



# TRAFFIC IMPACT STUDY

**QUIKTRIP 4299**

Monument, CO

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**QuikTrip**

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- B. LOS Descriptions
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## Executive Summary

### Site Location and Study Area

The property that comprises the application area for the proposed development is ±12-acres in size and is presently vacant. It is located southwest quadrant of the Baptist Road and Terrazzo Drive intersection.

The study area, as discussed with the Town of Monument (Staff) is generally bounded by the site boundaries to west, as well as Baptist Road to the north, Terrazzo Drive to the east, and Squadron Drive to the south. The study area for the project includes those intersections identified that could be affected by the proposed development:

- Baptist Road/Woodcarver Road/Old Denver Road roundabout
- Baptist Road/Site entrance
- Baptist Road/Terrazzo Drive
- Baptist Road/SB I-25 ramps
- Baptist Road/NB I-25 ramps

### Description of Proposed Development

The Applicant seeks to develop the property with 6 diesel pumps, 22 fueling pumps, and a convenience store and in a potential later phase with a 3,500 square foot (SF) fast-food restaurant with a drive thru. Two new driveways are being proposed to tie into the existing network to facilitate access and circulation throughout the site and to the existing network.

## Conclusions and Recommendations

### Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the signalized intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours.
- Under background future 2023 and 2028 traffic conditions, without the development of the subject site, delays would increase slightly at study intersections due to regional traffic growth. The signalized intersections would continue to operate at LOS “C” or better.
- The 2023 proposed site development would generate, upon completion and full occupancy, 298 new weekday AM and 283 new weekday PM peak hour vehicle trips as well as 2,840 new weekday daily trips.
- The 2028 proposed site development would generate, upon completion and full occupancy, 72 new weekday AM and 56 new weekday PM peak hour vehicle trips as well as 824 new weekday daily trips.
- Under 2023 and 2028 total future traffic conditions, all study intersections, including proposed site connections would operate at overall acceptable levels of service consistent with background conditions.

## Recommendations

- It is recommended that the proposed development provide access consistent with the attached plan.
- Due to forecasted left turn volumes, dual lefts and retiming of the Baptist Road signal at Terrazzo Drive should be provided at such a time when vehicle movements exceed 300 vehicles an hour.
- Signal timings should be coordinated with the Town of Monument.

## I. Introduction

### Overview

This report presents the results of a Traffic Impact Study (TIS) conducted in support of a site plan to develop a gas station with a convenience store use in the Town of Monument, Colorado. Currently, the site is vacant.

Per the requirements of the El Paso County Engineering Criteria Manual for Traffic Impact Studies, a TIS is generally required for all new land development proposals. More specifically, because the proposed development would generate more than 1,000 daily trips, per the guidelines a full TIS would be required.

The basis of this traffic impact study includes analysis of existing and future intersections that would be affected by the proposed development and information from the Applicant including preliminary site concepts.

### Site Location and Study Area

The property that comprises the application area for the proposed development is ±12-acres in size and identified as El Paso County Parcel Number: 7135000027, 7135000002, 7135000018 and addressed as 1671 Squadron Drive Monument, CO. It is located south of Baptist Road, east of Old Denver Road, west of Terrazzo Drive, and bound by property lines to the south, as shown on Figure 1-1. It is zoned as Planned Unit Development (PUD) and is currently vacant. Connections to the existing network are being proposed via a right-in/right-out entrance along Baptist Road, three full movement access via Terrazzo Drive, and a full movement access along Squadron Drive.

The Applicant seeks to develop the property with a gas station and convenience store. A reduction of the Applicant's proposed conceptual site plan is provided on Figure 1-2. A full-size copy of the plan is provided in Appendix A.

The study area is generally bounded by site boundaries to the west, Baptist Road to the north, Terrazzo Drive to the east, and Squadron Drive to the south.

Tasks undertaken in the course of this study included the following:

1. Reviewed the Applicant's proposed development plans and other background data.
2. Conducted a virtual field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.
3. Analyzed existing levels of service at each of the key study intersections based on the methodologies set forth in the Highway Capacity Guidelines 6<sup>th</sup> Edition as reported by Synchro version 11.
4. Prepared AM and PM peak hour background future traffic forecasts based on existing traffic volumes plus a percentage of growth.
5. Calculated background levels of service at each of the key study intersections for the projected build-out years based on background future traffic forecasts, and the existing lane use and traffic controls.

6. Estimated the number of AM and PM peak hour trips that would be generated by the proposed use based on the Institute of Transportation Engineers (ITE) 10<sup>th</sup> Generation Trip Generation Manual rates/equations and methodologies.
7. Prepared AM and PM peak hour total future traffic forecasts based on background traffic forecasts plus site traffic assignments for the 2023 buildout plus five (5) years (2028).
8. Calculated total future levels of service for each of the key study intersections based on projected total future traffic forecasts, existing/future traffic controls and intersection geometries.
9. Identified roadway improvements required to accommodate full buildout future traffic volumes as necessary.

Sources of data for this analysis included ITE, the Highway Capacity Manual (HCM), QuikTrip, Town of Monument, and the files/library of Galloway.

## Site Description and Access

### **Site Conditions**

The topography proximate to and surrounding the site is generally classified as “level”.

### **Hazardous Conditions**

Based on the field reconnaissance in the vicinity of the subject site, no hazardous features or constraints were identified.

### **Proposed Site Access**

Access to the site is being proposed via a right-in/right-out along Baptist Road, two full movement accesses along Terrazzo Drive, and a right-in/right-out along Terrazzo Drive.

### **Existing Zoning**

The subject site is currently zoned Planned Unit Development (PUD) and is currently vacant. Figure 1-3 depicts the existing zoning associated with the subject property, as well as neighboring properties as shown on the Town of Monument zoning map.

### **Nearby Uses**

The properties surrounding the subject site are generally developed with or planned for commercial uses.

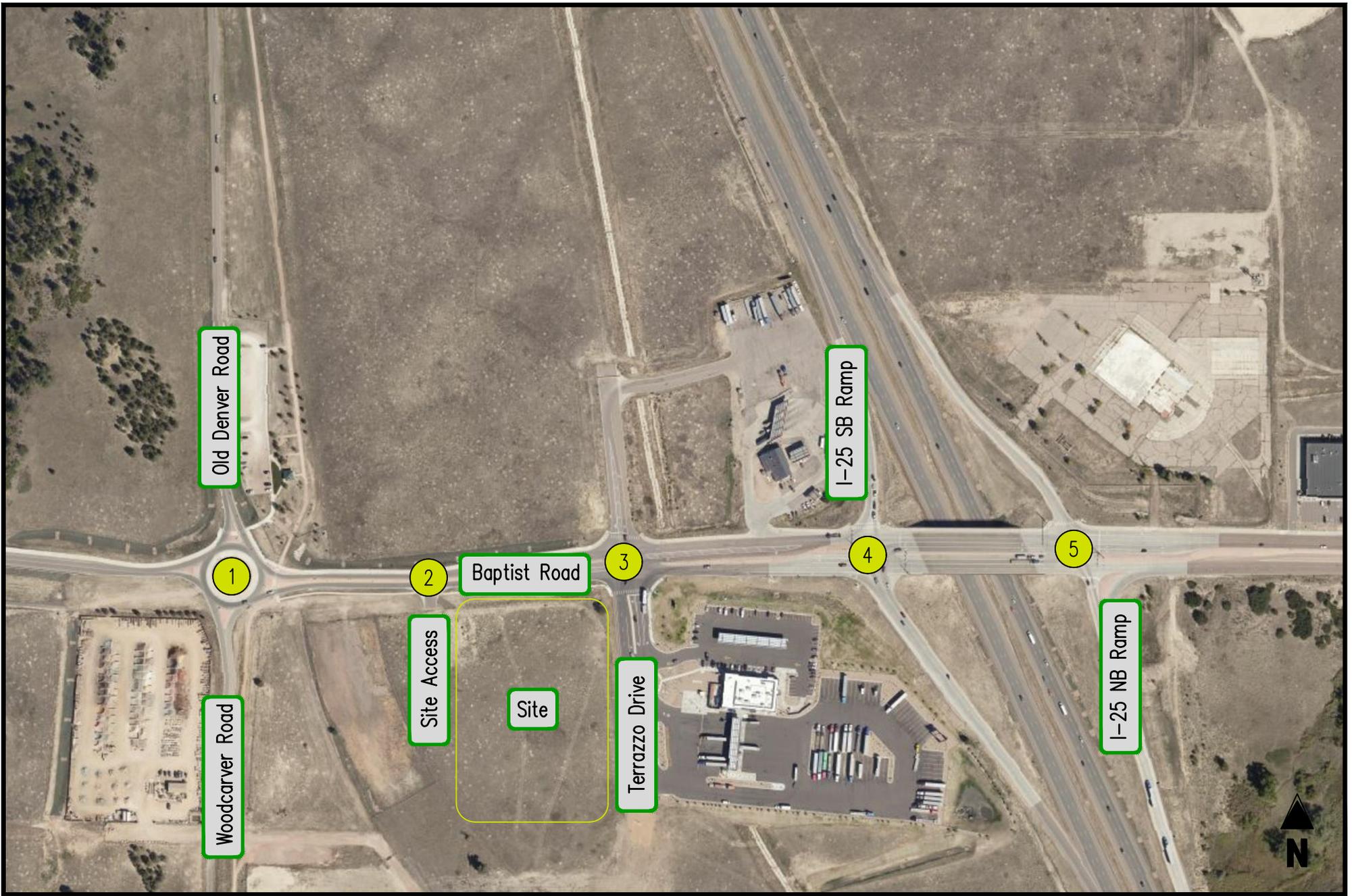


FIGURE 1-1  
Site Location

QKT 4299  
Monument, CO





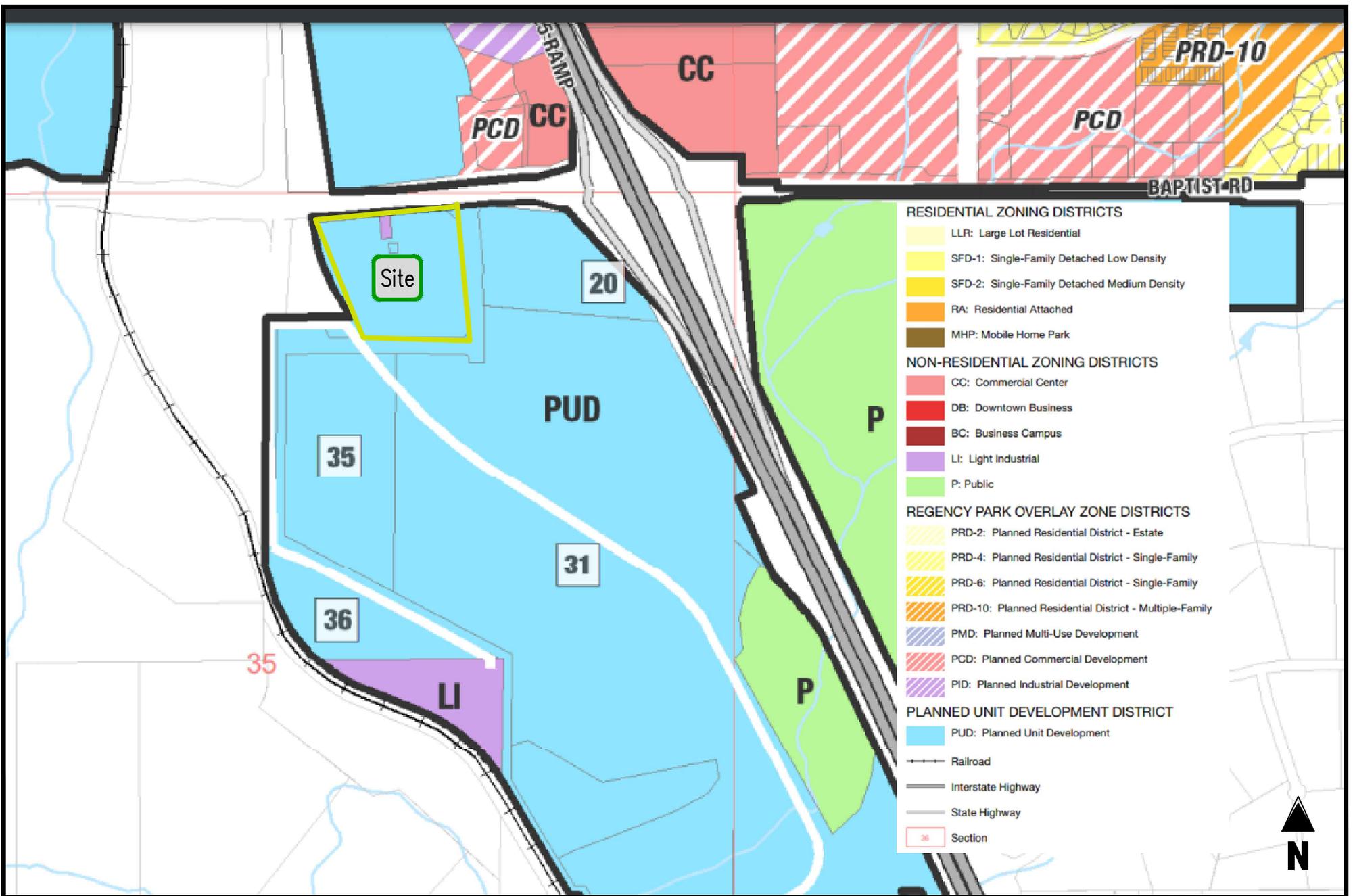


FIGURE 1-3  
Zoning

QKT 4299  
Monument, CO



## II. Background Information

### Study Area

The study area was determined by a review of intersections that would experience a significant portion of turning movement percentages as well as existing/proposed site entrance. As such, the traffic study focuses primarily on the following intersections:

#### **Existing Intersections**

- Baptist Road/Woodcarver Road/Old Denver Road roundabout
- Baptist Road/new site access
- Baptist Road/Terrazzo Drive
- Baptist Road/SB I-25 ramps
- Baptist Road/NB I-25 ramps

### Study Assumptions

For purposes of this analysis only, the gas station and convenience store are assumed to be built and occupied in 2023 and the fast-food restaurant with drive-thru is assumed to be built and occupied in 2028. A number of pipeline projects (approved but unbuilt development) were identified including: Forest Lakes Phase II, Wagons West, Nexus Industrial, & Willow Springs Ranch.

### Study Methodology

Synchro software version 11 was used to evaluate levels of service at each of the study intersections during the weekday AM and PM peak hours. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized and unsignalized intersections analyzed herein were taken from the HCM 6<sup>th</sup> reports generated by Synchro 11. Level of service descriptions are included in Appendix B.

To maintain a conservative analysis a default percent heavy vehicle (%HV) factor of 2% was used for all movements in the study area.

### Existing Roadway Network

Local access to the subject site is provided via Baptist Road and Terrazzo Drive. Figure 2-1 depicts existing lane use and traffic controls in the vicinity of the subject site. The following provides a description of each of the roadways within the study network.

#### **Baptist Road**

Starting from the roundabout at Old Denver Road/Woodcarver Road and heading east, Baptist Road is a one lane roadway expanding to two lanes after the proposed site access and expanding to three lanes after the I-25 NB ramps. There are auxiliary lanes for the left turn movements at Terrazzo Drive and dual left turn lanes at both I-25 ramps. The posted speed limit is 40 mph in the vicinity of the subject site. The roadway

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QuikTrip Traffic Impact Analysis

is classified by El Paso County as a principal arterial providing east-west connection through the region and access to a number of residential and commercial developments. The intersection with Woodcarver Road and Old Denver Road operates as a roundabout, the intersections with the site access and Terrazzo Drive operate under stop control, and the intersections with the I-25 north- and southbound ramps operate under signalized control.

#### **Old Denver Road**

Old Denver Road is an undivided two-lane roadway with a posted speed limit of 40 mph. The roadway is classified by El Paso County as a collector and provides north-south connection through the region and access to a number of industrial and residential developments. The intersection with Baptist Road operates as a roundabout.

#### **Woodcarver Road**

Woodcarver Road is an undivided two-lane roadway with an assumed speed limit of 25 mph. The roadway is unclassified in El Paso County's transportation plan and provides north-south connection to a number of commercial developments. The intersection with Baptist Road operates as a roundabout.

#### **Terrazzo Drive**

Terrazzo Drive is an undivided three-lane roadway providing north-south access. It is unclassified by El Paso County's transportation plan but in accordance with Table 2-7 of the County's Engineering Criteria Manual, Terrazzo Drive is assumed to be classified as a collector roadway with a speed limit of 35 mph. This assumption is consistent with the Falcon Commerce Center TIS. The intersection with Baptist Road operates under unsignalized control.

#### **I-25 Ramps**

Interstate 25 intersects Baptist Road in a diamond interchange with I-25 traffic proceeding underneath Baptist Road. The interchange is within CDOT jurisdiction. The ramps have a posted advisory speed limit of 45 mph. Both interchange ramps operate under signalized control with Baptist Road.

### **Assumed Improvements**

Due to the large amount of pipeline development, a number of improvements have been identified in the area. Terrazzo Drive is assumed to be extended to the south and Squadron Drive is assumed to be constructed south of Baptist Road. Squadron Drive will provide access from Woodcarver Road to Terrazzo Drive running east-west. In accordance with the Falcon Commerce Center TIS, the intersection of Terrazzo Drive and Baptist Road is assumed to be signalized by others in the near future.

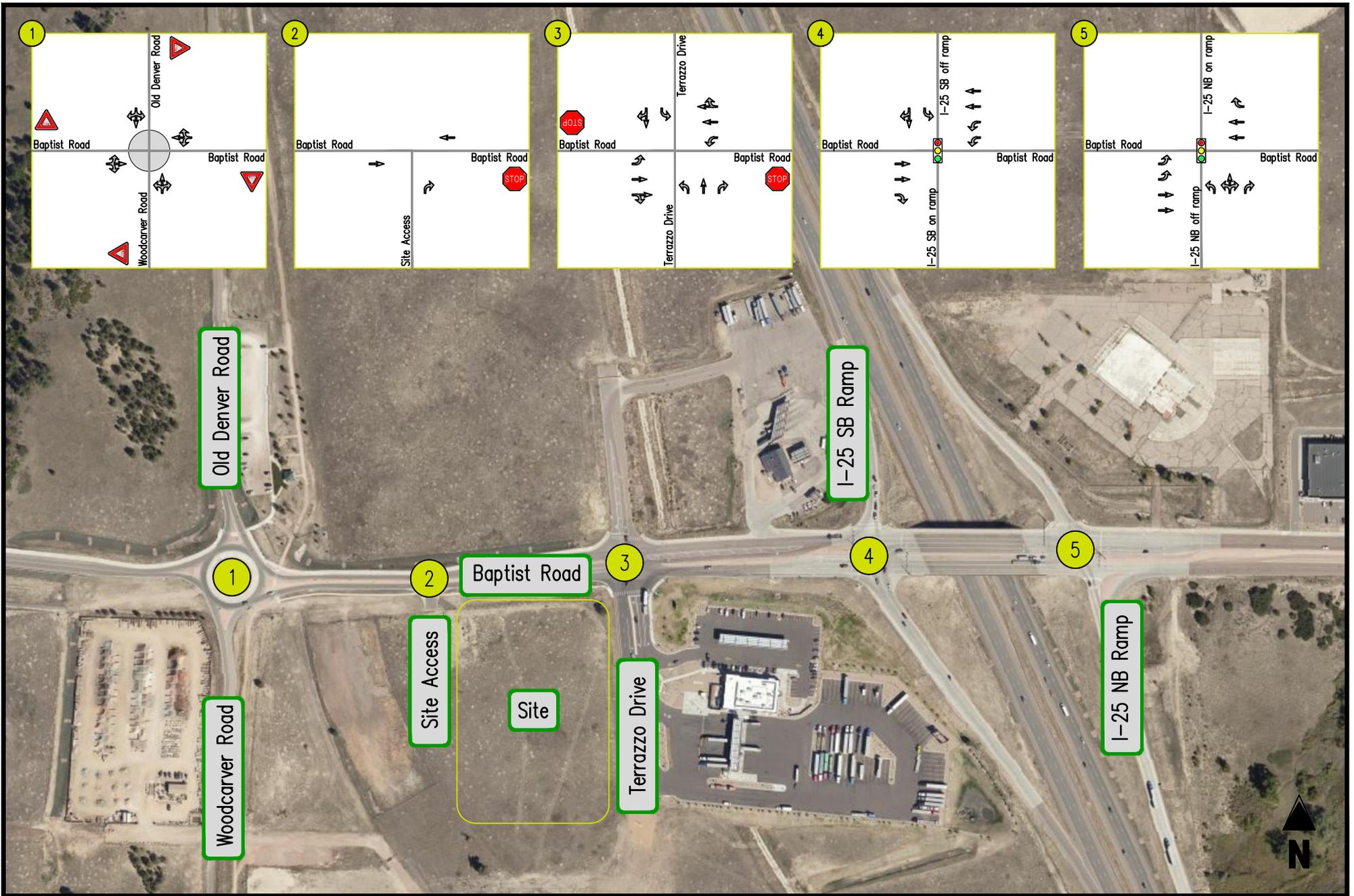


FIGURE 2-1  
Existing Lane Use & Traffic Control

QKT 4299  
Monument, CO

-  MOVEMENT
-  SIGNALIZED INTERSECTION
-  STOP SIGN
-  YIELD SIGN



### **III. Analysis of Existing Conditions**

#### **Traffic Volumes**

Weekday AM and PM peak hour traffic volumes counts were available from the Falcon Commerce Center 2020 TIS and were conducted on Thursday, February 13, 2020 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the study intersections by All Traffic Data.

For purposes of this study and in an effort to be consistent with nearby recent studies, the existing volumes were taken directly from the Falcon Commerce Center TIS. The existing volumes are summarized on Figure 3-1. Copies of traffic counts are included in Appendix C.

#### **Operational Analysis**

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown on Figure 2-1, existing baseline vehicular traffic volumes shown on Figure 3-1. The capacity analysis results are presented in Appendix D and summarized in Table 3-1 and on Figure 3-2.

As shown in Table 3-1, the study intersections currently operate at overall acceptable levels of service (LOS) "C" or better during the weekday peak hours. Side street approaches at the unsignalized intersection are operating at LOS "D" or better in both the AM and PM existing peak hours.

#### **Existing Intersection Queues**

An analysis of intersection 95<sup>th</sup>-percentile queues was performed at key locations. The results of the queuing analysis, as reported by Synchro, are summarized in Table 3-2.

As shown in the table, the existing queues are all contained within the effective storage within the study area.

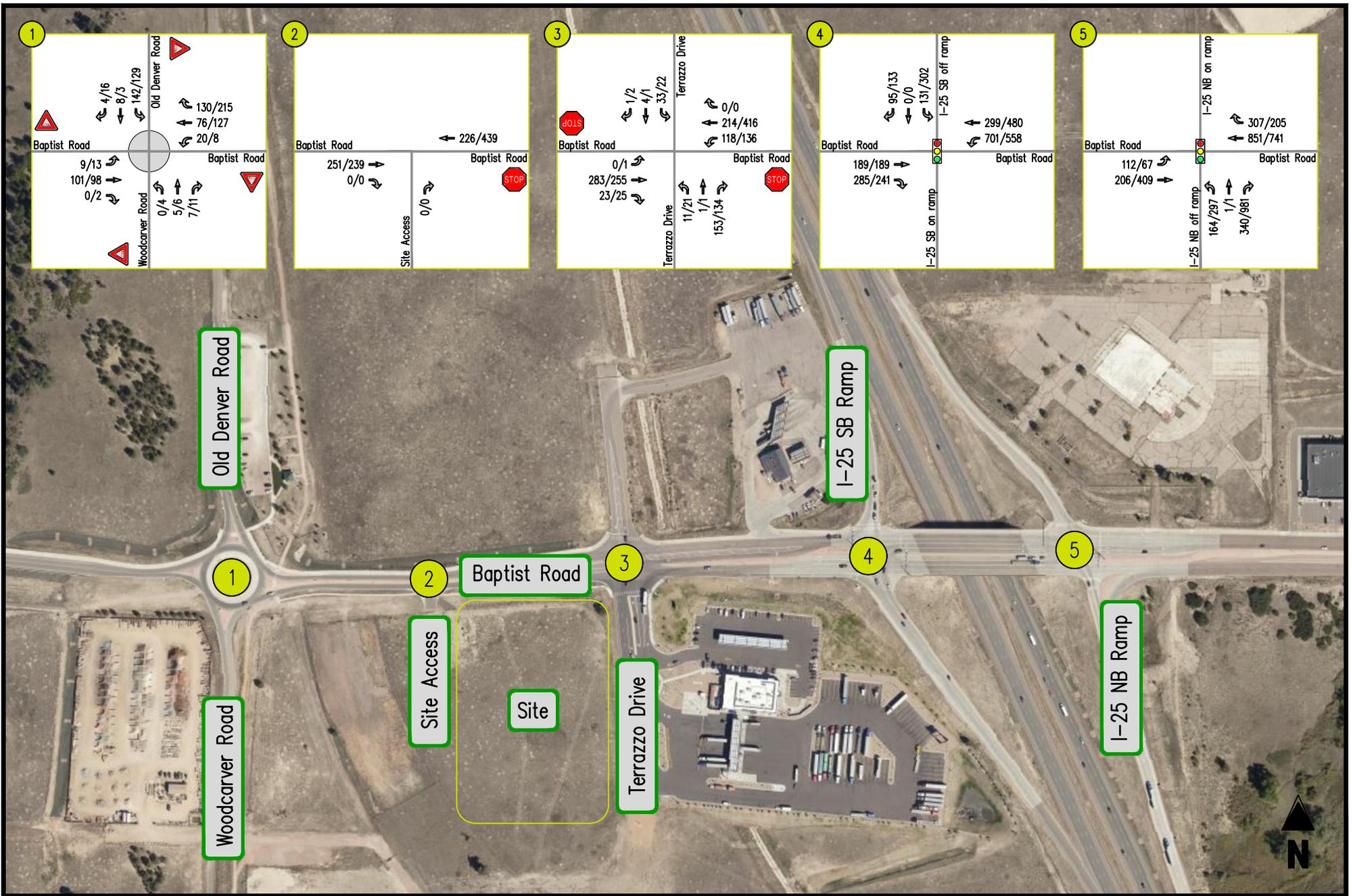


FIGURE 3-1  
Existing Volumes

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



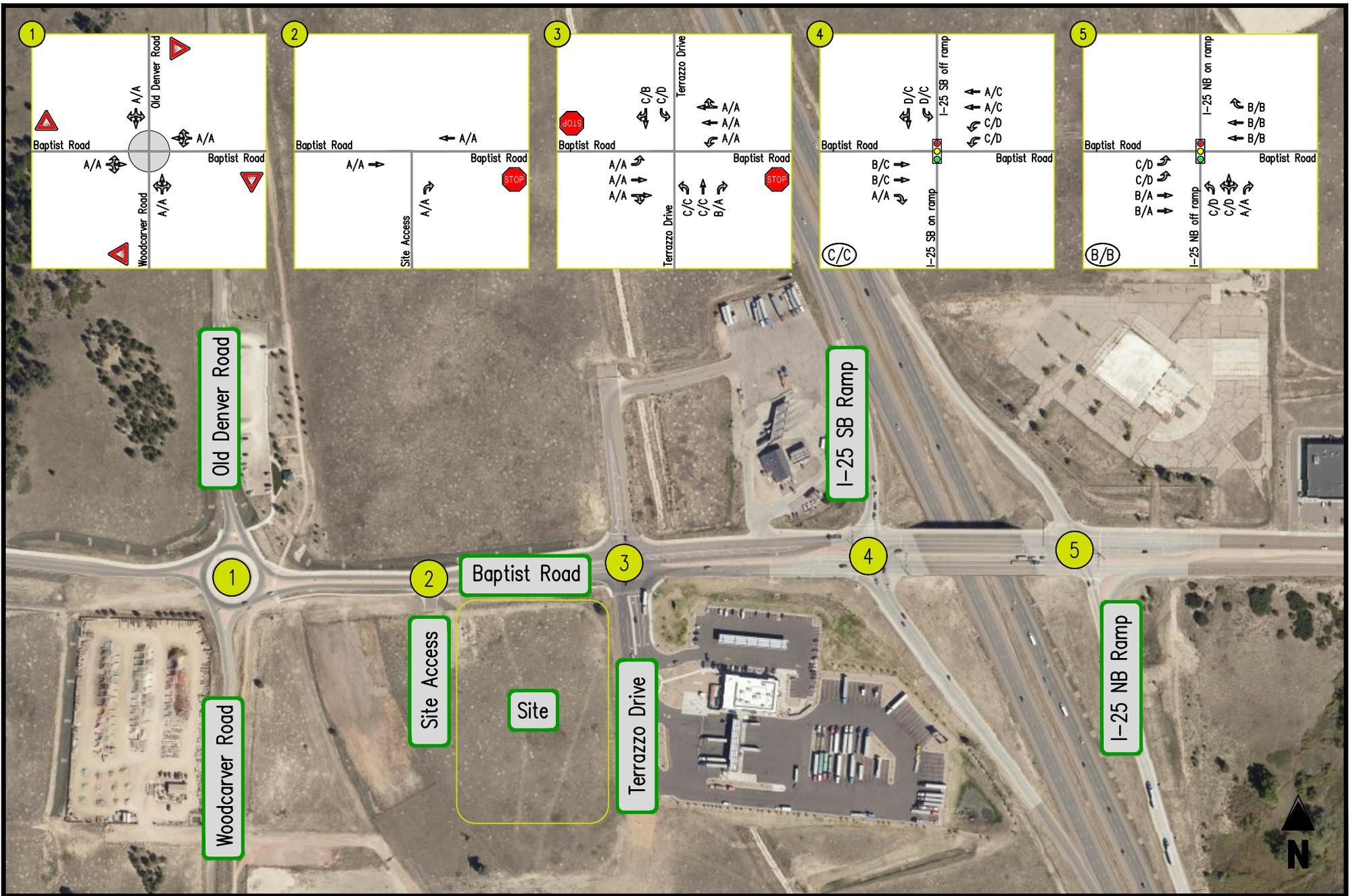


FIGURE 3-2  
Existing LOS

QKT 4299  
Monument, CO

(A/A) INTERSECTION LOS  
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



Table 3-1  
 Monument, CO  
 Existing LOS (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2021		
				AM Peak Hour	PM Peak Hour	
1	Baptist Road/Site Access	ROUNDAABOUT	Baptist Road	EBLTR	A [4.1]	A [4.0]
				WBLTR	A [4.2]	A [5.3]
			Woodcarver Road	NBLTR	A [3.6]	A [3.6]
			Old Denver Road	SBLTR	A [4.1]	A [4.3]
2	Baptist Road/Site Access	STOP	Road 1	EBTR	A [0.0]	A [0.0]
				WBT	A [0.0]	A [0.0]
			Road 2	NBR	A [0.0]	A [0.0]
3	Baptist Road/Terrazzo Drive	STOP	Baptist Road	EBL	A [0.0]	A [8.3]
				EBT	A [0.0]	A [0.0]
				EBR	A [0.0]	A [0.0]
				WBL	A [8.3]	A [8.3]
				WBT	A [0.0]	A [0.0]
			Terrazzo Drive	WBTR	A [0.0]	A [0.0]
				NBL	C [17.6]	C [21.3]
				NBT	C [18.0]	C [22.9]
				NBR	B [10.3]	A [10.0]
				SBL	C [20.8]	D [28.2]
				SBTR	C [16.4]	B [14.2]
4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	B (18.5)	C (24.4)
				EBR	A (0.0)	A (0.0)
				WBL	C (30.2)	D (44.9)
			I-25 SB Ramp	WBT	A (0.1)	C (21.3)
				SBL	D (37.6)	C (30.8)
				SBTR	<u>D (36.2)</u>	<u>C (25.0)</u>
				<b>Overall</b>	<b>C (23.4)</b>	<b>C (31.6)</b>
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	C (29.9)	D (37.7)
				EBT	B (10.4)	A (9.3)
				WBT	B (13.1)	B (11.5)
			I-25 NB Ramp	WBR	B (13.0)	B (11.0)
				NBL	C (32.3)	D (36.7)
				NBLTR	C (32.4)	D (36.8)
				NBR	<u>A (0.3)</u>	<u>A (2.3)</u>
				<b>Overall</b>	<b>B (13.2)</b>	<b>B (11.2)</b>

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.  
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 3-2  
Monument, CO  
Existing Queue

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2021		
					AM Peak Hour	PM Peak Hour	
1	Baptist Road/Old Devner Road/Woodcarver Road	ROUNDAABOUT	Baptist Road	EBLTR	-	0	0
				WBLTR	-	25	25
			Woodcarver Road	NBLTR	-	0	0
			Old Denver Road	SBLTR	-	0	0
2	Baptist Road/Site Access	STOP	Baptist Road	EBTR	-	0	0
				WBT	-	0	0
			Site Access	NBR	-	0	0
3	Baptist Road/Terrazzo Drive	STOP for Existing	Baptist Road	EBL	155	0	0
				EBT	-	0	0
				EBR	-	0	0
		SIGNAL for rest	Terrazzo Drive	WBL	420	10	10
				WBT	-	0	0
				WBTR	-	0	0
				NBL	135	2.5	12.5
				NBT	-	0	0
				NBR	135	17.5	7.5
				SBL	255	12.5	0
SBTR	-	2.5	15				
4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	-	40	44
				EBR	-	60	61
			I-25 SB Ramp	WBL	620	109	225
				WBT	-	14	64
				SBL	-	131	245
				SBTR	-	0	0
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	550	53	31
				EBT	-	66	80
			I-25 NB Ramp	WBT	-	111	92
				WBR	-	43	34
				NBL	-	90	151
				NBLT	-	91	152
				NBR	-	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

## **IV. Analysis of Future Conditions without Site Development**

### **Methodology**

The future traffic forecasts, without the proposed new use, was developed for 2023 and 2028 conditions based on a composite of existing baseline traffic volumes, pipeline development, and regional traffic. A 1% growth factor per year was applied to existing traffic along Baptist Road.

### **Regional Growth**

Increases in traffic associated with regional growth were estimated at one (1.0) percent per year compounded for through movements along Baptist Road up to 2028. This growth accounts for increases in traffic resulting from influences outside of the immediate study area.

### **Pipeline Development**

To account for projected traffic from adjacent developments not yet built, trip generations from the Forest Lakes Phase II, Wagons West, Nexus Industrial, and Willow Springs Ranch traffic studies were added to background traffic volumes. Certain improvements to the roadway network are identified in the pipeline developments' associated traffic study. These improvements, necessary for the construction of each pipeline is assumed complete in future scenarios. The lane use and traffic controls of the background and future scenarios is provided in Figure 4-1. The location of the pipeline development is shown in Figure 4-2.

### **Background 2023 Traffic Forecasts**

The existing traffic volumes depicted on Figure 3-1 and the regional growth shown on Figure 4-3 were added together to yield the background future traffic forecasts. The background future (without site development) forecasts are shown on Figure 4-4 for 2023 conditions.

### **Background 2023 Levels of Service**

Capacity analyses of 2023 future traffic conditions without the proposed development are provided in Appendix E and summarized in Table 4-1. The forecasted levels of service are also depicted graphically on Figure 4-5 for 2023 conditions. Due to the high amount of forecasted pipeline traffic, and in accordance with the Falcon Commerce Center TIS, the intersection of Baptist Road and Terrazzo Drive was assumed to be signalized by 2023. In addition, over 300 left turns are forecasted from Baptist Road onto Terrazzo Drive, so the intersection was analyzed with a westbound double left turn. This new lane use is shown in Figure 4-1.

As shown on Table 4-1, the signalized intersections within the study area would continue to operate at overall acceptable levels of service (LOS) "C" or better during the AM and PM peak hours, consistent with existing conditions. Minor increases in delay are forecasted due to growth along the arterials within the study area.

### **Background 2023 Queueing**

An analysis of intersection queues was performed at key locations under background future traffic conditions. The results of the queueing analysis are summarized in Table 4-2.

As shown in the table, queues within the study network will generally increase due to regional traffic growth. The increase in 95<sup>th</sup>-percentile queues within the study area are forecasted to be minor. No queues are forecasted to exceed their effective storage consistent with existing conditions.

### Background 2028 Traffic Forecasts

The existing traffic volumes depicted on Figure 3-1 and the regional growth shown on Figure 4-6 were added together to yield the background future traffic forecasts. The background future (without site development) forecasts are shown on Figure 4-7 for 2028 conditions.

