

2024-11-19  
Project: (230730)

Bernie Nimer  
1000535777 Ontario Inc  
200-260 King Street West  
Kitchener ON N2G 1B6

Dear Nimer:

**RE: 306 WOODVIEW DRIVE, NORTH PERTH – RESIDENTIAL SUBDIVISION  
TRANSPORTATION IMPACT BRIEF**

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Paradigm Transportation Solutions Limited has prepared this Transportation Impact Brief (TIB) for the proposed residential subdivision located at 306 Woodview Drive, Village of Atwood, Municipality of North Perth, County of Perth.

The purpose of this study is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study includes:

- ▶ assessing current traffic conditions within the study area;
- ▶ forecasting background traffic growth to a three-year horizon (2027);
- ▶ forecasting site-generated traffic;
- ▶ reviewing cul-de-sac length standards;
- ▶ analysing future traffic impacts at the intersection of Elma Centre Street and Main Street; and
- ▶ recommending and necessary measures to mitigate the site-generated traffic.

The County of Perth and the Town of North Perth do not have guidelines for Transportation Impact Assessments, so Traffic Impact Study Guidelines for Wellington County<sup>1</sup> were used.

**Appendix A** contains the pre-study consultation material and responses from the County of Perth.

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<sup>1</sup> Wellington County, *Appendix G - Traffic Impact Study Guidelines*, October 2021.

## Site Description

The subject site is located on the northeast corner of the intersection of Woodview Drive and Parkview Crescent. **Figure 1** illustrates the site location.

The proposed residential subdivision includes up to 90 units consisting of approximately 50 single-detached family units, and 14 semi-detached and 24 townhouse units. Vehicle access is proposed via an extension of Woodview Drive with a full-moves connection at Parkview Crescent. Additional future access is proposed via a municipal street connection in the northwest corner of the subdivision and will be constructed as part of the Dallmitch Subdivision. Timing for that connection is currently unknown. **Figure 2** illustrates the proposed Draft Plan of subdivision.

## Existing Conditions

### Existing Road Network

The existing road network within the study area includes:

- ▶ **Elma Centre Street**, an east-west local road<sup>2</sup> with a two-lane rural cross section with an assumed speed limit of 50 km/h; and
- ▶ **Main Street (Highway 23)**, a north-south provincial highway<sup>3</sup> with a two-lane urban cross section with a posted speed limit of 50 m/h.

Sidewalks are provided on both sides of Main Street. There are no sidewalks on Elma Centre Street leading toward the subject site, however, due to the low volume of vehicles travelling on Elma Centre Street, it is acceptable to assume that pedestrians can walk on the side of the roadway. Sidewalks will be provided on at least one side of all new roadways in the proposed subdivision and on roadways part of the Dallmitch Subdivision to the north.

### Traffic Volumes

Paradigm collected Turning Movement Counts (TMCs) at the intersection of Elma Centre Street and Main Street on January 17, 2024. **Figure 3** illustrates the existing weekday AM and PM peak hour traffic volumes at the study intersection.

**Appendix B** contains the count data.

## Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual<sup>4</sup> equations for Land Use Code (LUC) 210 Single-Family Detached Housing, Land Use Code (LUC) 215 Single-Family Attached Housing and Land Use Code (LUC) 220 Multi-Family Housing Low-Rise have

<sup>2</sup> Perth County, *GIS Roads Map*, January 2024.

<sup>3</sup> Perth County, *GIS Roads Map*, January 2024.

<sup>4</sup> Institute of Transportation Engineers, *Trip Generation Manual*, 11th ed., (Washington, DC: ITE, 2021).



been used to estimate the peak hour traffic volumes generated by the proposed development. **Table 1** summarizes the forecast number of net new trips generated by the proposed development.

**TABLE 1: TRIP GENERATION**

Land Use Code (General Urban/Suburban)	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
210 (Single-Family Detached Housing)	50	Eqn. <sup>1</sup>	10	30	40	Eqn. <sup>2</sup>	33	19	52
215 (Single-Family Attached Housing)	14	Eqn. <sup>3</sup>	0	2	2	Eqn. <sup>4</sup>	3	1	4
220 (Multi-Family Housing - Low Rise)	24	Eqn. <sup>5</sup>	7	23	30	Eqn. <sup>6</sup>	19	12	31
<b>Total (All Land Uses)</b>	<b>88</b>		<b>17</b>	<b>55</b>	<b>72</b>		<b>55</b>	<b>32</b>	<b>87</b>

<sup>1</sup> AM  $Ln(T)=0.91(LnX) + 0.12$

<sup>2</sup> PM  $Ln(T)=0.94(LnX) + 0.27$

<sup>3</sup> AM  $T=0.52(X) - 5.70$

<sup>4</sup> PM  $T=0.60(X) - 3.93$

<sup>5</sup> AM  $T=0.31(X) + 22.85$

<sup>6</sup> PM  $T=0.43(X) + 20.55$

Based on the distribution of existing traffic volumes along Main Street and the location of Listowel to the north and Monkton to the south, site-generated trips have been assigned 50% in both directions as determined by the existing travel patterns.

**Figure 4** illustrates the site-generated traffic volumes for the AM and PM peak hours.

### Future Traffic Volumes

The assessment of future traffic conditions in this section includes estimates of future background and total traffic volumes, and the intersection operations for the 2027 (three-year) horizon.

#### Background Traffic Volumes

To derive the 2027 generalized background traffic volumes, a growth rate of 2% was applied to the existing roadway traffic volumes. This growth rate was confirmed with Perth County staff during the pre-study consultation. **Figure 5** illustrates the background traffic growth for the AM and PM peak hours.

#### Total Traffic Volumes

**Figure 6** illustrates the total traffic volumes, including site-generated traffic volumes (**Figure 4**) and background traffic growth (**Figure 5**).

#### Total Traffic Operations

The operations of the intersection of Elma Centre Street and Main Street have been assessed using Synchro 11. The intersection analyses consider the following measures of performance:





- ▶ **Town of Perth:** Maximum length of 150 metres;
- ▶ **Town of Erin:** Maximum length of 300 metres, for a single-family housing development;
- ▶ **City of Kitchener:** Maximum length of 150 metres without emergency access, maximum 300 metres with emergency access;
- ▶ **Township of Centre Wellington:** Maximum length of 300 metres without emergency access, maximum 450 metres with emergency access; and
- ▶ **District of Hope:** P-Loop to be maximum of 550 metres as long as the entrance leg is less than 120 metres.

Based on these examples, the proposed cul-de-sac length exceeds the desirable length for acceptable emergency access without the second entrance to the Dallmitch subdivision.

The proposed connection to the Dallmitch Subdivision should be a priority and implemented as early as possible during buildout to alleviate the issue of emergency access to best support the new development.

In the near term, should the Dallmitch connection be delayed, the Listowel-Atwood Rail Trail which connects to Arthur Street and parallel the west side of the subject site, could be upgraded to a 6.0 metre emergency access point to service the development. **Figure 7** illustrates the Listowel-Atwood Rail Trail relative to the subject site.

## Left-Turn Lanes

The Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads<sup>5</sup> provides guidance on the assessment and/or need for auxiliary left-turn lanes. Warrants have been assessed for southbound left-turns at the study intersection.

The warrant nomograph is used to determine if a left-turn lane is needed based on criteria such as design speed (10 km/h over the posted speed), advancing volume, opposing volume and percent of advancing vehicles performing a left-turn maneuver. The highest amount of southbound left-turning traffic occurs during the forecast PM peak hour. **Figure 8** illustrates the warrant for the 2027 PM Peak Hour forecast traffic volumes.

