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Block 33, Belmont Road, Community of Belmont, Elgin County Transportation Impact Brief

Paradigm Transportation Solutions Limited

October 2023
230344



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Block 33, Belmont Road, Community of Belmont, Elgin County Transportation Impact Brief



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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Brief (TIB) for a proposed Residential Development located at Block 33, Belmont Road in the Community of Belmont, Municipality of Central Elgin, Elgin County.

This TIB includes an analysis of existing traffic conditions, a description of the proposed development, analysis of future traffic conditions, and assessment of development traffic impacts with recommendations as appropriate to accommodate the proposed development.

Development Concept

The subject site is located in the northeast corner of Belmont Road and Robin Ridge Drive, on the westerly edge of a residential area. The site consists of a single, rectangular parcel of land, and the proposed development will accommodate two 2-storey apartment buildings, each comprising eight units for a total of 16 units.

Vehicular access is proposed via a two-way, full-turns driveway from Robin Ridge Drive, which leads to an onsite parking area for the development.

TIB Scope

The scope of the Transportation Impact Brief for the proposed development includes:

- ▶ **Study Area Intersections:**
 - Belmont Road and Robin Ridge Drive; and
 - Driveway intersection on Robin Ridge Drive.
- ▶ **Analysis Periods:** Weekday AM and PM peak hours.
- ▶ **Background Developments:** Craigholme Estates Development, which comprises 157 single detached homes, 18 semi-detached homes, 16 street townhomes, and an elementary school.
- ▶ **Traffic Conditions:** Existing (2023) and ten years from date of application (2033).



Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The intersection of Belmont Road and Robin Ridge Drive is currently operating at acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 28 and 27 trips during the AM and PM peak hours, respectively.
- ▶ **2033 Background Traffic Conditions:** The intersection of Belmont Road and Robin Ridge Drive is forecast to operate at acceptable levels of service.
- ▶ **2033 Total Traffic Conditions:** The intersections of Belmont Road and Robin Ridge Drive and the Site Driveway on Robin Ridge Drive are forecast to operate at acceptable levels of service.
- ▶ **Roadway Traffic Volumes:** The peak hour, peak direction traffic volumes on Belmont Road are currently less than 500 vph, within the lane capacity of 900 vph. Under the 2033 total traffic conditions, the peak hour, peak direction traffic volumes will increase to approximately 630 vph and will be within the lane capacity of 900 vph. The projected increase will have minimal impact on Belmont Road.
- ▶ **Site Driveway:** The Site Driveway on Robin Ridge Drive is forecast to operate at LOS A under 2033 total traffic conditions. It is noted that an eastbound left-turn lane is not warranted on Robin Ridge Drive at the Site Driveway under 2033 total traffic conditions.

The westbound queue lengths at Belmont Road and Robin Ridge Drive are projected to a maximum of three metres under 2033 total traffic conditions, which will not impede inbound/outbound traffic operations at the Site Driveway on Robin Ridge Drive.

Recommendations

Based on the findings and conclusions of this study, it is recommended that the development be considered for approval as proposed.



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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation Impact Brief (TIB) for a proposed Residential Development located at Block 33, Belmont Road in the Community of Belmont, Municipality of Central Elgin, Elgin County. **Figure 1.1** details the subject development location.

The subject site is located in the northeast corner of Belmont Road and Robin Ridge Drive, on the westerly edge of a residential area. The site consists of a single, rectangular parcel of land, and the proposed development will accommodate two 2-storey apartment buildings, each comprising eight units for a total of 16 units.

Vehicular access is proposed via a two-way, full-turns driveway from Robin Ridge Drive, which leads to an onsite parking area for the development.

1.2 Purpose and Scope

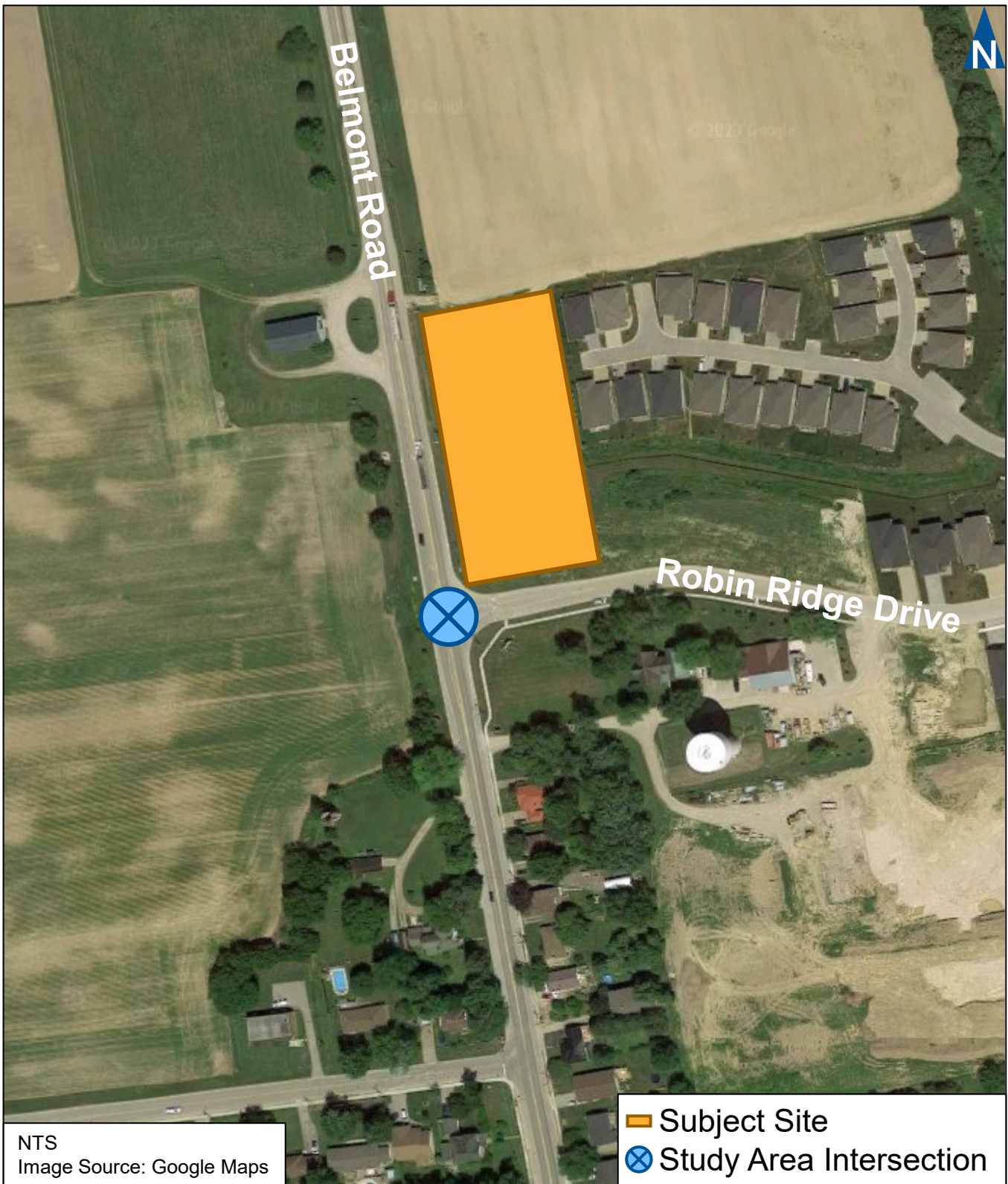
The purpose of this report is to identify and assess the potential traffic impact resulting from the proposed development. The scope of the study, developed in consultation with Elgin County staff via e-mail in July 2023, includes:

- ▶ assessment of the current traffic and site conditions within the study area;
- ▶ estimates of background traffic growth for ten years from date of application (2033);
- ▶ traffic volumes from the Craigholme Estates Development, which comprises 157 single detached homes, 18 semi-detached homes, 16 street townhomes, and an elementary school, are included in the background traffic forecasts;
- ▶ estimates of additional traffic generated by the subject site;
- ▶ analyses of the impact of the future traffic on the surrounding road network, including the following study area intersections:
 - Belmont Road and Robin Ridge Drive; and
 - Driveway intersection on Robin Ridge Drive.
- ▶ recommendations, if necessary, to mitigate the site generated traffic in a satisfactory manner.



Appendix A contains the pre-study consultation material and response from Elgin County.





Location of Subject Site

Block 33, Belmont Road, Elgin County TIB
230344

Figure 1.1

2 Existing Conditions

2.1 Existing Roadways

The main roadways near the subject development considered in assessing the traffic impacts of the development include:

- ▶ **Belmont Road (Elgin Road 74)** is a north-south county minor arterial road¹ with a two-lane cross section and a posted speed limit of 50 km/h. Sidewalks are provided on the east side of the roadway south of Robin Ridge Drive.
- ▶ **Robin Ridge Drive** is an east-west local road with a two-lane cross section and a posted speed limit of 40 km/h. Sidewalks are provided on the south side of the roadway.

Stop control is provided on the Robin Ridge Drive approach at Belmont Road.

Figure 2.1 illustrates the traffic control and lane configuration at the Belmont Road and Robin Ridge Drive intersection.

¹ Official Plan of the County of Elgin, Schedule B: Transportation, February 2015.





Existing Lane Configuration and Traffic Control

2.2 Traffic Volumes

Paradigm conducted turning movement counts at the intersection of Belmont Road and Robin Ridge Drive on 25 May 2023.

Figure 2.2 illustrates the existing AM (7:15 – 8:15) and PM (4:30 – 5:30) weekday peak hour turning movement traffic volumes.

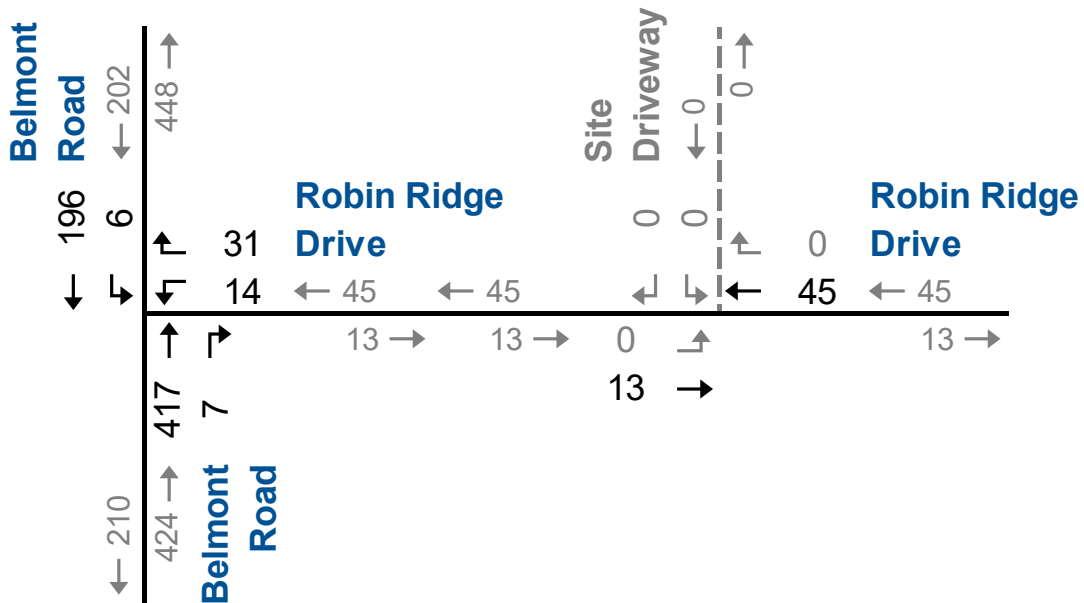
It is noted that the peak hour, peak direction traffic volume on Belmont Road is less than 500 vehicles per hour (vph) and within the lane capacity of 900 vph.

