

**Frazier, Dan**

---

**From:** Johnson, Joshua A. <JohnsonJA@scdot.org>  
**Sent:** Friday, June 14, 2024 10:51 AM  
**To:** Turner, Dillon  
**Cc:** JuLeigh Fleming; Icard, Kevin; Daniel Keefer; Frazier, Dan; Grooms, Robert W.; Weatherford, Luke A.  
**Subject:** RE: 9 Bruin TIA (Joiner Property)  
**Attachments:** 20240613 - Bruin Road Development TIA\_FINAL .pdf

Dillon,

The 9 Bruin Rd Joiner Property TIA is accepted with no external mitigation required, including no changes to pavement markings or signing on Bruin Rd. The plan set will include a sight distance exhibit to confirm no changes to on-street parking are needed. Please provide the TIA and this approval email with the encroachment application in EPPS.

Thank you,



**Josh Johnson, PE, PTOE**

*District 6 Traffic Engineer*

P 843-746-6719 E johnsonja@scdot.org

South Carolina Department of Transportation  
 6355 Fain Street, North Charleston, SC 29406




---

**From:** Turner, Dillon <Dillon.Turner@kimley-horn.com>  
**Sent:** Thursday, June 13, 2024 3:40 PM  
**To:** Johnson, Joshua A. <JohnsonJA@scdot.org>; Frazier, Dan <dfrazier@townofbluffton.com>  
**Cc:** Fleming, Juleigh B. <FlemingJB@scdot.org>; Icard, Kevin <kicard@townofbluffton.com>; Daniel Keefer <dan@wjkltd.com>  
**Subject:** RE: 9 Bruin TIA (Joiner Property)

\*\*\* This is an EXTERNAL email. Please do not click on a link or open any attachments unless you are confident it is from a trusted source. \*\*\*

Josh, Dan, and Kevin,

Please see the attached updated signed and sealed TIA. Please let me know if you have questions on the TIA.

Thanks!  
 Dillon Turner

# **9 Bruin Road**

## **Traffic Impact Analysis**

Bluffton, South Carolina

*Prepared by*

**Kimley»Horn**

Original April 2024,  
Updated June 2024  
© Kimley-Horn and Associates, Inc.

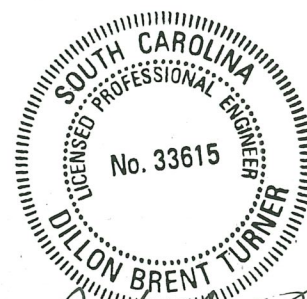
# 9 Bruin Road

## Traffic Impact Analysis

Bluffton, South Carolina

*Prepared by*

**Kimley»Horn**



June 13, 2024

Original April 2024,  
Updated June 2024

© Kimley-Horn and Associates, Inc.  
115 Fairchild Street, Suite 250  
Charleston, South Carolina, 29492

## Table of Contents

<b>Executive Summary .....</b>	<b>iii</b>
<b>1 Introduction.....</b>	<b>1</b>
1.1 Existing Conditions.....	1
<b>2 Project Traffic .....</b>	<b>4</b>
2.1 Trip Generation .....	4
2.2 Trip Distribution & Assignment.....	5
<b>3 Traffic Volume Development.....</b>	<b>8</b>
3.1 2024 Existing Traffic Development .....	8
3.2 2027 No-Build Traffic Development .....	8
3.3 2027 Build Traffic Development.....	8
<b>4 Capacity Analysis .....</b>	<b>12</b>
4.1 Bluffton Road/Boundary Street at May River Road/Bruin Road .....	13
4.2 Bluffton Road at Site Access #1 .....	14
4.3 Bruin Road at Site Access #2 .....	15
<b>5 Conclusion .....</b>	<b>16</b>

## List of Figures

Figure 1 – Project Location Map .....	2
Figure 2 – Existing Lane Geometry .....	3
Figure 3 – Project Trip Distribution .....	6
Figure 4 – Project Trip Assignment .....	7
Figure 5 – 2024 Existing Peak Hour Traffic Volumes .....	9
Figure 6 – 2027 No-Build Peak Hour Traffic Volumes .....	10
Figure 7 – 2027 Build Peak Hour Traffic Volumes .....	11
Figure 8 – Recommended Lane Geometry .....	17

## List of Tables

Table 1 – Trip Generation Summary .....	4
Table 2 – HCM Level of Service Criteria .....	12
Table 3 – Bluffton Road/Boundary Street at May River Road/ Bruin Road Capacity Analysis Results.....	13
Table 4 – Bluffton Road at Site Access #1 Capacity Analysis Results.....	14
Table 5 – Bruin Road at Site Access #2 Capacity Analysis Results .....	15

## List of Appendices

A – Conceptual Site Plan
B – Trip Generation Calculations
C – Traffic Volume Development Worksheets
D – Raw Turning Movement Counts
E – Historic Growth Charts and Background Development Volumes
F – Capacity Analysis Worksheets
G – Turn Lane Warrant Analysis

## Executive Summary

The proposed 9 Bruin Road Site is located on the northeast quadrant of the intersection of Bluffton Road/Boundary Street with May River Road/Bruin Road in Bluffton, South Carolina. This development is planned to consist of a mixed-use development that will consist of residential, office, restaurant, and retail buildings. Based on the conceptual site plan, it is assumed that the project will access the roadway network via two new driveways; one along Bluffton Road and one along Bruin Road.

The project is proposed to be constructed and fully occupied by 2027. This study summarizes the results of the traffic impact analyses for the 2024 Existing, 2027 No-Build, and 2027 Build conditions at the following study intersections:

1. Bluffton Road/Boundary Street and May River Road/Bruin Road
2. Bluffton Road and Site Access #1
3. Bruin Road and Site Access #2

Based on the results of the traffic analyses, the following improvements are recommended for the study area intersections:

### **Bluffton Road/Boundary Street at May River Road/Bruin Road**

- No capacity improvements are recommended at this intersection.

### **Bluffton Road at Site Access #1**

- Construct a right-in/right-out access
- Maximize available intersection spacing from the Nectar Restaurant Driveway and the Bluffton Road/Boundary Street at May River Road/Bruin Road intersection for the right-in/right-out.

### **Bruin Road at Site Access #2**

- Construct a full access driveway with one ingress lane and one egress lane.
- Install “Do Not Block Intersection” sign for westbound approach
  - Manual on Uniform Traffic Control Devices (2009 Edition) sign R10-7
- Install “Do Not Block Intersection” pavement markings at the intersection.
  - Manual on Uniform Traffic Control Devices (2009 Edition) Figure 3B-18

### **Internal Spine Road**

- Install raised speed tables to reduce the amount of cut-through traffic through the site to/from SC 46 and Bruin Road.

The recommended geometry and traffic control is shown on **Figure 8**. The Manual on Uniform Traffic Control Devices Figure 3B-18 is included in the Appendix.

## 1 Introduction

Kimley-Horn has been retained to analyze and document the traffic impacts associated with the proposed 9 Bruin Road Site located in the northeast quadrant of the intersection of Bluffton Road/Boundary Street at May River Road/Bruin Road in Bluffton, SC. The proposed development is planned to consist of residential, office, restaurant, and retail spaces. The conceptual site plan for the development is shown in **Figure 1** and is provided in **Appendix A**.

The project is proposed to be constructed and fully occupied by 2027. This study summarizes the results of the traffic analyses for the 2024 Existing, 2027 No-Build, and 2027 Build conditions at the following study intersections:

1. Bluffton Road/Boundary Street and May River Road/Bruin Road
2. Bluffton Road and Site Access #1
3. Bruin Road and Site Access #2

Based on the conceptual site plan, it is assumed that the project will access the roadway network via two new driveways; one along Bluffton Road and one along Bruin Road.

### 1.1 Existing Conditions

Bluffton Road is a two-lane urban minor arterial with a posted speed limit of 30 miles per hour (mph) in the study area. Based on SCDOT data, 18,700 vehicles per day travelled along Bluffton Road in 2023 at count station 07-0161 located at the south leg of the roundabout intersection with Bluffton Parkway.

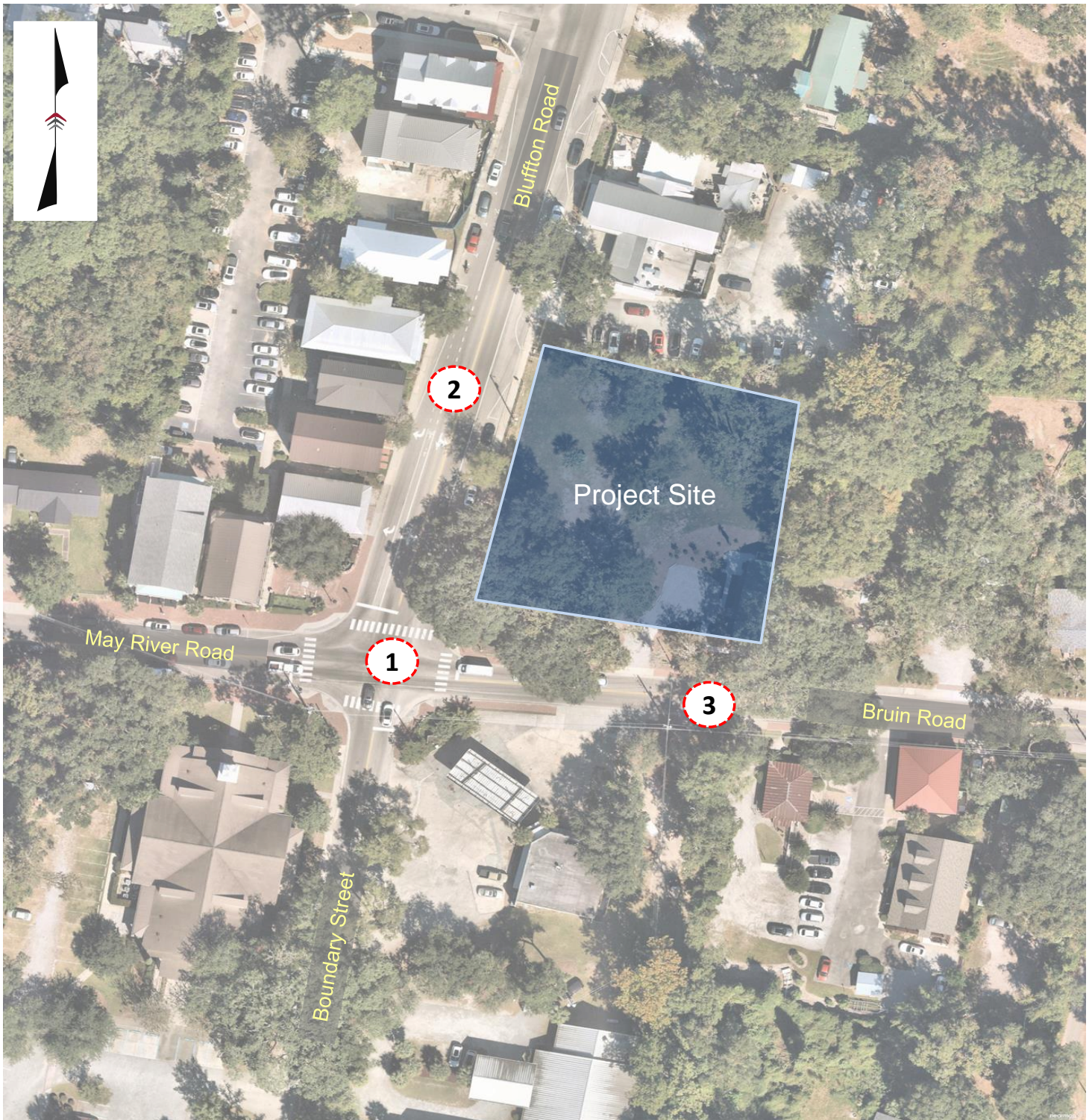
Bruin Road is a two-lane urban major collector with a speed limit of 30 mph in the study area. Based on SCDOT data, 7,900 vehicles per day travelled along Bruin Road in 2023 at count station 07-0159 located between Boundary Street and Maiden Lane.

May River Road is a two-lane urban minor arterial with a posted speed limit of 30 mph in the study area. Based on SCDOT data, 15,200 vehicles per day travelled along May River Road in 2023 at count station 07-0157 located between Whispering Pine Street and Stock Farm Road.

Boundary Street is a two-lane local road with a speed limit of 25 mph in the study area. Based on SCDOT data, 3,700 vehicles per day travelled along Boundary Street in 2023 at count station 07-0749 located between Lawton Street and Church Street.

The existing geometry and traffic control for the study area intersections is illustrated in **Figure 2**.

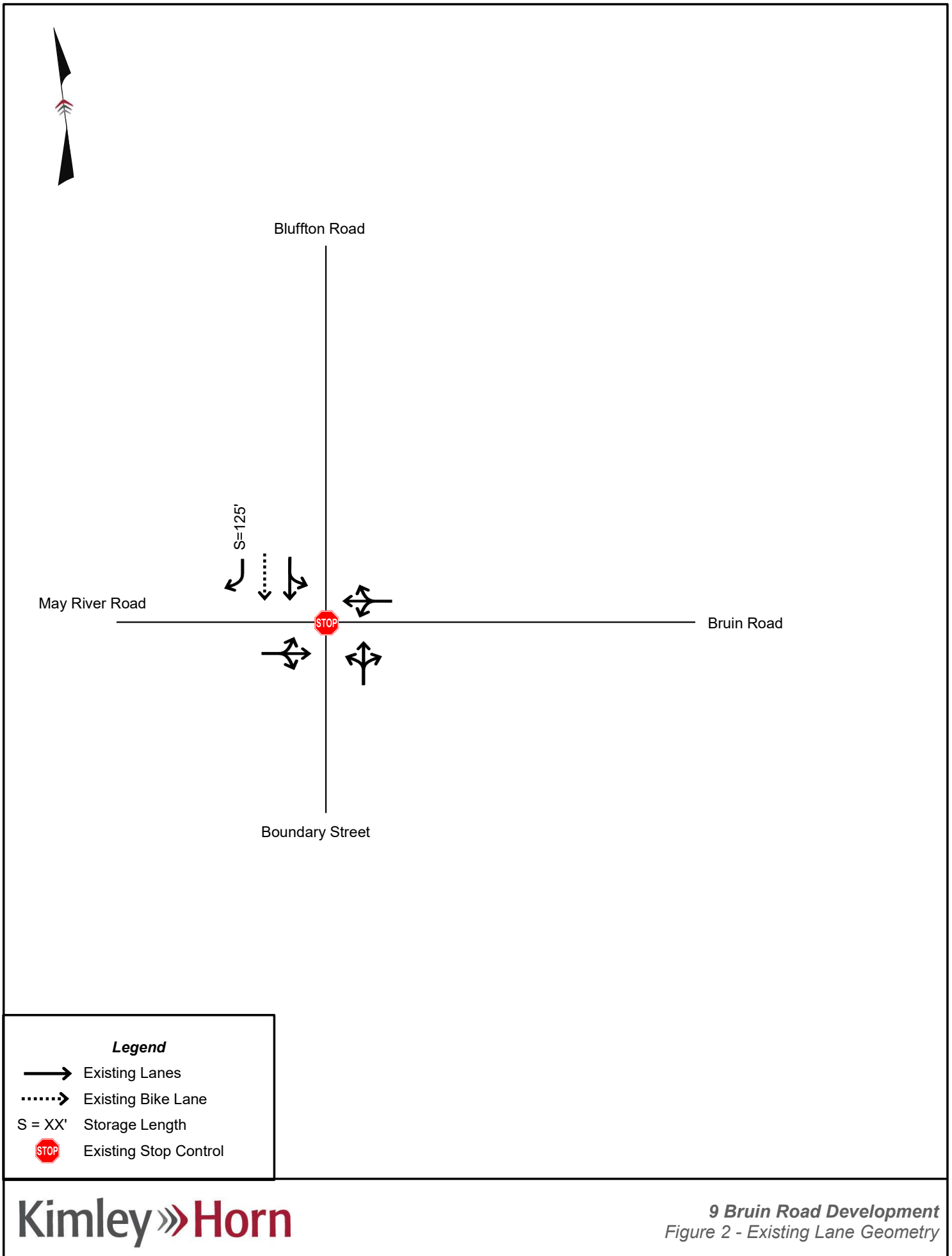




### **Study Intersections**

- 1.) Bluffton Road at Bruin Road
- 2.) Bluffton Road at Site Access #1
- 3.) Bruin Road at Site Access #2