Based on this, a southbound left-turn lane is not warranted at the intersection of Elma Centre Street and Main Street.

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<sup>5</sup> Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020).



## Conclusions

Based on the investigations conducted, it is concluded that:

- ▶ **Development Trip Generation:** The development is forecast to generate about 72 AM Peak Hour and 87 PM peak Hour trips.
- ▶ **Future Traffic Conditions:** The study intersection of Elma Centre Street and Main Street is forecast to operate at acceptable levels of service during the AM and PM peak hours.
- ▶ **Cul-de-Sac Review:** A temporary emergency access should be considered to service the development prior to the construction of the secondary connection to the Dallmitch subdivision.
- ▶ **Remedial Measures:** A southbound left-turn lane is not warranted at the study intersection.

## Recommendations

Based on the findings of this study, it is recommended that the development be considered for approval with the condition of a second emergency access point created to service the development. Priority should be given to completing the connection from the Dallmitch Subdivision to the northwest. Failing that and as an alternative, upgrading the Listowel-Atwood Rail Trail to provide a second means of emergency access to the subdivision could alleviate emergency access concerns.

We trust that the above review meets your requirements. Please do not hesitate to contact us if we can be of further assistance.

Yours very truly,

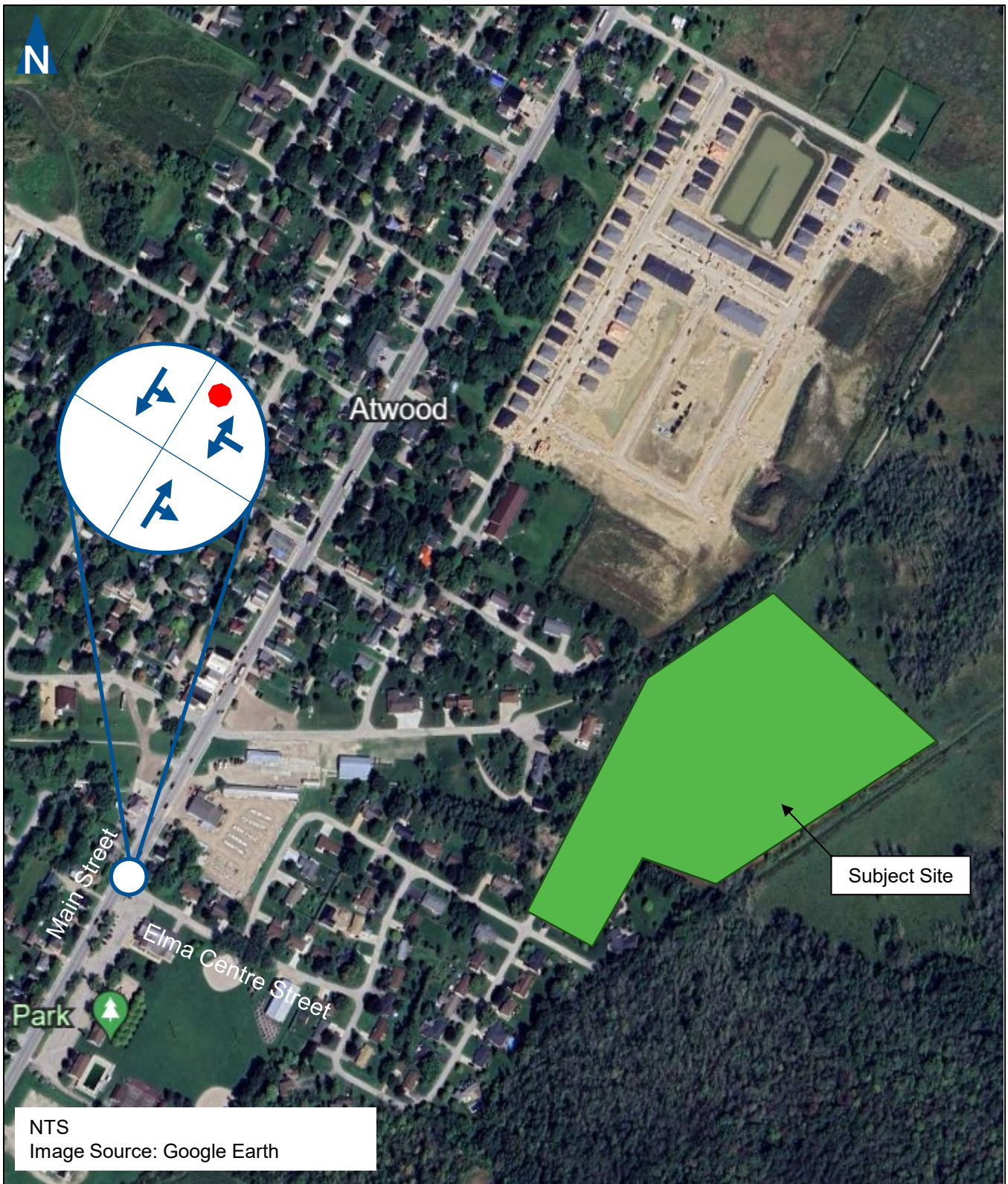
**PARADIGM TRANSPORTATION SOLUTIONS LIMITED**