### Background 2028 Levels of Service

Capacity analyses of 2028 future traffic conditions without the proposed development are provided in Appendix E and summarized in Table 4-3. The forecasted levels of service are also depicted graphically on Figure 4-8 for 2023 conditions.

As shown on Table 4-3, the signalized intersections within the study area would continue to operate at overall acceptable levels of service (LOS) "C" or better during the AM and PM peak hours, consistent with existing conditions. Minor increases in delay are forecasted due to growth along the arterials within the study area.

### Background 2028 Queueing

An analysis of intersection queues was performed at key locations under background future traffic conditions. The results of the queueing analysis are summarized in Table 4-4.

As shown in the table, queues within the study network will generally increase due to regional traffic growth. The increase in 95<sup>th</sup>-percentile queues within the study area are forecasted to be minor. No queues are forecasted to exceed their effective storage consistent with existing conditions.

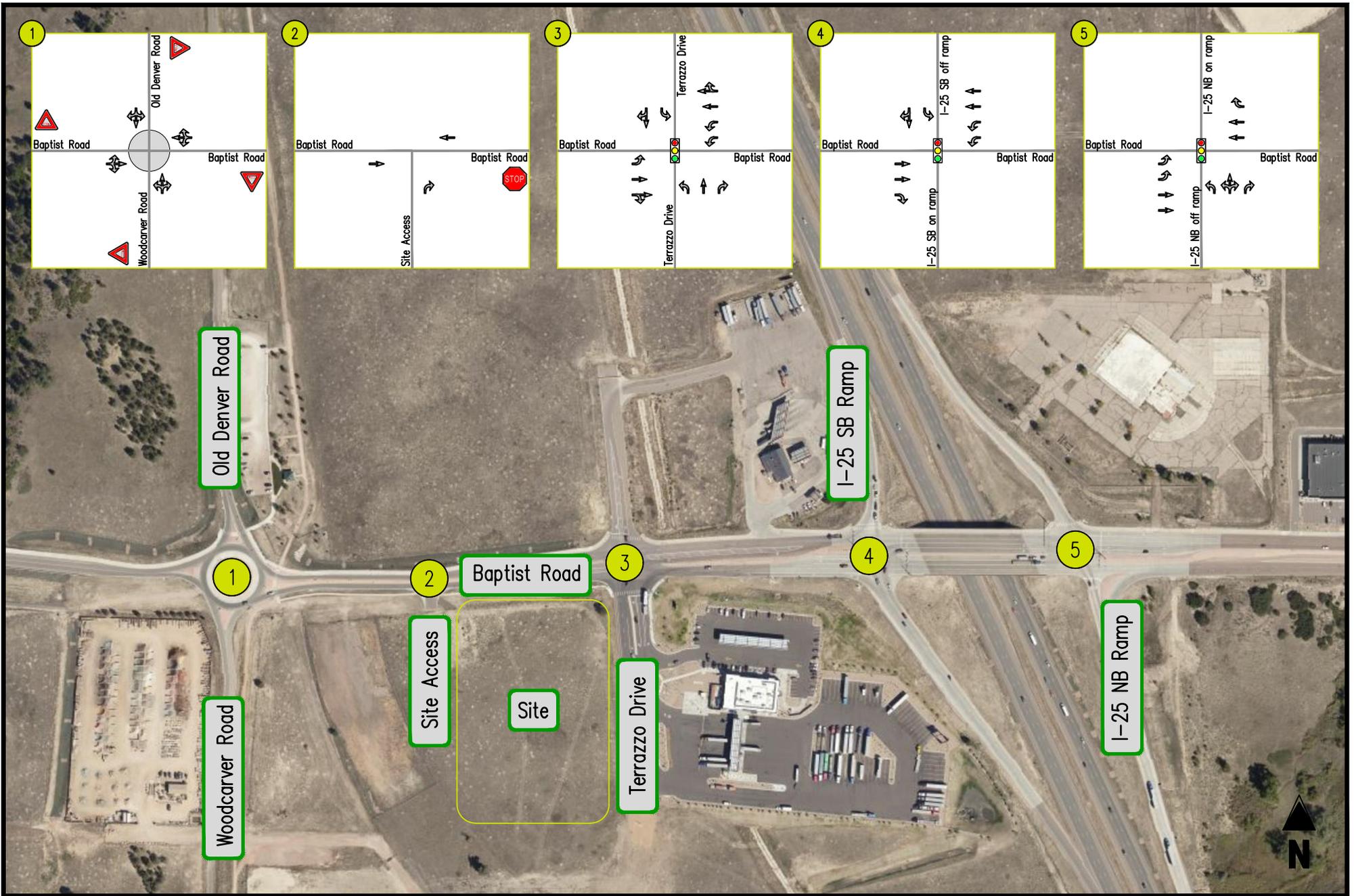


FIGURE 4-1  
Future Lane Use & Traffic Control

QKT 4299  
Monument, CO

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN





FIGURE 4-2  
Pipeline Development Area

QKT 4299  
Monument, CO

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



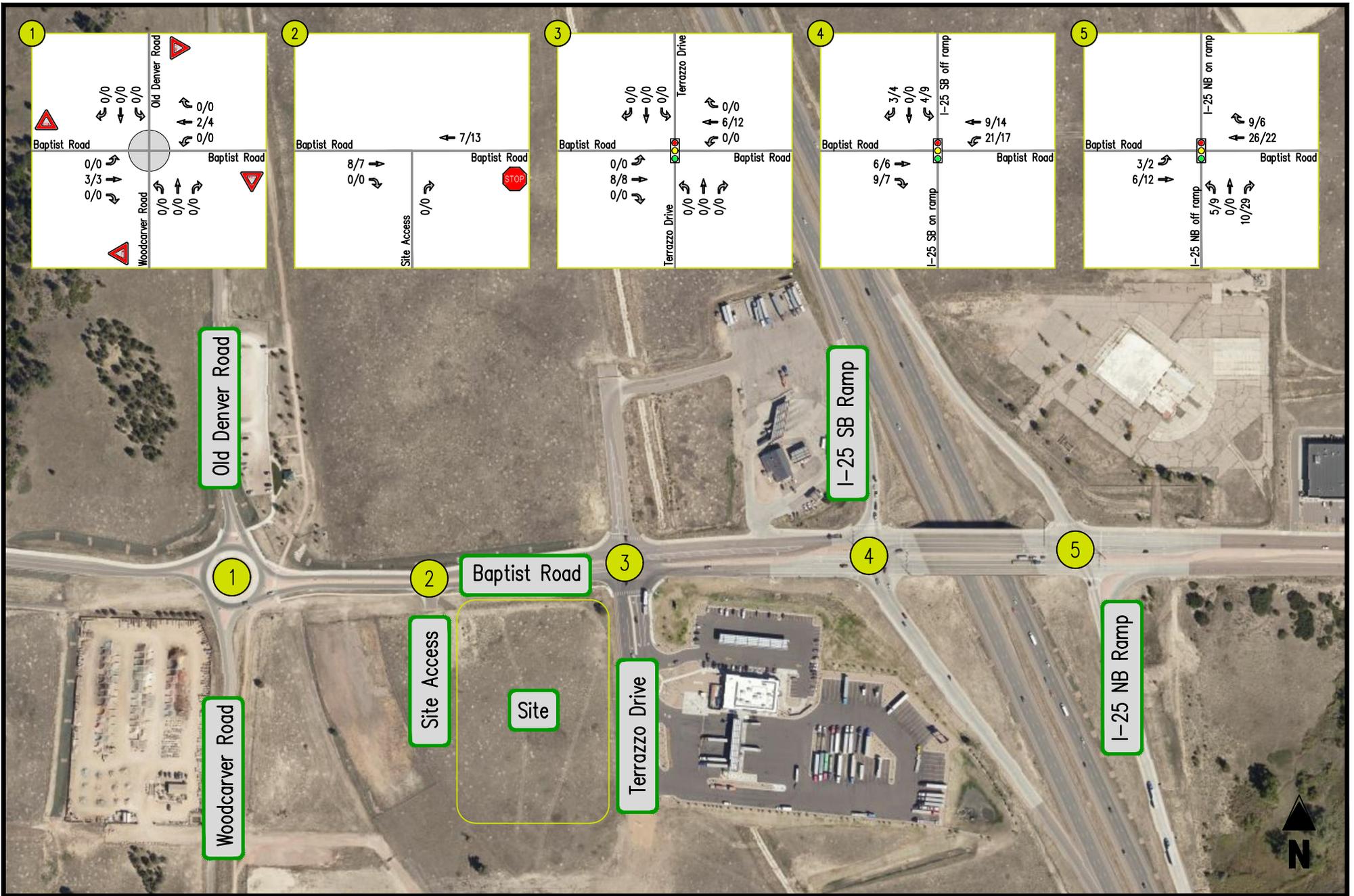


FIGURE 4-3  
Background 2023 Growth

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



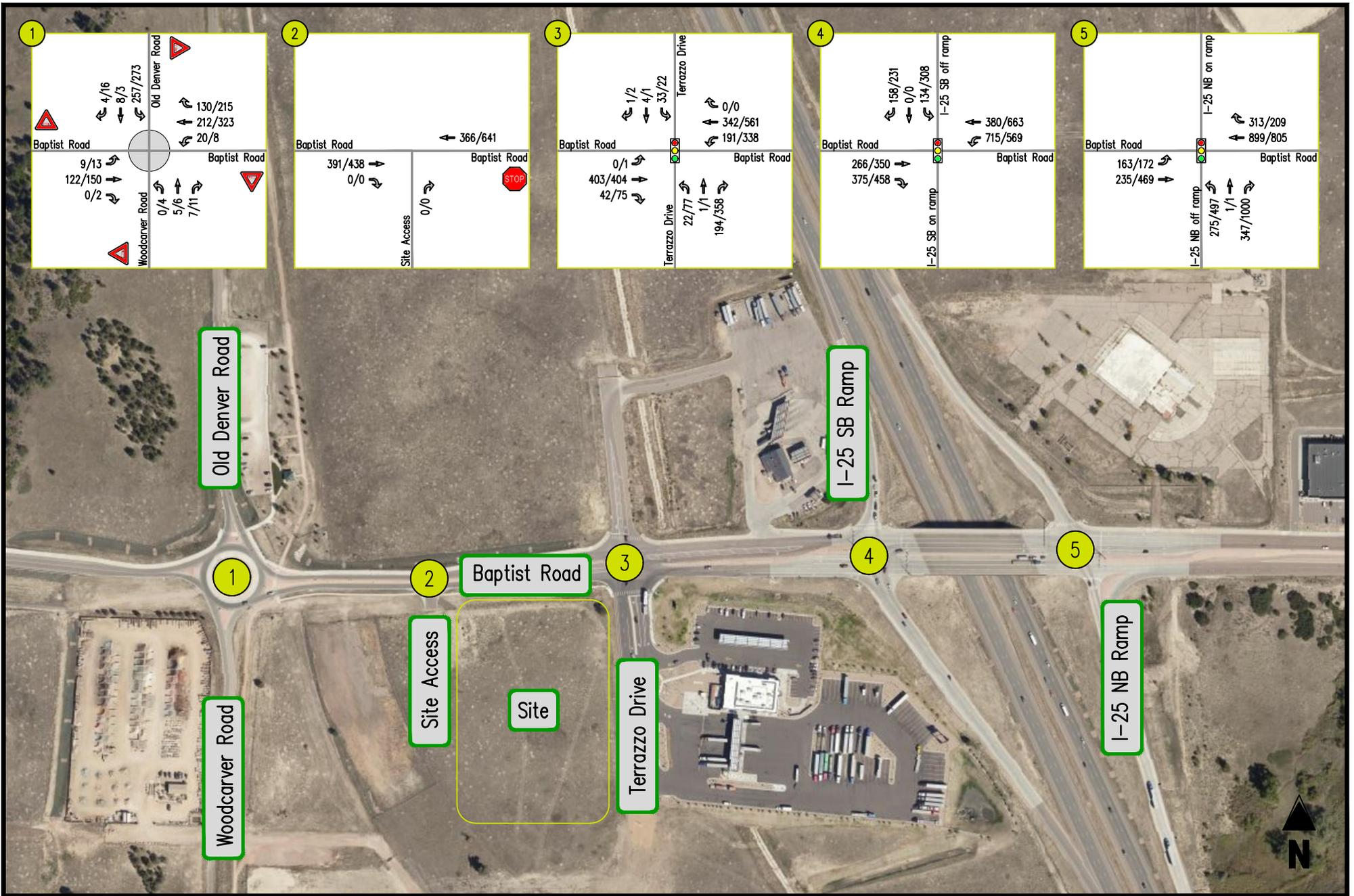


FIGURE 4-4  
Background 2023 Forecasts

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



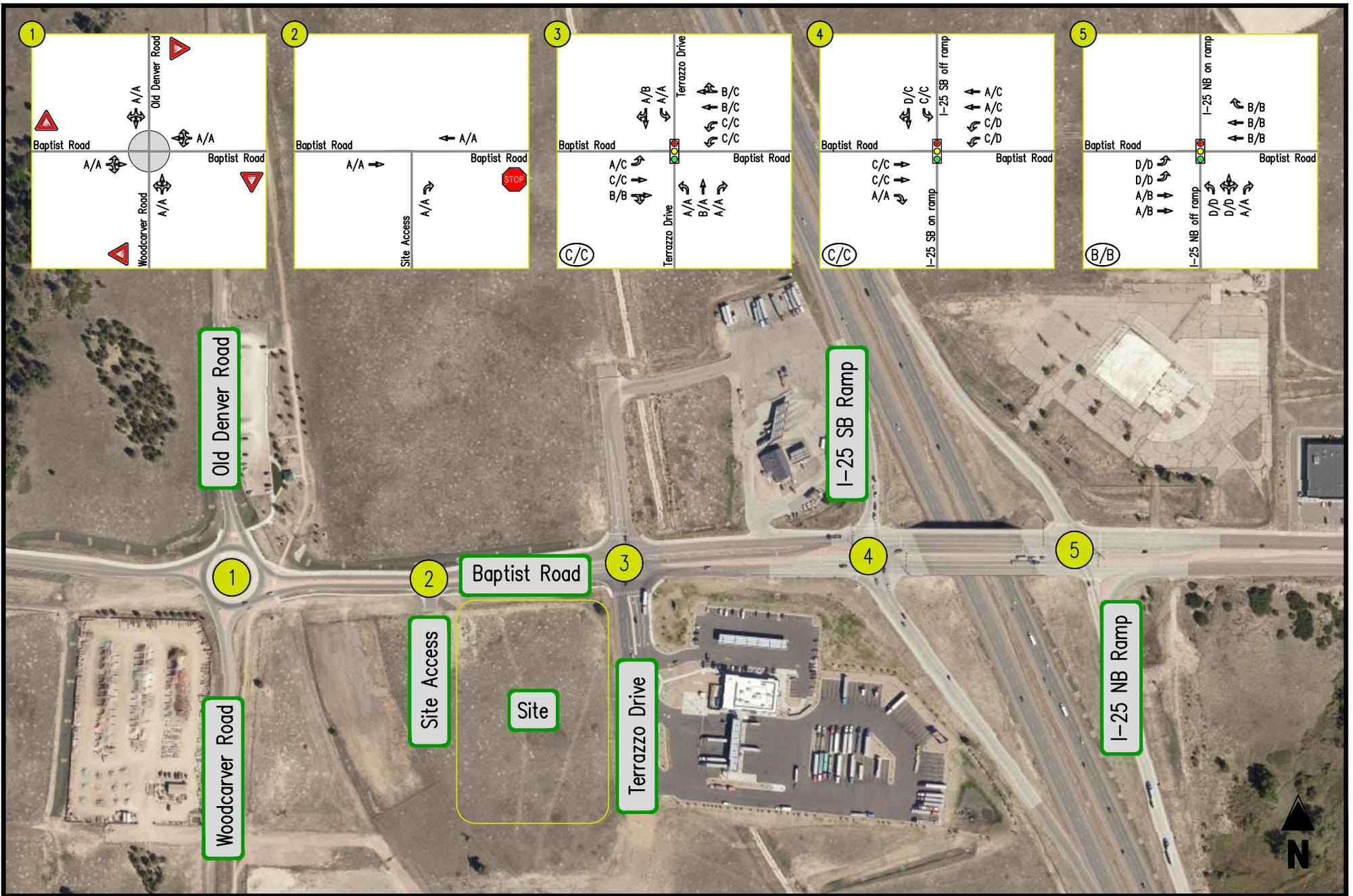
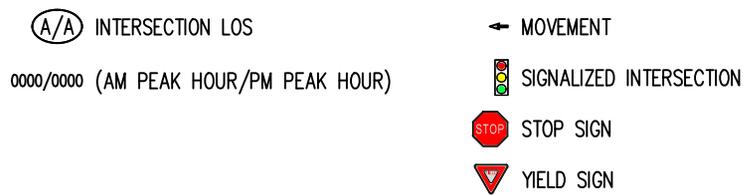


FIGURE 4-5  
Background 2023 LOS

QKT 4299  
Monument, CO



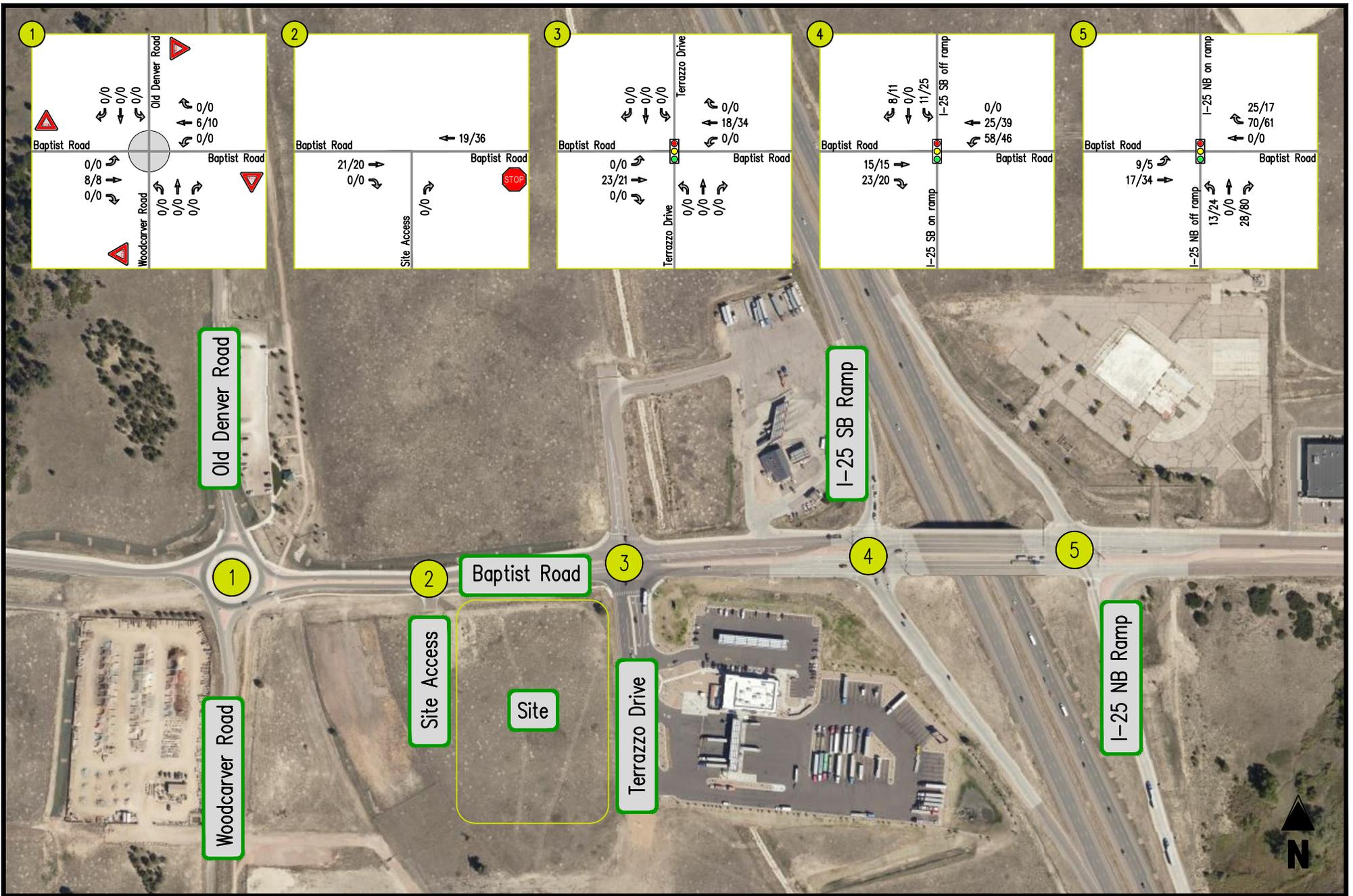


FIGURE 4-6  
Background 2028 Growth

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



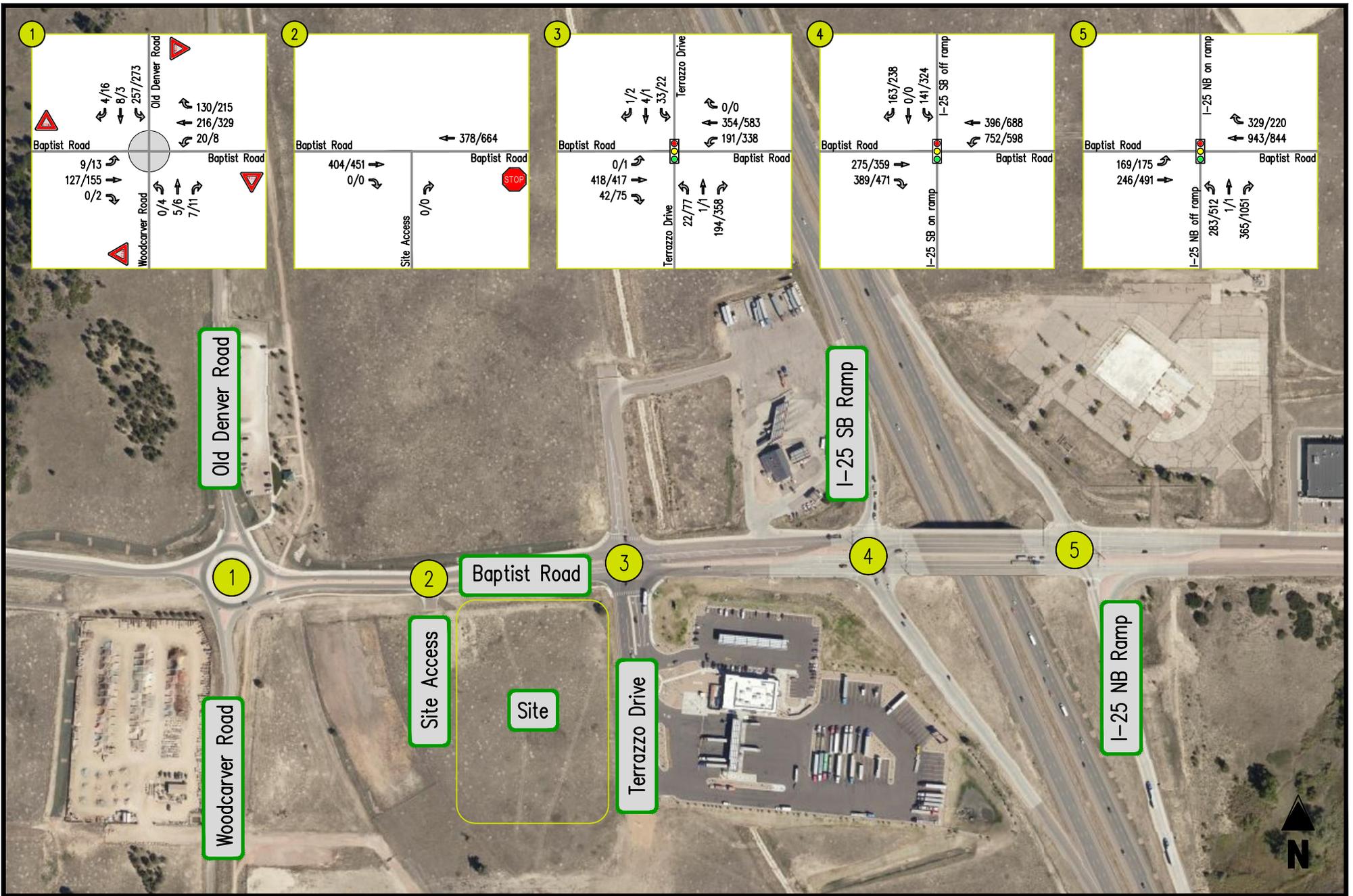


FIGURE 4-7  
Background 2028 Forecasts

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



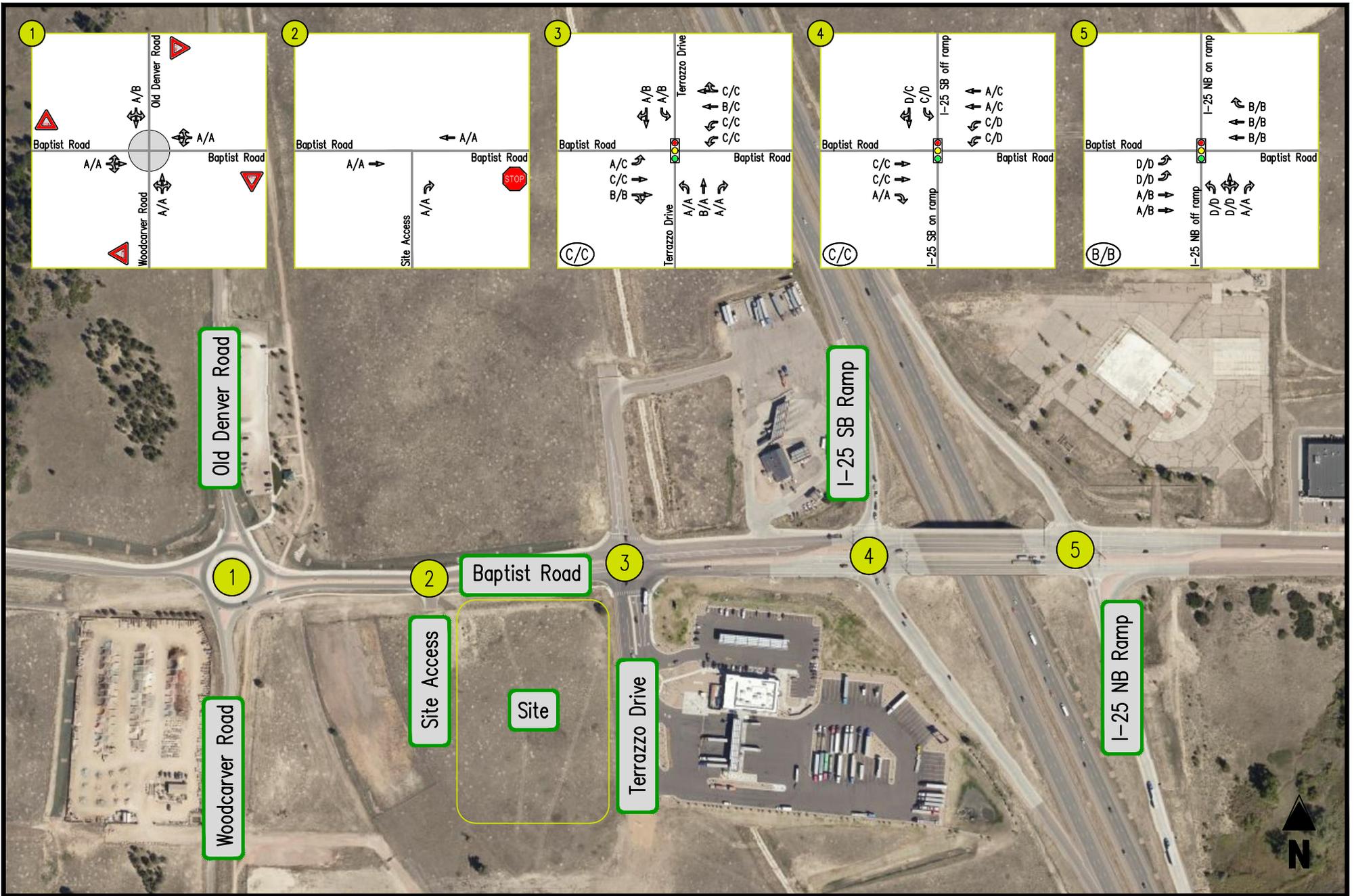


FIGURE 4-8  
Background 2028 LOS

QKT 4299  
Monument, CO

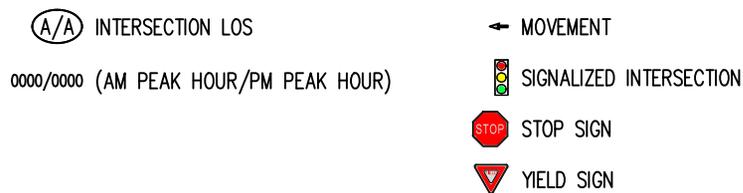


Table 4-1  
 Monument, CO  
 Background 2023 Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2021		Background 2023		
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour Original	
1	Baptist Road/Site Access	ROUNDAABOUT	Baptist Road	EBLTR	A [4.1]	A [4.0]	A [5.0]	A [5.4]
				WBLTR	A [4.2]	A [5.3]	A [5.3]	A [7.2]
			Woodcarver Road	NBLTR	A [3.6]	A [3.6]	A [4.2]	A [4.6]
			Old Denver Road	SBLTR	A [4.1]	A [4.3]	A [6.2]	A [7.6]
2	Baptist Road/Site Access	STOP	Road 1	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]
				WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			Road 2	NBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]
3	Baptist Road/Terrazzo Drive	STOP for Existing  SIGNAL for rest	Baptist Road	EBL	A [0.0]	A [8.3]	A (0.0)	C (26.8)
				EBT	A [0.0]	A [0.0]	C (28.9)	C (29.0)
				EBR	A [0.0]	A [0.0]	B (16.6)	B (15.9)
				WBL	A [8.3]	A [8.3]	C (30.6)	C (33.1)
				WBT	A [0.0]	A [0.0]	B (19.0)	C (25.8)
				WBTR	A [0.0]	A [0.0]	B (19.0)	C (25.8)
			Terrazzo Drive	NBL	C [17.6]	C [21.3]	A (9.2)	A (9.2)
				NBT	C [18.0]	C [22.9]	B (10.1)	A (9.7)
				NBR	B [10.3]	A [10.0]	A (5.6)	A (7.5)
				SBL	C [20.8]	D [28.2]	A (8.9)	A (10.0)
				SBTR	<u>C [16.4]</u>	<u>B [14.2]</u>	<u>A (9.7)</u>	<u>B (10.9)</u>
				<b>Overall</b>	<b>N/A</b>	<b>N/A</b>	<b>C (21.3)</b>	<b>C (23.0)</b>
			4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	B (18.5)
	EBR	A (0.0)				A (0.0)	A (0.0)	A (0.0)
	WBL	C (30.2)				D (44.9)	C (30.1)	D (47.1)
	WBT	A (0.1)				C (21.3)	A (0.2)	C (22.2)
I-25 SB Ramp	SBL	D (37.6)				C (30.8)	C (32.3)	C (34.3)
	SBTR	<u>D (36.2)</u>				<u>C (25.0)</u>	<u>D (35.3)</u>	<u>C (31.7)</u>
<b>Overall</b>	<b>C (23.4)</b>	<b>C (31.6)</b>				<b>C (22.6)</b>	<b>C (31.9)</b>	
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	C (29.9)	D (37.7)	D (44.1)	D (36.8)
				EBT	B (10.4)	A (9.3)	A (7.1)	B (18.3)
				WBT	B (13.1)	B (11.5)	B (14.1)	B (15.6)
				WBR	B (13.0)	B (11.0)	B (13.8)	B (14.6)
				NBL	C (32.3)	D (36.7)	D (35.8)	D (36.6)
			I-25 NB Ramp	NBLTR	C (32.4)	D (36.8)	D (35.9)	D (36.6)
				NBR	<u>A (0.3)</u>	<u>A (2.3)</u>	<u>A (0.4)</u>	<u>A (2.4)</u>
			<b>Overall</b>	<b>B (13.2)</b>	<b>B (11.2)</b>	<b>B (16.1)</b>	<b>B (16.3)</b>	

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.  
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 4-2  
 Monument, CO  
 Background 2023 Queueing Summary

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2021		Background 2023		
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour Original	
1	ROUNDABOUT	Baptist Road	EBLTR	-	0	0	25	25	
			WBLTR	-	25	25	25	50	
			Woodcarver Road	NBLTR	-	0	0	0	0
			Old Denver Road	SBLTR	-	0	0	25	50
2	STOP	Baptist Road	EBTR	-	0	0	0	0	
			WBTR	-	0	0	0	0	
			Site Access	NBR	-	0	0	0	0
3	STOP for Existing  SIGNAL for rest	Baptist Road	EBL	155	0	0	0	4	
			EBT	-	0	0	122	125	
			EBR	-	0	0	0	2	
			WBL	420	10	10	47	95	
			WBT	-	0	0	81	163	
		Terrazzo Drive	WBTR	-	0	0	81	163	
			NBL	135	2.5	12.5	17	45	
			NBT	-	0	0	4	4	
			NBR	135	17.5	7.5	35	58	
			SBL	255	12.5	0	23	18	
SBTR	-	2.5	15	8	6				
4	SIGNAL	Baptist Road	EBT	-	40	44	51	69	
			EBR	-	60	61	73	78	
			WBL	620	109	225	136	240	
		I-25 SB Ramp	WBTR	-	14	64	34	98	
			SBL	-	131	245	136	260	
			SBTR	-	0	0	0	74	
5	SIGNAL	Baptist Road	EBL	550	53	31	74	80	
			EBT	-	66	80	83	147	
			WBTR	-	111	92	115	110	
			WBR	-	43	34	42	39	
		I-25 NB Ramp	NBL	-	90	151	137	234	
			NBLT	-	91	152	140	232	
			NBR	-	0	0	0	0	

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

Table 4-3  
 Monument, CO  
 Background 2028 Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2023		Background 2028			
				AM Peak Hour	PM Peak Hour Original	AM Peak Hour	PM Peak Hour		
1	Baptist Road/Site Access	ROUNDAABOUT	Baptist Road	EBLTR	A [5.0]	A [5.4]	A [5.1]	A [5.4]	
				WBLTR	A [5.3]	A [7.2]	A [5.3]	A [7.3]	
				Woodcarver Road	NBLTR	A [4.2]	A [4.6]	A [4.2]	A [4.6]
				Old Denver Road	SBLTR	A [6.2]	A [7.6]	A [6.3]	A [7.7]
2	Baptist Road/Site Access	STOP	Road 1	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
				WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
			Road 2	NBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
3	Baptist Road/Terrazzo Drive	SIGNAL	Baptist Road	EBL	A (0.0)	C (26.8)	A (0.0)	C (26.6)	
				EBT	C (28.9)	C (29.0)	C (28.8)	C (28.9)	
				EBR	B (16.6)	B (15.9)	B (16.3)	B (15.6)	
				WBL	C (30.6)	C (33.1)	C (30.6)	C (33.1)	
			Terrazzo Drive	WBT	B (19.0)	C (25.8)	B (18.8)	C (26.0)	
				WBTR	B (19.0)	C (25.8)	B (18.8)	C (26.0)	
				NBL	A (9.2)	A (9.2)	A (9.4)	A (9.4)	
				NBT	B (10.1)	A (9.7)	B (10.2)	A (9.9)	
				NBR	A (5.6)	A (7.5)	A (5.7)	A (7.7)	
				SBL	A (8.9)	A (10.0)	A (9.1)	B (10.2)	
				SBTR	<u>A (9.7)</u>	<u>B (10.9)</u>	<u>A (9.9)</u>	<u>B (11.1)</u>	
				<b>Overall</b>	<b>C (21.3)</b>	<b>C (23.0)</b>	<b>C (21.3)</b>	<b>C (23.1)</b>	
				4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	C (21.7)
EBR	A (0.0)	A (0.0)	A (0.0)					A (0.0)	
WBL	C (30.1)	D (47.1)	C (29.4)					D (48.4)	
I-25 SB Ramp	WBT	A (0.2)	C (22.2)				A (0.2)	C (22.5)	
	SBL	C (32.3)	C (34.3)				C (33.9)	D (35.6)	
	SBTR	<u>D (35.3)</u>	<u>C (31.7)</u>				<u>D (37.4)</u>	<u>C (32.2)</u>	
	<b>Overall</b>	<b>C (22.6)</b>	<b>C (31.9)</b>				<b>C (22.6)</b>	<b>C (32.7)</b>	
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	D (44.1)	D (36.8)	D (43.9)	D (37.7)	
				EBT	A (7.1)	B (18.3)	A (7.2)	B (18.1)	
				WBT	B (14.1)	B (15.6)	B (14.4)	B (15.8)	
				WBR	B (13.8)	B (14.6)	B (14.0)	B (14.7)	
			I-25 NB Ramp	NBL	D (35.8)	D (36.6)	D (36.2)	D (37.3)	
				NBLTR	D (35.9)	D (36.6)	D (36.2)	D (37.4)	
				NBR	<u>A (0.4)</u>	<u>A (2.4)</u>	<u>A (0.4)</u>	<u>A (2.9)</u>	
				<b>Overall</b>	<b>B (16.1)</b>	<b>B (16.3)</b>	<b>B (16.2)</b>	<b>B (16.5)</b>	

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.  
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 4-4  
Monument, CO  
Background 2028 Queueing Summary

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Background 2023		Background 2028		
					AM Peak Hour	PM Peak Hour Original	AM Peak Hour	PM Peak Hour	
1	Baptist Road/Old Devner Road/Woodcarver Road	ROUNDAABOUT	Baptist Road	EBLTR	-	25	25	25	25
				WBLTR	-	25	50	25	50
			Woodcarver Road	NBLTR	-	0	0	0	0
			Old Denver Road	SBLTR	-	25	50	25	50
2	Baptist Road/Site Access	STOP	Baptist Road	EBTR	-	0	0	0	0
				WBT	-	0	0	0	0
			Site Access	NBR	-	0	0	0	0
3	Baptist Road/Terrazzo Drive	STOP for Existing	Baptist Road	EBL	155	0	4	0	4
				EBT	-	122	125	126	129
				EBR	-	0	2	0	2
		SIGNAL for rest	Terrazzo Drive	WBL	420	47	95	46	95
				WBT	-	81	163	83	170
				WBTR	-	81	163	83	170
				NBL	135	17	45	17	45
				NBT	-	4	4	4	4
				NBR	135	35	58	35	58
				SBL	255	23	18	23	18
SBTR	-	8	6	8	6				
4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	-	51	69	53	69
				EBR	-	73	78	88	78
				WBL	620	136	240	144	240
			I-25 SB Ramp	WBT	-	34	98	38	98
				SBL	-	136	260	142	260
				SBTR	-	0	74	0	86
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	550	74	80	77	80
				EBT	-	83	147	76	152
				WBT	-	115	110	118	116
			I-25 NB Ramp	WBR	-	42	39	42	39
				NBL	-	137	234	145	238
				NBLT	-	140	232	146	241
				NBR	-	0	0	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

## V. Site Analysis

### Overview

The Applicant proposes to develop the ±12-acre site with a gas station with convenience store use and fast-food restaurant with drive-thru. For purposes of this study, the site will be developed in two phases with phase 1 built and occupied in 2023 and phase 2 to be complete in 2028. The following land use development program was analyzed:

- 22 gasoline fueling positions (FP) and 6 high speed diesel FP gas station with convenience store
- 3,500 SF Fast-Food Restaurant with Drive-thru

### Proposed Site Access

As shown on the Applicant's plan (Figure 1-2) and mentioned above access to the site will be via a right-in/right-out only from Baptist Road, three full access movements along Terrazzo Drive, and a full movement access along Squadron Drive.

