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# Lora Bay Development - Phase 4B

## TRAFFIC IMPACT STUDY

NG Lora Bay Limited

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Issue	Date	Description
1	August 3, 2022	Final Report
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# 1 Introduction

Tatham Engineering Limited has been retained by NG Lora Bay Limited to prepare a Traffic Impact Study in support of the proposed Draft Plan of Subdivision for Phase 4B of the Lora Bay Development.

## 1.1 BACKGROUND

An initial traffic impact study was prepared in 2001 in support of the overall Lora Bay Development, and subsequently updated in 2004<sup>1</sup>. Following construction of Phases 1 through 3 of the development, a Traffic Opinion Letter<sup>2</sup> was prepared in 2019 to specifically address Phase 4 and the appropriateness of the transportation recommendations stemming from the 2004 study. Phase 4 was subsequently approved and constructed. In August 2022, a Traffic Impact Study<sup>3</sup> was prepared specifically for Phase 4B. Subsequent to the Phase 4B traffic study, the Phase 4B site plan has been revised, thus warranting this updated study.

## 1.2 STUDY PURPOSE

The purpose of this study is to consider the traffic impacts specific to Phase 4B of the Lora Bay development, with consideration for current conditions (including completion of Phases 1 through 4). In particular, the following will be discussed:

- the operations of the road system through the study area prior to development of Phase 4B;
- an estimation of the growth in the traffic volumes not otherwise attributed to Phase 4B (ie. from overall growth in the area and/or other developments);
- an estimation of the number of new trips that Phase 4B is likely to generate;
- the operations of the study area road system upon completion of Phase 4B; and
- the resulting impacts and need for mitigating measures (if required) to ensure acceptable overall road operations.

While it is acknowledged that the Lora Bay development also includes several future phases, such will be the focus of a future traffic impact study to be prepared in support of the respective development applications; this study is intended to support the approval of Phase 4B.

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<sup>1</sup> *Lora Bay Revised Traffic Impact Study The Town of The Blue Mountains*. Dillon Consulting Limited, November 2004.

<sup>2</sup> *Traffic Opinion Letter Phase 4 Lora Bay Residential Development*. Crozier Consulting Engineers, March 1, 2019.

<sup>3</sup> *Lora Bay Development Phase 4B Traffic Impact Study*. Tatham Engineering, August 3, 2022.



### 1.3 REPORT STRUCTURE

The structure of this report is as follows:

- Chapter 2 of this report addresses the existing conditions, detailing the road system and corresponding traffic operations;
- Chapter 3 addresses future conditions, prior to the completion of Lora Bay Phase 4B of the development, and addresses the expected growth in the traffic levels and the resulting operating conditions;
- Chapter 4 addresses Lora Bay Phase 4B specifically, including the volume of traffic that it will generate;
- Chapter 5 addresses the future road system with consideration for Lora Bay Phase 4B; and
- Chapter 6 summarizes the report and the key findings.



## 2 Existing Conditions

This chapter will describe the road network, traffic volumes and operations for the existing conditions.

### 2.1 ROAD NETWORK

The road network to be addressed by this study consists of Highway 26, Lora Bay Drive, 11<sup>th</sup> Line and Christie Beach Road.

#### 2.1.1 Key Road Sections

Mapping and photographs of the road network are provided in Figure 2 and Figure 3, with further details provided below.

##### Highway 26

Key elements/characteristics of Highway 26 are as follows:

- under the jurisdiction of MTO and designated a Class 2B Arterial as per the MTO's *Highway Access Management Guideline*;
- oriented east-west through the study area;
- 1 travel lane per direction with a rural cross-section;
- posted speed limit of 80 km/h across the frontage of the Lora Bay development, reducing to 70 km/h at Peel Street and to 50 km/h at Lansdowne Street (to the east);
- relatively straight and flat alignment, albeit there are some horizontal curves (large radii and short lengths); and
- assumed planning capacity of 900 vehicles per hour per lane (vphpl) reflective of its arterial road designation.

##### Lora Bay Drive

Lora Bay Drive has the following characteristics:

- under the jurisdiction of the Town of The Blue Mountains and designated a collector road under the Town's *Official Plan*;
- oriented north-south through the study area;
- 1 travel lane per direction with a combination of semi-urban and urban cross-sections;





- assumed speed limit of 50 km/h as not otherwise posted;
- relatively flat alignment with some horizontal curves; and
- assumed planning capacity of 600 vphpl reflective of its collector road designation.

#### **11<sup>th</sup> Line**

11<sup>th</sup> Line has the following characteristics:

- under the jurisdiction of the Town of The Blue Mountains and designated a local road under the Town's *Official Plan*;
- oriented north-south through the study area;
- 1 travel lane per direction with a rural cross-section complete with a gravel surface;
- assumed speed limit of 50 km/h as not otherwise posted;
- relatively flat alignment with a slight S bend upon approach to Highway 26 (as implemented by MTO as part of the Highway 26 improvements, to provide an improved intersection with Highway 26 and Lora Bay Drive, which is opposite 11<sup>th</sup> Line to the north); and
- assumed planning capacity of 400 vphpl reflective of its local road designation.

#### **Christie Beach Road**

Christie Beach Road has the following characteristics:

- under the jurisdiction of the Town of The Blue Mountains and designated a collector road under the Town's *Official Plan*;
- oriented north-south through the study area;
- 1 travel lane per direction with a rural cross-section;
- assumed speed limit of 50 km/h as not otherwise posted;
- relatively flat alignment with some horizontal curves; and
- assumed planning capacity of 600 vphpl reflective of its collector road designation.

### **2.1.2 Key Intersections**

#### **Highway 26 & Lora Bay Drive/11<sup>th</sup> Line**

As illustrated in Figure 3, the intersection of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line is a 4-leg intersection operating under stop control on Lora Bay Drive (north leg) and 11<sup>th</sup> Line (south leg). The north and south approaches each provide a shared left-through-right lane, the east approach has a left turn lane, a through lane and a right turn lane whereas the west approach has a left



turn lane and a shared through-right lane. The turn lanes have the following configurations (as measured from aerial photographs based on the pavement markings):

- westbound right turn: 90 metre parallel lane + 80 metre taper;
- westbound left turn: 30 metre storage/parallel lane + 145 metre taper; and
- eastbound left turn: 105 metre storage/parallel lane + 145 metre taper.

As per MTO geometric design standards, the following lane configurations apply (for 90 and 100 km/h design speeds as noted):

- right turn lane
  - 90 km/h: 70 metre parallel lane + 75 metre taper;
  - 100 km/h: 85 metre parallel lane + 80 metre taper;
- left turn lane
  - 90 km/h: 15 metre minimum storage + 60 metre parallel lane + 145 metre taper; and
  - 100 km/h: 15 metre minimum storage + 70 metre parallel + 160 metre taper.

In consideration of the above, the existing westbound right turn lane appears to have been designed for a 100 km/h design speed, whereas the left turn lanes reflect a 90 km/h design speed (albeit the westbound parallel length does not comply with the standards).

### **Highway 26 & Christie Beach Road**

As also illustrated in Figure 3, the intersection of Highway 26 with Christie Beach Road is a 3-leg intersection operating under stop control on Christie Beach Road (north leg). Christie Beach Road has a shared left-through-right lane, the east approach has a shared through-right lane and the west approach has a left turn lane and a through lane. The configuration of the left turn lane is as follows:

- eastbound left turn: 90 metre storage/parallel lane + 160 metre taper (which conforms to a design speed of 100 km/h).

## **2.2 TRAFFIC VOLUMES**

### **2.2.1 Traffic Counts**

Intersection turning movement counts were completed at the intersections of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line and with Christie Beach Road for purposes of this study – completed on Wednesday December 9 and Thursday December 10, 2020. Given the time of year, the volumes are reflective of winter conditions. It is acknowledged that the counts were completed



during the Covid-19 pandemic. However, the province wide lock-down was not initiated until December 26, 2020 and during the time of the traffic counts, Grey County was in the Yellow classification.

To address potential concerns with respect to the timing of the traffic counts and subsequent uncertainties with respect to implications to travel patterns and the adjustments/factors necessary to reflect typical conditions, an additional traffic count was completed at the Lora Bay Drive/11<sup>th</sup> Line intersection on Tuesday September 14, 2021 (PM peak hour) and Wednesday September 15, 2021 (AM peak hour).

The 2020 traffic counts are illustrated in Figure 4 whereas the 2021 traffic counts are illustrated in Figure 5; the associated count data is provided in Appendix A.

### 2.2.2 Adjustments & Factors

#### 2020 vs 2021 Volumes

In comparing the 2020 and 2021 traffic volumes at the intersection of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line, the following are noted:

- on Highway 26, the through volumes during the AM peak hour volumes observed in 2021 are approximately 15% greater than the 2020 volumes, whereas the PM peak hour volumes are near identical; and
- on Lora Bay Drive, the 2021 volumes are 10 to 115% greater, which is likely attributed to the increased residential activity and more so increased golf activity (seeing as the 2021 counts were completed in September and the 2020 counts in December).

To reflect the most current and greatest traffic volumes, and eliminate uncertainties with respect to Covid-19 implications, the September 2021 traffic volumes have been carried forward at the intersection of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line. Furthermore, the Highway 26 volumes will be extended westerly through the Christie Beach Road intersection to ensure the most appropriate representation at that intersection also (there are limited intersections or driveways between the noted intersections and hence volumes are expected to be comparable at both). Recognizing that the volumes to/from Christie Beach Road were collected in December 2020, they have been increased further by 15% reflective of the increases realized on Highway 26. (both AM and PM peak hour volumes have been increased to be conservative)

#### Covid-19

Given that the most recent counts were completed in September 2021, at which time area attractions and businesses were in full operations with nominal restrictions, no adjustments or factors to consider Covid-19 implications on travel have been considered.



### Average vs Summer vs Winter Conditions

Given that the 2021 traffic counts were undertaken in September, which is considered representative of average conditions, consideration has also been given to adjustments to reflect summer conditions, assuming such are the peak given the recreational nature of the area.

A summary of MTO published traffic data for the section of Highway 26 through Thornbury is provided in Table 1 for the most current 5 year period (latest published data is from 2019), considering:

- Average Annual Daily Traffic (AADT);
- Summer Average Annual Traffic (SADT); and
- Winter Average Daily Traffic (WADT).

**Table 1: Highway 26 Traffic Volumes – MTO Traffic Data**

YEAR	AADT	SADT	WADT	$\frac{SADT}{AADT}$	$\frac{SADT}{WADT}$
2014	6900	6900	6550	1.00	1.05
2015	6750	6750	6400	1.00	1.05
2016	6800	6800	6450	1.00	1.05
2017	6900	6850	6600	0.99	1.04
2018	6950	6900	6650	0.99	1.04
2019	7000	6900	6750	0.99	1.02
<b>Average</b>				<b>1.00</b>	<b>1.04</b>

As noted, the published summer volumes (SADT) are comparable to the average volumes (AADT), whereas both the average and summer volumes are 2 to 5% greater than the winter volumes. In this regard, no adjustments to reflect peak summer conditions are considered necessary.

### Annual Growth

Recognizing that the counts were conducted in 2020 and 2021, they have been factored to reflect 2023 conditions. As further discussed in Section 3.2.1, an annual growth rate of 2% has been assumed on Highway 26 and 1% on Lora Bay Drive, 11<sup>th</sup> Line and Christie Beach Road.



## Development Growth

There have been several active developments that have advanced over the period 2021 to 2023. Given the time of the noted traffic counts (2020 and 2021), the resulting traffic volumes do not reflect completion and occupancy of these developments. Rather than further adjust the traffic count volumes to account for such within the existing conditions horizon, they have been considered as part of the background growth as further detailed in Section 3.2.1.

### 2.2.3 2023 Traffic Volumes

The 2023 peak hour traffic volumes considered in this assessment therefore reflect the volumes as obtained through the traffic counts adjusted to account for annual growth through to 2023, the results of which are illustrated in Figure 6.

## 2.3 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations (both with and without the Lora Bay Phase 4B development) can be assessed.

### 2.3.1 Intersection Operations

The capacity, and hence operations, of a road system is effectively dictated by its intersections. As such, the analysis focused on the operations of the Highway 26 intersections considering:

- the 2023 traffic volumes;
- the existing intersection configurations and controls; and
- procedures outlined in the *2000 Highway Capacity Manual*<sup>4</sup> (using Synchro v.10 software).

For unsignalized intersections, the review considers the the following metrics for the critical, stop controlled movements/approaches and also the left turn movements (either separate or shared with the through lane):

- average delay (measured in seconds);
- level of service (LOS) - level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (level of service definitions are provided in Appendix B); and
- volume to capacity (v/c) ratios - a v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

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<sup>4</sup> *Highway Capacity Manual*. Transportation Research Board, Washington DC, 2000.



A summary of the 2023 intersection analyses is provided in Table 2, whereas detailed worksheets are included in Appendix C. Based on the existing volumes, intersection configurations and controls, the study area intersections provide acceptable levels of service (LOS D or better) during both peak hours. As such, no intersection improvements are required to support the existing intersection traffic operations.

**Table 2: Intersection Operations – 2023**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Stop	SB LTR	19	C	0.23	28	D	0.47
	Stop	NB LTR	15	C	0.04	15	C	0.06
Highway 26 & Christie Beach Rd	Stop	SB LTR	13	B	0.05	15	B	0.15
L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right								

### 2.3.2 Road Operations

Further to the intersection operations, consideration has also been given to the road operations employing the road capacities as previously noted, and the 2023 traffic volumes, as summarized in Table 3:

**Table 3: Road Operations – 2023**

ROAD SECTION & CAPACITY		PEAK TRAFFIC VOLUMES		PEAK V/C RATIOS	
		WB/SB	EB/NB	WB/SB	EB/NB
Highway 26 east of Lora Bay Drive	900 vphpl	490	420	0.54	0.47
Highway 26 Lora Bay Drive to Christie Beach Road	900 vphpl	465	385	0.52	0.43
Highway 26 west of Christie Beach Road	900 vphpl	475	395	0.53	0.44
Lora Bay Drive	600 vphpl	125	85	0.21	0.14
Christie Beach Road	600 vphpl	(60)	45	0.10	0.08



As noted:

- Highway 26 is operating at 54% or less of its capacity;
- Lora Bay Drive is operating at 21% or less of its capacity; and
- Christie Beach Road is operating at 10% or less of its capacity.

In all cases, there is significant reserve capacity remaining to accommodate future growth (and any further increases in 2023 volumes beyond the levels projected).

## **2.4 ROAD NETWORK IMPROVEMENTS**

Based on the results of the existing intersection and road operations, no improvements to the existing road network are considered necessary.



## 3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2025, 2030 and 2035. The 2025 horizon year has been adopted to reflect full build-out of Lora Bay Phase 4B, whereas the 2030 and 2035 horizons will address the longer-term impacts (5 and 10 years beyond build-out) as required to address MTO TIS requirements.

### 3.1 ROAD NETWORK

While the *Highway 26 Transportation Study*<sup>5</sup> identifies a number of possible road system improvements (including a widening of Highway 26 to 4 lanes west of Thornbury and the provision of a Thornbury bypass that would reconnect to Highway 26 in the area of Christie Beach Road to 11<sup>th</sup> Line), they are subject to further study and thus not likely to occur within the planning horizons considered for this study. In this regard, the existing road system as described in Section 2.1 has been maintained.

### 3.2 TRAFFIC VOLUMES

Background traffic volumes expected for the 2025, 2030 and 2035 horizon years have been determined based on the existing traffic volumes, historical and projected growth, and consideration for other development specific traffic volumes.

#### 3.2.1 Background Growth

##### Population Growth

Based on the Census data for the years 2011, 2016 and 2021, the population of the Town of The Blue Mountains increased from 6,453 to 7,025 to 9,390 persons, which translates to an annual growth of 3.8% over the 10 year period.

As per the *Grey County Growth Management Strategy Update*<sup>6</sup>, the Town's population was expected to increase from 7,010 in 2016 (slightly less than the census data) to 8,320 by 2031, 8,660 by 2036 and 8,910 by 2041, reflective of an annual growth of 1.1%. However, in comparison to the most recent 2021 census population, all of the noted population projections are less than the current population suggesting that such are no longer applicable. For the Municipality of

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<sup>5</sup> *Highway 26 Transportation Study, Needs Assessment Report Volume 1: Main Report*. AECOM, May 2015 (Revised October 2015).

<sup>6</sup> *Growth Management Strategy Update*, Hemson Consulting Ltd. December 15, 2015.





Meaford, recognizing it is located immediately to the west of the Lora Bay Development, a growth of 0.6% per year is anticipated citing the noted report.

The *Highway 26 Transportation Study* also noted that seasonal residential units within the Town of The Blue Mountains are expected to increase from 2,680 units in 2006 to 5,515 units in 2031, realizing an annual growth of 4.9%

### Traffic Growth

Historical Average Annual Daily Traffic (AADT) and Summer Average Daily Traffic (SADT) volumes on Highway 26 between Thornbury and Meaford were reviewed as reported by MTO for the period 2014 to 2019 (the most current 5-year published period) and summarized in Table 4. The resulting annual growth rate for the 5-year period is relatively minor (less than 1%)

**Table 4: Historical Traffic Volumes**

ROAD SECTION		ANNUAL TRAFFIC VOLUME						ANNUAL GROWTH
		2014	2015	2016	2017	2018	2019	
Highway 26 From Peel Street to Meaford East Limit	AADT	6900	6750	6800	6900	6950	7000	0.3%
	SADT	6900	6750	6800	6850	6900	6900	0.0%

### Other Studies

The *Highway 26 Transportation Study* provides future travel demand forecasts for Highway 26 extending from east of Stayner to west of Thornbury. Through Thornbury, a 2.0% annual growth is anticipated over the period 2010 through to 2035.

### Overall Background Growth

To maintain consistency with the previously completed *Highway 26 Transportation Study*, a 2% annual growth rate has been assumed on Highway 26 to represent background growth. For Lora Bay Drive, 11<sup>th</sup> Line and Christie Beach Road, a 1% annual growth has been assumed recognizing that continued development in the immediate area will be addressed separately.

#### 3.2.2 Development Growth

Further to the historical growth in traffic volumes and anticipated population growth in the area, consideration has been given to a number of area developments that are expected to increase traffic volumes through the study area, as detailed below and illustrated in Figure 7.



#### Lora Bay Phase 4

Details with respect to the Lora Bay Phase 4 land uses, development levels and traffic volumes were determined from the *Traffic Opinion Letter Phase 4 Lora Bay Residential Development* as follows:

- 38 single family detached dwellings; and
- 36 units within three 4-storey mid-rise buildings.

Access to Phase 4 is provided via Lora Bay Drive and West Ridge Drive. The Lora Bay Phase 4 traffic volumes through the study area are illustrated in Figure 8 as referenced from the noted report.

#### Cottages at Lora Bay

The Cottages at Lora Bay is a residential development located at the intersection of 39<sup>th</sup> Sideroad and Sunset Boulevard. The property was formerly a trailer park community and is being redeveloped to include a total of 194 single dwelling residential condominium units set amongst green space corridors that link to a centrally located recreational facility and the adjacent waterfront. Phases 1 through 3, consisting of approximately 107 units, have been completed and hence captured in the completed traffic counts; Phases 4, 5 and 6 (87 units) were undeveloped at the time of the traffic counts and thus have been further considered.

Trip estimates for Phases 4, 5 and 6 have been prepared based on ITE trip generation rates for single detached residential units, as summarized in Table 5.

**Table 5: Trip Generation - Cottages at Lora Bay**

TRIP ELEMENT	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
Single detached trip rates	trips/unit	0.18	0.52	0.70	0.59	0.35	0.94
Single detached units	87 units	16	45	61	52	30	82

The Cottages at Lora Bay trips were assigned to Christie Beach Road, Lora Bay Drive and through their respective intersections with Highway 26 in consideration of travel patterns/demands evident through the traffic counts, the results of which are illustrated in Figure 9. For travel to/from the west, trips are expected to use Christie Beach Road, whereas for travel to/from the east, they are assumed to use Lora Bay Drive.



## 207484 Highway 26

This project (which is now complete but not captured in the traffic counts), located just east of 11<sup>th</sup> Line on the south side of Highway 26, was for the rezoning of the former Black Angus Meats site to allow for a contractor's yard use. The traffic volumes through the study area have been determined from the respective traffic study<sup>7</sup> and are illustrated in Figure 10.

## Parkbridge Meaford

The Parkbridge Meaford development is located immediately north of Highway 26 and west of Christie Beach Road in the Municipality of Meaford. As per the project's website, a number of public engagement and consultation events have occurred, albeit no development specific details were provided. In this regard, the development is considered to be in the early proposal stages and thus has not been considered in context of this study in that development details (type of land use, number of units, phasing and timelines) have not been identified. Furthermore, this development is not identified on the Municipality's Development Status Map (a mapping of all current development applications within the Municipality).

## Meaford Highlands Resort

Meaford Highlands Resort is located on the south side of Highway 26, just west of Christie Beach Road and opposite Parkbridge Meaford, in the Municipality of Meaford. As per the *Meaford Highlands Resort Market Demand Analysis*<sup>8</sup>, the development is to consist of:

- 674 single family residential units;
- 84 medium density resort residential units (townhomes);
- 312 medium/high-density resort residential units (resort villas);
- a 9-hole golf course and related facilities (club house and golf training facility);
- a 60 room hotel; and
- 4,900 m<sup>2</sup> of commercial/retail (including a wellness centre/spa and aquatics centre).

As per the development's traffic study<sup>9</sup>, the development is expected to generate 411 trips during the AM peak hour and 613 trips during the PM peak hour, as summarized in Table 6 (note: the residential unit counts differ slightly from what was noted in the *Market Demand Analysis*). For the retail uses, such are considered ancillary to other uses and/or would cater to the

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<sup>7</sup> 207484 Highway 26 Traffic Impact Brief. Tatham Engineering, October 8, 2021.

<sup>8</sup> Meaford Highlands Resort Market Demand Analysis. Watson & Associates Economists Ltd., May 23, 2012.

<sup>9</sup> Meaford Highlands Resort Transportation Study. Cole Engineering, May 2012.



development alone and thus would not generate new traffic (as per the traffic study) to the external road system.

**Table 6: Trip Generation – Meaford Highlands Resort**

TRIP ELEMENT	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
Single Family Units	170 units	37	111	148	119	69	188
Residential Townhouses	44 units	6	28	34	25	12	37
Recreation Homes	863 units	92	45	137	93	132	225
Golf Course	9 holes	16	4	20	11	14	25
Resort Hotel	60 rooms	17	11	28	11	14	25
Aquatics & Fitness Centre	32,000 ft <sup>2</sup>	11	33	44	64	49	113
Retail	20,000 ft <sup>2</sup>	-	-	-	-	-	-
<b>Total</b>		<b>179</b>	<b>232</b>	<b>411</b>	<b>323</b>	<b>290</b>	<b>613</b>

With respect to the distribution of the site traffic to the road system, in the order of 50 to 60% was identified as being oriented to/from the east via Highway 26 and thus would pass the Lora Bay development, resulting in 88 to 185 additional trips per direction during the peak hours, as illustrated in Figure 11.

At the time of the 2012 *Market Demand Analysis*, the development was slated to be completed over the period 2015 to 2040. However, as per the Municipality's Development Status Map, there is no acknowledgment of the development and thus it has not been considered for this study.

### 3.2.3 Background Traffic Volumes

Background traffic volumes (ie. prior to consideration for Lora Bay Phase 4B) for the 2025, 2030 and 2035 horizon years have been determined based on the following:

- the 2023 volumes as per Figure 6;
- the noted annual background growth rates; and
- the additional traffic volumes associated with the noted background developments, assuming the following:



- 100% build-out of Lora Bay Phase 4 prior to 2025;
- 100% build-out of Cottages at Lora Bay prior to 2025; and
- 100% build-out of the 207484 Highway 26 development prior to 2025.