**Jim Mallett**

M.A.Sc., P.Eng., PTOE  
President and Chief Executive Officer, Principal





# Site Location and Lane Configuration

306 Woodview Drive  
230730

Figure 1

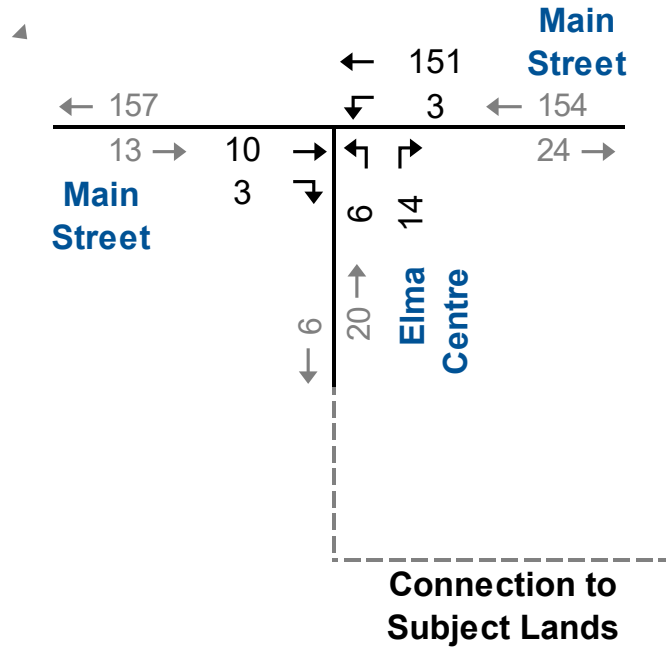


NTS  
 Image Source: Labreche Patterson and Associates

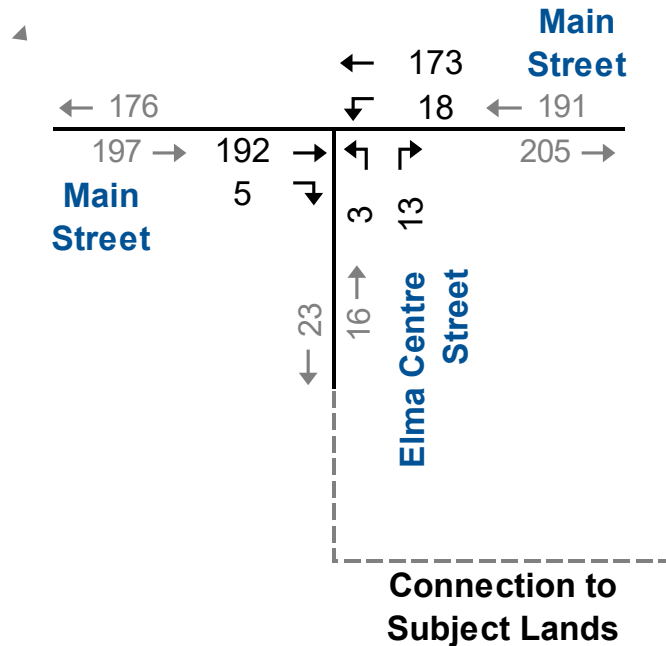


# Proposed Draft Plan of Subdivision

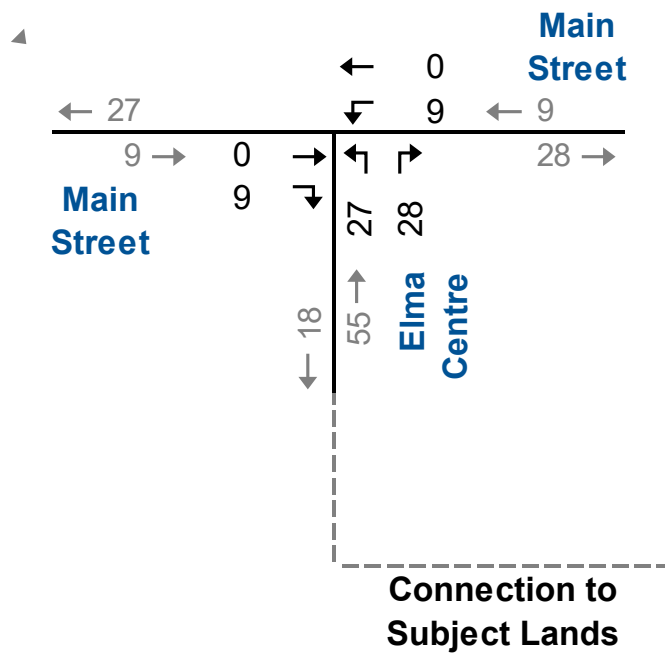
## AM PEAK HOUR



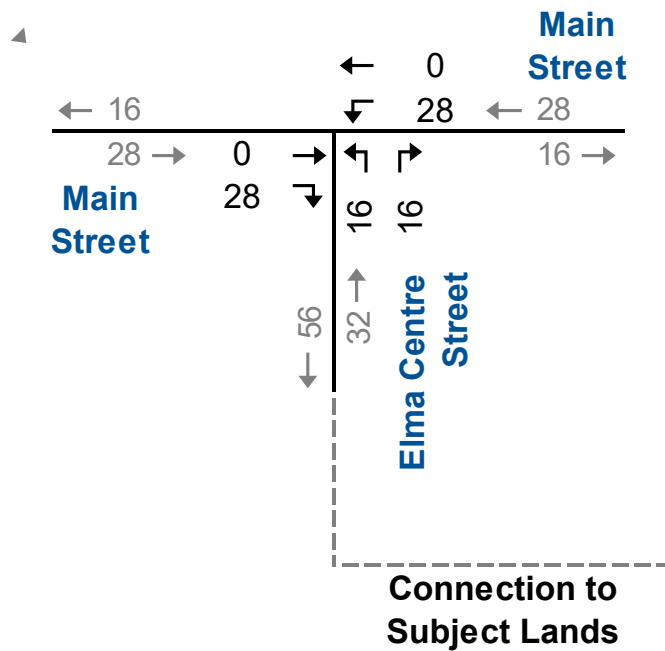
## PM PEAK HOUR



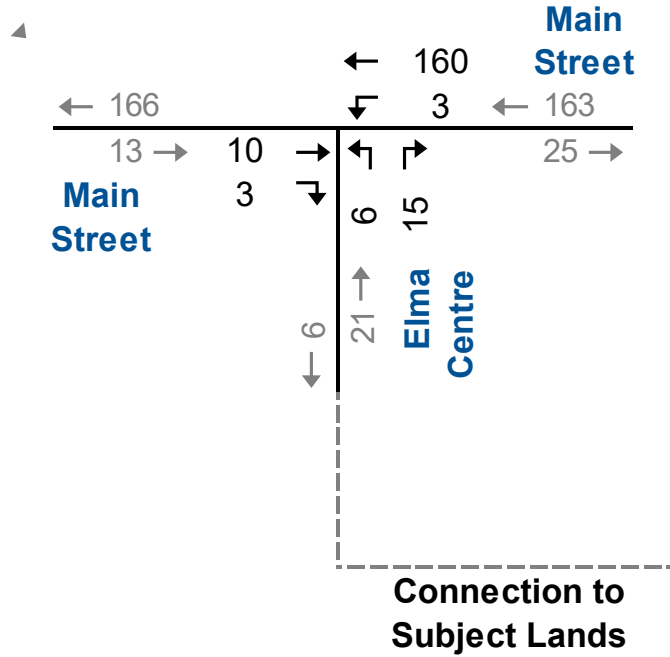
## AM PEAK HOUR



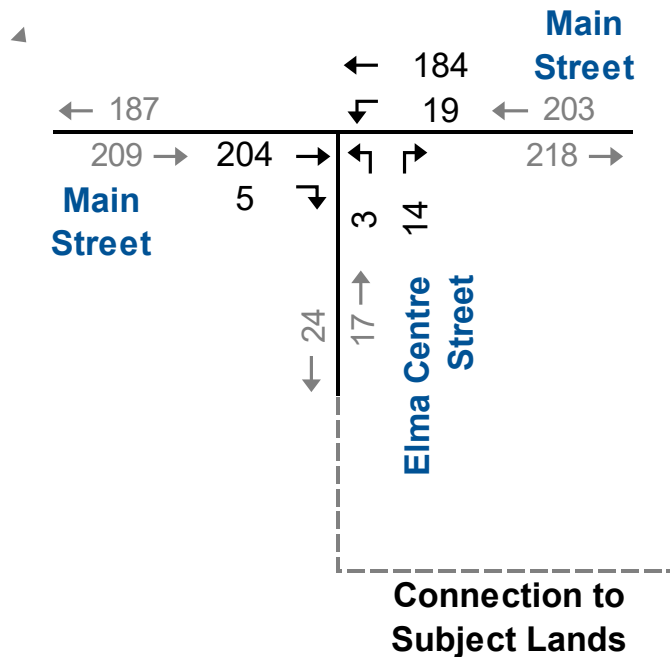
## PM PEAK HOUR



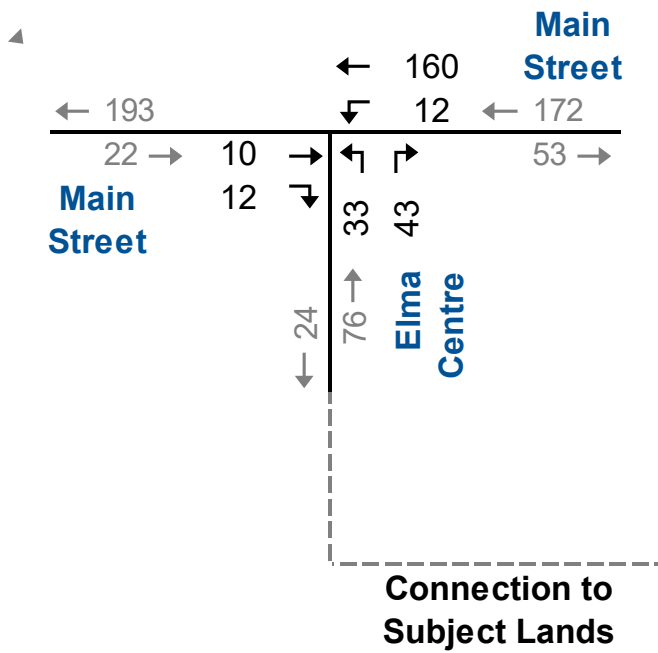
## AM PEAK HOUR



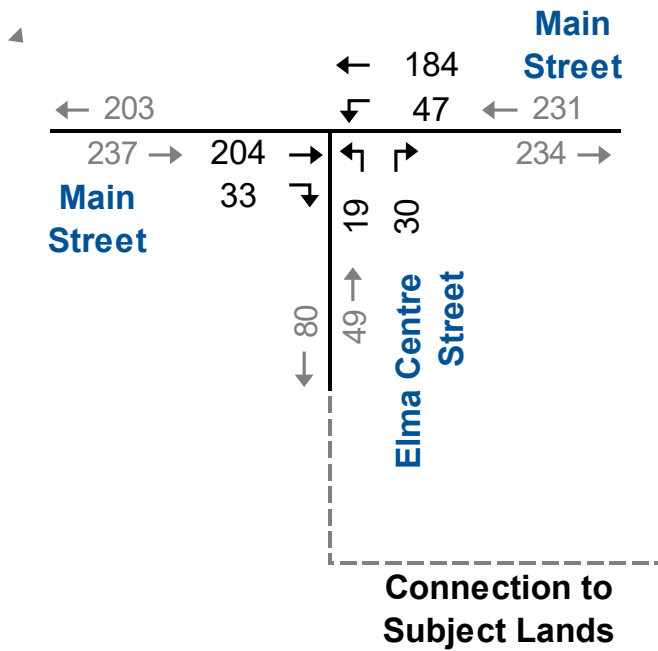
## PM PEAK HOUR

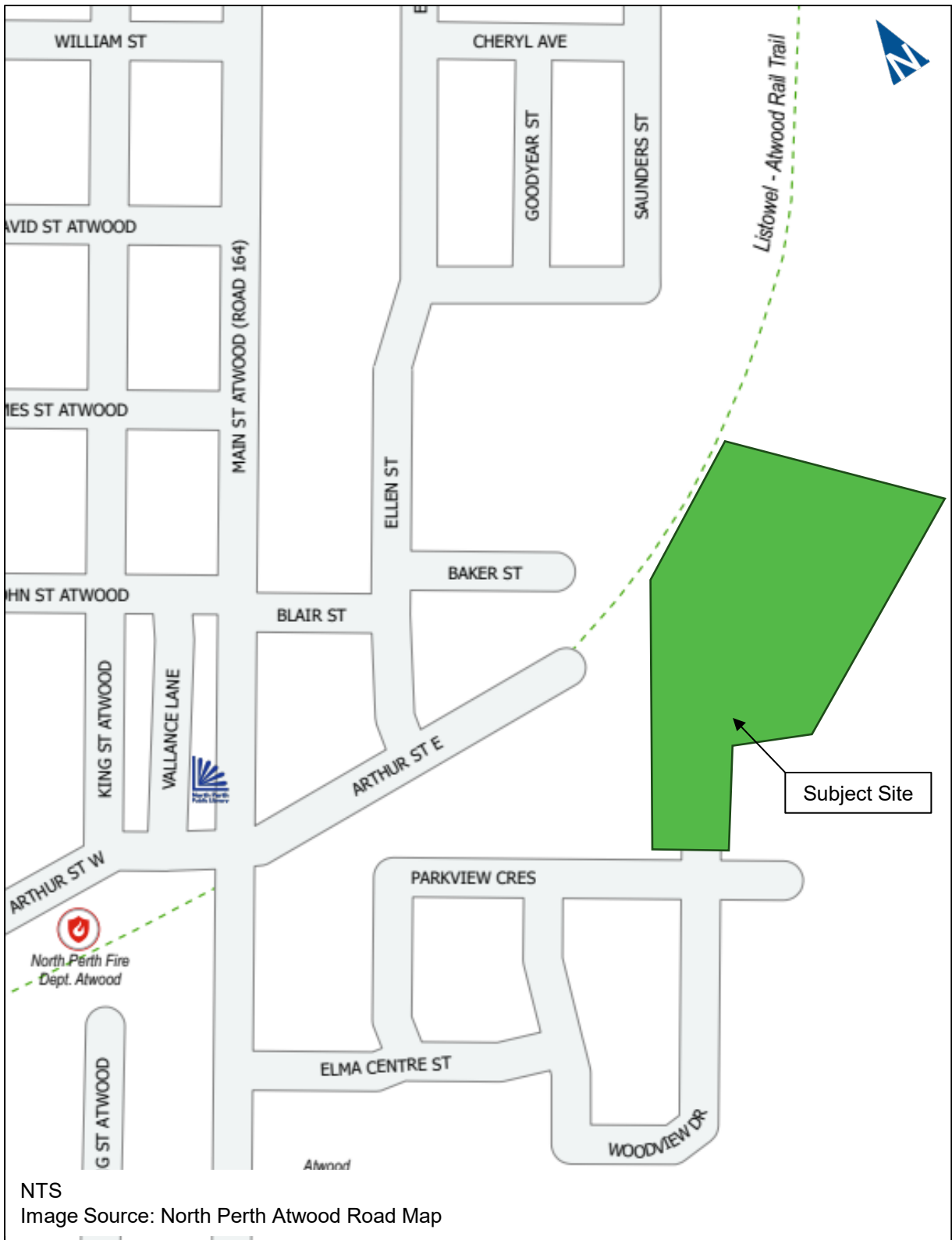


## AM PEAK HOUR



## PM PEAK HOUR





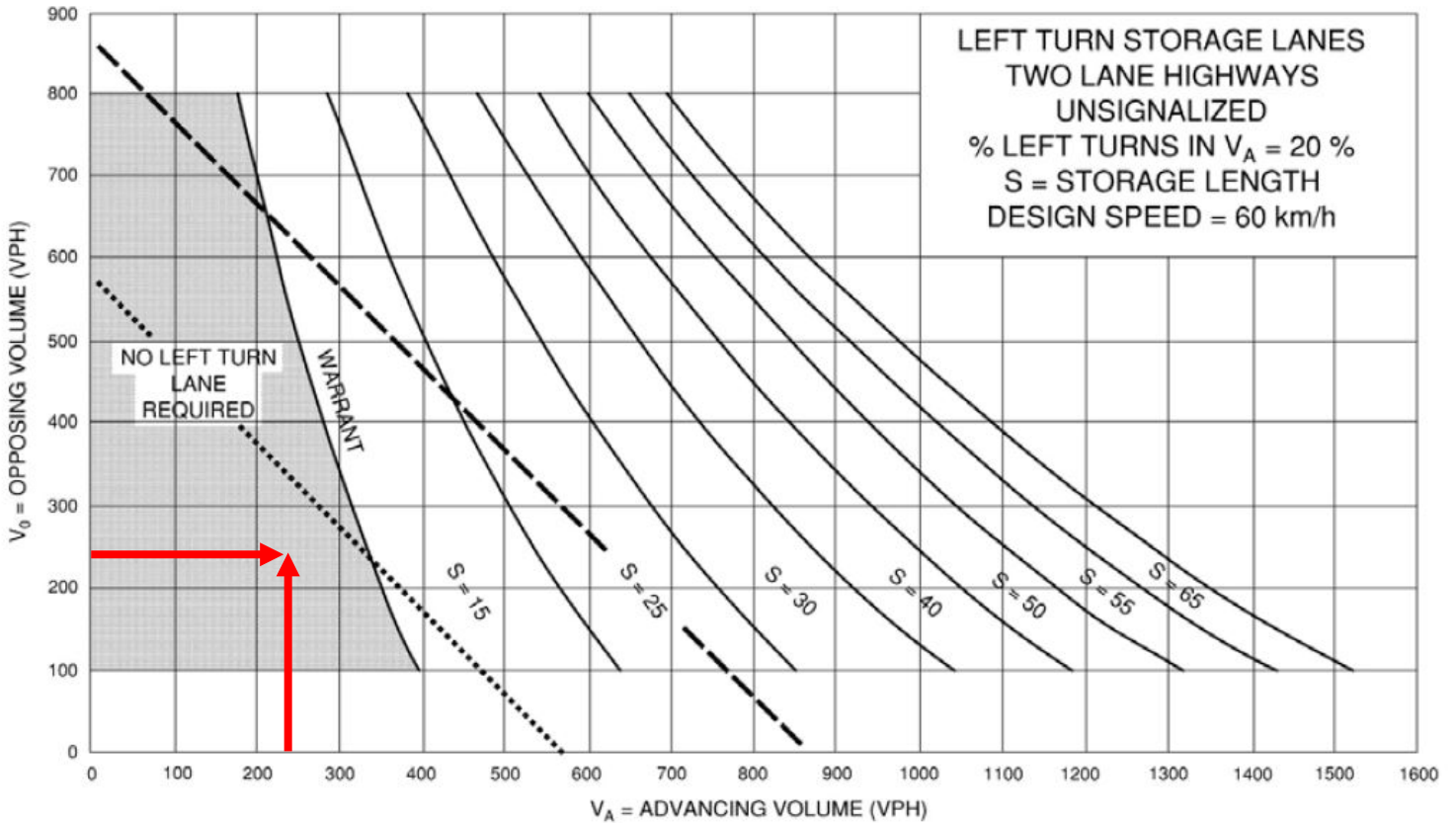


Image Source: Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017)

**Appendix A**  
**Pre-Study Consultation**



**From:** [Lyndon Kowch](#)  
**To:** [Jim Mallett](#)  
**Cc:** [Lauryn Coughlan](#)  
**Subject:** RE: (230730) 306 Woodview Drive, North Perth TIS Pre-Study Consultation  
**Date:** February 26, 2024 4:03:44 PM  
**Attachments:** [image001.png](#)

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Jim, I apologize for the delay, the scope is adequate, and the municipality has no additional comments.

Lyndon Kowch

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**From:** Jim Mallett <jmallett@ptsl.com>  
