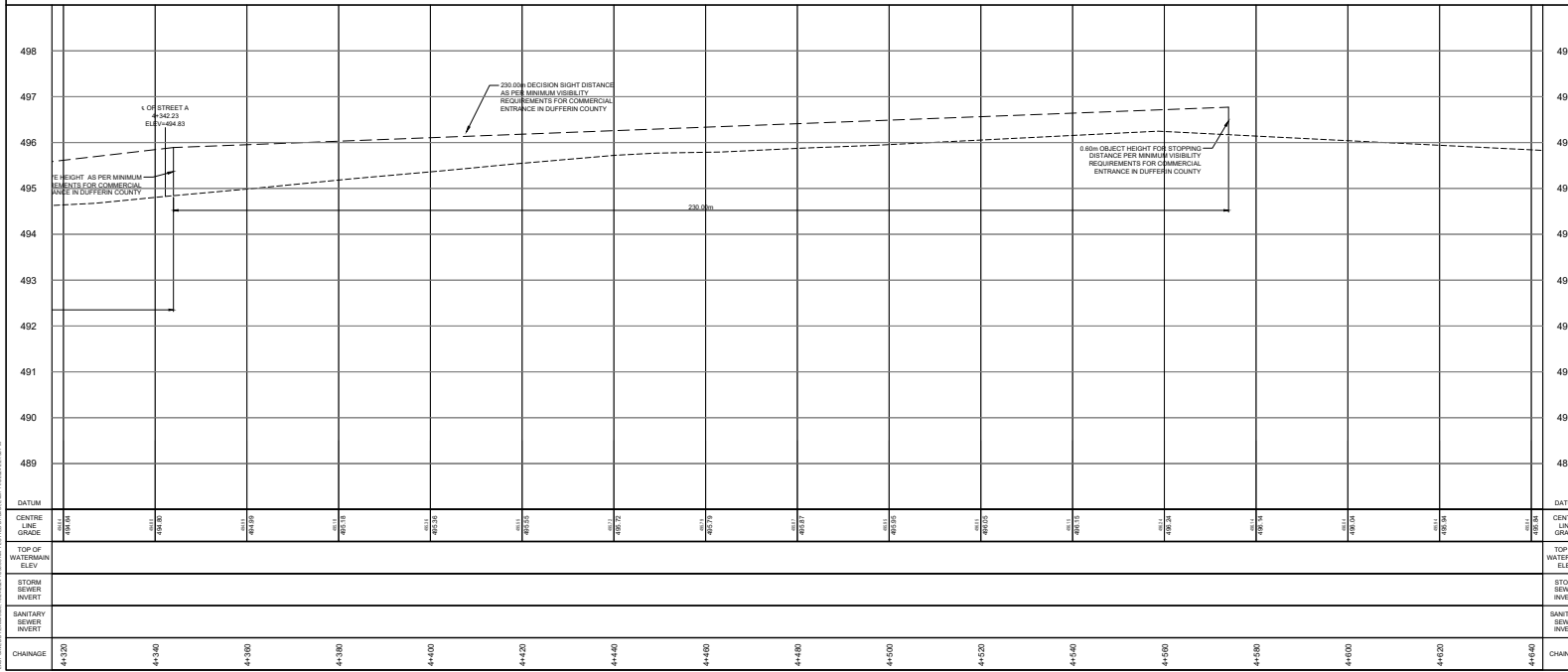
THE POSITION OF POLY-LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT GUARANTEED. THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEING THE PROPERTY OF THE TOWNSHIP OF EAST GARAFRAXA, THE TOWNSHIP OF EAST GARAFRAXA IS NOT RESPONSIBLE FOR THE LOCATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGES TO THEM.