### Trip Generation

#### **Overview**

Trip generation estimates for the weekday AM and PM peak hours, as well as the weekday average daily traffic (ADT), were derived from the standard Institute of Transportation Engineers (ITE) Trip Generation Manual rates/equations, as published in the 10<sup>th</sup> edition. The trip generation analysis is presented in Table 5-1.

#### **Pass-by Trips**

According to ITE, in some cases the driveway volumes at a particular land use are different from the amount of traffic added to the adjacent street system. Uses such as retail establishments attract a portion of their trips from traffic that is already present on the road network. Pass-by trip are those trips which are made as intermediate stops on the way to a primary destination. An example of a pass-by trip would be one in which a driver stops at a retail store on his/her way home from work.

The proposed use would experience pass-by trips consistent with the primary use located on site. In recognition of this phenomenon and consistent with ITE published data, the following pass-by reductions were applied to the trip generation analysis:

- Gas Station with Convenience 62% AM/ 56% PM
- Fast-Food Restaurant with Drive-Thru 49% AM/ 50% PM

As shown in Table 5-1, the site is anticipated to generate 488 weekday AM, and 360 weekday PM peak hour pass-by trips in 2023 and an additional in 69 weekday AM, and 58 weekday PM peak hour 2028. Therefore, these trips would be drawn from the existing road network and assigned to the future site entrances accordingly. Pass-by trip assignments at key study intersections are shown on Figure 5-1 and Figure 5-2.

### **Net Site Trips**

The vehicle trips that would be generated by the proposed development plan are summarized in Table 5-1. As shown in Table 5-1, the site would generate upon completion and full occupancy, 298 net new weekday AM and 283 net new weekday PM peak hour vehicle trips as well as 2,840 net new weekday daily trips in 2023. The site will generate 72 additional net new weekday AM, 56 additional net new weekday PM peak hour vehicle trips, and 824 net new weekday daily trips in 2028.

### **Site Trip Distributions**

The distribution of the anticipated trips generated by the completion of the proposed development was based on an examination of existing traffic counts and local knowledge. Existing travel patterns indicate the following distribution is appropriate in the forecasting of future site traffic:

- To/from the west on Baptist Road: 20%
- To/from the east on Baptist Road: 80%

### **Site Trip Assignments**

The assignment of the new vehicle trips generated upon the future build-out of the development project was based on the above distribution. The trips assignments are depicted on Figure 5-3 (2023) and Figure 5-4 (2028).

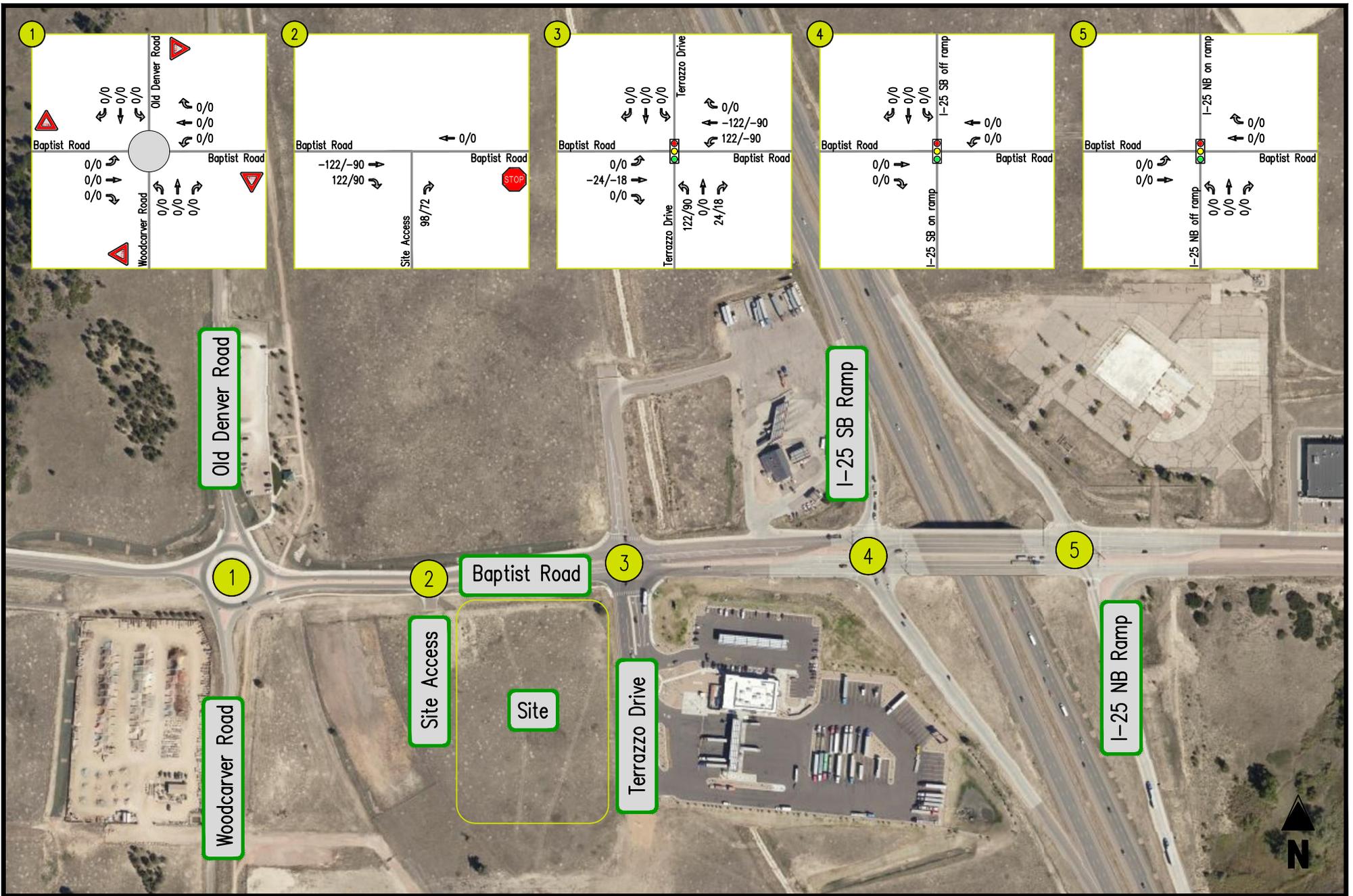


FIGURE 5-1  
Pass-by Trips 2023

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



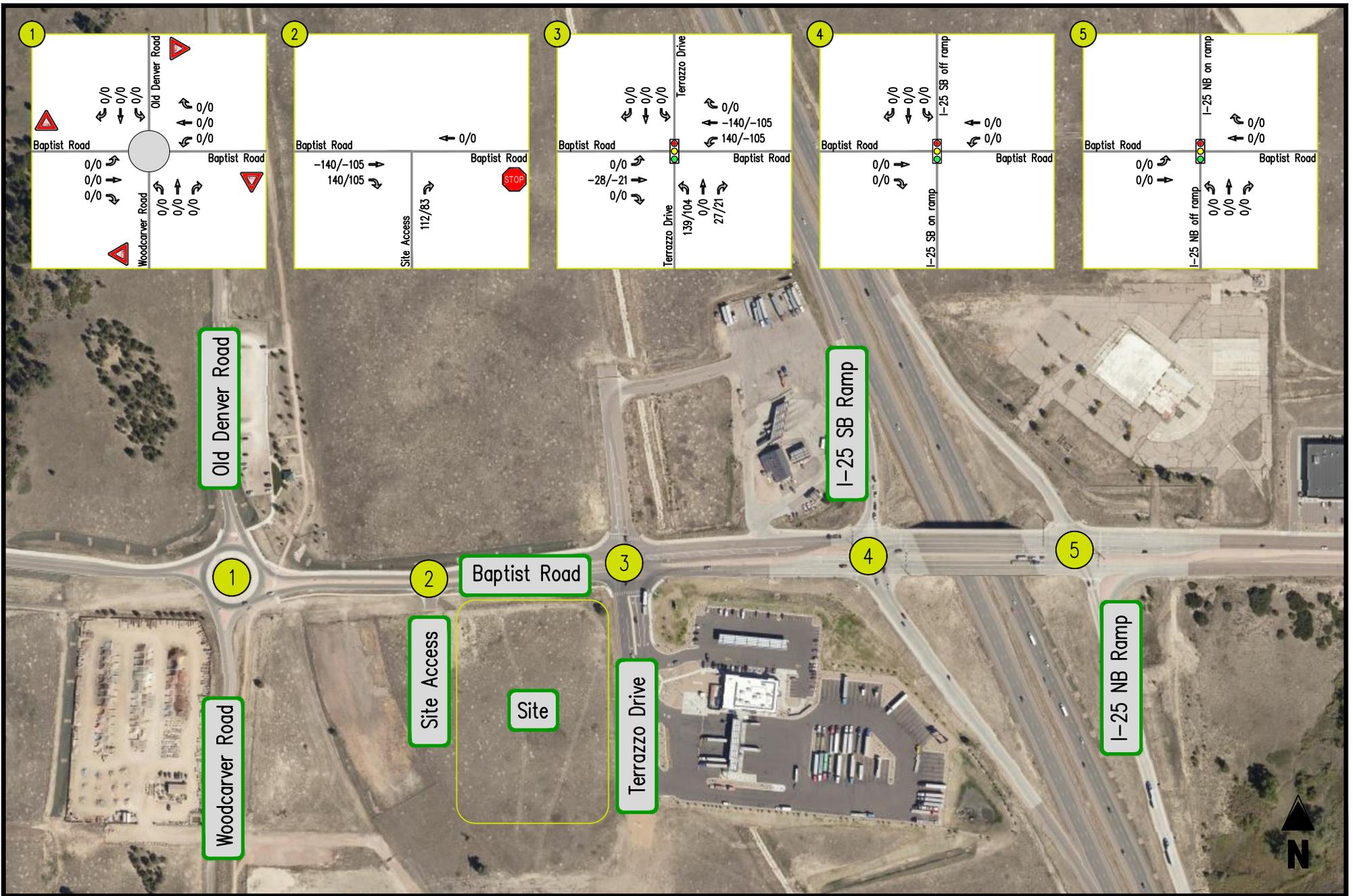


FIGURE 5-2  
Total Pass-by Trips 2028

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



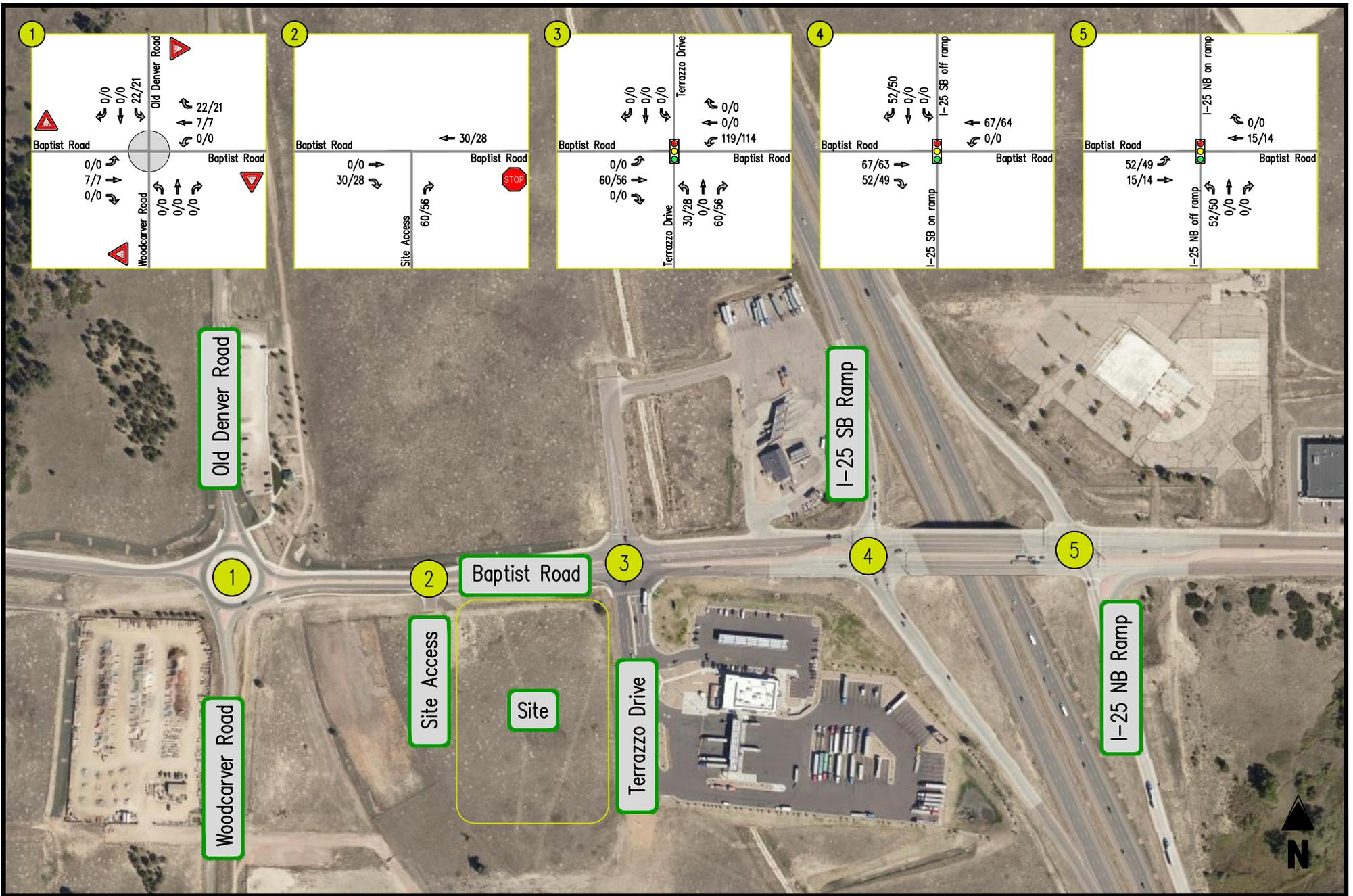


FIGURE 5-3  
Site Trips 2023

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



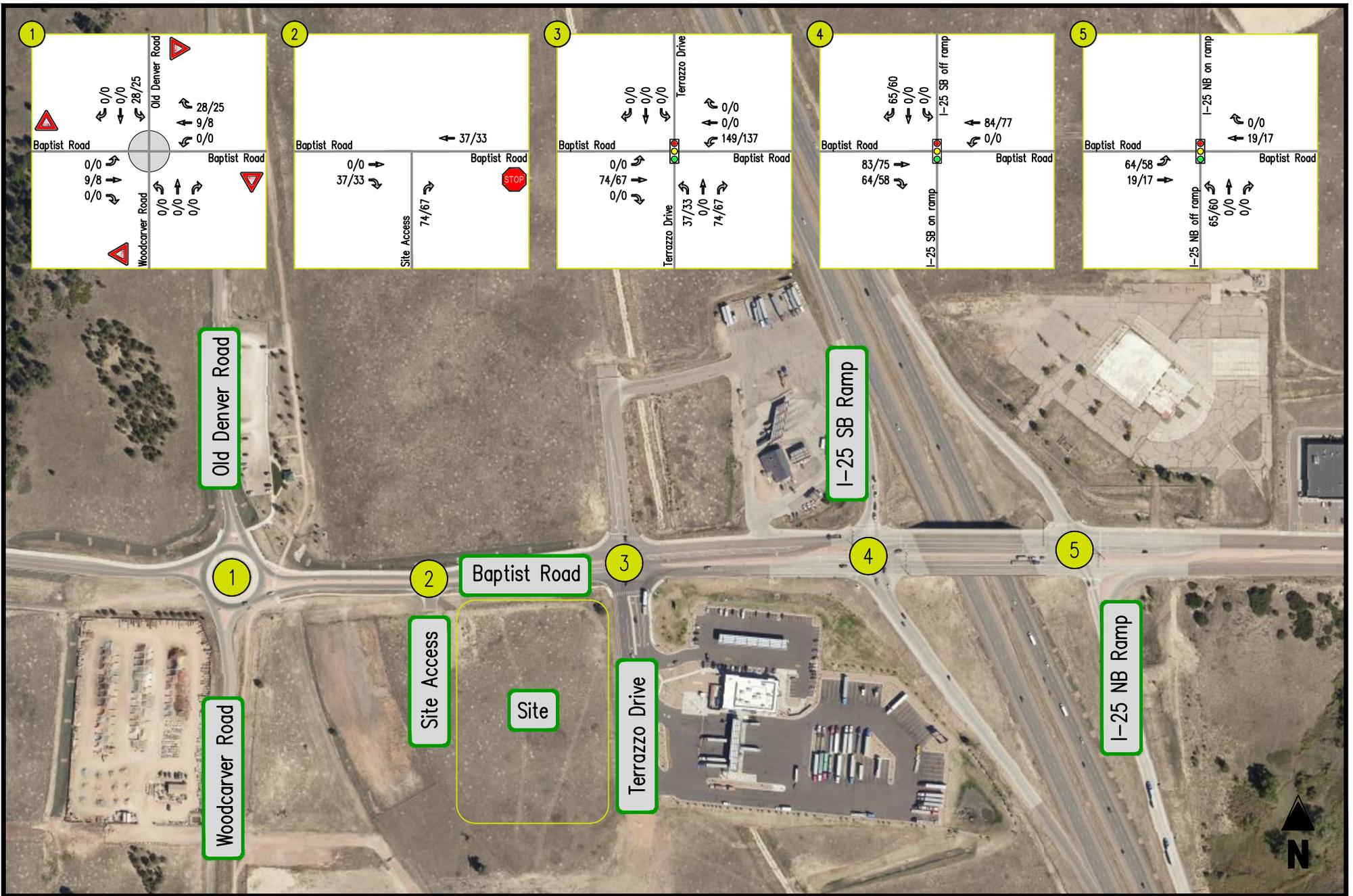


FIGURE 5-4  
Site Trips 2028

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



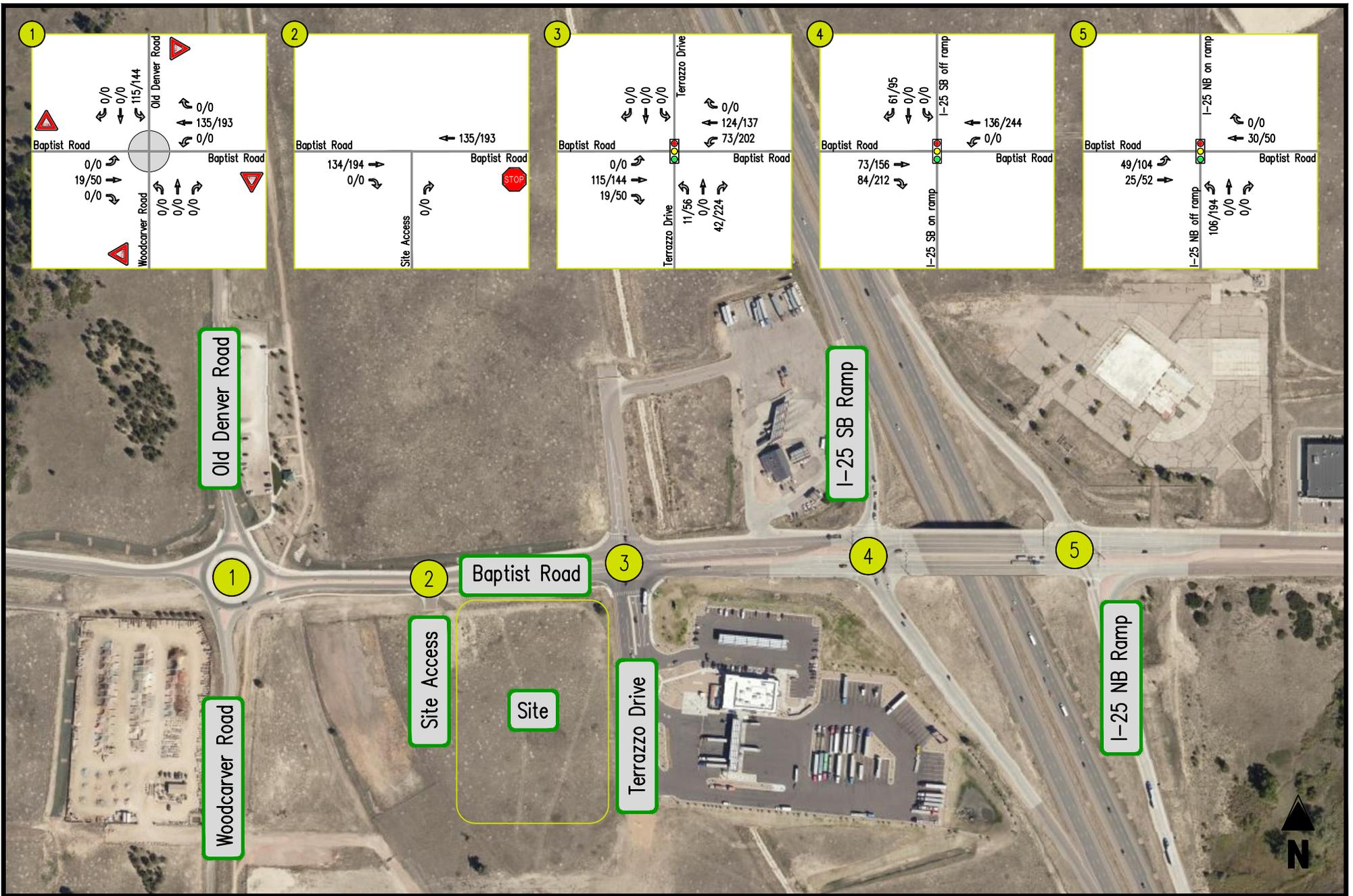


FIGURE 5-5  
Pipeline Volumes

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



Table 5-1  
 Monument, CO  
 Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<i>Phase 1 - 2023</i>										
Gas Station with Convenience Store	960	28	FP	393	393	786	322	321	643	6,455
<i>Phase 1 Pass-by (AM 62%/PM 56%)</i>				<i>(244)</i>	<i>(244)</i>	<i>(488)</i>	<i>(180)</i>	<i>(180)</i>	<i>(360)</i>	<i>(3,615)</i>
<i>Net Total</i>				<b>149</b>	<b>149</b>	<b>298</b>	<b>142</b>	<b>141</b>	<b>283</b>	<b>2,840</b>
<b>Phase 1 Net New Trips</b>				<b>149</b>	<b>149</b>	<b>298</b>	<b>142</b>	<b>141</b>	<b>283</b>	<b>2,840</b>
<i>Phase 2 - 2028</i>										
Fast-Food Restaurant with Drive-Thru	934	3.5	KSF	72	69	141	59	55	114	1,648
<i>Pass-by (AM 49%/PM 50%)</i>				<i>(35)</i>	<i>(34)</i>	<i>(69)</i>	<i>(30)</i>	<i>(28)</i>	<i>(58)</i>	<i>(824)</i>
<i>Net Total</i>				<b>37</b>	<b>35</b>	<b>72</b>	<b>29</b>	<b>27</b>	<b>56</b>	<b>824</b>
<b>Phase 2 Net New Trips</b>				<b>37</b>	<b>35</b>	<b>72</b>	<b>29</b>	<b>27</b>	<b>56</b>	<b>824</b>
<b>Total Net New Trips</b>				<b>186</b>	<b>184</b>	<b>370</b>	<b>171</b>	<b>168</b>	<b>339</b>	<b>3,664</b>

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 10th Edition

## **VI. Analysis of Future Conditions with Site Development**

### **Future 2023 Traffic Forecasts**

The 2023 total future traffic forecasts associated with the proposed development were developed by combining the background future forecasts shown on Figure 4-3, the pass-by trip assignments shown on Figure 5-1, and the total site trip assignments shown on Figure 5-2. The resulting total future traffic forecasts are provided on Figure 6-1 for 2023.

### **Future 2023 Levels of Service with Proposed Development**

Future levels of service with the proposed development plan were estimated at key study intersections based on the future traffic volumes shown on Figure 6-1, the future lane use on Figure 4-1, and the HCM 6<sup>th</sup> methodologies for signalized and unsignalized intersections. The results of these analyses are provided in Appendix F and presented in Table 6-1. The 2023 total future levels of service are also presented graphically on Figure 6-2.

As shown in Table 6-1, levels of service under future site development conditions would remain generally consistent with future background conditions (i.e., without site development). Overall delays would experience minor increase due to site trips. The intersections within the study area would continue to operate at acceptable overall LOS “C” or better in the AM and PM peak hours.

These results indicate that the development of the site would not require additional road improvements.

### **Future 2023 Queuing**

Total future queues were forecasted using Synchro software. The results of the queuing analysis are summarized in Table 6-2. In general, vehicle queues would be consistent with background future conditions.

### **Future 2028 Traffic Forecasts**

The 2028 total future traffic forecasts associated with the proposed development were developed by combining the background future forecasts shown on Figure 4-6, the pass-by trip assignments shown on Figure 5-2, and the total site trip assignments shown on Figure 5-4. The resulting total future traffic forecasts are provided on Figure 6-3 for 2028.

### **Future 2028 Levels of Service with Proposed Development**

Future levels of service with the proposed development plan were estimated at key study intersections based on the future traffic volumes shown on Figure 6-4 and the HCM 6<sup>th</sup> methodologies for signalized and unsignalized intersections. The results of these analyses are provided in Appendix F and presented in Table 6-3. The 2028 total future levels of service are also presented graphically on Figure 6-4.

As shown in Table 6-1, levels of service under future site development conditions would remain generally consistent with future background conditions (i.e., without site development). Overall delays would experience minor increase due to site trips. The intersections within the study area would continue to operate at acceptable overall LOS “D” or better in the AM and PM peak hours.

These results indicate that the development of the site would not require additional road improvements.

### Future 2028 Queuing

Total future queues were forecasted using Synchro software. The results of the queuing analysis are summarized in Table 6-4. In general, vehicle queues would be consistent with background future conditions.