**Sent:** Monday, February 26, 2024 2:49 PM  
**To:** Lyndon Kowch <LKowch@northperth.ca>; ngarland@perthcounty.ca  
**Cc:** Lauryn Coughlan <lcoughlan@ptsl.com>; 'Scott Patterson' <scott@lpplan.com>  
**Subject:** RE: (230730) 306 Woodview Drive, North Perth TIS Pre-Study Consultation

You don't often get email from [jmallett@ptsl.com](mailto:jmallett@ptsl.com). [Learn why this is important](#)

\*\*\* This email was sent from outside of the Municipality. Do not open links or attachments unless you recognize the sender and know the content is safe. \*\*\*

Hi Folks,

Since, we've had no response to inquiries, is it safe to assume that you are in full agreement with the scope discussed below?

We'd like to hear from you before we wrap up this report for Scott Patterson and his client.

Regards,

**Jim Mallett, M.A.Sc., P.Eng., PTOE**

President and CEO, Principal  
(he/him)

**Paradigm Transportation Solutions Limited**

p: 519.896.3163 x200

m: 519.897.0944

Office Hours: 07:30 – 17:30 M-T, closed Fridays



**From:** Lauryn Coughlan <[lcoughlan@ptsl.com](mailto:lcoughlan@ptsl.com)>  
**Sent:** Wednesday, February 7, 2024 2:55 PM  
**To:** Lyndon Kowch <[LKowch@northperth.ca](mailto:LKowch@northperth.ca)>  
**Cc:** Jim Mallett <[jmallett@ptsl.com](mailto:jmallett@ptsl.com)>; [ngarland@perthcounty.ca](mailto:ngarland@perthcounty.ca)  
**Subject:** (230730) 306 Woodview Drive, North Perth TIS Pre-Study Consultation

Hi Lyndon,