1.	09/12/2022	ISSUED FOR APPROVAL	A.E.K.
NO.	DATE	REVISION DESCRIPTION	DYND

GRCA (E) | GARAFRAXA (E) | GARAFRAXA (E) | GARAFRAXA (E) | GARAFRAXA (E)
330 TULLYHILL DRIVE, UNIT 2, KITCHENER, ON N2E 2Z7
TEL: 519-748-1001 | WWW.GMBLUEPLAN.CA

MARSVILLE SOUTH SUBDIVISION
TOWNSHIP OF EAST GARAFRAXA
THOMASFIELD HOMES LTD.
SOUTH SIGHTLINE ANALYSIS OF
13 LINE AT STREET A

DRAWN BY	APPROVED BY	PROJECT NO.	DRAWING NO.
E.B.	A.E.K.	420504	A8
DESIGNED BY	DATE	SCALE	
A.E.K.	MAY 2022	H 1:500 V 1:50	



13 LINE SIGHTLINE ANALYSIS OF 13 LINE AT STREET A
PROJECT NO. 420504
DRAWING NO. A8
DATE: MAY 2022
SCALE: H 1:500, V 1:50
DESIGNED BY: A.E.K.
APPROVED BY: A.E.K.
DRAFTER: E.B.

Appendix B: Turning Movement Counts

CR 3 @ 13th Line

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Marsville
Site #: 0000000002
Intersection: CR 3 & 13th Line
TFR File #: 2
Count date: 17-Sep-2024

Weather conditions:

Sunny/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: CR 3 runs W/E

North Leg Total: 7
 North Entering: 4
 North Peds: 0
 Peds Cross: \nlessgtr

Heavys	0	1	0	1
Trucks	0	0	0	0
Cars	0	0	3	3
Totals	0	1	3	

Heavys 1
 Trucks 0
 Cars 2
 Totals 3

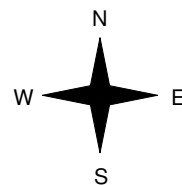
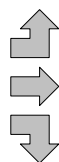
East Leg Total: 547
 East Entering: 209
 East Peds: 0
 Peds Cross: \nlessgtr

Heavys	Trucks	Cars	Totals
25	7	178	210



CR 3

Heavys	Trucks	Cars	Totals
1	0	1	2
16	7	303	326
1	1	2	4
18	8	306	



13th Line

Cars	Trucks	Heavys	Totals
1	0	0	1
176	7	24	207
1	0	0	1
178	7	24	

CR 3



Cars	Trucks	Heavys	Totals
312	8	18	338

Peds Cross: \nlessgtr
 West Peds: 0
 West Entering: 332
 West Leg Total: 542

Cars	3
Trucks	1
Heavys	2
Totals	6



Cars	2	0	6	8
Trucks	0	0	1	1
Heavys	1	0	2	3
Totals	3	0	9	

Peds Cross: \nlessgtr
 South Peds: 0
 South Entering: 12
 South Leg Total: 18

Comments

CR 3 @ 13th Line

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:45:00

To: 17:45:00

Municipality: Marsville

Site #: 0000000002

Intersection: CR 3 & 13th Line

TFR File #: 2

Count date: 17-Sep-2024

Weather conditions:

Sunny/Dry

Person(s) who counted:

Pyramid Traffic Inc

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

Major Road: CR 3 runs W/E

North Leg Total: 11

North Entering: 3

North Peds: 0

Peds Cross: \nlessgtr

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



Heavys 0

Trucks 3

Cars 5

Totals 8

East Leg Total: 632

East Entering: 347

East Peds: 0

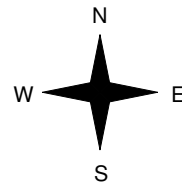
Peds Cross: \nlessgtr

Heavys	Trucks	Cars	Totals
16	7	321	344



CR 3

Heavys	Trucks	Cars	Totals
0	3	1	4
18	5	260	283
0	0	1	1
18	8	262	



13th Line



Cars	Trucks	Heavys	Totals
4	0	0	4
318	7	16	341
1	1	0	2
323	8	16	



CR 3



13th Line



Peds Cross: \nlessgtr

West Peds: 0

West Entering: 288

West Leg Total: 632

Cars	4
Trucks	1
Heavys	0
Totals	5



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

Peds Cross: \nlessgtr

South Peds: 0

South Entering: 4

South Leg Total: 9

Comments

CR 3 @ 13th Line

Total Count Diagram

Municipality: Marsville
Site #: 0000000002
Intersection: CR 3 & 13th Line
TFR File #: 2
Count date: 17-Sep-2024