The peak hour, peak directional volume on Robin Ridge Drive is noted to be 45 vph.

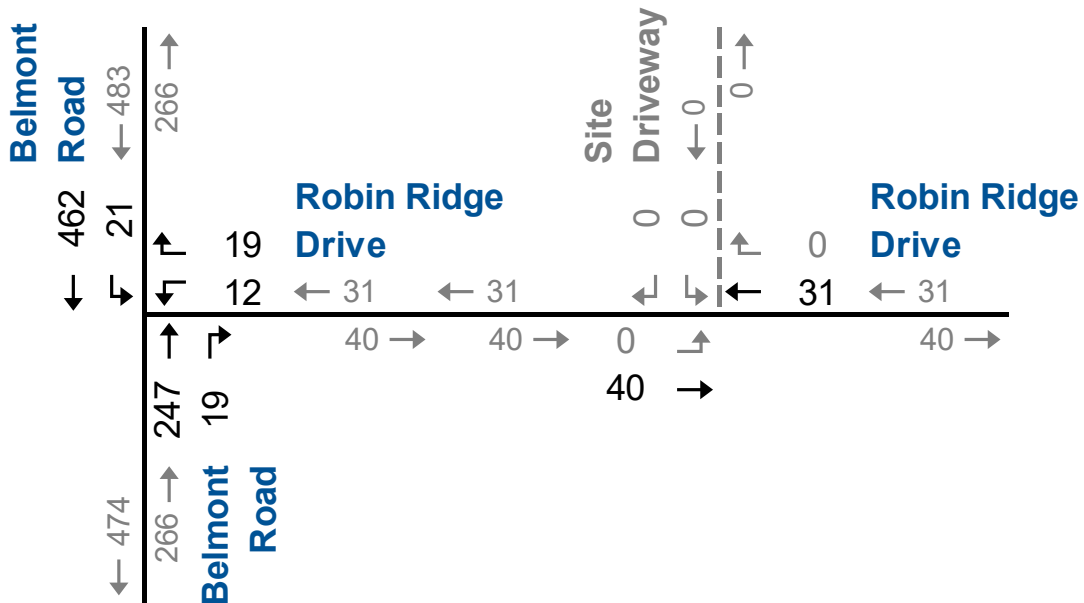
Appendix B contains the detailed traffic counts for the Belmont Road and Robin Ridge Drive intersection.



AM Peak Hour



PM Peak Hour



Existing Traffic Volumes

2.3 Traffic Operations

The level of service conditions at the intersection of Belmont Road and Robin Ridge Drive have been assessed through intersection operational analysis using Synchro 11.

Intersection level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles intending to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows and intersection geometry.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity (v/c) ratio is greater than 1.00, the movement is classed as LOS F and remedial measures are usually implemented if they are feasible. LOS E is usually used as a guideline for the determination of road improvement needs on through lanes, while LOS F may be acceptable for left-turn movements at peak times, depending on delays.

Movements are considered critical under the following conditions:

- ▶ v/c ratios for movements increased to 0.85 or above;
- ▶ movements that exceed LOS 'E'; and
- ▶ 95th percentile queue lengths that exceed available lane storage.

Table 2.1 summarizes the results of the intersection operational analysis under existing conditions, including the AM and PM peak hour LOS, v/c ratios, and 95th percentile queues experienced.

The results indicate that the intersection of Belmont Road and Robin Ridge Drive is operating at acceptable levels of service, and with no problem movements.

Appendix C contains the detailed Synchro 11 reports.



TABLE 2.1: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																										
				Eastbound				Westbound				Northbound				Southbound				Overall										
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach											
AM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					B 14 0.04 1 20 19					B 11 0.05 2 - -				B 12					A 0 > > > >		A 8 0 0 60 60	A 0 > > > >				A 0	
PM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					C 16 0.04 1 20 19					A 10 0.03 1 - -				B 12					A 0 > > > >		A 8 0 1 60 59	A 0 > > > >				A 0	

MOE - Measure of Effectiveness
 LOS - Level of Service
 Delay - Average Delay per Vehicle in Seconds
 V/C - Volume to Capacity Ratio
 Q - 95th Percentile Queue Length (m)
 Stor. - Existing Storage (m)
 Avail. - Available Storage (m)
 TWSC - Two-Way Stop Control
 </> - Shared with through movement



3 Development Concept

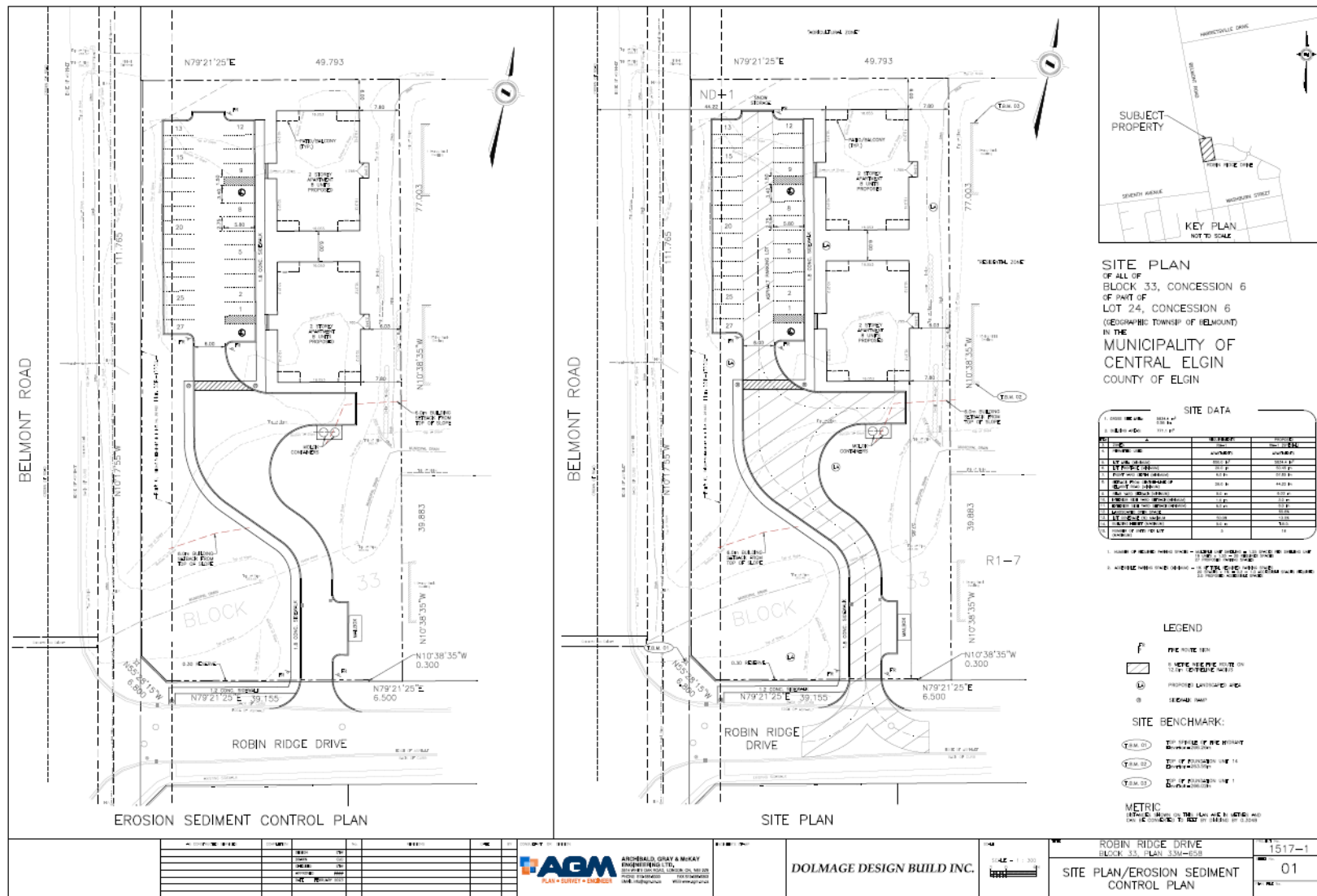
3.1 Development Description

The subject site is located in the northeast corner of Belmont Road and Robin Ridge Drive, on the westerly edge of a residential area. The site consists of a single, rectangular parcel of land, and the proposed development will accommodate two 2-storey apartment buildings, each comprising eight units for a total of 16 units.

Vehicular access is proposed via a two-way, full-turns driveway from Robin Ridge Drive, which leads to an onsite parking area for the development.

Figure 3.1 shows the concept site plan.





Concept Site Plan

Figure 3.1

Block 33, Belmont Road, Elgin County TIB 230344

3.2 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual² equations were used to estimate the peak hour traffic volumes generated by the subject development based on ITE Land Use Code 220, Multifamily Housing (Low Rise).

Table 3.1 summarizes the forecast number of net new trips generated by the proposed development.

TABLE 3.1: TRIP GENERATION

Land Use Code	Units	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total
220: Multifamily Housing (Low-Rise)	16	Eq	7	21	28	Eq	17	10	27
Total Trip Generation			7	21	28		17	10	27

LUC 220 | AM: $T = 0.31(X) + 22.85$ | PM: $T = 0.43(X) + 20.55$

3.3 Development Trip Distribution and Assignment

The trip distribution was determined based on existing travel patterns at the intersection of Belmont Road and Robin Ridge Drive. **Table 3.2** displays the breakdown of trip distributions used in this study.

TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

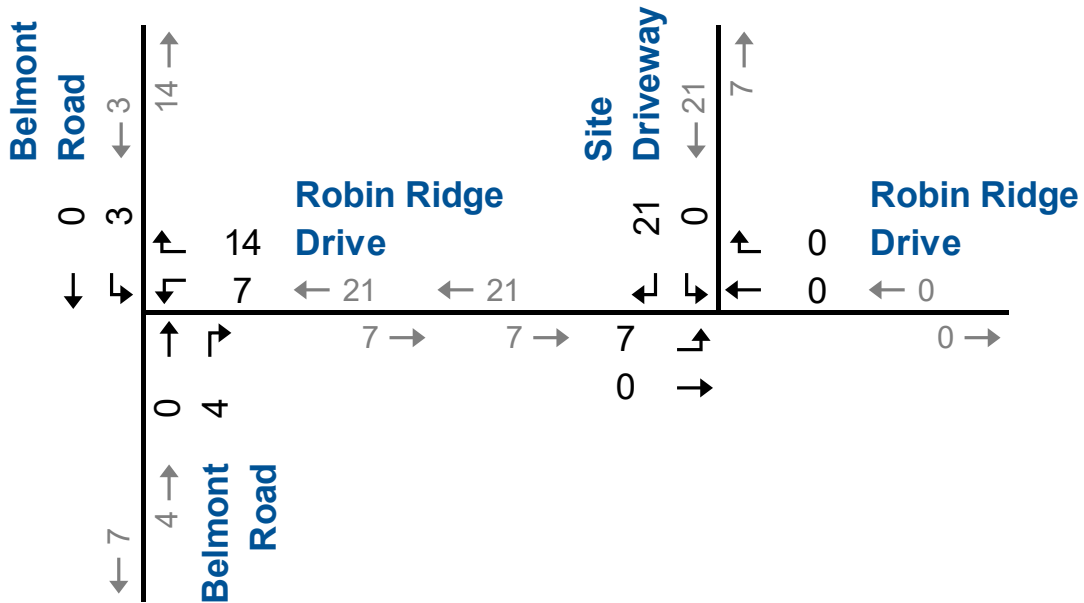
Origin/Destination	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
North via Belmont Road	46%	69%	53%	61%
South via Belmont Road	54%	31%	47%	39%
Total	100%	100%	100%	100%

Figure 3.2 illustrates the site-generated traffic volumes for the AM and PM peak hours.

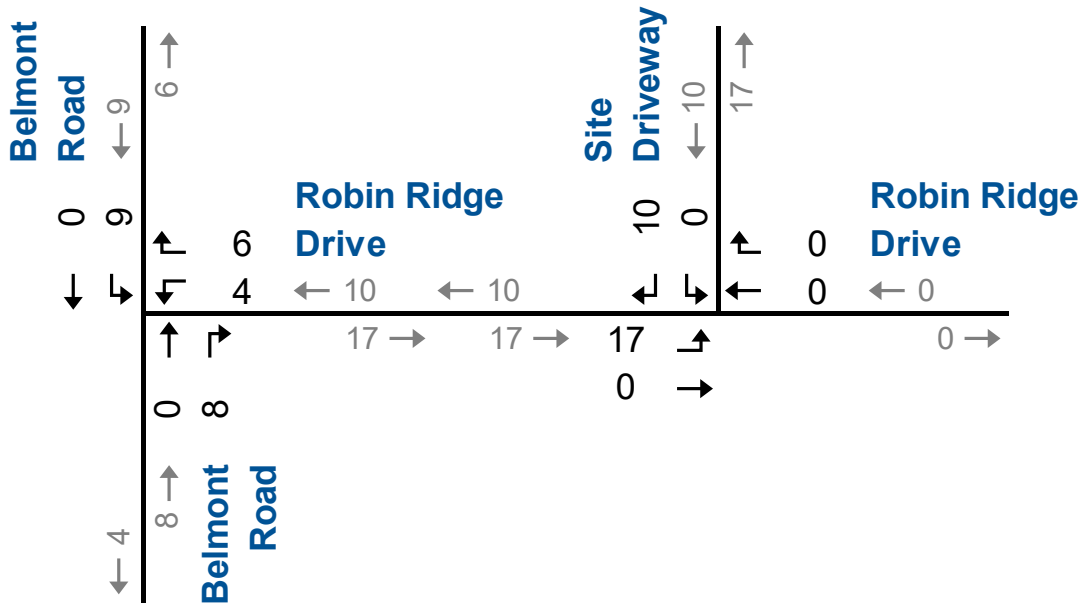
² Institute of Transportation Engineers, *Trip Generation Manual*, 11th ed., (Washington, DC: ITE, 2021).



AM Peak Hour



PM Peak Hour



Site Generated Traffic Volumes

4 Evaluation of Future Traffic Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic volumes, and the analyses for the traffic conditions ten years from the date of application (2033).

4.1 Background Traffic Forecasts

In order to derive the 2033 generalized background traffic volumes, a growth rate of 2.0% per annum was applied to the existing roadway traffic volumes. This growth rate was confirmed with County during the pre-study consultation.

4.1.1 Other Area Developments

The site traffic generated by the Criaghholme Estates Development is included in the background traffic volumes.

The development is located on the south side of Seventh Avenue west of Snyders Avenue in the Community of Belmont. **Figure 4.1** illustrates the location of the background development.

The development comprises 157 single detached homes, 18 semi-detached homes, 16 street townhomes, and an elementary school and is expected to be completed by 2032.

The TIS³ completed for this location indicates the development is forecast to generate 350 trips during the AM peak hour and 240 trips during the PM peak hour. The TIS includes the distribution of site traffic volumes at Belmont Road and Seventh Avenue. The volumes travelling on Belmont Road north of Seventh Avenue are assumed to travel north/south on Belmont Road through Robin Ridge Drive.

It is noted that the TIS includes an alternate scenario where the elementary school is instead developed as 56 semi-detached residential homes. However, the site traffic from the scenario including the elementary school is conservatively applied herein⁴.

Appendix D contains the background development traffic volumes.

³ Prepared by R.J. Burnside and Associates, *Craigholme Estates Development Transportation Study Belmont, ON*, July 2021.

⁴ According to the TIS, the elementary school is forecast to generate 173 and 1 more AM/PM peak hour trip than the 56 semi-detached homes.





Background Development Location

Block 33, Belmont Road, Elgin County TIB
230344

Figure 4.1

4.2 2033 Background Traffic Operations

Figure 4.2 illustrates the 2033 background traffic volumes, including road traffic growth and other area development traffic.

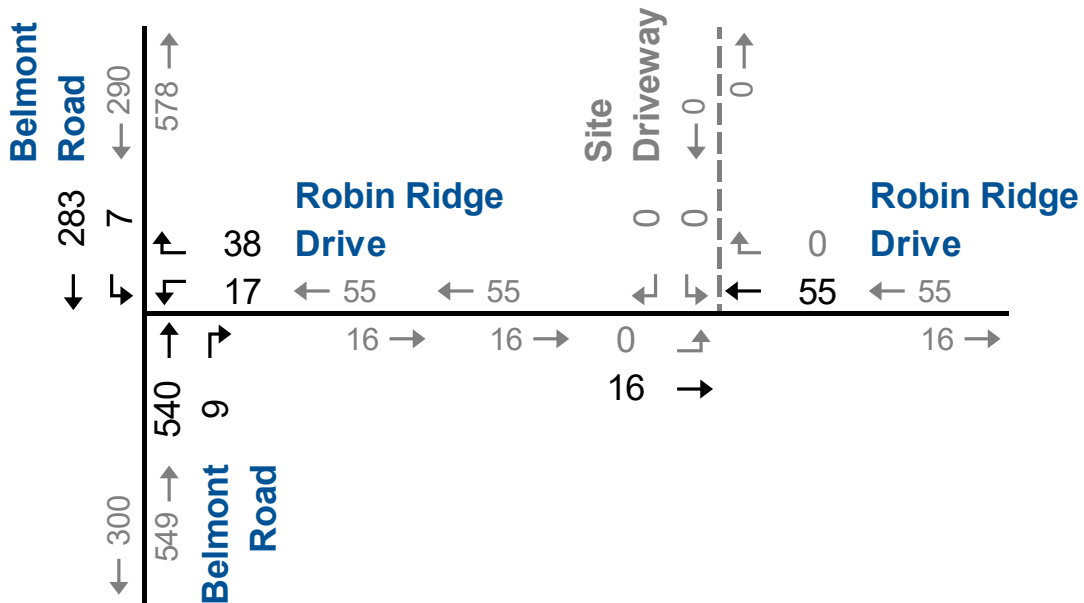
The 2033 background traffic volumes have been analyzed using the same methodology as under existing traffic conditions.

Table 4.1 summarizes the results of the 2033 background traffic operations. The results indicate that the intersection of Belmont Road and Robin Ridge Drive is forecast to operate at acceptable levels of service during the AM and PM peak hours.

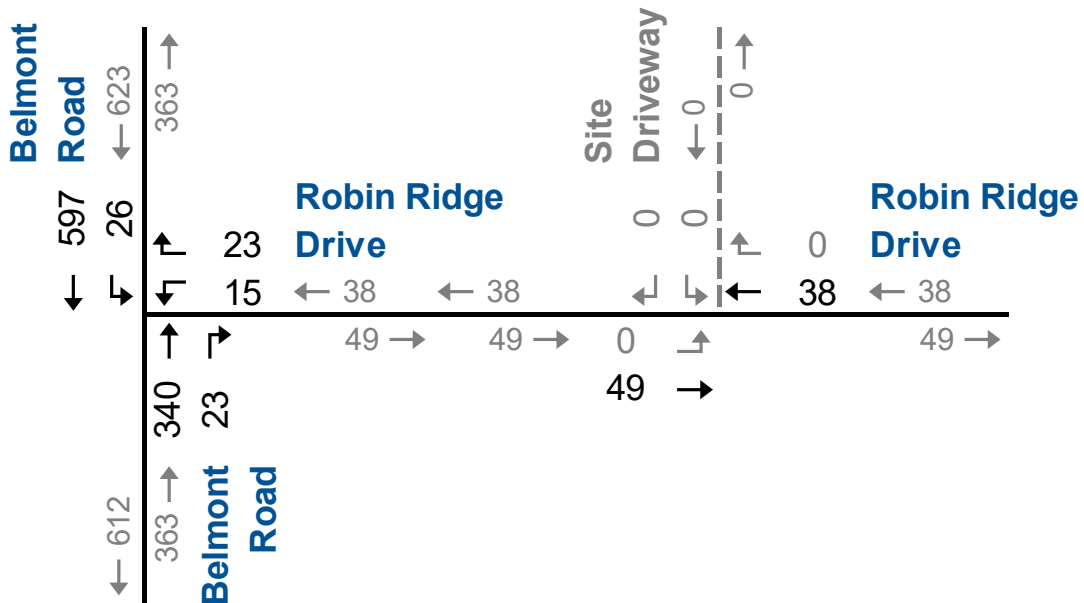
Appendix E contains the supporting detailed Synchro 11 reports.