The resulting background traffic volumes are illustrated in Figure 12 through Figure 14.

### 3.3 TRAFFIC OPERATIONS

#### 3.3.1 Intersection Operations

The Highway 26 intersections were again analyzed for each horizon year given the projected background volumes. The results are summarized in Table 7 through Table 9 for the respective horizon years with detailed worksheets provided in Appendix D. In each case, the existing intersection configurations and controls have been maintained.

As indicated, increased delays and hence poor levels of service (LOS F) will result at the Lora Bay/11<sup>th</sup> Line intersection during the PM peak hour of each horizon. While LOS F results in 2025, the associated delays are not considered unbearable (54 seconds) and thus improvements are recommended for the 2030 horizon (provided the traffic volumes as projected are realized). It is noted that the projected decreased levels of service and increased delays are primarily attributed to the increase in traffic volumes on Highway 26. At the Christie Beach Road intersection, acceptable operations will be provided through to 2035 and thus no improvements are required.

**Table 7: Intersection Operations - 2025 Background**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Stop	SB LTR	29	D	0.48	<b>54</b>	<b>F</b>	0.76
	Stop	NB LTR	18	C	0.10	19	C	0.13
Highway 26 & Christie Beach Rd	Stop	SB LTR	14	B	0.08	17	C	0.21
L left lane	T through lane	R right lane	LT left-through	TR through-right	LTR left-through-right			



**Table 8: Intersection Operations - 2030 Background**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Stop	SB LTR	86	E	0.57	<b>85</b>	<b>F</b>	<b>0.90</b>
	Stop	NB LTR	18	C	0.12	22	C	0.15
Highway 26 & Christie Beach Rd	Stop	SB LTR	14	B	0.09	18	C	0.23

L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right

**Table 9: Intersection Operations - 2035 Background**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Stop	SB LTR	48	E	0.65	<b>153</b>	<b>F</b>	<b>1.11</b>
	Stop	NB LTR	21	C	0.13	250	D	0.18
Highway 26 & Christie Beach Rd	Stop	SB LTR	15	C	0.11	21	C	0.27

L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right

### 3.3.2 Road Operations

Road operations were repeated for the 2035 conditions (the most critical horizon), the results of which are provided in Table 10. As noted, all of the road sections will operate well below capacity (74% or less) indicating there will remain significant reserve capacity.

### 3.4 ROAD NETWORK IMPROVEMENTS

To ensure acceptable operations for background traffic through to the 2035 horizon year and beyond, the implementation of traffic signals at the intersection of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line is recommended to serve the 2030 horizon and beyond.



**Table 10: Road Operations – 2035 Background**

ROAD SECTION & CAPACITY		PEAK TRAFFIC VOLUMES		PEAK V/C RATIOS	
		WB/SB	EB/NB	WB/SB	EB/NB
Highway 26 east of Lora Bay Drive	900 vphpl	670	580	0.74	0.64
Highway 26 Lora Bay Drive to Christie Beach Road	900 vphpl	600	500	0.67	0.56
Highway 26 west of Christie Beach Road	900 vphpl	620	515	0.69	0.57
Lora Bay Drive	600 vphpl	185	150	0.31	0.25
Christie Beach Road	600 vphpl	80	65	0.13	0.11

### 3.4.1 Traffic Signal Warrants

The technical warrants for traffic signals were reviewed, considering Justification 7: Projected Volumes from the *Ontario Traffic Manual Book 12 – Traffic Signals* and the following:

- the projected background traffic volumes;
- free-flow conditions (the operating speed along Highway 26 is in excess of 70 km/h); and
- 4-leg intersection.

The resulting traffic signal warrants are provided in Appendix E, with the results (extent to which the requirements are satisfied and the resulting warrant justification) summarized in Table 11 for each of the future horizon years. It is noted that signals are warranted if either criterion is 100% compliant or if both are 80% compliant. As indicated, the traffic signal warrants are not satisfied under the horizon periods addressed (while the volumes on Highway 26 exceed the required thresholds, those on Lora Bay Drive/11<sup>th</sup> Line do not)

**Table 11: Traffic Signal Warrants – Background**

HORIZON	MINIMUM VEHICULAR VOLUMES	DELAY TO CROSS TRAFFIC	WARRANTED
2025	65%	76%	No
2030	67%	83%	No
2035	69%	91%	No



### 3.4.2 Recommendations

While the signal warrants are not satisfied, traffic signals are nonetheless recommended to serve the Lora Bay/11<sup>th</sup> Line intersection for the 2030 horizon and beyond to ensure acceptable operations (while the projected delays in 2025 result in a level of service F, such are not unbearable (54 seconds)); further increases may result in driver frustration and acceptance of gaps in the Highway 26 traffic stream that may not be appropriate, thus increasing safety risks). Under traffic signal control, the intersection will provide good levels of service assuming the existing intersection configuration is maintained with implementation of simple phasing plans (semi-actuated control with an overall cycle length of 80 seconds). Corresponding worksheets are provided in Appendix F, with a summary of operations provided in Table 12 for the 2035 horizon year. As an appropriate level of service will be provided for the 2035 horizon year, so will they be provided for the 2030 horizon year.

**Table 12: Intersection Operations – 2035 Background + Traffic Signals**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Signal	EB L	6	A	0.06	6	A	0.13
		EB TR	10	A	0.64	7	A	0.50
		WB L	6	A	0.03	5	A	0.03
		WB T	8	A	0.52	10	A	0.67
		WB R	6	A	0.06	6	A	0.07
		NB LTR	11	B	0.07	13	B	0.08
		SB LTR	16	B	0.43	24	C	0.64
		overall	9	A	0.57	11	B	0.66
L left lane	T through lane	R right lane	LT left-through	TR through-right	LTR left-through-right			





## 4 Lora Bay Phase 4B Development

This chapter will provide additional details with respect to the Lora Bay Phase 4B development, including its location, the projected site generated traffic volumes and the assignment of such to the adjacent road network. While there remains future phases of the Lora Bay development, these will be addressed as part of a future study specific to their development.

### 4.1 LOCATION

The overall location is illustrated in Figure 1 whereas Figure 2 provides a more detailed location. As noted, Lora Bay Phase 4B is located adjacent to Lora Bay Phase 4 with access via West Ridge Drive.

### 4.2 LAND USE

Phase 4B will include the following:

- 45 single detached residential units (a reduction of 5 units as compared to the previous site plan and traffic study);
- 13 rowhouses (3 blocks of 3 and 1 block of 4); and
- 58 total units.

An overall site plan is provided in Figure 15.

### 4.3 PHASING

Full build-out of Phase 4B is assumed by 2025.

### 4.4 ACCESS

Access to Phase 4B will be via West Ridge Drive and its subsequent extension through the Phase 4 lands. Access to the external road system will be provided through the roundabout with Lora Bay Drive and via the intersection of Lora Bay Drive with Highway 26.

### 4.5 SITE CIRCULATION

The proposed internal streets will all have 20 metre rights-of-way and the road cross-sections will reflect the Town's design standard for a local road.

As evident in Figure 15 and in consideration of the configuration of the Phase 4B lands, an internal looping road system has been proposed to serve Lots 4 through 45, with horizontal curve radii of 19.25 metres measured along the centreline of the road. While it is acknowledged that the



Town standards requires a 100 metre radius for a 50 km/h design speed (appropriate for a 40 km/h posted speed), which is premised on a 2% standard road crown (ie. no superelevation), the proposed design is considered appropriate for the following reasons:

- reduced radii will result in reduced travel speeds which are favoured in a local residential environment given the focus on safety for all road users;
- the proposed road is a crescent road that will serve limited traffic volumes with limited, if any, through traffic;
- the primary road users will be residents of the proposed street and thus will be familiar with the road configuration; and
- the reduced radii allows for an increase in the number of lot frontages, thus ensuring the resulting parcel fabric is efficient and achieves the design density targets.

Further to the above, the Town standards allows for “right angle bends” for local roads configured as courts or crescents provided the local roads service 50 or fewer units (42 lots are proposed along the looping road system) and the bends are configured as follows:

- deflection angles of 80 to 120°;
- minimum inside curb radii of 15 metres (and thus centreline radii of 19.25 metres when considering an 8.5 metre local road); and
- expanded bulb as necessary to achieve minimum lot frontage.

The proposed horizontal curve adjacent to Lot 40 is configured as per the Town standard for a “right angle bend”. While the curves adjacent to Lots 36 and 45 have angles in excess of the range noted above, they otherwise employ the minimum radii as noted (expanded bulbs are not considered necessary given the broader angle of deflection). As the employed radii are otherwise acceptable when incorporated into a right angle bend, and for the reasons previously stated, the curves are considered appropriate in context of the proposed local road system.

#### **4.6 SITE PARKING**

Parking will be provided within each residential lot in accordance with the requirements of the Town (2 spaces per unit).

#### **4.7 SITE TRAFFIC**

##### **4.7.1 Trip Generation**

The number of vehicle trips to be generated by the proposed development for the weekday AM and PM peak hours has been determined based on type of use, development size and trip



generation rates as per the *ITE Trip Generation Manual, 11<sup>th</sup> Edition.*, corresponding to the following land uses:

- single family detached (ITE land use code 210); and
- single family attached (220).

The associated trip rates and trip estimates are provided in Table 13.

**Table 13: Trip Generation – Lora Bay Phase 4B**

TRIP ELEMENT	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
Single detached units	trips/unit	0.18	0.52	0.70	0.59	0.35	0.94
	45 units	8	24	32	27	16	43
Single attached units (rowhouses)	trips/unit	0.15	0.33	0.48	0.32	0.25	0.57
	13 units	2	4	6	4	3	7
<b>Total</b>	<b>63 units</b>	<b>10</b>	<b>28</b>	<b>38</b>	<b>31</b>	<b>19</b>	<b>50</b>

As noted, Phase 4B is expected to generate in the order of 38 to 50 trips during the peak hours. This is premised on the assumption that the units will be typical primary residence units as opposed to seasonal residences or recreational homes (which would generate in the order of 13 to 17 trips during the peak hours, or approximately 34% of what has otherwise been assumed).

#### 4.7.2 Trip Distribution & Assignment

The distribution of the Phase 4B trips has been developed based on traffic patterns identified through a review of the traffic count data and in consideration of the area developments and attractions. The following has been assumed:

- 20% to/from the west via Highway 26;
- 75% to/from the east via Highway 26; and
- 5% to/from the south via 11<sup>th</sup> Line.

In comparison, the previous studies for Lora Bay assumed approximately equal distribution between the west and east. The assignment of the trips generated by Phase 4B to the area road network is illustrated in Figure 16.



## 5 Future Total Conditions

This chapter will address the resulting impacts of Lora Bay Phase 4B on the adjacent road system with a focus on the following:

- operations of the study area road network;
- potential improvements to the study area road network, if necessary.

### 5.1 TRAFFIC VOLUMES

To assess the impacts of the increased traffic volumes resulting from Phase 4B, the site generated traffic was combined with the 2025, 2030 and 2035 background traffic volumes. The resulting total traffic volumes are presented in Figure 17 through Figure 19.

### 5.2 TRAFFIC OPERATIONS

#### 5.2.1 Intersection Operations

The operations of the subject intersections were again investigated considering the total traffic volumes for each horizon year. For the Lora Bay Drive/11<sup>th</sup> Line intersection, traffic signals have been assumed for the 2030 and 2035 horizons as otherwise recommended to address the background conditions. The analysis results are summarized in Table 14 through Table 16, with operational reports provided in Appendix G.

**Table 14: Intersection Operations – 2025 Total**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Stop	SB LTR	35	D	0.60	<b>71</b>	<b>F</b>	0.86
	Stop	NB LTR	18	C	0.10	20	C	0.14
Highway 26 & Christie Beach Rd	Stop	SB LTR	14	B	0.08	17	C	0.21

L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right



**Table 15: Intersection Operations – 2030 Total**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Signal	EB L	6	A	0.08	6	A	0.13
		EB TR	9	A	0.61	7	A	0.47
		WB L	6	A	0.03	6	A	0.02
		WB T	8	A	0.49	9	A	0.64
		WB R	6	A	0.06	6	A	0.09
		NB LTR	10	B	0.07	12	B	0.08
		SB LTR	17	B	0.52	24	C	0.66
		overall	10	B	0.57	11	B	0.65
Highway 26 & Christie Beach Rd	Stop	SB LTR	14	B	0.09	19	C	0.24
L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right								

**Table 16: Intersection Operations – 2035 Total**

INTERSECTION, CONTROL & MOVEMENT			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	Signal	EB L	6	A	0.08	6	A	0.14
		EB TR	10	A	0.64	7	A	0.49
		WB L	6	A	0.03	5	A	0.03
		WB T	8	A	0.52	10	A	0.67
		WB R	6	A	0.06	6	A	0.09
		NB LTR	11	B	0.07	13	B	0.08
		SB LTR	18	B	0.54	28	C	0.71
		overall	10	B	0.60	11	B	0.68
Highway 26 & Christie Beach Rd	Stop	SB LTR	15	C	0.11	21	C	0.27
L left lane    T through lane    R right lane    LT left-through    TR through-right    LTR left-through-right								



As indicated, the intersection of Lora Bay Drive/11<sup>th</sup> Line with Highway 26 will provide acceptable operations during the 2025 AM peak hour (under stop control), and during the 2030 and 2035 peak hours (under signal control). As with the 2025 background conditions, a level of service F is projected during the 2025 PM peak hour, resulting from the increased delays for southbound travel (from Lora Bay Drive to Highway 26). The associated delay is expected to increase from 54 seconds under the background conditions to 71 seconds with consideration for Lora Bay Phase 4B. Given the width of the Lora Bay approach, it is possible for 2 vehicles to operate simultaneously upon approach to Highway 26 (ie. should a vehicle be waiting to complete a through or left turn movement, a right turning vehicle can proceed at the same time). Under this operating arrangement, the delays will be reduced to 55 seconds. In consideration of this, and recognizing that the increased delays will be limited to the PM peak hour, no further improvements are recommended to support the 2025 horizon.

The intersection of Christie Beach Road with Highway 26 will continue to operate at acceptable levels under all horizons (stop control maintained) and thus no improvements are warranted at this intersection.

### 5.2.2 Road Operations

Road operations for the 2035 total conditions are summarized in Table 17, with the results being comparable to those of the background conditions.

**Table 17: Road Operations – 2035 Total**

ROAD SECTION & CAPACITY		PEAK TRAFFIC VOLUMES		PEAK V/C RATIOS	
		WB/SB	EB/NB	WB/SB	EB/NB
Highway 26 east of Lora Bay Drive	900 vphpl	695	605	0.77	0.67
Highway 26 Lora Bay Drive to Christie Beach Road	900 vphpl	600	505	0.67	0.56
Highway 26 west of Christie Beach Road	900 vphpl	620	520	0.69	0.58
Lora Bay Drive	600 vphpl	195	180	0.33	0.30
Christie Beach Road	600 vphpl	80	65	0.13	0.11

### 5.2.3 Turn Lane Requirements

While there are currently left and right turn lanes on Highway 26 at Lora Bay Drive (the means of access to Lora Bay Phase 4B), such have been reviewed in consideration of their configuration



and their ability to accommodate traffic queues associated with the future traffic volumes. A review of SimTraffic queue operations (which is considered more appropriate for queue analysis than Synchro and reflects the average of 5 model runs) for the 2035 peak hour operations (the most critical scenario), provides the queue lengths noted in Table 18 (the 95<sup>th</sup> percentile queue will only be exceeded 5% of the time). As indicated, the anticipated left and right turn queues on Highway 26 can be readily accommodated within the existing turn lanes.

**Table 18: Queue Operations – 2035 Total**

INTERSECTION, CONTROL & MOVEMENT		LANE LENGTH	AM PEAK HOUR QUEUE LENGTH		PM PEAK HOUR QUEUE LENGTH	
			50 <sup>th</sup>	95 <sup>th</sup>	50 <sup>th</sup>	95 <sup>th</sup>
Highway 26 & Lora Bay Drive / 11 <sup>th</sup> Line	WB right	90 m	7 m	16 m	9 m	18 m
	WB left	30 m	2 m	10 m	2 m	11 m
	EB left	105 m	5 m	15 m	7 m	17 m

### 5.3 SIGHT LINE ANALYSIS

Notwithstanding that both subject intersections are existing intersections, the sight lines available along Highway 26 have nonetheless been reviewed. Similarly, those along Lora Bay Drive at West Ridge Drive, which will provide access to Lora Bay Phase 4B, have also been considered. The sight line analysis has considered both minimum stopping sight distance and intersection sight distance as per Transportation Association of Canada (TAC) guidelines and defined below.

- Minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a hazard in the road and bring their vehicle to a complete stop prior to the hazard.
- Intersection sight distance allows a vehicle to enter a main road from a side street (or site access) and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

The corresponding sight distance requirements are provided in Table 19 for a speed limit of 80 km/h (design speed of 100 km/h) on Highway 26 and a speed limit of 50 km/h (design speed of 60 km/h) on Lora Bay Drive. Similarly, the available sight distances are also noted (and further evident in the photos of Figure 20). In all cases, the available sight distances exceed the minimum stopping sight distance and the intersection sight distance requirements and thus the available sight distances are considered appropriate. It is also noted that as there is a roundabout at the intersection of West Ridge Drive and Lora Bay Drive, vehicle speeds will be much less than the posted speed and vehicles need only see other vehicles approaching from the left (as all vehicles



must travel in a counter clockwise direction through the roundabout and all approaching motorists must yield to those in the roundabout).

**Table 19: Sight Line Assessment**

INTERSECTION	DESIGN SPEED	STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE		SIGHT DISTANCE TO/FROM	
			Left Turn	Right Turn	West/North	East/South
Lora Bay Drive/ 11 <sup>th</sup> Line	100 km/h	185 m	210 m	185 m	>300 m	>300 m
Christie Beach Road	100 km/h	185 m	210 m	185 m	>300 m	>300 m
West Ridge Dr	60 km/h	85 m	130 m	110 m	>110 m	>110 m

#### 5.4 ROAD NETWORK IMPROVEMENTS

Other than the traffic signals recommended for the intersection of Highway 26 and Lora Bay Drive/11<sup>th</sup> Line to address background conditions prior to Lora Bay Phase 4B, no further improvements are considered necessary to support the Lora Bay Phase 4 B development.





## 6 Summary

### 6.1 PROPOSED DEVELOPMENT

This study has addressed the transportation impacts associated with the proposed Lora Bay Phase 4B development located in the Town of The Blue Mountains. Phase 4B will consist of a total of 58 residential units (45 single detached units and 13 rowhouse units). Overall, it is expected to generate 38 new trips during the AM peak hour and 50 new trips during the PM peak hour upon build-out.

### 6.2 TRANSPORTATION ASSESSMENT

In addressing the study area traffic operations, the intersections of Highway 26 with Lora Bay Drive/11<sup>th</sup> Line and Christie Beach Road were analysed under existing (2023) and future (2025, 2030 and 2035) horizon periods. The review included an assessment of intersection operations, a review of exclusive turn lane requirements and a review of the lane capacities on the subject road sections. Based on the assessment of existing, background (without Lora Bay Phase 4B) and total (with Lora Bay Phase 4B) conditions, the following improvements are recommended:

- 2025 Background & Total Conditions
  - while a level of service F will result at the Lora Bay/11<sup>th</sup> Line intersection with Highway 26 during the PM peak hour, the delays are not considered unbearable and thus no improvements have been identified
- 2030 Background Conditions
  - install traffic signals to serve the Lora Bay/11<sup>th</sup> Line intersection with Highway 26 (signals should be in place to serve the 2030 horizon)
- 2030 Total Conditions
  - no further requirements beyond those required under 2030 background conditions
- 2035 Background & Total Conditions
  - no further requirements

It is noted that traffic signals were recommended at this intersection within the initial Lora Bay traffic impact study prepared in 2004. They remain required in response to increased traffic volumes on Highway 26 and are not otherwise precipitated by the Lora Bay Phase 4B development. It is recommended that the traffic volumes and operations be monitored and the need for traffic signal control be confirmed following completion of Lora Bay Phase 4B.



The existing left turn lanes on Highway 26 at Lora Bay Drive/11<sup>th</sup> Line and Christie Beach Road are of sufficient length to accommodate the projected traffic queues through to the 2035 horizon year. Similarly, the existing right turn lane on Highway 26 at Lora Bay Drive is also considered appropriate. In this regard, no modifications to the existing turn lanes are considered necessary.

While it is often desired to provide exclusive turn lanes on the side street at signalized intersections to maximize the effectiveness of the traffic signals and minimize overall delays, such is not considered necessary on Lora Bay Drive given the limited traffic volumes (in the order of 165 to 200 southbound vehicles during the peak hours, which equates to approximately 3 to 4 vehicles per minute) and the increased approach width and radii at the highway (which would accommodate a queued through or left turning vehicle and still allow a right turning vehicle to proceed on a red light).

### **6.3 SIGHT LINES**

The available sight lines along Highway 26 at the subject intersections and along Lora Bay Drive at West Ridge Drive (which will provide access to Phase 4B) are appropriate and thus no improvements are required necessary.