Weather conditions:
Sunny/Dry
Person(s) who counted:
Pyramid Traffic Inc

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

Major Road: CR 3 runs W/E

North Leg Total: 42
North Entering: 24
North Peds: 0
Peds Cross: \nlessgtr

Heavys	3	1	0	4
Trucks	1	1	1	3
Cars	3	4	10	17
Totals	7	6	11	

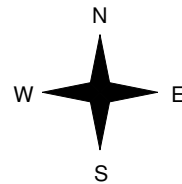
Heavys	2
Trucks	4
Cars	12
Totals	18

East Leg Total: 2196
East Entering: 1082
East Peds: 0
Peds Cross: \nlessgtr

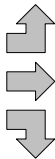
Heavys	Trucks	Cars	Totals
75	31	978	1084



CR 3



Heavys	Trucks	Cars	Totals
1	4	2	7
67	30	994	1091
1	1	5	7
69	35	1001	



13th Line

Cars	Trucks	Heavys	Totals
8	0	0	8
968	30	70	1068
5	1	0	6
981	31	70	

CR 3



Cars	Trucks	Heavys	Totals
1013	32	69	1114

Peds Cross: \nlessgtr
West Peds: 0
West Entering: 1105
West Leg Total: 2189

Cars	14
Trucks	3
Heavys	2
Totals	19



Cars	7	2	9	18
Trucks	0	0	1	1
Heavys	2	1	2	5
Totals	9	3	12	

Peds Cross: \nlessgtr
South Peds: 1
South Entering: 24
South Leg Total: 43

Comments

CR 3 @ Maple St

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 7:45:00

To: 8:45:00

Municipality: Marsville
Site #: 0000000001
Intersection: CR 3 & Maple St
TFR File #: 1
Count date: 17-Sep-2024

Weather conditions:

Sunny/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: CR 3 runs W/E

North Leg Total: 6
North Entering: 5
North Peds: 0
Peds Cross: 0

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

Heavys	0
Trucks	0
Cars	1
Totals	1

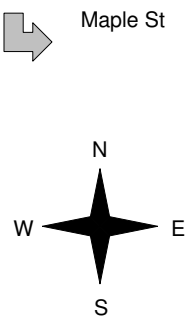
East Leg Total: 531
East Entering: 207
East Peds: 0
Peds Cross: 0

Heavys	Trucks	Cars	Totals
26	8	172	206



CR 3

Heavys	Trucks	Cars	Totals
0	0	0	0
20	11	288	319
20	11	288	



Maple St

Cars	Trucks	Heavys	Totals
1	0	0	1
172	8	26	206
173	8	26	

CR 3



Cars	Trucks	Heavys	Totals
292	11	21	324

Peds Cross: 0
West Peds: 0
West Entering: 319
West Leg Total: 525

Comments

CR 3 @ Maple St

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 18:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Marsville
Site #: 0000000001
Intersection: CR 3 & Maple St
TFR File #: 1
Count date: 17-Sep-2024

Weather conditions:

Sunny/Dry

Person(s) who counted:

Pyramid Traffic Inc

** Non-Signalized Intersection **

Major Road: CR 3 runs W/E

North Leg Total: 2
North Entering: 1
North Peds: 0
Peds Cross: 0

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

Heavys	0
Trucks	0
Cars	1
Totals	1

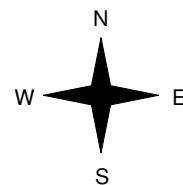
East Leg Total: 621
East Entering: 334
East Peds: 0
Peds Cross: 0

Heavys	Trucks	Cars	Totals
18	13	303	334



CR 3

Heavys	Trucks	Cars	Totals
0	0	1	1
23	4	259	286
23	4	260	



Maple St

Cars	Trucks	Heavys	Totals
0	0	0	0
303	13	18	334
303	13	18	

CR 3



Cars	Trucks	Heavys	Totals
260	4	23	287

Peds Cross: 0
West Peds: 0
West Entering: 287
West Leg Total: 621

Comments

CR 3 @ Maple St

Total Count Diagram

Municipality: Marsville
Site #: 0000000001
Intersection: CR 3 & Maple St
TFR File #: 1
Count date: 17-Sep-2024

Weather conditions:
Sunny/Dry
Person(s) who counted:
Pyramid Traffic Inc

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

Major Road: CR 3 runs W/E

North Leg Total: 12
North Entering: 8
North Peds: 0
Peds Cross: \times

Heavys	0	1	1
Trucks	0	0	0
Cars	2	5	7
Totals	2	6	



Heavys	0
Trucks	0
Cars	4
Totals	4

East Leg Total: 2140
East Entering: 1048
East Peds: 0
Peds Cross: \times

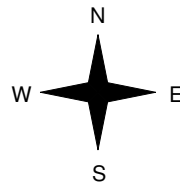
Heavys	Trucks	Cars	Totals
84	34	931	1049