AM Peak Hour



PM Peak Hour



2033 Background Traffic Volumes

TABLE 4.1: 2033 BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																											
				Eastbound				Westbound				Northbound				Southbound				Overall											
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach												
AM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					C 18 0.06 2 20 18					B 13 0.08 2 -				B 14					A 0 0 0 -	> > > > >	A 0	A 9 0 0 60 60	A 0 0 0 -				A 0	
PM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					C 21 0.07 2 20 18					B 11 0.04 1 -				B 15					A 0 0 0 -	> > > > >	A 0	A 8 0 1 60 59	A 0 0 0 -				A 0	

MOE - Measure of Effectiveness
 LOS - Level of Service
 Delay - Average Delay per Vehicle in Seconds
 V/C - Volume to Capacity Ratio
 Q - 95th Percentile Queue Length (m)
 Stor. - Existing Storage (m)
 Avail. - Available Storage (m)
 TWSC - Two-Way Stop Control
 </> - Shared with through movement



4.3 2033 Total Traffic Operations

Figure 4.3 illustrates the 2033 total traffic volumes, including trips generated by the proposed development.

The 2033 total traffic volumes have been analyzed using the same methodology as under existing and background traffic conditions.

Table 4.2 summarizes the results of the 2033 total traffic operations. The results indicate that the study area intersections are forecast to operate at acceptable levels of service during the AM and PM peak hours.

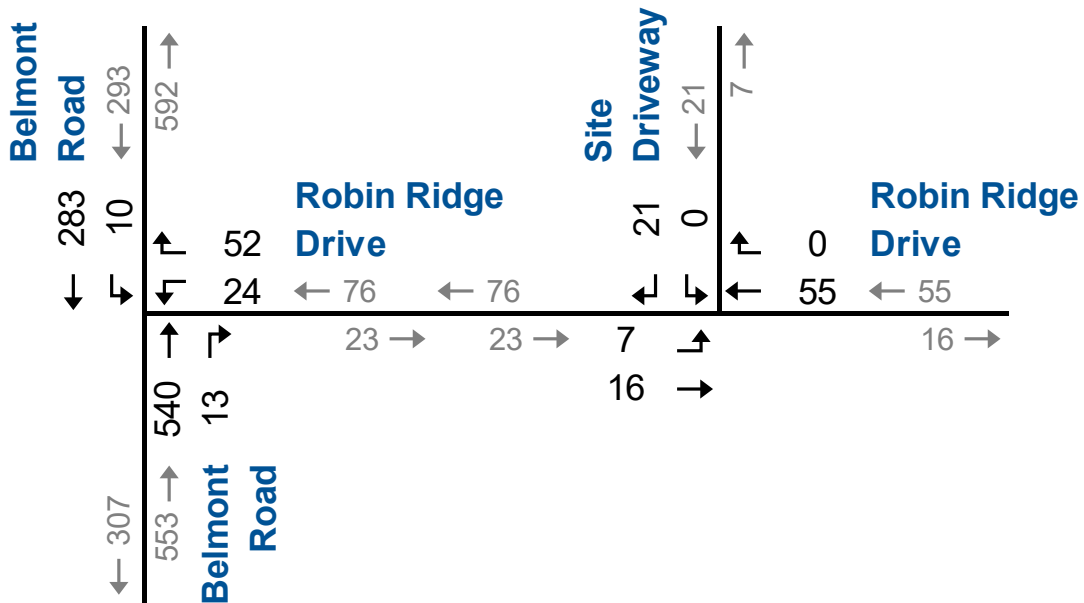
The Site Driveway intersection on Robin Ridge Drive is forecast to operate at LOS A during the AM and PM peak hours.

It is noted that the Site Driveway is proposed to be located approximately 35 metres east of the westbound stop bar at Belmont Road. The westbound queue lengths at Belmont Road and Robin Ridge Drive are projected to a maximum of three metres under 2033 total traffic conditions, which will not impede inbound/outbound traffic operations at the Site Driveway on Robin Ridge Drive.

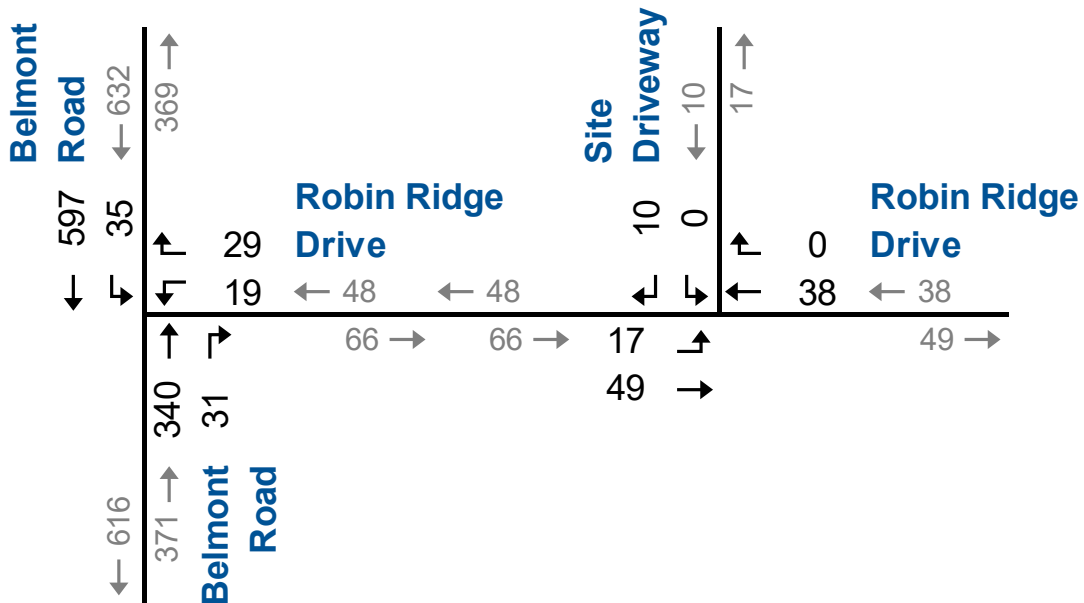
Appendix F contains the supporting detailed Synchro 11 reports.



AM Peak Hour



PM Peak Hour



2033 Total Traffic Volumes

TABLE 4.2: 2033 TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					C 18 0.09 2 20 18		B 13 0.11 3 -	B 14			A 0 0.00 0 -	> > > > >	A 0	A 9 0.01 0 60 60	A 0 0.00 0 -	A 0	
	Robin Ridge Drive & Site Driveway	TWSC	LOS Delay V/C Q	< < < <	A 7 0.01 0		A 2	A 0 0.00 0	> > > >	A 0							A 9 0.02 1	> > > >	A 9	
PM Peak Hour	Belmont Road & Robin Ridge Drive	TWSC	LOS Delay V/C Q Stor. Avail.					C 22 0.09 2 20 18		B 11 0.05 1 -	C 15			A 0 0.00 0 -	> > > > >	A 0	A 8 0.03 1 60 59	A 0 0.00 0 -	A 0	
	Robin Ridge Drive & Site Driveway	TWSC	LOS Delay V/C Q	< < < <	A 7 0.01 0		A 2	A 0 0.00 0	> > > >	A 0							A 8 0.01 0	> > > >	A 8	

MOE - Measure of Effectiveness Q - 95th Percentile Queue Length (m) </> - Shared with through movement
 LOS - Level of Service Stor. - Existing Storage (m)
 Delay - Average Delay per Vehicle in Seconds Avail. - Available Storage (m)
 V/C - Volume to Capacity Ratio TWSC - Two-Way Stop Control

4.4 Roadway Traffic Volumes

As stated in **Section 2.3**, the peak hour, peak direction traffic volume on Belmont Road is less than 500 vph and within the lane capacity of 900 vph. The 2033 background peak hour, peak direction traffic volume on Belmont Road will be around 625 vph.

The additional traffic volumes generated by the subject development will be minimal. The peak hour, peak direction traffic volume on Belmont Road is expected to be around 630 vph. As under existing conditions, the directional peak will be within capacity of Belmont Road.

Similarly, the peak hour, peak directional volume on Robin Ridge Drive will be around 75 vph and well within capacity under the 2033 total traffic scenario.

The Average Daily Traffic (ADT) volume is a measurement of the two-way, daily traffic volumes along a road segment. When 24-hour traffic count data are not available, the ADT is typically estimated by assuming the daily PM peak hour traffic volume to be 10% of the ADT.

The current ADT volume along Belmont Road in vicinity of the subject site is 7,490 vehicles and is estimated to increase to 10,010 vehicles by 2033. Over a 10-year period, this is an average increase of approximately 252 vehicles per year. The increase will have minimal impacts on Belmont Road traffic flows.