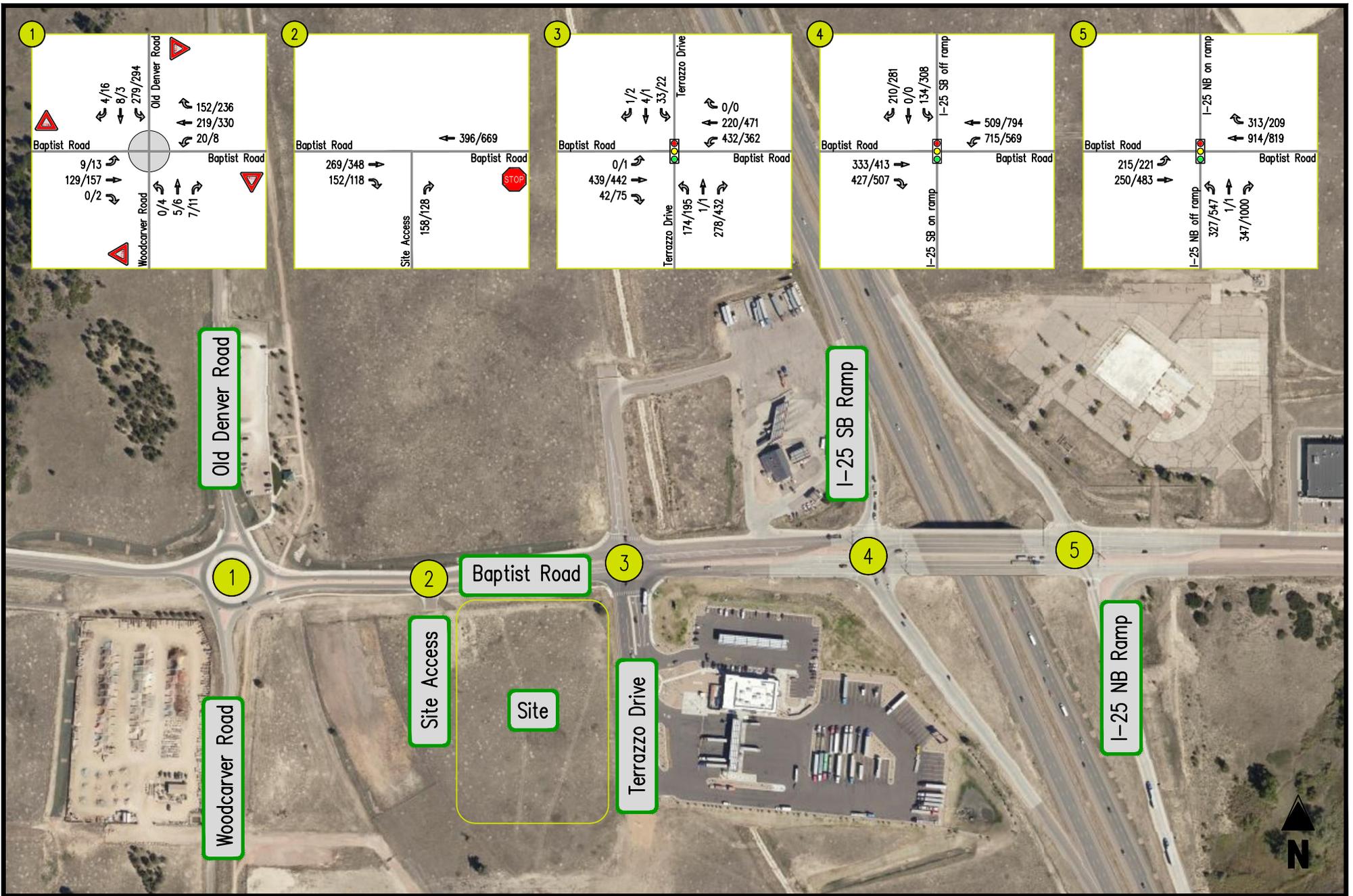


FIGURE 6-1  
 Future 2023 Forecasts

QKT 4299  
 Monument, CO



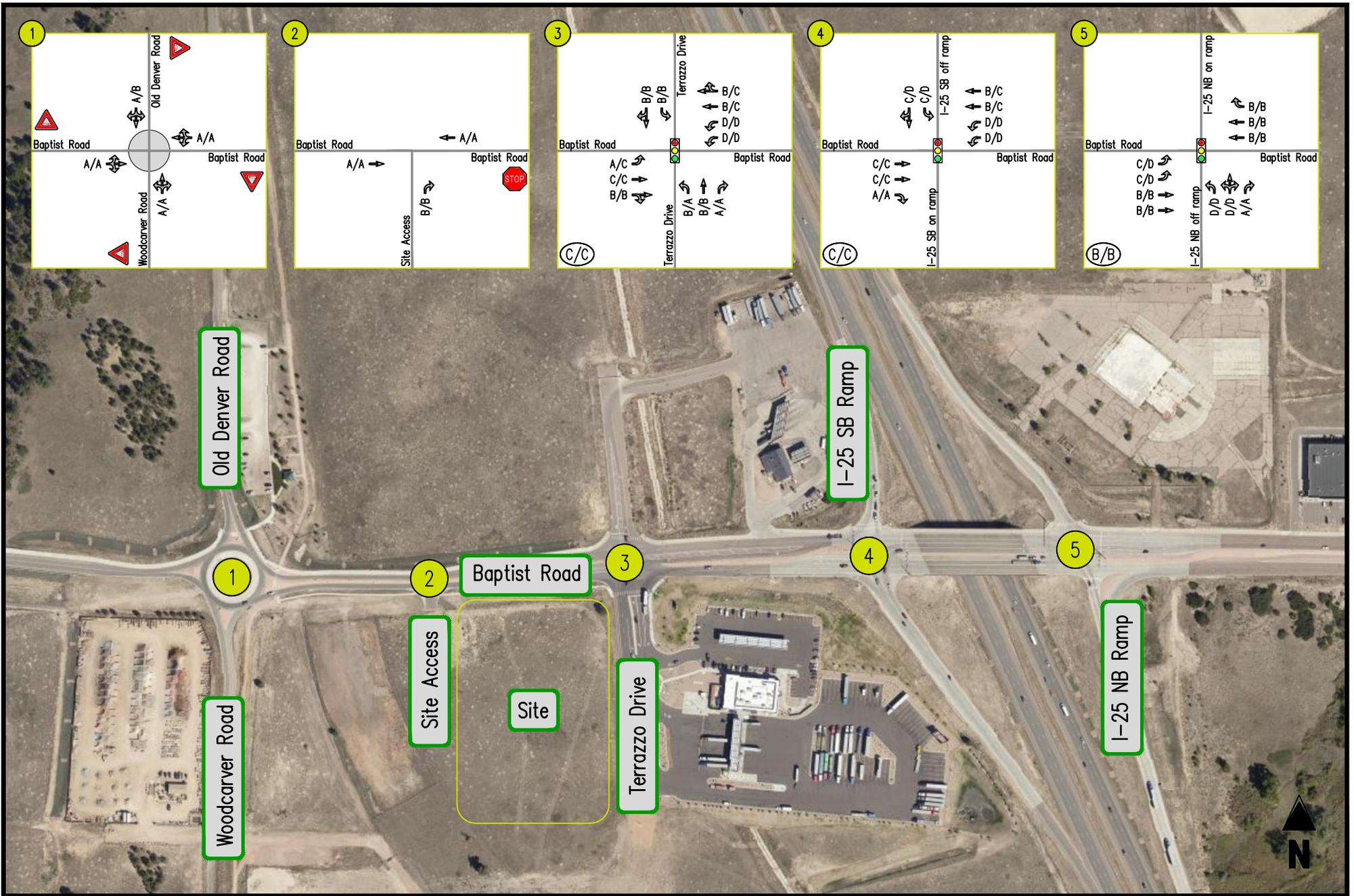


FIGURE 6-2  
Future 2023 LOS

QKT 4299  
Monument, CO

(A/A) INTERSECTION LOS  
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



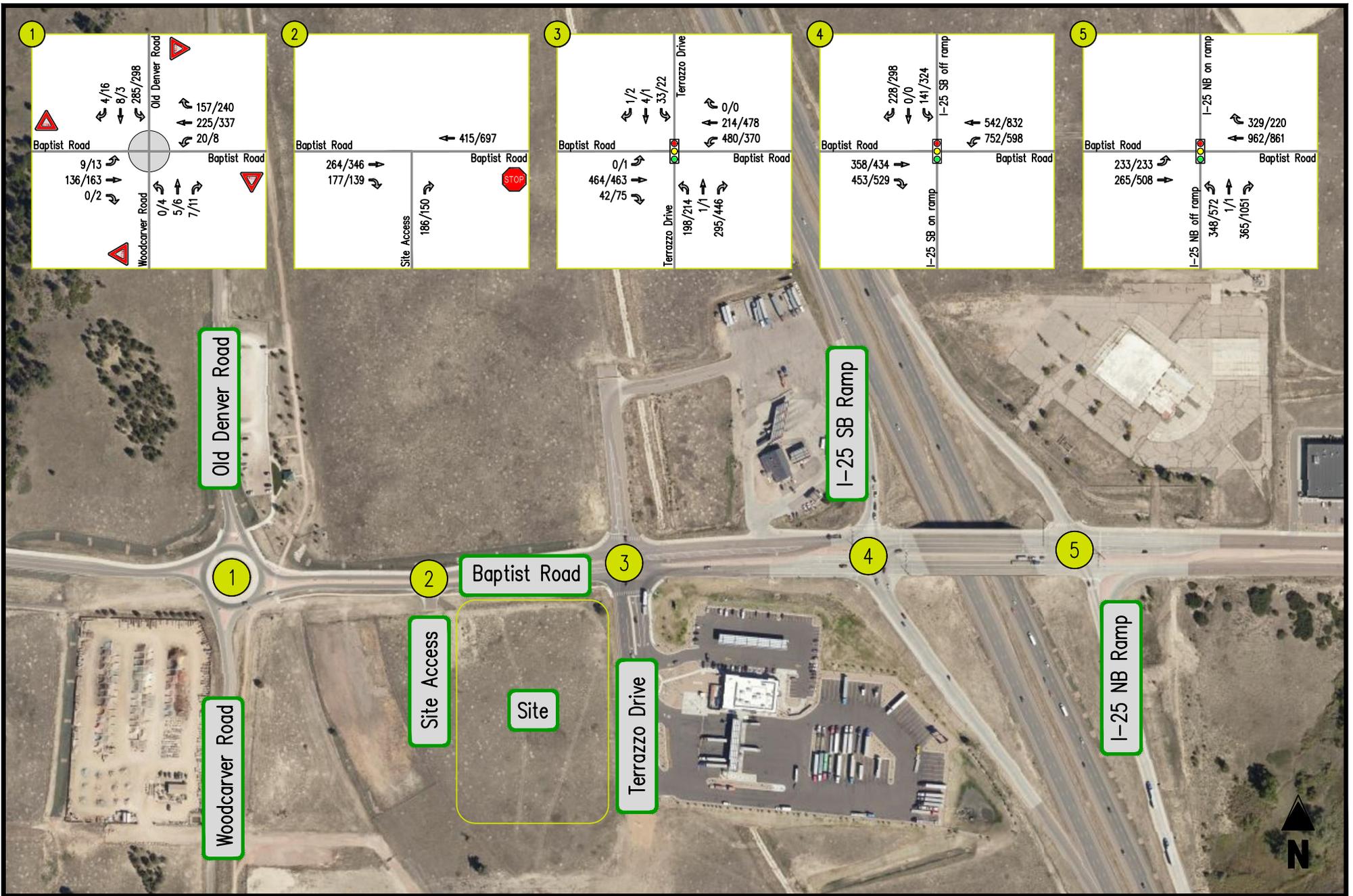


FIGURE 6-2  
Future 2028 Forecasts

QKT 4299  
Monument, CO

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- ⚠️ YIELD SIGN



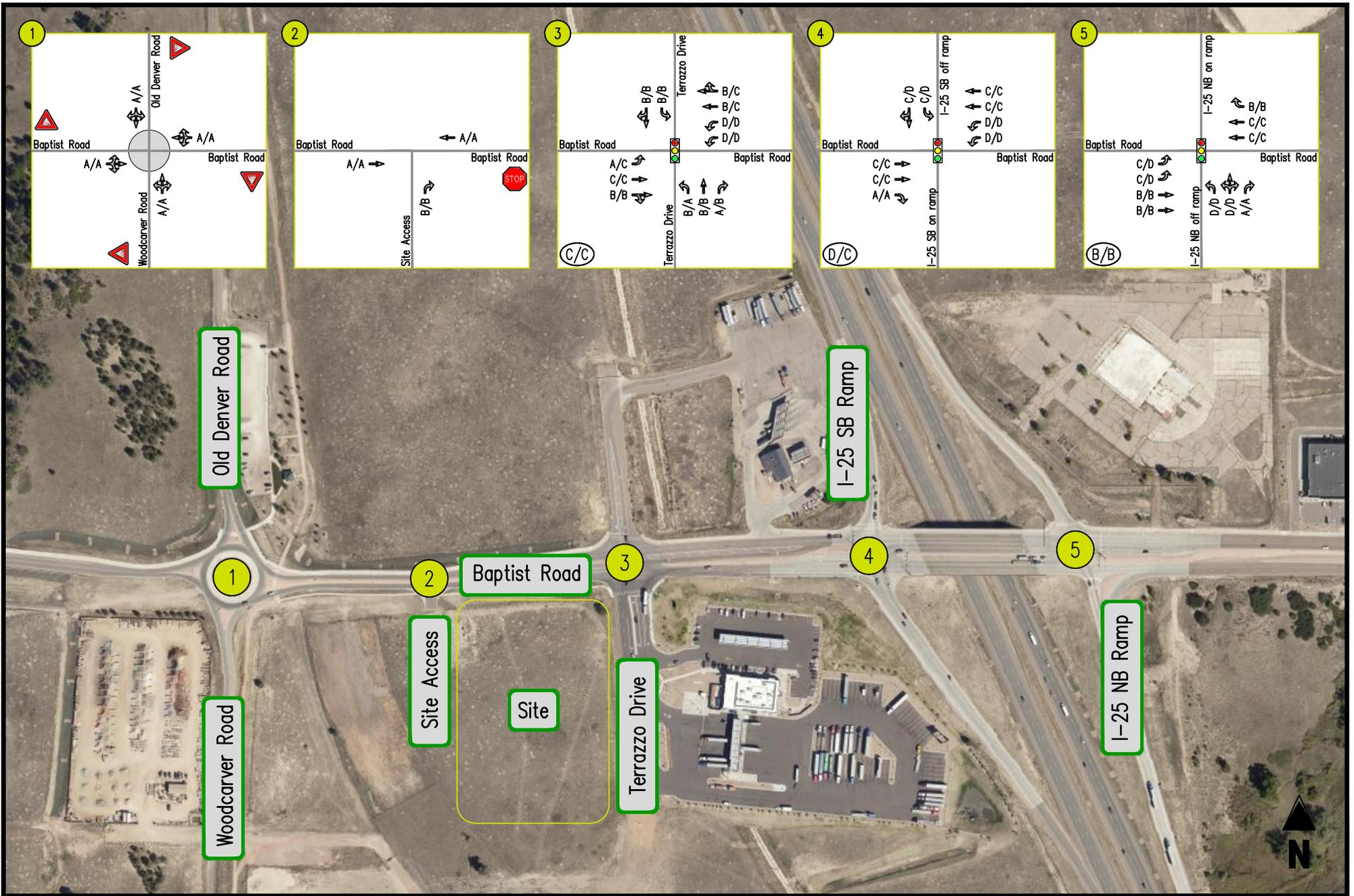


FIGURE 6-4  
 Future 2028 LOS

QKT 4299  
 Monument, CO

(A/A) INTERSECTION LOS  
 0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- 🛑 STOP SIGN
- 🚶 YIELD SIGN



Table 6-1  
 Monument, CO  
 Total Future 2023 Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2023		Total Future 2023			
				AM Peak Hour	PM Peak Hour Original	AM Peak Hour	PM Peak Hour		
1	Baptist Road/Site Access	ROUNDAABOUT	Baptist Road	EBLTR	A [5.0]	A [5.4]	A [5.2]	A [5.6]	
				WBLTR	A [5.3]	A [7.2]	A [5.5]	A [7.5]	
				Woodcarver Road	NBLTR	A [4.2]	A [4.6]	A [4.4]	A [4.7]
				Old Denver Road	SBLTR	A [6.2]	A [7.6]	A [6.5]	A [8.0]
2	Baptist Road/Site Access	STOP	Road 1	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
				WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
			Road 2	NBR	A [0.0]	A [0.0]	B [12.2]	B [12.6]	
3	Baptist Road/Terrazzo Drive	SIGNAL	Baptist Road	EBL	A (0.0)	C (26.8)	A (0.0)	C (26.3)	
				EBT	C (28.9)	C (29.0)	C (29.1)	C (29.0)	
				EBR	B (16.6)	B (15.9)	B (13.8)	B (13.9)	
				WBL	C (30.6)	C (33.1)	D (36.6)	D (35.5)	
			Terrazzo Drive	WBT	B (19.0)	C (25.8)	B (16.5)	C (23.3)	
				WBTR	B (19.0)	C (25.8)	B (16.5)	C (23.3)	
				NBL	A (9.2)	A (9.2)	B (11.0)	A (9.6)	
				NBT	B (10.1)	A (9.7)	B (11.3)	B (10.2)	
				NBR	A (5.6)	A (7.5)	A (7.2)	A (10.0)	
			SBL	A (8.9)	A (10.0)	B (11.8)	B (11.7)		
			SBTR	<u>A (9.7)</u>	<u>B (10.9)</u>	<u>B (13.1)</u>	<u>B (12.6)</u>		
			<b>Overall</b>	<b>C (21.3)</b>	<b>C (23.0)</b>	<b>C (22.8)</b>	<b>C (22.1)</b>		
			4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	C (21.7)	C (23.6)
EBR	A (0.0)	A (0.0)					A (0.0)	A (0.0)	
WBL	C (30.1)	D (47.1)					D (50.0)	D (47.6)	
WBT	A (0.2)	C (22.2)					B (19.9)	C (22.4)	
I-25 SB Ramp	SBL	C (32.3)				C (34.3)	C (26.2)	D (36.2)	
	SBTR	<u>D (35.3)</u>				<u>C (31.7)</u>	<u>C (30.4)</u>	<u>D (37.7)</u>	
	<b>Overall</b>	<b>C (22.6)</b>				<b>C (31.9)</b>	<b>C (34.4)</b>	<b>C (32.5)</b>	
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	D (44.1)	D (36.8)	C (31.8)	D (40.9)	
				EBT	A (7.1)	B (18.3)	B (14.1)	B (17.8)	
				WBT	B (14.1)	B (15.6)	B (14.4)	B (15.7)	
				WBR	B (13.8)	B (14.6)	B (13.9)	B (14.6)	
			I-25 NB Ramp	NBL	D (35.8)	D (36.6)	D (38.0)	D (41.8)	
				NBLTR	D (35.9)	D (36.6)	D (38.1)	D (41.9)	
				NBR	<u>A (0.4)</u>	<u>A (2.4)</u>	<u>A (0.4)</u>	<u>A (2.4)</u>	
				<b>Overall</b>	<b>B (16.1)</b>	<b>B (16.3)</b>	<b>B (17.1)</b>	<b>B (18.0)</b>	

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.  
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 6-2  
 Monument, CO  
 Total Future 2023 Queueing Summary

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Background 2023		Total Future 2023	
					AM Peak Hour	PM Peak Hour Original	AM Peak Hour	PM Peak Hour
1	ROUNDABOUT	Baptist Road	EBLTR	-	25	25	25	25
			WBLTR	-	25	50	25	50
			Woodcarver Road NBLTR	-	0	0	0	0
			Old Denver Road SBLTR	-	25	50	25	50
2	STOP	Baptist Road	EBTR	-	0	0	0	0
			WBT	-	0	0	0	0
			Site Access NBR	-	0	0	0	0
3	STOP for Existing  SIGNAL for rest	Baptist Road	EBL	155	0	4	0	4
			EBT	-	122	125	126	129
			EBR	-	0	2	0	2
			WBL	420	47	95	46	95
			WBT	-	81	163	83	170
			WBTR	-	81	163	83	170
			Terrazzo Drive NBL	135	17	45	17	45
			NBT	-	4	4	4	4
			NBR	135	35	58	35	58
			SBL	255	23	18	23	18
SBTR	-	8	6	8	6			
4	SIGNAL	Baptist Road	EBT	-	51	69	53	69
			EBR	-	73	78	88	78
			WBL	620	136	240	144	240
			WBT	-	34	98	38	98
			I-25 SB Ramp SBL	-	136	260	142	260
			SBTR	-	0	74	0	86
5	SIGNAL	Baptist Road	EBL	550	74	80	77	80
			EBT	-	83	147	76	152
			WBT	-	115	110	118	116
			WBR	-	42	39	42	39
			NBL	-	137	234	145	238
			I-25 NB Ramp NBLT	-	140	232	146	241
			NBR	-	0	0	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

Table 6-3  
 Monument, CO  
 Total Future 2028 Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Total Future 2023		Total Future 2028		
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1	Baptist Road/Site Access	ROUNDABOUT	Baptist Road	EBLTR	A [5.2]	A [5.6]	A [5.4]	A [5.7]
				WBLTR	A [5.5]	A [7.5]	A [5.6]	A [7.6]
				NBLTR	A [4.4]	A [4.7]	A [4.4]	A [4.8]
				SBLTR	A [6.5]	A [8.0]	A [6.7]	A [8.2]
2	Baptist Road/Site Access	STOP	Road 1	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]
				WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			Road 2	NBR	B [12.2]	B [12.6]	B [12.8]	B [13.1]
3	Baptist Road/Terrazzo Drive	SIGNAL	Baptist Road	EBL	A (0.0)	C (26.3)	A (0.0)	C (26.0)
				EBT	C (29.1)	C (29.0)	C (29.3)	C (29.1)
				EBR	B (13.8)	B (13.9)	B (13.4)	B (13.0)
				WBL	D (36.6)	D (35.5)	D (38.0)	D (37.2)
				WBT	B (16.5)	C (23.3)	B (15.4)	C (23.0)
				WBTR	B (16.5)	C (23.3)	B (15.4)	C (23.0)
			Terrazzo Drive	NBL	B (11.0)	A (9.6)	B (12.1)	A (9.9)
				NBT	B (11.3)	B (10.2)	B (12.1)	B (10.4)
				NBR	A (7.2)	A (10.0)	A (8.1)	B (11.0)
				SBL	B (11.8)	B (11.7)	B (12.7)	B (12.5)
				SBTR	<u>B (13.1)</u>	<u>B (12.6)</u>	<u>B (14.0)</u>	<u>B (13.5)</u>
				<b>Overall</b>	<b>C (22.8)</b>	<b>C (22.1)</b>	<b>C (23.7)</b>	<b>C (22.5)</b>
4	Baptist Road/SB I-25 Ramp	SIGNAL	Baptist Road	EBT	C (26.5)	C (23.2)	C (27.2)	C (23.0)
				EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)
				WBL	D (50.0)	D (47.6)	D (51.8)	D (48.2)
			I-25 SB Ramp	WBT	B (19.9)	C (22.4)	C (20.2)	C (22.3)
				SBL	C (26.2)	D (36.2)	C (26.4)	D (40.1)
				SBTR	<u>C (30.4)</u>	<u>D (37.7)</u>	<u>C (31.5)</u>	<u>D (42.9)</u>
				<b>Overall</b>	<b>C (34.4)</b>	<b>C (32.5)</b>	<b>D (35.4)</b>	<b>C (33.7)</b>
5	Baptist Road/NB I-25 Ramp	SIGNAL	Baptist Road	EBL	C (31.8)	D (40.9)	C (32.8)	D (42.5)
				EBT	B (14.1)	B (17.8)	B (14.2)	B (18.0)
				WBT	B (14.4)	B (15.7)	B (14.6)	B (15.9)
				WBR	B (13.9)	B (14.6)	B (14.1)	B (14.8)
			I-25 NB Ramp	NBL	D (38.0)	D (41.8)	D (39.1)	D (43.9)
				NBLTR	D (38.1)	D (41.9)	D (39.1)	D (43.8)
				NBR	<u>A (0.4)</u>	<u>A (2.4)</u>	<u>A (0.4)</u>	<u>A (2.9)</u>
				<b>Overall</b>	<b>B (17.1)</b>	<b>B (18.0)</b>	<b>B (17.5)</b>	<b>B (18.6)</b>

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.  
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 6-4  
Monument, CO  
Total Future 2028 Queueing Summary

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Total Future 2023		Total Future 2028	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1	ROUNDABOUT	Baptist Road	EBLTR	-	25	25	25	25
			WBLTR	-	25	50	25	75
			Woodcarver Road NBLTR	-	0	0	0	0
			Old Denver Road SBLTR	-	25	50	25	50
2	STOP	Baptist Road	EBTR	-	0	0	0	0
			WBT	-	0	0	0	0
			Site Access NBR	-	0	0	25	22.5
3	STOP for Existing  SIGNAL for rest	Baptist Road	EBL	155	0	4	0	4
			EBT	-	126	129	136	137
			EBR	-	0	2	0	2
			WBL	420	46	95	102	105
			WBT	-	83	170	54	138
			WBTR	-	83	170	54	138
			Terrazzo Drive NBL	135	17	45	85	99
			NBT	-	4	4	4	4
			NBR	135	35	58	52	61
			SBL	255	23	18	22	18
SBTR	-	8	6	8	6			
4	SIGNAL	Baptist Road	EBT	-	53	69	68	77
			EBR	-	88	78	78	80
			WBL	620	144	240	314	242
			WBT	-	38	98	55	198
			I-25 SB Ramp SBL	-	142	260	114	165
			SBTR	-	0	86	0	131
5	SIGNAL	Baptist Road	EBL	550	77	80	101	112
			EBT	-	76	152	93	145
			WBT	-	118	116	121	112
			WBR	-	42	39	43	39
			NBL	-	145	238	165	280
			I-25 NB Ramp NBLT	-	146	241	166	283
			NBR	-	0	0	0	0

Notes : (1) Queue length is based on the 95th percentile queue as reported by Synchro, Version 11.

## VII. Conclusions and Recommendations

### Conclusions

Based on the results of this traffic impact study, the following may be concluded:

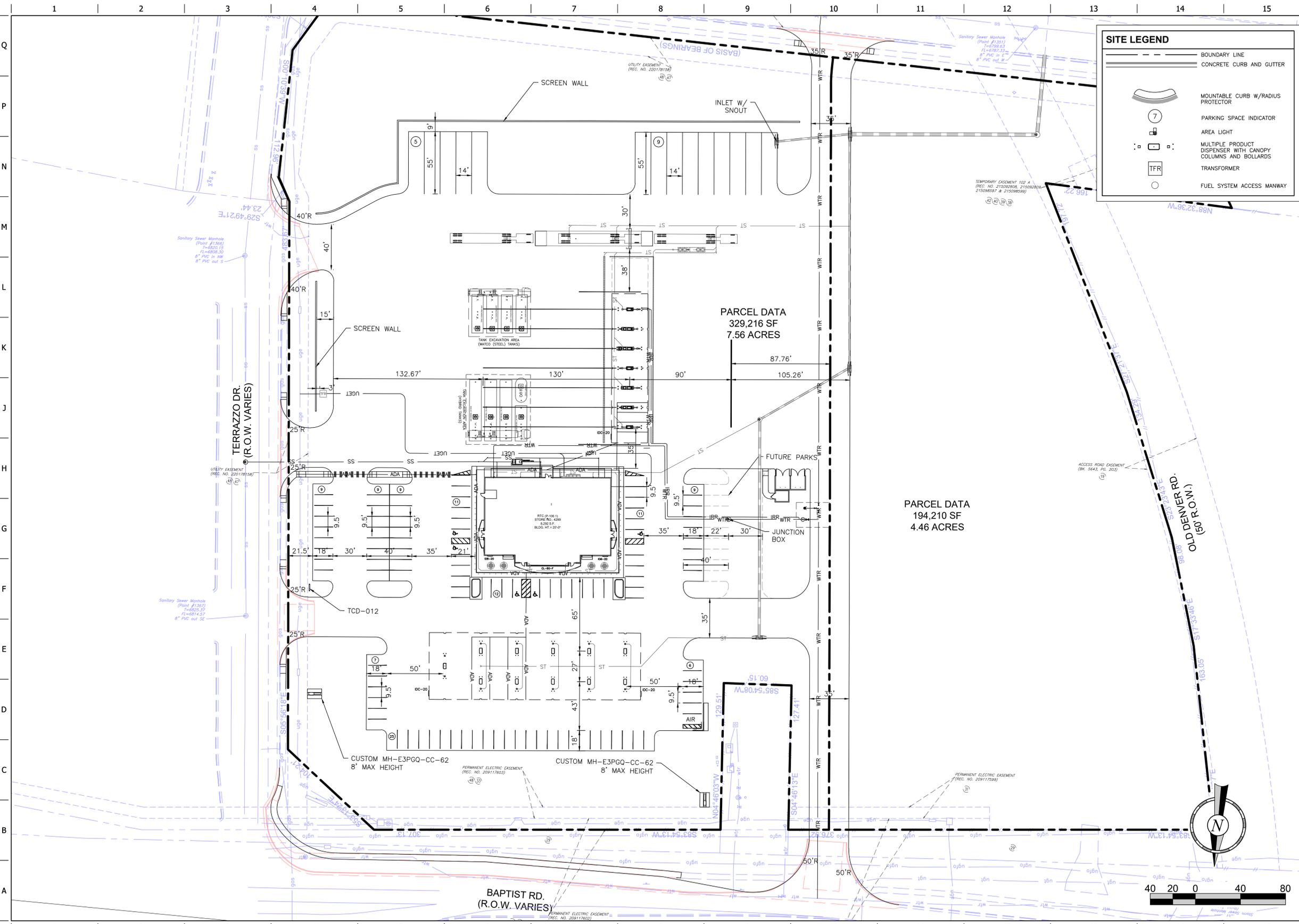
- Under existing traffic conditions, the signalized intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours.
- Under background future 2023 and 2028 traffic conditions, without the development of the subject site, delays would increase slightly at study intersections due to regional traffic growth. The signalized intersections would continue to operate at LOS “C” or better.
- The 2023 proposed site development would generate, upon completion and full occupancy, 298 new weekday AM and 283 new weekday PM peak hour vehicle trips as well as 2,840 new weekday daily trips.
- The 2028 proposed site development would generate, upon completion and full occupancy, 72 new weekday AM and 56 new weekday PM peak hour vehicle trips as well as 824 new weekday daily trips.
- Under 2023 and 2028 total future traffic conditions, all study intersections, including proposed site connections would operate at overall acceptable levels of service consistent with background conditions.

### Recommendations

- It is recommended that the proposed development provide access consistent with the attached plan.
- Due to forecasted left turn volumes, dual lefts and retiming of the Baptist Road signal at Terrazzo Drive should be provided at such a time when vehicle movements exceed 300 vehicles an hour.
- Signal timings should be coordinated with the Town of Monument.

## **APPENDIX A – Full Sized Plan**

FILE LOCATION: \\Quiktrip\Quiktrip\04299-Monument, CO\Civil\1-Concept\83-4299-Civil.dwg TAB NAME: EDP\_Site\_Demo USER: Duncanson, Roby SAVED: 8/16/2021 3:06 PM PLOTTED: 8/16/2021 3:09 PM



**SITE LEGEND**

- BOUNDARY LINE
- CONCRETE CURB AND GUTTER
- MOUNTABLE CURB W/RADIUS PROTECTOR
- PARKING SPACE INDICATOR
- AREA LIGHT
- MULTIPLE PRODUCT DISPENSER WITH CANOPY COLUMNS AND BOLLARDS
- TRANSFORMER
- FUEL SYSTEM ACCESS MANWAY

PARCEL DATA  
329,216 SF  
7.56 ACRES

PARCEL DATA  
194,210 SF  
4.46 ACRES

PROJECT NO.: #####

**QuikTrip No. 4299**  
SWC BAPTIST RD & TERRAZZO DR.  
MONUMENT, COLORADO



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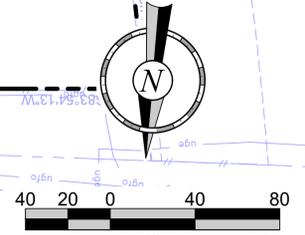
PROTOTYPE:	P-106 (05/01/21)
DIVISION:	83
VERSION:	001
DESIGNED BY:	DLR
DRAWN BY:	DLR
REVIEWED BY:	ACJ

REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 8/16/2021

SHEET TITLE:  
SITE/DEMO PLAN

SHEET NUMBER:  
**1**



## **APPENDIX B – LOS Descriptions**

## Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the  $v/c$  ratio for the lane group in question.

**LOS A** describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

**LOS B** describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	$\leq 10.0$
B	$> 10.0$ and $\leq 20.0$
C	$> 20.0$ and $\leq 35.0$
D	$> 35.0$ and $\leq 55.0$
E	$> 55.0$ and $\leq 80.0$
F	$> 80.0$

**LOS C** describes operations with delay greater than 20 and up to 35 sec per 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 at this level, though many still pass through the intersection without stopping.

**LOS D** describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high  $v/c$  ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

**LOS E** describes operations with delay greater than 55 and up to 80 sec per 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.

**LOS F** describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the 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 causes to such delay levels.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

## Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Table 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	$\leq 10$
B	$> 10$ and $\leq 15$
C	$> 15$ and $\leq 25$
D	$> 25$ and $\leq 35$
E	$> 35$ and $\leq 50$
F	$> 50$

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

## **APPENDIX C – Traffic Counts and Existing Signal Timings**

CDOT

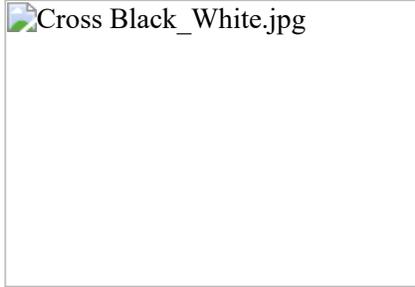
### MaxTime Timing Shee

2.0.16 Update

#### Administration

#### Unit Information

Controller ID	0
Main St.	25A
Side St.	Baptist NB Ramp



Adapter	IP Address	Subnet Mask	Default Gateway	ARP	DHCP
1	192.168.10.104	255.255.255.0	192.168.10.1	Disable	
2	10.20.70.51	255.255.255.0	0.0.0.0	Disable	

#### Serial Ports:

Port	Description	Function	Address	Baud	Bits	Stop	Parity	Flow	CTS	RTS
1	Port 2/C21S	None	1	9600	8	1	None	None	0	0
2	Aux P3/C22S	None	1	9600	8	1	None	None	0	0
3	SDLC Port 1	None	1	9600	8	1	None	None	0	0
4	Com A/C50S	None	1	9600	8	1	None	None	0	0
5	FIO	None	1	9600	8	1	None	None	0	0
6	DISPLAY/C60M	None	1	9600	8	1	None	None	0	0
7	SP7	None	1	9600	8	1	None	None	0	0
8	SP8/Com B	None	1	9600	8	1	None	None	0	0

#### Unit Parameters

Startup Flash	0	Auto Ped Clr	Enable	Red Revert	4.0	Backup Time	600	Ext Mode	Disable
All Red Exit	0	Grn Flash Freq.	60	Yel Flash Freq.	60	MCE Enable	Enable	Free Seq.	1
MCE Seq.	1	Start Yellow	0.0	Start Red	0.0	Start Clear Hold	6		

#### Phase Parameters

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Walk Time	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clear Time	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Don't Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Green	5	19	5	5	6	19	5	6	1	1	1	1	1	1	1	1	1	1	1	1
Min Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passage	1.0	3.0	1.0	1.0	3.0	3.0	1.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max-1	0	30	0	0	20	30	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Max-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yel Change	3.0	4.0	3.0	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Add Red Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	0.0	5.0	0.0	0.0	5.0	5.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Initial	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	0.0	0.0	0.0
Max Initial	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	0.0	0.0	0.0
Time B4 Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars B4 Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduce By	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	0.0	0.0	0.0
Min Gap	0.0	3.0	0.0	0.0	3.0	3.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dyn Max Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dyn Max Step	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	0.0	0.0	0.0
Advance Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pre Green	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	0.0	0.0	0.0
Pre Clearance	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	0.0	0.0	0.0

Phases	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Walk Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clear Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Don't Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Green	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ped Clr During Yel																				
Ped Clr During Red																				
Cond Reservice																				
Yel Min Override																				
No Startup Call																				
Adv. Warn Flasher																				
No Ped Str Up Call																				
Ped Clr OVTG																				
Flash Exit Call																				
Flash Exit Ped Call																				
MinGreen2																				
MaxGreen2																				
MaxGreen3																				
Ped2																				
Ped Clear Pre Clear																				
Ped NA+ Mode																				
Red Rest																				
Serve Evy Oth Even																				
Serve Evy Oth Odd																				

Phases	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ped Clr During Yel																				
Ped Clr During Red																				
Cond Reservice																				
Yel Min Override																				
No Startup Call																				
Adv. Warn Flasher																				
No Ped Str Up Call																				
Ped Clr OVTG																				
Flash Exit Call																				
Flash Exit Ped Call																				
MinGreen2																				
MaxGreen2																				
MaxGreen3																				
Ped2																				
Ped Clear Pre Clear																				
Ped NA+ Mode																				
Red Rest																				
Serve Evy Oth Even																				
Serve Evy Oth Odd																				

**Phase Configuration**

Ph.	Startup	Ring	Concurrent	No Served Phases	Startup Min	Description
1	Phase Not On	0			0	
2	Green No Walk	1	5,6		0	EB
3	Phase Not On	0			0	
4	Phase Not On	0			0	
5	Phase Not On	2	2		0	EBLT
6	Green No Walk	2	2		0	WB
7	Phase Not On	0			0	
8	Phase Not On	2			0	NB
9	None	0			0	
10	None	0			0	
11	None	0			0	
12	None	0			0	
13	None	0			0	
14	None	0			0	
15	None	0			0	
16	None	0			0	
17	None	0			0	
18	None	0			0	
19	None	0			0	
20	None	0			0	

15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0

35	0	0	0	0	0
36	0	0	0	0	0
37	0	0	0	0	0
38	0	0	0	0	0
39	0	0	0	0	0
40	0	0	0	0	0

**Overlaps**

OLP	Type	Included Phases	Modifier Phases	Trail		Walk		Ped		Delay	Flash	Descriptions
				GRN	YEL	RED	1	Clr 1	2			
1	FYA - 4 Sec	2	1	0	0.0	0.0	0	0	0	0	0.0	On
2	Off			0	0.0	0.0	0	0	0	0	0.0	Off
3	FYA - 4 Sec	4	3	0	0.0	0.0	0	0	0	0	0.0	On
4	Off			0	0.0	0.0	0	0	0	0	0.0	Off
5	FYA - 4 Sec	6	5	0	0.0	0.0	0	0	0	0	0.0	On
6	Off			0	0.0	0.0	0	0	0	0	0.0	Off
7	FYA - 4 Sec	8	7	0	0.0	0.0	0	0	0	0	0.0	On
8	Off			0	0.0	0.0	0	0	0	0	0.0	Off
9	Off			0	0.0	0.0	0	0	0	0	0.0	Off
10	Off			0	0.0	0.0	0	0	0	0	0.0	Off
11	Off			0	0.0	0.0	0	0	0	0	0.0	Off
12	Off			0	0.0	0.0	0	0	0	0	0.0	Off
13	Off			0	0.0	0.0	0	0	0	0	0.0	Off
14	Off			0	0.0	0.0	0	0	0	0	0.0	Off
15	Off			0	0.0	0.0	0	0	0	0	0.0	Off
16	Off			0	0.0	0.0	0	0	0	0	0.0	Off
17	Off			0	0.0	0.0	0	0	0	0	0.0	Off
18	Off			0	0.0	0.0	0	0	0	0	0.0	Off
19	Off			0	0.0	0.0	0	0	0	0	0.0	Off
20	Off			0	0.0	0.0	0	0	0	0	0.0	Off
21	Off			0	0.0	0.0	0	0	0	0	0.0	Off
22	Off			0	0.0	0.0	0	0	0	0	0.0	Off
23	Off			0	0.0	0.0	0	0	0	0	0.0	Off
24	Off			0	0.0	0.0	0	0	0	0	0.0	Off
25	Off			0	0.0	0.0	0	0	0	0	0.0	Off
26	Off			0	0.0	0.0	0	0	0	0	0.0	Off
27	Off			0	0.0	0.0	0	0	0	0	0.0	Off
28	Off			0	0.0	0.0	0	0	0	0	0.0	Off
29	Off			0	0.0	0.0	0	0	0	0	0.0	Off
30	Off			0	0.0	0.0	0	0	0	0	0.0	Off
31	Off			0	0.0	0.0	0	0	0	0	0.0	Off
32	Off			0	0.0	0.0	0	0	0	0	0.0	Off

**Coordination Parameters**

Operational Mode	Correction Mode	Maximum Mode	Force Mode
Automatic	Shortway (Auto)	Per Pattern	Per Pattern

**Patterns**

Patt.	Cycle	Offset 1	Offset 2	Offset 2	Split	Sequence	Ref. Color	Max Mode	Phs	Det	Ped
									Pln	Pln	Pln
1	90	0	0	0	1	1	Yel	Inh	1	1	1
2	0	0	0	0	0	0	Yel	Inh	1	1	1
3	0	0	0	0	0	0	Yel	Inh	1	1	1
4	0	0	0	0	0	0	Yel	Inh	1	1	1
5	0	0	0	0	0	0	Yel	Inh	1	1	1
6	0	0	0	0	0	0	Yel	Inh	1	1	1
7	0	0	0	0	0	0	Yel	Inh	1	1	1
8	0	0	0	0	0	0	Yel	Inh	1	1	1
9	0	0	0	0	0	0	Yel	Inh	1	1	1
10	0	0	0	0	0	0	Yel	Inh	1	1	1
11	0	0	0	0	0	0	Yel	Inh	1	1	1
12	0	0	0	0	0	0	Yel	Inh	1	1	1
13	0	0	0	0	0	0	Yel	Inh	1	1	1
14	0	0	0	0	0	0	Yel	Inh	1	1	1
15	0	0	0	0	0	0	Yel	Inh	1	1	1
16	0	0	0	0	0	0	Yel	Inh	1	1	1