Maple St



CR 3



Heavys	Trucks	Cars	Totals
0	0	3	3
77	38	971	1086
77	38	974	



Cars	Trucks	Heavys	Totals
1	0	0	1
929	34	84	1047
930	34	84	

CR 3



Cars	Trucks	Heavys	Totals
976	38	78	1092

Peds Cross: \times
West Peds: 0
West Entering: 1089
West Leg Total: 2138

















Comments

Appendix C: Existing Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	326	4	1	207	1	3	0	9	3	1	0
Future Volume (Veh/h)	2	326	4	1	207	1	3	0	9	3	1	0
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)	2	354	4	1	225	1	3	0	10	3	1	0
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	226			358			588	588	356	598	590	226
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226			358			588	588	356	598	590	226
tC, single (s)	4.6			4.1			7.4	6.5	6.5	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.2			3.8	4.0	3.6	3.5	4.9	3.3
p0 queue free %	100			100			99	100	98	99	100	100
cM capacity (veh/h)	1105			1212			376	423	624	410	312	819
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	360	227	13	4								
Volume Left	2	1	3	3								
Volume Right	4	1	10	0								
cSH	1105	1212	541	380								
Volume to Capacity	0.00	0.00	0.02	0.01								
Queue Length 95th (m)	0.0	0.0	0.6	0.2								
Control Delay (s)	0.1	0.0	11.8	14.6								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.1	0.0	11.8	14.6								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.4									
Intersection Capacity Utilization			28.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	319	0	0	206	1	0	0	0	5	0	0
Future Volume (Veh/h)	0	319	0	0	206	1	0	0	0	5	0	0
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)	0	347	0	0	224	1	0	0	0	5	0	0
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	225			347			572	572	347	572	572	224
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	225			347			572	572	347	572	572	224
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1356			1212			431	430	696	405	430	820
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	347	225	0	5								
Volume Left	0	0	0	5								
Volume Right	0	1	0	0								
cSH	1356	1212	1700	405								
Volume to Capacity	0.00	0.00	0.09	0.01								
Queue Length 95th (m)	0.0	0.0	0.0	0.3								
Control Delay (s)	0.0	0.0	0.0	14.0								
Lane LOS			A	B								
Approach Delay (s)	0.0	0.0	0.0	14.0								
Approach LOS			A	B								
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			26.8%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	283	1	2	341	4	3	0	1	1	2	0
Future Volume (Veh/h)	4	283	1	2	341	4	3	0	1	1	2	0
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)	4	308	1	2	371	4	3	0	1	1	2	0
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	375			309			694	696	308	694	694	373
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	375			309			694	696	308	694	694	373
tC, single (s)	4.8			4.6			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.9			2.7			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	100	99	100
cM capacity (veh/h)	874			1023			356	366	736	357	366	678
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	313	377	4	3								
Volume Left	4	2	3	1								
Volume Right	1	4	1	0								
cSH	874	1023	409	363								
Volume to Capacity	0.00	0.00	0.01	0.01								
Queue Length 95th (m)	0.1	0.0	0.2	0.2								
Control Delay (s)	0.2	0.1	13.9	15.0								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.2	0.1	13.9	15.0								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			29.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

10-15-2024

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	286	0	0	334	0	0	0	0	1	0	0
Future Volume (Veh/h)	1	286	0	0	334	0	0	0	0	1	0	0
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)	1	311	0	0	363	0	0	0	0	1	0	0
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	363			311			676	676	311	676	676	363
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	363			311			676	676	311	676	676	363
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1207			1249			367	375	729	370	375	686
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	312	363	0	1								
Volume Left	1	0	0	1								
Volume Right	0	0	0	0								
cSH	1207	1249	1700	370								
Volume to Capacity	0.00	0.00	0.09	0.00								
Queue Length 95th (m)	0.0	0.0	0.0	0.1								
Control Delay (s)	0.0	0.0	0.0	14.8								
Lane LOS	A		A	B								
Approach Delay (s)	0.0	0.0	0.0	14.8								
Approach LOS			A	B								
Intersection Summary												
Average Delay			0.0									
Intersection Capacity Utilization			27.6%	ICU Level of Service				A				
Analysis Period (min)			15									