We have been retained to complete the Transportation Impact Assessment (TIA) for the proposed residential development near 306 Woodview Drive. The proposed development includes ~60 single-detached units, with access via Woodview Drive (existing) and possible future access via a new subdivision to the north. The concept plan is attached.

Based on the above information, we have prepared the following scope of work for review/approval:

- Weekday AM and PM peak hours for analysis.
- We will get new counts and analyze the intersection of Elma Centre Street and Main Street proposed access connection to Mulock Road.
- Horizon Year: existing conditions and 3 years from TIA (2027)
- Background Growth Rate: 2% per annum
- Emergency Services Access Review
- Trip Generation: ITE Trip Generation Manual 11<sup>th</sup> Edition
- Trip Distribution: Existing conditions

Please let us know if you have any comments or questions.

Thank you,

**Lauryn Coughlan**  
*Transportation Student*  
(She/her)



### **Paradigm Transportation Solutions Limited**

5A-150 Pinebush Road, Cambridge ON N1R 8J8

e: [lcoughlan@ptsl.com](mailto:lcoughlan@ptsl.com)

w: [www.ptsl.com](http://www.ptsl.com)

*Paradigm operates on a four-day workweek. Our offices are closed on Fridays.*

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## Appendix B

### Existing Traffic Data





Paradigm Transportation Solutions Limited  
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8  
519-896-3163 cbowness@ptsl.com

Count Name: Elma Centre Street & Main Street  
Site Code: 230730  
Start Date: 01/17/2024  
Page No: 1