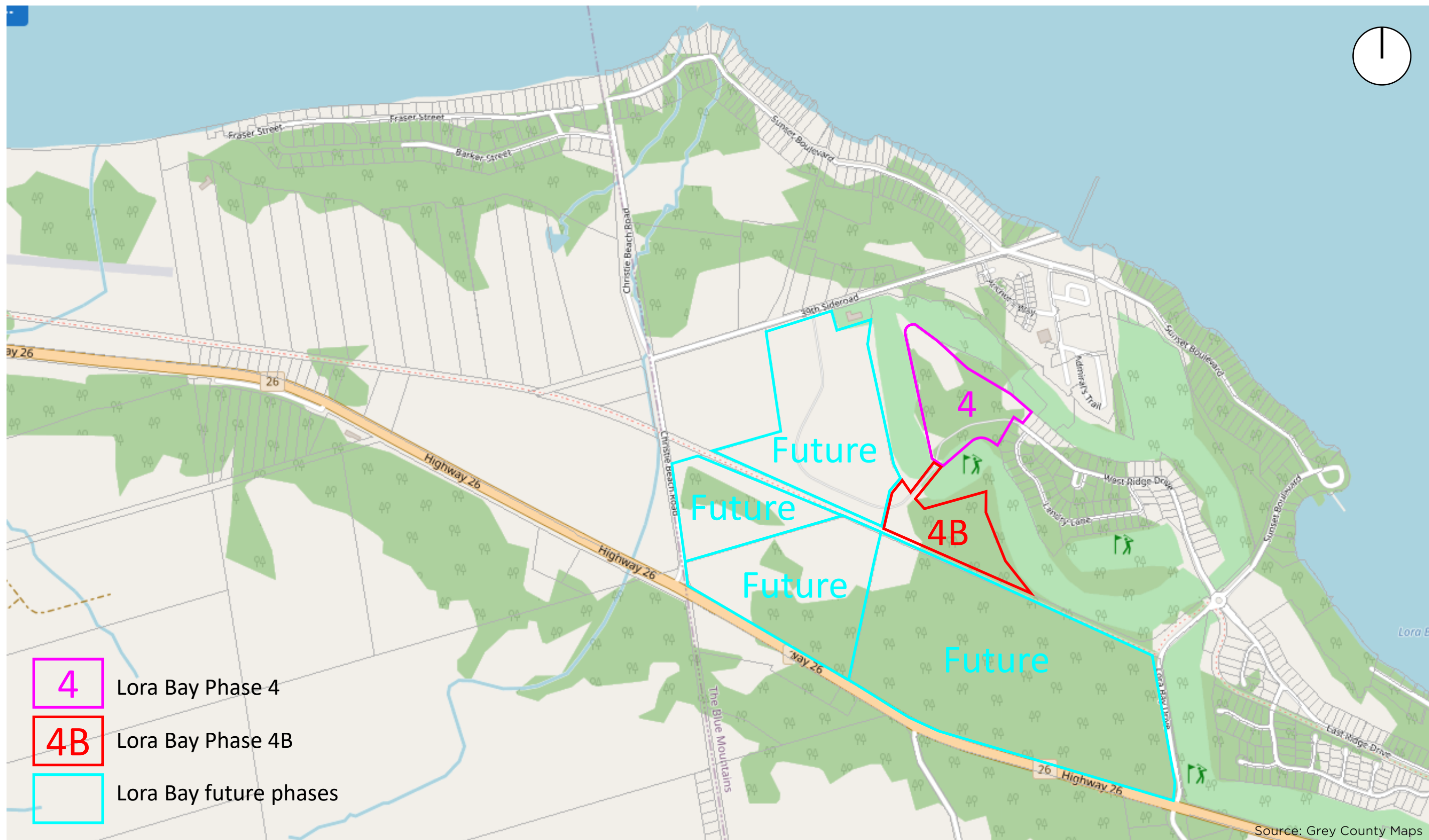




**LORA BAY DEVELOPMENT - PHASE 4B**

Figure 1: Site Location





## LORA BAY DEVELOPMENT - PHASE 4B

Figure 2A: Area Road Network





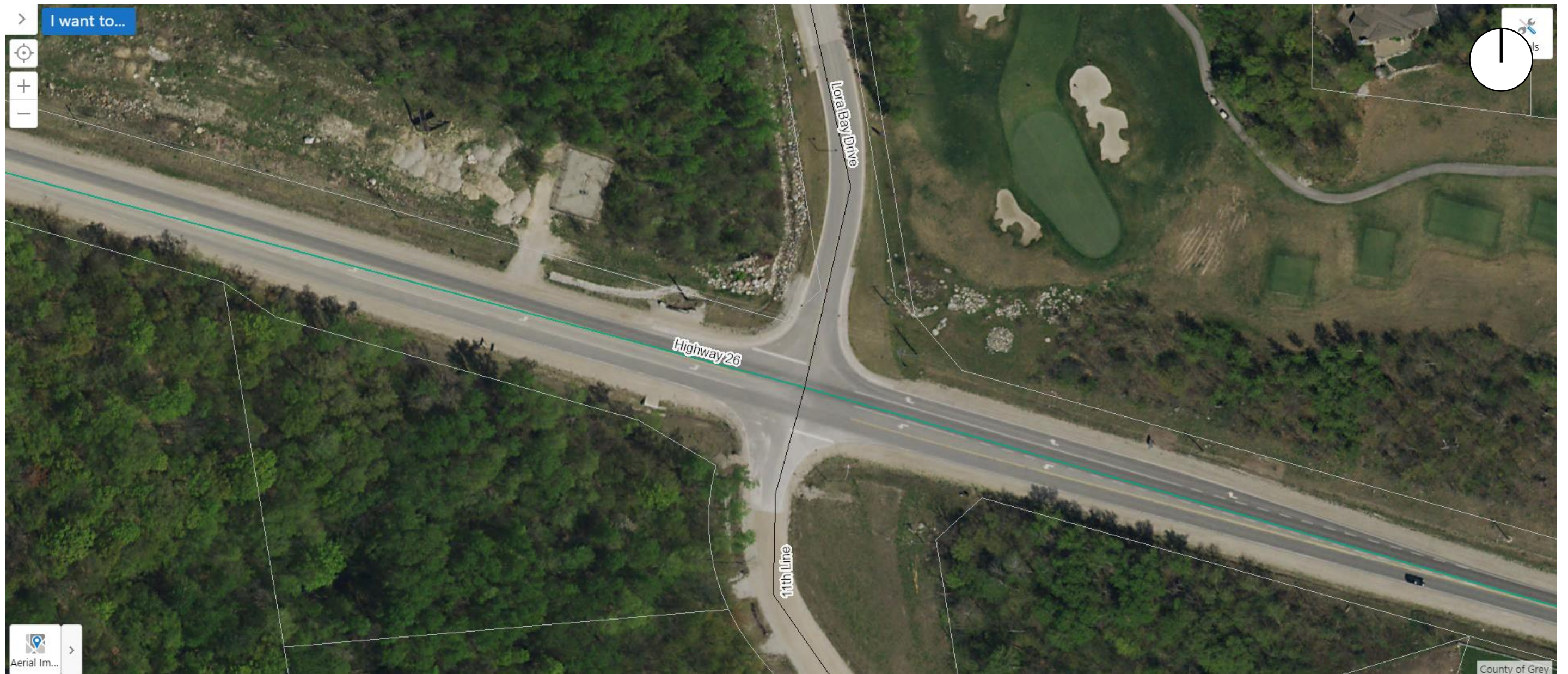


# **LORA BAY DEVELOPMENT - PHASE 4B**

Figure 2B: Area Road Network







Looking W on Highway 26



Looking N on Lora Bay Drive



Looking E on Highway 26

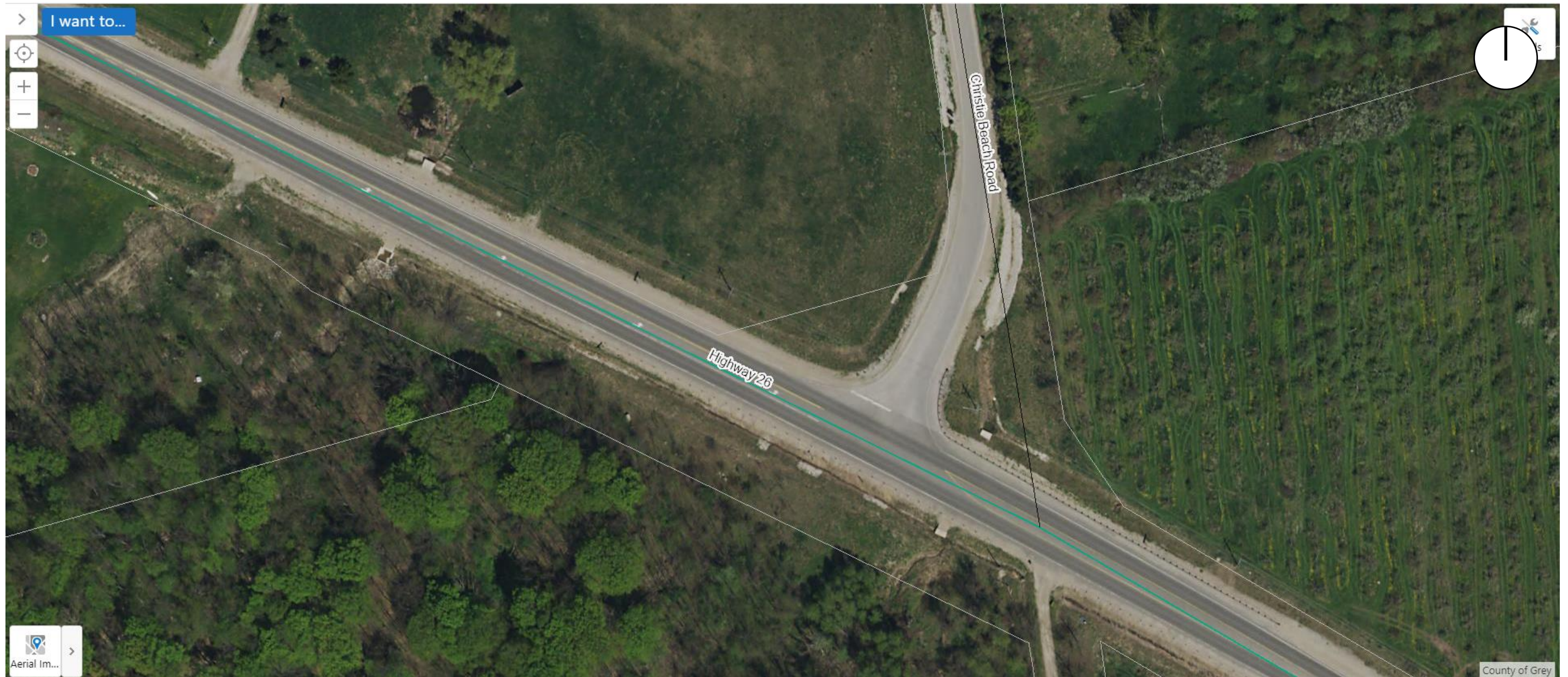


## LORA BAY DEVELOPMENT - PHASE 4B

Figure 3A: Area Intersections - Highway 26 & Lora Bay Drive/11<sup>th</sup> Line







Looking W on Highway 26



Looking N on Christie Beach Road



Looking E on Highway 26



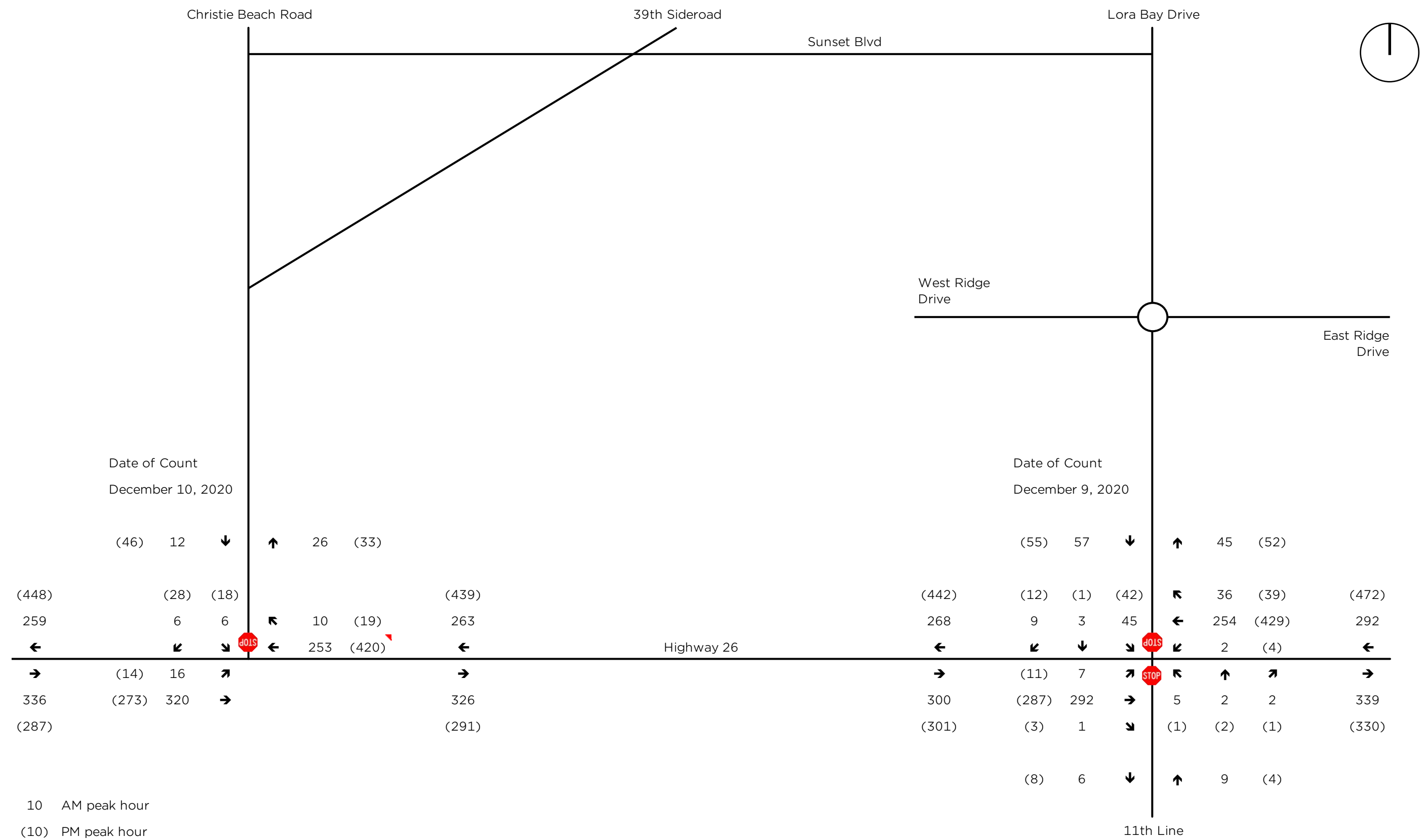
Source: Google Maps

## LORA BAY DEVELOPMENT - PHASE 4B

Figure 3B: Area Intersections - Highway 26 & Christie Beach Road



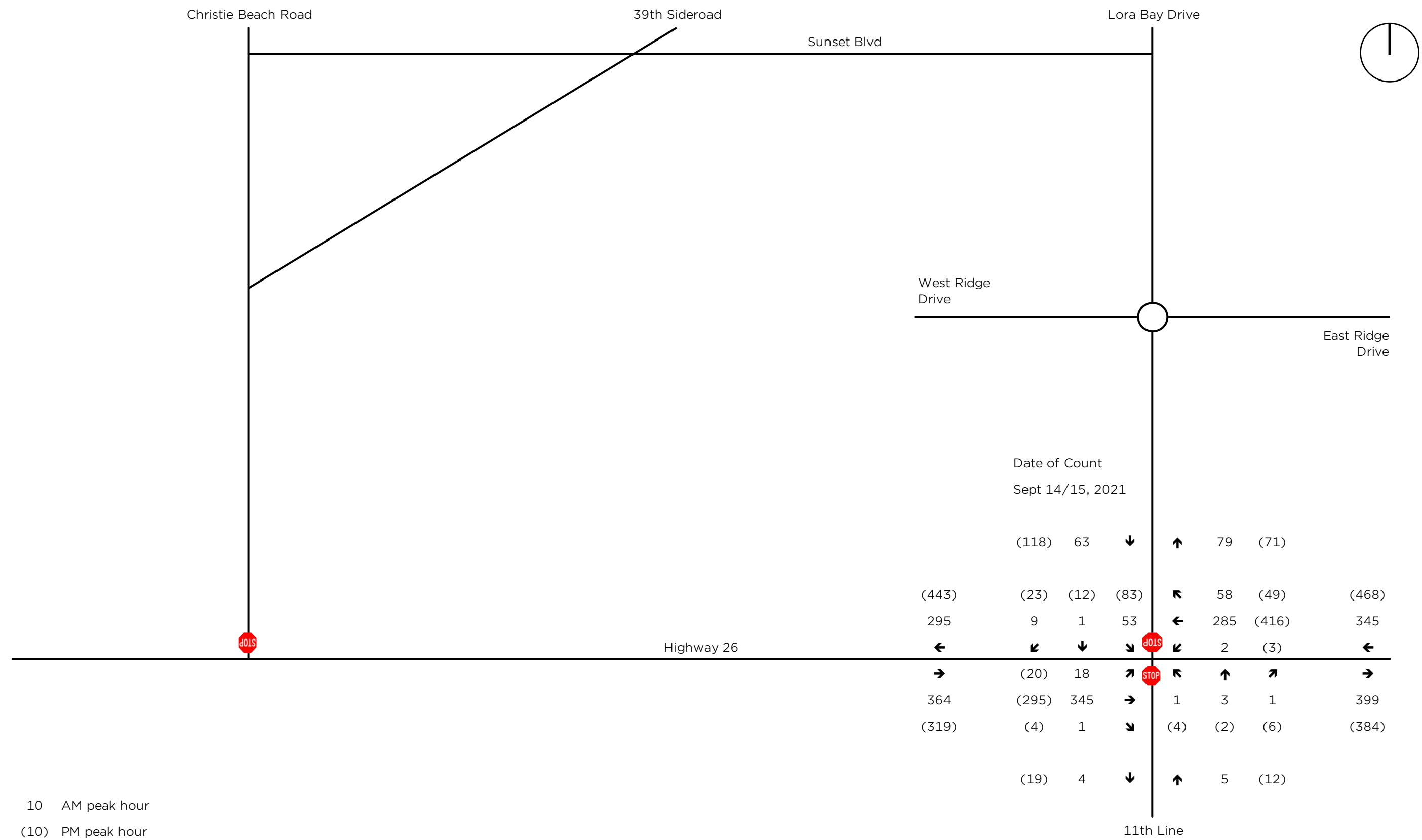




**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 4: Traffic Counts - 2020



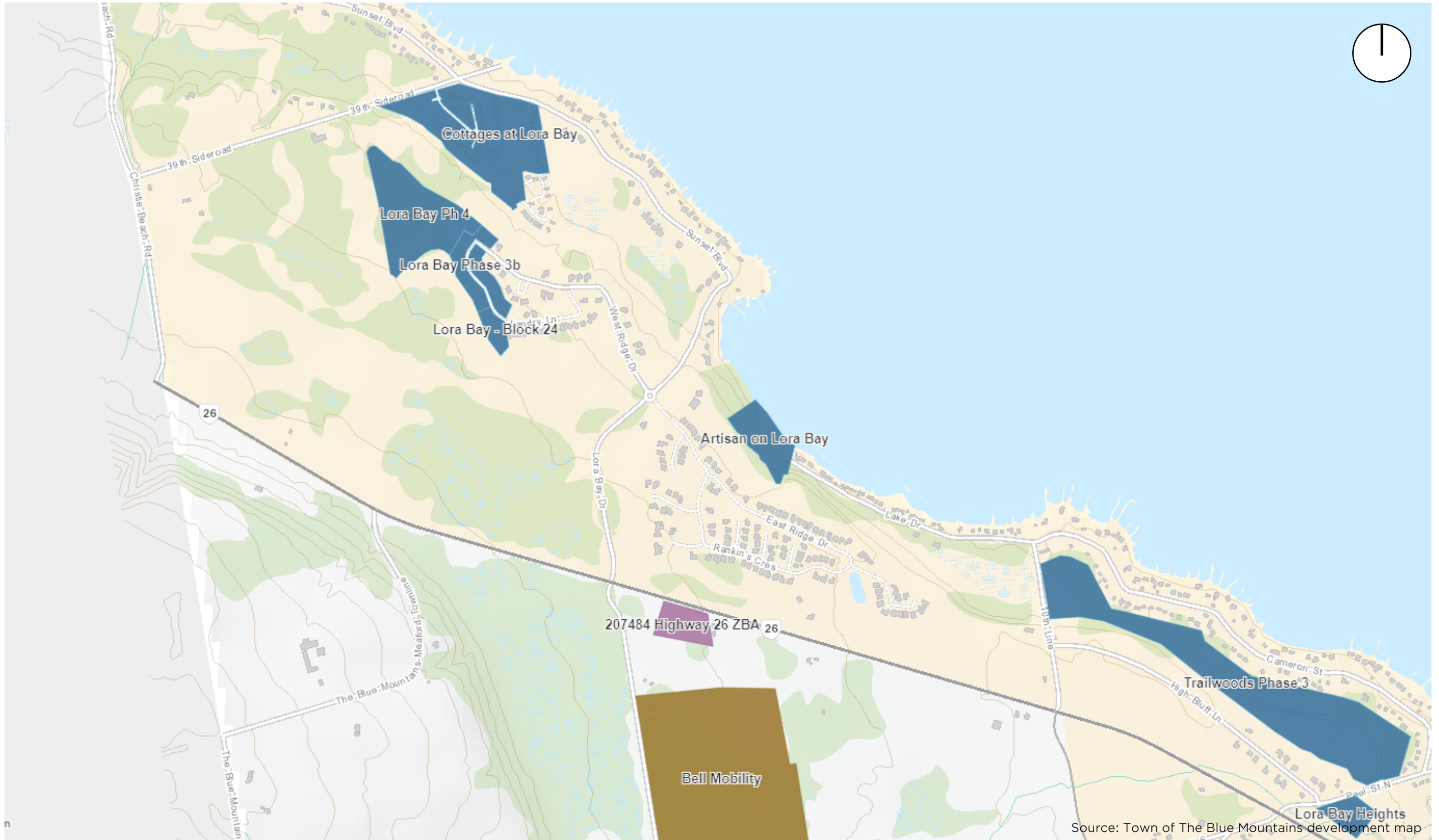




**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 5: Traffic Counts - 2021





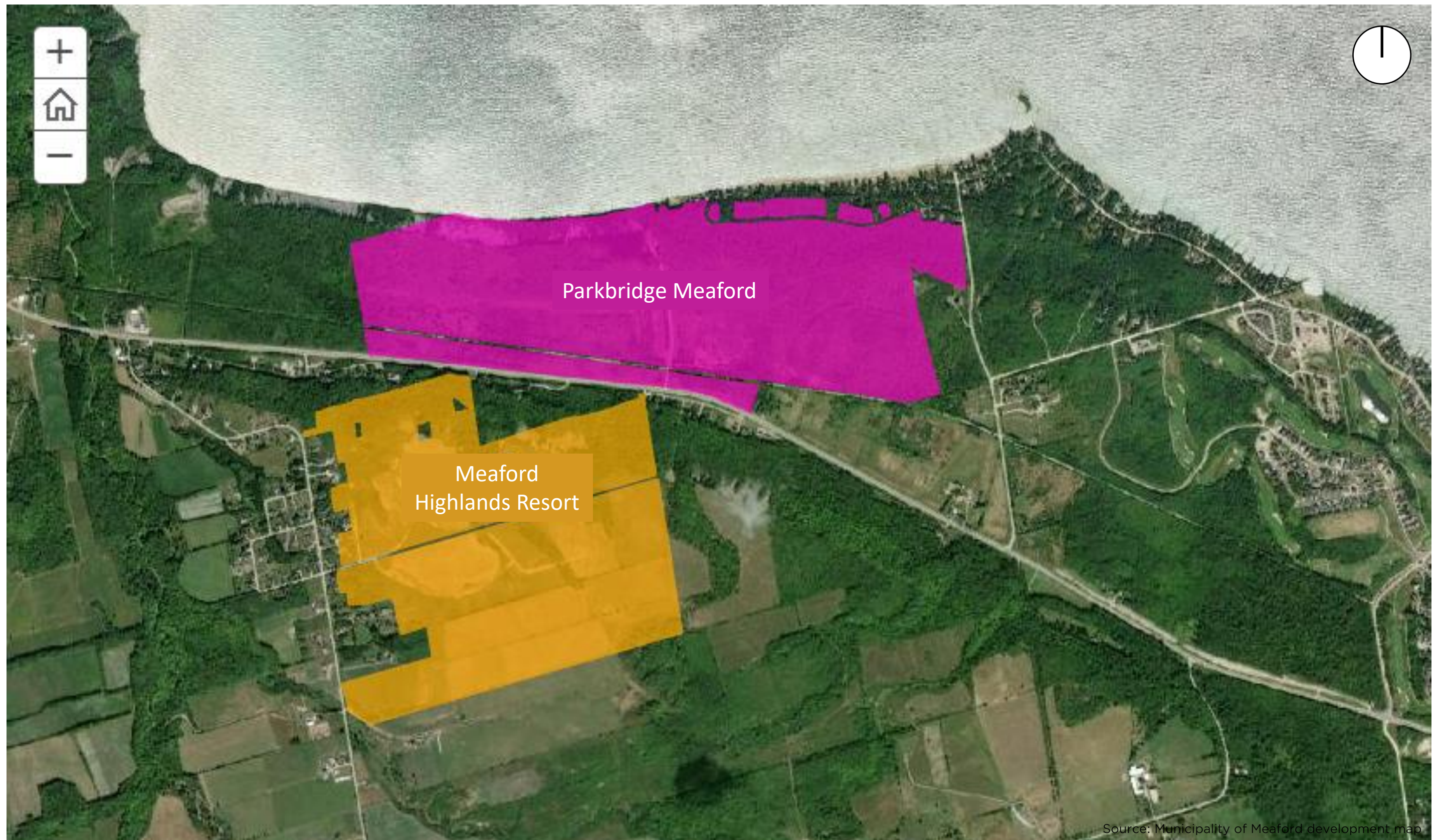


**LORA BAY DEVELOPMENT - PHASE 4B**

Figure 7A: Area Developments - Town of The Blue Mountains