Appendix D: Future Background Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	392	5	1	255	1	4	0	11	4	1	0
Future Volume (Veh/h)	2	392	5	1	255	1	4	0	11	4	1	0
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)	2	426	5	1	277	1	4	0	12	4	1	0
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			431			712	712	428	724	714	278
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			431			712	712	428	724	714	278
tC, single (s)	4.6			4.1			7.4	6.5	6.5	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.2			3.8	4.0	3.6	3.5	4.9	3.3
p0 queue free %	100			100			99	100	98	99	100	100
cM capacity (veh/h)	1053			1139			308	359	566	336	259	766
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	433	279	16	5								
Volume Left	2	1	4	4								
Volume Right	5	1	12	0								
cSH	1053	1139	468	317								
Volume to Capacity	0.00	0.00	0.03	0.02								
Queue Length 95th (m)	0.0	0.0	0.8	0.4								
Control Delay (s)	0.1	0.0	13.0	16.5								
Lane LOS	A	A	B	C								
Approach Delay (s)	0.1	0.0	13.0	16.5								
Approach LOS			B	C								
Intersection Summary												
Average Delay			0.4									
Intersection Capacity Utilization			32.4%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	384	0	0	254	1	0	0	0	6	0	0
Future Volume (Veh/h)	0	384	0	0	254	1	0	0	0	6	0	0
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)	0	417	0	0	276	1	0	0	0	7	0	0
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	277			417			694	694	417	694	694	276
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	277			417			694	694	417	694	694	276
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	100
cM capacity (veh/h)	1298			1142			357	366	636	335	367	767
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	417	277	0	7								
Volume Left	0	0	0	7								
Volume Right	0	1	0	0								
cSH	1298	1142	1700	335								
Volume to Capacity	0.00	0.00	0.09	0.02								
Queue Length 95th (m)	0.0	0.0	0.0	0.5								
Control Delay (s)	0.0	0.0	0.0	16.0								
Lane LOS			A	C								
Approach Delay (s)	0.0	0.0	0.0	16.0								
Approach LOS			A	C								
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization			30.2%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3

















10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	352	1	2	413	5	4	0	1	1	2	0
Future Volume (Veh/h)	5	352	1	2	413	5	4	0	1	1	2	0
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)	5	383	1	2	449	5	4	0	1	1	2	0
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	454			384			850	852	384	850	850	452
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	454			384			850	852	384	850	850	452
tC, single (s)	4.8			4.6			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.9			2.7			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	100	100	99	100
cM capacity (veh/h)	810			955			279	297	668	281	297	612
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	389	456	5	3								
Volume Left	5	2	4	1								
Volume Right	1	5	1	0								
cSH	810	955	316	292								
Volume to Capacity	0.01	0.00	0.02	0.01								
Queue Length 95th (m)	0.1	0.0	0.4	0.2								
Control Delay (s)	0.2	0.1	16.6	17.5								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.2	0.1	16.6	17.5								
Approach LOS			C	C								
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			33.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

10-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	355	0	0	405	0	0	0	0	1	0	0
Future Volume (Veh/h)	1	355	0	0	405	0	0	0	0	1	0	0
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)	1	386	0	0	440	0	0	0	0	1	0	0
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	440			386			828	828	386	828	828	440
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	440			386			828	828	386	828	828	440
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1131			1172			290	306	662	292	306	621
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	387	440	0	1								
Volume Left	1	0	0	1								
Volume Right	0	0	0	0								
cSH	1131	1172	1700	292								
Volume to Capacity	0.00	0.00	0.09	0.00								
Queue Length 95th (m)	0.0	0.0	0.0	0.1								
Control Delay (s)	0.0	0.0	0.0	17.4								
Lane LOS	A		A	C								
Approach Delay (s)	0.0	0.0	0.0	17.4								
Approach LOS			A	C								
Intersection Summary												
Average Delay	0.0											
Intersection Capacity Utilization	31.3%			ICU Level of Service					A			
Analysis Period (min)	15											