## 2 Project Traffic

### 2.1 Trip Generation

The trip generation rates and equations published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual; 11th Edition* were used to estimate the trip generation potential for the development. The analysis was performed using the information for the anticipated mix of residential, office, retail, and restaurant land uses. The anticipated uses are as follows:

- LUC 210 – Single Family Detached Housing – (2 dwelling units)
- LUC 712 – Small Office Building – (8,900 square feet)
- LUC 822 – Strip Retail Plaza (<40k) – (8,900 square Feet)
- LUC 932 – High Turnover (Sit-Down) Restaurant – (1,000 square feet)

As shown in **Table 1**, the development is anticipated to generate 44 (30 In/14 Out) AM peak hour trips and 85 (40 In/45 Out) PM peak hour trips during a typical weekday. The estimated trip generation is summarized in **Table 1**, and the trip generation calculations can be found in **Appendix B**.

Based on the mixed-use nature of this development, internal capture and pass-by trips are applicable and used in the trip generation calculations.

**Table 1 – Trip Generation Summary**

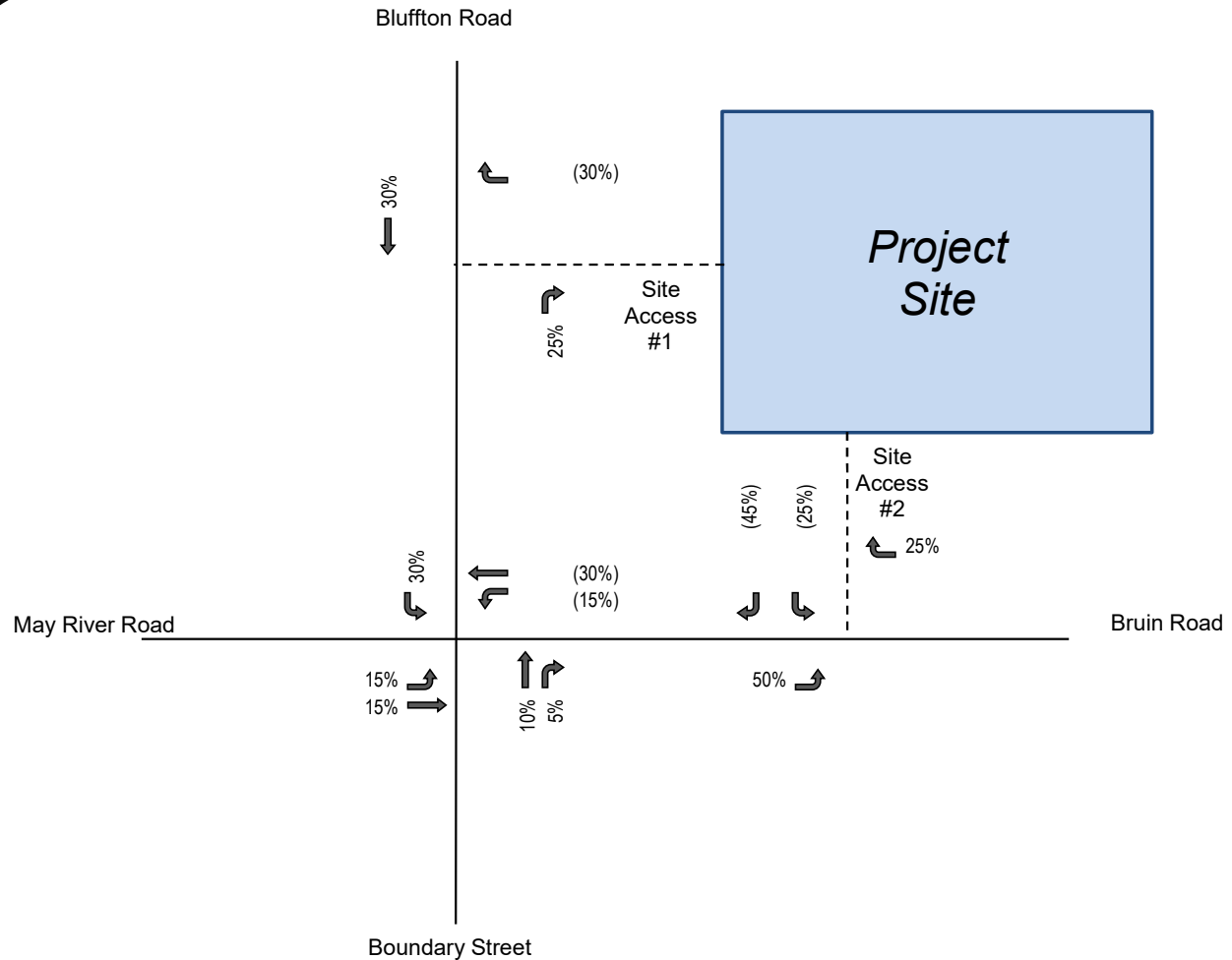
Land Use	Intensity	Units	Daily	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
210 – Single Family Detached Housing	2	DU	28	2	1	1	3	2	1
712 – Small Office Building	8.9	KSF	128	15	12	3	19	6	13
822 – Strip Retail Plaza (<40k)	8.9	KSF	605	27	16	11	72	36	36
932 – High Turnover (Sit-Down) Restaurant	1.0	KSF	107	10	6	4	9	5	4
<b>Subtotal</b>			<b>868</b>	<b>54</b>	<b>35</b>	<b>19</b>	<b>103</b>	<b>49</b>	<b>54</b>
<b>Internal Capture</b>			<b>174</b>	<b>10</b>	<b>5</b>	<b>5</b>	<b>16</b>	<b>8</b>	<b>8</b>
<b>Pass-By</b>			<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>
<b>Total Net New External Trips</b>			<b>676</b>	<b>44</b>	<b>30</b>	<b>14</b>	<b>85</b>	<b>40</b>	<b>45</b>

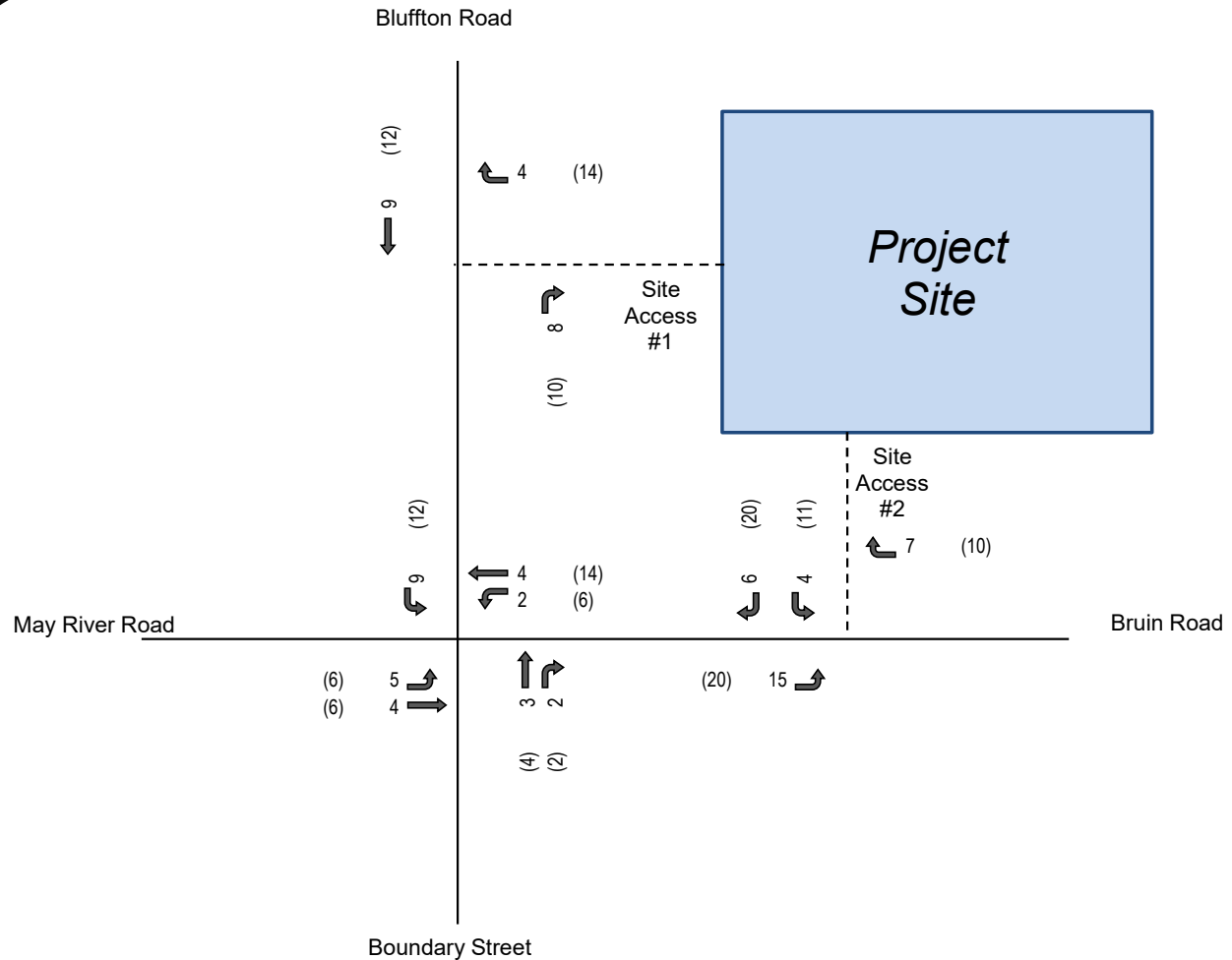
## 2.2 Trip Distribution & Assignment

New external trips generated by the proposed development were distributed and assigned to the surrounding roadway network based on existing travel patterns, surrounding land uses, and the proposed site layout. The trip distribution percentages used in this analysis are as follows.

- 30% to/from the north via Bluffton Road
- 30% to/from the west via May River Road
- 25% to/from the east via Bruin Road
- 15% to/from the south via Boundary Street

The project trip distributions are illustrated in **Figure 3** and the project trip assignments are illustrated in **Figure 4**.





#### Legend

- xx AM Peak-Hour Project Trips
- (xx) PM Peak-Hour Project Trips



### 3 Traffic Volume Development

The 2024 Existing traffic volumes were utilized in the analysis to develop future year traffic volumes. The future year volumes consisted of the existing traffic volumes adjusted by an annual growth rate and the projected traffic volumes of the proposed development. Worksheets documenting the traffic volume development are provided in **Appendix C**.

#### 3.1 2024 Existing Traffic Development

Turning movement counts (TMCs) were collected on Tuesday, March 26<sup>th</sup>, 2024, for the study area. Data was collected during the AM Peak Period (7:00 AM to 9:00 AM) and PM Peak Period (4:00 PM to 6:00 PM) and is provided in **Appendix D**.

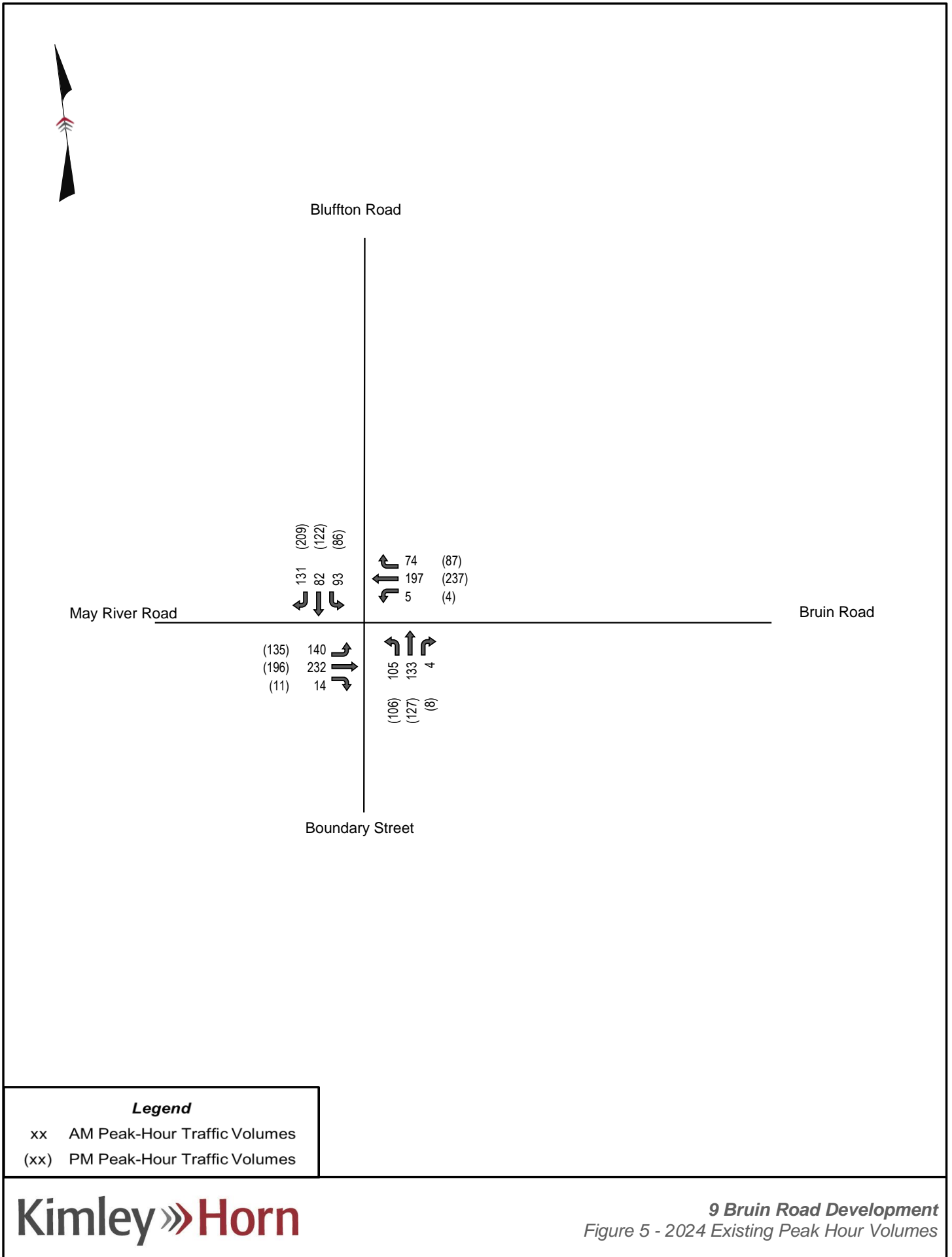
**Figure 5** illustrates the 2024 Existing Peak Hour Traffic Volumes for the AM and PM peak hours.