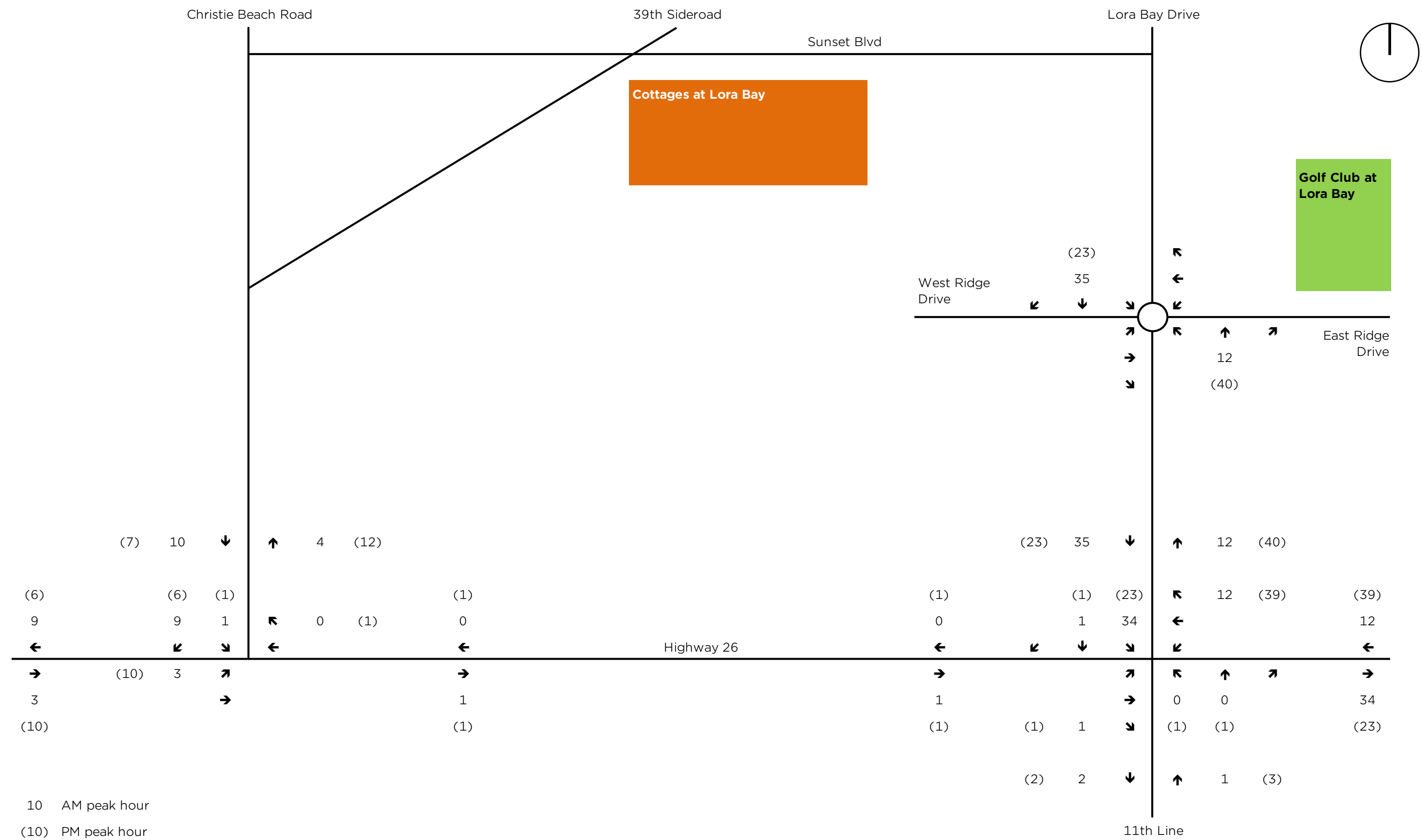
**LORA BAY DEVELOPMENT - PHASE 4B**

Figure 7B: Area Developments - Meaford



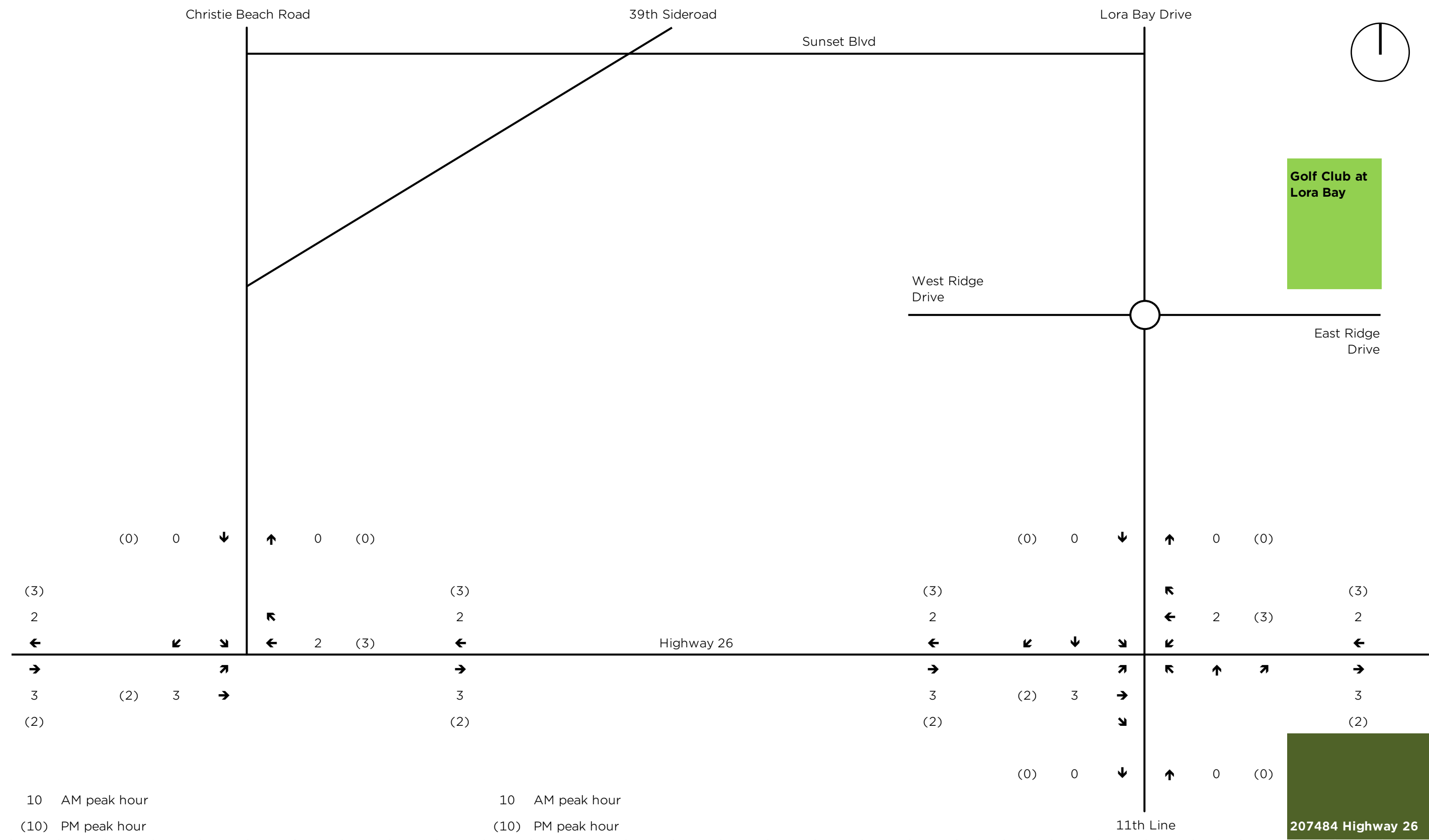






**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 9: Area Developments Traffic Volumes - Cottages at Lora Bay

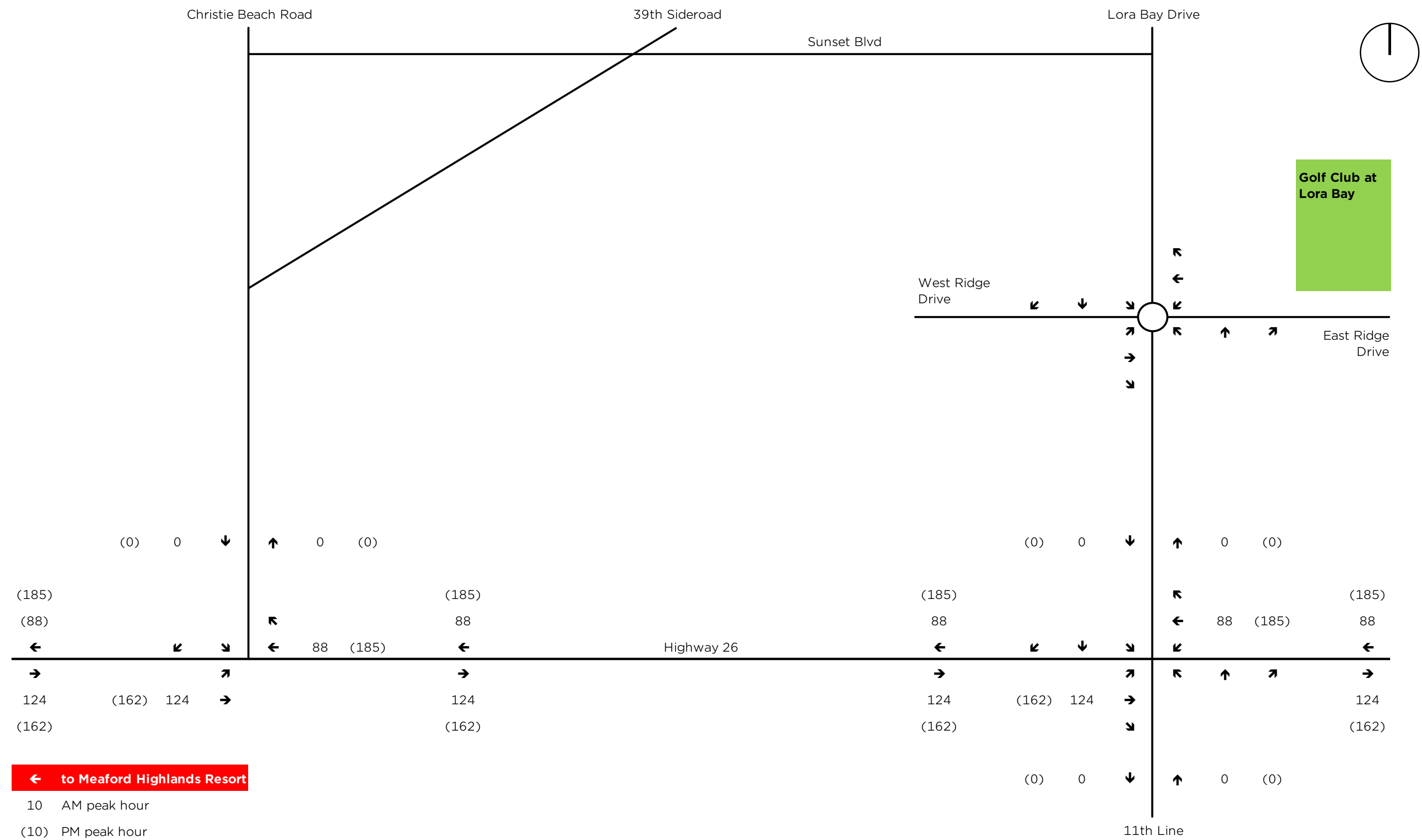




**LORA BAY DEVELOPMENT - PHASE 4B**

Figure 10: Area Developments Traffic Volumes - 207484 Highway 26



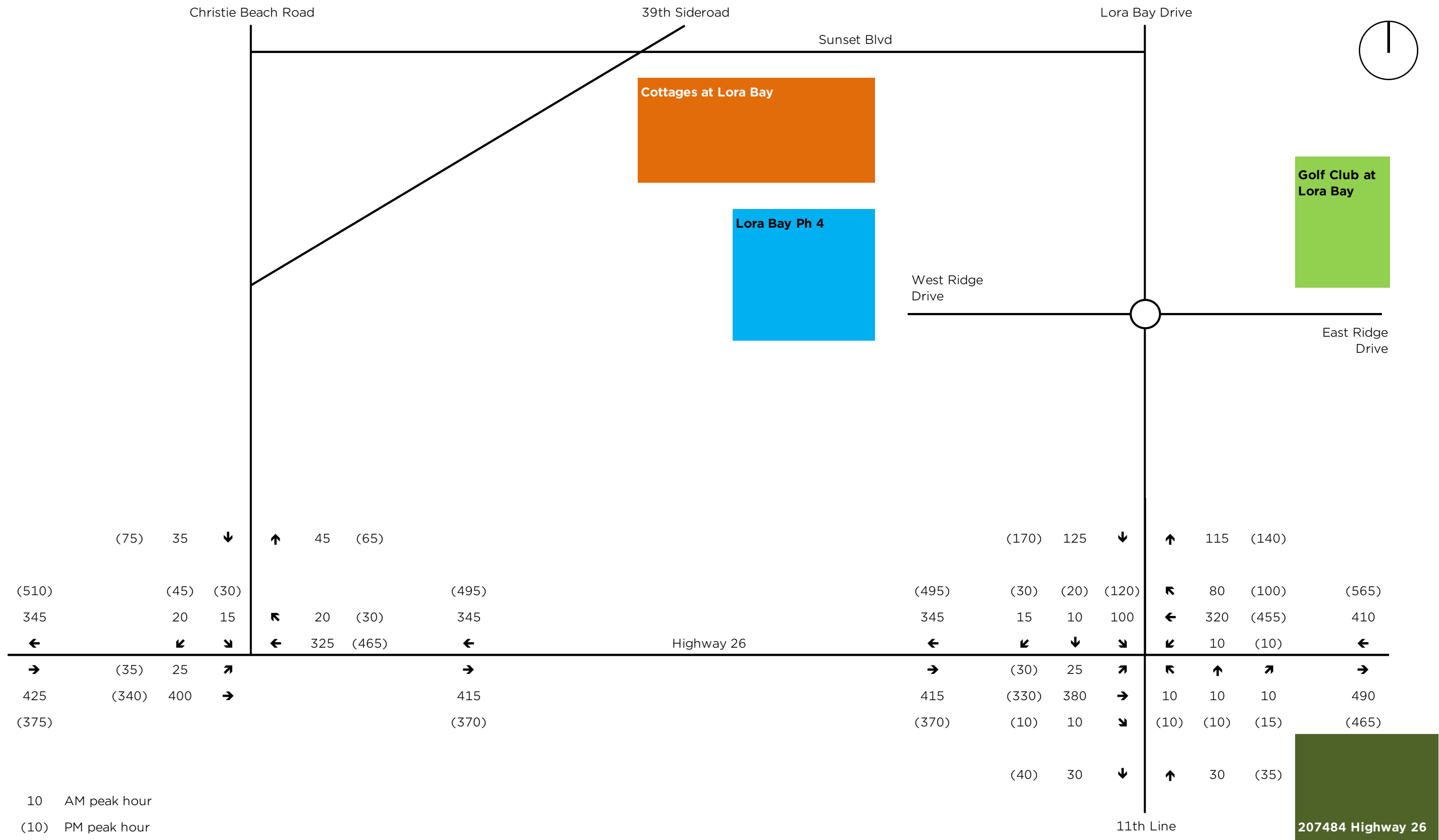


# LORA BAY DEVELOPMENT - PHASE 4B

Figure 11: Area Developments Traffic Volumes - Meaford Highlands Resort



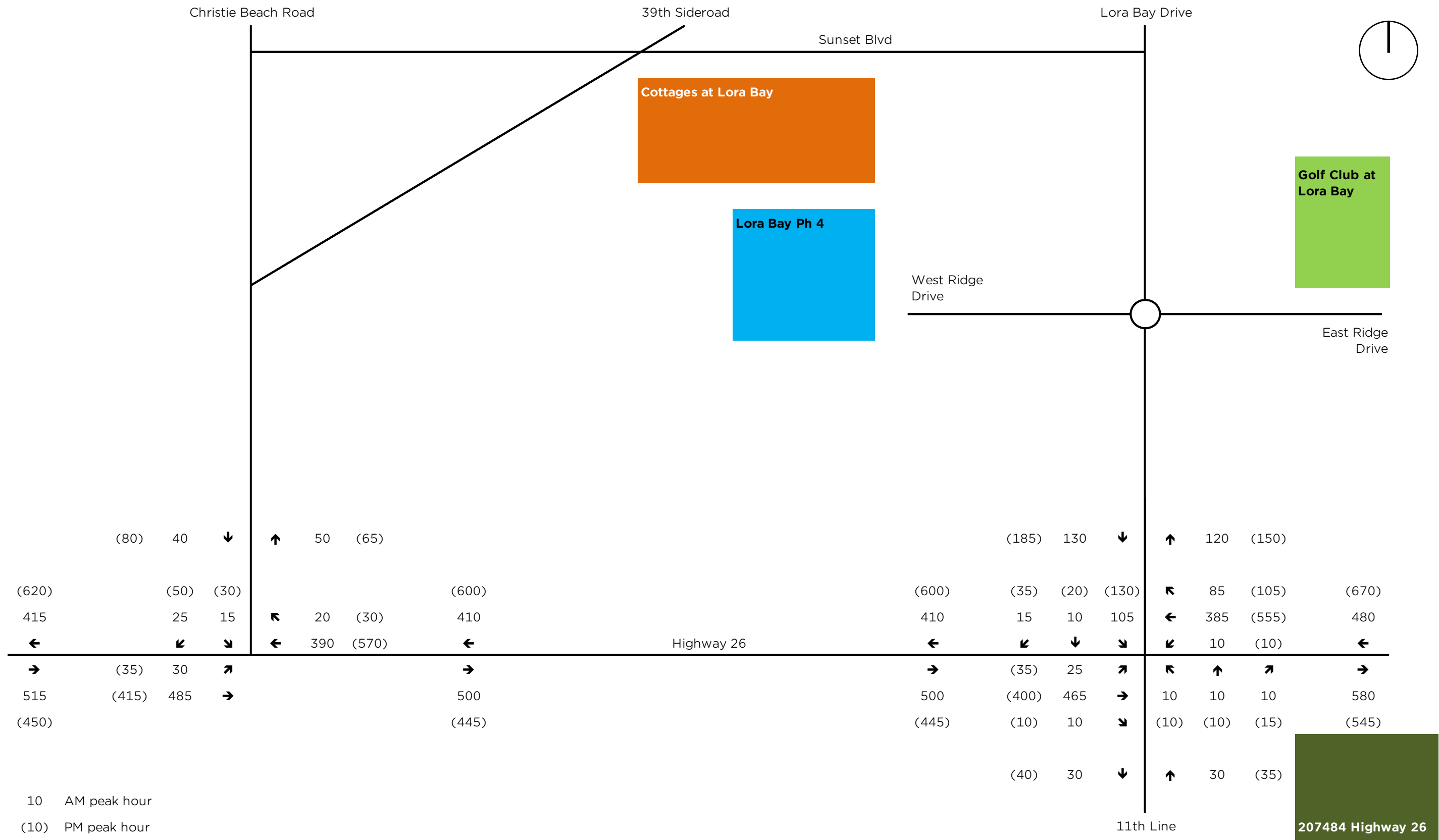




**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 12: Background Traffic Volumes - 2025

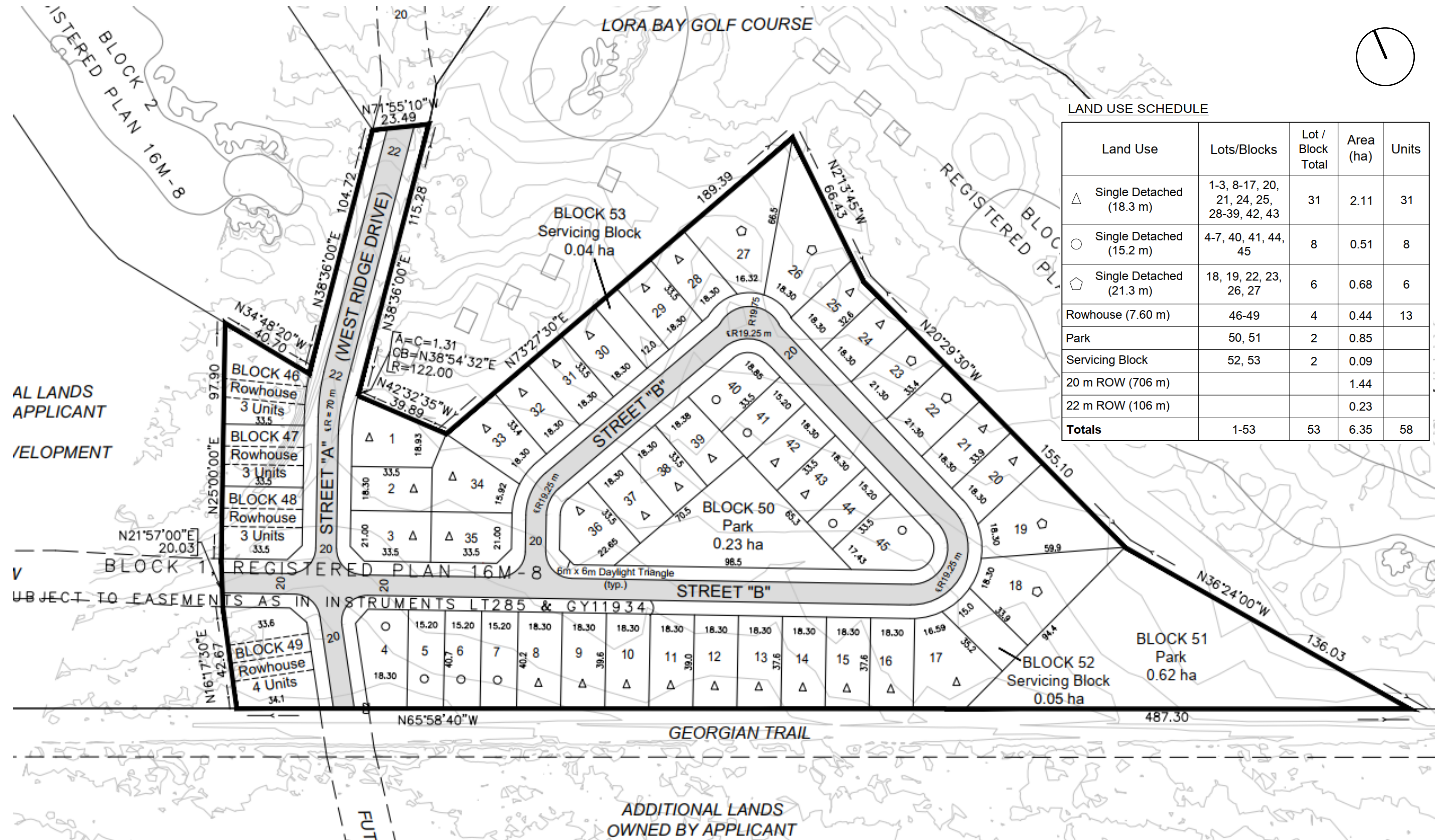






**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 14: Background Traffic Volumes - 2035

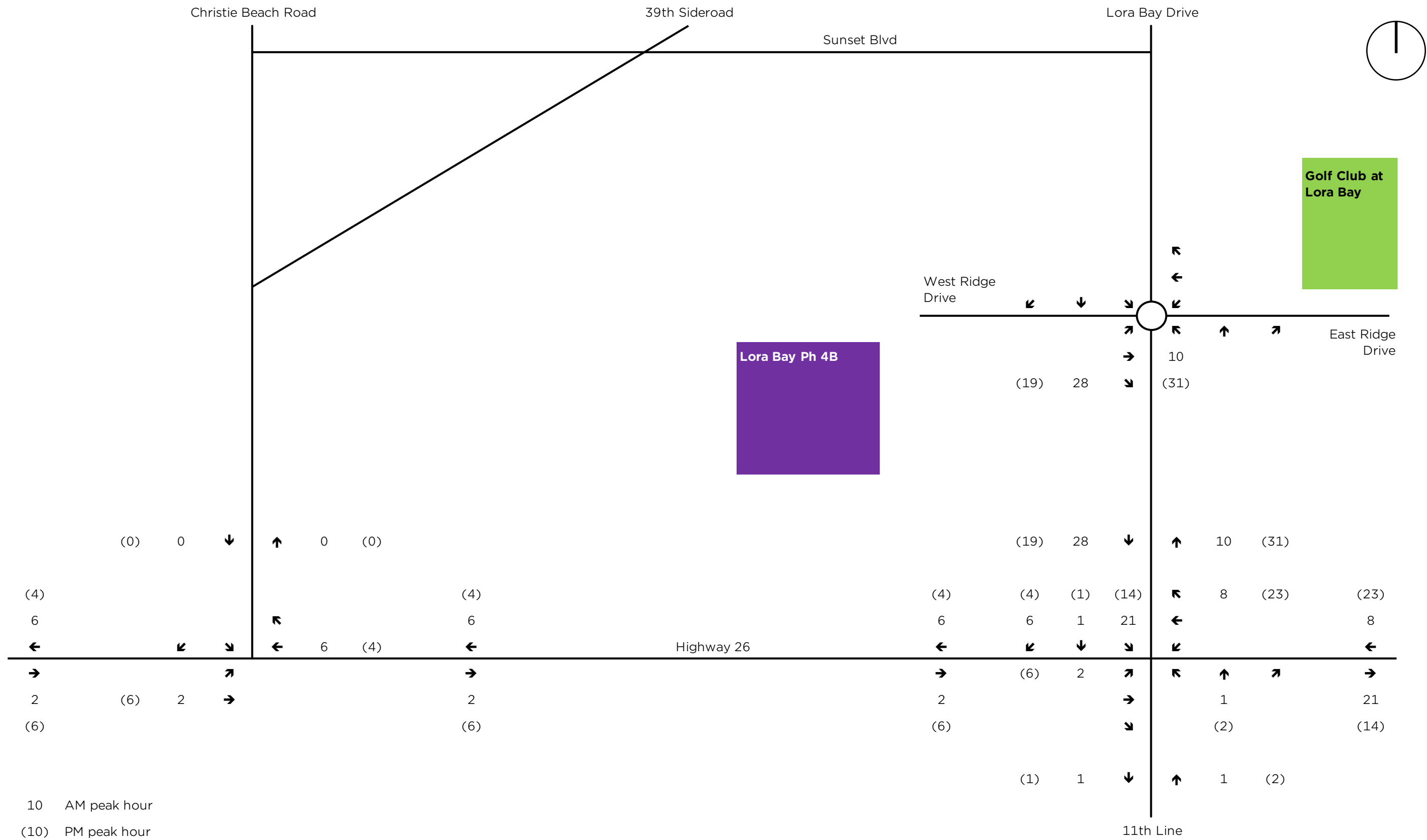




**LORA BAY DEVELOPMENT - PHASE 4B**

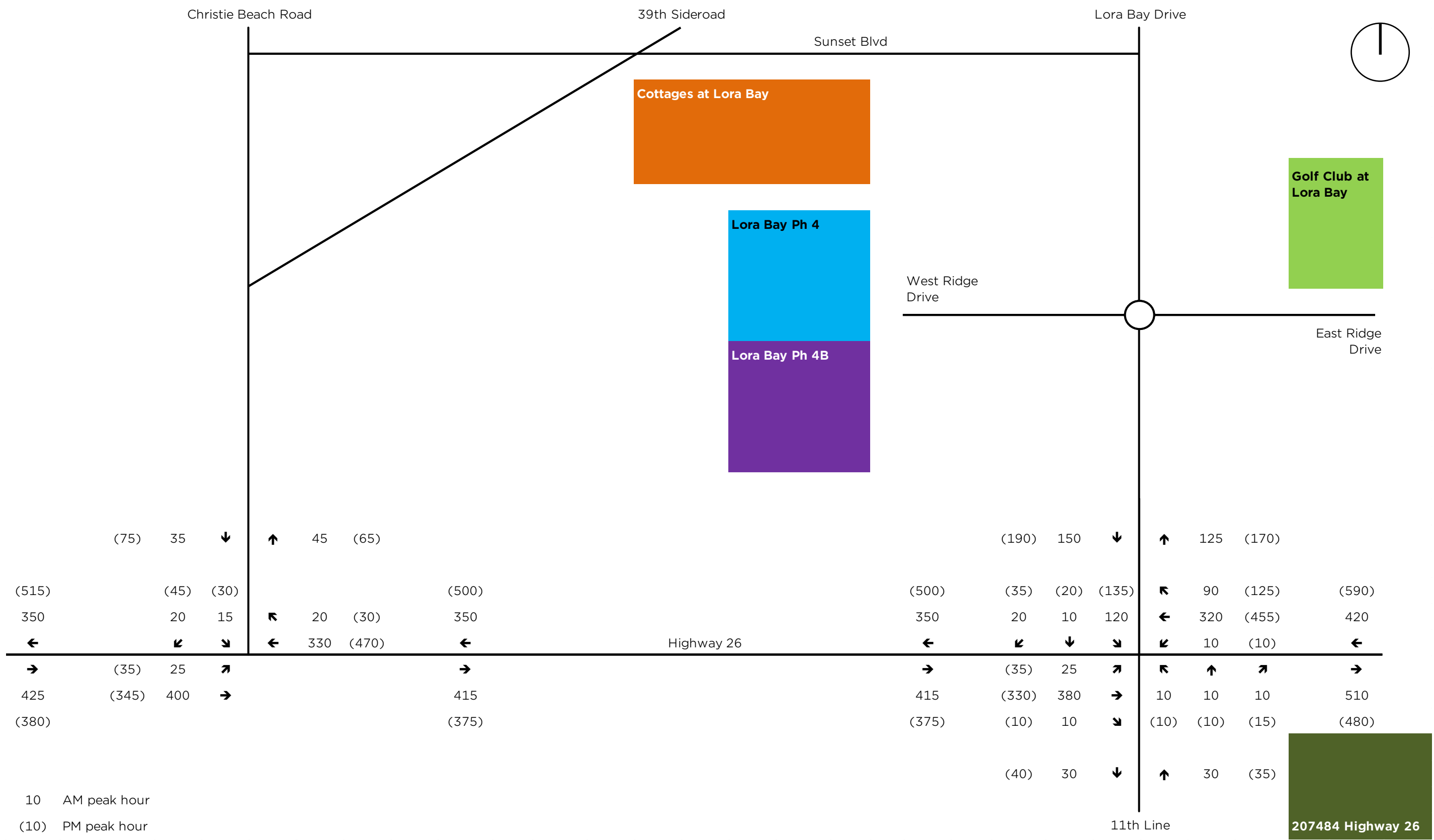
Figure 15: Lora Bay Phase 4B Site Plan





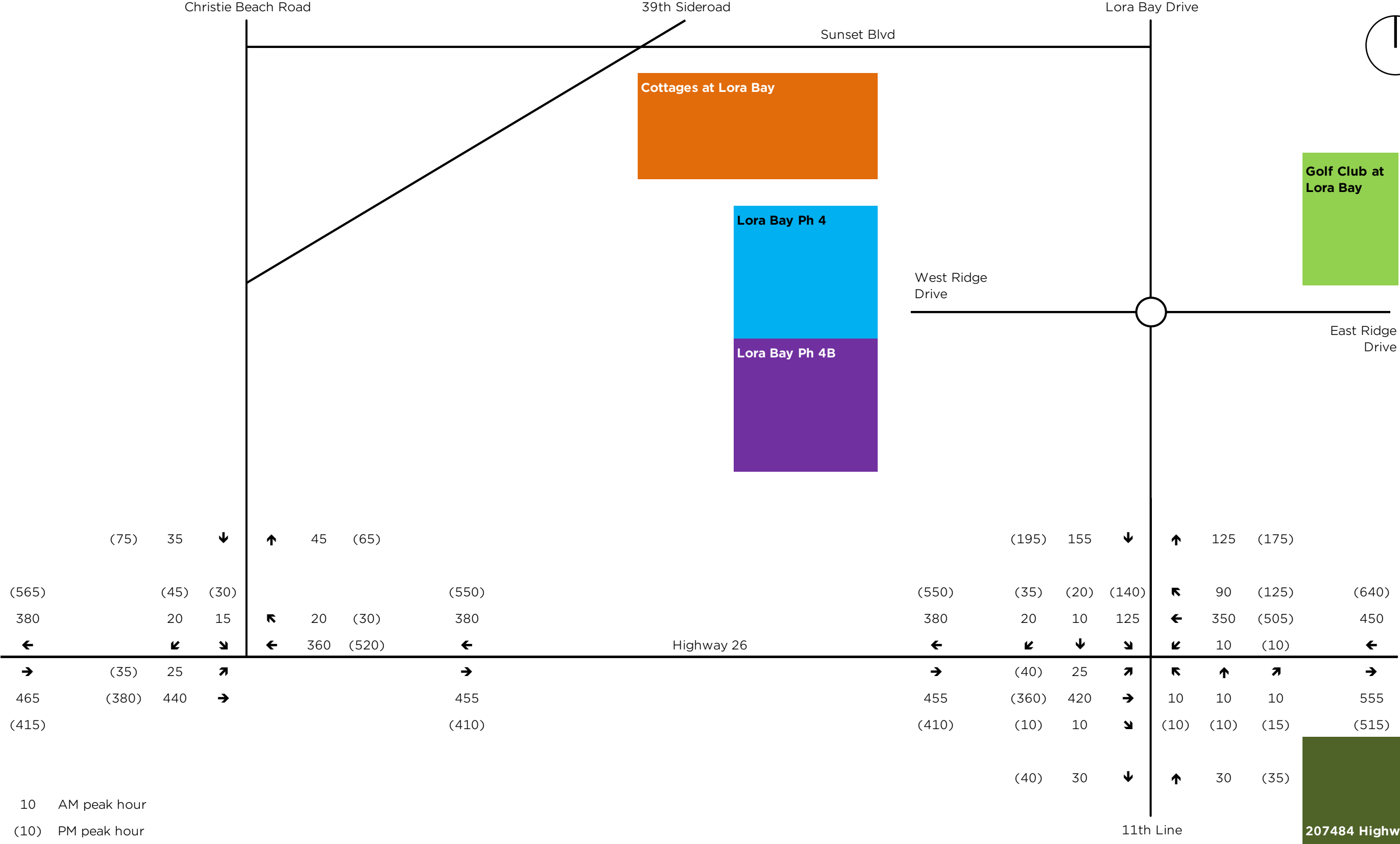
**LORA BAY DEVELOPMENT - PHASE 4B**  
 Figure 16: Lora Bay Phase 4B Traffic Volumes