4.5 Left-Turn Lanes

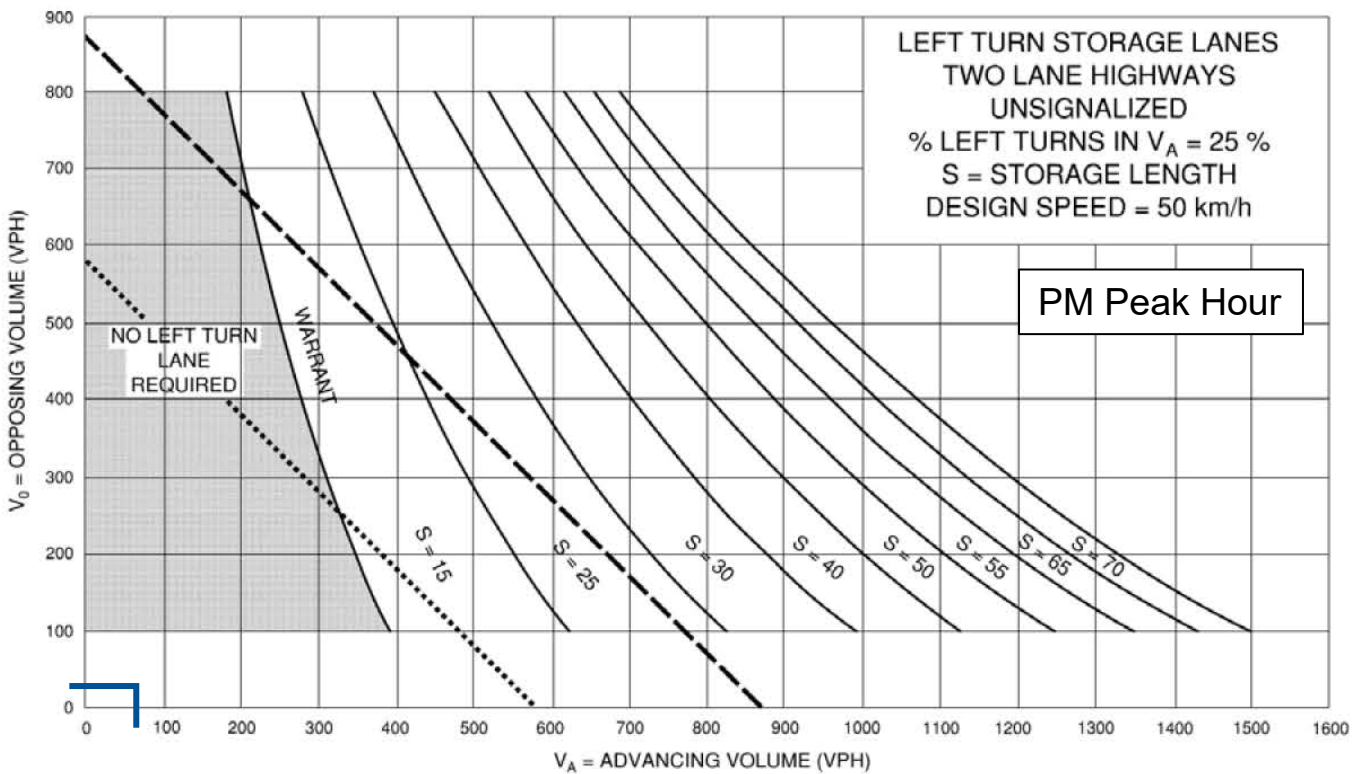
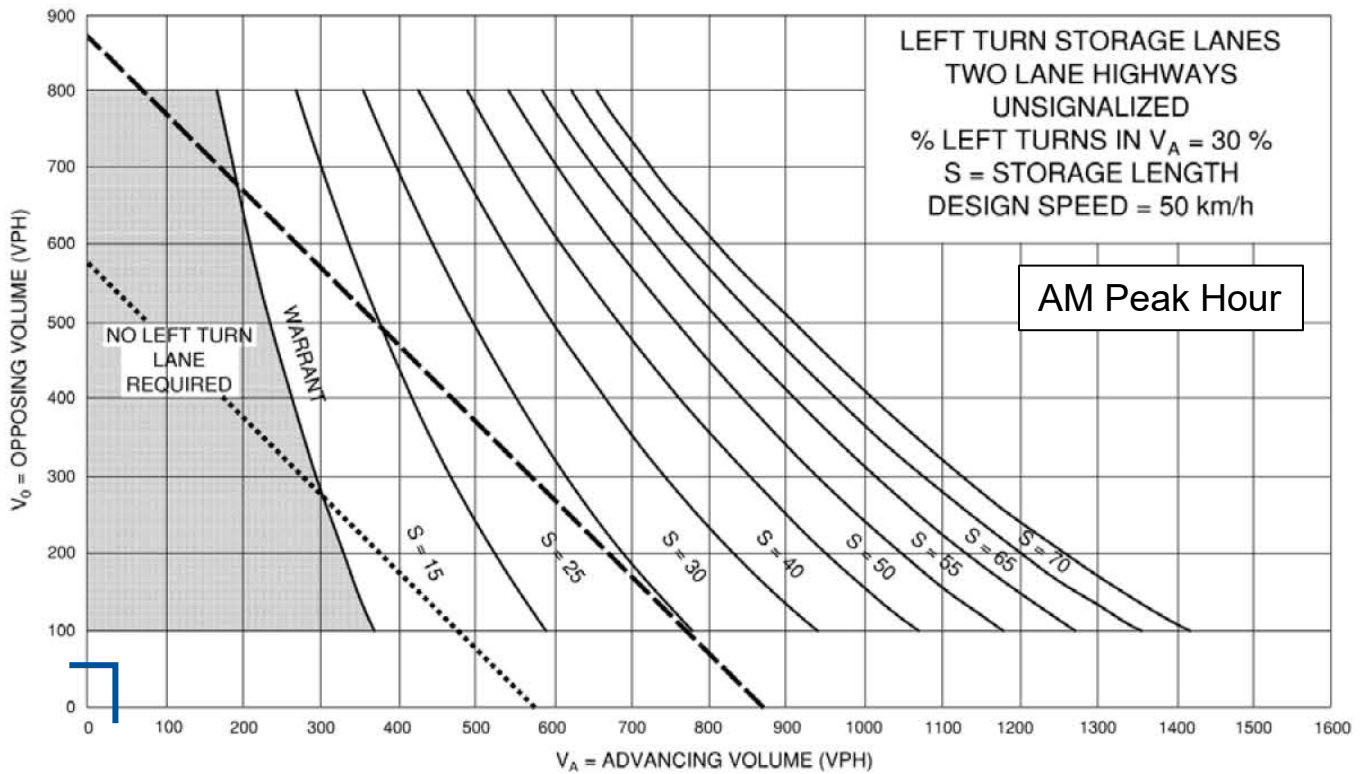
The need for an auxiliary eastbound left-turn turning lane on Robin Ridge Drive at the proposed driveway was assessed based on the requirements and procedures detailed in the Ministry of Transportation Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads⁵. The assessment is based on the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a design speed of 10 kilometres per hour over the posted speed limit (50 km/h).

Based on these criteria, an eastbound left-turn lane on Robin Ridge Drive at the proposed driveway is not warranted under 2033 total traffic conditions.

Figure 4.4 contains the warrant nomographs.

⁵ MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017.





Robin Ridge Drive and Site Driveway Eastbound Left-Turn Lane 2033 Total Traffic Conditions

5 Conclusions and Recommendations

5.1 Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The intersection of Belmont Road and Robin Ridge Drive is currently operating at acceptable levels of service.
- ▶ **Development Trip Generation:** The development is forecast to generate 28 and 27 trips during the AM and PM peak hours, respectively.
- ▶ **2033 Background Traffic Conditions:** The intersection of Belmont Road and Robin Ridge Drive is forecast to operate at acceptable levels of service.
- ▶ **2033 Total Traffic Conditions:** The intersections of Belmont Road and Robin Ridge Drive and the Site Driveway on Robin Ridge Drive are forecast to operate at acceptable levels of service.
- ▶ **Roadway Traffic Volumes:** The peak hour, peak direction traffic volumes on Belmont Road are currently less than 500 vph, well within the lane capacity of 900 vph. Under the 2033 total traffic conditions, the peak hour, peak direction traffic volumes will increase to approximately 630 vph and will be within the lane capacity of 900 vph. The projected increase will have minimal impact on Belmont Road.
- ▶ **Site Driveway:** The Site Driveway on Robin Ridge Drive is forecast to operate at LOS A under 2033 total traffic conditions. It is noted that an eastbound left-turn lane is not warranted on Robin Ridge Drive at the Site Driveway under 2033 total traffic conditions.

It is noted that the westbound queue lengths at Belmont Road and Robin Ridge Drive are projected to a maximum of three metres under 2033 total traffic conditions, which will not impede inbound/outbound traffic operations at the Site Driveway on Robin Ridge Drive.

5.2 Recommendations

Based on the findings and conclusions of this study, it is recommended that the development be considered for approval as proposed.



Appendix A

Pre-Study Consultation



From: [Peter Dutchak](#)
To: [Patrick Neal](#)
Cc: [Rajan Philips](#)
Subject: RE: (230344) Block 33 Belmont Road, Central Elgin TIB - Pre-Study Consultation
Date: July 13, 2023 9:24:19 AM
Attachments: [image001.png](#)
[image003.png](#)

Thank you Patrick.

I can confirm your assumptions for traffic growth and existing TIS being accurate.

My only initial concern is a potential traffic cue that may develop as a result of vehicle's left turn movement into the development site and how that may affect drivers entering Robin Ridge Road. Ideally this entrance should be located to the east development property limits as much as possible.

Regards,

Peter Dutchak, CET, CRS
Acting Director, Engineering Services

County of Elgin
450 Sunset Drive,
St. Thomas, Ontario
N5R 5V1

(519)631-1460 ext. 124
pdutchak@elgin.ca

From: Patrick Neal <pneal@ptsl.com>
Sent: July 12, 2023 4:41 PM
To: Peter Dutchak <pdutchak@elgin.ca>
Cc: Rajan Philips <rphilips@ptsl.com>
Subject: (230344) Block 33 Belmont Road, Central Elgin TIB - Pre-Study Consultation

This email originated from outside of your organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Peter,

Paradigm has been retained to undertake a Transportation Impact Brief (TIB) for the proposed Residential development located at Block 33 Belmont Road in Central Elgin, Elgin County. The subject site is located in the northeast corner of Belmont Road and Robin Ridge Drive, on the westerly edge of the residential area.

The site consists of a single, rectangular parcel of lands, and the proposed development will accommodate two, 2-storey apartment buildings, each comprising eight units for a total

of 16 units.

Vehicle access is proposed via a two-way, full turns driveway from Robin Ridge Drive, which leads to an onsite parking area for the development.

The concept site plan is attached.

Based on the above information and requirements, we are proposing the following TIB scope of work, for your review and approval:

- Weekday AM and PM peak hour analysis of adjacent roadways.
- Study Area Intersections:
 - Belmont Road and Robin Ridge Drive; and
 - driveway intersection on Robin Ridge Drive.
- Traffic Data: We will undertake traffic counts at the intersection of Belmont Road and Robin Ridge Drive.
- Horizon Year: ten years from date of application (2033).
- Background Growth Rate: 2.0% per annum. **Please confirm.**
- Background Developments: We will include traffic from the Craigholme Estates Development, based on the July 2021 TIS prepared by R.J. Burnside and Associates. **Please confirm.**
- Trip Generation: ITE Trip Generation Manual 11th Edition.
- Trip Distribution: Existing traffic patterns.