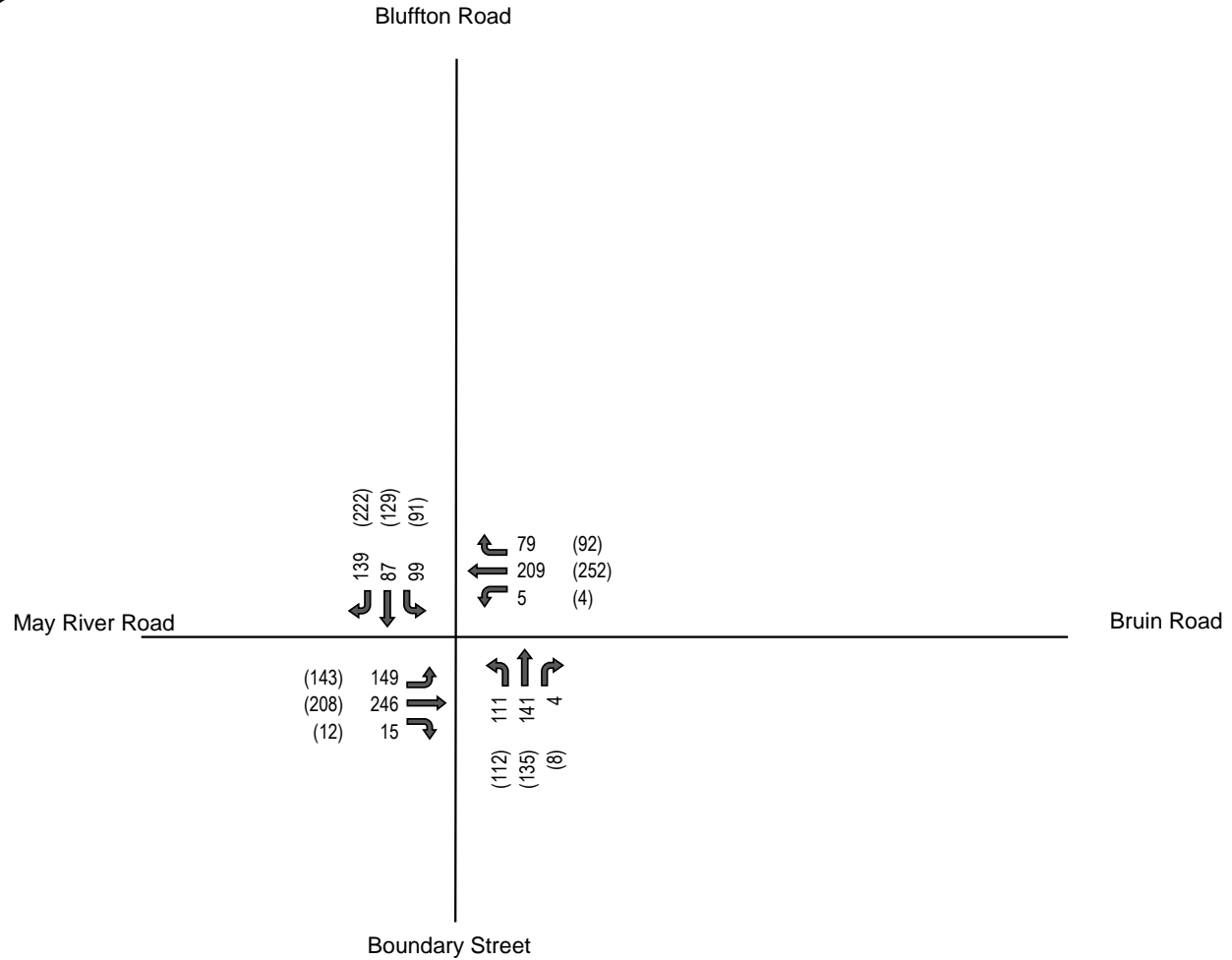
#### 3.2 2027 No-Build Traffic Development

As mentioned previously, the development will be built and operational by 2027. The future-year traffic volumes consist of the 2024 Existing traffic volumes adjusted by a growth rate for the 2027 No-Build conditions. To determine the historical growth rate in the area, traffic count data was obtained from SCDOT and includes count stations along May River Road, Bruin Road, Bluffton Road, and Boundary Street. It was determined that this area has experienced an annual growth of 2% over the past nine years. This 2% growth rate was applied to form the 2027 No-Build traffic volumes. The 2027 No-Build traffic volumes for the AM and PM peak hours are shown in **Figure 6**, and historic growth rate calculations are provided in **Appendix E**.

#### 3.3 2027 Build Traffic Development

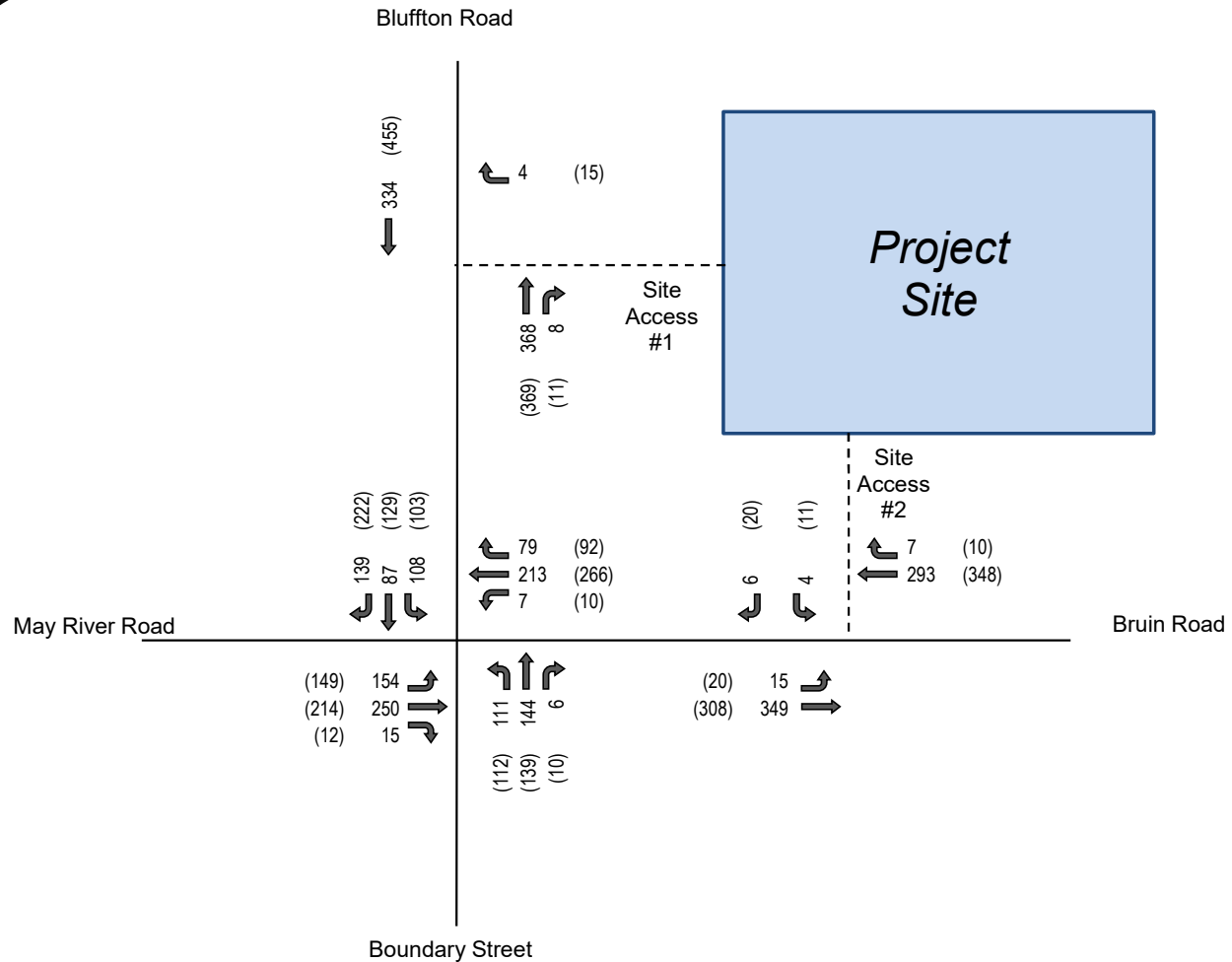
2027 Build traffic volumes were developed by adding anticipated project trips to the 2027 No-Build traffic volumes. The 2027 Build traffic volumes for the AM and PM peak hours are shown in **Figure 7**.





#### Legend

xx AM Peak-Hour Traffic Volumes  
(xx) PM Peak-Hour Traffic Volumes



#### Legend

xx AM Peak-Hour Traffic Volumes  
(xx) PM Peak-Hour Traffic Volumes

## 4 Capacity Analysis

Capacity and Level-of-Service (LOS) analyses were conducted using the Highway Capacity Manual (HCM), 6th Edition, methodologies and the Synchro, Version 11, traffic analysis software. Capacity analyses were conducted for the 2024 Existing conditions, 2027 No-Build conditions, 2027 Build conditions during the AM and PM peak hours.

Intersection level of service (LOS) grades range from LOS A to LOS F, which are directly related to the level of control delay at the intersection and characterize the operational conditions of the intersection traffic flow. LOS A operations typically represent ideal, free-flow conditions where vehicles experience little to no delays, and LOS F operations typically represent poor, gridlocked conditions with high vehicular delays, and are generally considered undesirable. **Table 2** lists the LOS control delay thresholds published in the *HCM* for unsignalized intersections.

**Table 2 – HCM Level of Service Criteria for Unsignalized Intersections**

LOS	Control Delay per Vehicle (sec/veh)
A	≤ 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

Existing peak hour factors (PHF) were utilized for the existing and future scenarios. Existing heavy vehicle percentages were utilized for all scenarios, with a minimum of 2% considered.

Unsignalized intersections operating at LOS A-LOS C are considered to operate with short delays, unsignalized intersections operating at LOS D-LOS E are considered to operate with moderate delays, and intersections operating at LOS F are considered to operate with long delays.

The following sections outline the results of the capacity analysis for each of the study intersections. The capacity analysis worksheets are included in **Appendix F**.



## 4.1 Bluffton Road/Boundary Street at May River Road/Bruin Road

The capacity analysis results for the all-way stop-control intersection of Bluffton Road/Boundary Street at May River Road/Bruin Road are summarized in **Table 3** for the analyzed conditions.

**Table 3 – Bluffton Road/Boundary Street at May River Road/Bruin Road Capacity Analysis Results**

Condition	Measure	May River Road			Bruin Road			Boundary Street			Bluffton Road			Intersection
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM Peak Hour														
2024 Existing	LOS (Delay)	D (32.3)			C (19.3)			C (19.4)			B (14.8)			C (22.3)
	Synchro 95th Q	190'			90'			80'			53'		28'	
2027 No-Build	LOS (Delay)	E (44.8)			C (23.3)			C (23.0)			C (16.4)			D (28.4)
	Synchro 95th Q	245'			115'			100'			60'		33'	
2027 Build	LOS (Delay)	F (55.1)			D (26.3)			D (25.3)			C (17.7)			D (33.1)
	Synchro 95th Q	283'			130'			110'			70'		35'	
PM Peak Hour														
2024 Existing	LOS (Delay)	D (33.3)			D (28.9)			C (22.6)			C (18.3)			D (25.6)
	Synchro 95th Q	175'			153'			93'			75'		60'	
2027 No-Build	LOS (Delay)	E (49.9)			E (42.0)			D (28.9)			C (21.8)			E (35.3)
	Synchro 95th Q	240'			208'			123'			93'		78'	
2027 Build	LOS (Delay)	F (69.9)			F (61.5)			E (35.1)			D (25.6)			E (47.8)
	Synchro 95th Q	298'			273'			145'			115'		85'	

Note:

1. Delay represented in sec/veh

As shown in **Table 3**, the intersection currently operates at a LOS C during the AM peak hour and LOS D during the PM peak hour. The LOS during the AM and PM peak hour is expected to drop to LOS D and LOS E, respectively, due to anticipated background growth. During the 2027 build conditions, the intersection is anticipated to operate at the same LOS as 2027 no-build conditions. From 2027 No-Build conditions to 2027 Build conditions, the eastbound approach LOS is anticipated to drop from LOS E to LOS F during the AM and PM peak hours and the westbound approach is anticipated to drop from LOS E to LOS F during the PM peak hour. The queue on the eastbound approach is anticipated to increase by two car lengths during the AM and PM peak hours from 2027 No-Build to Build conditions. The queue on the westbound approach is anticipated to increase by three car lengths from 2027 No-Build to 2027 Build Conditions during the PM peak hour. The proposed development only accounts for 2.2% and 3.4% of the trips during the AM and PM peak hours under the 2027 Build condition, respectively.

No mitigation is recommendation at this intersection because the intersection Level of Service (LOS) remains the same between the 2027 No-Build and 2027 Build scenarios during both the AM and PM peak hours, with a maximum queue increase of two vehicles on the eastbound and westbound approaches.

## 4.2 Bluffton Road at Site Access #1

The capacity analysis results for the unsignalized intersection of Bluffton Road and Site Access #1 are summarized in **Table 4**.