Appendix E: ITE Trip Generation Manual Excerpts

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

**On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.**

Setting/Location: General Urban/Suburban

Number of Studies: 192

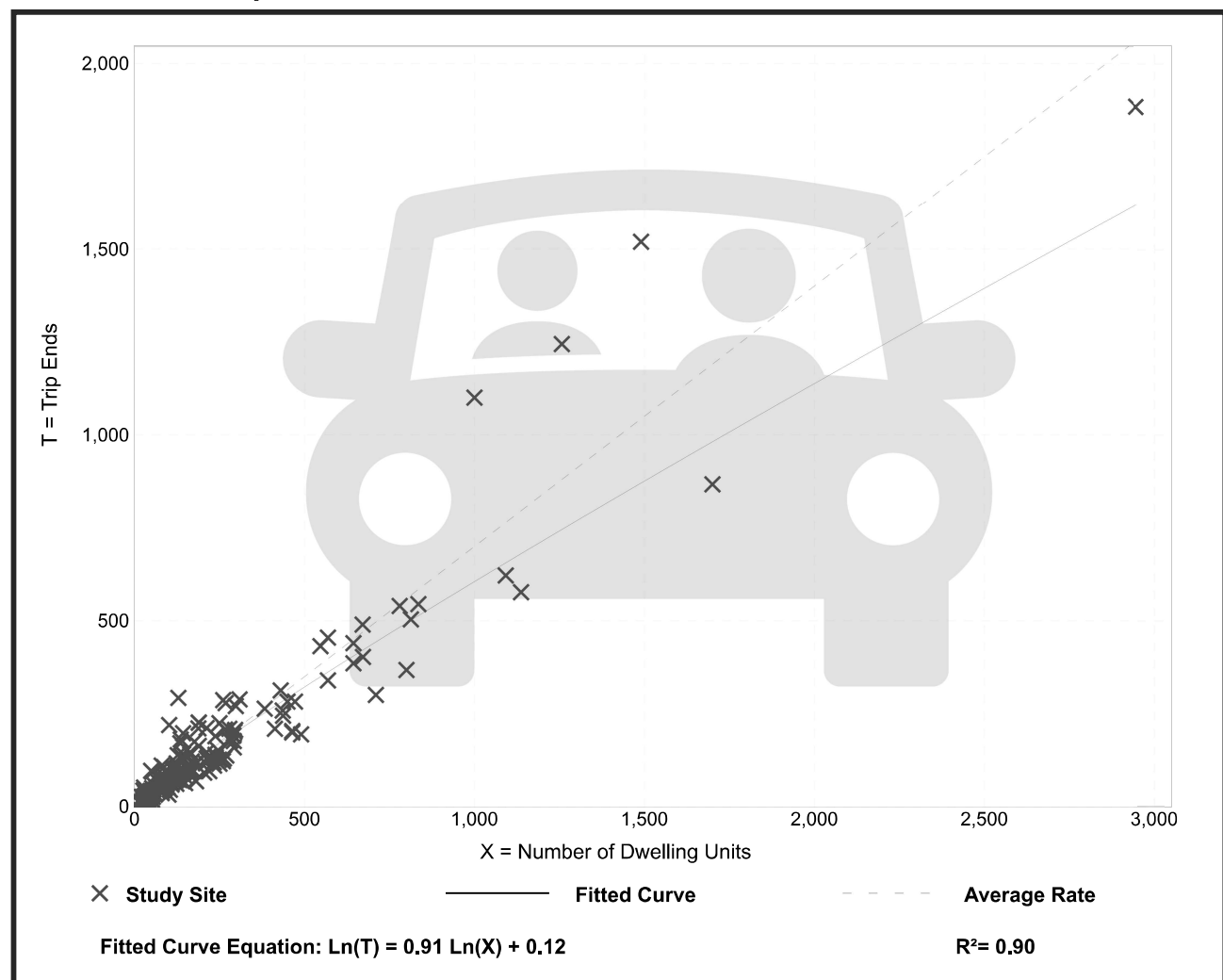
Avg. Num. of Dwelling Units: 226

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

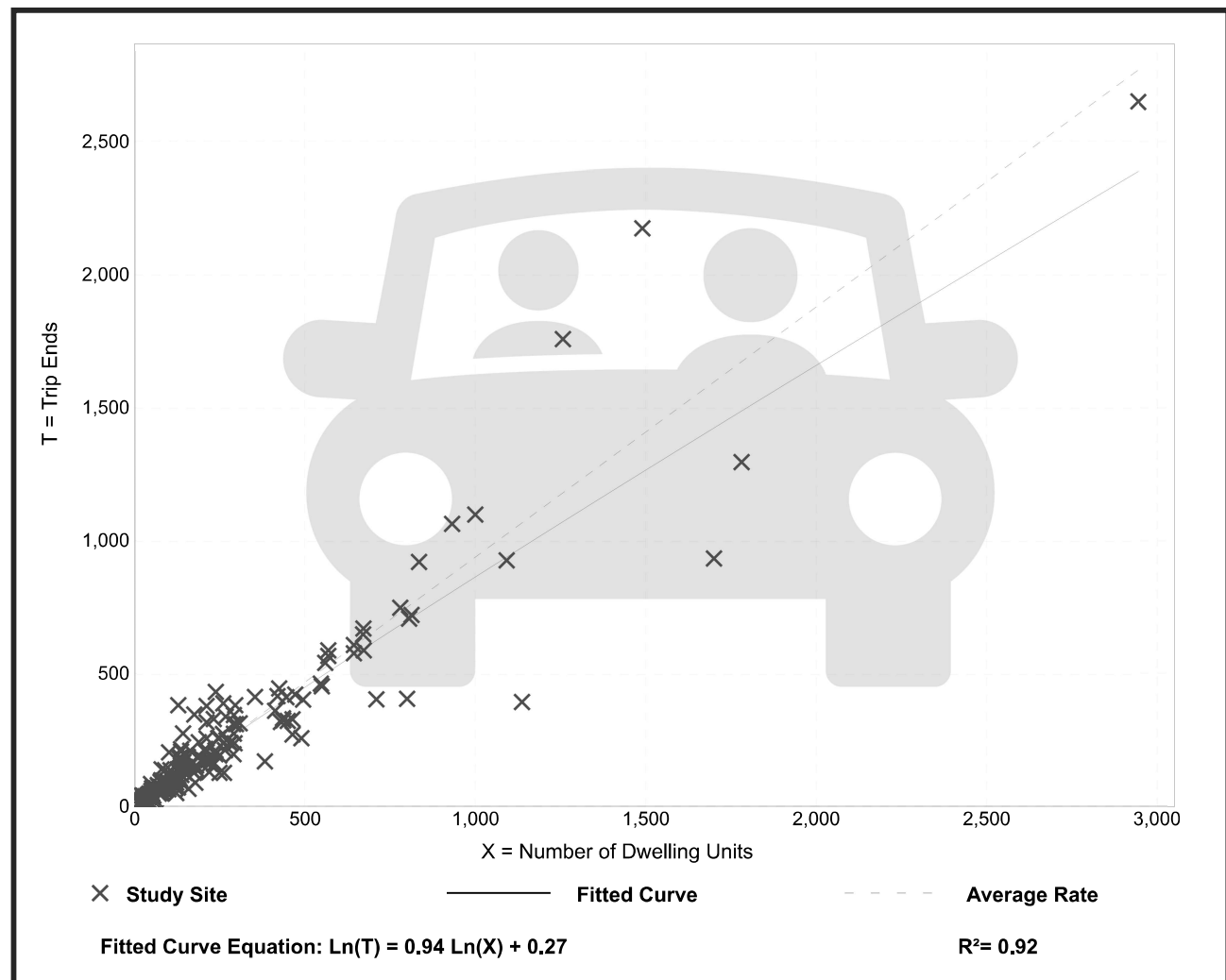
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



















Appendix F: Future Total Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3










10-23-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	411	5	4	260	2	4	0	25	9	1	3
Future Volume (Veh/h)	3	411	5	4	260	2	4	0	25	9	1	3
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)	3	447	5	4	283	2	4	0	27	10	1	3
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	285			452			751	748	450	774	750	284
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	285			452			751	748	450	774	750	284
tC, single (s)	4.6			4.1			7.4	6.5	6.5	7.1	7.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.2			3.8	4.0	3.6	3.5	4.9	3.3
p0 queue free %	100			100			99	100	95	97	100	100
cM capacity (veh/h)	1046			1119			288	341	550	301	244	760
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	455	289	31	14								
Volume Left	3	4	4	10								
Volume Right	5	2	27	3								
cSH	1046	1119	492	339								
Volume to Capacity	0.00	0.00	0.06	0.04								
Queue Length 95th (m)	0.1	0.1	1.5	1.0								
Control Delay (s)	0.1	0.1	12.8	16.1								
Lane LOS	A	A	B	C								
Approach Delay (s)	0.1	0.1	12.8	16.1								
Approach LOS			B	C								
Intersection Summary												
Average Delay				0.9								
Intersection Capacity Utilization				33.6%	ICU Level of Service				A			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis