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

Regards,

Patrick Neal, EIT
Transportation Consultant



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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: Belmont Road & Robin Ridge Drive
Site Code: 230344
Start Date: 05/25/2023
Page No: 1

Turning Movement Data

Start Time	Robin Ridge Drive Westbound					Belmont Road Northbound					Belmont Road Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	
7:00 AM	4	6	0	0	10	82	1	0	0	83	0	37	0	0	37	130
7:15 AM	3	7	0	0	10	108	0	0	0	108	0	44	0	0	44	162
7:30 AM	2	9	0	0	11	115	1	0	0	116	3	50	0	0	53	180
7:45 AM	3	4	0	0	7	107	3	0	0	110	1	49	0	0	50	167
Hourly Total	12	26	0	0	38	412	5	0	0	417	4	180	0	0	184	639
8:00 AM	6	11	0	0	17	87	3	0	0	90	2	53	0	0	55	162
8:15 AM	4	4	0	0	8	88	7	0	0	95	0	46	0	0	46	149
8:30 AM	4	5	0	0	9	75	3	0	0	78	1	32	0	0	33	120
8:45 AM	6	3	0	0	9	58	5	0	0	63	0	48	0	0	48	120
Hourly Total	20	23	0	0	43	308	18	0	0	326	3	179	0	0	182	551
9:00 AM	6	3	0	0	9	60	2	0	0	62	2	46	0	0	48	119
9:15 AM	1	6	0	0	7	72	3	0	0	75	0	39	0	0	39	121
9:30 AM	3	9	0	0	12	63	0	0	0	63	0	43	0	0	43	118
9:45 AM	2	8	0	0	10	45	3	0	0	48	4	45	0	0	49	107
Hourly Total	12	26	0	0	38	240	8	0	0	248	6	173	0	0	179	465
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	3	5	0	2	8	38	2	0	0	40	3	37	0	0	40	88
11:15 AM	4	3	0	0	7	52	3	0	0	55	2	36	0	0	38	100
11:30 AM	1	3	0	0	4	52	2	0	0	54	4	35	0	0	39	97
11:45 AM	2	0	0	0	2	41	1	0	0	42	4	35	0	0	39	83
Hourly Total	10	11	0	2	21	183	8	0	0	191	13	143	0	0	156	368
12:00 PM	3	8	0	0	11	40	1	0	0	41	4	52	0	0	56	108
12:15 PM	1	5	0	0	6	50	1	0	0	51	7	56	0	0	63	120
12:30 PM	2	5	0	0	7	41	2	0	0	43	6	39	0	0	45	95
12:45 PM	3	3	0	0	6	28	3	0	0	31	5	54	0	0	59	96
Hourly Total	9	21	0	0	30	159	7	0	0	166	22	201	0	0	223	419
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	5	3	0	0	8	59	6	0	0	65	9	81	0	0	90	163
3:15 PM	3	5	0	0	8	60	1	0	1	61	3	105	0	0	108	177
3:30 PM	2	4	0	0	6	56	5	0	0	61	2	91	0	0	93	160
3:45 PM	2	6	0	0	8	69	6	0	0	75	9	85	0	0	94	177
Hourly Total	12	18	0	0	30	244	18	0	1	262	23	362	0	0	385	677
4:00 PM	6	4	0	0	10	57	4	0	0	61	1	105	0	0	106	177
4:15 PM	4	4	0	0	8	72	4	0	0	76	2	119	0	0	121	205
4:30 PM	0	7	0	0	7	74	3	0	0	77	6	117	0	0	123	207
4:45 PM	4	3	0	0	7	56	2	0	0	58	3	116	0	0	119	184

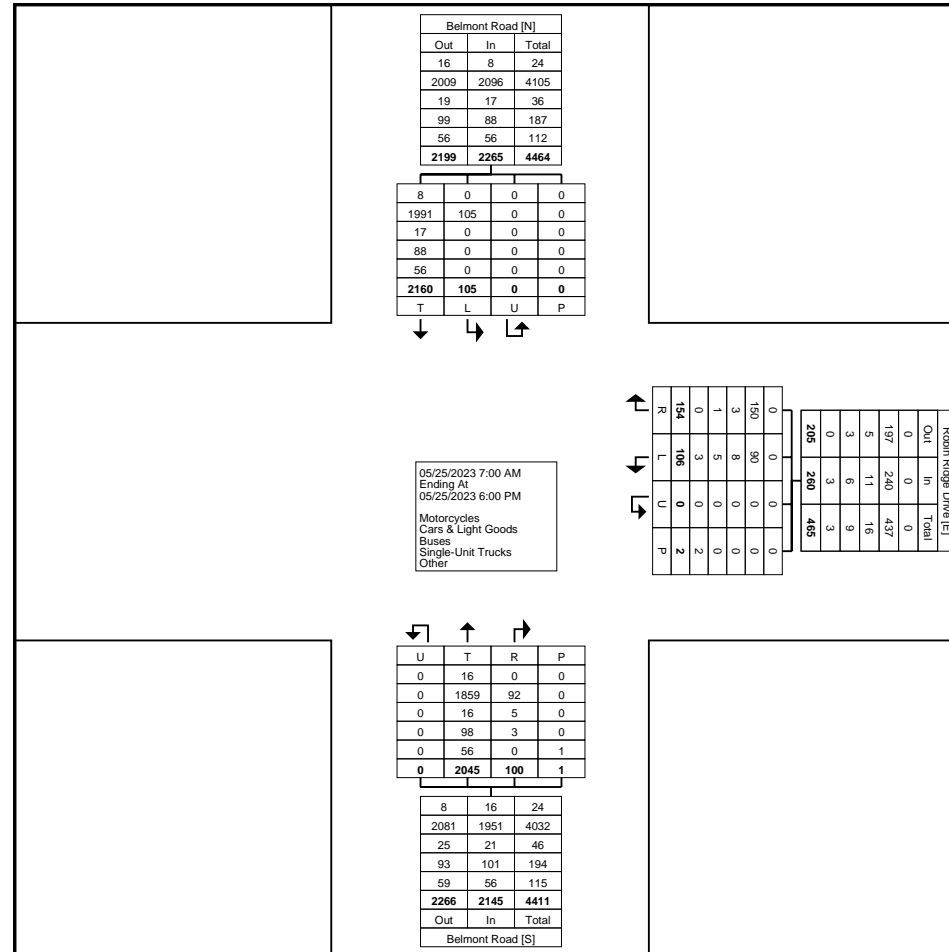
Hourly Total	14	18	0	0	32	259	13	0	0	272	12	457	0	0	469	773
5:00 PM	1	2	0	0	3	58	8	0	0	66	6	108	0	0	114	183
5:15 PM	7	7	0	0	14	59	6	0	0	65	6	121	0	0	127	206
5:30 PM	5	2	0	0	7	58	6	0	0	64	4	129	0	0	133	204
5:45 PM	4	0	0	0	4	65	3	0	0	68	6	107	0	0	113	185
Hourly Total	17	11	0	0	28	240	23	0	0	263	22	465	0	0	487	778
Grand Total	106	154	0	2	260	2045	100	0	1	2145	105	2160	0	0	2265	4670
Approach %	40.8	59.2	0.0	-	-	95.3	4.7	0.0	-	-	4.6	95.4	0.0	-	-	-
Total %	2.3	3.3	0.0	-	5.6	43.8	2.1	0.0	-	45.9	2.2	46.3	0.0	-	48.5	-
Motorcycles	0	0	0	-	0	16	0	0	-	16	0	8	0	-	8	24
% Motorcycles	0.0	0.0	-	-	0.0	0.8	0.0	-	-	0.7	0.0	0.4	-	-	0.4	0.5
Cars & Light Goods	90	150	0	-	240	1859	92	0	-	1951	105	1991	0	-	2096	4287
% Cars & Light Goods	84.9	97.4	-	-	92.3	90.9	92.0	-	-	91.0	100.0	92.2	-	-	92.5	91.8
Buses	8	3	0	-	11	16	5	0	-	21	0	17	0	-	17	49
% Buses	7.5	1.9	-	-	4.2	0.8	5.0	-	-	1.0	0.0	0.8	-	-	0.8	1.0
Single-Unit Trucks	5	1	0	-	6	98	3	0	-	101	0	88	0	-	88	195
% Single-Unit Trucks	4.7	0.6	-	-	2.3	4.8	3.0	-	-	4.7	0.0	4.1	-	-	3.9	4.2
Articulated Trucks	0	0	0	-	0	55	0	0	-	55	0	56	0	-	56	111
% Articulated Trucks	0.0	0.0	-	-	0.0	2.7	0.0	-	-	2.6	0.0	2.6	-	-	2.5	2.4
Bicycles on Road	3	0	0	-	3	1	0	0	-	1	0	0	0	-	0	4
% Bicycles on Road	2.8	0.0	-	-	1.2	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	2	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



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Start Date: 05/25/2023
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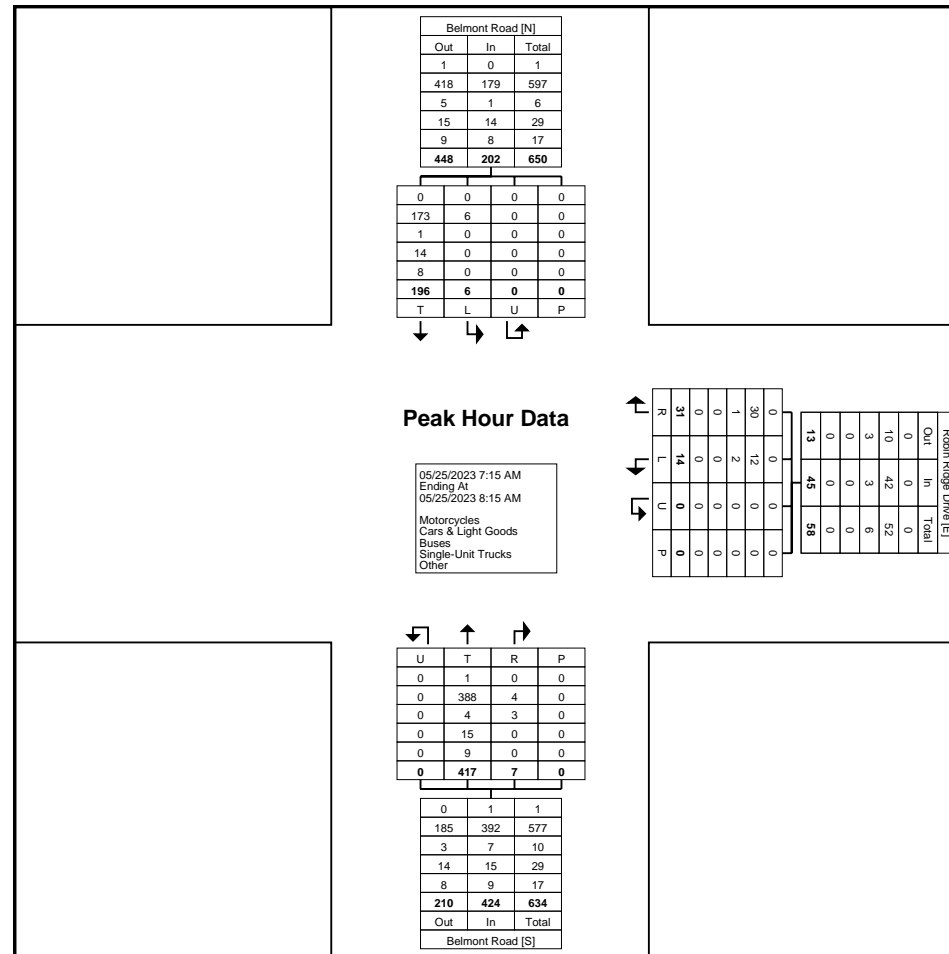
Turning Movement Data Plot



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Site Code: 230344
Start Date: 05/25/2023
Page No: 5