**Table 4 – Bluffton Road and Site Access #1 Capacity Analysis Results**

Condition	Measure	Site Access #1		Bluffton Road		Bluffton Road	
		WBL	WBR	NBT	NBR	SBL	SBT
AM Peak Hour							
2027 Build	LOS (Delay)	B (10.7)		A (0.0)		A (0.0)	
	Synchro 95th Q	0'		0'		0'	
PM Peak Hour							
2027 Build	LOS (Delay)	B (10.8)		A (0.0)		A (0.0)	
	Synchro 95th Q	3'		0'		0'	

Note:  
1. Delay in sec/veh

Based on the results presented in **Table 4**, the proposed site access is expected to have acceptable LOS for all approaches. A turn lane warrant analysis was conducted along Bluffton Road, and it was determined that a northbound right-turn lane would not be necessary. Turn lane warrant analysis worksheets are included in **Appendix G**.

Based on the capacity analysis, Site Access #1 should be constructed as a right-in/right-out driveway with one ingress lane and one egress lane. The spacing between this access, the Nectar Driveway and 4-way stop should be maximized. No additional mitigation is recommended for this location.

### 4.3 Bruin Road at Site Access #2

The capacity analysis results for the unsignalized intersection of Bruin Road and Site Access #2 are summarized in **Table 5** for the analyzed conditions.

**Table 5 – Bruin Road at Site Access #2 Capacity Analysis Results**

Condition	Measure	Bruin Road		Bruin Road		Site Access #2
		EBTL	WBT	WBR	SBR	
AM Peak Hour						
2027 Build	LOS (Delay)	A (8.0)	A (0.0)		B (12.1)	
	Synchro 95th Q	0'	0'		3'	
PM Peak Hour						
2027 Build	LOS (Delay)	A (8.2)	A (0.0)		B (12.7)	
	Synchro 95th Q	3'	0'		5'	

Note:  
1. Delay in sec/veh

Based on the results presented in **Table 5**, the proposed site access is expected to have acceptable LOS for all approaches. A turn lane warrant analysis was conducted along Bruin Road, and it was determined that an eastbound left-turn lane and westbound right-turn lane will not be necessary. Turn lane warrant analysis worksheets are included in **Appendix G**

Based on the capacity analysis, Site Access #2 should be constructed as a full-movement driveway with one ingress lane and one egress lane. No additional mitigation is recommended for this location.

To supplement the capacity analysis, ten SimTraffic analysis runs were performed per peak hour to determine if the eastbound left-turn into Site Access #2 queued back to the 4-way stop at Bluffton Road/Boundary Street at May River Road/Bruin Road. Based on the SimTraffic analysis, the maximum eastbound left-turn queue was 40' during the AM peak hour and 93' during the PM peak hour. The distance between Site Access #2 and Bluffton Road/Boundary Street is approximately 115'. The static queue graphic from SimTraffic show the eastbound traffic is anticipated to spillback to the 4-way stop at Bluffton Road/Boundary Street at May River Road/Bruin Road during the PM peak hour. The SimTraffic input assumed the westbound traffic would block Site Access #2, which would be the worst case scenario for inbound eastbound left-turning vehicles.

To mitigate the eastbound left-turn spillback, signage and pavement markings for "Do Not Block Intersection" are recommended.

The SimTraffic reports, SimTraffic Static graphics and suggested signs/pavement markings are included in the **Appendix**.

## 5 Conclusion

The proposed 9 Bruin Road Site is located on the northeast quadrant of the intersection of Bluffton Road/Boundary Street with May River Road/Bruin Road in Bluffton, South Carolina. This development is planned to consist of a mixed-use development that will consist of residential, office, restaurant, and retail buildings. Based on the conceptual site plan, it is assumed that the project will access the roadway network via two new driveways; one along Bluffton Road and one along Bruin Road.

The project is proposed to be constructed and fully occupied by 2027. This study summarizes the results of the traffic impact analyses for the 2024 Existing, 2027 No-Build, and 2027 Build conditions at the following study intersections:

1. Bluffton Road/Boundary Street and May River Road/Bruin Road
2. Bluffton Road and Site Access #1
3. Bruin Road and Site Access #2

Based on the results of the traffic analyses, the following improvements are recommended for the study area intersections:

### **Bluffton Road/Boundary Street at May River Road/Bruin Road**

- No capacity improvements are recommended at this intersection.

### **Bluffton Road at Site Access #1**

- Construct a right-in/right-out access
- Maximize available intersection spacing from the Nectar Restaurant Driveway and the Bluffton Road/Boundary Street at May River Road/Bruin Road intersection for the right-in/right-out.

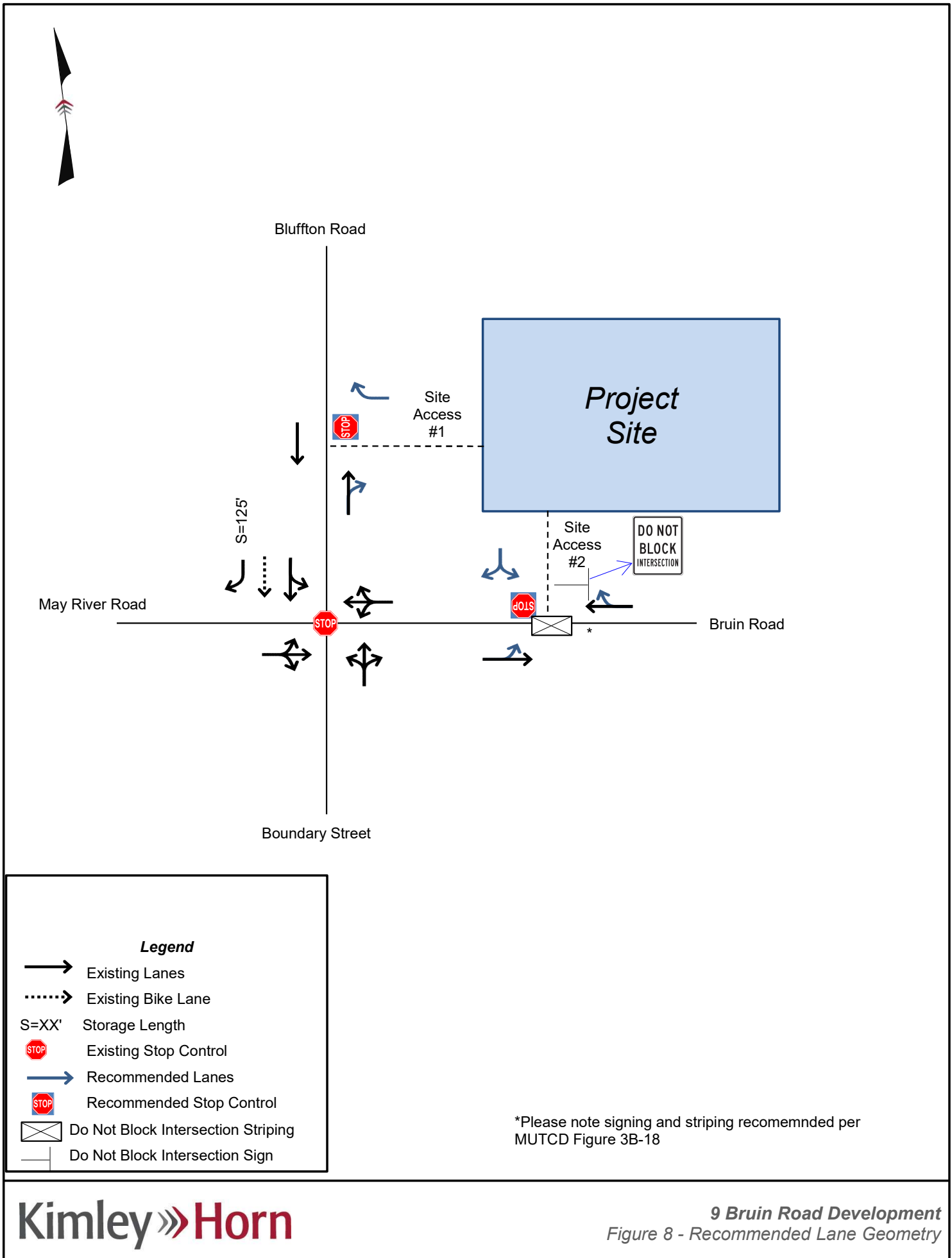
### **Bruin Road at Site Access #2**

- Construct a full access driveway with one ingress lane and one egress lane.
- Install “Do Not Block Intersection” sign for westbound approach
  - Manual on Uniform Traffic Control Devices (2009 Edition) sign R10-7
- Install “Do Not Block Intersection” pavement markings at the intersection.
  - Manual on Uniform Traffic Control Devices (2009 Edition) Figure 3B-18

### **Internal Spine Road**

- Install raised speed tables to reduce the amount of cut-through traffic through the site to/from SC 46 and Bruin Road.

The recommended geometry and traffic control is shown on **Figure 8**. The Manual on Uniform Traffic Control Devices Figure 3B-18 is included in the Appendix.





## Appendix A – Conceptual Site Plan





©2024 WJK LTD.  
DESIGN CONCEPTS, DRAWING, SHEETS, LOGOS, SPECIFICATIONS, DETAILS, WRITTEN MATERIAL SHALL NOT BE USED OR REPRODUCED IN WHOLE OR IN PART IN ANY FORM WITHOUT PRIOR WRITTEN CONSENT OF WJK LTD.  
THIS SHEET TO SCALE AT: 24"X36"

SITE DEVELOPMENT PLANS  
FOR  
**JOINER PROPERTY**  
9 BRUIN ROAD  
BLUFFTON, SOUTH CAROLINA

DATE: MAY 29, 2024  
PROJECT NO.: 22-054-01  
DRAWN BY: JM  
CHECKED BY: DK

REVISIONS:


DRAWING TITLE  
**SITE PLAN**

DRAWING NUMBER

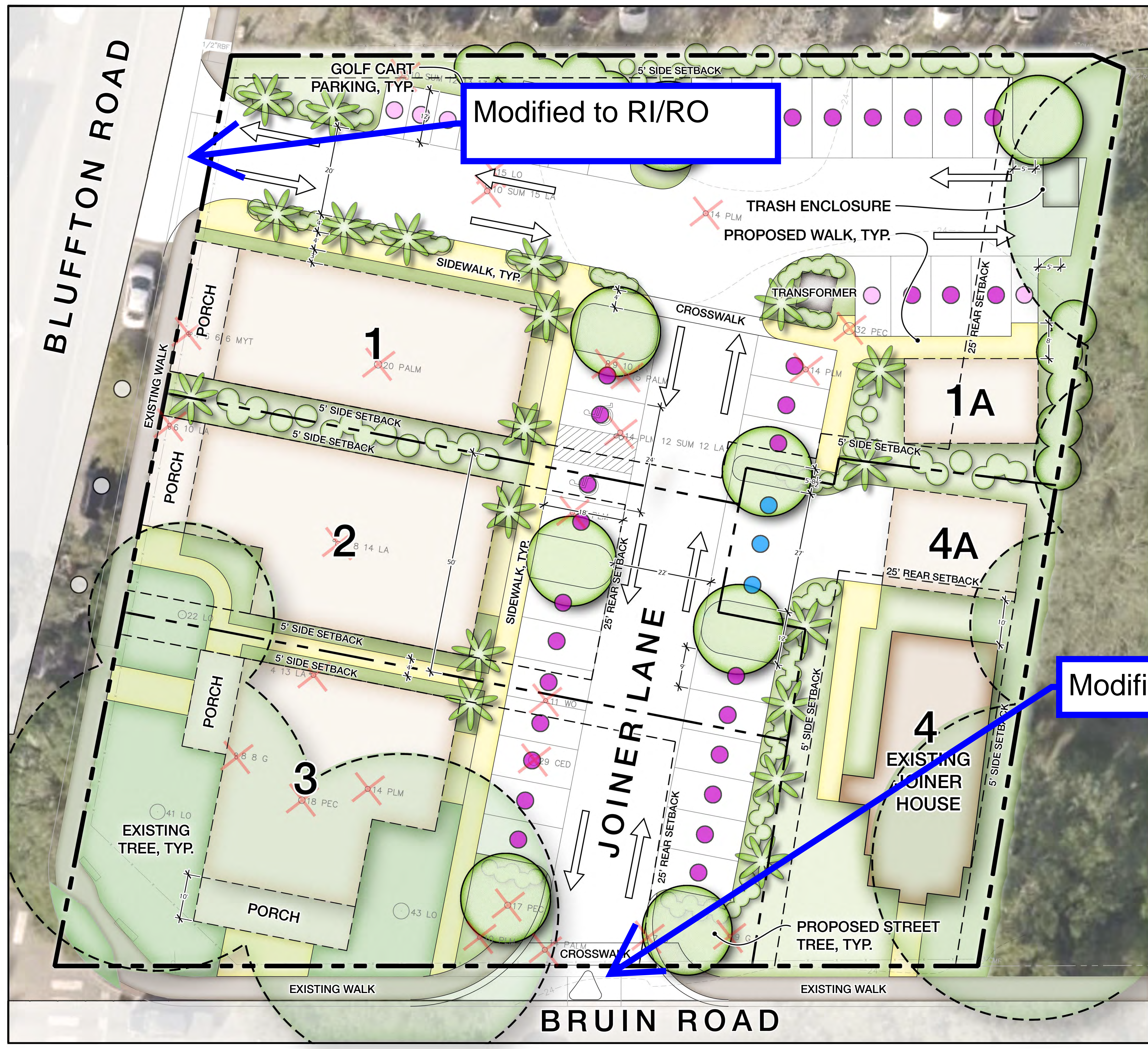
**B**

**PARKING SUMMARY**

**LOTS 1 - 4**  
**REQUIRED SPACES = 47**  
**(SEE TABLE 1)**

- PROVIDED SPACES = 47**
- INCLUDES 3 SPACES ALLOCATED FOR BLDG 4 AND BLDG 4A
  - INCLUDES 3 EXISTING SPACES ON BLUFFTON ROAD
  - INCLUDES 6 GOLF CART SPACES AND 1 COMPACT SPACE

**NOTE:** APPROXIMATE BUILDING AND PORCH FOOTPRINTS SHOWN ARE FOR REFERENCE ONLY. FINAL BUILDING FOOTPRINTS SUBJECT TO CHANGE BASED ON FUTURE BUILDING DESIGNS.