80	0	0	0	0	0	0	Yel	Inh	1	1	1
81	0	0	0	0	0	0	Yel	Inh	1	1	1
82	0	0	0	0	0	0	Yel	Inh	1	1	1
83	0	0	0	0	0	0	Yel	Inh	1	1	1
84	0	0	0	0	0	0	Yel	Inh	1	1	1
85	0	0	0	0	0	0	Yel	Inh	1	1	1
86	0	0	0	0	0	0	Yel	Inh	1	1	1
87	0	0	0	0	0	0	Yel	Inh	1	1	1
88	0	0	0	0	0	0	Yel	Inh	1	1	1
89	0	0	0	0	0	0	Yel	Inh	1	1	1
90	0	0	0	0	0	0	Yel	Inh	1	1	1
91	0	0	0	0	0	0	Yel	Inh	1	1	1
92	0	0	0	0	0	0	Yel	Inh	1	1	1
93	0	0	0	0	0	0	Yel	Inh	1	1	1
94	0	0	0	0	0	0	Yel	Inh	1	1	1
95	0	0	0	0	0	0	Yel	Inh	1	1	1
96	0	0	0	0	0	0	Yel	Inh	1	1	1
97	0	0	0	0	0	0	Yel	Inh	1	1	1
98	0	0	0	0	0	0	Yel	Inh	1	1	1
99	0	0	0	0	0	0	Yel	Inh	1	1	1
100	0	0	0	0	0	0	Yel	Inh	1	1	1
101	0	0	0	0	0	0	Yel	Inh	1	1	1
102	0	0	0	0	0	0	Yel	Inh	1	1	1
103	0	0	0	0	0	0	Yel	Inh	1	1	1
104	0	0	0	0	0	0	Yel	Inh	1	1	1
105	0	0	0	0	0	0	Yel	Inh	1	1	1
106	0	0	0	0	0	0	Yel	Inh	1	1	1
107	0	0	0	0	0	0	Yel	Inh	1	1	1
108	0	0	0	0	0	0	Yel	Inh	1	1	1
109	0	0	0	0	0	0	Yel	Inh	1	1	1
110	0	0	0	0	0	0	Yel	Inh	1	1	1
111	0	0	0	0	0	0	Yel	Inh	1	1	1
112	0	0	0	0	0	0	Yel	Inh	1	1	1
113	0	0	0	0	0	0	Yel	Inh	1	1	1
114	0	0	0	0	0	0	Yel	Inh	1	1	1
115	0	0	0	0	0	0	Yel	Inh	1	1	1
116	0	0	0	0	0	0	Yel	Inh	1	1	1
117	0	0	0	0	0	0	Yel	Inh	1	1	1
118	0	0	0	0	0	0	Yel	Inh	1	1	1
119	0	0	0	0	0	0	Yel	Inh	1	1	1
120	0	0	0	0	0	0	Yel	Inh	1	1	1
121	0	0	0	0	0	0	Yel	Inh	1	1	1
122	0	0	0	0	0	0	Yel	Inh	1	1	1
123	0	0	0	0	0	0	Yel	Inh	1	1	1
124	0	0	0	0	0	0	Yel	Inh	1	1	1
125	0	0	0	0	0	0	Yel	Inh	1	1	1
126	0	0	0	0	0	0	Yel	Inh	1	1	1
127	0	0	0	0	0	0	Yel	Inh	1	1	1
128	0	0	0	0	0	0	Yel	Inh	1	1	1

**Split Parameters**

Split 1		Coord	Ref	
PH.	Time	PH	PH	Mode
1	0			None
2	66			None
3	0			None
4	0			None
5	20			None
6	46			None
7	0			None
8	24			None
9	0			None
10	0			None
11	0			None

Split 2		Coord	Ref	
PH.	Time	PH	PH	Mode
1	0			None
2	0			None
3	0			None
4	0			None
5	0			None
6	0			None
7	0			None
8	0			None
9	0			None
10	0			None
11	0			None

CDOT

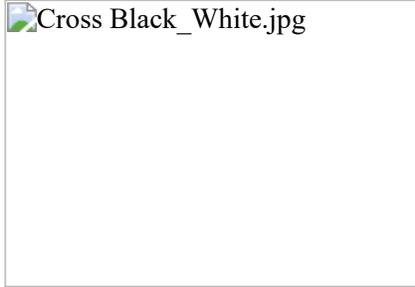
### MaxTime Timing Shee

332 FYA

#### Administration

#### Unit Information

Controller ID	0
Main St.	25A
Side St.	Baptist SB Ramp (West)



Adapter	IP Address	Subnet Mask	Default Gateway	ARP	DHCP
1	192.168.10.104	255.255.255.0	192.168.10.1	Disable	
2	10.20.70.51	255.255.255.0	0.0.0.0	Disable	

#### Serial Ports:

Port	Description	Function	Address	Baud	Bits	Stop	Parity	Flow	CTS	RTS
1	Port 2/C21S	None	1	9600	8	1	None	None	0	0
2	Aux P3/C22S	None	1	9600	8	1	None	None	0	0
3	SDLC Port 1	None	1	9600	8	1	None	None	0	0
4	Com A/C50S	None	1	9600	8	1	None	None	0	0
5	FIO	None	1	9600	8	1	None	None	0	0
6	DISPLAY/C60M	None	1	9600	8	1	None	None	0	0
7	SP7	None	1	9600	8	1	None	None	0	0
8	SP8/Com B	None	1	9600	8	1	None	None	0	0

#### Unit Parameters

Startup Flash	0	Auto Ped Clr	Enable	Red Revert	4.0	Backup Time	600	Ext Mode	Disable
All Red Exit	0	Grn Flash Freq.	60	Yel Flash Freq.	60	MCE Enable	Enable	Free Seq.	1
MCE Seq.	1	Start Yellow	0.0	Start Red	0.0	Start Clear Hold	6		

#### Phase Parameters

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Walk Time	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clear Time	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Don't Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Green	19	6	5	6	5	19	5	5	1	1	1	1	1	1	1	1	1	1	1	1
Min Green 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passage	3.0	3.0	1.0	4.0	1.0	3.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max-1	38	30	0	30	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yel Change	4.0	4.0	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	2.0	2.0	1.0	2.0	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Add Red Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert	5.0	5.0	0.0	5.0	0.0	5.0	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
Added Initial	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	0.0	0.0	0.0
Max Initial	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	0.0	0.0	0.0
Time B4 Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cars B4 Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduce By	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	0.0	0.0	0.0
Min Gap	3.0	3.0	0.0	3.0	0.0	3.0	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
Dyn Max Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dyn Max Step	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	0.0	0.0	0.0
Advance Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alt Ped Clr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pre Green	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	0.0	0.0	0.0
Pre Clearance	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	0.0	0.0	0.0

Phases	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Walk Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clear Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Don't Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Green	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Phases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ped Clr During Yel																				
Ped Clr During Red																				
Cond Reservice																				
Yel Min Override																				
No Startup Call																				
Adv. Warn Flasher																				
No Ped Str Up Call																				
Ped Clr OVTG																				
Flash Exit Call																				
Flash Exit Ped Call																				
MinGreen2																				
MaxGreen2																				
MaxGreen3																				
Ped2																				
Ped Clear Pre Clear																				
Ped NA+ Mode																				
Red Rest																				
Serve Evy Oth Even																				
Serve Evy Oth Odd																				

Phases	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ped Clr During Yel																				
Ped Clr During Red																				
Cond Reservice																				
Yel Min Override																				
No Startup Call																				
Adv. Warn Flasher																				
No Ped Str Up Call																				
Ped Clr OVTG																				
Flash Exit Call																				
Flash Exit Ped Call																				
MinGreen2																				
MaxGreen2																				
MaxGreen3																				
Ped2																				
Ped Clear Pre Clear																				
Ped NA+ Mode																				
Red Rest																				
Serve Evy Oth Even																				
Serve Evy Oth Odd																				

**Phase Configuration**

Ph.	Startup	Ring	Concurrent	No Served Phases	Startup Min	Description
1	Phase Not On	1	6		0	WBLT
2	Green No Walk	1	6		0	EB
3	Phase Not On	0			0	
4	Phase Not On	1			0	SB
5	Phase Not On	0			0	
6	Green No Walk	2	1,2		0	WB
7	Phase Not On	0			0	
8	Phase Not On	0			0	
9	None	0			0	
10	None	0			0	
11	None	0			0	
12	None	0			0	
13	None	0			0	
14	None	0			0	
15	None	0			0	
16	None	0			0	
17	None	0			0	
18	None	0			0	
19	None	0			0	
20	None	0			0	

15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0

35	0	0	0	0	0
36	0	0	0	0	0
37	0	0	0	0	0
38	0	0	0	0	0
39	0	0	0	0	0
40	0	0	0	0	0

**Overlaps**

OLP	Type	Included Phases	Modifier Phases	Trail		Walk		Ped		Delay	Flash	Descriptions
				GRN	YEL	RED	1	Clr 1	2			
1	FYA - 4 Sec	2	1	0	0.0	0.0	0	0	0	0	0.0	On
2	Off			0	0.0	0.0	0	0	0	0	0.0	Off
3	FYA - 4 Sec	4	3	0	0.0	0.0	0	0	0	0	0.0	On
4	Off			0	0.0	0.0	0	0	0	0	0.0	Off
5	FYA - 4 Sec	6	5	0	0.0	0.0	0	0	0	0	0.0	On
6	Off			0	0.0	0.0	0	0	0	0	0.0	Off
7	FYA - 4 Sec	8	7	0	0.0	0.0	0	0	0	0	0.0	On
8	Off			0	0.0	0.0	0	0	0	0	0.0	Off
9	Off			0	0.0	0.0	0	0	0	0	0.0	Off
10	Off			0	0.0	0.0	0	0	0	0	0.0	Off
11	Off			0	0.0	0.0	0	0	0	0	0.0	Off
12	Off			0	0.0	0.0	0	0	0	0	0.0	Off
13	Off			0	0.0	0.0	0	0	0	0	0.0	Off
14	Off			0	0.0	0.0	0	0	0	0	0.0	Off
15	Off			0	0.0	0.0	0	0	0	0	0.0	Off
16	Off			0	0.0	0.0	0	0	0	0	0.0	Off
17	Off			0	0.0	0.0	0	0	0	0	0.0	Off
18	Off			0	0.0	0.0	0	0	0	0	0.0	Off
19	Off			0	0.0	0.0	0	0	0	0	0.0	Off
20	Off			0	0.0	0.0	0	0	0	0	0.0	Off
21	Off			0	0.0	0.0	0	0	0	0	0.0	Off
22	Off			0	0.0	0.0	0	0	0	0	0.0	Off
23	Off			0	0.0	0.0	0	0	0	0	0.0	Off
24	Off			0	0.0	0.0	0	0	0	0	0.0	Off
25	Off			0	0.0	0.0	0	0	0	0	0.0	Off
26	Off			0	0.0	0.0	0	0	0	0	0.0	Off
27	Off			0	0.0	0.0	0	0	0	0	0.0	Off
28	Off			0	0.0	0.0	0	0	0	0	0.0	Off
29	Off			0	0.0	0.0	0	0	0	0	0.0	Off
30	Off			0	0.0	0.0	0	0	0	0	0.0	Off
31	Off			0	0.0	0.0	0	0	0	0	0.0	Off
32	Off			0	0.0	0.0	0	0	0	0	0.0	Off

**Coordination Parameters**

Operational Mode	Correction Mode	Maximum Mode	Force Mode
Automatic	Shortway (Auto)	Per Pattern	Per Pattern

**Patterns**

Patt.	Cycle	Offset 1	Offset 2	Offset 3	Split	Sequence	Ref. Color	Max Mode	Phs	Det	Ped
									Pln	Pln	Pln
1	90	1	0	0	1	2	Yel	Inh	1	1	1
2	90	3	0	0	2	2	Yel	Inh	1	1	1
3	0	0	0	0	0	0	Yel	Inh	1	1	1
4	0	0	0	0	0	0	Yel	Inh	1	1	1
5	0	0	0	0	0	0	Yel	Inh	1	1	1
6	0	0	0	0	0	0	Yel	Inh	1	1	1
7	0	0	0	0	0	0	Yel	Inh	1	1	1
8	0	0	0	0	0	0	Yel	Inh	1	1	1
9	0	0	0	0	0	0	Yel	Inh	1	1	1
10	0	0	0	0	0	0	Yel	Inh	1	1	1
11	0	0	0	0	0	0	Yel	Inh	1	1	1
12	0	0	0	0	0	0	Yel	Inh	1	1	1
13	0	0	0	0	0	0	Yel	Inh	1	1	1
14	0	0	0	0	0	0	Yel	Inh	1	1	1
15	0	0	0	0	0	0	Yel	Inh	1	1	1
16	0	0	0	0	0	0	Yel	Inh	1	1	1

80	0	0	0	0	0	0	Yel	Inh	1	1	1
81	0	0	0	0	0	0	Yel	Inh	1	1	1
82	0	0	0	0	0	0	Yel	Inh	1	1	1
83	0	0	0	0	0	0	Yel	Inh	1	1	1
84	0	0	0	0	0	0	Yel	Inh	1	1	1
85	0	0	0	0	0	0	Yel	Inh	1	1	1
86	0	0	0	0	0	0	Yel	Inh	1	1	1
87	0	0	0	0	0	0	Yel	Inh	1	1	1
88	0	0	0	0	0	0	Yel	Inh	1	1	1
89	0	0	0	0	0	0	Yel	Inh	1	1	1
90	0	0	0	0	0	0	Yel	Inh	1	1	1
91	0	0	0	0	0	0	Yel	Inh	1	1	1
92	0	0	0	0	0	0	Yel	Inh	1	1	1
93	0	0	0	0	0	0	Yel	Inh	1	1	1
94	0	0	0	0	0	0	Yel	Inh	1	1	1
95	0	0	0	0	0	0	Yel	Inh	1	1	1
96	0	0	0	0	0	0	Yel	Inh	1	1	1
97	0	0	0	0	0	0	Yel	Inh	1	1	1
98	0	0	0	0	0	0	Yel	Inh	1	1	1
99	0	0	0	0	0	0	Yel	Inh	1	1	1
100	0	0	0	0	0	0	Yel	Inh	1	1	1
101	0	0	0	0	0	0	Yel	Inh	1	1	1
102	0	0	0	0	0	0	Yel	Inh	1	1	1
103	0	0	0	0	0	0	Yel	Inh	1	1	1
104	0	0	0	0	0	0	Yel	Inh	1	1	1
105	0	0	0	0	0	0	Yel	Inh	1	1	1
106	0	0	0	0	0	0	Yel	Inh	1	1	1
107	0	0	0	0	0	0	Yel	Inh	1	1	1
108	0	0	0	0	0	0	Yel	Inh	1	1	1
109	0	0	0	0	0	0	Yel	Inh	1	1	1
110	0	0	0	0	0	0	Yel	Inh	1	1	1
111	0	0	0	0	0	0	Yel	Inh	1	1	1
112	0	0	0	0	0	0	Yel	Inh	1	1	1
113	0	0	0	0	0	0	Yel	Inh	1	1	1
114	0	0	0	0	0	0	Yel	Inh	1	1	1
115	0	0	0	0	0	0	Yel	Inh	1	1	1
116	0	0	0	0	0	0	Yel	Inh	1	1	1
117	0	0	0	0	0	0	Yel	Inh	1	1	1
118	0	0	0	0	0	0	Yel	Inh	1	1	1
119	0	0	0	0	0	0	Yel	Inh	1	1	1
120	0	0	0	0	0	0	Yel	Inh	1	1	1
121	0	0	0	0	0	0	Yel	Inh	1	1	1
122	0	0	0	0	0	0	Yel	Inh	1	1	1
123	0	0	0	0	0	0	Yel	Inh	1	1	1
124	0	0	0	0	0	0	Yel	Inh	1	1	1
125	0	0	0	0	0	0	Yel	Inh	1	1	1
126	0	0	0	0	0	0	Yel	Inh	1	1	1
127	0	0	0	0	0	0	Yel	Inh	1	1	1
128	0	0	0	0	0	0	Yel	Inh	1	1	1

**Split Parameters**

Split 1		Coord	Ref	
PH.	Time	PH	PH	Mode
1	44			None
2	26			None
3	0			None
4	20			None
5	0			None
6	70			None
7	0			None
8	0			None
9	0			None
10	0			None
11	0			None

Split 2		Coord	Ref	
PH.	Time	PH	PH	Mode
1	35			None
2	25			None
3	0			None
4	30			None
5	0			None
6	60			None
7	0			None
8	0			None
9	0			None
10	0			None
11	0			None

## **APPENDIX D – Existing Synchro Outputs**

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	4.2			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	120	246	13	167
Demand Flow Rate, veh/h	122	251	13	170
Vehicles Circulating, veh/h	188	15	279	107
Vehicles Exiting, veh/h	89	277	31	159
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.1	4.2	3.6	4.1
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	122	251	13	170
Cap Entry Lane, veh/h	1139	1359	1038	1237
Entry HV Adj Factor	0.982	0.981	0.992	0.981
Flow Entry, veh/h	120	246	13	167
Cap Entry, veh/h	1119	1334	1030	1214
V/C Ratio	0.107	0.185	0.013	0.137
Control Delay, s/veh	4.1	4.2	3.6	4.1
LOS	A	A	A	A
95th %tile Queue, veh	0	1	0	0

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷		↷
Traffic Vol, veh/h	385	0	0	361	0	0
Future Vol, veh/h	385	0	0	361	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	418	0	0	392	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	418
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	-	0	634
Stage 1	-	0	-	0	-
Stage 2	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	634
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 6th TWSC  
3: Terrazzo Drive & Baptist Road

09/07/2021

Intersection												
Int Delay, s/veh	4.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↵↵		↵	↵↵		↵	↵	↵	↵	↵	
Traffic Vol, veh/h	0	283	23	118	214	0	11	1	153	33	4	1
Future Vol, veh/h	0	283	23	118	214	0	11	1	153	33	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	160	-	-	420	-	-	135	-	0	255	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	308	25	128	233	0	12	1	166	36	4	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	233	0	0	333	0	0	696	810	167	644	822	117
Stage 1	-	-	-	-	-	-	321	321	-	489	489	-
Stage 2	-	-	-	-	-	-	375	489	-	155	333	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1332	-	-	1223	-	-	328	312	848	358	307	913
Stage 1	-	-	-	-	-	-	665	650	-	529	548	-
Stage 2	-	-	-	-	-	-	618	548	-	832	642	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1332	-	-	1223	-	-	298	279	848	264	275	913
Mov Cap-2 Maneuver	-	-	-	-	-	-	298	279	-	264	275	-
Stage 1	-	-	-	-	-	-	665	650	-	529	490	-
Stage 2	-	-	-	-	-	-	548	490	-	668	642	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			2.9			10.8			20.2		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	298	279	848	1332	-	-	1223	-	-	264	320
HCM Lane V/C Ratio	0.04	0.004	0.196	-	-	-	0.105	-	-	0.136	0.017
HCM Control Delay (s)	17.6	18	10.3	0	-	-	8.3	-	-	20.8	16.4
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	0.1	0	0.7	0	-	-	0.4	-	-	0.5	0.1

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021

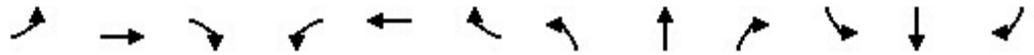


Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	205	310	762	325	142	103
v/c Ratio	0.09	0.42	0.78	0.13	0.45	0.13
Control Delay	21.8	5.0	25.8	1.5	38.4	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	5.0	25.8	1.5	38.4	0.4
Queue Length 50th (ft)	23	0	100	3	73	0
Queue Length 95th (ft)	40	60	109	14	131	0
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	2167	740	1220	2437	314	771
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.42	0.62	0.13	0.45	0.13
<b>Intersection Summary</b>						

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	189	285	701	299	0	0	0	0	131	0	95
Future Volume (veh/h)	0	189	285	701	299	0	0	0	0	131	0	95
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	205	0	762	325	0				142	0	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2388		868	2448	0				317	0	282
Arrive On Green	0.00	0.37	0.00	0.42	1.00	0.00				0.18	0.00	0.18
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	205	0	762	325	0				142	0	103
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	1.9	0.0	18.2	0.0	0.0				6.4	0.0	5.1
Cycle Q Clear(g_c), s	0.0	1.9	0.0	18.2	0.0	0.0				6.4	0.0	5.1
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2388		868	2448	0				317	0	282
V/C Ratio(X)	0.00	0.09		0.88	0.13	0.00				0.45	0.00	0.37
Avail Cap(c_a), veh/h	0	2388		1229	2448	0				317	0	282
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	18.4	0.0	24.9	0.0	0.0				33.1	0.0	32.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	5.3	0.1	0.0				4.5	0.0	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.7	0.0	6.1	0.0	0.0				3.0	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	18.5	0.0	30.2	0.1	0.0				37.6	0.0	36.2
LnGrp LOS	A	B		C	A	A				D	A	D
Approach Vol, veh/h		205	A		1087						245	
Approach Delay, s/veh		18.5			21.2						37.0	
Approach LOS		B			C						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	28.6	39.4		22.0		68.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	32.0	24.0		16.0		62.0						
Max Q Clear Time (g_c+I1), s	20.2	3.9		8.4		2.0						
Green Ext Time (p_c), s	2.4	1.1		0.5		2.2						

### Intersection Summary

HCM 6th Ctrl Delay	23.4
HCM 6th LOS	C

### Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	122	224	925	334	89	90	370
v/c Ratio	0.37	0.09	0.29	0.35	0.26	0.27	0.23
Control Delay	32.1	10.5	13.4	2.6	32.9	33.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.1	10.5	13.4	2.6	32.9	33.0	0.3
Queue Length 50th (ft)	29	21	84	0	45	46	0
Queue Length 95th (ft)	53	66	111	43	90	91	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	534	2359	3235	964	336	337	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.09	0.29	0.35	0.26	0.27	0.23
<b>Intersection Summary</b>							

HCM Signalized Intersection Capacity Analysis  
 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	 	 			  								
Traffic Volume (vph)	112	206	0	0	851	307	164	1	340	0	0	0	
Future Volume (vph)	112	206	0	0	851	307	164	1	340	0	0	0	
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	4.0				
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583				
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583				
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)	122	224	0	0	925	334	178	1	370	0	0	0	
RTOR Reduction (vph)	0	0	0	0	0	166	0	0	0	0	0	0	
Lane Group Flow (vph)	122	224	0	0	925	168	89	90	370	0	0	0	
Turn Type	Prot	NA			NA	Perm	Split	NA	Free				
Protected Phases	5	2			6		8	8					
Permitted Phases						6			Free				
Actuated Green, G (s)	8.6	60.0			45.4	45.4	18.0	18.0	90.0				
Effective Green, g (s)	8.6	60.0			45.4	45.4	18.0	18.0	90.0				
Actuated g/C Ratio	0.10	0.67			0.50	0.50	0.20	0.20	1.00				
Clearance Time (s)	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					
Lane Grp Cap (vph)	328	2359			3232	798	336	337	1583				
v/s Ratio Prot	0.04	0.06			c0.14		0.05	0.05					
v/s Ratio Perm						0.11			c0.23				
v/c Ratio	0.37	0.09			0.29	0.21	0.26	0.27	0.23				
Uniform Delay, d1	38.2	5.3			12.9	12.4	30.4	30.4	0.0				
Progression Factor	0.77	1.93			1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.7	0.1			0.2	0.6	1.9	1.9	0.3				
Delay (s)	29.9	10.4			13.1	13.0	32.3	32.4	0.3				
Level of Service	C	B			B	B	C	C	A				
Approach Delay (s)		17.3			13.1			10.8			0.0		
Approach LOS		B			B			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.2		HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.31										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0				
Intersection Capacity Utilization			59.9%		ICU Level of Service				B				
Analysis Period (min)			15										

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	4.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	123	381	23	160
Demand Flow Rate, veh/h	125	389	23	163
Vehicles Circulating, veh/h	155	25	266	154
Vehicles Exiting, veh/h	162	264	14	260
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.0	5.3	3.6	4.3
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	125	389	23	163
Cap Entry Lane, veh/h	1178	1345	1052	1179
Entry HV Adj Factor	0.983	0.980	0.994	0.981
Flow Entry, veh/h	123	381	23	160
Cap Entry, veh/h	1158	1318	1046	1157
V/C Ratio	0.106	0.289	0.022	0.138
Control Delay, s/veh	4.0	5.3	3.6	4.3
LOS	A	A	A	A
95th %tile Queue, veh	0	1	0	0

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	433	0	0	632	0	0
Future Vol, veh/h	433	0	0	632	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	471	0	0	687	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	471
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	592
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	592
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 6th TWSC  
3: Terrazzo Drive & Baptist Road

09/07/2021

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕	↖	↕	↖	↕
Traffic Vol, veh/h	1	255	25	136	416	0	21	1	134	22	1	2
Future Vol, veh/h	1	255	25	136	416	0	21	1	134	22	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	160	-	-	420	-	-	135	-	0	255	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	277	27	148	452	0	23	1	146	24	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	452	0	0	304	0	0	816	1041	152	889	1054	226
Stage 1	-	-	-	-	-	-	293	293	-	748	748	-
Stage 2	-	-	-	-	-	-	523	748	-	141	306	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1105	-	-	1254	-	-	269	229	867	238	225	777
Stage 1	-	-	-	-	-	-	691	669	-	371	418	-
Stage 2	-	-	-	-	-	-	505	418	-	847	660	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1105	-	-	1254	-	-	243	202	867	179	198	777
Mov Cap-2 Maneuver	-	-	-	-	-	-	243	202	-	179	198	-
Stage 1	-	-	-	-	-	-	690	668	-	371	369	-
Stage 2	-	-	-	-	-	-	443	369	-	703	659	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	11.6	26.5
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	243	202	867	1105	-	-	1254	-	-	179	393
HCM Lane V/C Ratio	0.094	0.005	0.168	0.001	-	-	0.118	-	-	0.134	0.008
HCM Control Delay (s)	21.3	22.9	10	8.3	-	-	8.3	-	-	28.2	14.2
HCM Lane LOS	C	C	B	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.3	0	0.6	0	-	-	0.4	-	-	0.5	0

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021

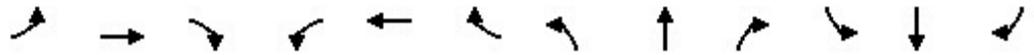


Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	205	262	607	522	328	145
v/c Ratio	0.13	0.44	0.74	0.27	0.60	0.20
Control Delay	27.1	6.6	32.3	12.9	31.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	6.6	32.3	12.9	31.6	0.6
Queue Length 50th (ft)	26	0	176	49	157	0
Queue Length 95th (ft)	44	61	225	64	245	0
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1607	593	953	1966	550	714
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.44	0.64	0.27	0.60	0.20

Intersection Summary

HCM 6th Signalized Intersection Summary  
 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	189	241	558	480	0	0	0	0	302	0	133
Future Volume (veh/h)	0	189	241	558	480	0	0	0	0	302	0	133
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	205	0	607	522	0				328	0	145
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1784		731	1974	0				554	0	493
Arrive On Green	0.00	0.28	0.00	0.07	0.18	0.00				0.31	0.00	0.31
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	205	0	607	522	0				328	0	145
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	2.1	0.0	15.6	11.3	0.0				14.0	0.0	6.2
Cycle Q Clear(g_c), s	0.0	2.1	0.0	15.6	11.3	0.0				14.0	0.0	6.2
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1784		731	1974	0				554	0	493
V/C Ratio(X)	0.00	0.11		0.83	0.26	0.00				0.59	0.00	0.29
Avail Cap(c_a), veh/h	0	1784		960	1974	0				554	0	493
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.97	0.97	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	24.3	0.0	40.3	21.0	0.0				26.2	0.0	23.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	4.7	0.3	0.0				4.6	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.8	0.0	7.6	5.2	0.0				6.2	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	24.4	0.0	44.9	21.3	0.0				30.8	0.0	25.0
LnGrp LOS	A	C		D	C	A				C	A	C
Approach Vol, veh/h		205	A		1129						473	
Approach Delay, s/veh		24.4			34.0						29.0	
Approach LOS		C			C						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.0	31.0		34.0		56.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	25.0	19.0		28.0		50.0						
Max Q Clear Time (g_c+I1), s	17.6	4.1		16.0		13.3						
Green Ext Time (p_c), s	1.4	1.0		1.4		3.6						

Intersection Summary

HCM 6th Ctrl Delay	31.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	73	445	805	223	161	163	1066
v/c Ratio	0.26	0.19	0.23	0.23	0.48	0.48	0.67
Control Delay	37.7	9.4	11.6	2.4	37.4	37.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.7	9.4	11.6	2.4	37.4	37.5	2.3
Queue Length 50th (ft)	16	56	69	0	86	87	0
Queue Length 95th (ft)	m31	80	92	34	151	152	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	534	2359	3488	963	336	337	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.19	0.23	0.23	0.48	0.48	0.67

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis  
 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	67	409	0	0	741	205	297	1	981	0	0	0	
Future Volume (vph)	67	409	0	0	741	205	297	1	981	0	0	0	
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	4.0				
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583				
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583				
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)	73	445	0	0	805	223	323	1	1066	0	0	0	
RTOR Reduction (vph)	0	0	0	0	0	105	0	0	0	0	0	0	
Lane Group Flow (vph)	73	445	0	0	805	118	161	163	1066	0	0	0	
Turn Type	Prot	NA			NA	Perm	Split	NA	Free				
Protected Phases	5	2			6		8	8					
Permitted Phases						6			Free				
Actuated Green, G (s)	6.2	60.0			47.8	47.8	18.0	18.0	90.0				
Effective Green, g (s)	6.2	60.0			47.8	47.8	18.0	18.0	90.0				
Actuated g/C Ratio	0.07	0.67			0.53	0.53	0.20	0.20	1.00				
Clearance Time (s)	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					
Lane Grp Cap (vph)	236	2359			3403	840	336	337	1583				
v/s Ratio Prot	0.02	0.13			0.13		0.10	0.10					
v/s Ratio Perm						0.07			c0.67				
v/c Ratio	0.31	0.19			0.24	0.14	0.48	0.48	0.67				
Uniform Delay, d1	39.9	5.7			11.3	10.7	31.9	31.9	0.0				
Progression Factor	0.93	1.60			1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.7	0.2			0.2	0.4	4.8	4.9	2.3				
Delay (s)	37.7	9.3			11.5	11.0	36.7	36.8	2.3				
Level of Service	D	A			B	B	D	D	A				
Approach Delay (s)		13.3			11.4			10.3			0.0		
Approach LOS		B			B			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			11.2		HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0				
Intersection Capacity Utilization			62.5%		ICU Level of Service				B				
Analysis Period (min)			15										

c Critical Lane Group

**APPENDIX E - Background (without site development) Synchro  
Outputs**

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	5.6			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	143	393	13	292
Demand Flow Rate, veh/h	146	401	13	298
Vehicles Circulating, veh/h	316	15	431	257
Vehicles Exiting, veh/h	239	429	31	159
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.0	5.3	4.2	6.2
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	146	401	13	298
Cap Entry Lane, veh/h	1000	1359	889	1062
Entry HV Adj Factor	0.982	0.981	0.992	0.979
Flow Entry, veh/h	143	393	13	292
Cap Entry, veh/h	981	1333	882	1040
V/C Ratio	0.146	0.295	0.015	0.281
Control Delay, s/veh	5.0	5.3	4.2	6.2
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	1

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	391	0	0	366	0	0
Future Vol, veh/h	391	0	0	366	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	425	0	0	398	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	425
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	628
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	628
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

# Queues

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	438	46	208	372	24	1	211	36	5
v/c Ratio	0.60	0.10	0.32	0.30	0.03	0.00	0.25	0.05	0.01
Control Delay	28.5	0.5	18.2	16.8	9.8	16.0	3.1	9.8	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	0.5	18.2	16.8	9.8	16.0	3.1	9.8	14.6
Queue Length 50th (ft)	91	0	31	61	5	0	0	7	1
Queue Length 95th (ft)	122	0	47	81	17	4	35	23	8
Internal Link Dist (ft)	423			557		495			367
Turn Bay Length (ft)		310	420		135			255	
Base Capacity (vph)	985	559	658	1230	728	860	857	732	837
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.08	0.32	0.30	0.03	0.00	0.25	0.05	0.01

### Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↘	↖↖	↗↗		↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	0	403	42	191	342	0	22	1	194	33	4	1
Future Volume (veh/h)	0	403	42	191	342	0	22	1	194	33	4	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	438	46	208	372	0	24	1	211	36	4	1
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	613	273	497	1090	0	806	868	736	710	684	171
Arrive On Green	0.00	0.17	0.17	0.07	0.31	0.00	0.03	0.46	0.46	0.04	0.47	0.47
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	1444	361
Grp Volume(v), veh/h	0	438	46	208	372	0	24	1	211	36	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1805
Q Serve(g_s), s	0.0	8.1	1.4	0.0	5.7	0.0	0.5	0.0	3.6	0.7	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.1	1.4	0.0	5.7	0.0	0.5	0.0	3.6	0.7	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	198	613	273	497	1090	0	806	868	736	710	0	855
V/C Ratio(X)	0.00	0.71	0.17	0.42	0.34	0.00	0.03	0.00	0.29	0.05	0.00	0.01
Avail Cap(c_a), veh/h	322	990	442	526	1090	0	898	868	736	786	0	855
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	1.00	1.00	0.99	0.99	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	27.3	16.3	30.0	18.8	0.0	9.2	10.0	4.6	8.9	0.0	9.7
Incr Delay (d2), s/veh	0.0	1.6	0.3	0.6	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	0.6	1.6	2.1	0.0	0.2	0.0	1.8	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	28.9	16.6	30.6	19.0	0.0	9.2	10.1	5.6	8.9	0.0	9.7
LnGrp LOS	A	C	B	C	B	A	A	B	A	A	A	A
Approach Vol, veh/h		484			580			236				41
Approach Delay, s/veh		27.7			23.1			6.0				9.0
Approach LOS		C			C			A				A
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	37.0	9.4	16.6	6.4	37.7	0.0	26.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	21.5	5.5	19.5	5.5	21.5	5.0	20.0				
Max Q Clear Time (g_c+I1), s	2.7	5.6	2.0	10.1	2.5	2.1	0.0	7.7				
Green Ext Time (p_c), s	0.0	0.6	0.2	1.9	0.0	0.0	0.0	1.7				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				21.3								
HCM 6th LOS				C								

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	289	408	777	413	146	172
v/c Ratio	0.16	0.55	0.78	0.18	0.37	0.24
Control Delay	25.2	6.2	36.9	5.1	32.9	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	6.2	36.9	5.1	32.9	0.8
Queue Length 50th (ft)	35	0	234	33	71	0
Queue Length 95th (ft)	57	75	296	48	126	0
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1854	748	1220	2280	393	723
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.55	0.64	0.18	0.37	0.24

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	266	375	715	380	0	0	0	0	134	0	158
Future Volume (veh/h)	0	266	375	715	380	0	0	0	0	134	0	158
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	289	0	777	413	0				146	0	172
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2075		882	2290	0				396	0	352
Arrive On Green	0.00	0.32	0.00	0.43	1.00	0.00				0.22	0.00	0.22
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	289	0	777	413	0				146	0	172
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	2.9	0.0	18.6	0.0	0.0				6.2	0.0	8.5
Cycle Q Clear(g_c), s	0.0	2.9	0.0	18.6	0.0	0.0				6.2	0.0	8.5
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2075		882	2290	0				396	0	352
V/C Ratio(X)	0.00	0.14		0.88	0.18	0.00				0.37	0.00	0.49
Avail Cap(c_a), veh/h	0	2075		1229	2290	0				396	0	352
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.00	0.96	0.96	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	21.6	0.0	24.6	0.0	0.0				29.7	0.0	30.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	5.6	0.2	0.0				2.6	0.0	4.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	0.0	6.2	0.1	0.0				2.8	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	21.7	0.0	30.1	0.2	0.0				32.3	0.0	35.3
LnGrp LOS	A	C		C	A	A				C	A	D
Approach Vol, veh/h		289	A		1190						318	
Approach Delay, s/veh		21.7			19.7						33.9	
Approach LOS		C			B						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	29.0	35.0		26.0		64.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	32.0	20.0		20.0		58.0						
Max Q Clear Time (g_c+I1), s	20.6	4.9		10.5		2.0						
Green Ext Time (p_c), s	2.4	1.5		0.9		2.8						

### Intersection Summary

HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

### Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	177	255	977	340	149	151	377
v/c Ratio	0.54	0.11	0.31	0.36	0.42	0.43	0.24
Control Delay	64.0	1.8	14.0	2.7	35.0	35.1	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.0	1.8	14.0	2.7	35.0	35.1	0.4
Queue Length 50th (ft)	57	3	93	0	77	78	0
Queue Length 95th (ft)	91	12	115	42	137	140	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	343	2320	3161	953	354	355	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.11	0.31	0.36	0.42	0.43	0.24