### Turning Movement Data

Start Time	Main Street Eastbound					Main Street Westbound					Elma Centre Street Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	46	1	0	0	47	0	29	0	0	29	1	4	0	1	5	81
7:15 AM	30	0	0	0	30	1	36	0	0	37	0	6	0	0	6	73
7:30 AM	38	1	0	0	39	1	41	0	1	42	1	2	0	1	3	84
7:45 AM	39	2	0	0	41	0	34	0	0	34	2	1	0	0	3	78
Hourly Total	153	4	0	0	157	2	140	0	1	142	4	13	0	2	17	316
8:00 AM	44	0	0	0	44	1	38	0	0	39	0	3	0	0	3	86
8:15 AM	38	1	0	0	39	0	40	0	0	40	3	5	0	0	8	87
8:30 AM	45	0	0	0	45	2	39	0	0	41	1	5	0	0	6	92
8:45 AM	32	0	0	0	32	1	27	0	0	28	1	2	0	1	3	63
Hourly Total	159	1	0	0	160	4	144	0	0	148	5	15	0	1	20	328
9:00 AM	46	0	0	0	46	7	32	0	0	39	1	4	0	0	5	90
9:15 AM	57	1	0	0	58	3	21	0	0	24	0	6	0	0	6	88
9:30 AM	45	0	0	0	45	2	36	0	0	38	1	1	0	0	2	85
9:45 AM	29	0	0	0	29	1	35	0	0	36	0	2	0	0	2	67
Hourly Total	177	1	0	0	178	13	124	0	0	137	2	13	0	0	15	330
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM	27	2	0	0	29	1	35	0	0	36	0	0	0	0	0	65
12:15 PM	32	2	0	0	34	1	31	0	1	32	1	2	0	0	3	69
12:30 PM	28	2	0	0	30	1	34	0	0	35	0	2	0	0	2	67
12:45 PM	32	0	0	0	32	3	35	0	0	38	1	3	0	0	4	74
Hourly Total	119	6	0	0	125	6	135	0	1	141	2	7	0	0	9	275
1:00 PM	40	0	0	0	40	2	33	0	0	35	1	1	0	0	2	77
1:15 PM	29	0	0	0	29	3	31	0	0	34	1	6	0	0	7	70
1:30 PM	22	1	0	0	23	0	44	0	0	44	0	3	0	0	3	70
1:45 PM	27	2	0	0	29	0	29	0	1	29	0	1	0	0	1	59
Hourly Total	118	3	0	0	121	5	137	0	1	142	2	11	0	0	13	276
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	22	2	0	0	24	3	51	0	0	54	4	5	0	0	9	87
3:15 PM	34	0	0	0	34	2	46	0	0	48	0	2	0	0	2	84
3:30 PM	55	3	0	0	58	1	40	0	0	41	0	0	0	1	0	99
3:45 PM	48	4	0	0	52	7	49	0	0	56	1	2	0	0	3	111
Hourly Total	159	9	0	0	168	13	186	0	0	199	5	9	0	1	14	381
4:00 PM	33	0	0	0	33	4	43	0	1	47	1	3	0	1	4	84
4:15 PM	39	2	0	0	41	2	52	0	0	54	2	2	0	0	4	99
4:30 PM	40	3	0	0	43	4	48	0	0	52	2	2	0	0	4	99
4:45 PM	47	0	0	0	47	6	38	0	0	44	0	4	0	1	4	95

Hourly Total	159	5	0	0	164	16	181	0	1	197	5	11	0	2	16	377
5:00 PM	45	1	0	0	46	4	41	0	0	45	1	0	0	0	1	92
5:15 PM	40	2	0	0	42	6	39	0	0	45	0	5	0	0	5	92
5:30 PM	60	2	0	0	62	2	55	0	0	57	2	4	0	0	6	125
5:45 PM	38	2	0	0	40	7	40	0	0	47	2	5	0	0	7	94
Hourly Total	183	7	0	0	190	19	175	0	0	194	5	14	0	0	19	403
Grand Total	1227	36	0	0	1263	78	1222	0	4	1300	30	93	0	6	123	2686
Approach %	97.1	2.9	0.0	-	-	6.0	94.0	0.0	-	-	24.4	75.6	0.0	-	-	-
Total %	45.7	1.3	0.0	-	47.0	2.9	45.5	0.0	-	48.4	1.1	3.5	0.0	-	4.6	-
Motorcycles	2	0	0	-	2	0	0	0	-	0	0	0	0	-	0	2
% Motorcycles	0.2	0.0	-	-	0.2	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	1072	34	0	-	1106	72	1054	0	-	1126	28	89	0	-	117	2349
% Cars & Light Goods	87.4	94.4	-	-	87.6	92.3	86.3	-	-	86.6	93.3	95.7	-	-	95.1	87.5
Buses	1	0	0	-	1	3	1	0	-	4	0	3	0	-	3	8
% Buses	0.1	0.0	-	-	0.1	3.8	0.1	-	-	0.3	0.0	3.2	-	-	2.4	0.3
Single-Unit Trucks	47	2	0	-	49	3	42	0	-	45	2	1	0	-	3	97
% Single-Unit Trucks	3.8	5.6	-	-	3.9	3.8	3.4	-	-	3.5	6.7	1.1	-	-	2.4	3.6
Articulated Trucks	105	0	0	-	105	0	125	0	-	125	0	0	0	-	0	230
% Articulated Trucks	8.6	0.0	-	-	8.3	0.0	10.2	-	-	9.6	0.0	0.0	-	-	0.0	8.6
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	4	-	-	-	-	6	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-



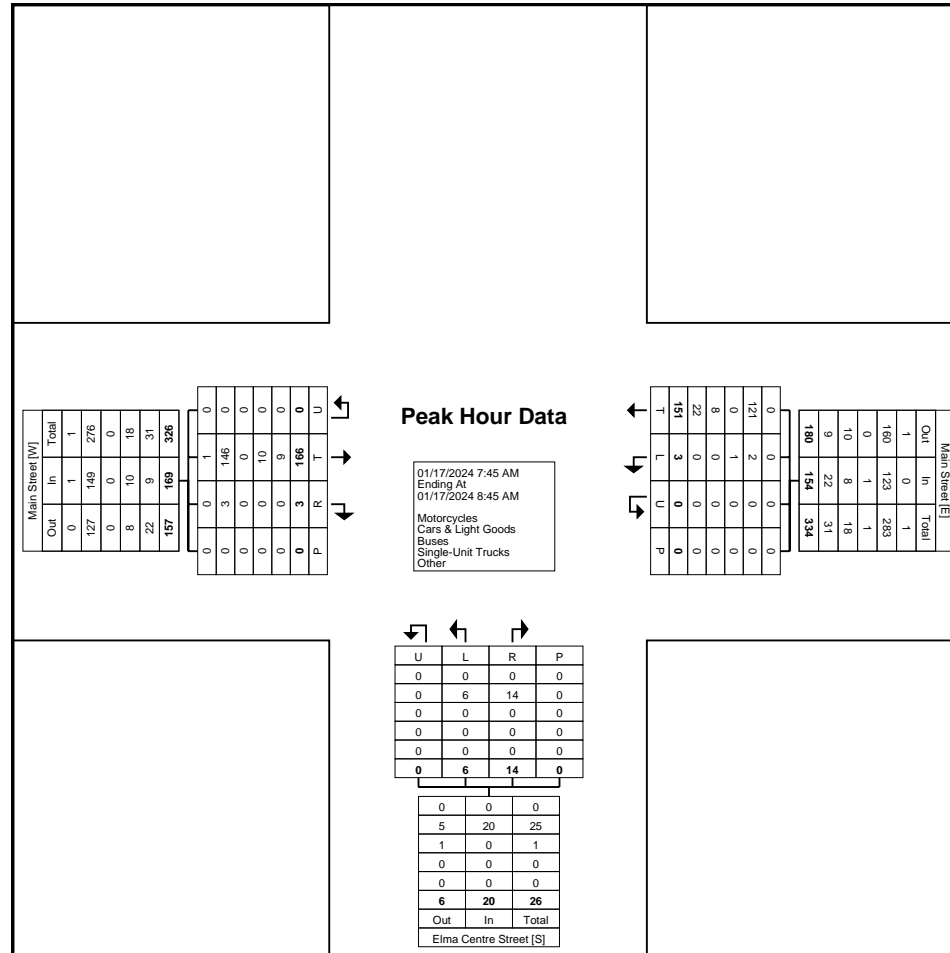




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Site Code: 230730  
Start Date: 01/17/2024  
Page No: 5