**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 17: Total Traffic Volumes - 2025

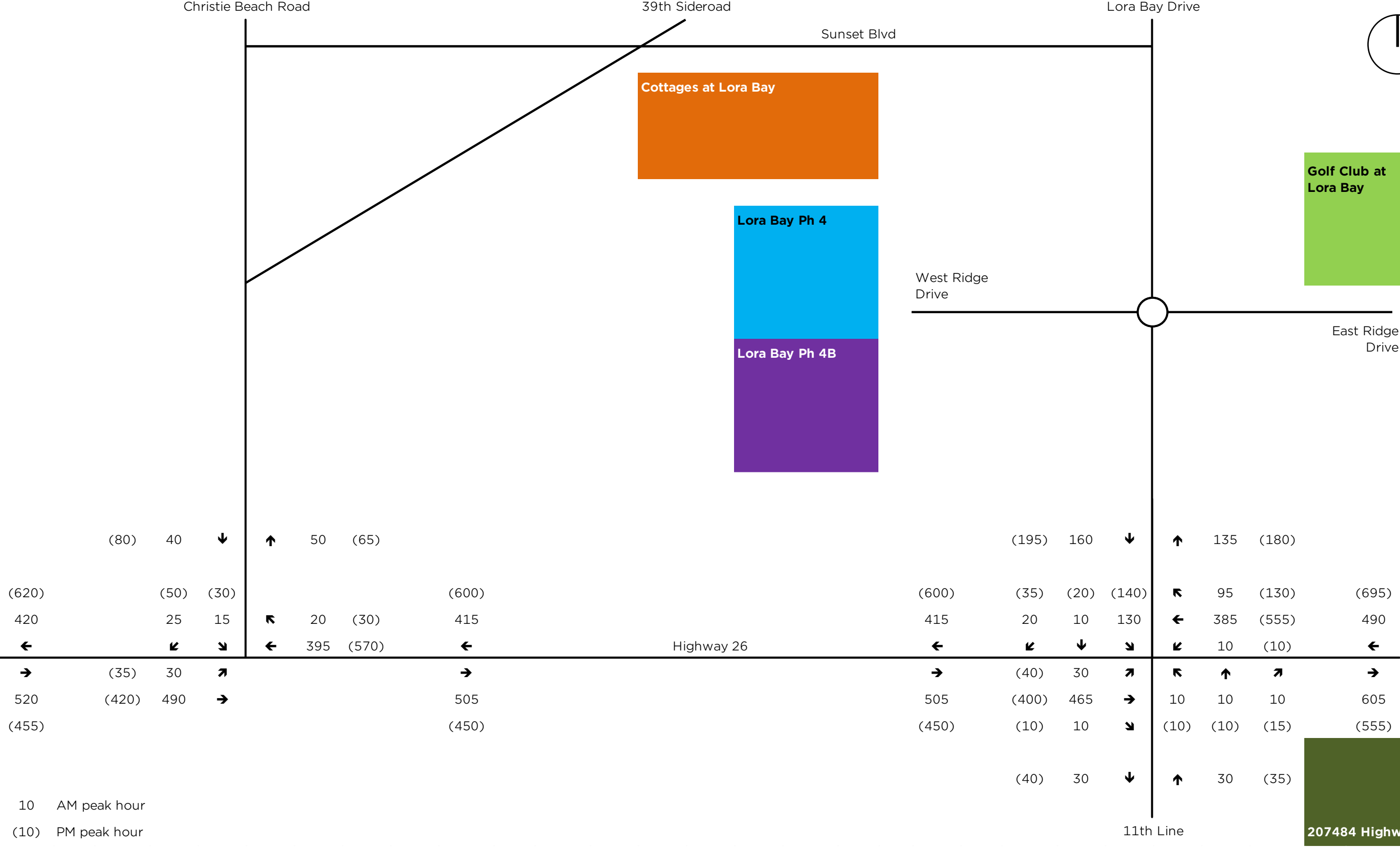




LORA BAY DEVELOPMENT - PHASE 4B

Figure 18: Total Traffic Volumes - 2030





**LORA BAY DEVELOPMENT - PHASE 4B**  
Figure 19: Total Traffic Volumes - 2035







Looking east on Highway 26 at Lora Bay Drive/11<sup>th</sup> Line



Looking west on Highway 26 at Lora Bay Drive/11<sup>th</sup> Line

Source: Google Maps

#### **LORA BAY DEVELOPMENT - PHASE 4B**

Figure 20A: Area Intersections Sight Lines - Highway 26 & Lora Bay Drive/11<sup>th</sup> Line







Looking east on Highway 26 at Christie Beach Road



Looking west on Highway 26 at Christie Beach Road

Source: Google Maps

# **LORA BAY DEVELOPMENT - PHASE 4B**

Figure 20B: Area Intersections Sight Lines - Highway 26 & Christie Beach Road







Looking north on Lora Bay Drive from West Ridge Drive



Looking south on Lora Bay Drive from West Ridge Drive

Source: Google Maps

# **LORA BAY DEVELOPMENT - PHASE 4B**

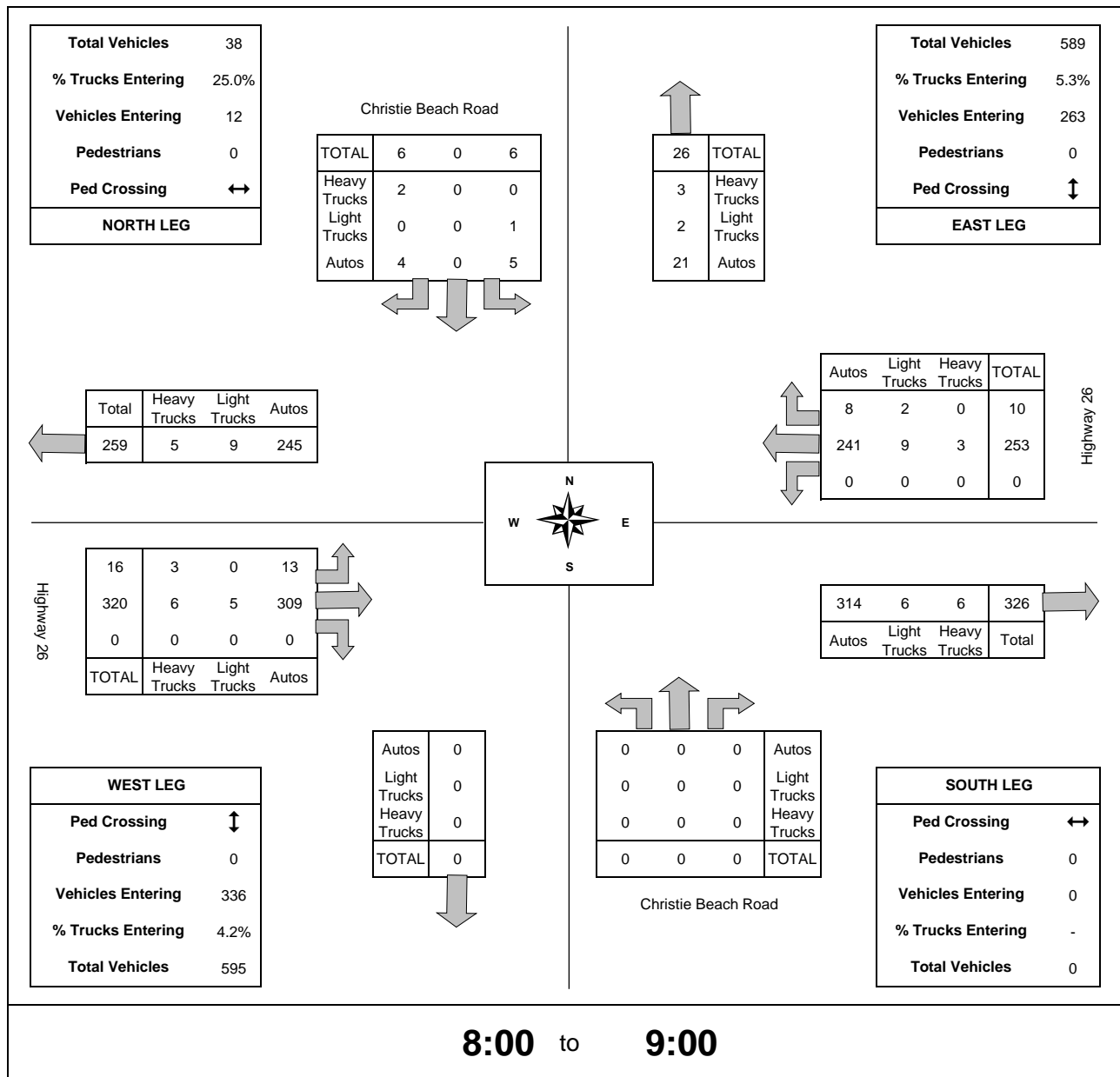
Figure 20C: Area Intersections Sight Lines - Lora Bay Drive & West Ridge Drive