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	163	235	0	0	899	313	275	1	347	0	0	0	
Future Volume (vph)	163	235	0	0	899	313	275	1	347	0	0	0	
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	4.0				
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583				
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583				
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)	177	255	0	0	977	340	299	1	377	0	0	0	
RTOR Reduction (vph)	0	0	0	0	0	174	0	0	0	0	0	0	
Lane Group Flow (vph)	177	255	0	0	977	166	149	151	377	0	0	0	
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free				
Protected Phases	5	2			6			8					
Permitted Phases						6	8		Free				
Actuated Green, G (s)	10.0	60.0			44.0	44.0	18.0	18.0	90.0				
Effective Green, g (s)	10.0	60.0			44.0	44.0	18.0	18.0	90.0				
Actuated g/C Ratio	0.11	0.67			0.49	0.49	0.20	0.20	1.00				
Clearance Time (s)	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					
Lane Grp Cap (vph)	381	2359			3132	773	336	337	1583				
v/s Ratio Prot	c0.05	0.07			c0.15								
v/s Ratio Perm						0.10	0.09	0.09	0.24				
v/c Ratio	0.46	0.11			0.31	0.22	0.44	0.45	0.24				
Uniform Delay, d1	37.5	5.4			13.9	13.1	31.6	31.6	0.0				
Progression Factor	1.15	1.30			1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	0.9	0.1			0.3	0.6	4.2	4.3	0.4				
Delay (s)	44.1	7.1			14.1	13.8	35.8	35.9	0.4				
Level of Service	D	A			B	B	D	D	A				
Approach Delay (s)		22.3			14.0			16.1			0.0		
Approach LOS		C			B			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			16.1		HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.37										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0				
Intersection Capacity Utilization			68.1%		ICU Level of Service				C				
Analysis Period (min)			15										

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	7.0			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	179	594	23	317
Demand Flow Rate, veh/h	182	606	23	323
Vehicles Circulating, veh/h	315	25	483	371
Vehicles Exiting, veh/h	379	481	14	260
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.4	7.2	4.6	7.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	182	606	23	323
Cap Entry Lane, veh/h	1001	1345	843	945
Entry HV Adj Factor	0.982	0.980	0.994	0.981
Flow Entry, veh/h	179	594	23	317
Cap Entry, veh/h	983	1318	838	927
V/C Ratio	0.182	0.451	0.027	0.342
Control Delay, s/veh	5.4	7.2	4.6	7.6
LOS	A	A	A	A
95th %tile Queue, veh	1	2	0	2

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	438	0	0	641	0	0
Future Vol, veh/h	438	0	0	641	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	476	0	0	697	0	0

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	476
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	588
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	588
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

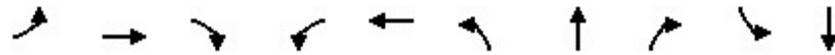
Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Queues

3: Terrazzo Drive & Baptist Road

09/07/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1	439	82	367	610	84	1	389	24	3
v/c Ratio	0.01	0.62	0.18	0.50	0.53	0.13	0.00	0.41	0.04	0.00
Control Delay	20.0	29.0	0.9	22.8	21.1	10.7	16.0	3.9	10.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	29.0	0.9	22.8	21.1	10.7	16.0	3.9	10.5	14.0
Queue Length 50th (ft)	0	92	0	59	108	16	0	0	5	0
Queue Length 95th (ft)	4	125	2	95	163	45	4	58	18	6
Internal Link Dist (ft)		423			557		495			367
Turn Bay Length (ft)	160		310	420		135			255	
Base Capacity (vph)	200	915	530	845	1168	667	857	938	672	656
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.48	0.15	0.43	0.52	0.13	0.00	0.41	0.04	0.00

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖↗	↖↗		↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	1	404	75	338	561	0	77	1	358	22	1	2
Future Volume (veh/h)	1	404	75	338	561	0	77	1	358	22	1	2
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1	439	82	367	610	0	84	1	389	24	1	2
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	609	272	497	858	0	829	885	750	590	246	493
Arrive On Green	0.00	0.17	0.17	0.07	0.24	0.00	0.06	0.47	0.47	0.03	0.44	0.44
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	557	1113
Grp Volume(v), veh/h	1	439	82	367	610	0	84	1	389	24	0	3
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1670
Q Serve(g_s), s	0.0	8.2	2.5	2.1	11.0	0.0	1.7	0.0	7.4	0.5	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.2	2.5	2.1	11.0	0.0	1.7	0.0	7.4	0.5	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.67
Lane Grp Cap(c), veh/h	105	609	272	497	858	0	829	885	750	590	0	739
V/C Ratio(X)	0.01	0.72	0.30	0.74	0.71	0.00	0.10	0.00	0.52	0.04	0.00	0.00
Avail Cap(c_a), veh/h	230	919	410	670	1097	0	857	885	750	670	0	739
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.94	0.94	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	27.4	15.2	30.3	24.3	0.0	9.2	9.7	4.9	10.0	0.0	10.9
Incr Delay (d2), s/veh	0.0	1.6	0.6	2.7	1.5	0.0	0.1	0.0	2.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.3	1.1	2.9	4.4	0.0	0.6	0.0	3.6	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.8	29.0	15.9	33.1	25.8	0.0	9.2	9.7	7.5	10.0	0.0	10.9
LnGrp LOS	C	C	B	C	C	A	A	A	A	B	A	B
Approach Vol, veh/h		522			977			474				27
Approach Delay, s/veh		27.0			28.5			7.8				10.1
Approach LOS		C			C			A				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	37.6	9.5	16.5	8.5	35.5	4.6	21.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	20.4	8.5	18.1	5.1	20.3	5.0	21.6				
Max Q Clear Time (g_c+I1), s	2.5	9.4	4.1	10.2	3.7	2.1	2.0	13.0				
Green Ext Time (p_c), s	0.0	1.1	0.5	1.8	0.0	0.0	0.0	2.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			23.0									
HCM 6th LOS			C									

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



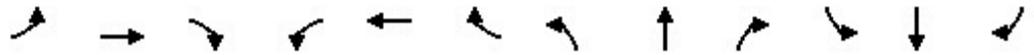
Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	380	498	618	721	335	251
v/c Ratio	0.21	0.62	0.79	0.35	0.66	0.41
Control Delay	25.4	6.5	33.5	12.2	35.2	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	6.5	33.5	12.2	35.2	8.0
Queue Length 50th (ft)	48	0	127	73	166	16
Queue Length 95th (ft)	69	78	240	98	260	74
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1805	803	839	2044	511	608
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.62	0.74	0.35	0.66	0.41

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	350	458	569	663	0	0	0	0	308	0	231
Future Volume (veh/h)	0	350	458	569	663	0	0	0	0	308	0	231
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	380	0	618	721	0				335	0	251
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1930		730	2053	0				515	0	458
Arrive On Green	0.00	0.30	0.00	0.07	0.19	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	380	0	618	721	0				335	0	251
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.0	0.0	15.9	15.8	0.0				14.8	0.0	12.0
Cycle Q Clear(g_c), s	0.0	4.0	0.0	15.9	15.8	0.0				14.8	0.0	12.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1930		730	2053	0				515	0	458
V/C Ratio(X)	0.00	0.20		0.85	0.35	0.00				0.65	0.00	0.55
Avail Cap(c_a), veh/h	0	1930		845	2053	0				515	0	458
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.85	0.00	0.93	0.93	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	23.4	0.0	40.4	21.8	0.0				28.0	0.0	27.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	6.7	0.4	0.0				6.3	0.0	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.0	7.9	7.5	0.0				6.7	0.0	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	23.6	0.0	47.1	22.2	0.0				34.3	0.0	31.7
LnGrp LOS	A	C		D	C	A				C	A	C
Approach Vol, veh/h		380	A		1339						586	
Approach Delay, s/veh		23.6			33.7						33.2	
Approach LOS		C			C						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.0	33.0		32.0		58.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	22.0	24.0		26.0		52.0						
Max Q Clear Time (g_c+I1), s	17.9	6.0		16.8		17.8						
Green Ext Time (p_c), s	1.0	2.2		1.7		5.2						

### Intersection Summary

HCM 6th Ctrl Delay	31.9
HCM 6th LOS	C

### Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	187	510	875	227	270	271	1087
v/c Ratio	0.62	0.24	0.30	0.27	0.63	0.63	0.69
Control Delay	42.1	18.5	15.7	3.0	37.3	37.3	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	18.5	15.7	3.0	37.3	37.3	2.4
Queue Length 50th (ft)	44	107	88	0	143	144	0
Queue Length 95th (ft)	m80	147	110	39	231	232	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	305	2162	2927	846	429	430	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.24	0.30	0.27	0.63	0.63	0.69

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  			 				
Traffic Volume (vph)	172	469	0	0	805	209	497	1	1000	0	0	0
Future Volume (vph)	172	469	0	0	805	209	497	1	1000	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	187	510	0	0	875	227	540	1	1087	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	187	510	0	0	875	104	270	271	1087	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	7.9	55.0			41.1	41.1	23.0	23.0	90.0			
Effective Green, g (s)	7.9	55.0			41.1	41.1	23.0	23.0	90.0			
Actuated g/C Ratio	0.09	0.61			0.46	0.46	0.26	0.26	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	301	2162			2926	722	429	430	1583			
v/s Ratio Prot	0.05	0.14			0.14							
v/s Ratio Perm						0.07	0.16	0.16	c0.69			
v/c Ratio	0.62	0.24			0.30	0.14	0.63	0.63	0.69			
Uniform Delay, d1	39.6	8.0			15.4	14.2	29.7	29.7	0.0			
Progression Factor	0.84	2.27			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	3.7	0.2			0.3	0.4	6.8	6.9	2.4			
Delay (s)	36.8	18.3			15.6	14.6	36.6	36.6	2.4			
Level of Service	D	B			B	B	D	D	A			
Approach Delay (s)		23.3			15.4			13.8			0.0	
Approach LOS		C			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			76.7%		ICU Level of Service				D			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	5.6			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	148	398	13	292
Demand Flow Rate, veh/h	151	406	13	298
Vehicles Circulating, veh/h	316	15	436	262
Vehicles Exiting, veh/h	244	434	31	159
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.1	5.3	4.2	6.3
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	151	406	13	298
Cap Entry Lane, veh/h	1000	1359	885	1056
Entry HV Adj Factor	0.982	0.981	0.992	0.979
Flow Entry, veh/h	148	398	13	292
Cap Entry, veh/h	981	1333	878	1034
V/C Ratio	0.151	0.299	0.015	0.282
Control Delay, s/veh	5.1	5.3	4.2	6.3
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	1

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↑↑		↔
Traffic Vol, veh/h	404	0	0	378	0	0
Future Vol, veh/h	404	0	0	378	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	439	0	0	411	0	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	-	-	-	439
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	0	617
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	617
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0	0			
HCM LOS				A		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	0	-	-	-		
HCM Lane LOS	A	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

# Queues

## 3: Terrazzo Drive & Baptist Road

09/07/2021

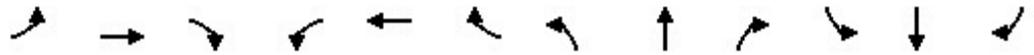


Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	454	46	208	385	24	1	211	36	5
v/c Ratio	0.61	0.10	0.32	0.31	0.03	0.00	0.25	0.05	0.01
Control Delay	28.4	0.4	18.1	16.6	10.0	16.0	3.1	10.0	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	0.4	18.1	16.6	10.0	16.0	3.1	10.0	14.6
Queue Length 50th (ft)	94	0	31	62	5	0	0	7	1
Queue Length 95th (ft)	126	0	46	83	17	4	35	23	8
Internal Link Dist (ft)	423			557		495			367
Turn Bay Length (ft)		310	420		135			255	
Base Capacity (vph)	985	559	652	1244	722	854	853	726	831
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.08	0.32	0.31	0.03	0.00	0.25	0.05	0.01

### Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	418	42	191	354	0	22	1	194	33	4	1
Future Volume (veh/h)	0	418	42	191	354	0	22	1	194	33	4	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	454	46	208	385	0	24	1	211	36	4	1
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	629	281	497	1107	0	799	860	729	704	677	169
Arrive On Green	0.00	0.18	0.18	0.07	0.31	0.00	0.03	0.46	0.46	0.04	0.47	0.47
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	1444	361
Grp Volume(v), veh/h	0	454	46	208	385	0	24	1	211	36	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1805
Q Serve(g_s), s	0.0	8.4	1.4	0.0	5.9	0.0	0.5	0.0	3.7	0.7	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.4	1.4	0.0	5.9	0.0	0.5	0.0	3.7	0.7	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	199	629	281	497	1107	0	799	860	729	704	0	847
V/C Ratio(X)	0.00	0.72	0.16	0.42	0.35	0.00	0.03	0.00	0.29	0.05	0.00	0.01
Avail Cap(c_a), veh/h	323	990	442	526	1107	0	891	860	729	780	0	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	1.00	1.00	0.99	0.99	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	27.2	16.1	30.0	18.6	0.0	9.4	10.2	4.7	9.1	0.0	9.9
Incr Delay (d2), s/veh	0.0	1.6	0.3	0.6	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	0.6	1.6	2.2	0.0	0.2	0.0	1.8	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	28.8	16.3	30.6	18.8	0.0	9.4	10.2	5.7	9.1	0.0	9.9
LnGrp LOS	A	C	B	C	B	A	A	B	A	A	A	A
Approach Vol, veh/h		500			593			236				41
Approach Delay, s/veh		27.6			22.9			6.1				9.2
Approach LOS		C			C			A				A
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	36.7	9.4	16.9	6.4	37.3	0.0	26.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	21.5	5.5	19.5	5.5	21.5	5.0	20.0				
Max Q Clear Time (g_c+I1), s	2.7	5.7	2.0	10.4	2.5	2.1	0.0	7.9				
Green Ext Time (p_c), s	0.0	0.6	0.2	2.0	0.0	0.0	0.0	1.8				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				21.3								
HCM 6th LOS				C								

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021

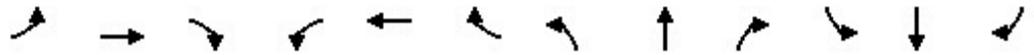


Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	299	423	817	430	153	177
v/c Ratio	0.16	0.56	0.79	0.19	0.41	0.25
Control Delay	25.4	6.3	35.9	4.9	34.6	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	6.3	35.9	4.9	34.6	0.9
Queue Length 50th (ft)	36	0	226	33	76	0
Queue Length 95th (ft)	59	77	297	50	134	0
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1848	757	1258	2320	373	704
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.56	0.65	0.19	0.41	0.25

Intersection Summary

HCM 6th Signalized Intersection Summary  
 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	275	389	752	396	0	0	0	0	141	0	163
Future Volume (veh/h)	0	275	389	752	396	0	0	0	0	141	0	163
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	299	0	817	430	0				153	0	177
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2072		922	2330	0				376	0	335
Arrive On Green	0.00	0.32	0.00	0.45	1.00	0.00				0.21	0.00	0.21
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	299	0	817	430	0				153	0	177
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	3.0	0.0	19.5	0.0	0.0				6.7	0.0	8.9
Cycle Q Clear(g_c), s	0.0	3.0	0.0	19.5	0.0	0.0				6.7	0.0	8.9
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2072		922	2330	0				376	0	335
V/C Ratio(X)	0.00	0.14		0.89	0.18	0.00				0.41	0.00	0.53
Avail Cap(c_a), veh/h	0	2072		1267	2330	0				376	0	335
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.88	0.00	0.95	0.95	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	21.7	0.0	23.7	0.0	0.0				30.6	0.0	31.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	5.7	0.2	0.0				3.2	0.0	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	0.0	6.4	0.1	0.0				3.0	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	21.8	0.0	29.4	0.2	0.0				33.9	0.0	37.4
LnGrp LOS	A	C		C	A	A				C	A	D
Approach Vol, veh/h		299	A		1247						330	
Approach Delay, s/veh		21.8			19.3						35.8	
Approach LOS		C			B						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	30.0	35.0		25.0		65.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	33.0	20.0		19.0		59.0						
Max Q Clear Time (g_c+I1), s	21.5	5.0		10.9		2.0						
Green Ext Time (p_c), s	2.5	1.5		0.9		2.9						

Intersection Summary

HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	184	267	1025	358	154	155	397
v/c Ratio	0.56	0.11	0.32	0.37	0.46	0.46	0.25
Control Delay	64.2	1.5	13.6	2.6	36.8	36.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.2	1.5	13.6	2.6	36.8	36.9	0.4
Queue Length 50th (ft)	59	3	96	0	82	82	0
Queue Length 95th (ft)	94	10	118	42	145	146	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	343	2359	3228	975	336	337	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.11	0.32	0.37	0.46	0.46	0.25

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖↖			↑↑↑	↖	↖	↖	↖			
Traffic Volume (vph)	169	246	0	0	943	329	283	1	365	0	0	0
Future Volume (vph)	169	246	0	0	943	329	283	1	365	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	184	267	0	0	1025	358	308	1	397	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	184	0	0	0	0	0	0
Lane Group Flow (vph)	184	267	0	0	1025	174	154	155	397	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	10.2	60.0			43.8	43.8	18.0	18.0	90.0			
Effective Green, g (s)	10.2	60.0			43.8	43.8	18.0	18.0	90.0			
Actuated g/C Ratio	0.11	0.67			0.49	0.49	0.20	0.20	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	389	2359			3118	770	336	337	1583			
v/s Ratio Prot	c0.05	0.08			c0.16							
v/s Ratio Perm						0.11	0.09	0.09	0.25			
v/c Ratio	0.47	0.11			0.33	0.23	0.46	0.46	0.25			
Uniform Delay, d1	37.4	5.4			14.1	13.3	31.7	31.7	0.0			
Progression Factor	1.15	1.31			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.9	0.1			0.3	0.7	4.5	4.5	0.4			
Delay (s)	43.9	7.2			14.4	14.0	36.2	36.2	0.4			
Level of Service	D	A			B	B	D	D	A			
Approach Delay (s)		22.2			14.3			16.0			0.0	
Approach LOS		C			B			B			A	

### Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	7.0			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	184	601	23	317
Demand Flow Rate, veh/h	187	613	23	323
Vehicles Circulating, veh/h	315	25	488	378
Vehicles Exiting, veh/h	386	486	14	260
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.4	7.3	4.6	7.7
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	187	613	23	323
Cap Entry Lane, veh/h	1001	1345	839	938
Entry HV Adj Factor	0.982	0.980	0.994	0.981
Flow Entry, veh/h	184	601	23	317
Cap Entry, veh/h	983	1318	834	921
V/C Ratio	0.187	0.456	0.027	0.344
Control Delay, s/veh	5.4	7.3	4.6	7.7
LOS	A	A	A	A
95th %tile Queue, veh	1	2	0	2

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	451	0	0	664	0	0
Future Vol, veh/h	451	0	0	664	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	490	0	0	722	0	0

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	0	0	-	490
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	3.319
Pot Cap-1 Maneuver	-	0	0	577
Stage 1	-	0	0	-
Stage 2	-	0	0	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	577
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

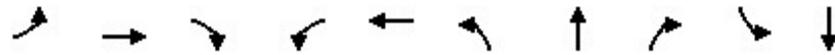
Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Queues

3: Terrazzo Drive & Baptist Road

09/07/2021



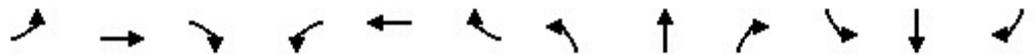
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1	453	82	367	634	84	1	389	24	3
v/c Ratio	0.00	0.62	0.18	0.50	0.54	0.13	0.00	0.42	0.04	0.00
Control Delay	20.0	28.7	0.9	22.5	21.0	10.9	16.0	3.9	10.6	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	28.7	0.9	22.5	21.0	10.9	16.0	3.9	10.6	14.0
Queue Length 50th (ft)	0	93	0	57	110	17	0	0	5	0
Queue Length 95th (ft)	4	129	2	95	170	45	4	58	18	6
Internal Link Dist (ft)		423			557		495			367
Turn Bay Length (ft)	160		310	420		135			255	
Base Capacity (vph)	201	915	530	850	1186	659	846	931	664	647
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.50	0.15	0.43	0.53	0.13	0.00	0.42	0.04	0.00

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	1	417	75	338	583	0	77	1	358	22	1	2
Future Volume (veh/h)	1	417	75	338	583	0	77	1	358	22	1	2
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1	453	82	367	634	0	84	1	389	24	1	2
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	623	278	497	872	0	824	878	744	586	244	488
Arrive On Green	0.00	0.18	0.18	0.07	0.25	0.00	0.06	0.47	0.47	0.03	0.44	0.44
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	557	1113
Grp Volume(v), veh/h	1	453	82	367	634	0	84	1	389	24	0	3
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1670
Q Serve(g_s), s	0.0	8.4	2.4	2.1	11.5	0.0	1.7	0.0	7.5	0.5	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.4	2.4	2.1	11.5	0.0	1.7	0.0	7.5	0.5	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.67
Lane Grp Cap(c), veh/h	105	623	278	497	872	0	824	878	744	586	0	732
V/C Ratio(X)	0.01	0.73	0.29	0.74	0.73	0.00	0.10	0.00	0.52	0.04	0.00	0.00
Avail Cap(c_a), veh/h	230	919	410	670	1097	0	851	878	744	666	0	732
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.94	0.94	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.6	27.3	15.0	30.3	24.3	0.0	9.3	9.9	5.1	10.1	0.0	11.1
Incr Delay (d2), s/veh	0.0	1.6	0.6	2.7	1.7	0.0	0.1	0.0	2.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	1.1	2.9	4.6	0.0	0.6	0.0	3.6	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	28.9	15.6	33.1	26.0	0.0	9.4	9.9	7.7	10.2	0.0	11.1
LnGrp LOS	C	C	B	C	C	A	A	A	A	B	A	B
Approach Vol, veh/h		536			1001			474				27
Approach Delay, s/veh		26.9			28.6			8.0				10.3
Approach LOS		C			C			A				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	37.4	9.5	16.8	8.5	35.2	4.6	21.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	20.4	8.5	18.1	5.1	20.3	5.0	21.6				
Max Q Clear Time (g_c+I1), s	2.5	9.5	4.1	10.4	3.7	2.1	2.0	13.5				
Green Ext Time (p_c), s	0.0	1.1	0.5	1.8	0.0	0.0	0.0	2.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				23.1								
HCM 6th LOS				C								

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	390	512	650	748	352	259
v/c Ratio	0.22	0.63	0.81	0.37	0.69	0.43
Control Delay	25.7	6.6	34.5	12.3	36.6	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	6.6	34.5	12.3	36.6	9.4
Queue Length 50th (ft)	50	0	154	76	177	25
Queue Length 95th (ft)	70	79	252	101	275	86
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1779	809	839	2044	511	599
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.63	0.77	0.37	0.69	0.43
<b>Intersection Summary</b>						

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	359	471	598	688	0	0	0	0	324	0	238
Future Volume (veh/h)	0	359	471	598	688	0	0	0	0	324	0	238
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	390	0	650	748	0				352	0	259
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1886		753	2053	0				515	0	458
Arrive On Green	0.00	0.29	0.00	0.07	0.19	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	390	0	650	748	0				352	0	259
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.1	0.0	16.8	16.5	0.0				15.8	0.0	12.5
Cycle Q Clear(g_c), s	0.0	4.1	0.0	16.8	16.5	0.0				15.8	0.0	12.5
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1886		753	2053	0				515	0	458
V/C Ratio(X)	0.00	0.21		0.86	0.36	0.00				0.68	0.00	0.57
Avail Cap(c_a), veh/h	0	1886		845	2053	0				515	0	458
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.85	0.00	0.93	0.93	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	23.9	0.0	40.4	22.0	0.0				28.4	0.0	27.2
Incr Delay (d2), s/veh	0.0	0.2	0.0	7.9	0.5	0.0				7.2	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.0	8.5	7.8	0.0				7.3	0.0	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	24.1	0.0	48.4	22.5	0.0				35.6	0.0	32.2
LnGrp LOS	A	C		D	C	A				D	A	C
Approach Vol, veh/h		390	A		1398						611	
Approach Delay, s/veh		24.1			34.5						34.1	
Approach LOS		C			C						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.6	32.4		32.0		58.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	22.0	24.0		26.0		52.0						
Max Q Clear Time (g_c+I1), s	18.8	6.1		17.8		18.5						
Green Ext Time (p_c), s	0.9	2.2		1.7		5.5						

### Intersection Summary

HCM 6th Ctrl Delay	32.7
HCM 6th LOS	C

### Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	190	534	917	239	278	280	1142
v/c Ratio	0.63	0.25	0.31	0.28	0.65	0.65	0.72
Control Delay	43.0	18.3	15.9	3.0	38.0	38.1	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	18.3	15.9	3.0	38.0	38.1	2.9
Queue Length 50th (ft)	45	113	92	0	148	149	0
Queue Length 95th (ft)	m80	152	116	39	238	241	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	305	2162	2927	853	429	430	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.25	0.31	0.28	0.65	0.65	0.72

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	 	 			  								
Traffic Volume (vph)	175	491	0	0	844	220	512	1	1051	0	0	0	
Future Volume (vph)	175	491	0	0	844	220	512	1	1051	0	0	0	
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	4.0				
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00				
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85				
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583				
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00				
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583				
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)	190	534	0	0	917	239	557	1	1142	0	0	0	
RTOR Reduction (vph)	0	0	0	0	0	130	0	0	0	0	0	0	
Lane Group Flow (vph)	190	534	0	0	917	109	278	280	1142	0	0	0	
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free				
Protected Phases	5	2			6			8					
Permitted Phases						6	8		Free				
Actuated Green, G (s)	7.9	55.0			41.1	41.1	23.0	23.0	90.0				
Effective Green, g (s)	7.9	55.0			41.1	41.1	23.0	23.0	90.0				
Actuated g/C Ratio	0.09	0.61			0.46	0.46	0.26	0.26	1.00				
Clearance Time (s)	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					
Lane Grp Cap (vph)	301	2162			2926	722	429	430	1583				
v/s Ratio Prot	0.06	0.15			0.14								
v/s Ratio Perm						0.07	0.17	0.17	c0.72				
v/c Ratio	0.63	0.25			0.31	0.15	0.65	0.65	0.72				
Uniform Delay, d1	39.6	8.0			15.5	14.3	29.9	29.9	0.0				
Progression Factor	0.85	2.23			1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	3.9	0.2			0.3	0.4	7.4	7.5	2.9				
Delay (s)	37.7	18.1			15.8	14.7	37.3	37.4	2.9				
Level of Service	D	B			B	B	D	D	A				
Approach Delay (s)		23.2			15.6			14.2			0.0		
Approach LOS		C			B			B			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			16.5		HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.90										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0				
Intersection Capacity Utilization			79.2%		ICU Level of Service				D				
Analysis Period (min)			15										

c Critical Lane Group

## **APPENDIX F – Future (with site development) Synchro Outputs**

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	5.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	150	425	13	316
Demand Flow Rate, veh/h	153	433	13	322
Vehicles Circulating, veh/h	340	15	462	265
Vehicles Exiting, veh/h	247	460	31	183
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.2	5.5	4.4	6.5
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	153	433	13	322
Cap Entry Lane, veh/h	976	1359	861	1053
Entry HV Adj Factor	0.982	0.982	0.992	0.981
Flow Entry, veh/h	150	425	13	316
Cap Entry, veh/h	958	1335	855	1033
V/C Ratio	0.157	0.319	0.015	0.306
Control Delay, s/veh	5.2	5.5	4.4	6.5
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	1

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	269	152	0	396	0	158
Future Vol, veh/h	269	152	0	396	0	158
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	292	165	0	430	0	172

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	375
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	670
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	670
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	670	-	-	-
HCM Lane V/C Ratio	0.256	-	-	-
HCM Control Delay (s)	12.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	1	-	-	-

Queues

3: Terrazzo Drive & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	477	46	470	239	189	1	302	36	5
v/c Ratio	0.64	0.10	0.74	0.19	0.29	0.00	0.34	0.06	0.01
Control Delay	29.2	0.4	29.7	15.4	11.4	16.0	3.9	10.2	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	0.4	29.7	15.4	11.4	16.0	3.9	10.2	16.8
Queue Length 50th (ft)	99	0	76	36	41	0	0	7	1
Queue Length 95th (ft)	136	0	102	54	85	4	52	22	8
Internal Link Dist (ft)	423			557		495			367
Turn Bay Length (ft)		310	420		135			255	
Base Capacity (vph)	910	528	779	1260	661	841	880	630	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.09	0.60	0.19	0.29	0.00	0.34	0.06	0.01

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘↗	↑↑		↘	↑	↗	↘	↗	↗
Traffic Volume (veh/h)	0	439	42	432	220	0	174	1	278	33	4	1
Future Volume (veh/h)	0	439	42	432	220	0	174	1	278	33	4	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	477	46	470	239	0	189	1	302	36	4	1
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	257	642	287	574	1206	0	790	808	685	586	562	141
Arrive On Green	0.00	0.18	0.18	0.09	0.34	0.00	0.08	0.43	0.43	0.04	0.39	0.39
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	1444	361
Grp Volume(v), veh/h	0	477	46	470	239	0	189	1	302	36	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1805
Q Serve(g_s), s	0.0	8.9	1.3	4.1	3.3	0.0	4.4	0.0	5.7	0.8	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.9	1.3	4.1	3.3	0.0	4.4	0.0	5.7	0.8	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	257	642	287	574	1206	0	790	808	685	586	0	703
V/C Ratio(X)	0.00	0.74	0.16	0.82	0.20	0.00	0.24	0.00	0.44	0.06	0.00	0.01
Avail Cap(c_a), veh/h	382	914	408	668	1206	0	790	808	685	649	0	703
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.98	0.98	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	27.1	13.5	29.4	16.4	0.0	10.8	11.3	5.2	11.8	0.0	13.1
Incr Delay (d2), s/veh	0.0	2.0	0.3	6.8	0.1	0.0	0.2	0.0	2.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	0.6	4.0	1.2	0.0	1.6	0.0	3.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	29.1	13.8	36.2	16.5	0.0	11.0	11.3	7.2	11.8	0.0	13.1
LnGrp LOS	A	C	B	D	B	A	B	B	A	B	A	B
Approach Vol, veh/h		523			709			492				41
Approach Delay, s/veh		27.8			29.6			8.7				12.0
Approach LOS		C			C			A				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	34.7	11.1	17.2	10.0	31.7	0.0	28.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	20.5	8.5	18.0	5.5	20.0	5.0	21.5				
Max Q Clear Time (g_c+I1), s	2.8	7.7	6.1	10.9	6.4	2.1	0.0	5.3				
Green Ext Time (p_c), s	0.0	0.9	0.4	1.8	0.0	0.0	0.0	1.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				22.8								
HCM 6th LOS				C								

# Queues

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	362	464	777	486	146	228
v/c Ratio	0.22	0.62	0.88	0.24	0.29	0.32
Control Delay	27.3	7.0	36.6	8.9	26.7	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	7.0	36.6	8.9	26.7	1.2
Queue Length 50th (ft)	47	0	113	42	64	0
Queue Length 95th (ft)	68	78	#314	55	114	0
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1629	748	915	2044	511	719
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.62	0.85	0.24	0.29	0.32

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	333	427	715	447	0	0	0	0	134	0	210
Future Volume (veh/h)	0	333	427	715	447	0	0	0	0	134	0	210
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	362	0	777	486	0				146	0	228
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1664		873	2053	0				515	0	458
Arrive On Green	0.00	0.26	0.00	0.08	0.19	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	362	0	777	486	0				146	0	228
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.0	0.0	20.0	10.4	0.0				5.7	0.0	10.8
Cycle Q Clear(g_c), s	0.0	4.0	0.0	20.0	10.4	0.0				5.7	0.0	10.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1664		873	2053	0				515	0	458
V/C Ratio(X)	0.00	0.22		0.89	0.24	0.00				0.28	0.00	0.50
Avail Cap(c_a), veh/h	0	1664		922	2053	0				515	0	458
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.85	0.00	0.95	0.95	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	26.2	0.0	40.0	19.6	0.0				24.8	0.0	26.6
Incr Delay (d2), s/veh	0.0	0.3	0.0	10.0	0.3	0.0				1.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	0.0	10.4	4.6	0.0				2.5	0.0	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	26.5	0.0	50.0	19.9	0.0				26.2	0.0	30.4
LnGrp LOS	A	C		D	B	A				C	A	C
Approach Vol, veh/h		362	A		1263						374	
Approach Delay, s/veh		26.5			38.4						28.8	
Approach LOS		C			D						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	28.7	29.3		32.0		58.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	24.0	22.0		26.0		52.0						
Max Q Clear Time (g_c+I1), s	22.0	6.0		12.8		12.4						
Green Ext Time (p_c), s	0.7	2.0		1.4		3.3						

### Intersection Summary

HCM 6th Ctrl Delay	34.4
HCM 6th LOS	C

### Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	234	272	993	340	177	179	377
v/c Ratio	0.60	0.12	0.32	0.36	0.53	0.53	0.24
Control Delay	30.3	18.7	14.5	2.8	38.7	38.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	18.7	14.5	2.8	38.7	38.8	0.4
Queue Length 50th (ft)	57	63	97	0	95	96	0
Queue Length 95th (ft)	92	101	121	43	165	166	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	419	2359	3114	943	336	337	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.12	0.32	0.36	0.53	0.53	0.24

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
 5: NB off-ramp/NB on-ramp & Baptist Road

09/03/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  							
Traffic Volume (vph)	215	250	0	0	914	313	327	1	347	0	0	0
Future Volume (vph)	215	250	0	0	914	313	327	1	347	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	234	272	0	0	993	340	355	1	377	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	175	0	0	0	0	0	0
Lane Group Flow (vph)	234	272	0	0	993	165	177	179	377	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	10.3	60.0			43.7	43.7	18.0	18.0	90.0			
Effective Green, g (s)	10.3	60.0			43.7	43.7	18.0	18.0	90.0			
Actuated g/C Ratio	0.11	0.67			0.49	0.49	0.20	0.20	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	392	2359			3111	768	336	337	1583			
v/s Ratio Prot	c0.07	0.08			c0.15							
v/s Ratio Perm						0.10	0.11	0.11	0.24			
v/c Ratio	0.60	0.12			0.32	0.21	0.53	0.53	0.24			
Uniform Delay, d1	37.9	5.4			14.1	13.3	32.2	32.2	0.0			
Progression Factor	0.78	2.58			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	2.4	0.1			0.3	0.6	5.8	5.9	0.4			
Delay (s)	31.8	14.1			14.4	13.9	38.0	38.1	0.4			
Level of Service	C	B			B	B	D	D	A			
Approach Delay (s)		22.3			14.3			18.7			0.0	
Approach LOS		C			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			17.1		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			73.8%		ICU Level of Service				D			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	7.3			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	187	625	23	340
Demand Flow Rate, veh/h	190	637	23	346
Vehicles Circulating, veh/h	338	25	514	379
Vehicles Exiting, veh/h	387	512	14	283
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.6	7.5	4.7	8.0
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	190	637	23	346
Cap Entry Lane, veh/h	978	1345	817	937
Entry HV Adj Factor	0.982	0.981	0.994	0.982
Flow Entry, veh/h	187	625	23	340
Cap Entry, veh/h	960	1319	812	921
V/C Ratio	0.194	0.474	0.028	0.369
Control Delay, s/veh	5.6	7.5	4.7	8.0
LOS	A	A	A	A
95th %tile Queue, veh	1	3	0	2

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑		↑
Traffic Vol, veh/h	348	118	0	669	0	128
Future Vol, veh/h	348	118	0	669	0	128
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	378	128	0	727	0	139

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	442
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	615
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	615
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

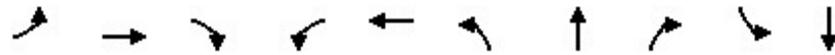
Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	615	-	-	-
HCM Lane V/C Ratio	0.226	-	-	-
HCM Control Delay (s)	12.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.9	-	-	-

Queues

3: Terrazzo Drive & Baptist Road

09/07/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1	480	82	393	512	212	1	470	24	3
v/c Ratio	0.00	0.64	0.18	0.55	0.43	0.33	0.00	0.48	0.04	0.01
Control Delay	20.0	28.9	0.9	23.5	19.6	12.6	16.0	4.0	10.6	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	28.9	0.9	23.5	19.6	12.6	16.0	4.0	10.6	14.3
Queue Length 50th (ft)	0	98	0	61	84	48	0	0	5	0
Queue Length 95th (ft)	4	137	2	105	138	99	4	61	18	6
Internal Link Dist (ft)		423			557		495			367
Turn Bay Length (ft)	160		310	420		135			255	
Base Capacity (vph)	201	910	528	799	1182	639	842	973	608	553
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.53	0.16	0.49	0.43	0.33	0.00	0.48	0.04	0.01

Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	442	75	362	471	0	195	1	432	22	1	2
Future Volume (veh/h)	1	442	75	362	471	0	195	1	432	22	1	2
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1	480	82	393	512	0	212	1	470	24	1	2
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	649	290	499	901	0	823	863	731	520	223	446
Arrive On Green	0.00	0.18	0.18	0.07	0.25	0.00	0.09	0.46	0.46	0.03	0.40	0.40
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	557	1113
Grp Volume(v), veh/h	1	480	82	393	512	0	212	1	470	24	0	3
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1670
Q Serve(g_s), s	0.0	8.9	2.3	2.6	8.8	0.0	4.6	0.0	10.0	0.5	0.0	0.1
Cycle Q Clear(g_c), s	0.0	8.9	2.3	2.6	8.8	0.0	4.6	0.0	10.0	0.5	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.67
Lane Grp Cap(c), veh/h	105	649	290	499	901	0	823	863	731	520	0	669
V/C Ratio(X)	0.01	0.74	0.28	0.79	0.57	0.00	0.26	0.00	0.64	0.05	0.00	0.00
Avail Cap(c_a), veh/h	230	914	408	620	1041	0	823	863	731	600	0	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.93	0.93	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.2	27.0	13.4	30.4	22.8	0.0	9.5	10.2	5.7	11.6	0.0	12.6
Incr Delay (d2), s/veh	0.0	2.0	0.5	5.1	0.5	0.0	0.2	0.0	4.3	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.7	1.1	3.3	3.4	0.0	1.7	0.0	4.9	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.3	29.0	13.9	35.5	23.3	0.0	9.6	10.2	10.0	11.7	0.0	12.6
LnGrp LOS	C	C	B	D	C	A	A	B	A	B	A	B
Approach Vol, veh/h		563			905			683				27
Approach Delay, s/veh		26.8			28.6			9.9				11.8
Approach LOS		C			C			A				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	36.8	9.6	17.3	10.6	32.6	4.6	22.2				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	21.5	7.5	18.0	6.1	20.4	5.0	20.5				
Max Q Clear Time (g_c+I1), s	2.5	12.0	4.6	10.9	6.6	2.1	2.0	10.8				
Green Ext Time (p_c), s	0.0	1.3	0.4	1.9	0.0	0.0	0.0	2.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				22.1								
HCM 6th LOS				C								

Queues

4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	449	551	618	790	335	305
v/c Ratio	0.24	0.64	0.80	0.38	0.68	0.53
Control Delay	24.5	6.3	35.2	11.5	37.2	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	6.3	35.2	11.5	37.2	14.4
Queue Length 50th (ft)	56	0	173	73	169	52
Queue Length 95th (ft)	77	80	242	198	265	131
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1905	858	801	2084	491	575
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.64	0.77	0.38	0.68	0.53
<b>Intersection Summary</b>						

HCM 6th Signalized Intersection Summary  
 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	413	507	569	727	0	0	0	0	308	0	281
Future Volume (veh/h)	0	413	507	569	727	0	0	0	0	308	0	281
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	449	0	618	790	0				335	0	305
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2002		730	2093	0				495	0	440
Arrive On Green	0.00	0.31	0.00	0.07	0.19	0.00				0.28	0.00	0.28
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	449	0	618	790	0				335	0	305
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.7	0.0	15.9	17.4	0.0				15.1	0.0	15.5
Cycle Q Clear(g_c), s	0.0	4.7	0.0	15.9	17.4	0.0				15.1	0.0	15.5
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2002		730	2093	0				495	0	440
V/C Ratio(X)	0.00	0.22		0.85	0.38	0.00				0.68	0.00	0.69
Avail Cap(c_a), veh/h	0	2002		806	2093	0				495	0	440
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.82	0.00	0.92	0.92	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	23.0	0.0	40.4	21.9	0.0				28.9	0.0	29.1
Incr Delay (d2), s/veh	0.0	0.2	0.0	7.2	0.5	0.0				7.3	0.0	8.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.7	0.0	8.0	8.3	0.0				7.0	0.0	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	23.2	0.0	47.6	22.4	0.0				36.2	0.0	37.7
LnGrp LOS	A	C		D	C	A				D	A	D
Approach Vol, veh/h		449	A		1408						640	
Approach Delay, s/veh		23.2			33.5						36.9	
Approach LOS		C			C						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.0	34.0		31.0		59.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	21.0	26.0		25.0		53.0						
Max Q Clear Time (g_c+I1), s	17.9	6.7		17.5		19.4						
Green Ext Time (p_c), s	0.8	2.7		1.8		5.8						

Intersection Summary

HCM 6th Ctrl Delay	32.5
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	240	525	890	227	297	299	1087
v/c Ratio	0.71	0.24	0.30	0.27	0.72	0.73	0.69
Control Delay	46.3	18.0	15.8	3.0	42.9	42.9	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	18.0	15.8	3.0	42.9	42.9	2.4
Queue Length 50th (ft)	62	101	89	0	163	165	0
Queue Length 95th (ft)	m#112	145	112	39	#280	#283	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	343	2202	2926	846	410	412	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.24	0.30	0.27	0.72	0.73	0.69

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/03/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  							
Traffic Volume (vph)	221	483	0	0	819	209	547	1	1000	0	0	0
Future Volume (vph)	221	483	0	0	819	209	547	1	1000	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	240	525	0	0	890	227	595	1	1087	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	240	525	0	0	890	104	297	299	1087	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	8.9	56.0			41.1	41.1	22.0	22.0	90.0			
Effective Green, g (s)	8.9	56.0			41.1	41.1	22.0	22.0	90.0			
Actuated g/C Ratio	0.10	0.62			0.46	0.46	0.24	0.24	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	339	2202			2926	722	410	412	1583			
v/s Ratio Prot	0.07	0.15			0.14							
v/s Ratio Perm						0.07	0.18	0.18	c0.69			
v/c Ratio	0.71	0.24			0.30	0.14	0.72	0.73	0.69			
Uniform Delay, d1	39.3	7.5			15.4	14.2	31.2	31.2	0.0			
Progression Factor	0.88	2.33			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	6.1	0.2			0.3	0.4	10.6	10.6	2.4			
Delay (s)	40.9	17.8			15.7	14.6	41.8	41.9	2.4			
Level of Service	D	B			B	B	D	D	A			
Approach Delay (s)		25.0			15.5			16.4			0.0	
Approach LOS		C			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.0		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			80.0%		ICU Level of Service				D			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	5.9			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	158	438	13	323
Demand Flow Rate, veh/h	161	446	13	329
Vehicles Circulating, veh/h	347	15	477	272
Vehicles Exiting, veh/h	254	475	31	189
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.4	5.6	4.4	6.7
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	161	446	13	329
Cap Entry Lane, veh/h	969	1359	848	1046
Entry HV Adj Factor	0.982	0.982	0.992	0.981
Flow Entry, veh/h	158	438	13	323
Cap Entry, veh/h	951	1335	842	1026
V/C Ratio	0.166	0.328	0.015	0.315
Control Delay, s/veh	5.4	5.6	4.4	6.7
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	1

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	2.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷		↷
Traffic Vol, veh/h	264	177	0	415	0	186
Future Vol, veh/h	264	177	0	415	0	186
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	287	192	0	451	0	202

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	383
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	664
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	664
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	664	-	-	-
HCM Lane V/C Ratio	0.304	-	-	-
HCM Control Delay (s)	12.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	1.3	-	-	-

# Queues

## 3: Terrazzo Drive & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	504	46	522	233	215	1	321	36	5
v/c Ratio	0.66	0.10	0.80	0.18	0.34	0.00	0.36	0.06	0.01
Control Delay	29.0	0.4	32.9	14.6	13.1	17.0	4.0	10.9	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	0.4	32.9	14.6	13.1	17.0	4.0	10.9	16.8
Queue Length 50th (ft)	103	0	84	34	49	0	0	7	1
Queue Length 95th (ft)	144	0	107	51	102	4	53	24	8
Internal Link Dist (ft)	423			557		495			367
Turn Bay Length (ft)		310	420		135			255	
Base Capacity (vph)	910	528	772	1304	639	826	880	604	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.09	0.68	0.18	0.34	0.00	0.36	0.06	0.01

### Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	464	42	480	214	0	198	1	295	33	4	1
Future Volume (veh/h)	0	464	42	480	214	0	198	1	295	33	4	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	504	46	522	233	0	215	1	321	36	4	1
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	270	669	298	618	1278	0	761	770	652	557	533	133
Arrive On Green	0.00	0.19	0.19	0.11	0.36	0.00	0.08	0.41	0.41	0.04	0.37	0.37
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	1444	361
Grp Volume(v), veh/h	0	504	46	522	233	0	215	1	321	36	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1805
Q Serve(g_s), s	0.0	9.4	1.3	5.2	3.1	0.0	5.2	0.0	6.3	0.9	0.0	0.1
Cycle Q Clear(g_c), s	0.0	9.4	1.3	5.2	3.1	0.0	5.2	0.0	6.3	0.9	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	270	669	298	618	1278	0	761	770	652	557	0	666
V/C Ratio(X)	0.00	0.75	0.15	0.84	0.18	0.00	0.28	0.00	0.49	0.06	0.00	0.01
Avail Cap(c_a), veh/h	394	914	408	668	1278	0	761	770	652	620	0	666
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	1.00	1.00	0.98	0.98	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	26.9	13.2	28.9	15.4	0.0	11.9	12.1	5.5	12.7	0.0	14.0
Incr Delay (d2), s/veh	0.0	2.4	0.2	9.0	0.1	0.0	0.2	0.0	2.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.9	0.6	4.7	1.1	0.0	2.0	0.0	3.4	0.3	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	29.3	13.4	37.9	15.4	0.0	12.1	12.1	8.1	12.7	0.0	14.0
LnGrp LOS	A	C	B	D	B	A	B	B	A	B	A	B
Approach Vol, veh/h		550			755			537				41
Approach Delay, s/veh		27.9			31.0			9.7				12.9
Approach LOS		C			C			A				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	33.3	12.0	17.7	10.0	30.3	0.0	29.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	20.5	8.5	18.0	5.5	20.0	5.0	21.5				
Max Q Clear Time (g_c+I1), s	2.9	8.3	7.2	11.4	7.2	2.1	0.0	5.1				
Green Ext Time (p_c), s	0.0	0.9	0.3	1.8	0.0	0.0	0.0	1.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				23.6								
HCM 6th LOS				C								

# Queues

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	389	492	817	522	153	248
v/c Ratio	0.24	0.64	0.91	0.26	0.30	0.36
Control Delay	27.6	7.2	39.5	9.0	26.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	7.2	39.5	9.0	26.9	2.1
Queue Length 50th (ft)	51	0	240	45	67	0
Queue Length 95th (ft)	72	82	#341	60	120	14
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1602	764	915	2044	511	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.64	0.89	0.26	0.30	0.36

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM 6th Signalized Intersection Summary

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	358	453	752	480	0	0	0	0	141	0	228
Future Volume (veh/h)	0	358	453	752	480	0	0	0	0	141	0	228
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	389	0	817	522	0				153	0	248
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1612		901	2053	0				515	0	458
Arrive On Green	0.00	0.25	0.00	0.09	0.19	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	389	0	817	522	0				153	0	248
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.3	0.0	21.1	11.2	0.0				6.0	0.0	11.9
Cycle Q Clear(g_c), s	0.0	4.3	0.0	21.1	11.2	0.0				6.0	0.0	11.9
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1612		901	2053	0				515	0	458
V/C Ratio(X)	0.00	0.24		0.91	0.25	0.00				0.30	0.00	0.54
Avail Cap(c_a), veh/h	0	1612		922	2053	0				515	0	458
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.84	0.00	0.94	0.94	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	26.9	0.0	40.1	19.9	0.0				24.9	0.0	27.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	11.8	0.3	0.0				1.5	0.0	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.6	0.0	11.1	5.1	0.0				2.6	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	27.2	0.0	51.8	20.2	0.0				26.4	0.0	31.5
LnGrp LOS	A	C		D	C	A				C	A	C
Approach Vol, veh/h		389	A		1339						401	
Approach Delay, s/veh		27.2			39.5						29.6	
Approach LOS		C			D						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	29.5	28.5		32.0		58.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	24.0	22.0		26.0		52.0						
Max Q Clear Time (g_c+I1), s	23.1	6.3		13.9		13.2						
Green Ext Time (p_c), s	0.4	2.1		1.5		3.6						

### Intersection Summary

HCM 6th Ctrl Delay	35.4
HCM 6th LOS	D

### Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	253	288	1046	358	189	190	397
v/c Ratio	0.64	0.12	0.34	0.38	0.56	0.56	0.25
Control Delay	31.3	19.6	14.8	2.8	39.9	39.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.3	19.6	14.8	2.8	39.9	39.9	0.4
Queue Length 50th (ft)	62	68	103	0	103	103	0
Queue Length 95th (ft)	100	108	127	44	175	175	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	419	2359	3102	951	336	337	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.12	0.34	0.38	0.56	0.56	0.25

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/03/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  							
Traffic Volume (vph)	233	265	0	0	962	329	348	1	365	0	0	0
Future Volume (vph)	233	265	0	0	962	329	348	1	365	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	253	288	0	0	1046	358	378	1	397	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	185	0	0	0	0	0	0
Lane Group Flow (vph)	253	288	0	0	1046	173	189	190	397	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	10.4	60.0			43.6	43.6	18.0	18.0	90.0			
Effective Green, g (s)	10.4	60.0			43.6	43.6	18.0	18.0	90.0			
Actuated g/C Ratio	0.12	0.67			0.48	0.48	0.20	0.20	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	396	2359			3104	766	336	337	1583			
v/s Ratio Prot	c0.07	0.08			c0.16							
v/s Ratio Perm						0.11	0.11	0.11	0.25			
v/c Ratio	0.64	0.12			0.34	0.23	0.56	0.56	0.25			
Uniform Delay, d1	38.0	5.4			14.3	13.4	32.5	32.5	0.0			
Progression Factor	0.78	2.59			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	3.3	0.1			0.3	0.7	6.7	6.7	0.4			
Delay (s)	32.8	14.2			14.6	14.1	39.1	39.1	0.4			
Level of Service	C	B			B	B	D	D	A			
Approach Delay (s)		22.9			14.5			19.3			0.0	
Approach LOS		C			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			17.5		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			77.5%		ICU Level of Service				D			
Analysis Period (min)			15									

c Critical Lane Group

HCM 6th Roundabout  
 1: Woodcarver Road/Old Denver Road & Baptist Road

09/07/2021

Intersection				
Intersection Delay, s/veh	7.4			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	193	636	23	344
Demand Flow Rate, veh/h	197	648	23	350
Vehicles Circulating, veh/h	342	25	525	386
Vehicles Exiting, veh/h	394	523	14	287
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.7	7.6	4.8	8.2
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	197	648	23	350
Cap Entry Lane, veh/h	974	1345	808	931
Entry HV Adj Factor	0.982	0.981	0.994	0.983
Flow Entry, veh/h	193	636	23	344
Cap Entry, veh/h	956	1320	803	915
V/C Ratio	0.202	0.482	0.028	0.376
Control Delay, s/veh	5.7	7.6	4.8	8.2
LOS	A	A	A	A
95th %tile Queue, veh	1	3	0	2

HCM 6th TWSC  
2: Site Access & Baptist Road

09/07/2021

Intersection						
Int Delay, s/veh	1.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↑↑		↗
Traffic Vol, veh/h	346	139	0	697	0	150
Future Vol, veh/h	346	139	0	697	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	376	151	0	758	0	163

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	452
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	607
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	607
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

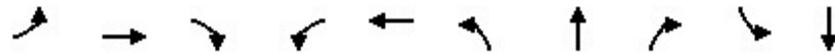
Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	607	-	-	-
HCM Lane V/C Ratio	0.269	-	-	-
HCM Control Delay (s)	13.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	1.1	-	-	-

Queues

3: Terrazzo Drive & Baptist Road

09/07/2021

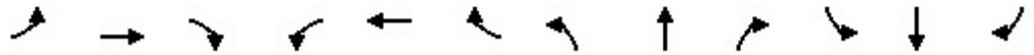


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	1	503	82	402	520	233	1	485	24	3
v/c Ratio	0.00	0.66	0.17	0.57	0.44	0.36	0.00	0.50	0.04	0.01
Control Delay	20.0	29.0	0.9	24.1	19.7	12.7	16.0	4.0	10.5	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	29.0	0.9	24.1	19.7	12.7	16.0	4.0	10.5	14.3
Queue Length 50th (ft)	0	103	0	61	84	54	0	0	5	0
Queue Length 95th (ft)	4	144	2	109	144	105	3	61	17	6
Internal Link Dist (ft)		423			557		495			367
Turn Bay Length (ft)	160		310	420		135			255	
Base Capacity (vph)	202	910	528	747	1187	641	839	979	600	544
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.55	0.16	0.54	0.44	0.36	0.00	0.50	0.04	0.01

Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: Terrazzo Drive & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘↗	↑↑		↘	↑	↗	↘	↑	↗
Traffic Volume (veh/h)	1	463	75	370	478	0	214	1	446	22	1	2
Future Volume (veh/h)	1	463	75	370	478	0	214	1	446	22	1	2
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1	503	82	402	520	0	233	1	485	24	1	2
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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	671	299	501	926	0	818	850	720	496	211	423
Arrive On Green	0.00	0.19	0.19	0.07	0.26	0.00	0.10	0.45	0.45	0.03	0.38	0.38
Sat Flow, veh/h	1781	3554	1585	3456	3647	0	1781	1870	1585	1781	557	1113
Grp Volume(v), veh/h	1	503	82	402	520	0	233	1	485	24	0	3
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	0	1781	1870	1585	1781	0	1670
Q Serve(g_s), s	0.0	9.4	2.2	2.8	8.9	0.0	5.2	0.0	10.6	0.6	0.0	0.1
Cycle Q Clear(g_c), s	0.0	9.4	2.2	2.8	8.9	0.0	5.2	0.0	10.6	0.6	0.0	0.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.67
Lane Grp Cap(c), veh/h	105	671	299	501	926	0	818	850	720	496	0	634
V/C Ratio(X)	0.01	0.75	0.27	0.80	0.56	0.00	0.28	0.00	0.67	0.05	0.00	0.00
Avail Cap(c_a), veh/h	230	914	408	569	990	0	819	850	720	575	0	634
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.93	0.93	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.9	26.8	12.5	30.4	22.4	0.0	9.7	10.4	6.0	12.5	0.0	13.5
Incr Delay (d2), s/veh	0.0	2.3	0.5	6.8	0.6	0.0	0.2	0.0	5.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.9	1.1	3.5	3.4	0.0	1.9	0.0	5.2	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.0	29.1	13.0	37.2	23.0	0.0	9.9	10.4	11.0	12.5	0.0	13.5
LnGrp LOS	C	C	B	D	C	A	A	B	B	B	A	B
Approach Vol, veh/h		586			922			719				27
Approach Delay, s/veh		26.9			29.2			10.6				12.7
Approach LOS		C			C			B				B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.4	36.3	9.6	17.7	11.6	31.1	4.6	22.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	22.5	6.5	18.0	7.1	20.4	5.0	19.5				
Max Q Clear Time (g_c+I1), s	2.6	12.6	4.8	11.4	7.2	2.1	2.0	10.9				
Green Ext Time (p_c), s	0.0	1.4	0.3	1.9	0.0	0.0	0.0	2.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				22.5								
HCM 6th LOS				C								

# Queues

## 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT
Lane Group Flow (vph)	472	575	650	832	352	324
v/c Ratio	0.25	0.66	0.81	0.39	0.75	0.59
Control Delay	24.5	6.4	34.6	11.1	41.5	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	6.4	34.6	11.1	41.5	17.5
Queue Length 50th (ft)	59	0	157	78	183	68
Queue Length 95th (ft)	81	82	252	105	#306	156
Internal Link Dist (ft)	557			464		409
Turn Bay Length (ft)						
Base Capacity (vph)	1922	877	839	2123	472	551
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.66	0.77	0.39	0.75	0.59

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
 4: SB on-ramp/SB off-ramp & Baptist Road

09/07/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘↗	↑↑					↘	↗	
Traffic Volume (veh/h)	0	434	529	598	765	0	0	0	0	324	0	298
Future Volume (veh/h)	0	434	529	598	765	0	0	0	0	324	0	298
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	472	0	650	832	0				352	0	324
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2029		753	2132	0				475	0	423
Arrive On Green	0.00	0.32	0.00	0.07	0.20	0.00				0.27	0.00	0.27
Sat Flow, veh/h	0	6696	1585	3456	3647	0				1781	0	1585
Grp Volume(v), veh/h	0	472	0	650	832	0				352	0	324
Grp Sat Flow(s),veh/h/ln	0	1609	1585	1728	1777	0				1781	0	1585
Q Serve(g_s), s	0.0	4.9	0.0	16.8	18.3	0.0				16.3	0.0	17.0
Cycle Q Clear(g_c), s	0.0	4.9	0.0	16.8	18.3	0.0				16.3	0.0	17.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2029		753	2132	0				475	0	423
V/C Ratio(X)	0.00	0.23		0.86	0.39	0.00				0.74	0.00	0.77
Avail Cap(c_a), veh/h	0	2029		845	2132	0				475	0	423
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.80	0.00	0.91	0.91	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	22.8	0.0	40.4	21.8	0.0				30.2	0.0	30.4
Incr Delay (d2), s/veh	0.0	0.2	0.0	7.8	0.5	0.0				10.0	0.0	12.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	0.0	8.5	8.7	0.0				7.8	0.0	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	23.0	0.0	48.2	22.3	0.0				40.1	0.0	42.9
LnGrp LOS	A	C		D	C	A				D	A	D
Approach Vol, veh/h		472	A		1482						676	
Approach Delay, s/veh		23.0			33.6						41.5	
Approach LOS		C			C						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.6	34.4		30.0		60.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	22.0	26.0		24.0		54.0						
Max Q Clear Time (g_c+I1), s	18.8	6.9		19.0		20.3						
Green Ext Time (p_c), s	0.9	2.8		1.4		6.2						

Intersection Summary

HCM 6th Ctrl Delay	33.7
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues

5: NB off-ramp/NB on-ramp & Baptist Road

09/07/2021



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	253	552	936	239	311	312	1142
v/c Ratio	0.74	0.25	0.32	0.28	0.76	0.76	0.72
Control Delay	48.3	18.2	16.0	3.0	45.1	45.0	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	18.2	16.0	3.0	45.1	45.0	2.9
Queue Length 50th (ft)	66	108	95	0	172	173	0
Queue Length 95th (ft)	m#113	154	118	39	#301	#302	0
Internal Link Dist (ft)		464	805			356	
Turn Bay Length (ft)	570						
Base Capacity (vph)	343	2202	2920	851	410	412	1583
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.25	0.32	0.28	0.76	0.76	0.72

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# HCM Signalized Intersection Capacity Analysis

## 5: NB off-ramp/NB on-ramp & Baptist Road

09/03/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			  			 				
Traffic Volume (vph)	233	508	0	0	861	220	572	1	1051	0	0	0
Future Volume (vph)	233	508	0	0	861	220	572	1	1051	0	0	0
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	4.0			
Lane Util. Factor	0.97	0.95			0.86	1.00	0.95	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3433	3539			6408	1583	1681	1686	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3433	3539			6408	1583	1681	1686	1583			
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)	253	552	0	0	936	239	622	1	1142	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	130	0	0	0	0	0	0
Lane Group Flow (vph)	253	552	0	0	936	109	311	312	1142	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Free			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		Free			
Actuated Green, G (s)	9.0	56.0			41.0	41.0	22.0	22.0	90.0			
Effective Green, g (s)	9.0	56.0			41.0	41.0	22.0	22.0	90.0			
Actuated g/C Ratio	0.10	0.62			0.46	0.46	0.24	0.24	1.00			
Clearance Time (s)	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				
Lane Grp Cap (vph)	343	2202			2919	721	410	412	1583			
v/s Ratio Prot	0.07	0.16			0.15							
v/s Ratio Perm						0.07	0.18	0.19	c0.72			
v/c Ratio	0.74	0.25			0.32	0.15	0.76	0.76	0.72			
Uniform Delay, d1	39.4	7.6			15.6	14.3	31.5	31.5	0.0			
Progression Factor	0.89	2.33			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	7.3	0.2			0.3	0.4	12.4	12.3	2.9			
Delay (s)	42.5	18.0			15.9	14.8	43.9	43.8	2.9			
Level of Service	D	B			B	B	D	D	A			
Approach Delay (s)		25.7			15.7			17.3			0.0	
Approach LOS		C			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.6		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				18.0			
Intersection Capacity Utilization			83.3%		ICU Level of Service				E			
Analysis Period (min)			15									

c Critical Lane Group

## **APPENDIX G – Falcon Commerce Center TIS**

# TRAFFIC IMPACT STUDY

For

**Falcon Commerce Center  
Monument, Colorado**

June 2020  
Revised:  
August 2020

Prepared for:

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19-121125

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## I. Introduction

### Project Overview

This traffic impact study addresses the capacity, geometric, and control requirements associated with the development entitled Falcon Commerce Center.

This traffic impact study has been revised to address CDOT review comments regarding consideration of turn lanes along Baptist Road and updated intersection geometry and the Baptist Road and Terrazzo Drive intersection.

This proposed mixed-use development consists of a variety of land uses including industrial, commercial, retail, office, and the potential for high-density residential. The development is located on the southwest side of the Interstate 25 and Baptist Road interchange in Monument, Colorado.

### Study Area Boundaries

The study area to be examined in this analysis encompasses the Baptist Road intersections with Interstate 25 northbound and southbound ramps, Woodcarver Road, Terrazzo Drive, and proposed site accesses.

Figure 1 illustrates location of the site and study intersections.

### Site Description

The proposed development is conceptual and no specific land uses have been determined. However, for purposes of this analysis, there is assumed to be construction of a 96,000 square feet of distribution center, approximately 150,000 square feet of commercial, 450,000 square feet of office park, 454,000 square feet of business park, and either 350,000 square feet of light industrial or 640 multifamily residential dwelling units within Area D of the Sketch Plan.

Land for the development is currently vacant and surrounded by a mix of open space, residential, industrial, and commercial land uses.

Proposed access to the development is provided at the following locations: one full-movement access onto Baptist Road (as an extension of the existing Terrazzo Drive) and one full-movement access onto Woodcarver Road (referred to as Squadron Drive). There is potential for an additional right-in / right-out access along Baptist Road to serve Area A of the Sketch Plan. However, in order to provide a conservative analysis, the potential right-in / right-out access will not be included.

For purposes of this study, it is anticipated that development construction would be phased. Phase One is assumed to consist of the commercial land use and an approximate 96,000 square foot distribution center with construction to be completed by Year 2025. The build-out phase is assumed to consist of office park, and business park, and either multifamily residential dwelling units or light industrial land uses. The build-out phase is anticipated to be completed by end of Year 2040.

A Sketch Plan, as prepared by N.E.S. Inc., is shown on Figure 2. This plan is provided for illustrative purposes.





## Existing and Committed Surface Transportation Network

Within the study area, Baptist Road is the primary roadway that will accommodate traffic to and from the proposed development. Secondary roadways include Interstate 25, Woodcarver Road, Old Denver Road, and Terrazzo Drive. A brief description of each roadway is provided below:

Baptist Road is an east-west roadway within The Colorado Department of Transportation's (CDOT) jurisdiction, within the study area, but is maintained by El Paso County. Baptist Road has a varying number of through lanes (one to three lanes in each direction) with a combination of shared and exclusive turn lanes at the intersections within the study area. The County's transportation plan<sup>1</sup> categorizes Baptist Road as a principal arterial roadway east of Interstate 25 and a collector roadway west of Interstate 25. Baptist Road provides an eastbound posted speed limit of 40 MPH and westbound posted speed limits of 45 and 35 MPH east and west of Terrazzo Drive, respectively.

Old Denver Road is a north-south collector roadway within the Town of Monument having two through lanes (one lane in each direction) with exclusive turn lanes at the intersection within the study area. Old Denver Road provides a posted speed limit of 40 MPH. Old Denver Road ends at Baptist Road and continues south as Woodcarver Road.

Woodcarver Road is a north-south private roadway within El Paso County having two through lanes (one lane in each direction) with shared turn lanes at the roundabout intersection within the study area. Woodcarver Road is unclassified in the County's transportation plan. However, per Section 2.2.4 and Table 2-7 of the County's standards<sup>2</sup>, Woodcarver Road is assumed to be classified as a local roadway with a posted speed limit of 25MPH, with future potential to become a collector roadway north of the proposed intersection with Squadron Drive. Woodcarver Road ends at Baptist Road and continues north as Old Denver Road.

Terrazzo Drive is a north-south roadway within the Town of Monument having three through lanes (two northbound lanes and one southbound lane) with a combination of shared and exclusive turn lanes at the intersection within the study area. Terrazzo Drive is unclassified in the County's transportation plan. However, per Section 2.2.4 and Table 2-7 of the County's standards and connection to Baptist Road, Terrazzo Drive is assumed to be classified as a collector roadway with a posted speed limit of 35 MPH. This assumption is consistent with the Pilot Travel Center traffic impact study<sup>3</sup>.

Interstate 25 at Baptist Road is an existing diamond interchange with Interstate 25 travel below Baptist Road. The interchange is within CDOT jurisdiction. Northbound and southbound on / off ramps have a posted advisory speed limit of 45 MPH. Each interchange ramp has one travel lane with a combination of shared and exclusive turn lanes at Baptist Road.

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<sup>1</sup> El Paso County 2016 Major Transportation Corridors Plan Update, Felsburg Holt & Ullevig, December 2016.

<sup>2</sup> El Paso County Engineering Criteria Manual, El Paso County, December 2016.

<sup>3</sup> Pilot Travel Center, Drexel, Barrell & Co., July 2017.

The study intersections of Baptist Road with the Interstate 25 northbound and southbound ramps are signalized. The study intersection of Baptist Road with Woodcarver Road operates as a roundabout. All other study intersections operate under a stop-controlled condition. A stop-controlled intersection is defined as a roadway intersection where vehicle rights-of-way are controlled by one or more “STOP” signs.

No regional or specific improvements for the above described roadways are known to be planned or committed at this time. Without consideration of future development within the area, Woodcarver Road is not built to minimum cross-sectional standards for collector roadways as defined within the County’s standards but is anticipated to be built-out as part of the proposed development north of proposed intersection with Squadron Drive. This development will not be improving the private part of Woodcarver Road south of the Squadron Drive intersection. The remaining study area roadways appear to be built to their ultimate cross-sections.

## II. Existing Traffic Conditions

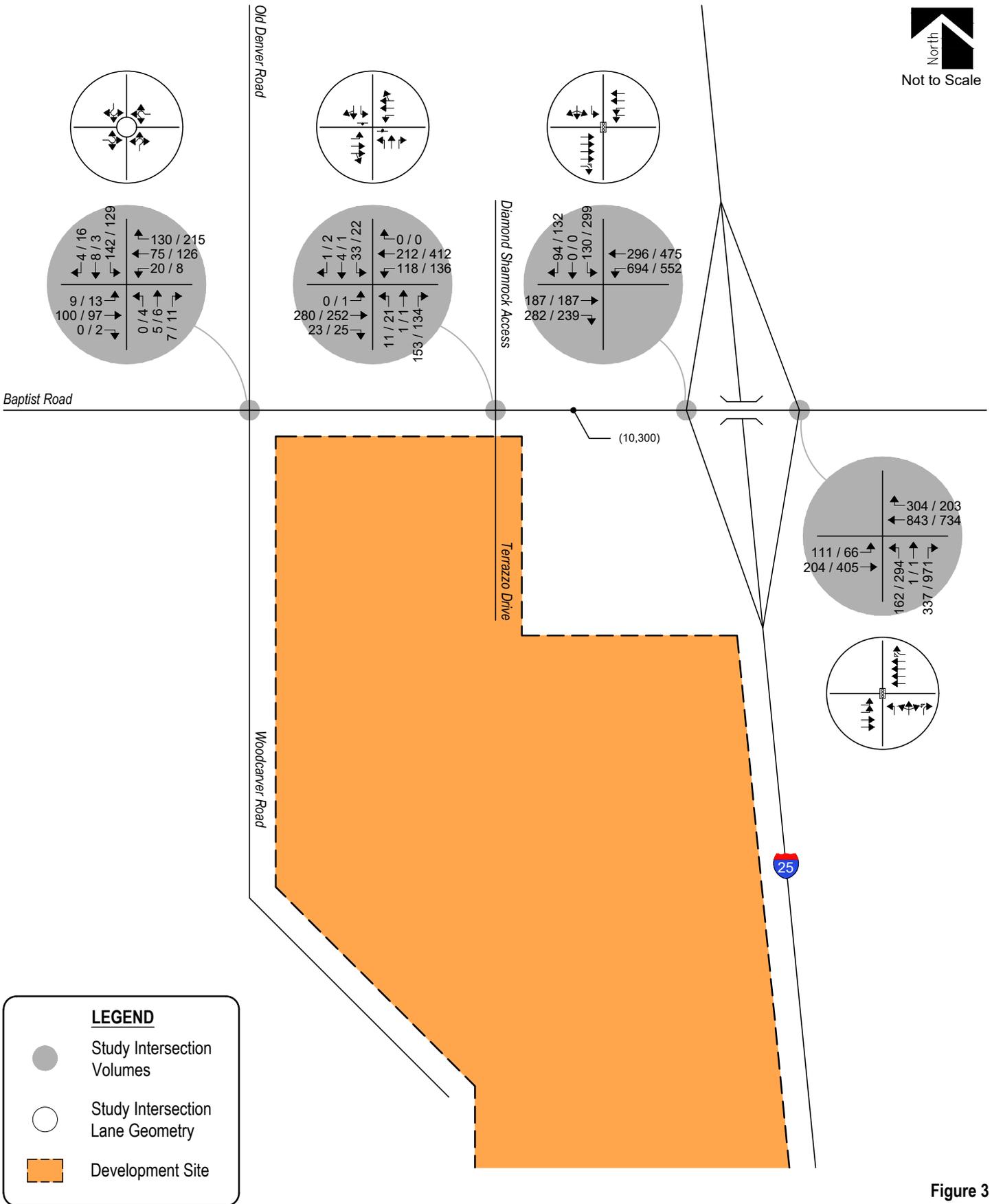
Morning (AM) and afternoon (PM) peak hour traffic counts were collected at the Baptist Road intersections with the Interstate 25 northbound and southbound ramps. Peak hour traffic counts shown for the Baptist Road intersections with Woodcarver Road and Terrazzo Drive, and 24-hour traffic volumes shown for Baptist Road, were obtained from the Santa Fe Park traffic study<sup>4</sup>. These counts are shown on Figure 3.

Traffic count data is included for reference in Appendix A.

Existing signal timing parameters for the Baptist Road intersections with Interstate 25 northbound and southbound ramps were obtained from CDOT and used throughout this study to the best extent possible in order to remain consistent with existing signal coordination plans. CDOT signal timing information received is included for reference in Appendix A.

---

<sup>4</sup> Santa Fe Park, LSC Transportation Consultants, Inc., January 2020.



**Figure 3**  
**EXISTING TRAFFIC**  
Volumes & Intersection Geometry  
AM / PM Peak Hour  
(ADT) : Average Daily Traffic



The Signalized and Unsignalized Intersection Analysis techniques, as published in the Highway Capacity Manual (HCM) by the Transportation Research Board and as incorporated into the SYNCHRO computer program, were used to analyze the study intersections for existing traffic conditions. These nationally accepted techniques allow for the determination of intersection level of service (LOS) based on the congestion and delay of each traffic movement.

Level of service is a method of measurement used by transportation professionals to quantify a driver's perception of travel conditions that include travel time, number of stops, and total amount of stopped delay experienced on a roadway network. The HCM categorizes level of service into a range from "A" which indicates little, if any, vehicle delay, to "F" which indicates a level of operation considered unacceptable to most drivers. These levels of service grades with brief descriptions of the operating condition, for unsignalized and signalized intersections, are included for reference in Appendix B and have been used throughout this study.

The level of service analyses results for existing conditions are summarized in Table 1.

Intersection capacity worksheets developed for this study are provided in Appendix C.

**Table 1 – Intersection Capacity Analysis Summary – Existing Traffic**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Baptist Road / I-25 Northbound Ramp (Signalized)	B (12.7)	B (11.2)
Baptist Road / I-25 Southbound Ramp (Signalized)	C (23.5)	C (23.4)
Baptist Road / Old Denver Road (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
Baptist Road / Terrazzo Drive (Stop-controlled)		
Eastbound Left	A	A
Westbound Left	A	A
Northbound Left	C	C
Northbound Through	C	C
Northbound Right	B	B
Southbound Left	C	D
Southbound Through and Right	C	B

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

### **Existing Traffic Analysis Results**

Under existing conditions, operational analysis shows that the signalized intersection of Baptist Road with Interstate 25 Northbound Ramp has overall operations at LOS B during both morning and afternoon peak traffic hours.