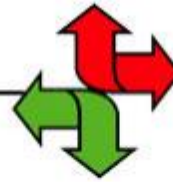


Modified to RI/RO

Modified to Full Access



# Manual on Uniform Traffic Control Devices (MUTCD)



Knowledge

[Back to Chapter 3B](#)

## 2009 Edition Part 3 Figure 3B-18. Do Not Block Intersection Markings

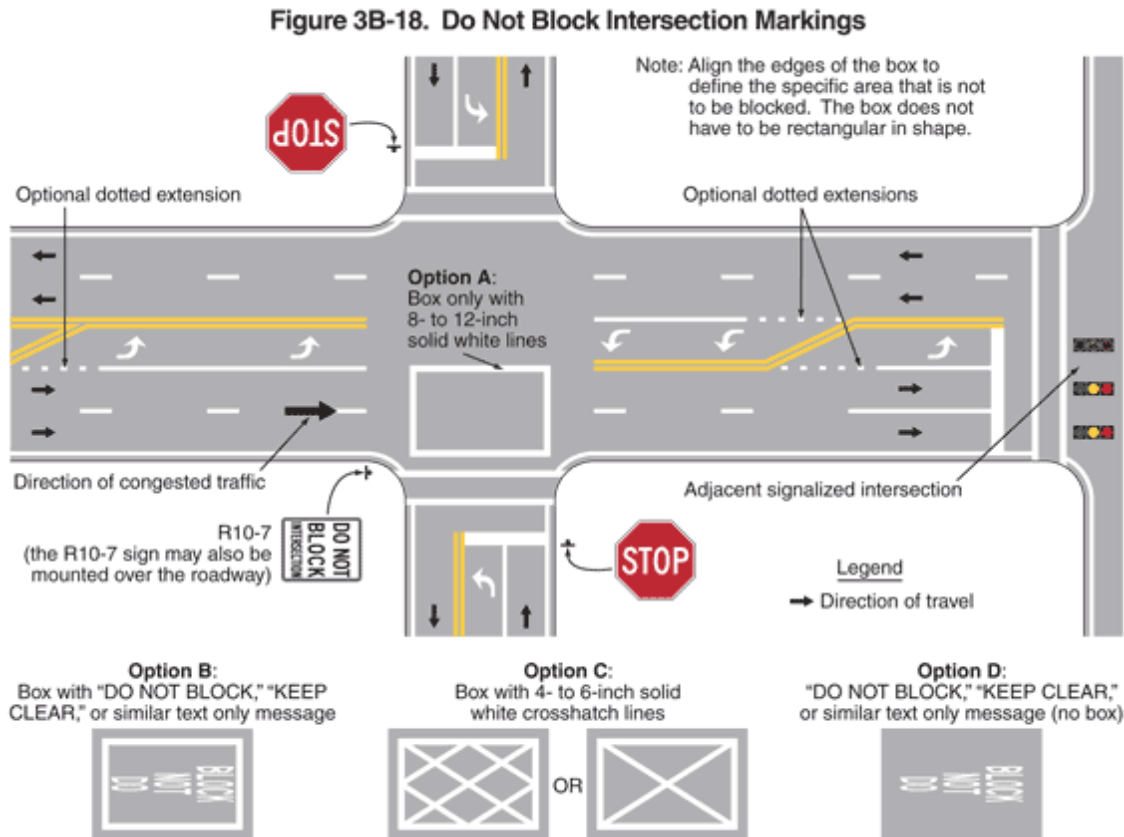


Figure 3B-18. Do Not Block Intersection Markings

This figure illustrates an example of Do Not Block intersection markings. A legend shows a black arrow indicating the direction of travel in the lanes.

This figure shows the intersection of a five-lane horizontal roadway with a three-lane vertical roadway. The horizontal roadway intersects a second vertical roadway at the far right side of the figure. Arrows show that the direction of travel is two lanes eastbound and two lanes westbound with opposing center turn lanes on the horizontal roadway, and one lane northbound and one lane southbound with opposing center turn lanes on the vertical roadway. No direction of travel is shown on the second vertical roadway.

The horizontal roadway is composed of two through lanes in each direction and a center left turn lane. The vertical roadway is composed of one through lane in each direction and a center turn lane. On both roadways, the through lanes are divided from each other by a broken white line. The left turn lane is divided from the same direction through lanes by a solid white line, with an optional dotted white line extension in advance of the solid white line. The beginning of the left turn lane is shown by

a solid double yellow line that angles from the broken white line to the solid double yellow line that separates the turn lane from the oncoming lanes. White turn arrows are marked in the turn lanes.

On the first vertical roadway, a solid white stop line is marked across all approach lanes at the intersection. To the right of the roadway at the white stop line, a STOP sign is shown. On each side of the intersection are two parallel solid white lines denoting crosswalks.

On the horizontal roadway, a large black right-pointing horizontal arrow denoting the direction of congested traffic is shown marked in the through lanes traveling left to right in advance of the intersection with the first vertical roadway. To the right of the right lane traveling left to right and at the intersection, an R10-7 sign is shown with the words "Do Not Block Intersection." A note states "the R10-7 sign may also be mounted over the roadway." Beyond this intersection and at the intersection with the second vertical roadway, a solid white stop line is marked across the lanes traveling left to right. Two parallel solid white lines denoting crosswalks are shown across all lanes just beyond the stop line. In the intersection, three symbols of stop lights (one for each left-to-right lane) are shown at the adjacent signalized intersection.

In the through lanes traveling left to right on the horizontal roadway, a box composed of solid white lines is shown marked on the pavement at the intersection with the first vertical roadway. A note states: "Align the edges of the box to define the specific area that is not to be blocked. The box does not have to be rectangular in shape."

Four options are shown for the box markings:

- Option A is labeled "Box only with 8- to 12-inch solid white lines." The example shows a box composed of solid white lines on the pavement.
- Option B is labeled "Box with "DO NOT BLOCK," "KEEP CLEAR," or similar text only message. The example shows a box composed of solid white lines with the words "DO NOT BLOCK" in white on three lines, reading from bottom to top.
- Option C is labeled: "Box with 4- to 6-inch solid white crosshatch lines." The example shows a box composed of solid white lines and filled with a series of white crosshatch lines to the left of the word "OR" and another box composed of solid white lines and filled with one crosshatch marking extending from the northwest to southeast corners and from the southwest to northeast corners.
- Option D is labeled "DO NOT BLOCK," "KEEP CLEAR," or similar text only message (no box)." The example shows a gray rectangle with the words "DO NOT BLOCK" in white on three lines, reading from bottom to top. There is no box composed of white lines.

[Back to Chapter 3B](#)

## Appendix B – Trip Generation Calculations



9 Bruin Road Development - Option 1 Trip Generation									
Land Use	Intensity	Units	Daily	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
Office Land Uses			128	15	12	3	19	6	13
712 - Small Office Building	8.9	KSF	128	15	12	3	19	6	13
Retail Land Uses			605	27	16	11	72	36	36
822 - Strip Retail Plaza (<40k)	8.9	KSF	605	27	16	11	72	36	36
Restaurant Land Uses			107	10	6	4	9	5	4
932 - High-Turnover (Sit-Down) Restaurant	1.0	KSF	107	10	6	4	9	5	4
Residential Land Uses			28	2	1	1	3	2	1
210 - Single-Family Detached Housing	2	DU	28	2	1	1	3	2	1
Subtotal			868	54	35	19	103	49	54
Internal Capture			174	10	5	5	16	8	8
ITE Pass-By			18	0	0	0	2	1	1
Adjacent Street Traffic			14,750	1,300			1,450		
10% Adjacent Street Traffic			1,475	130	65	65	146	73	73
Pass-By			18	0	0	0	2	1	1
Total Net New External Trips			676	44	30	14	85	40	45
Note: Trip generation was calculated using the following data:									
Daily Traffic Generation									
Office Land Uses									
712 - Small Office Building			ITE 712	=	T = 14.39 (X); (50 % In; 50 % Out)				
Retail Land Uses									
822 - Strip Retail Plaza (<40k)			ITE 822	=	T = 42.2 * (X) + (229.68); (50 % In; 50 % Out)				
Restaurant Land Uses									
932 - High-Turnover (Sit-Down) Restaurant			ITE 932	=	T = 107.2 (X); (50 % In; 50 % Out)				
Residential Land Uses									
210 - Single-Family Detached Housing			ITE 210	=	LN (T) = 0.92 * LN (X) + (2.68); (50 % In; 50 % Out)				
AM Peak-Hour Traffic Generation									
Office Land Uses									
712 - Small Office Building			ITE 712	=	T = 1.67 (X); (82 % In; 18 % Out)				
Retail Land Uses									
822 - Strip Retail Plaza (<40k)			ITE 822	=	LN (T) = 0.66 * LN (X) + (1.84); (60 % In; 40 % Out)				
Restaurant Land Uses									
932 - High-Turnover (Sit-Down) Restaurant			ITE 932	=	T = 9.57 (X); (55 % In; 45 % Out)				
Residential Land Uses									
210 - Single-Family Detached Housing			ITE 210	=	LN (T) = 0.91 * LN (X) + (0.12); (26 % In; 74 % Out)				
PM Peak-Hour Traffic Generation									
Office Land Uses									
712 - Small Office Building			ITE 712	=	T = 2.16 (X); (34 % In; 66 % Out)				
Retail Land Uses									
822 - Strip Retail Plaza (<40k)			ITE 822	=	LN (T) = 0.71 * LN (X) + (2.72); (50 % In; 50 % Out)				
Restaurant Land Uses									
932 - High-Turnover (Sit-Down) Restaurant			ITE 932	=	T = 9.05 (X); (61 % In; 39 % Out)				
Residential Land Uses									
210 - Single-Family Detached Housing			ITE 210	=	LN (T) = 0.94 * LN (X) + (0.27); (63 % In; 37 % Out)				

## Appendix C – Traffic Volume Development Worksheets

**INTERSECTION TRAFFIC VOLUME DEVELOPMENT**

**INTERSECTION:** Boundary Street and Bruin Road  
**COUNT DATE:** March 26, 2024  
**AM PEAK HOUR FACTOR:** 0.93  
**PM PEAK HOUR FACTOR:** 0.92  
**AM FUTURE PEAK HOUR FACTOR:** 0.93  
**PM FUTURE PEAK HOUR FACTOR:** 0.92

**AM Peak Hour**

AM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
AM Adjusted Turning Movement Counts <sup>1</sup>					0	140	232	14	0	5	197	74	0	105	133	4	0	93	82	131	
AM Volume Balancing					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
AM 2024 EXISTING TRAFFIC					0	140	232	14	0	5	197	74	0	105	133	4	0	93	82	131	
AM Heavy Vehicle Percentage					2%	4%	1%	2%	2%	2%	4%	4%	2%	3%	2%	2%	2%	3%	1%	6%	
AM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
AM 2027 NO-BUILD TRAFFIC GROWTH					0	9	14	1	0	0	12	5	0	6	8	0	0	6	5	8	
AM 2027 NO-BUILD TRAFFIC					0	149	246	15	0	5	209	79	0	111	141	4	0	99	87	139	
"SITE TRAFFIC DISTRIBUTION"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Pass-By Distribution	Entering																				
	Exiting																				
Diverted Trip Distribution	Entering																				
	Exiting																				
Net New Distribution	Entering					15%	15%								10%	5%		30%			
	Exiting									15%	30%										
"AM PROJECT TRIPS"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Project Trip	Pass - By																				
	Diverted Trips																				
	Net New				0	5	4	0	0	2	4	0	0	0	3	2	0	9	0	0	
AM TOTAL PROJECT TRIPS					0	5	4	0	0	2	4	0	0	0	3	2	0	9	0	0	
AM 2027 BUILD-OUT TRAFFIC					0	154	250	15	0	7	213	79	0	111	144	6	0	108	87	139	

**PM Peak Hour**

PM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
PM Adjusted Turning Movement Counts <sup>1</sup>					0	135	196	11	0	4	237	87	0	106	127	8	0	86	122	209
PM Volume Balancing					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
PM 2024 EXISTING TRAFFIC					0	135	196	11	0	4	237	87	0	106	127	8	0	86	122	209
PM Heavy Vehicle Percentage					2%	2%	1%	2%	2%	2%	3%	2%	2%	2%	1%	2%	2%	5%	2%	0%
PM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
PM 2027 NO-BUILD TRAFFIC GROWTH					0	8	12	1	0	0	15	5	0	6	8	0	0	5	7	13
PM 2027 NO-BUILD TRAFFIC					0	143	208	12	0	4	252	92	0	112	135	8	0	91	129	222
"SITE TRAFFIC DISTRIBUTION"																				
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR			
Pass-By Distribution	Entering																			
	Exiting																			
Diverted Trip Distribution	Entering																			
	Exiting																			
Net New Distribution	Entering		15%	15%								10%	5%		30%					
	Exiting						15%	30%												
"PM PROJECT TRIPS"																				
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR			
Project Trip	Pass - By																			
	Diverted Trips																			
	Net New	0	6	6	0	0	6	14	0	0	0	4	2	0	12	0	0			
PM TOTAL PROJECT TRIPS		0	6	6	0	0	6	14	0	0	0	4	2	0	12	0	0			
PM 2027 BUILD-OUT TRAFFIC		0	149	214	12	0	10	266	92	0	112	139	10	0	103	129	222			

**INTERSECTION TRAFFIC VOLUME DEVELOPMENT**

**INTERSECTION:** Bluffton Road and Site Access #1  
**COUNT DATE:**  
**AM PEAK HOUR FACTOR:** 0.90 **AM FUTURE PEAK HOUR FACTOR:** 0.90  
**PM PEAK HOUR FACTOR:** 0.90 **PM FUTURE PEAK HOUR FACTOR:** 0.90

**AM Peak Hour**

AM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
AM Adjusted Turning Movement Counts <sup>1</sup>					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AM Volume Balancing					0	0	0	0	0	0	0	0	0	0	347	0	0	0	306	0	
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
AM 2024 EXISTING TRAFFIC					0	0	0	0	0	0	0	0	0	0	347	0	0	0	306	0	
AM Heavy Vehicle Percentage					2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
AM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	
AM 2027 NO-BUILD TRAFFIC GROWTH					0	0	0	0	0	0	0	0	0	0	21	0	0	0	19	0	
AM 2027 NO-BUILD TRAFFIC					0	0	0	0	0	0	0	0	0	0	368	0	0	0	325	0	
"SITE TRAFFIC DISTRIBUTION"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Pass-By Distribution		Entering																			
		Exiting																			
Diverted Trip Distribution		Entering																			
		Exiting																			
Net New Distribution		Entering														25%			30%		
		Exiting										30%									
"AM PROJECT TRIPS"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Project Trip		Pass - By																			
		Diverted Trips																			
		Net New			0	0	0	0	0	0	0	4	0	0	0	8	0	0	9	0	
AM TOTAL PROJECT TRIPS					0	0	0	0	0	0	0	4	0	0	0	8	0	0	9	0	
AM 2027 BUILD-OUT TRAFFIC					0	0	0	0	0	0	0	4	0	0	368	8	0	0	334	0	