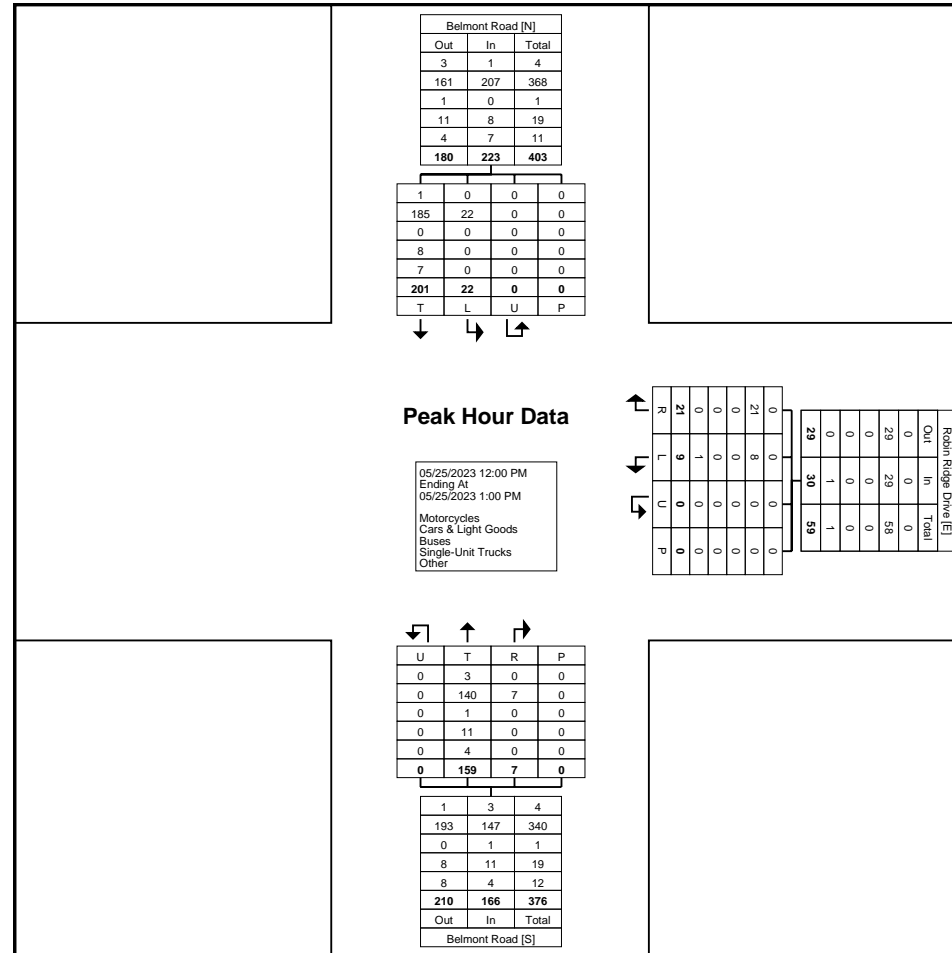
Turning Movement Peak Hour Data Plot (7:15 AM)



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Page No: 7



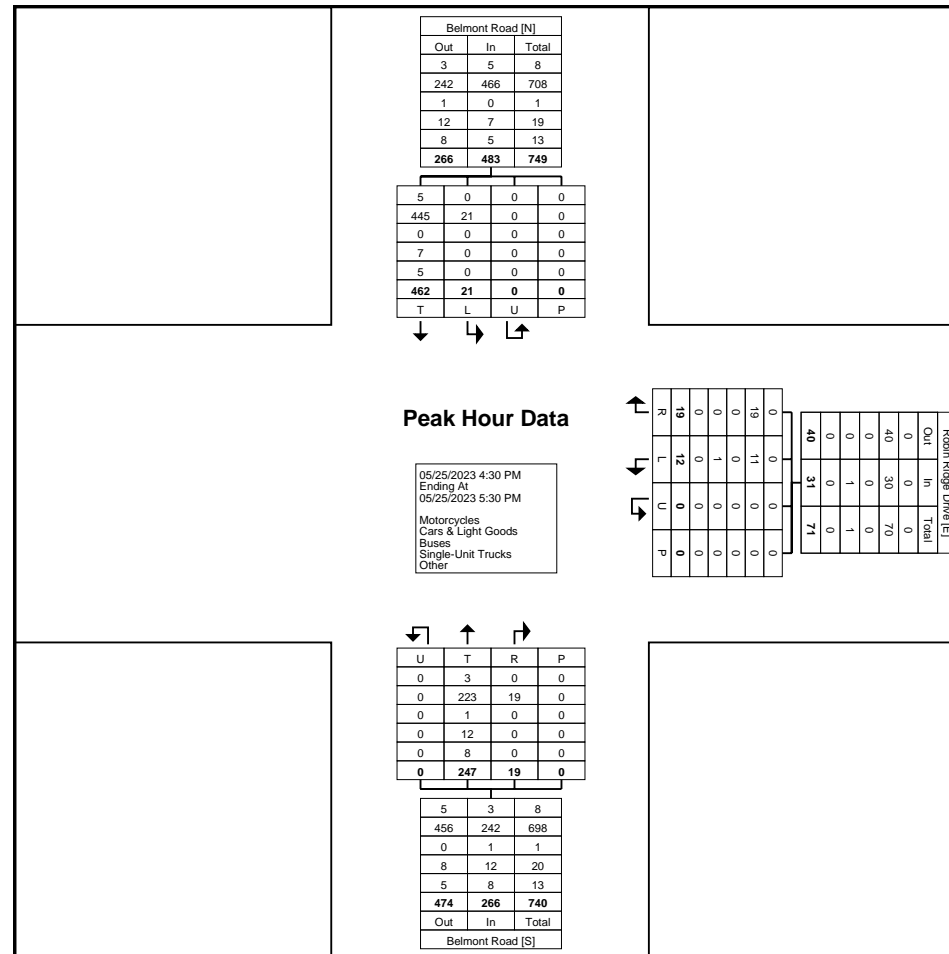
Turning Movement Peak Hour Data Plot (12:00 PM)



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Count Name: Belmont Road & Robin Ridge Drive
Site Code: 230344
Start Date: 05/25/2023
Page No: 9



Turning Movement Peak Hour Data Plot (4:30 PM)

Appendix C

Existing Traffic Operations Reports



Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

Existing AM Peak Hour
(230344) Block 33, Belmont Rd TIB

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖		↗	↖
Traffic Volume (vph)	14	31	417	7	6	196
Future Volume (vph)	14	31	417	7	6	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.998			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1791	0	1805	1712
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1791	0	1805	1712
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	6%	0%	0%	11%
Adj. Flow (vph)	15	33	448	8	6	211
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	33	456	0	6	211
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

Existing AM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖		↗	↖
Traffic Vol, veh/h	14	31	417	7	6	196
Future Vol, veh/h	14	31	417	7	6	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	6	0	0	11
Mvmt Flow	15	33	448	8	6	211

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	675	452	0
Stage 1	452	-	-
Stage 2	223	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	422	612	-
Stage 1	645	-	-
Stage 2	819	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	420	612	-
Mov Cap-2 Maneuver	420	-	-
Stage 1	645	-	-
Stage 2	815	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	420	612	1115
HCM Lane V/C Ratio	-	-	0.036	0.054	0.006
HCM Control Delay (s)	-	-	13.9	11.2	8.2
HCM Lane LOS	-	-	B	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0

Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

Existing PM Peak Hour
(230344) Block 33, Belmont Rd TIB



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↵		↵	↵
Traffic Volume (vph)	12	19	247	19	21	462
Future Volume (vph)	12	19	247	19	21	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.990			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1671	1615	1751	0	1805	1845
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1671	1615	1751	0	1805	1845
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	8%	0%	8%	0%	0%	3%
Adj. Flow (vph)	13	20	263	20	22	491
Shared Lane Traffic (%)						
Lane Group Flow (vph)	13	20	283	0	22	491
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	34.3%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

Existing PM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↵		↵	↵
Traffic Vol, veh/h	12	19	247	19	21	462
Future Vol, veh/h	12	19	247	19	21	462
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	8	0	8	0	0	3
Mvmt Flow	13	20	263	20	22	491

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	808	273	0
Stage 1	273	-	-
Stage 2	535	-	-
Critical Hdwy	6.48	6.2	-
Critical Hdwy Stg 1	5.48	-	-
Critical Hdwy Stg 2	5.48	-	-
Follow-up Hdwy	3.572	3.3	-
Pot Cap-1 Maneuver	342	771	-
Stage 1	759	-	-
Stage 2	575	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	336	771	-
Mov Cap-2 Maneuver	336	-	-
Stage 1	759	-	-
Stage 2	565	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.2	0	0.3
HCM LOS	B		

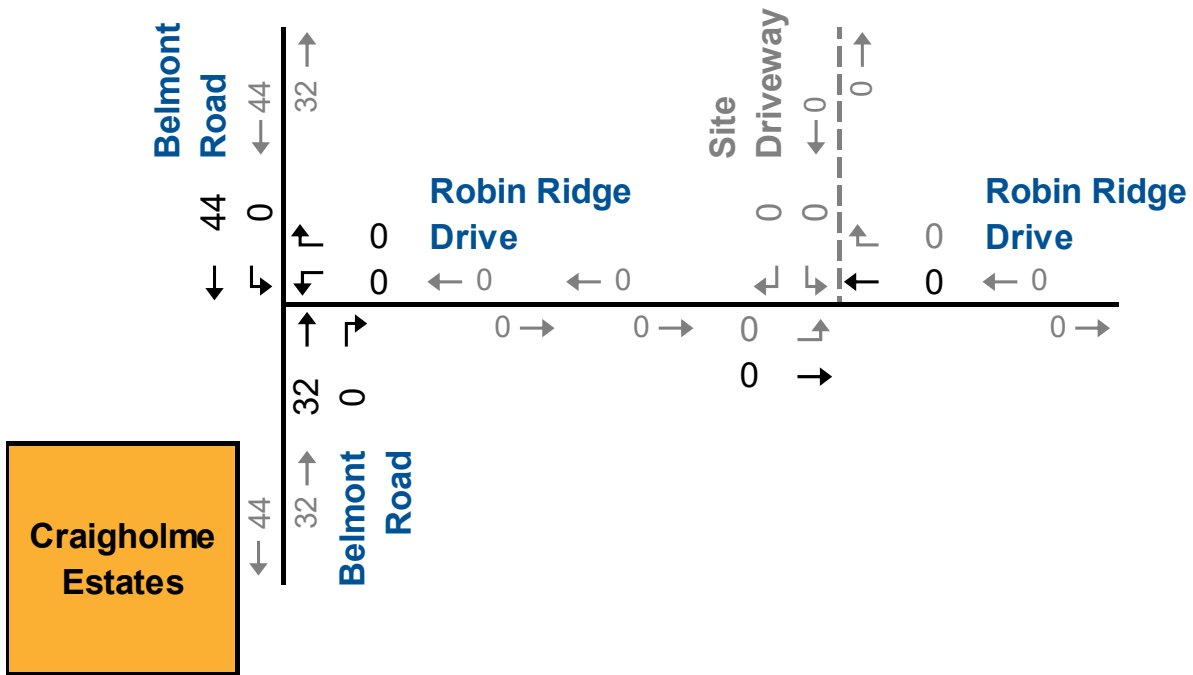
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	336	771	1291	-
HCM Lane V/C Ratio	-	-	0.038	0.026	0.017	-
HCM Control Delay (s)	-	-	16.1	9.8	7.8	-
HCM Lane LOS	-	-	C	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0.1	-