Turning Movement Peak Hour Data Plot (7:45 AM)

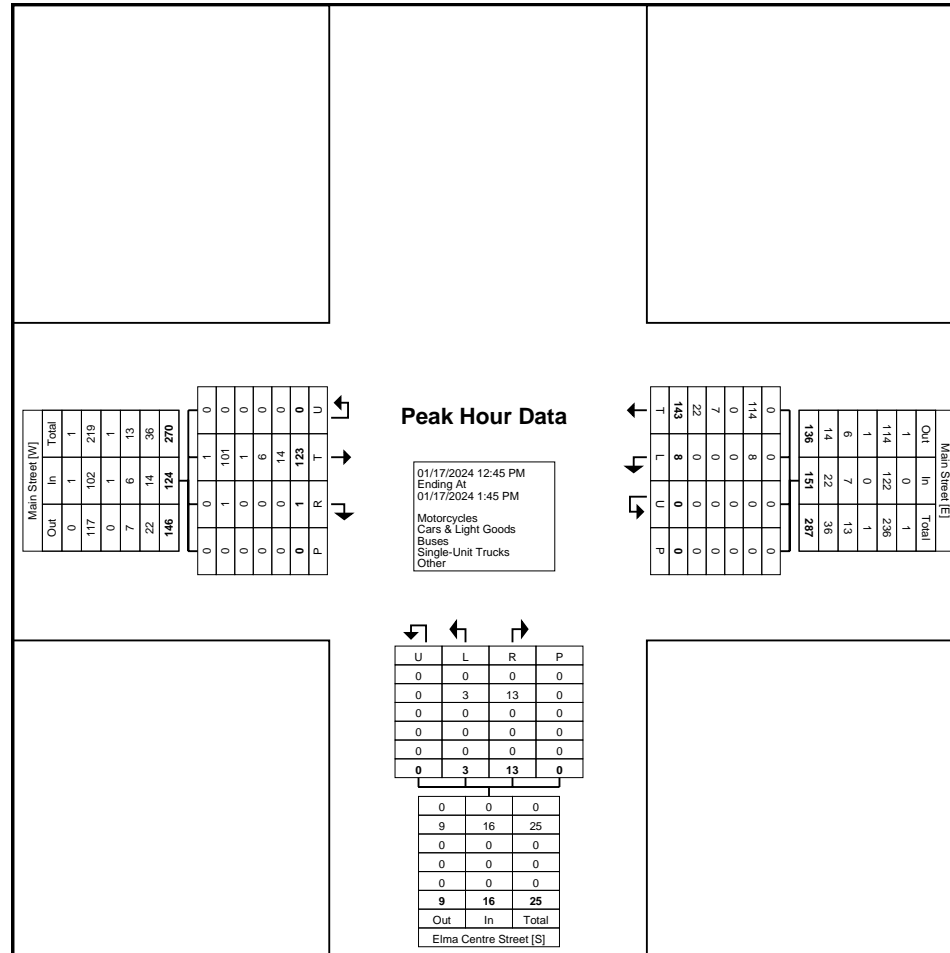




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Count Name: Elma Centre Street & Main Street  
Site Code: 230730  
Start Date: 01/17/2024  
Page No: 7



Turning Movement Peak Hour Data Plot (12:45 PM)



Paradigm Transportation Solutions Limited  
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8  
519-896-3163 cbowness@ptsl.com

Count Name: Elma Centre Street & Main Street  
Site Code: 230730  
Start Date: 01/17/2024  
Page No: 8

### Turning Movement Peak Hour Data (4:45 PM)

Start Time	Main Street Eastbound					Main Street Westbound					Elma Centre Street Northbound					Int. Total
	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
4:45 PM	47	0	0	0	47	6	38	0	0	44	0	4	0	1	4	95
5:00 PM	45	1	0	0	46	4	41	0	0	45	1	0	0	0	1	92
5:15 PM	40	2	0	0	42	6	39	0	0	45	0	5	0	0	5	92
5:30 PM	60	2	0	0	62	2	55	0	0	57	2	4	0	0	6	125
Total	192	5	0	0	197	18	173	0	0	191	3	13	0	1	16	404
Approach %	97.5	2.5	0.0	-	-	9.4	90.6	0.0	-	-	18.8	81.3	0.0	-	-	-
Total %	47.5	1.2	0.0	-	48.8	4.5	42.8	0.0	-	47.3	0.7	3.2	0.0	-	4.0	-
PHF	0.800	0.625	0.000	-	0.794	0.750	0.786	0.000	-	0.838	0.375	0.650	0.000	-	0.667	0.808
Motorcycles	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Cars & Light Goods	181	4	0	-	185	18	163	0	-	181	2	13	0	-	15	381
% Cars & Light Goods	94.3	80.0	-	-	93.9	100.0	94.2	-	-	94.8	66.7	100.0	-	-	93.8	94.3
Buses	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	3	1	0	-	4	0	1	0	-	1	1	0	0	-	1	6
% Single-Unit Trucks	1.6	20.0	-	-	2.0	0.0	0.6	-	-	0.5	33.3	0.0	-	-	6.3	1.5
Articulated Trucks	8	0	0	-	8	0	9	0	-	9	0	0	0	-	0	17
% Articulated Trucks	4.2	0.0	-	-	4.1	0.0	5.2	-	-	4.7	0.0	0.0	-	-	0.0	4.2
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



## Appendix C

### Future Traffic Operations





Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	10	3	3	151	6	14
Traffic Volume (vph)	10	3	3	151	6	14
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.971			0.999	0.986	
Flt Protected						
Satd. Flow (prot)	1809	0	0	1861	1660	0
Flt Permitted						
Satd. Flow (perm)	1809	0	0	1861	1660	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	176.8			129.8	251.5	
Travel Time (s)	12.7			9.3	18.1	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	3	3	162	6	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	0	165	21	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary	Other					
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.4%					
Analysis Period (min)	15					
	ICU Level of Service A					

Intersection	1					
In/Delay, s/vch	EBT	EBR	WBL	WBT	NBL	NBR
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	10	3	3	151	6	14
Traffic Vol. veh/h	10	3	3	151	6	14
Future Vol. veh/h	10	3	3	151	6	14
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	- None	- None	- None	- None	- None	- None
Storage Length	-	-	-	-	-	-
Veh in Median Storage. #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	3	3	162	6	15
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	14	0	181	13
Stage 1	-	-	-	-	13	-
Stage 2	-	-	-	-	168	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1604	-	808	1067
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	862	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1604	-	806	1067
Mov Cap-2 Maneuver	-	-	-	-	806	-
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	860	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.1			8.8	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBT
Capacity (veh/h)	973	-	-	-	1604	-
HCM Lane V/C Ratio	0.022	-	-	-	0.002	-
HCM Control Delay (s)	8.8	-	-	-	7.2	0
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	1	1	1	1	1
Traffic Volume (vph)	192	5	18	173	3	13
Future Volume (vph)	192	5	18	173	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Ft	0.997			0.889		
Flt Protected			0.995	0.991		
Satd. Flow (prot)	1857	0	0	1853	1641	0
Flt Permitted			0.995	0.991		
Satd. Flow (perm)	1857	0	0	1853	1641	0
Link Speed (k/h)	60		50	50		50
Link Distance (m)	176.8		129.8	251.5		18.1
Travel Time (s)	12.7		9.3	18.1		
Conf. Peds. (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	5	20	188	3	14
Shared Lane Traffic (%)						
Lane Group Flow (vph)	214	0	0	208	17	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0		0.0	3.6		0.0
Link Offset(m)	0.0		0.0	0.0		0.0
Crosswalk Width(m)	4.8		4.8	4.8		4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25	25		15
Sign Control	Free	Free	Free	Stop	Stop	Stop
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.9%					
Analysis Period (min)	15					
ICU Level of Service	A					