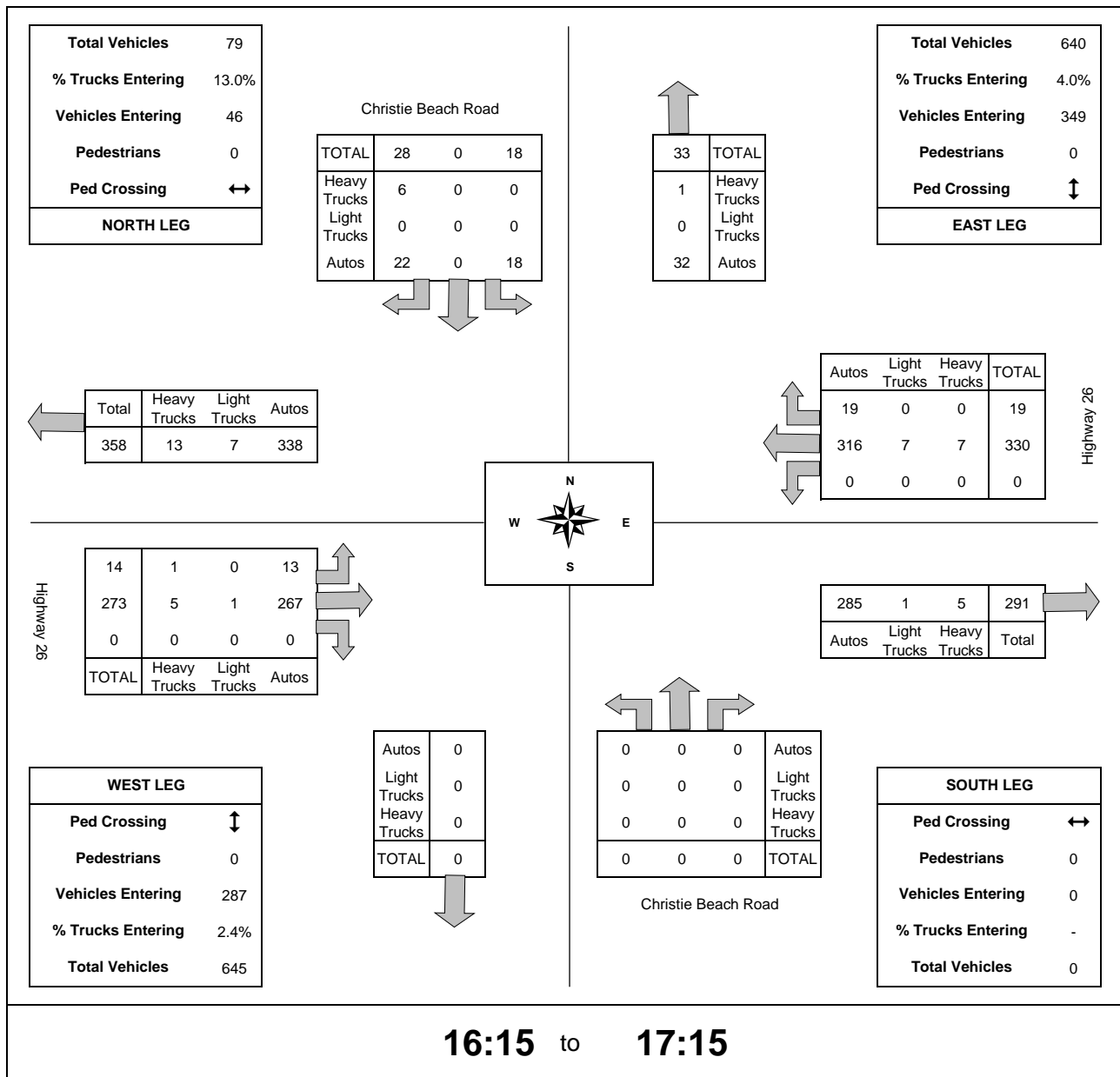


## Appendix A: Traffic Counts

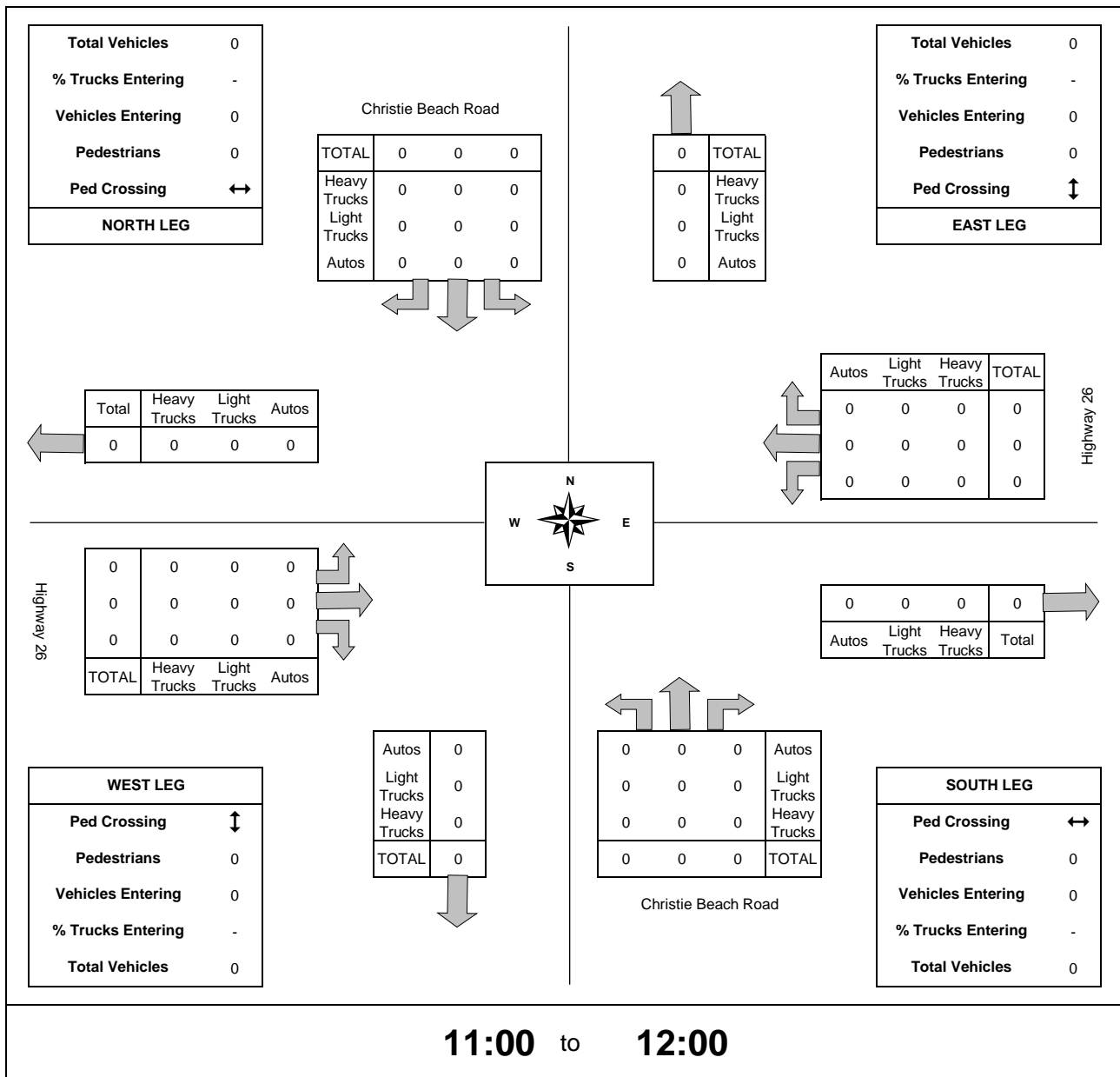
GENERAL INFORMATION			
Surveyor Name	Morgan Giles	Jurisdiction/Date	Town of the Blue Mountains 10 December 2020
Weather Conditions	3°C	Major Street	Highway 26 E-W
Project Name	Lora Bay Development	Minor Street	Christie Beach Road N-S
Project Number	120141	Intersection Control	stop control on minor street
Additional Comments Roads are bare			



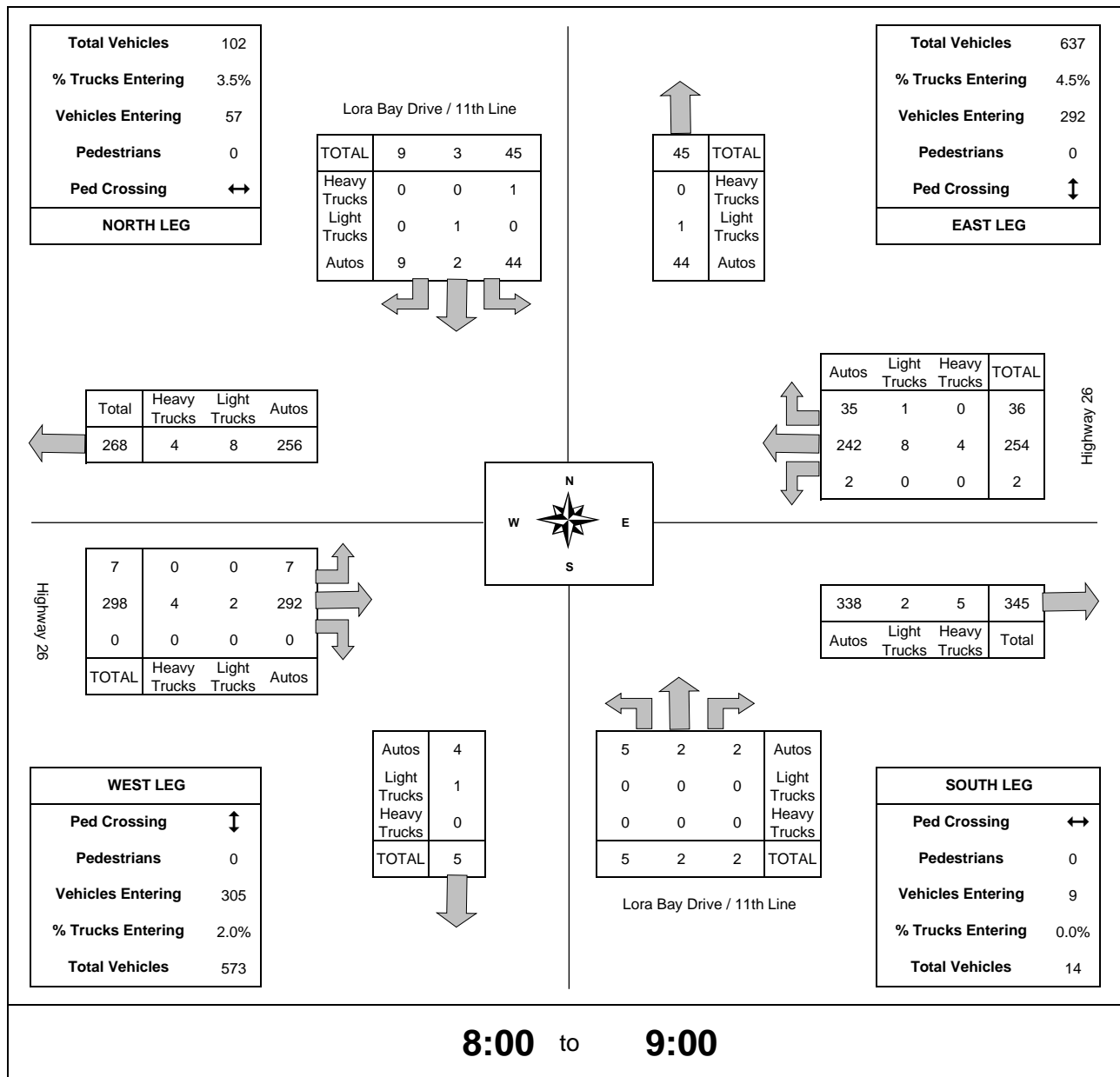
GENERAL INFORMATION			
Surveyor Name	Morgan Giles	Jurisdiction/Date	Town of the Blue Mountains 10 December 2020
Weather Conditions	3°C	Major Street	Highway 26 E-W
Project Name	Lora Bay Development	Minor Street	Christie Beach Road N-S
Project Number	120141	Intersection Control	stop control on minor street
Additional Comments Roads are bare			



GENERAL INFORMATION			
<b>Surveyor Name</b>	<u>Morgan Giles</u>	<b>Jurisdiction/Date</b>	<u>Town of the Blue Mountains</u> <u>10 December 2020</u>
<b>Weather Conditions</b>	<u>3°C</u>	<b>Major Street</b>	<u>Highway 26</u> <u>E-W</u>
<b>Project Name</b>	<u>Lora Bay Development</u>	<b>Minor Street</b>	<u>Christie Beach Road</u> <u>N-S</u>
<b>Project Number</b>	<u>120141</u>	<b>Intersection Control</b>	<u>stop control on minor street</u>
<b>Additional Comments</b>			

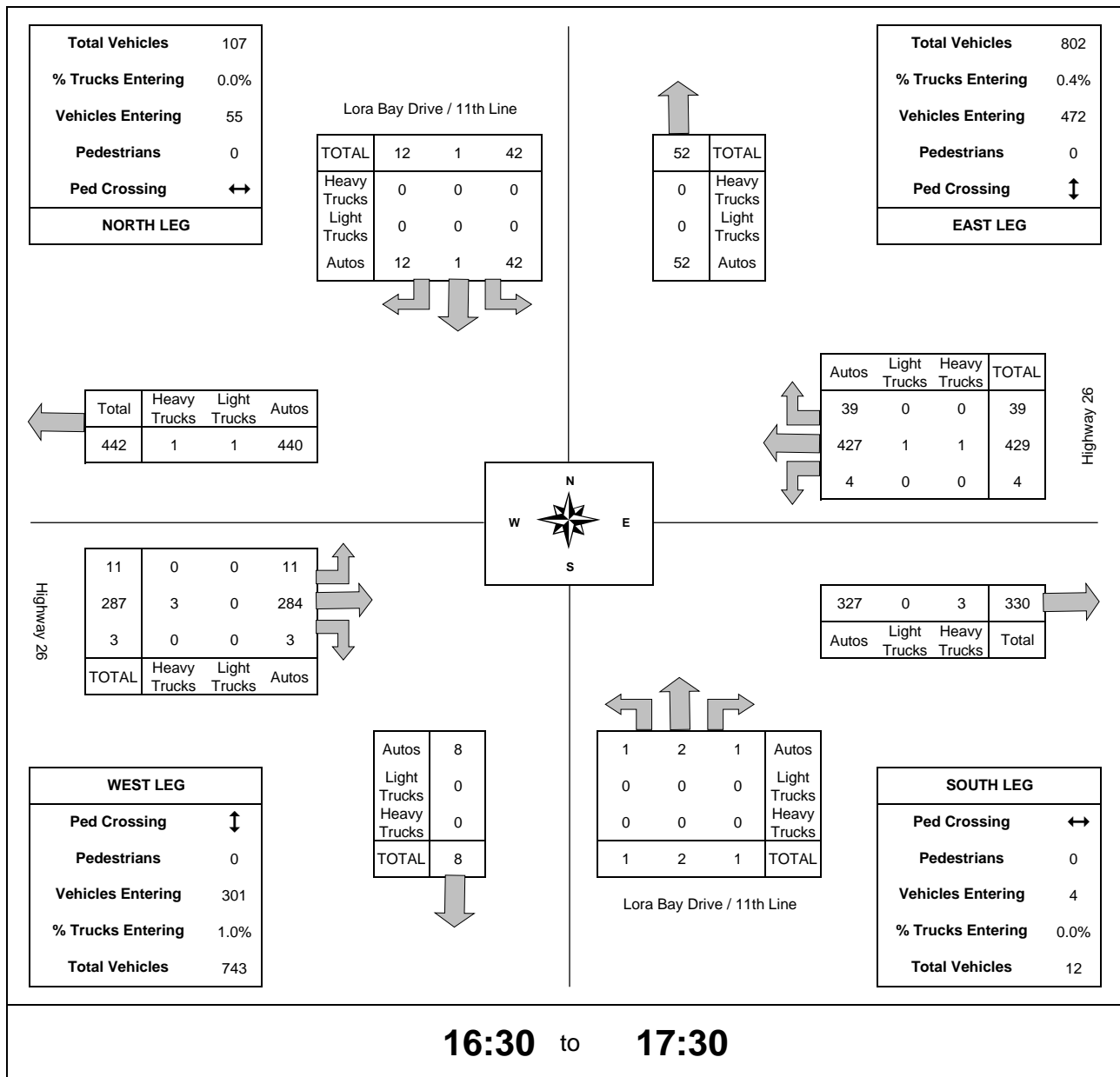


GENERAL INFORMATION			
Surveyor Name	Morgan Giles	Jurisdiction/Date	Town of The Blue Moutains 09 December 2020
Weather Conditions	2°C Overcast	Major Street	Highway 26 E-W
Project Name	Lora Bay Development	Minor Street	Lora Bay Drive / 11th Line N-S
Project Number	120141	Intersection Control	stop control on minor street
Additional Comments Roads are Bare			



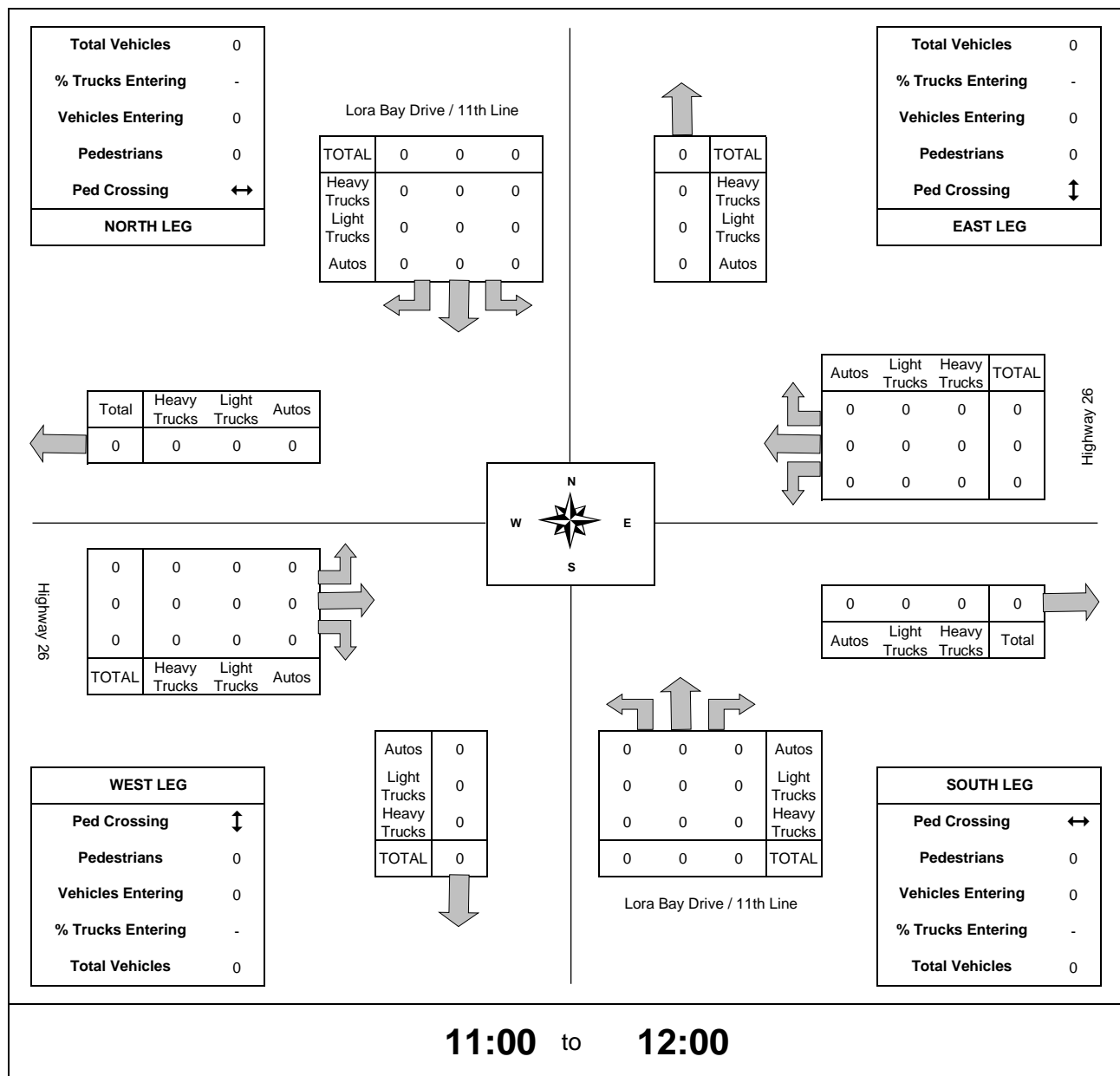


GENERAL INFORMATION			
Surveyor Name	Morgan Giles	Jurisdiction/Date	Town of The Blue Moutains 09 December 2020
Weather Conditions	2°C Overcast	Major Street	Highway 26 E-W
Project Name	Lora Bay Development	Minor Street	Lora Bay Drive / 11th Line N-S
Project Number	120141	Intersection Control	stop control on minor street
Additional Comments Roads are Bare			

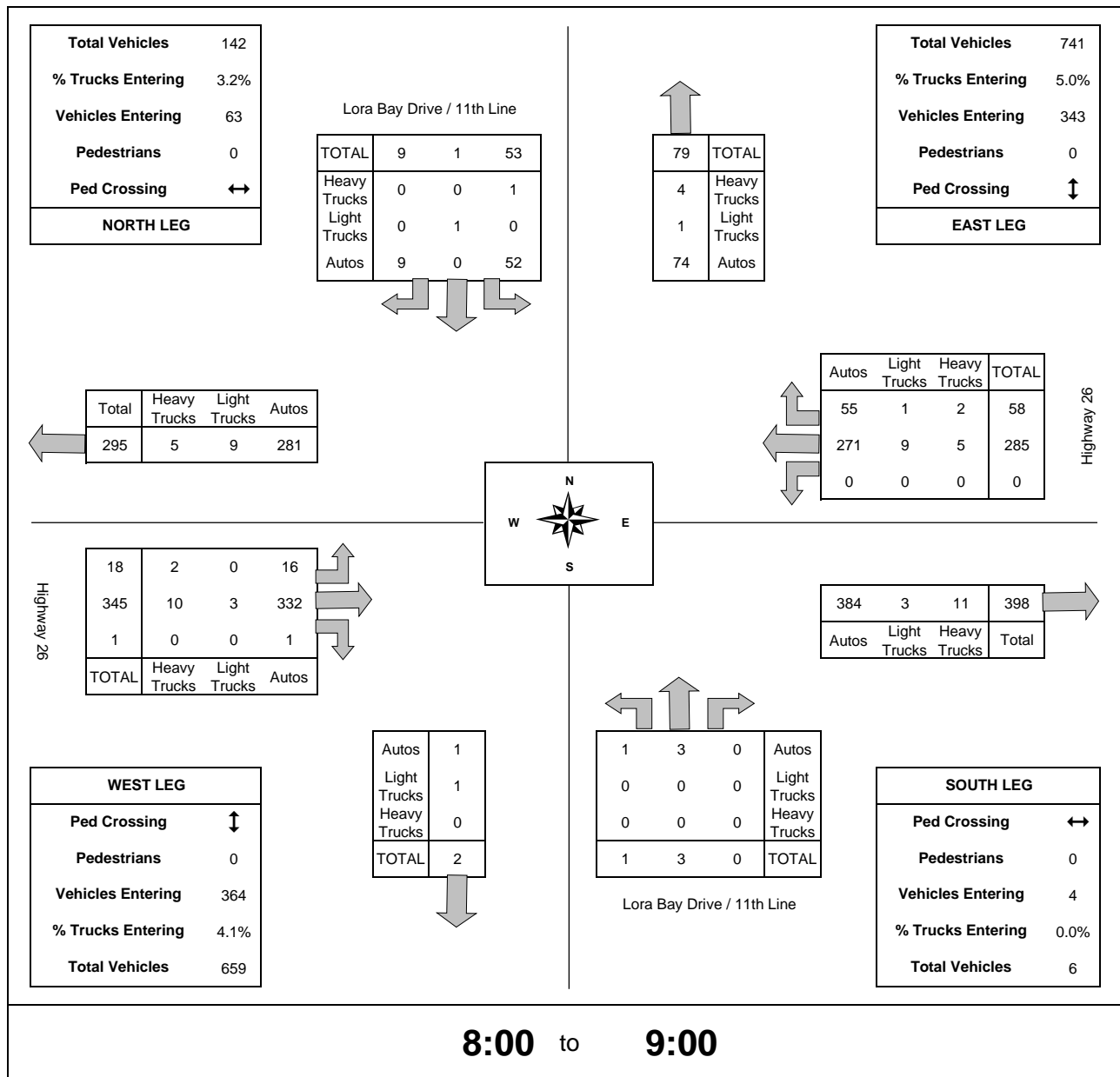


# INTERSECTION COUNT MID-DAY PEAK HOUR

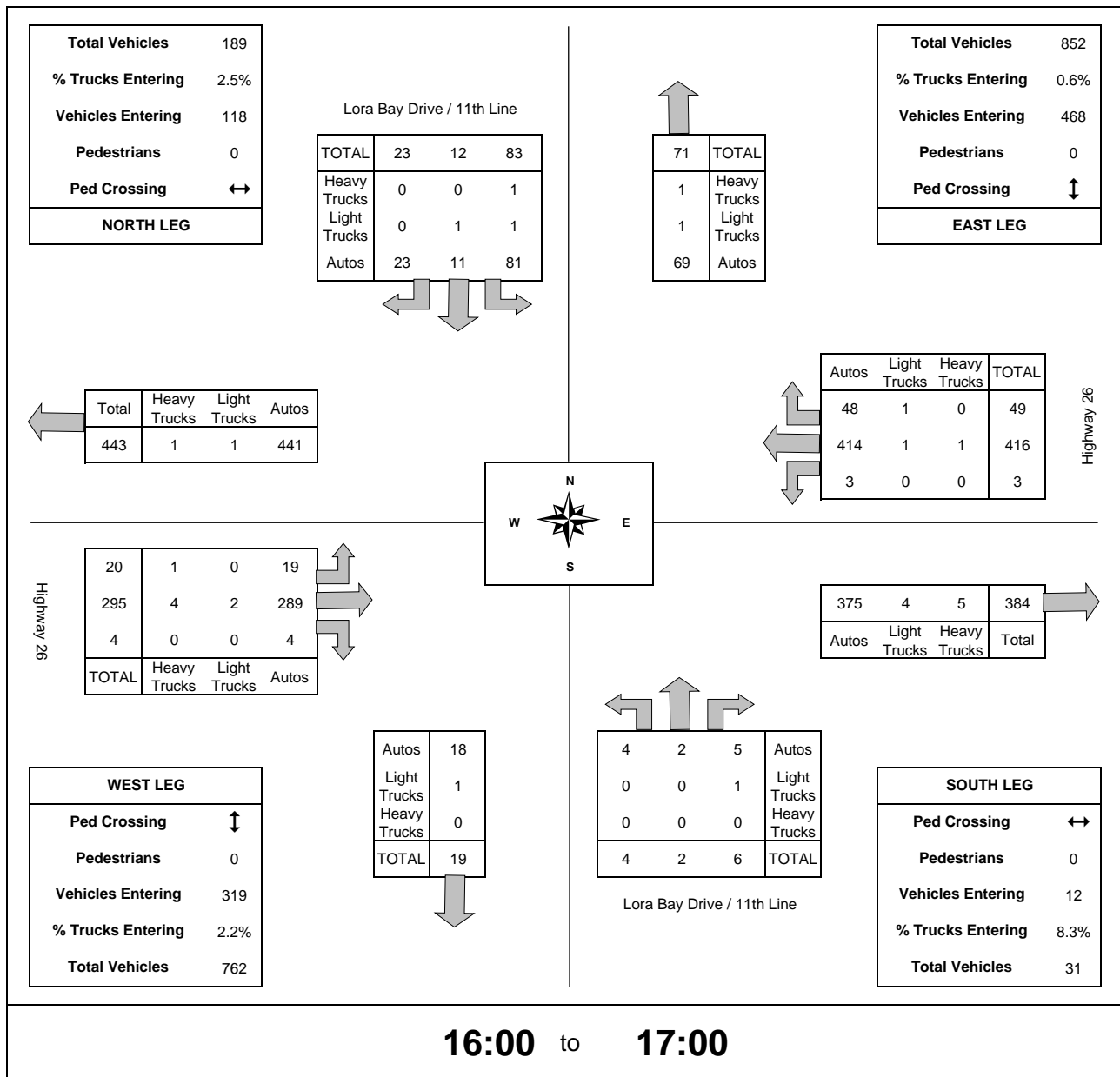
GENERAL INFORMATION			
<b>Surveyor Name</b>	Morgan Giles	<b>Jurisdiction/Date</b>	Town of The Blue Moutains 09 December 2020
<b>Weather Conditions</b>	2°C Overcast	<b>Major Street</b>	Highway 26 E-W
<b>Project Name</b>	Lora Bay Development	<b>Minor Street</b>	Lora Bay Drive / 11th Line N-S
<b>Project Number</b>	120141	<b>Intersection Control</b>	stop control on minor street
<b>Additional Comments</b>			



GENERAL INFORMATION			
<b>Surveyor Name</b>	Morgan Giles	<b>Jurisdiction/Date</b>	Town of The Blue Moutains Sept 14-15/2021
<b>Weather Conditions</b>		<b>Major Street</b>	Highway 26 E-W
<b>Project Name</b>	Lora Bay Development	<b>Minor Street</b>	Lora Bay Drive / 11th Line N-S
<b>Project Number</b>	120141	<b>Intersection Control</b>	stop control on minor street
<b>Additional Comments</b> AM counted Sept 15, PM counted Sept 14			



GENERAL INFORMATION			
Surveyor Name	Morgan Giles	Jurisdiction/Date	Town of The Blue Moutains Sept 14-15/2021
Weather Conditions		Major Street	Highway 26 E-W
Project Name	Lora Bay Development	Minor Street	Lora Bay Drive / 11th Line N-S
Project Number	120141	Intersection Control	stop control on minor street
Additional Comments AM counted Sept 15, PM counted Sept 14			



## **Appendix B: Level of Service Definitions**

## Level of Service - Unsignalized Intersections

Level of Service (LOS) for unsignalized intersections is defined in terms of control delay for each critical lane. Control delay include initial deceleration, queue move-up time, stopped delay, and final acceleration delay, and is a function of the service rate or capacity of the approach and degree of saturation.