Appendix D

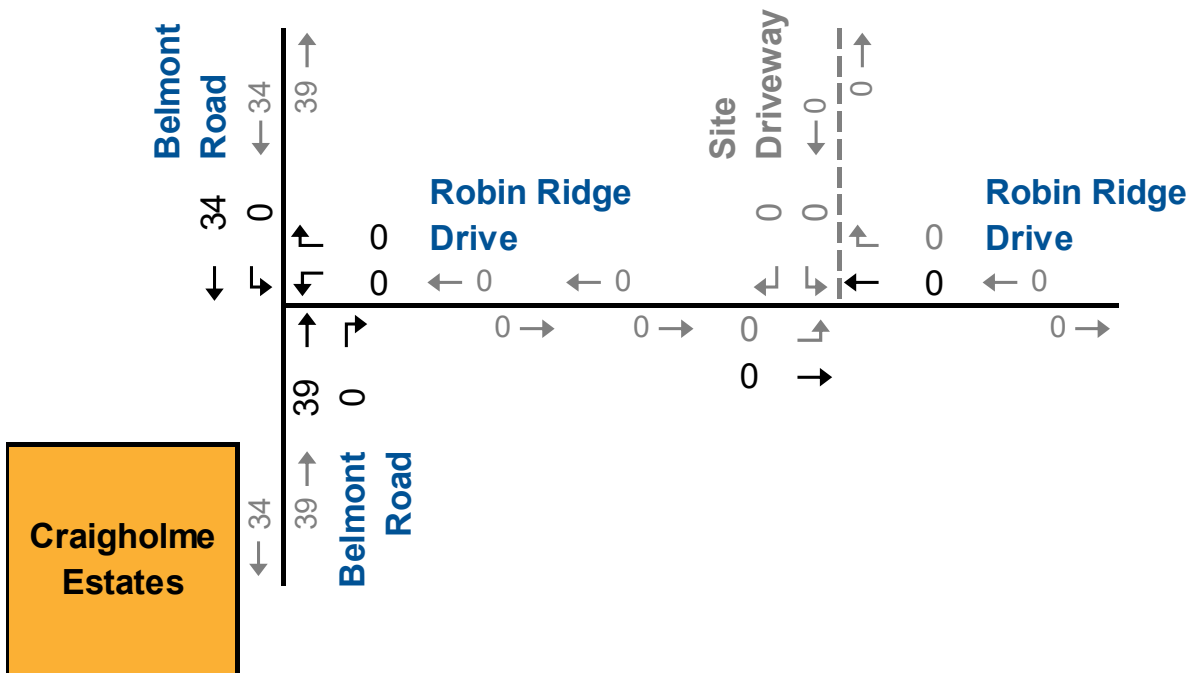
Background Development Traffic Volumes



AM Peak Hour



PM Peak Hour



Background Development Traffic Volumes

Appendix E

2033 Background Traffic Operations Reports



Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

2033 Background AM Peak Hour
(230344) Block 33, Belmont Rd TIB

	↖	↗	↕	↙	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕		↙	↘
Traffic Volume (vph)	17	38	540	9	7	283
Future Volume (vph)	17	38	540	9	7	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.998			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1791	0	1805	1712
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1791	0	1805	1712
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	6%	0%	0%	11%
Adj. Flow (vph)	18	41	581	10	8	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	41	591	0	8	304
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

2033 Background AM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕		↙	↘
Traffic Vol, veh/h	17	38	540	9	7	283
Future Vol, veh/h	17	38	540	9	7	283
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	6	0	0	11
Mvmt Flow	18	41	581	10	8	304

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	906	586	0
Stage 1	586	-	-
Stage 2	320	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	309	514	995
Stage 1	560	-	-
Stage 2	741	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	307	514	995
Mov Cap-2 Maneuver	307	-	-
Stage 1	560	-	-
Stage 2	735	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	307	514	995	-
HCM Lane V/C Ratio	-	-	0.06	0.079	0.008	-
HCM Control Delay (s)	-	-	17.5	12.6	8.6	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0	-

Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

2033 Background PM Peak Hour
(230344) Block 33, Belmont Rd TIB

	↖	↗	↖	↗	↘	↙
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	15	23	340	23	26	597
Future Volume (vph)	15	23	340	23	26	597
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.991			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1783	0	1805	1712
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1783	0	1805	1712
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	6%	0%	0%	11%
Adj. Flow (vph)	16	25	366	25	28	642
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	25	391	0	28	642
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.4%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

2033 Background PM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Vol, veh/h	15	23	340	23	26	597
Future Vol, veh/h	15	23	340	23	26	597
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	6	0	0	11
Mvmt Flow	16	25	366	25	28	642

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1077	379	0
Stage 1	379	-	-
Stage 2	698	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	245	672	-
Stage 1	696	-	-
Stage 2	497	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	239	672	-
Mov Cap-2 Maneuver	239	-	-
Stage 1	696	-	-
Stage 2	485	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.8	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	239	672	1179	-
HCM Lane V/C Ratio	-	-	0.067	0.037	0.024	-
HCM Control Delay (s)	-	-	21.2	10.6	8.1	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	0.1	-

Appendix F

2033 Total Traffic Operations Reports



Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

2033 Total AM Peak Hour
(230344) Block 33, Belmont Rd TIB

	↖	↗	↖	↗	↘	↙
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	24	52	540	13	10	283
Future Volume (vph)	24	52	540	13	10	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.997			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1789	0	1805	1712
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1789	0	1805	1712
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	6%	0%	0%	11%
Adj. Flow (vph)	26	56	581	14	11	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	56	595	0	11	304
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.2%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

2033 Total AM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	1.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Vol, veh/h	24	52	540	13	10	283
Future Vol, veh/h	24	52	540	13	10	283
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	6	0	0	11
Mvmt Flow	26	56	581	14	11	304

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	914	588	0
Stage 1	588	-	-
Stage 2	326	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	306	513	-
Stage 1	559	-	-
Stage 2	736	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	303	513	-
Mov Cap-2 Maneuver	303	-	-
Stage 1	559	-	-
Stage 2	728	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	0.3
HCM LOS	B		

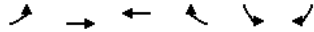
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	303	513	991	-
HCM Lane V/C Ratio	-	-	0.085	0.109	0.011	-
HCM Control Delay (s)	-	-	18	12.9	8.7	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.4	0	-

Lanes, Volumes, Timings

2: Robin Ridge Drive & Site Driveway

2033 Total AM Peak Hour

(230344) Block 33, Belmont Rd TIB



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	7	16	55	0	0	21
Future Volume (vph)	7	16	55	0	0	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.984				
Satd. Flow (prot)	0	1833	1863	0	1611	0
Flt Permitted		0.984				
Satd. Flow (perm)	0	1833	1863	0	1611	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		52.6	141.9		81.8	
Travel Time (s)		4.7	12.8		5.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	17	60	0	0	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	25	60	0	23	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	17.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th TWSC

2: Robin Ridge Drive & Site Driveway

2033 Total AM Peak Hour

(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	7	16	55	0	0	21
Future Vol, veh/h	7	16	55	0	0	21
Conflicting Peds, #/hr	0	0	0	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	8	17	60	0	0	23

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	60	0	93
Stage 1	-	-	60
Stage 2	-	-	33
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1544	-	907
Stage 1	-	-	963
Stage 2	-	-	989
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1544	-	902
Mov Cap-2 Maneuver	-	-	902
Stage 1	-	-	958
Stage 2	-	-	989

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1544	-	-	-	1005
HCM Lane V/C Ratio	0.005	-	-	-	0.023
HCM Control Delay (s)	7.3	0	-	-	8.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lanes, Volumes, Timings
1: Belmont Road & Robin Ridge Drive

2033 Total PM Peak Hour
(230344) Block 33, Belmont Rd TIB

	↖	↗	↖	↗	↘	↙
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	19	29	340	31	35	597
Future Volume (vph)	19	29	340	31	35	597
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0	0.0		0.0	60.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	30.0				60.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.989			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1781	0	1805	1712
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1781	0	1805	1712
Link Speed (k/h)	40		50			50
Link Distance (m)	52.6		145.0			149.0
Travel Time (s)	4.7		10.4			10.7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	6%	0%	0%	11%
Adj. Flow (vph)	20	31	366	33	38	642
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	31	399	0	38	642
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.4%
ICU Level of Service A	
Analysis Period (min)	15

HCM 6th TWSC
1: Belmont Road & Robin Ridge Drive

2033 Total PM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Vol, veh/h	19	29	340	31	35	597
Future Vol, veh/h	19	29	340	31	35	597
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	20	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	6	0	0	11
Mvmt Flow	20	31	366	33	38	642

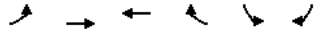
Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1101	383	0
Stage 1	383	-	-
Stage 2	718	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	237	669	-
Stage 1	694	-	-
Stage 2	487	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	229	669	-
Mov Cap-2 Maneuver	229	-	-
Stage 1	694	-	-
Stage 2	471	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	229	669	1171	-
HCM Lane V/C Ratio	-	-	0.089	0.047	0.032	-
HCM Control Delay (s)	-	-	22.3	10.6	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	0.1	-

Lanes, Volumes, Timings
2: Robin Ridge Drive & Site Driveway

2033 Total PM Peak Hour
(230344) Block 33, Belmont Rd TIB



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	17	49	38	0	0	10
Future Volume (vph)	17	49	38	0	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.865		
Flt Protected		0.987				
Satd. Flow (prot)	0	1839	1863	0	1611	0
Flt Permitted		0.987				
Satd. Flow (perm)	0	1839	1863	0	1611	0
Link Speed (k/h)		40	40		50	
Link Distance (m)		52.6	141.9		81.8	
Travel Time (s)		4.7	12.8		5.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	53	41	0	0	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	71	41	0	11	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM 6th TWSC
2: Robin Ridge Drive & Site Driveway

2033 Total PM Peak Hour
(230344) Block 33, Belmont Rd TIB

Intersection

Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	17	49	38	0	0	10
Future Vol, veh/h	17	49	38	0	0	10
Conflicting Peds, #/hr	0	0	0	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	18	53	41	0	0	11

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	41	0	0
Stage 1	-	-	41
Stage 2	-	-	89
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1568	-	864
Stage 1	-	-	981
Stage 2	-	-	934
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1568	-	854
Mov Cap-2 Maneuver	-	-	854
Stage 1	-	-	969
Stage 2	-	-	934

Approach

	EB	WB	SB
HCM Control Delay, s	1.9	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1568	-	-	-	1030
HCM Lane V/C Ratio	0.012	-	-	-	0.011
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0