Intersection	EBT	EBR	WBL	WBT	NBL	NBR
In Delay, s/veh						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	1	1	1	1	1
Traffic Vol. veh/h	192	5	18	173	3	13
Future Vol. veh/h	192	5	18	173	3	13
Conflicting Peds. #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage. #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	209	5	20	188	3	14
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	215	0	441	213
Stage 1	-	-	-	-	213	-
Stage 2	-	-	-	-	228	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	2.218	-	3.518	3.318	-
Pot Cap-1 Maneuver	-	-	1355	-	574	827
Stage 1	-	-	823	-	810	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1354	-	564	826
Mov Cap-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	797	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.7	9.8			
HCM LOS			A			
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	760	-	-	1354	-	
HCM Lane V/C Ratio	0.023	-	-	0.014	-	
HCM Control Delay (s)	9.8	-	-	7.7	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	11	3	3	3	6	15
Traffic Volume (vph)	11	3	3	3	160	6
Future Volume (vph)	11	3	3	3	160	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.973					
Frt	0.999					
Flt Protected	0.985					
Satd. Flow (prot)	1812	0	0	1861	1662	0
Flt Permitted	0.999					
Satd. Flow (perm)	1812	0	0	1861	1662	0
Link Speed (k/h)	50					
Link Distance (m)	176.8					
Travel Time (s)	12.7					
Conf. Peds. (#/hr)	9.3					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	3	3	3	174	7
Shared Lane Traffic (%)	-					
Lane Group Flow (vph)	15	0	0	177	23	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0					
Link Offset(m)	0.0					
Crosswalk Width(m)	4.8					
Two way Left Turn Lane	-					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15					
Sign Control	Free	Free	Free	Free	Stop	Stop
Intersection Summary	-					
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.8%					
Analysis Period (min)	15					
ICU Level of Service A	-					

Intersection	1					
In/Delay, s/vch	EBT	EBR	WBL	WBT	NBL	NBR
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	11	3	3	3	6	15
Traffic Vol. veh/h	11	3	3	3	160	6
Future Vol. veh/h	11	3	3	3	160	6
Conflicting Peds. #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage. #	0	-	-	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	3	3	3	174	7
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	16	0	195	15
Stage 1	-	-	-	-	15	-
Stage 2	-	-	-	-	180	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1602	-	794	1065
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	851	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1601	-	792	1064
Mov Cap-2 Maneuver	-	-	-	-	792	-
Stage 1	-	-	-	-	1007	-
Stage 2	-	-	-	-	849	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.1	8.8			
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBT
Capacity (veh/h)	969	-	-	-	1601	-
HCM Lane V/C Ratio	0.024	-	-	-	0.002	-
HCM Control Delay (s)	8.8	-	-	-	7.3	0
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0	-

Lanes, Volumes, Timings  
 1: Elma Centre Street & Main Street

HCM 6th TWSC  
 1: Elma Centre Street & Main Street

PM - Background Traffic  
 (230730) 306 Woodview Drive

PM - Background Traffic  
 (230730) 306 Woodview Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	1	1	1	1	1
Traffic Volume (vph)	204	5	19	184	3	14
Future Volume (vph)	204	5	19	184	3	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Ft	0.997			0.887		
Flt Protected				0.995	0.992	
Satd. Flow (prot)	1857	0	0	1853	1639	0
Flt Permitted				0.995	0.992	
Satd. Flow (perm)	1857	0	0	1853	1639	0
Link Speed (k/h)	60			50	50	
Link Distance (m)	176.8			129.8	251.5	
Travel Time (s)	12.7			9.3	18.1	
Conf. Peds. (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	5	21	200	3	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	227	0	0	221	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free	Free	Free	Free	Stop	Stop
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization:	35.2%					
Analysis Period (min)	15					
	ICU Level of Service A					

Intersection	EBT	EBR	WBL	WBT	NBL	NBR
In Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	1	1	1	1	1
Traffic Vol. veh/h	204	5	19	184	3	14
Future Vol. veh/h	204	5	19	184	3	14
Conflicting Peds. #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage. #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	222	5	21	200	3	15
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	228	0	468	226
Stage 1	-	-	-	-	226	-
Stage 2	-	-	-	-	242	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1340	-	553	813
Stage 1	-	-	-	-	812	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1339	-	542	812
Mov Cap-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	784	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.7	9.9			
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	746	-	-	1339	-	
HCM Lane V/C Ratio	0.025	-	-	0.015	-	
HCM Control Delay (s)	9.9	-	-	7.7	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	



Lanes, Volumes, Timings  
 1: Elma Centre Street & Main Street

HCM 6th TWSC  
 1: Elma Centre Street & Main Street

PM - Total Traffic  
 (230730) 306 Woodview Drive

PM - Total Traffic  
 (230730) 306 Woodview Drive

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	204	26	41	184	16	27
Traffic Volume (vph)	204	26	41	184	16	27
Future Volume (vph)	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.985				0.915	
Ped Bike Factor					0.982	
Flt Protected	1835	0	0	1846	1674	0
Satd. Flow (prot)	1835	0	0	1846	1674	0
Flt Permitted	60				50	50
Satd. Flow (perm)	176.8				129.8	251.5
Link Speed (k/h)	12.7				9.3	18.1
Link Distance (m)					1	1
Travel Time (s)	0.92	0.92	0.92	0.92	0.92	0.92
Conf. Peds. (#/hr)	222	28	45	200	17	29
Peak Hour Factor						
Adj. Flow (vph)	250	0	0	245	46	0
Shared Lane Traffic (%)	No	No	No	No	No	No
Enter Blocked Intersection	Left	Right	Left	Left	Left	Right
Lane Alignment	0.0	0.0	0.0	0.0	3.6	0.0
Median Width(m)	4.8				4.8	4.8
Crosswalk Width(m)	1.00	1.00	1.00	1.00	1.00	1.00
Two way Left Turn Lane	15	25			25	15
Headway Factor	Free	Free	Free	Free	Stop	Stop
Turning Speed (k/h)						
Sign Control	ICU Level of Service A					
Intersection Summary	Other:					
Area Type:	Other:					
Control Type:	Unsignalized					
Intersection Capacity Utilization	37.6%					
Analysis Period (min)	15					

Intersection	EBT	EBR	WBL	WBT	NBL	NBR
In Delay, s/vch	1.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	204	26	41	184	16	27
Traffic Vol. veh/h	204	26	41	184	16	27
Future Vol. veh/h	204	26	41	184	16	27
Conflicting Peds. #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage. #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	222	28	45	200	17	29
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	251	0	527	237
Stage 1	-	-	-	-	237	-
Stage 2	-	-	-	-	290	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1314	-	512	802
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	759	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1313	-	492	801
Mov Cap-2 Maneuver	-	-	-	-	492	-
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	729	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	1.4	11			
HCM LOS		B				
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBT
Capacity (veh/h)	649	-	-	1313	-	-
HCM Lane V/C Ratio	0.072	-	-	0.034	-	-
HCM Control Delay (s)	11	-	-	7.8	0	-
HCM Lane LOS	B	-	-	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-