The following table describes in detail the characteristics of each level:

LOS	Description of Traffic Operations	Delay (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 < d \leq 15$
C	Average traffic delays	$15 < d \leq 25$
D	Long traffic delays	$25 < d \leq 35$
E	Very long traffic delays	$35 < d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$d > 50$

source: 2010 Highway Capacity Manual

## Level of Service - Signalized Intersections

Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay.

The following table describes in detail the characteristics of each level:

LOS	Description of Traffic Operations	Delay (sec/veh)
A	Describes operations with very low control delay, up to 10 seconds/vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$d \leq 10$
B	Describes operations with control delay greater than 10 seconds and up to 20 seconds/vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 < d \leq 20$
C	Describes operations with control delay greater than 20 seconds and up to 35 seconds/vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 < d \leq 35$
D	Describes operations with control delay greater than 35 seconds and up to 55 seconds/vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 < d \leq 55$
E	Describes operations with control delay greater than 55 seconds and up to 80 seconds/vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$55 < d \leq 80$
F	LOS F describes operations with control delay in excess of 80 seconds/vehicle. This oversaturation, considered to be unacceptable to most drivers, occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels.	$d > 80$

source: 2010 Highway Capacity Manual





















## **Appendix C: Existing Intersection Operations**



# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26












2023 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	360	5	5	300	60	5	5	5	55	5	10
Future Volume (Veh/h)	20	360	5	5	300	60	5	5	5	55	5	10
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)	22	391	5	5	326	65	5	5	5	60	5	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	391			396			787	838	394	778	776	326
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	391			396			787	838	394	778	776	326
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 %	98			100			98	98	99	80	98	98
cM capacity (veh/h)	1168			1163			296	295	655	302	321	715
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	22	396	5	326	65	15	76					
Volume Left	22	0	5	0	0	5	60					
Volume Right	0	5	0	0	65	5	11					
cSH	1168	1700	1163	1700	1700	362	331					
Volume to Capacity	0.02	0.23	0.00	0.19	0.04	0.04	0.23					
Queue Length 95th (m)	0.4	0.0	0.1	0.0	0.0	1.0	6.6					
Control Delay (s)	8.1	0.0	8.1	0.0	0.0	15.4	19.1					
Lane LOS	A		A			C	C					
Approach Delay (s)	0.4		0.1			15.4	19.1					
Approach LOS						C	C					
Intersection Summary												
Average Delay				2.1								
Intersection Capacity Utilization				34.2%	ICU Level of Service			A				
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

2: Hwy 26 & Christie Beach Road





















2023 AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	375	300	15	10	10
Future Volume (Veh/h)	20	375	300	15	10	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	408	326	16	11	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	342				786	334
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342				786	334
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				97	98
cM capacity (veh/h)	1217				354	708
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	22	408	342	22		
Volume Left	22	0	0	11		
Volume Right	0	0	16	11		
cSH	1217	1700	1700	472		
Volume to Capacity	0.02	0.24	0.20	0.05		
Queue Length 95th (m)	0.4	0.0	0.0	1.1		
Control Delay (s)	8.0	0.0	0.0	13.0		
Lane LOS	A			B		
Approach Delay (s)	0.4		0.0	13.0		
Approach LOS				B		
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			29.7%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26












2023 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	310	5	5	435	50	5	5	10	85	15	25
Future Volume (Veh/h)	25	310	5	5	435	50	5	5	10	85	15	25
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)	27	337	5	5	473	54	5	5	11	92	16	27
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	527			342			912	930	340	888	879	473
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	527			342			912	930	340	888	879	473
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 %	97			100			98	98	98	63	94	95
cM capacity (veh/h)	1040			1217			227	259	703	251	278	591
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	27	342	5	473	54	21	135					
Volume Left	27	0	5	0	0	5	92					
Volume Right	0	5	0	0	54	11	27					
cSH	1040	1700	1217	1700	1700	369	287					
Volume to Capacity	0.03	0.20	0.00	0.28	0.03	0.06	0.47					
Queue Length 95th (m)	0.6	0.0	0.1	0.0	0.0	1.4	18.0					
Control Delay (s)	8.6	0.0	8.0	0.0	0.0	15.4	28.2					
Lane LOS	A		A			C	D					
Approach Delay (s)	0.6		0.1			15.4	28.2					
Approach LOS						C	D					
Intersection Summary												
Average Delay				4.2								
Intersection Capacity Utilization				43.2%	ICU Level of Service			A				
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

2: Hwy 26 & Christie Beach Road

2023 PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	315	440	25	25	35
Future Volume (Veh/h)	20	315	440	25	25	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	342	478	27	27	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	505				878	492
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	505				878	492
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				91	93
cM capacity (veh/h)	1060				312	577
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	22	342	505	65		
Volume Left	22	0	0	27		
Volume Right	0	0	27	38		
cSH	1060	1700	1700	427		
Volume to Capacity	0.02	0.20	0.30	0.15		
Queue Length 95th (m)	0.5	0.0	0.0	4.1		
Control Delay (s)	8.5	0.0	0.0	14.9		
Lane LOS	A			B		
Approach Delay (s)	0.5		0.0	14.9		
Approach LOS				B		
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			34.9%		ICU Level of Service	A
Analysis Period (min)			15			























## **Appendix D: Future Background Intersection Operations**

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2025 Background AM Peak Hour





												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	380	10	10	320	80	10	10	10	100	10	15
Future Volume (Veh/h)	25	380	10	10	320	80	10	10	10	100	10	15
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)	27	413	11	11	348	87	11	11	11	109	11	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	435			424			864	930	418	854	848	348
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	435			424			864	930	418	854	848	348
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 %	98			99			96	96	98	58	96	98
cM capacity (veh/h)	1125			1135			254	258	635	258	288	695
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	27	424	11	348	87	33	136					
Volume Left	27	0	11	0	0	11	109					
Volume Right	0	11	0	0	87	11	16					
cSH	1125	1700	1135	1700	1700	320	282					
Volume to Capacity	0.02	0.25	0.01	0.20	0.05	0.10	0.48					
Queue Length 95th (m)	0.6	0.0	0.2	0.0	0.0	2.6	18.8					
Control Delay (s)	8.3	0.0	8.2	0.0	0.0	17.6	29.2					
Lane LOS	A		A			C	D					
Approach Delay (s)	0.5		0.2			17.6	29.2					
Approach LOS						C	D					
Intersection Summary												
Average Delay				4.6								
Intersection Capacity Utilization				41.1%	ICU Level of Service				A			
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2025 Background AM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	400	325	20	15	20
Future Volume (Veh/h)	25	400	325	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	435	353	22	16	22
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				853	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375				853	364
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				95	97
cM capacity (veh/h)	1183				322	681
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	27	435	375	38		
Volume Left	27	0	0	16		
Volume Right	0	0	22	22		
cSH	1183	1700	1700	463		
Volume to Capacity	0.02	0.26	0.22	0.08		
Queue Length 95th (m)	0.5	0.0	0.0	2.0		
Control Delay (s)	8.1	0.0	0.0	13.5		
Lane LOS	A			B		
Approach Delay (s)	0.5		0.0	13.5		
Approach LOS				B		
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			31.1%		ICU Level of Service	
Analysis Period (min)			15			
			A			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2025 Background PM Peak Hour

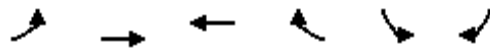
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	330	10	10	455	100	10	10	15	120	20	30
Future Volume (Veh/h)	30	330	10	10	455	100	10	10	15	120	20	30
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	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)	33	359	11	11	495	109	11	11	16	130	22	33
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	604			370			992	1056	364	964	953	495
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	604			370			992	1056	364	964	953	495
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 %	97			99			94	95	98	39	91	94
cM capacity (veh/h)	974			1189			191	216	680	213	248	575
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	33	370	11	495	109	38	185					
Volume Left	33	0	11	0	0	11	130					
Volume Right	0	11	0	0	109	16	33					
cSH	974	1700	1189	1700	1700	288	245					
Volume to Capacity	0.03	0.22	0.01	0.29	0.06	0.13	0.76					
Queue Length 95th (m)	0.8	0.0	0.2	0.0	0.0	3.4	41.0					
Control Delay (s)	8.8	0.0	8.1	0.0	0.0	19.4	54.3					
Lane LOS	A		A			C	F					
Approach Delay (s)	0.7		0.1			19.4	54.3					
Approach LOS						C	F					
Intersection Summary												
Average Delay	9.0											
Intersection Capacity Utilization	47.8%			ICU Level of Service			A					
Analysis Period (min)	15											







# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2025 Background PM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	340	465	30	30	45
Future Volume (Veh/h)	35	340	465	30	30	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	370	505	33	33	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	538				968	522
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	538				968	522
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				88	91
cM capacity (veh/h)	1030				271	555
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	370	538	82		
Volume Left	38	0	0	33		
Volume Right	0	0	33	49		
cSH	1030	1700	1700	391		
Volume to Capacity	0.04	0.22	0.32	0.21		
Queue Length 95th (m)	0.9	0.0	0.0	5.9		
Control Delay (s)	8.6	0.0	0.0	16.6		
Lane LOS	A			C		
Approach Delay (s)	0.8		0.0	16.6		
Approach LOS				C		
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.2%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

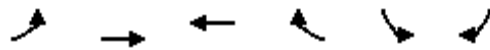
2030 Background AM Peak Hour





												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	420	10	10	350	85	10	10	15	105	10	15
Future Volume (Veh/h)	25	420	10	10	350	85	10	10	15	105	10	15
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)	27	457	11	11	380	92	11	11	16	114	11	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	472			468			940	1010	462	934	924	380
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	472			468			940	1010	462	934	924	380
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 %	98			99			95	95	97	49	96	98
cM capacity (veh/h)	1090			1094			224	231	599	225	260	667
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	27	468	11	380	92	38	141					
Volume Left	27	0	11	0	0	11	114					
Volume Right	0	11	0	0	92	16	16					
cSH	1090	1700	1094	1700	1700	308	246					
Volume to Capacity	0.02	0.28	0.01	0.22	0.05	0.12	0.57					
Queue Length 95th (m)	0.6	0.0	0.2	0.0	0.0	3.2	24.6					
Control Delay (s)	8.4	0.0	8.3	0.0	0.0	18.3	37.7					
Lane LOS	A		A			C	E					
Approach Delay (s)	0.5		0.2			18.3	37.7					
Approach LOS						C	E					
Intersection Summary												
Average Delay				5.5								
Intersection Capacity Utilization				43.3%	ICU Level of Service				A			
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2030 Background AM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	440	355	20	15	20
Future Volume (Veh/h)	25	440	355	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	478	386	22	16	22
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	408				929	397
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408				929	397
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				94	97
cM capacity (veh/h)	1151				290	652
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	27	478	408	38		
Volume Left	27	0	0	16		
Volume Right	0	0	22	22		
cSH	1151	1700	1700	428		
Volume to Capacity	0.02	0.28	0.24	0.09		
Queue Length 95th (m)	0.5	0.0	0.0	2.2		
Control Delay (s)	8.2	0.0	0.0	14.2		
Lane LOS	A			B		
Approach Delay (s)	0.4		0.0	14.2		
Approach LOS				B		
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			33.2%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2030 Background PM Peak Hour





												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	360	10	10	505	105	10	10	15	125	20	30
Future Volume (Veh/h)	30	360	10	10	505	105	10	10	15	125	20	30
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)	33	391	11	11	549	114	11	11	16	136	22	33
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	663			402			1078	1148	396	1050	1039	549
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	663			402			1078	1148	396	1050	1039	549
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 %	96			99			93	94	98	26	90	94
cM capacity (veh/h)	926			1157			165	190	653	185	220	535
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	33	402	11	549	114	38	191					
Volume Left	33	0	11	0	0	11	136					
Volume Right	0	11	0	0	114	16	33					
cSH	926	1700	1157	1700	1700	255	213					
Volume to Capacity	0.04	0.24	0.01	0.32	0.07	0.15	0.90					
Queue Length 95th (m)	0.8	0.0	0.2	0.0	0.0	3.9	54.7					
Control Delay (s)	9.0	0.0	8.1	0.0	0.0	21.6	84.5					
Lane LOS	A		A			C	F					
Approach Delay (s)	0.7		0.1			21.6	84.5					
Approach LOS						C	F					
Intersection Summary												
Average Delay				13.0								
Intersection Capacity Utilization				49.7%	ICU Level of Service				A			
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2030 Background PM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	370	515	30	30	45
Future Volume (Veh/h)	35	370	515	30	30	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	402	560	33	33	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	593				1054	576
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	593				1054	576
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				86	91
cM capacity (veh/h)	983				240	517
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	402	593	82		
Volume Left	38	0	0	33		
Volume Right	0	0	33	49		
cSH	983	1700	1700	353		
Volume to Capacity	0.04	0.24	0.35	0.23		
Queue Length 95th (m)	0.9	0.0	0.0	6.7		
Control Delay (s)	8.8	0.0	0.0	18.2		
Lane LOS	A			C		
Approach Delay (s)	0.8		0.0	18.2		
Approach LOS				C		
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.2%	ICU Level of Service		A
Analysis Period (min)			15			



# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

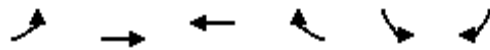
2035 Background AM Peak Hour





												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	465	10	10	385	85	10	10	10	105	10	15
Future Volume (Veh/h)	25	465	10	10	385	85	10	10	10	105	10	15
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)	27	505	11	11	418	92	11	11	11	114	11	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	510			516			1026	1096	510	1016	1010	418
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	510			516			1026	1096	510	1016	1010	418
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 %	97			99			94	95	98	42	95	97
cM capacity (veh/h)	1055			1050			195	206	563	198	231	635
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	27	516	11	418	92	33	141					
Volume Left	27	0	11	0	0	11	114					
Volume Right	0	11	0	0	92	11	16					
cSH	1055	1700	1050	1700	1700	255	218					
Volume to Capacity	0.03	0.30	0.01	0.25	0.05	0.13	0.65					
Queue Length 95th (m)	0.6	0.0	0.2	0.0	0.0	3.3	29.8					
Control Delay (s)	8.5	0.0	8.5	0.0	0.0	21.2	47.7					
Lane LOS	A		A			C	E					
Approach Delay (s)	0.4		0.2			21.2	47.7					
Approach LOS						C	E					
Intersection Summary												
Average Delay				6.3								
Intersection Capacity Utilization				45.7%	ICU Level of Service				A			
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2035 Background AM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	485	390	20	15	25
Future Volume (Veh/h)	30	485	390	20	15	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	527	424	22	16	27
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	446				1028	435
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	446				1028	435
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				94	96
cM capacity (veh/h)	1114				252	621
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	33	527	446	43		
Volume Left	33	0	0	16		
Volume Right	0	0	22	27		
cSH	1114	1700	1700	402		
Volume to Capacity	0.03	0.31	0.26	0.11		
Queue Length 95th (m)	0.7	0.0	0.0	2.7		
Control Delay (s)	8.3	0.0	0.0	15.0		
Lane LOS	A			C		
Approach Delay (s)	0.5		0.0	15.0		
Approach LOS				C		
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			35.5%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

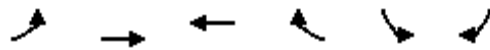
2035 Background PM Peak Hour





												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	400	10	10	555	105	10	10	15	130	20	35
Future Volume (Veh/h)	35	400	10	10	555	105	10	10	15	130	20	35
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)	38	435	11	11	603	114	11	11	16	141	22	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	717			446			1190	1256	440	1158	1147	603
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	717			446			1190	1256	440	1158	1147	603
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 %	96			99			92	93	97	8	88	92
cM capacity (veh/h)	884			1114			133	162	617	154	189	499
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	38	446	11	603	114	38	201					
Volume Left	38	0	11	0	0	11	141					
Volume Right	0	11	0	0	114	16	38					
cSH	884	1700	1114	1700	1700	215	181					
Volume to Capacity	0.04	0.26	0.01	0.35	0.07	0.18	1.11					
Queue Length 95th (m)	1.0	0.0	0.2	0.0	0.0	4.8	76.2					
Control Delay (s)	9.3	0.0	8.3	0.0	0.0	25.3	152.6					
Lane LOS	A		A			D	F					
Approach Delay (s)	0.7		0.1			25.3	152.6					
Approach LOS						D	F					
Intersection Summary												
Average Delay	22.1											
Intersection Capacity Utilization	52.9%			ICU Level of Service			A					
Analysis Period (min)	15											

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2035 Background PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	415	570	30	30	50
Future Volume (Veh/h)	35	415	570	30	30	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	451	620	33	33	54
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	653				1164	636
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	653				1164	636
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	89
cM capacity (veh/h)	934				206	478
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	451	653	87		
Volume Left	38	0	0	33		
Volume Right	0	0	33	54		
cSH	934	1700	1700	319		
Volume to Capacity	0.04	0.27	0.38	0.27		
Queue Length 95th (m)	1.0	0.0	0.0	8.3		
Control Delay (s)	9.0	0.0	0.0	20.5		
Lane LOS	A			C		
Approach Delay (s)	0.7		0.0	20.5		
Approach LOS				C		
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			43.2%	ICU Level of Service		A
Analysis Period (min)			15			

## **Appendix E: Future Background Traffic Signal Warrants**



## GENERAL INFORMATION

Analyst	Michael Cullip	Jurisdiction/Area	Town of The Blue Mountains	Date	March 2021
Agency or Company	Tatham Engineering	East-West Street	Highway 26		
Analysis Period	2025	North-South Street	Lora Bay Drive / 11th Line		
Flow Conditions	Free flow (rural)	Major Street	East-West		
T Intersection	No	Approach Lanes per Direction	1		
		Existing or Planned Intersection	existing intersection		
Additional Comments					

## TRAFFIC & PEDESTRIAN VOLUMES

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) ÷ 4		
	right	thru	left	right	thru	left	right	thru	left
<b>MAJOR STREET</b>									
Eastbound	10	380	25	10	330	30	5	178	14
Westbound	80	320	10	100	455	10	45	194	5
<b>MINOR STREET</b>									
Northbound	10	10	10	15	10	10	6	5	5
Southbound	30	10	100	30	20	120	15	8	55
<b>PEDESTRIANS</b>									
crossing MAJOR street		0			0			0	
crossing MINOR street		0			0			0	

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) ÷ 4		
	major	minor	total	major	minor	total	major	minor	total
<b>APPROACH VOLUMES</b>	825	170	995	935	205	1140	440	94	534
<b>CROSSING VOLUMES</b>			120			150			68

## JUSTIFICATION 7 - PROJECTED VOLUMES

Justification	Description	Warrant Level	Warrant Adjustment	Sectional Numerical	Sectional Compliance	Entire Compliance
<b>1. MINIMUM VEHICULAR VOLUMES</b>	A. Vehicle volume, all approaches (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	534	93%	65%
	B. Vehicle volume, along minor streets (average hour)	120 or 180 <small>(full intersection) (tee intersection)</small>	120%	94	65%	
<b>2. DELAY TO CROSS TRAFFIC</b>	A. Vehicle volume, major street (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	440	76%	76%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50 or 120 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	68	100%	

Signals are warranted if BOTH Justification 1A and Justification 1B OR Justification 2A and Justification 2B are 100% compliant.

Not Warranted

Signals are warranted if THE LESSER of Justification 1A or 1B AND the lesser of Justification 2A or Justification 2B are 80% compliant.

Not Warranted

### Notes:

Restricted Flow Conditions

- roads with operating speeds less than 70 km/h
- normally encountered in urban areas where the traffic volumes approach or exceed practical working capacity of road

Free Flow Conditions

- roads with operating speeds greater than or equal to 70 km/h
- normally encountered in rural areas
- may also be used at intersections within the built-up area of a community with < 10 000 people and outside the commuting influence of a large urban centre, even if the speed is less than 70 km/h

## GENERAL INFORMATION

<b>Analyst</b>	Michael Cullip	<b>Jurisdiction/Area</b>	Town of The Blue Mountains	<b>Date</b>	March 2021
<b>Agency or Company</b>	Tatham Engineering	<b>East-West Street</b>	Highway 26		
<b>Analysis Period</b>	2030	<b>North-South Street</b>	Lora Bay Drive / 11th Line		
<b>Flow Conditions</b>	Free flow (rural)	<b>Major Street</b>	East-West		
<b>T Intersection</b>	No	<b>Approach Lanes per Direction</b>	1		
		<b>Existing or Planned Intersection</b>	existing intersection		
<b>Additional Comments</b>					

## TRAFFIC & PEDESTRIAN VOLUMES

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) ÷ 4		
	right	thru	left	right	thru	left	right	thru	left
<b>MAJOR STREET</b>									
Eastbound	10	420	25	10	360	30	5	195	14
Westbound	85	350	10	105	505	10	48	214	5
<b>MINOR STREET</b>									
Northbound	10	10	10	15	10	10	6	5	5
Southbound	30	10	105	30	20	125	15	8	58
<b>PEDESTRIANS</b>									
crossing MAJOR street		0			0			0	
crossing MINOR street		0			0			0	

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) ÷ 4		
	major	minor	total	major	minor	total	major	minor	total
<b>APPROACH VOLUMES</b>	900	175	1075	1020	210	1230	480	96	576
<b>CROSSING VOLUMES</b>			125			155			70

## JUSTIFICATION 7 - PROJECTED VOLUMES

Justification	Description	Warrant Level	Warrant Adjustment	Sectional Numerical	Sectional Compliance	Entire Compliance
<b>1. MINIMUM VEHICULAR VOLUMES</b>	A. Vehicle volume, all approaches (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	576	100%	67%
	B. Vehicle volume, along minor streets (average hour)	120 or 180 <small>(full intersection) (tee intersection)</small>	120%	96	67%	
<b>2. DELAY TO CROSS TRAFFIC</b>	A. Vehicle volume, major street (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	480	83%	83%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50 or 120 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	70	100%	

Signals are warranted if BOTH Justification 1A and Justification 1B OR Justification 2A and Justification 2B are 100% compliant.