**PM Peak Hour**

PM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
PM Adjusted Turning Movement Counts <sup>1</sup>					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM Volume Balancing					0	0	0	0	0	0	0	0	0	0	349	0	0	0	0	417	0
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
PM 2024 EXISTING TRAFFIC					0	0	0	0	0	0	0	0	0	0	349	0	0	0	0	417	0
PM Heavy Vehicle Percentage					2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
PM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
PM 2027 NO-BUILD TRAFFIC GROWTH					0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	26	0
PM 2027 NO-BUILD TRAFFIC					0	0	0	0	0	0	0	0	0	0	370	0	0	0	0	443	0
"SITE TRAFFIC DISTRIBUTION"																					
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR				
Pass-By Distribution	Entering											-100%	100%								
	Exiting								100%												
Diverted Trip Distribution	Entering																				
	Exiting																				
Net New Distribution	Entering												25%				30%				
	Exiting								30%												
"PM PROJECT TRIPS"																					
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR				
Project Trip	Pass - By								1			-1	1								
	Diverted Trips																				
	Net New	0	0	0	0	0	0	0	14	0	0	0	10	0	0	12	0				
PM TOTAL PROJECT TRIPS					0	0	0	0	0	0	0	15	0	0	-1	11	0	0	12	0	
PM 2027 BUILD-OUT TRAFFIC					0	0	0	0	0	0	0	15	0	0	369	11	0	0	455	0	

**INTERSECTION TRAFFIC VOLUME DEVELOPMENT**

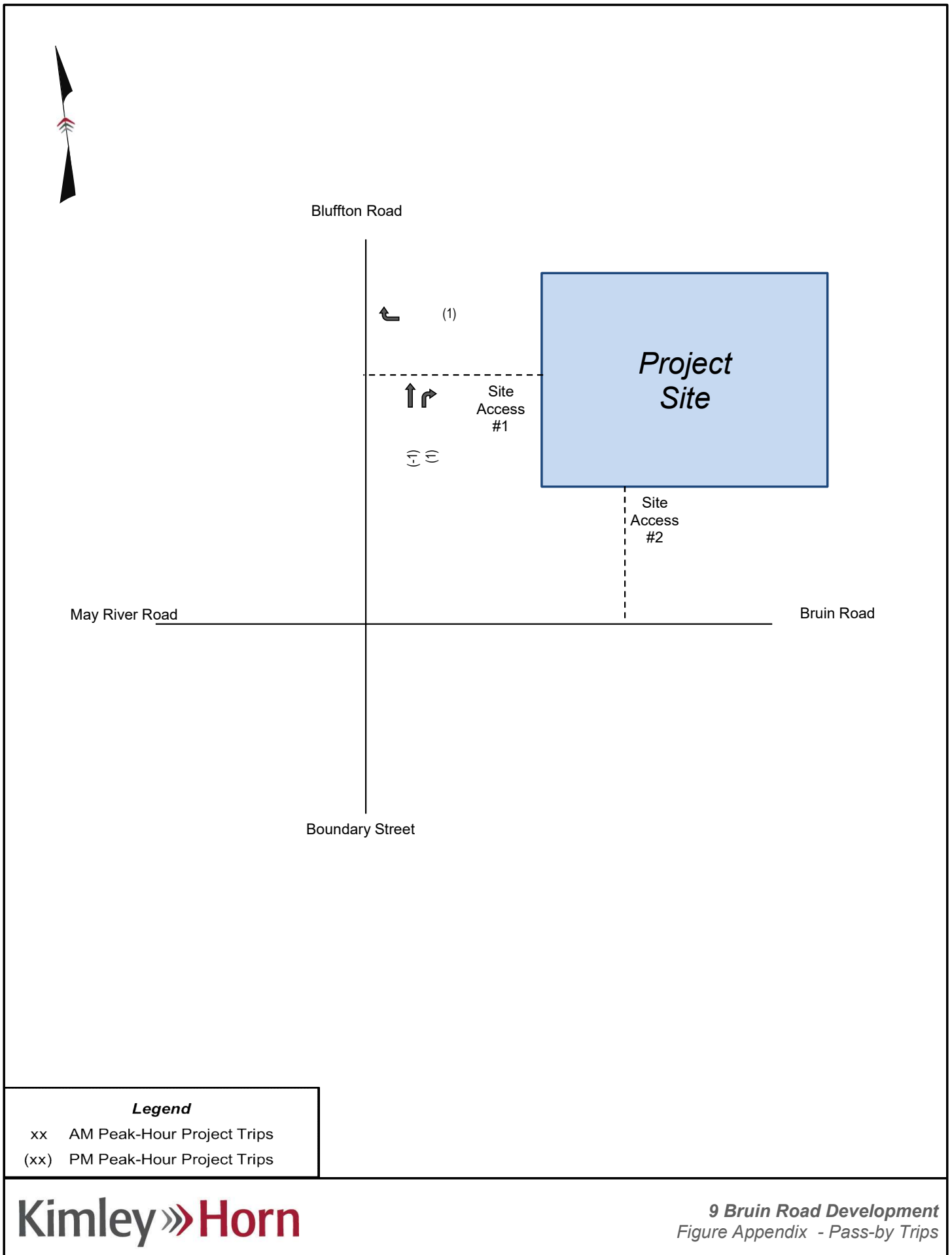
**INTERSECTION:** Bruin Road and Site Access #2  
**COUNT DATE:**  
**AM PEAK HOUR FACTOR:** 0.90 **AM FUTURE PEAK HOUR FACTOR:** 0.90  
**PM PEAK HOUR FACTOR:** 0.90 **PM FUTURE PEAK HOUR FACTOR:** 0.90

**AM Peak Hour**

AM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
AM Adjusted Turning Movement Counts <sup>1</sup>					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AM Volume Balancing					0	0	329	0	0	0	276	0	0	0	0	0	0	0	0	0	
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
AM 2024 EXISTING TRAFFIC					0	0	329	0	0	0	276	0	0	0	0	0	0	0	0	0	
AM Heavy Vehicle Percentage					2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
AM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	
AM 2027 NO-BUILD TRAFFIC GROWTH					0	0	0	20	0	0	0	17	0	0	0	0	0	0	0	0	0
AM 2027 NO-BUILD TRAFFIC					0	0	349	0	0	0	293	0	0	0	0	0	0	0	0	0	
"SITE TRAFFIC DISTRIBUTION"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Pass-By Distribution	Entering																				
	Exiting																				
Diverted Trip Distribution	Entering																				
	Exiting																				
Net New Distribution	Entering				50%						25%										
	Exiting																	25%		45%	
"AM PROJECT TRIPS"																					
LAND USE		TYPE			EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Project Trip	Pass - By																				
	Diverted Trips																				
	Net New			0	15	0	0	0	0	0	0	7	0	0	0	0	0	4	0	6	
AM TOTAL PROJECT TRIPS					0	15	0	0	0	0	0	7	0	0	0	0	0	4	0	6	
AM 2027 BUILD-OUT TRAFFIC					0	15	349	0	0	0	293	7	0	0	0	0	0	4	0	6	

**PM Peak Hour**

PM 2024 EXISTING TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
PM Adjusted Turning Movement Counts <sup>1</sup>					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM Volume Balancing					0	0	290	0	0	0	328	0	0	0	0	0	0	0	0	0	0
Peak Season Correction Factor					1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
PM 2024 EXISTING TRAFFIC					0	0	290	0	0	0	328	0	0	0	0	0	0	0	0	0	0
PM Heavy Vehicle Percentage					2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
PM 2027 NO-BUILD TRAFFIC					EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	
Years To Buildout					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Annual Growth Rate					2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
PM 2027 NO-BUILD TRAFFIC GROWTH					0	0	18	0	0	0	20	0	0	0	0	0	0	0	0	0	0
PM 2027 NO-BUILD TRAFFIC					0	0	308	0	0	0	348	0	0	0	0	0	0	0	0	0	0
"SITE TRAFFIC DISTRIBUTION"																					
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR				
Pass-By Distribution	Entering																				
	Exiting																				
Diverted Trip Distribution	Entering																				
	Exiting																				
Net New Distribution	Entering		50%					25%													
	Exiting														25%		45%				
"PM PROJECT TRIPS"																					
LAND USE	TYPE	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR				
Project Trip	Pass - By																				
	Diverted Trips																				
	Net New	0	20	0	0	0	0	0	10	0	0	0	0	0	11	0	20				
PM TOTAL PROJECT TRIPS		0	20	0	0	0	0	0	10	0	0	0	0	0	11	0	20				
PM 2027 BUILD-OUT TRAFFIC		0	20	308	0	0	0	348	10	0	0	0	0	0	11	0	20				



## Appendix D – Raw Turning Movement Counts





(303) 216-2439  
www.alltrafficdata.net

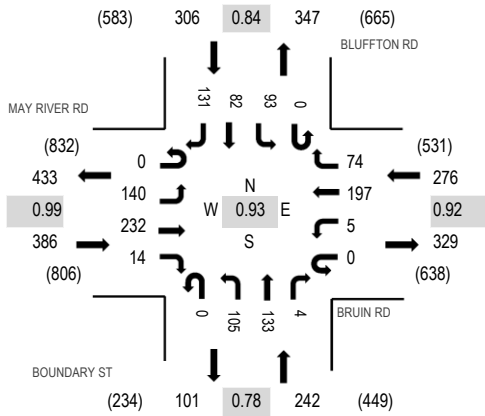
**Location:** 1 BOUNDARY ST & BRUIN RD AM

**Date:** Tuesday, March 26, 2024

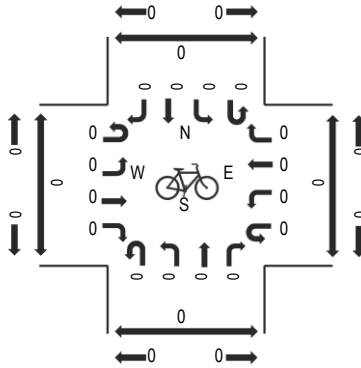
**Peak Hour:** 07:15 AM - 08:15 AM

**Peak 15-Minutes:** 07:30 AM - 07:45 AM

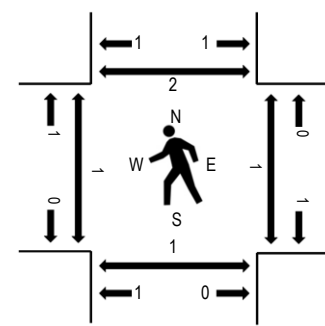
### Peak Hour - Motorized Vehicles



### Peak Hour - Bicycles



### Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

### Traffic Counts - Motorized Vehicles

Interval Start Time	MAY RIVER RD Eastbound				BRUIN RD Westbound				BOUNDARY ST Northbound				BLUFFTON RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	34	74	2	0	0	38	12	0	24	18	2	0	20	9	30	263	1,175	0	0	0	0
7:15 AM	0	37	56	1	0	0	35	19	0	24	35	0	0	31	21	33	292	1,210	1	0	0	0
7:30 AM	0	26	55	4	0	2	53	17	0	29	48	1	0	37	17	37	326	1,207	0	1	0	1
7:45 AM	0	37	65	3	0	1	50	19	0	24	32	0	0	14	15	34	294	1,175	0	0	0	0
8:00 AM	0	40	56	6	0	2	59	19	0	28	18	3	0	11	29	27	298	1,194	0	0	1	1
8:15 AM	0	46	57	2	0	1	62	10	0	25	29	1	0	6	28	22	289		1	0	1	0
8:30 AM	0	46	54	4	0	3	50	16	0	25	25	5	0	12	29	25	294		4	0	0	0
8:45 AM	0	36	58	7	0	8	43	12	0	16	34	3	0	17	40	39	313		4	0	0	0

### Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	135	230	14	0	5	189	71	0	102	130	4	0	90	81	123	1,174
Mediums	0	5	2	0	0	0	8	3	0	3	3	0	0	3	1	8	36
Total	0	140	232	14	0	5	197	74	0	105	133	4	0	93	82	131	1,210

### Heavy Vehicle Percentage and Peak Hour Factor

	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Heavy Vehicle %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy Vehicle %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Peak Hour Factor	0.99				0.92				0.78				0.84				0.93
Peak Hour Factor	0.00	0.92	0.84	0.68	0.00	0.44	0.90	0.97	0.00	0.91	0.69	0.60	0.00	0.69	0.79	0.91	0.93



(303) 216-2439  
www.alltrafficdata.net

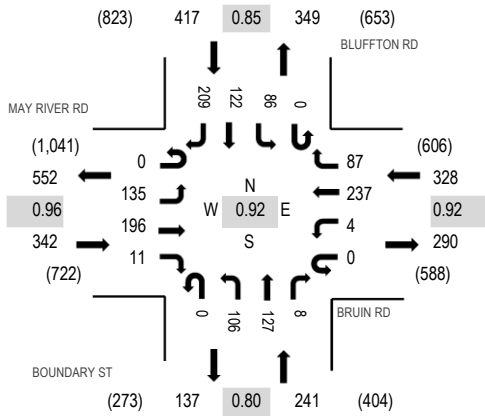
**Location:** 1 BOUNDARY ST & BRUIN RD PM

**Date:** Tuesday, March 26, 2024

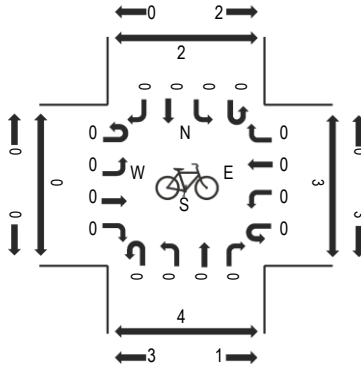
**Peak Hour:** 04:45 PM - 05:45 PM

**Peak 15-Minutes:** 05:00 PM - 05:15 PM

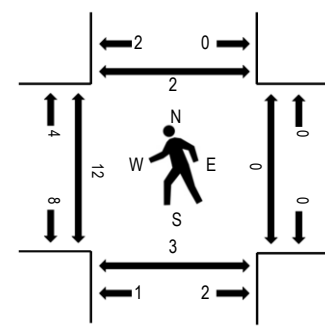
### Peak Hour - Motorized Vehicles



### Peak Hour - Bicycles



### Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

### Traffic Counts - Motorized Vehicles

Interval Start Time	MAY RIVER RD Eastbound				BRUIN RD Westbound				BOUNDARY ST Northbound				BLUFFTON RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	34	53	2	0	1	50	15	0	24	26	1	0	18	37	59	320	1,250	0	3	0	2
4:15 PM	0	40	56	3	0	1	45	18	0	17	18	1	0	27	23	50	299	1,292	0	2	1	0
4:30 PM	0	39	50	9	0	1	54	14	0	17	28	1	0	15	24	54	306	1,310	2	1	6	0
4:45 PM	0	37	55	4	0	1	54	21	0	19	27	1	0	20	24	62	325	1,328	4	0	0	2
5:00 PM	0	36	40	2	0	1	59	24	0	37	36	2	0	29	35	61	362	1,305	3	0	0	0
5:15 PM	0	26	50	4	0	1	55	22	0	31	32	2	0	20	31	43	317		5	0	2	0
5:30 PM	0	36	51	1	0	1	69	20	0	19	32	3	0	17	32	43	324		0	0	1	0
5:45 PM	0	38	53	3	0	1	59	19	0	14	15	1	0	22	31	46	302		2	0	3	0

### Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	132	195	11	0	4	230	87	0	104	126	8	0	82	119	208	1,306
Mediums	0	3	1	0	0	0	7	0	0	2	1	0	0	4	3	1	22
Total	0	135	196	11	0	4	237	87	0	106	127	8	0	86	122	209	1,328

### Heavy Vehicle Percentage and Peak Hour Factor

	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Heavy Vehicle %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy Vehicle %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Peak Hour Factor	0.96				0.92				0.80				0.85				0.92
Peak Hour Factor	0.00	0.95	0.96	0.53	0.00	1.00	0.88	0.91	0.00	0.72	0.88	0.67	0.00	0.78	0.92	0.92	0.92

## Appendix E – Historic Growth Rate Calculations

<i>Short-Term Growth Inputs</i>	
<b>Start Year</b>	2017
<b>End Year</b>	2022
<i>Long-Term Growth Inputs</i>	
<b>Start Year</b>	2013
<b>End Year</b>	2022

INDEX	Station ID	Location											Growth	
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Short-Term Growth (%)	Long-Term Growth (%)
1	07-0159	S-120 : S- 163 (BURNT CHURCH RD) TO SC 46 (MAY RIVER RD), S- 66	5500	5100	7700	7900	7800	7800	6800	6200	7300	7600	-0.5%	3.7%
2	07-0479	S-66 : SC 46 (MAY RIVER RD), S- 120 TO S- 13 (BRIDGE ST)	3100	2900	2600	3100	3100	3300	3300	3300	3200	3500	2.5%	1.4%
3	07-0161	SC46 : S- 66 (BOUNDARY ST), S- 120 TO US 278 (FORDING ISLAND RD), L- 4790	11000	9900	13500	13700	14500	15200	16400	15200	16600	16800	3.0%	4.8%
4	07-0483	S-122 : SC 46 (MAY RIVER RD) TO S- 31 (BRIDGE ST)	750	700	700	1300	1000	1050	900	900	850	900	-2.1%	2.0%
5	07-0485	S-31 : S- 754 (ABLE ST), L- 2037 TO SC 46 (MAY RIVER RD)	1650	1500	1500	1650	1650	1750	1550	1550	1750	1900	2.9%	1.6%
6	07-0489	S-404 : SC 46 (MAY RIVER RD) TO S- 403 (HILDERBRAND DR)	475	325	325	350	475	500	450	450	450	500	1.0%	0.6%
7	07-0157	SC46 : S- 29 (BUCK ISLAND RD) TO S- 66 (BOUNDARY ST), S- 120	10100	9200	8500	13400	12500	13100	14100	13100	13800	14000	2.3%	3.7%
8	07-0341	S-163 : S- 120 (BRUIN RD) TO US 278 (FORDING ISLAND RD)	13000	13000	8000	7400	7300	7300	6600	6100	7000	7200	-0.3%	-6.4%

SUMMARY STATISTICS				
Station ID	Location	Functional Class	5-Year Growth (%)	9-Year Growth (%)
07-0159	S-120 : S- 163 (BURNT CHURCH RD) TO SC 46 (MAY RIVER RD), S- 66	Not Reported	-0.5%	3.7%
07-0479	S-66 : SC 46 (MAY RIVER RD), S- 120 TO S- 13 (BRIDGE ST)	Not Reported	2.5%	1.4%
07-0161	SC46 : S- 66 (BOUNDARY ST), S- 120 TO US 278 (FORDING ISLAND RD), L- 4790	Not Reported	3.0%	4.8%
07-0483	S-122 : SC 46 (MAY RIVER RD) TO S- 31 (BRIDGE ST)	Not Reported	-2.1%	2.0%
07-0485	S-31 : S- 754 (ABLE ST), L- 2037 TO SC 46 (MAY RIVER RD)	Not Reported	2.9%	1.6%
07-0489	S-404 : SC 46 (MAY RIVER RD) TO S- 403 (HILDERBRAND DR)	Not Reported	1.0%	0.6%
07-0157	SC46 : S- 29 (BUCK ISLAND RD) TO S- 66 (BOUNDARY ST), S- 120	Not Reported	2.3%	3.7%
07-0341	S-163 : S- 120 (BRUIN RD) TO US 278 (FORDING ISLAND RD)	Not Reported	-0.3%	-6.4%
Weighted Average			1.6%	2.0%






## Appendix F – Capacity Analysis Worksheets

## 2024 Existing Conditions

HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

9 Bruin Road  
2024 Existing AM Peak

Intersection	
Intersection Delay, s/veh	22.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	140	232	14	5	197	74	105	133	4	93	82	131
Future Vol, veh/h	140	232	14	5	197	74	105	133	4	93	82	131
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	4	1	2	2	4	4	3	2	2	3	1	6
Mvmt Flow	151	249	15	5	212	80	113	143	4	100	88	141
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay, s/veh	32.3	19.3	19.4	14.8
HCM LOS	D	C	C	B






Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	43%	36%	2%	53%	0%
Vol Thru, %	55%	60%	71%	47%	0%
Vol Right, %	2%	4%	27%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	242	386	276	175	131
LT Vol	105	140	5	93	0
Through Vol	133	232	197	82	0
RT Vol	4	14	74	0	131
Lane Flow Rate	260	415	297	188	141
Geometry Grp	4a	2	2	5	5
Degree of Util (X)	0.546	0.801	0.577	0.421	0.275
Departure Headway (Hd)	7.556	6.946	7.001	8.046	7.016
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	476	523	513	446	510
Service Time	5.625	4.946	5.065	5.811	4.78
HCM Lane V/C Ratio	0.546	0.793	0.579	0.422	0.276
HCM Control Delay, s/veh	19.4	32.3	19.3	16.6	12.4
HCM Lane LOS	C	D	C	C	B
HCM 95th-tile Q	3.2	7.6	3.6	2.1	1.1



HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

9 Bruin Road  
2024 Existing PM Peak

Intersection	
Intersection Delay, s/veh	25.6
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	135	196	11	4	237	87	106	127	8	86	122	209
Future Vol, veh/h	135	196	11	4	237	87	106	127	8	86	122	209
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	2	2	3	2	2	1	2	5	2	0
Mvmt Flow	147	213	12	4	258	95	115	138	9	93	133	227
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay, s/veh	33.3	28.9	22.6	18.3
HCM LOS	D	D	C	C






Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	44%	39%	1%	41%	0%
Vol Thru, %	53%	57%	72%	59%	0%
Vol Right, %	3%	3%	27%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	241	342	328	208	209
LT Vol	106	135	4	86	0
Through Vol	127	196	237	122	0
RT Vol	8	11	87	0	209
Lane Flow Rate	262	372	357	226	227
Geometry Grp	4a	2	2	5	5
Degree of Util (X)	0.593	0.784	0.738	0.525	0.465
Departure Headway (Hd)	8.154	7.593	7.452	8.356	7.366
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	440	476	485	430	486
Service Time	6.247	5.674	5.535	6.139	5.149
HCM Lane V/C Ratio	0.595	0.782	0.736	0.526	0.467
HCM Control Delay, s/veh	22.6	33.3	28.9	20.1	16.5
HCM Lane LOS	C	D	D	C	C
HCM 95th-tile Q	3.7	7	6.1	3	2.4

## 2027 No-Build Conditions

HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

9 Bruin Road  
2027 No-Build AM Peak

Intersection	
Intersection Delay, s/veh	28.4
Intersection LOS	D






Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	149	246	15	5	209	79	111	141	4	99	87	139
Future Vol, veh/h	149	246	15	5	209	79	111	141	4	99	87	139
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	4	1	2	2	4	4	3	2	2	3	1	6
Mvmt Flow	160	265	16	5	225	85	119	152	4	106	94	149
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay, s/veh	44.8	23.3	23	16.4
HCM LOS	E	C	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	43%	36%	2%	53%	0%
Vol Thru, %	55%	60%	71%	47%	0%
Vol Right, %	2%	4%	27%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	256	410	293	186	139
LT Vol	111	149	5	99	0
Through Vol	141	246	209	87	0
RT Vol	4	15	79	0	139
Lane Flow Rate	275	441	315	200	149
Geometry Grp	4a	2	2	5	5
Degree of Util (X)	0.611	0.888	0.649	0.47	0.308
Departure Headway (Hd)	7.988	7.251	7.411	8.451	7.417
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	449	498	485	424	483
Service Time	6.075	5.325	5.495	6.235	5.2
HCM Lane V/C Ratio	0.612	0.886	0.649	0.472	0.308
HCM Control Delay, s/veh	23	44.8	23.3	18.6	13.5
HCM Lane LOS	C	E	C	C	B
HCM 95th-tile Q	4	9.8	4.6	2.4	1.3

HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

9 Bruin Road  
2027 No-Build PM Peak






Intersection												
Intersection Delay, s/veh	35.3											
Intersection LOS	E											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	143	208	12	4	252	92	112	135	8	91	129	222
Future Vol, veh/h	143	208	12	4	252	92	112	135	8	91	129	222
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	2	2	3	2	2	1	2	5	2	0
Mvmt Flow	155	226	13	4	274	100	122	147	9	99	140	241
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			2			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			2			1			1		
HCM Control Delay, s/veh	49.9			42			28.9			21.8		
HCM LOS	E			E			D			C		
Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2							
Vol Left, %	44%	39%	1%	41%	0%							
Vol Thru, %	53%	57%	72%	59%	0%							
Vol Right, %	3%	3%	26%	0%	100%							
Sign Control	Stop	Stop	Stop	Stop	Stop							
Traffic Vol by Lane	255	363	348	220	222							
LT Vol	112	143	4	91	0							
Through Vol	135	208	252	129	0							
RT Vol	8	12	92	0	222							
Lane Flow Rate	277	395	378	239	241							
Geometry Grp	4a	2	2	5	5							
Degree of Util (X)	0.68	0.895	0.846	0.595	0.534							
Departure Headway (Hd)	8.827	8.17	8.047	8.955	7.961							
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes							
Cap	407	442	450	402	451							
Service Time	6.91	6.243	6.119	6.73	5.735							
HCM Lane V/C Ratio	0.681	0.894	0.84	0.595	0.534							
HCM Control Delay, s/veh	28.9	49.9	42	24.1	19.6							
HCM Lane LOS	D	E	E	C	C							
HCM 95th-tile Q	4.9	9.6	8.3	3.7	3.1							

## 2027 Build Conditions

HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

9 Bruin Road  
2027 Build-Out AM Peak

Intersection	
Intersection Delay, s/veh	33.1
Intersection LOS	D




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	154	250	15	7	213	79	111	144	6	108	87	139
Future Vol, veh/h	154	250	15	7	213	79	111	144	6	108	87	139
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	4	1	2	2	4	4	3	2	2	3	1	6
Mvmt Flow	166	269	16	8	229	85	119	155	6	116	94	149
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay, s/veh	55.1	26.3	25.3	17.7
HCM LOS	F	D	D	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	43%	37%	2%	55%	0%
Vol Thru, %	55%	60%	71%	45%	0%
Vol Right, %	2%	4%	26%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	261	419	299	195	139
LT Vol	111	154	7	108	0
Through Vol	144	250	213	87	0
RT Vol	6	15	79	0	139
Lane Flow Rate	281	451	322	210	149
Geometry Grp	4a	2	2	5	5
Degree of Util (X)	0.645	0.94	0.69	0.509	0.32
Departure Headway (Hd)	8.279	7.514	7.721	8.746	7.699
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	435	482	469	413	468
Service Time	6.345	5.549	5.759	6.491	5.444
HCM Lane V/C Ratio	0.646	0.936	0.687	0.508	0.318
HCM Control Delay, s/veh	25.3	55.1	26.3	20.3	14
HCM Lane LOS	D	F	D	C	B
HCM 95th-tile Q	4.4	11.3	5.2	2.8	1.4

HCM 6th TWSC  
2: Bluffton Rd & Site Access #1

9 Bruin Road  
2027 Build-Out AM Peak

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	4	368	8	0	334
Future Vol, veh/h	0	4	368	8	0	334
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	4	409	9	0	371
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	414	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	638	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	638	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s/v	10.7	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	638		-		
HCM Lane V/C Ratio	-	0.007		-		
HCM Control Delay (s/veh)	-	10.7		-		
HCM Lane LOS	-	B		-		
HCM 95th %tile Q (veh)	-	0		-		

# HCM 6th TWSC

## 3: Bruin Rd & Site Access #2






9 Bruin Road  
2027 Build-Out AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		<b>4</b>	<b>1</b>		<b>4</b>	
Traffic Vol, veh/h	15	349	293	7	4	6
Future Vol, veh/h	15	349	293	7	4	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	388	326	8	4	7
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	334	0	-	0	752	330
Stage 1	-	-	-	-	330	-
Stage 2	-	-	-	-	422	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1225	-	-	-	378	712
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	662	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1225	-	-	-	371	712
Mov Cap-2 Maneuver	-	-	-	-	371	-
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	662	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	0.3	0		12.1		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1225	-	-	-	521	
HCM Lane V/C Ratio	0.014	-	-	-	0.021	
HCM Control Delay (s/veh)	8	0	-	-	12.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q (veh)	0	-	-	-	0.1	



HCM 6th AWSC  
1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd




9 Bruin Road  
2027 Build-Out PM Peak

Intersection												
Intersection Delay, s/veh	47.8											
Intersection LOS	E											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	149	214	12	10	266	92	112	139	10	103	129	222
Future Vol, veh/h	149	214	12	10	266	92	112	139	10	103	129	222
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	2	2	3	2	2	1	2	5	2	0
Mvmt Flow	162	233	13	11	289	100	122	151	11	112	140	241
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			2			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			2			1			1		
HCM Control Delay, s/veh	69.9			61.5			35.1			25.6		
HCM LOS	F			F			E			D		
Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2							
Vol Left, %	43%	40%	3%	44%	0%							
Vol Thru, %	53%	57%	72%	56%	0%							
Vol Right, %	4%	3%	25%	0%	100%							
Sign Control	Stop	Stop	Stop	Stop	Stop							
Traffic Vol by Lane	261	375	368	232	222							
LT Vol	112	149	10	103	0							
Through Vol	139	214	266	129	0							
RT Vol	10	12	92	0	222							
Lane Flow Rate	284	408	400	252	241							
Geometry Grp	4a	2	2	5	5							
Degree of Util (X)	0.74	0.982	0.948	0.664	0.568							
Departure Headway (Hd)	9.387	8.671	8.53	9.483	8.469							
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes							
Cap	383	420	424	381	427							
Service Time	7.472	6.717	6.576	7.238	6.224							
HCM Lane V/C Ratio	0.742	0.971	0.943	0.661	0.564							
HCM Control Delay, s/veh	35.1	69.9	61.5	29.2	21.9							
HCM Lane LOS	E	F	F	D	C							
HCM 95th-tile Q	5.8	11.9	10.9	4.6	3.4							