8: 13th Line & Street A

















10-23-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	0	0	14	7	3
Future Volume (Veh/h)	14	0	0	14	7	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	0	0	15	8	3
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	24	10	11			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24	10	11			
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)	991	1072	1608			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	15	15	11			
Volume Left	15	0	0			
Volume Right	0	0	3			
cSH	991	1608	1700			
Volume to Capacity	0.02	0.00	0.01			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	8.7	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

















10-23-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	385	10	3	257	1	19	0	14	6	0	3
Future Volume (Veh/h)	2	385	10	3	257	1	19	0	14	6	0	3
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)	2	418	11	3	279	1	21	0	15	7	0	3
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	280			429			716	714	424	728	718	280
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			429			716	714	424	728	718	280
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	100			100			94	100	98	98	100	100
cM capacity (veh/h)	1294			1130			343	355	630	308	353	764
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	431	283	36	10								
Volume Left	2	3	21	7								
Volume Right	11	1	15	3								
cSH	1294	1130	423	376								
Volume to Capacity	0.00	0.00	0.09	0.03								
Queue Length 95th (m)	0.0	0.1	2.1	0.6								
Control Delay (s)	0.1	0.1	14.3	14.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.1	0.1	14.3	14.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			32.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

3: 13th Line & CR 3










10-23-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	361	1	17	433	10	4	0	8	4	2	3
Future Volume (Veh/h)	9	361	1	17	433	10	4	0	8	4	2	3
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)	10	392	1	18	471	11	4	0	9	4	2	3
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	482			393			929	930	392	934	926	476
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	482			393			929	930	392	934	926	476
tC, single (s)	4.8			4.6			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.9			2.7			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	100	99	98	99	99
cM capacity (veh/h)	788			947			241	261	661	239	262	593
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	403	500	13	9								
Volume Left	10	18	4	4								
Volume Right	1	11	9	3								
cSH	788	947	431	306								
Volume to Capacity	0.01	0.02	0.03	0.03								
Queue Length 95th (m)	0.3	0.4	0.7	0.7								
Control Delay (s)	0.4	0.5	13.6	17.1								
Lane LOS	A	A	B	C								
Approach Delay (s)	0.4	0.5	13.6	17.1								
Approach LOS			B	C								
Intersection Summary												
Average Delay												
0.8												
Intersection Capacity Utilization												
41.5%												
ICU Level of Service												
A												
Analysis Period (min)												
15												

HCM Unsignalized Intersection Capacity Analysis

8: 13th Line & Street A

















10-23-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	0	5	6	15
Future Volume (Veh/h)	7	0	0	5	6	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	0	5	7	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	20	15	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	20	15	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	997	1065	1592			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	5	23			
Volume Left	8	0	0			
Volume Right	0	0	16			
cSH	997	1592	1700			
Volume to Capacity	0.01	0.00	0.01			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.6	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.6	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization		13.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: Street A/Maple & CR 3

10-23-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	359	24	15	408	0	17	0	7	1	0	3
Future Volume (Veh/h)	5	359	24	15	408	0	17	0	7	1	0	3
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)	5	390	26	16	443	0	18	0	8	1	0	3
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	443			416			891	888	403	896	901	443
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	443			416			891	888	403	896	901	443
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			93	100	99	100	100	100
cM capacity (veh/h)	1128			1143			258	278	647	256	273	619
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	421	459	26	4								
Volume Left	5	16	18	1								
Volume Right	26	0	8	3								
cSH	1128	1143	317	457								
Volume to Capacity	0.00	0.01	0.08	0.01								
Queue Length 95th (m)	0.1	0.3	2.0	0.2								
Control Delay (s)	0.1	0.4	17.4	12.9								
Lane LOS	A	A	C	B								
Approach Delay (s)	0.1	0.4	17.4	12.9								
Approach LOS			C	B								
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			40.3%		ICU Level of Service				A			
Analysis Period (min)			15									