Not Warranted

Signals are warranted if THE LESSER of Justification 1A or 1B AND the lesser of Justification 2A or Justification 2B are 80% compliant.

Not Warranted

### Notes:

Restricted Flow Conditions

- roads with operating speeds less than 70 km/h
- normally encountered in urban areas where the traffic volumes approach or exceed practical working capacity of road

Free Flow Conditions

- roads with operating speeds greater than or equal to 70 km/h
- normally encountered in rural areas
- may also be used at intersections within the built-up area of a community with < 10 000 people and outside the commuting influence of a large urban centre, even if the speed is less than 70 km/h

## GENERAL INFORMATION

Analyst	Michael Cullip	Jurisdiction/Area	Town of The Blue Mountains	Date	March 2021
Agency or Company	Tatham Engineering	East-West Street	Highway 26		
Analysis Period	2035	North-South Street	Lora Bay Drive / 11th Line		
Flow Conditions	Free flow (rural)	Major Street	East-West		
T Intersection	No	Approach Lanes per Direction	1		
		Existing or Planned Intersection	existing intersection		
Additional Comments					

## TRAFFIC & PEDESTRIAN VOLUMES

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) + 4		
	right	thru	left	right	thru	left	right	thru	left
<b>MAJOR STREET</b>									
Eastbound	10	465	25	10	400	35	5	216	15
Westbound	85	385	10	105	555	10	48	235	5
<b>MINOR STREET</b>									
Northbound	10	10	10	15	10	10	6	5	5
Southbound	35	10	105	35	20	130	18	8	59
<b>PEDESTRIANS</b>									
crossing MAJOR street		0			0			0	
crossing MINOR street		0			0			0	

	AM Peak Hour			PM Peak Hour			Average Hour (AM+PM) + 4		
	major	minor	total	major	minor	total	major	minor	total
<b>APPROACH VOLUMES</b>	980	180	1160	1115	220	1335	524	100	624
<b>CROSSING VOLUMES</b>			125			160			71

## JUSTIFICATION 7 - PROJECTED VOLUMES

Justification	Description	Warrant Level	Warrant Adjustment	Sectional Numerical	Sectional Compliance	Entire Compliance
<b>1. MINIMUM VEHICULAR VOLUMES</b>	A. Vehicle volume, all approaches (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	624	100%	69%
	B. Vehicle volume, along minor streets (average hour)	120 or 180 <small>(full intersection) (tee intersection)</small>	120%	100	69%	
<b>2. DELAY TO CROSS TRAFFIC</b>	A. Vehicle volume, major street (average hour)	480 or 600 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	524	91%	91%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50 or 120 <small>(1 lane approach on main road) (2 or more lane approach on main road)</small>	120%	71	100%	

Signals are warranted if BOTH Justification 1A and Justification 1B OR Justification 2A and Justification 2B are 100% compliant.

Not Warranted

Signals are warranted if THE LESSER of Justification 1A or 1B AND the lesser of Justification 2A or Justification 2B are 80% compliant.

Not Warranted

### Notes:

Restricted Flow Conditions

- roads with operating speeds less than 70 km/h
- normally encountered in urban areas where the traffic volumes approach or exceed practical working capacity of road

Free Flow Conditions





















- roads with operating speeds greater than or equal to 70 km/h
- normally encountered in rural areas
- may also be used at intersections within the built-up area of a community with < 10 000 people and outside the commuting influence of a large urban centre, even if the speed is less than 70 km/h

## **Appendix F: Future Background Intersection Operations with Improvements**

# HCM Signalized Intersection Capacity Analysis

## 1: 11th Line/Lora Bay Drive & Hwy 26

2035 BG AM Peak Hour + Traffic Signals

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	465	10	10	385	85	10	10	10	105	10	15
Future Volume (vph)	25	465	10	10	385	85	10	10	10	105	10	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.95			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	
Satd. Flow (prot)	1789	1877		1789	1883	1601		1769			1783	
Flt Permitted	0.52	1.00		0.41	1.00	1.00		0.85			0.74	
Satd. Flow (perm)	970	1877		769	1883	1601		1521			1381	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	505	11	11	418	92	11	11	11	114	11	16
RTOR Reduction (vph)	0	2	0	0	0	53	0	8	0	0	5	0
Lane Group Flow (vph)	27	514	0	11	418	39	0	25	0	0	136	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.1	15.1		15.1	15.1	15.1		8.1			8.1	
Effective Green, g (s)	15.1	15.1		15.1	15.1	15.1		8.1			8.1	
Actuated g/C Ratio	0.43	0.43		0.43	0.43	0.43		0.23			0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	416	805		329	807	686		350			317	
v/s Ratio Prot		c0.27			0.22							
v/s Ratio Perm	0.03			0.01		0.02		0.02			c0.10	
v/c Ratio	0.06	0.64		0.03	0.52	0.06		0.07			0.43	
Uniform Delay, d1	5.9	7.9		5.8	7.4	5.9		10.6			11.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	1.7		0.0	0.6	0.0		0.4			4.2	
Delay (s)	6.0	9.6		5.9	7.9	5.9		11.0			15.8	
Level of Service	A	A		A	A	A		B			B	
Approach Delay (s)		9.4			7.5			11.0			15.8	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.4			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		35.2			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		49.0%			ICU Level of Service			A				
Analysis Period (min)		15										





















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# HCM Signalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2035 BG PM Peak Hour + Signals

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	400	10	10	555	105	10	10	15	130	20	35
Future Volume (vph)	35	400	10	10	555	105	10	10	15	130	20	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	
Satd. Flow (prot)	1789	1876		1789	1883	1601		1751			1773	
Flt Permitted	0.34	1.00		0.49	1.00	1.00		0.86			0.77	
Satd. Flow (perm)	635	1876		917	1883	1601		1528			1408	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	435	11	11	603	114	11	11	16	141	22	38
RTOR Reduction (vph)	0	3	0	0	0	60	0	13	0	0	9	0
Lane Group Flow (vph)	38	443	0	11	603	54	0	25	0	0	192	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	18.3	18.3		18.3	18.3	18.3		8.2			8.2	
Effective Green, g (s)	18.3	18.3		18.3	18.3	18.3		8.2			8.2	
Actuated g/C Ratio	0.48	0.48		0.48	0.48	0.48		0.21			0.21	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	301	891		435	895	760		325			299	
v/s Ratio Prot		0.24			c0.32							
v/s Ratio Perm	0.06			0.01		0.03		0.02			c0.14	
v/c Ratio	0.13	0.50		0.03	0.67	0.07		0.08			0.64	
Uniform Delay, d1	5.6	6.9		5.4	7.8	5.5		12.1			13.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.2	0.4		0.0	2.0	0.0		0.5			10.1	
Delay (s)	5.8	7.4		5.4	9.8	5.5		12.6			23.9	
Level of Service	A	A		A	A	A		B			C	
Approach Delay (s)		7.3			9.1			12.6			23.9	
Approach LOS		A			A			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		10.6			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		38.5			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		56.3%			ICU Level of Service			B				
Analysis Period (min)		15										





















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## **Appendix G: Future Total Intersection Operations**

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26












2025 Total AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	380	10	10	320	90	10	10	10	125	10	20
Future Volume (Veh/h)	25	380	10	10	320	90	10	10	10	125	10	20
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)	27	413	11	11	348	98	11	11	11	136	11	22
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	446			424			870	940	418	854	848	348
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446			424			870	940	418	854	848	348
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 %	98			99			96	96	98	47	96	97
cM capacity (veh/h)	1114			1135			249	255	635	258	288	695
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	27	424	11	348	98	33	169					
Volume Left	27	0	11	0	0	11	136					
Volume Right	0	11	0	0	98	11	22					
cSH	1114	1700	1135	1700	1700	315	283					
Volume to Capacity	0.02	0.25	0.01	0.20	0.06	0.10	0.60					
Queue Length 95th (m)	0.6	0.0	0.2	0.0	0.0	2.6	27.0					
Control Delay (s)	8.3	0.0	8.2	0.0	0.0	17.8	34.9					
Lane LOS	A		A			C	D					
Approach Delay (s)	0.5		0.2			17.8	34.9					
Approach LOS						C	D					
Intersection Summary												
Average Delay	6.1											
Intersection Capacity Utilization	42.8%			ICU Level of Service			A					
Analysis Period (min)	15											

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road





















2025 Total AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	400	330	20	15	20
Future Volume (Veh/h)	25	400	330	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	435	359	22	16	22
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	381				859	370
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	381				859	370
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				95	97
cM capacity (veh/h)	1177				319	676
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	27	435	381	38		
Volume Left	27	0	0	16		
Volume Right	0	0	22	22		
cSH	1177	1700	1700	460		
Volume to Capacity	0.02	0.26	0.22	0.08		
Queue Length 95th (m)	0.5	0.0	0.0	2.0		
Control Delay (s)	8.1	0.0	0.0	13.5		
Lane LOS	A			B		
Approach Delay (s)	0.5		0.0	13.5		
Approach LOS				B		
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			31.1%		ICU Level of Service	A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26












2025 Total PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	330	10	10	455	125	10	10	15	135	20	35
Future Volume (Veh/h)	35	330	10	10	455	125	10	10	15	135	20	35
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)	38	359	11	11	495	136	11	11	16	147	22	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	631			370			1006	1094	364	974	963	495
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	631			370			1006	1094	364	974	963	495
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 %	96			99			94	95	98	30	91	93
cM capacity (veh/h)	951			1189			184	204	680	209	243	575
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	38	370	11	495	136	38	207					
Volume Left	38	0	11	0	0	11	147					
Volume Right	0	11	0	0	136	16	38					
cSH	951	1700	1189	1700	1700	277	240					
Volume to Capacity	0.04	0.22	0.01	0.29	0.08	0.14	0.86					
Queue Length 95th (m)	0.9	0.0	0.2	0.0	0.0	3.6	53.0					
Control Delay (s)	8.9	0.0	8.1	0.0	0.0	20.1	71.2					
Lane LOS	A		A			C	F					
Approach Delay (s)	0.8		0.1			20.1	71.2					
Approach LOS						C	F					
Intersection Summary												
Average Delay	12.3											
Intersection Capacity Utilization	53.1%			ICU Level of Service			A					
Analysis Period (min)	15											

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2025 Total PM Peak Hour





















						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	350	470	30	30	45
Future Volume (Veh/h)	35	350	470	30	30	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	380	511	33	33	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	544				984	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	544				984	528
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				88	91
cM capacity (veh/h)	1025				265	551
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	380	544	82		
Volume Left	38	0	0	33		
Volume Right	0	0	33	49		
cSH	1025	1700	1700	384		
Volume to Capacity	0.04	0.22	0.32	0.21		
Queue Length 95th (m)	0.9	0.0	0.0	6.1		
Control Delay (s)	8.6	0.0	0.0	16.9		
Lane LOS	A			C		
Approach Delay (s)	0.8		0.0	16.9		
Approach LOS				C		
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.2%	ICU Level of Service		A
Analysis Period (min)			15			



# HCM Signalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2030 Total AM Peak Hour












												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	420	10	10	350	90	10	10	15	130	10	20
Future Volume (vph)	30	420	10	10	350	90	10	10	15	130	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	
Satd. Flow (prot)	1789	1877		1789	1883	1601		1751			1779	
Flt Permitted	0.54	1.00		0.46	1.00	1.00		0.85			0.74	
Satd. Flow (perm)	1010	1877		860	1883	1601		1514			1371	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	457	11	11	380	98	11	11	16	141	11	22
RTOR Reduction (vph)	0	2	0	0	0	58	0	12	0	0	5	0
Lane Group Flow (vph)	33	466	0	11	380	40	0	26	0	0	169	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	13.9	13.9		13.9	13.9	13.9		8.1			8.1	
Effective Green, g (s)	13.9	13.9		13.9	13.9	13.9		8.1			8.1	
Actuated g/C Ratio	0.41	0.41		0.41	0.41	0.41		0.24			0.24	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	412	767		351	769	654		360			326	
v/s Ratio Prot		c0.25			0.20							
v/s Ratio Perm	0.03			0.01		0.03		0.02			c0.12	
v/c Ratio	0.08	0.61		0.03	0.49	0.06		0.07			0.52	
Uniform Delay, d1	6.1	7.9		6.0	7.4	6.1		10.0			11.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	1.4		0.0	0.5	0.0		0.4			5.8	
Delay (s)	6.2	9.3		6.1	7.9	6.1		10.4			17.0	
Level of Service	A	A		A	A	A		B			B	
Approach Delay (s)		9.1			7.5			10.4			17.0	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.6										
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		34.0										
Intersection Capacity Utilization		50.5%										
Analysis Period (min)		15										

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road




















2030 Total AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	445	360	20	15	20
Future Volume (Veh/h)	25	445	360	20	15	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	484	391	22	16	22
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	413				940	402
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	413				940	402
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				94	97
cM capacity (veh/h)	1146				286	648
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	27	484	413	38		
Volume Left	27	0	0	16		
Volume Right	0	0	22	22		
cSH	1146	1700	1700	423		
Volume to Capacity	0.02	0.28	0.24	0.09		
Queue Length 95th (m)	0.5	0.0	0.0	2.2		
Control Delay (s)	8.2	0.0	0.0	14.4		
Lane LOS	A			B		
Approach Delay (s)	0.4		0.0	14.4		
Approach LOS				B		
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			33.4%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Signalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2030 Total PM Peak Hour












												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	360	10	10	505	135	10	10	15	140	20	35
Future Volume (vph)	40	360	10	10	505	135	10	10	15	140	20	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	
Satd. Flow (prot)	1789	1876		1789	1883	1601		1751			1774	
Flt Permitted	0.38	1.00		0.53	1.00	1.00		0.86			0.76	
Satd. Flow (perm)	720	1876		990	1883	1601		1525			1403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	391	11	11	549	147	11	11	16	152	22	38
RTOR Reduction (vph)	0	3	0	0	0	80	0	12	0	0	9	0
Lane Group Flow (vph)	43	399	0	11	549	67	0	26	0	0	203	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	16.9	16.9		16.9	16.9	16.9		8.1			8.1	
Effective Green, g (s)	16.9	16.9		16.9	16.9	16.9		8.1			8.1	
Actuated g/C Ratio	0.46	0.46		0.46	0.46	0.46		0.22			0.22	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	328	856		452	860	731		333			307	
v/s Ratio Prot		0.21			c0.29							
v/s Ratio Perm	0.06			0.01		0.04		0.02			c0.14	
v/c Ratio	0.13	0.47		0.02	0.64	0.09		0.08			0.66	
Uniform Delay, d1	5.8	6.9		5.5	7.7	5.7		11.5			13.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.2	0.4		0.0	1.6	0.1		0.4			10.8	
Delay (s)	6.0	7.3		5.5	9.3	5.8		11.9			24.0	
Level of Service	A	A		A	A	A		B			C	
Approach Delay (s)		7.2			8.5			11.9			24.0	
Approach LOS		A			A			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		10.5			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.65										
Actuated Cycle Length (s)		37.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		60.8%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road





















2030 Total PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	380	520	30	30	45
Future Volume (Veh/h)	35	380	520	30	30	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	413	565	33	33	49
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	598				1070	582
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598				1070	582
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				86	90
cM capacity (veh/h)	979				235	513
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	413	598	82		
Volume Left	38	0	0	33		
Volume Right	0	0	33	49		
cSH	979	1700	1700	348		
Volume to Capacity	0.04	0.24	0.35	0.24		
Queue Length 95th (m)	0.9	0.0	0.0	6.9		
Control Delay (s)	8.8	0.0	0.0	18.5		
Lane LOS	A			C		
Approach Delay (s)	0.7		0.0	18.5		
Approach LOS				C		
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.3%	ICU Level of Service		A
Analysis Period (min)			15			

# HCM Signalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2035 Total AM Peak Hour

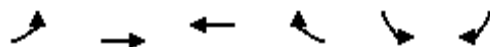
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	465	10	10	385	95	10	10	10	130	10	25
Future Volume (vph)	30	465	10	10	385	95	10	10	10	130	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.95			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	
Satd. Flow (prot)	1789	1877		1789	1883	1601		1769			1775	
Flt Permitted	0.52	1.00		0.41	1.00	1.00		0.83			0.75	
Satd. Flow (perm)	970	1877		769	1883	1601		1496			1383	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	505	11	11	418	103	11	11	11	141	11	27
RTOR Reduction (vph)	0	2	0	0	0	59	0	8	0	0	7	0
Lane Group Flow (vph)	33	514	0	11	418	44	0	25	0	0	172	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.1	15.1		15.1	15.1	15.1		8.1			8.1	
Effective Green, g (s)	15.1	15.1		15.1	15.1	15.1		8.1			8.1	
Actuated g/C Ratio	0.43	0.43		0.43	0.43	0.43		0.23			0.23	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	416	805		329	807	686		344			318	
v/s Ratio Prot		c0.27			0.22							
v/s Ratio Perm	0.03			0.01		0.03		0.02			c0.12	
v/c Ratio	0.08	0.64		0.03	0.52	0.06		0.07			0.54	
Uniform Delay, d1	5.9	7.9		5.8	7.4	5.9		10.6			11.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	1.7		0.0	0.6	0.0		0.4			6.5	
Delay (s)	6.0	9.6		5.9	7.9	5.9		11.0			18.4	
Level of Service	A	A		A	A	A		B			B	
Approach Delay (s)		9.4			7.5			11.0			18.4	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.9										
HCM 2000 Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		35.2										
Intersection Capacity Utilization		51.0%										
Analysis Period (min)		15										





c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2035 Total AM Peak Hour























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	490	400	20	15	25
Future Volume (Veh/h)	30	490	400	20	15	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	533	435	22	16	27
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	457				1045	446
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	457				1045	446
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				93	96
cM capacity (veh/h)	1104				246	612
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	33	533	457	43		
Volume Left	33	0	0	16		
Volume Right	0	0	22	27		
cSH	1104	1700	1700	394		
Volume to Capacity	0.03	0.31	0.27	0.11		
Queue Length 95th (m)	0.7	0.0	0.0	2.8		
Control Delay (s)	8.4	0.0	0.0	15.3		
Lane LOS	A			C		
Approach Delay (s)	0.5		0.0	15.3		
Approach LOS				C		
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			35.8%		ICU Level of Service	
Analysis Period (min)			15			
A						



# HCM Signalized Intersection Capacity Analysis

1: 11th Line/Lora Bay Drive & Hwy 26

2035 Total PM Peak Hour













												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	400	10	10	555	135	10	10	15	145	20	35
Future Volume (vph)	40	400	10	10	555	135	10	10	15	145	20	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94			0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	
Satd. Flow (prot)	1789	1876		1789	1883	1601		1751			1775	
Flt Permitted	0.34	1.00		0.49	1.00	1.00		0.87			0.76	
Satd. Flow (perm)	638	1876		917	1883	1601		1544			1400	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	435	11	11	603	147	11	11	16	158	22	38
RTOR Reduction (vph)	0	3	0	0	0	77	0	13	0	0	9	0
Lane Group Flow (vph)	43	443	0	11	603	70	0	25	0	0	209	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	18.6	18.6		18.6	18.6	18.6		8.2			8.2	
Effective Green, g (s)	18.6	18.6		18.6	18.6	18.6		8.2			8.2	
Actuated g/C Ratio	0.48	0.48		0.48	0.48	0.48		0.21			0.21	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	305	899		439	902	767		326			295	
v/s Ratio Prot		0.24			c0.32							
v/s Ratio Perm	0.07			0.01		0.04		0.02			c0.15	
v/c Ratio	0.14	0.49		0.03	0.67	0.09		0.08			0.71	
Uniform Delay, d1	5.6	6.9		5.3	7.7	5.5		12.3			14.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.2	0.4		0.0	1.9	0.1		0.5			13.5	
Delay (s)	5.9	7.3		5.3	9.6	5.6		12.7			27.7	
Level of Service	A	A		A	A	A		B			C	
Approach Delay (s)		7.2			8.8			12.7			27.7	
Approach LOS		A			A			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			38.8				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			61.1%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Hwy 26 & Christie Beach Road

2035 Total PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations					 	
Traffic Volume (veh/h)	35	420	570	30	30	50
Future Volume (Veh/h)	35	420	570	30	30	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	457	620	33	33	54
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	653				1170	636
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	653				1170	636
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	89
cM capacity (veh/h)	934				205	478
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	38	457	653	87		
Volume Left	38	0	0	33		
Volume Right	0	0	33	54		
cSH	934	1700	1700	317		
Volume to Capacity	0.04	0.27	0.38	0.27		
Queue Length 95th (m)	1.0	0.0	0.0	8.3		
Control Delay (s)	9.0	0.0	0.0	20.6		
Lane LOS	A			C		
Approach Delay (s)	0.7		0.0	20.6		
Approach LOS				C		
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			43.2%	ICU Level of Service		A
Analysis Period (min)			15			

## Queuing and Blocking Report

### Baseline

06/30/2022

#### Intersection: 1: 11th Line/Lora Bay Drive & Hwy 26

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	TR	L	T	R	LTR	LTR
Maximum Queue (m)	16.5	63.4	16.8	50.9	20.0	14.1	32.6
Average Queue (m)	5.4	29.9	2.1	23.4	7.6	5.1	14.1
95th Queue (m)	14.5	52.1	9.7	42.2	15.9	13.2	27.2
Link Distance (m)	1618.9		964.4		323.5		685.5
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	105.0		30.0		90.0		
Storage Blk Time (%)	2						
Queuing Penalty (veh)	3						

#### Intersection: 2: Hwy 26 & Christie Beach Road

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	14.4	13.6
Average Queue (m)	3.3	4.5
95th Queue (m)	11.3	9.8
Link Distance (m)	668.9	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	90.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Network Summary

Network wide Queuing Penalty: 3

## Queuing and Blocking Report

### Baseline

06/30/2022

#### Intersection: 1: 11th Line/Lora Bay Drive & Hwy 26

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	TR	L	T	R	LTR	LTR
Maximum Queue (m)	20.5	56.6	21.3	59.5	21.1	19.1	39.9
Average Queue (m)	7.0	26.0	2.1	31.6	9.3	5.5	20.1
95th Queue (m)	16.8	47.4	10.8	51.5	18.0	14.3	35.2
Link Distance (m)	1618.9		964.4		323.5		685.5
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	105.0		30.0		90.0		
Storage Blk Time (%)					5		
Queuing Penalty (veh)					7		

#### Intersection: 2: Hwy 26 & Christie Beach Road

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	12.1	21.2
Average Queue (m)	3.4	7.3
95th Queue (m)	11.1	15.6
Link Distance (m)	668.9	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	90.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

#### Network Summary

Network wide Queuing Penalty: 7
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