## HCM 6th TWSC




### 2: Bluffton Rd & Site Access #1

9 Bruin Road  
2027 Build-Out PM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	15	369	11	0	455
Future Vol, veh/h	0	15	369	11	0	455
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	17	410	12	0	506
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	416	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	637	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	637	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s/v	10.8	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	637		-		
HCM Lane V/C Ratio	-	0.026		-		
HCM Control Delay (s/veh)	-	10.8		-		
HCM Lane LOS	-	B		-		
HCM 95th %tile Q (veh)	-	0.1		-		

HCM 6th TWSC  
3: Bruin Rd & Site Access #2

9 Bruin Road  
2027 Build-Out PM Peak

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	308	348	10	11	20
Future Vol, veh/h	20	308	348	10	11	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	342	387	11	12	22
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	398	0	-	0	779	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1161	-	-	-	364	656
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	687	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1161	-	-	-	356	656
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	687	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	0.5	0		12.7		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1161	-	-	-	505	
HCM Lane V/C Ratio	0.019	-	-	-	0.068	
HCM Control Delay (s/veh)	8.2	0	-	-	12.7	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q (veh)	0.1	-	-	-	0.2	

## Queuing and Blocking Report

## Queuing and Blocking Report

9 Bruin Road  
2027 Build-Out AM Peak

### Intersection: 1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	193	150	123	96	85
Average Queue (ft)	84	71	61	45	41
95th Queue (ft)	146	118	99	75	71
Link Distance (ft)	545	150	524	207	
Upstream Blk Time (%)		0			
Queuing Penalty (veh)		1			
Storage Bay Dist (ft)					125
Storage Blk Time (%)				0	0
Queuing Penalty (veh)				0	0

### Intersection: 2: Bluffton Rd & Site Access #1

Movement	WB
Directions Served	R
Maximum Queue (ft)	27
Average Queue (ft)	4
95th Queue (ft)	19
Link Distance (ft)	148
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

### Intersection: 3: Bruin Rd & Site Access #2

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	40	29
Average Queue (ft)	4	8
95th Queue (ft)	23	28
Link Distance (ft)	150	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

## Network Summary

Network wide Queuing Penalty: 1

## Queuing and Blocking Report

## Queuing and Blocking Report

9 Bruin Road  
2027 Build-Out PM Peak

### Intersection: 1: Boundary St/Bluffton Rd & May River Rd/Bruin Rd

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	219	192	154	122	114
Average Queue (ft)	88	89	65	57	48
95th Queue (ft)	172	158	115	96	83
Link Distance (ft)	545	150	524	207	
Upstream Blk Time (%)		3			0
Queuing Penalty (veh)		12			0
Storage Bay Dist (ft)					125
Storage Blk Time (%)				0	0
Queuing Penalty (veh)				1	0

### Intersection: 2: Bluffton Rd & Site Access #1

Movement	WB
Directions Served	R
Maximum Queue (ft)	28
Average Queue (ft)	9
95th Queue (ft)	30
Link Distance (ft)	148
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

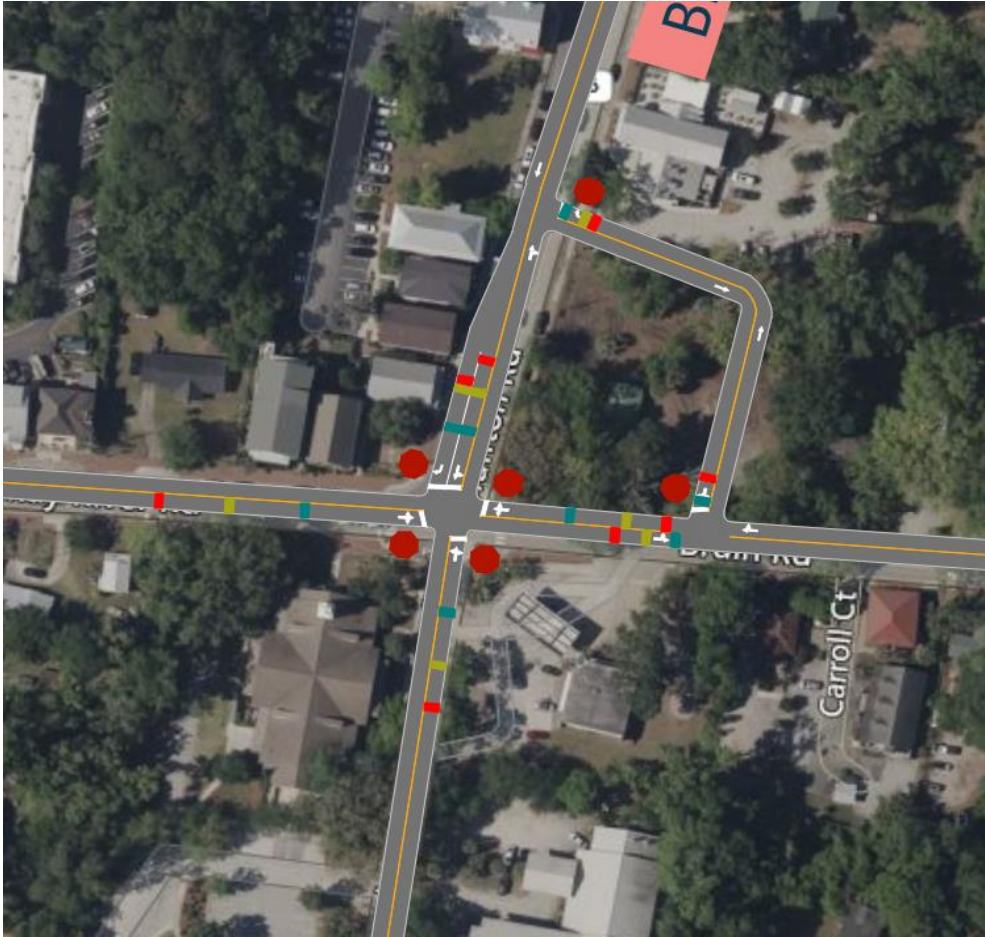
### Intersection: 3: Bruin Rd & Site Access #2

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	93	32	48
Average Queue (ft)	12	2	18
95th Queue (ft)	57	25	42
Link Distance (ft)	150	419	159
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	1		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Network Summary

Network wide Queuing Penalty: 14

## SimTraffic Static Graphics



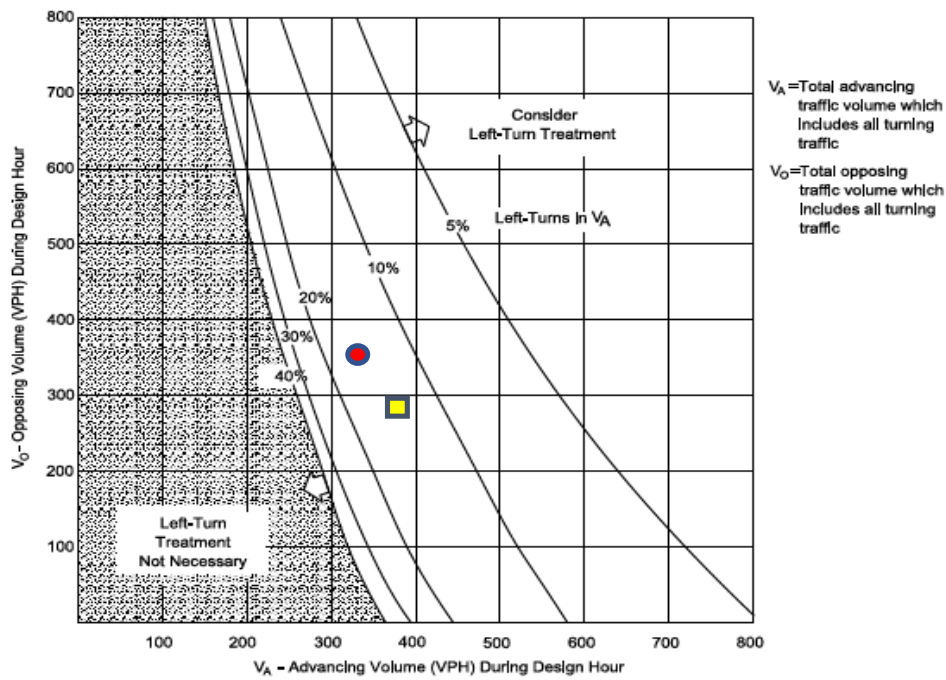
2027 Build AM Peak Hour



2027 Build PM Peak Hour

## Appendix G – Turn Lane Warrant Analysis







**Instructions:**

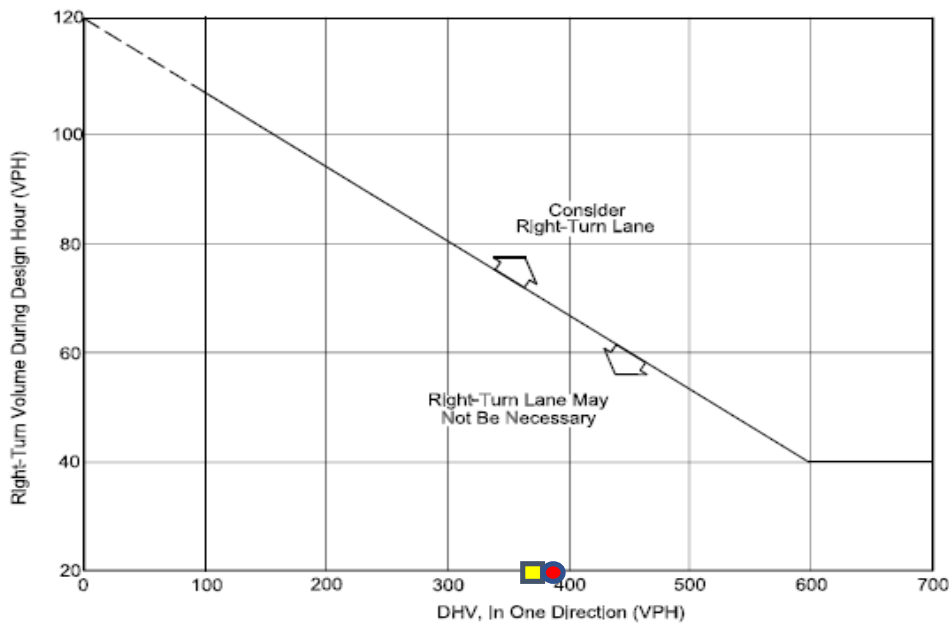
1. The family of curves represents the percent of left turns in the advancing volume ( $V_A$ ). The designer should locate the curve for the actual percentage of left turns. When this is not an even increment of 5, the designer should estimate where the curve lies.
2. Read  $V_A$  and  $V_O$  into the chart and locate the intersection of the two volumes.
3. Note the location of the point in #2 relative to the line in #1. If the point is to the right of the line, then a left-turn lane is warranted. If the point is to the left of the line, then a left-turn lane is not warranted based on traffic volumes.

**VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS (40 mph)**  
Figure 9.5-G

**Bruin Road at Site Access #2**

Southbound	Left	$V_A$	$V_O$	LTs	LT %
	2027 Build AM	364	300	15	4.1%
	2027 Build PM	328	358	20	6.1%





*Note: For highways with a design speed below 50 miles per hour with a DHV < 300 and where right turns > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.*

#### Example



Given: Design Speed = 35 miles per hour  
 DHV = 250 vehicles per hour  
 Right Turns = 100 vehicles per hour

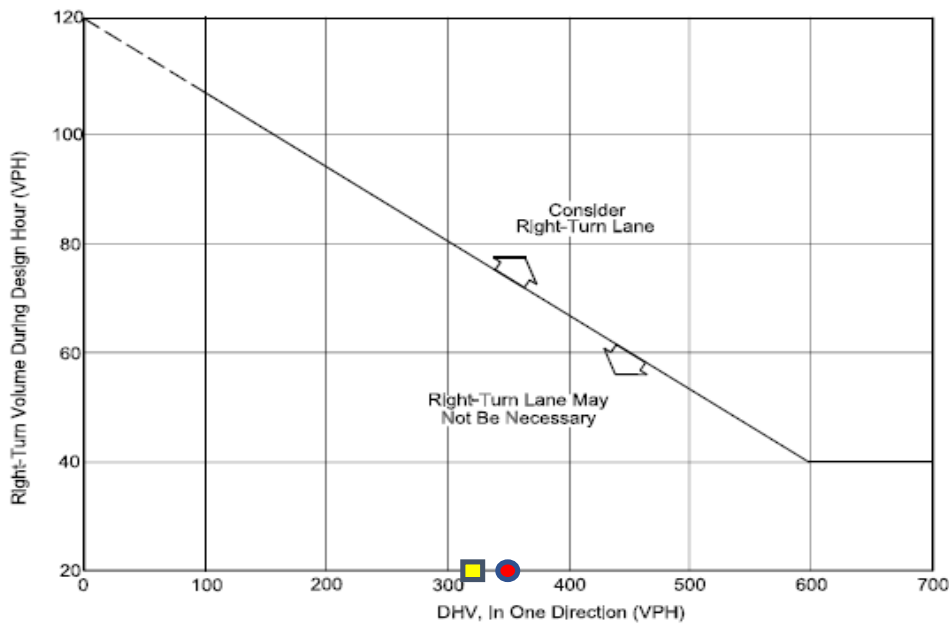
Problem: Determine if a right-turn lane is necessary.

Solution: To read the vertical axis, use  $100 - 20 = 80$  vehicles per hour. The figure indicates that a right-turn lane is not necessary, unless other factors (e.g., high crash rate) indicate a lane is needed.

#### GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS Figure 9.5-A

##### Bluffton Road at Site Access #1

Northbound	Right	DHV	RTs
	2027 Build AM	376	8
	2027 Build PM	380	11



*Note: For highways with a design speed below 50 miles per hour with a DHV < 300 and where right turns > 40, an adjustment should be used. To read the vertical axis of the chart, subtract 20 from the actual number of right turns.*

#### Example



Given: Design Speed = 35 miles per hour  
 DHV = 250 vehicles per hour  
 Right Turns = 100 vehicles per hour

Problem: Determine if a right-turn lane is necessary.

Solution: To read the vertical axis, use  $100 - 20 = 80$  vehicles per hour. The figure indicates that a right-turn lane is not necessary, unless other factors (e.g., high crash rate) indicate a lane is needed.

#### GUIDELINES FOR RIGHT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS Figure 9.5-A

#### Bruin Road at Site Access #2

Westbound	Right (PM)	DHV	RTs
	2027 Build AM	300	7
	2027 Build PM	358	10