The signalized intersection of Baptist Road with Interstate 25 Southbound Ramp has overall operations at LOS C during both morning and afternoon peak traffic hours.

The roundabout intersection of Baptist Road with Old Denver Road has turn movement operations at LOS A during both morning and afternoon peak traffic hours.

The unsignalized intersection of Baptist Road with Terrazzo Drive has turn movement operations at or better than LOS C during morning peak traffic hours and LOS D or better during afternoon peak traffic hours.

### III. Future Traffic Conditions Without Proposed Development

Background traffic is the traffic projected to be on area roadways without consideration of the proposed development. Background traffic includes traffic generated by development of vacant parcels in the area.

To account for projected increases in background traffic for Years 2025 and 2040, a compounded annual growth rate was determined using traffic data provided by CDOT's Online Transportation Information System (OTIS), which anticipates a 20-year growth rate of approximately two percent. Therefore, in order to provide for a conservative analysis, a growth rate of two percent was applied to existing traffic volumes.

To account for projected traffic from adjacent developments not yet built, trip generations from the Forest Lakes Phase II<sup>5</sup>, Wagons West<sup>6</sup>, Nexus Industrial<sup>7</sup>, Willow Springs Ranch<sup>8</sup>, and Santa Fe Park traffic studies were added to background traffic volumes.

A signal warrant analysis, using Year 2025 background traffic volumes, was conducted for the Baptist Road intersection with Terrazzo Drive in order to review potential for traffic signal control. Analysis results conclude that the intersection was found to be above the minimum vehicle volumes required to meet Warrant 3 – Peak Hour, from the Manual on Uniform Traffic Control Devices (MUTCD), for the installation of a traffic signal. As such, the Baptist Road and Terrazzo Drive intersection was analyzed under traffic signal control. Signal timing parameters for the Baptist Road and Terrazzo Drive intersection were referenced from the Pilot Travel Center traffic study. Warrant study worksheets are provided for reference in Appendix D.

Warrant 3 is intended for use at locations where traffic conditions are such that for a minimum of one hour on an average day, the minor-street (Terrazzo Drive) traffic suffers undue delay when entering or crossing the major street (Baptist Road). This assumption provides for a conservative analysis. Said intersection should be monitored further as area development occurs to determine when signalization installation is appropriate.

Pursuant to the non-committed area roadway improvements discussed in Section I, Year 2025 background traffic conditions assume no roadway improvements to accommodate regional transportation demands. In order to remain consistent with the Pilot Travel Center traffic impact study, Year 2040 assumes improvements at the Baptist Road and Terrazzo Drive intersection which include dual westbound left turn lanes and a northbound shared through and right turn lane. Year 2040 also assumes existing signal timing parameters for the Baptist Road intersections with the Interstate 25 northbound and southbound ramps with optimized intersection splits in effort to better long-term intersection performance. This assumption provides for a conservative analysis.

Projected background traffic volumes and intersection geometries for Years 2025 and 2040 are shown on Figure 4 and Figure 5, respectively.

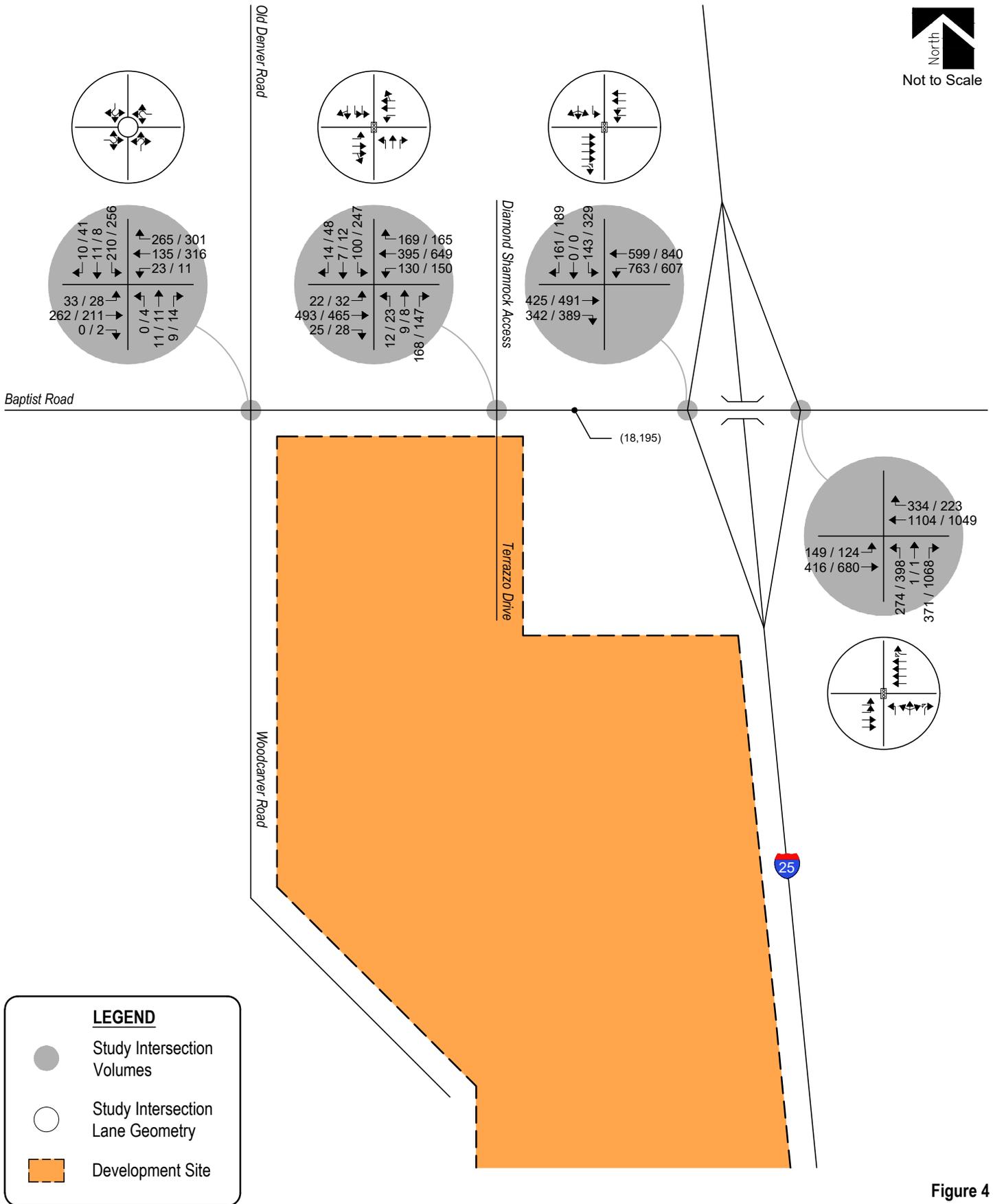
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<sup>5</sup> Forest Lakes Phase II Traffic Impact Study, LSC Transportation Consultants, Inc., February 2019.

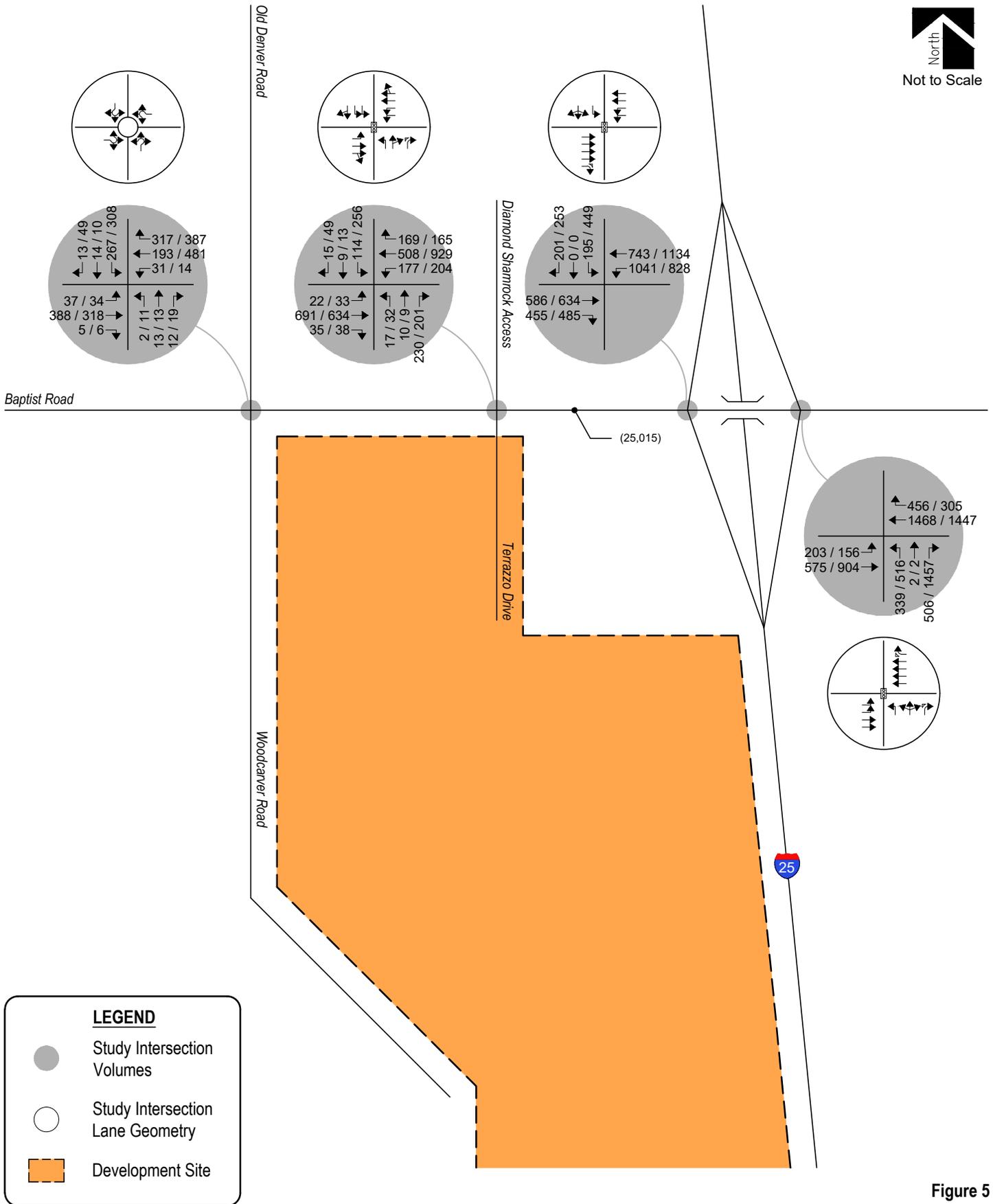
<sup>6</sup> Wagons West Traffic Impact Study, LSC Transportation Consultants, Inc., August 2017.

<sup>7</sup> Nexus Industrial Traffic Impact Study, LSC Transportation Consultants Inc., November 2017.

<sup>8</sup> Willow Springs Ranch Traffic Impact Study, LSC Transportation Consultants, Inc., December 2019.



**Figure 4**  
**BACKGROUND TRAFFIC - YEAR 2025**  
Volumes & Intersection Geometry  
AM / PM Peak Hour  
(ADT) : Average Daily Traffic



**Figure 5**  
**BACKGROUND TRAFFIC - YEAR 2040**  
 Volumes & Intersection Geometry  
 AM / PM Peak Hour  
 (ADT) : Average Daily Traffic



As with existing traffic conditions, the operations of study intersections were analyzed under background conditions, without the proposed development, using the SYNCHRO computer program.

Background traffic level of service analysis results for Year 2025 are listed in Table 2. Year 2040 operational results are summarized in Table 3.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

**Table 2 – Intersection Capacity Analysis Summary – Background Traffic – Year 2025**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Baptist Road / I-25 Northbound Ramp (Signalized)	B (14.4)	B (13.6)
Baptist Road / I-25 Southbound Ramp (Signalized)	C (20.6)	C (21.9)
Baptist Road / Terrazzo Drive (Signalized)	B (17.4)	B (17.6)
Baptist Road / Old Denver Road (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	B
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	B

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)  
Roundabout Intersection: Level of Service

### Background Traffic Analysis Results – Year 2025

Year 2025 background traffic analysis indicates that the signalized intersection of Baptist Road with Interstate 25 Northbound Ramp has overall operations at LOS B during both morning and afternoon peak traffic periods.

The signalized intersection of Baptist Road with Interstate 25 Southbound Ramp has over operations at LOS C during both morning and afternoon peak traffic periods.

The signalized intersection of Baptist Road with Terrazzo Drive has overall operations at LOS B during both morning and afternoon peak traffic periods.

The roundabout intersection of Baptist Road with Old Denver Road has turn movement operations at LOS A during morning peak traffic periods and LOS B or better during afternoon peak traffic periods.

**Table 3 – Intersection Capacity Analysis Summary – Background Traffic – Year 2040**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Baptist Road / I-25 Northbound Ramp (Signalized)	B (16.5)	C (23.7)
Baptist Road / I-25 Southbound Ramp (Signalized)	C (27.4)	C (30.2)
Baptist Road / Terrazzo Drive (Signalized)	B (18.6)	B (20.0)
Baptist Road / Old Denver Road (Roundabout)		
Eastbound Left, Through and Right	B	B
Westbound Left, Through and Right	B	D
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	C

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)  
Roundabout Intersection: Level of Service

### Background Traffic Analysis Results – Year 2040

By Year 2040 and without the proposed development, the study intersection of Baptist Road and Interstate 25 Northbound Ramp experiences LOS B operations during morning peak traffic hours and LOS C operations during afternoon peak traffic hours.

The study intersection of Baptist Road and Interstate 25 Southbound Ramp experiences LOS C operations during both morning and afternoon peak traffic hours.

The signalized intersection of Baptist Road with Terrazzo Drive anticipates overall operations at LOS B during both morning and afternoon peak traffic hours.

The roundabout intersection of Baptist Road with Old Denver Road anticipates turn movement operations at or better than LOS B during morning peak traffic hours and LOS D or better during afternoon peak traffic hours.

### Auxiliary Lane Analysis

Auxiliary lane requirements for Terrazzo Drive were analyzed using Year 2040 background traffic conditions and are to be based on CDOT's code<sup>9</sup>. An existing CDOT access permit for the Terrazzo Drive and Baptist Road intersection identifies Baptist Road as having a CDOT access category of Non-Rural Principal Highway (NR-A).

Without the proposed development, an evaluation of auxiliary lane requirements, pursuant to Section 3.10(7)(b) of CDOT's code, reveals that an eastbound right turn deceleration along Baptist Road at Terrazzo Drive is required since the projected peak hour right turn ingress volume exceeds the State's threshold of 25 vehicles per hour.

<sup>9</sup> [State Highway Access Code](#), The Transportation Commission of Colorado, March 2002.

## IV. Proposed Project Traffic

### Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation, 10<sup>th</sup> Edition, were applied to the proposed land use in order to estimate average daily traffic (ADT), AM Peak Hour, and PM Peak Hour vehicle trips. A vehicle trip is defined as a one-way vehicle movement from a point of origin to a point of destination.

The ITE land use codes 150 (Warehousing), 221 (Multifamily Housing (Mid-Rise)), 750 (Office Park), 770 (Business Park), and 820 (Shopping Center) were used for estimating trip generation because of their best fit to the anticipated land use descriptions. Office Park and Business Park land uses include a variety of other land uses including retail, wholesale stores, warehousing, manufacturing, light industrial, service stations, restaurants, banks, recreational areas, and support services.

It should be noted that Area D of the Sketch Plan will either be entirely residential or entirely non-residential land use. For purposes of this analysis, the more conservative trip-generator (residential) was used.

As actual land uses, densities or site plans within Falcon Commerce Center become defined over time, it is expected that traffic generation characteristics considered within this study will need to be updated by more specific traffic analyses or studies to help assess if transportation improvements are needed to mitigate potential traffic impacts.

Trip generation rates used in this study are presented in Table 4.

**Table 4 – Trip Generation Rates**

ITE CODE	LAND USE	UNIT	TRIP GENERATION RATES						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
150	Warehousing	KSF	1.74	0.13	0.04	0.17	0.05	0.14	0.19
221	Multifamily Housing (Mid-Rise)	DU	5.44	0.09	0.27	0.36	0.27	0.17	0.44
750	Office Park	KSF	11.07	1.28	0.16	1.44	0.07	1.00	1.07
770	Business Park	KSF	12.44	0.24	0.16	0.40	0.19	0.23	0.42
820	Shopping Center	KSF	37.75	0.58	0.36	0.94	1.83	1.98	3.81

Key: KSF = Thousand Square Feet Gross Floor Area. DU = Dwelling Unit.  
 Note: All data and calculations above are subject to being rounded to nearest v value.

Table 5 illustrates projected average daily traffic (ADT), AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out.

**Table 5 – Trip Generation Summary**

ITE CODE	LAND USE	SIZE	TOTAL TRIPS GENERATED							
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR			
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	
<u>Site Development - Phase One</u>										
150	Warehousing	96.0 KSF	167	13	4	16	5	13	18	
820	Shopping Center	150.0 KSF	5,663	87	54	141	274	297	572	
<i>Phase One Total:</i>			<i>5,830</i>	<i>100</i>	<i>57</i>	<i>157</i>	<i>279</i>	<i>310</i>	<i>590</i>	
<u>Site Development - Built-Out</u>										
221	Multifamily Housing (Mid-Rise)	640 DU	3,482	60	170	230	172	110	282	
750	Office Park	450.0 KSF	4,982	577	71	648	34	448	482	
770	Business Park	454.0 KSF	5,648	111	71	182	88	103	191	
<i>Build-Out Total:</i>			<i>19,940</i>	<i>847</i>	<i>370</i>	<i>1,217</i>	<i>572</i>	<i>971</i>	<i>1,544</i>	

Note: All data and calculations above are subject to being rounded to nearest value.

Upon build-out, Table 5 illustrates that the proposed development has the potential to generate approximately 19,940 daily trips with 1,217 of those occurring during the morning peak hour and 1,544 during the afternoon peak hour.

### Adjustments to Trip Generation Rates

It is considered likely that a mixed-use development of this type will attract trips from within area land uses. Based on the diversity of land uses being proposed, it is anticipated that approximately ten percent of the proposed trips resulting from the Shopping Center land use will be captured internally. However, it should be noted that given the land use densities, varieties, and locations assumed, specific internal capture rates can only be estimated and may be higher than that analyzed in this study.

A development of this type is also likely to attract trips from pass-by or diverted linked trips from the adjacent roadway system, however no pass-by or diverted linked trip reductions were taken in this analysis. This assumption provides for a conservative analysis.

As example, published ITE pass-by and diverted link trip data indicates an average trip generation reduction rate between 8 and 66 percent, as typical to shopping centers. Considering the lowest reduction percentage, primary trip generation for the shopping center land use equates to 92 percent of trip generation volumes presented in Table 5. A primary trip is defined by ITE as a trip made for the specific purpose of visiting the destination generator.

Table 6 illustrates projected average daily traffic (ADT), AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out with reductions applied due to internal capture. The assumed ten percent trip reduction continues to provide for a conservative analysis.

**Table 6 – Trip Generation Summary with Reductions**

ITE CODE	LAND USE	SIZE	TOTAL TRIPS GENERATED							
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR			
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	
<u>Site Development - Phase One</u>										
150	Warehousing	96.0 KSF	167	13	4	16	5	13	18	
820	Shopping Center	150.0 KSF	5,096	79	48	127	247	267	514	
<i>Phase One Total:</i>			5,263	91	52	143	252	281	533	
<u>Site Development - Build-Out</u>										
221	Multifamily Housing (Mid-Rise)	640 DU	3,482	60	170	230	172	110	282	
750	Office Park	450.0 KSF	4,982	577	71	648	34	448	482	
770	Business Park	454.0 KSF	5,648	111	71	182	88	103	191	
<i>Build-Out Total:</i>			19,374	839	365	1,203	545	941	1,486	

Note: All data and calculations above are subject to being rounded to nearest value.

Upon build-out and with consideration of applicable trip reductions, Table 6 indicates that the proposed development has the potential to generate approximately 19,374 new daily trips with 1,203 of those occurring during the morning peak hour and 1,486 during the afternoon peak hour.

### Trip Distribution

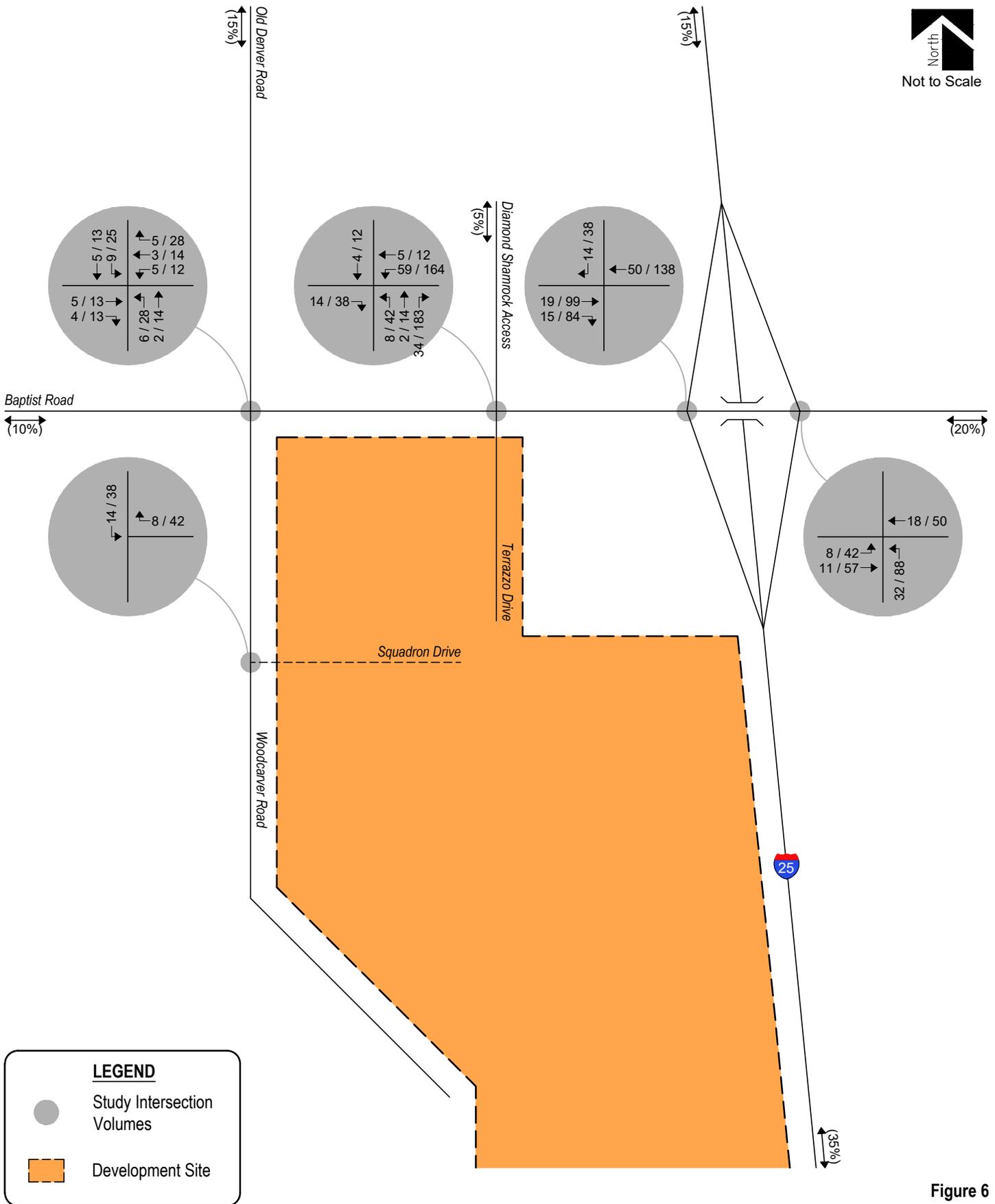
The overall directional distribution of site-generated traffic was determined based on the location of the development site within the Town, proposed and existing area land uses, allowed turning movements, and available roadway network. Vehicle trip distribution patterns were also referenced with the Santa Fe Park traffic study, which is of comparable size and has similar land uses.

Overall trip distribution patterns for the development by Year 2025 are shown on Figure 6. Year 2040 trip distribution patterns are shown on Figure 7.

### Trip Assignment

Trip assignment is how generated and distributed vehicle trips are expected to be loaded onto the available roadway network.

Applying trip distribution patterns to site-generated traffic provides the Year 2025 site-generated trip assignments from Phase One shown on Figure 6 and Year 2040 assignments for the build-out phase on Figure 7.



**Figure 6**  
**SITE DEVELOPMENT DISTRIBUTION - PHASE ONE**  
 (%): Overall  
**SITE-GENERATED**  
 AM / PM Peak Hour





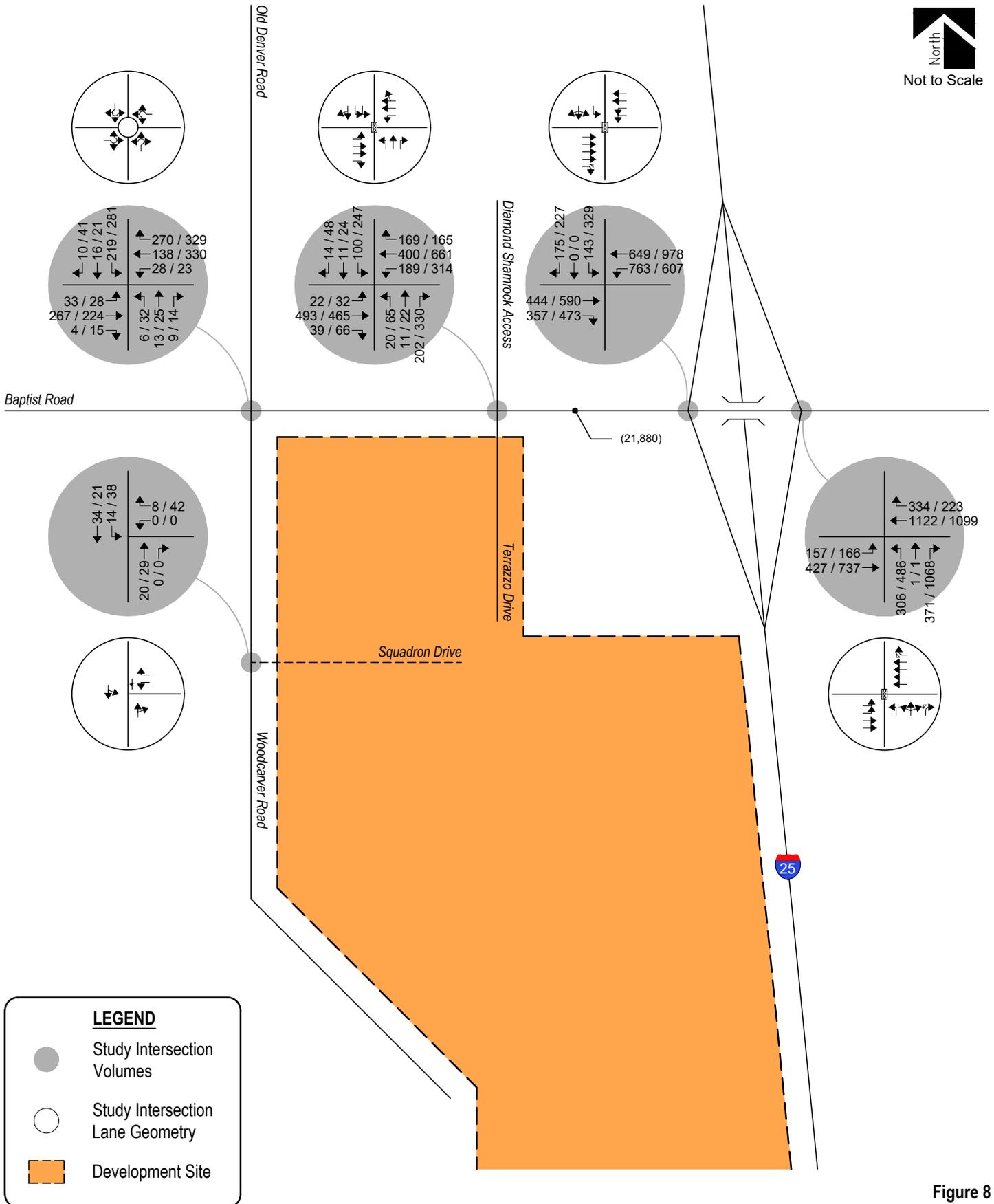
## **V. Future Traffic Conditions With Proposed Developments**

Site-generated traffic was added to background traffic projections for Years 2025 and 2040 to develop total traffic projections. For analysis purposes, it was assumed that development construction would be completed by end of Year 2025.

Pursuant to area roadway improvement discussions provided in Section III, Year 2025 and Year 2040 total traffic conditions assume no additional roadway improvements to accommodate regional transportation demands. Roadway improvements associated with site development are expected to be limited to site access and frontage as required by the governing agency.

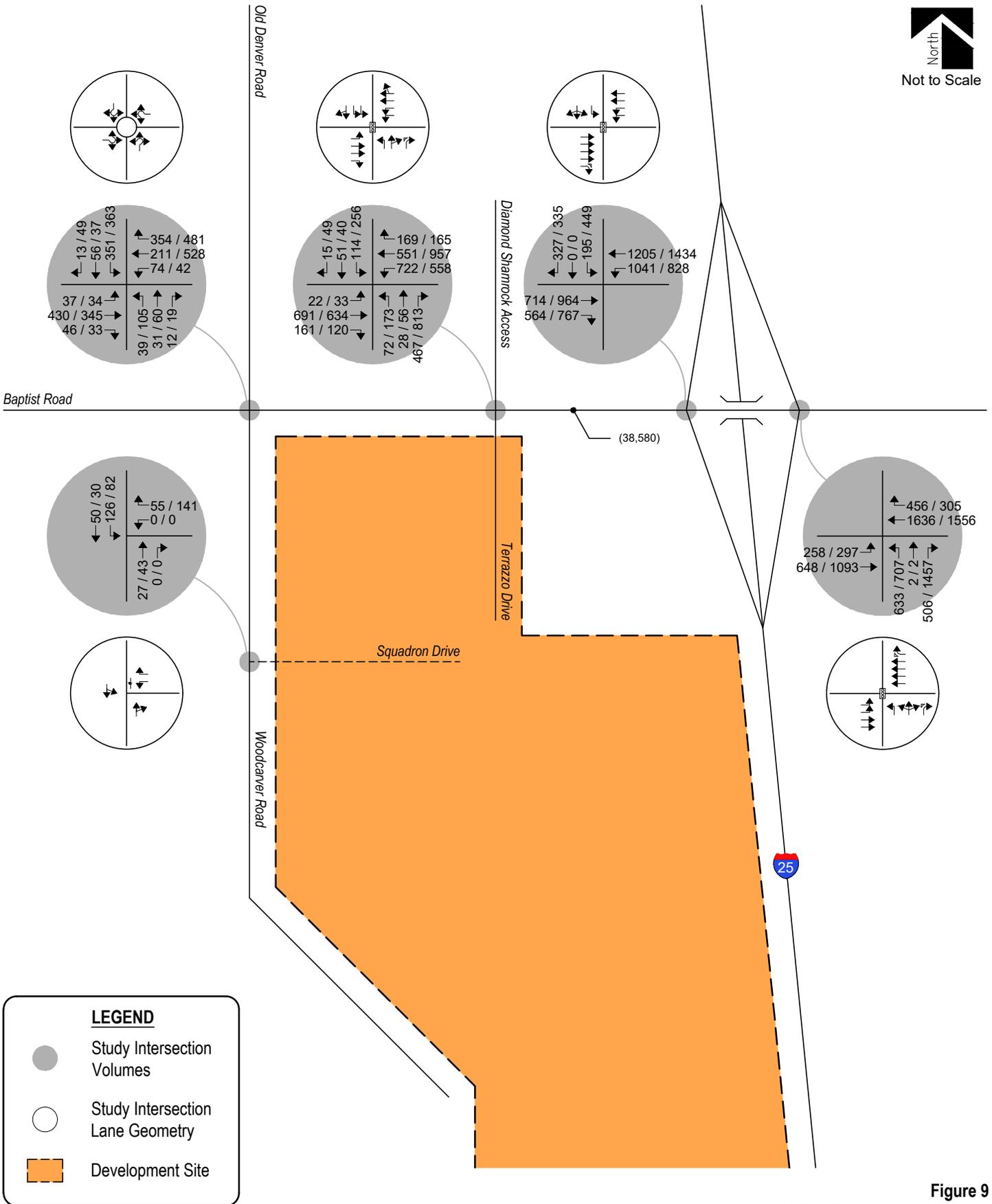
Projected Year 2025 total traffic volumes and intersection geometry are shown in Figure 8.

Figure 9 shows projected total traffic volumes and intersection geometry for Year 2040.



**Figure 8**  
**TOTAL TRAFFIC - YEAR 2025**  
 Volumes & Intersection Geometry  
 AM / PM Peak Hour  
 (ADT) : Average Daily Traffic





## VI. Project Impacts

The analyses and procedures described in this study were performed in accordance with the Highway Capacity Manual (HCM) and are based upon the worst-case conditions that occur during a typical weekday upon build-out of site development and analyzed land uses. Therefore, study intersections are likely to operate with traffic conditions better than those described within this study, which represent the peak hours of weekday operations only.

### Peak Hour Intersection Levels of Service

As with background traffic, the operations of the study intersections were analyzed under projected total traffic conditions using the SYNCHRO computer program. Total traffic level of service analysis results for Years 2025 and 2040 are summarized in Table 7 and Table 8, respectively.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

**Table 7 – Intersection Capacity Analysis Summary – Total Traffic – Year 2025**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Baptist Road / I-25 Northbound Ramp (Signalized)	B (15.0)	B (16.1)
Baptist Road / I-25 Southbound Ramp (Signalized)	B (20.0)	C (22.0)
Baptist Road / Terrazzo Drive (Signalized)	B (17.9)	B (17.9)
Baptist Road / Old Denver Road (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	C
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	B
Woodcarver Road / Squadron Drive (Stop-Controlled)		
Westbound Left	A	A
Westbound Right	A	A
Southbound Through and Left	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)  
 Roundabout Intersection: Level of Service  
 Stop-Controlled Intersection: Level of Service

**Table 8 – Intersection Capacity Analysis Summary – Total Traffic – Year 2040**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Baptist Road / I-25 Northbound Ramp (Signalized)	C (21.8)	C (26.6)
Baptist Road / I-25 Southbound Ramp (Signalized)	C (31.7)	D (39.4)
Baptist Road / Terrazzo Drive (Signalized)	C (26.9)	C (24.7)
Baptist Road / Old Denver Road (Roundabout)		
Eastbound Left, Through and Right	D	C
Westbound Left, Through and Right	E	F
Northbound Left, Through and Right	B	B
Southbound Left, Through and Right	B	F
Woodcarver Road / Squadron Drive (Stop-Controlled)		
Westbound Left	A	A
Westbound Right	A	A
Southbound Through and Left	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/v/h)  
 Roundabout Intersection: Level of Service  
 Stop-Controlled Intersection: Level of Service

### Total Traffic Analysis Results Upon Development Build-Out

Table 8 illustrates how, by Year 2040 and upon development build-out, the signalized intersection of Baptist Road with Interstate 25 Northbound Ramp shows an overall LOS C operation during both morning and afternoon peak traffic hours.

The signalized intersection of Baptist Road with Interstate 25 Southbound Ramp is projected to have LOS C operations during morning peak traffic hours and LOS D operations during afternoon peak traffic hours.

The signalized intersection of Baptist Road with Terrazzo Drive is projected to have overall operations at LOS C during both morning and afternoon peak traffic hours.

The roundabout intersection of Baptist Road with Old Denver Road anticipates turn movement operations at or better than LOS D during both morning and afternoon peak traffic hours. Exceptions would include the westbound and southbound turn movements which operate at LOS E and LOS F during morning and afternoon peak traffic hours, respectively. The LOS E and F operations are attributed to the large approach volumes at the intersection and the roundabout-controlled nature of the intersection. The addition of a free-moving westbound right turn lane, as shown in previously referenced traffic studies, is shown to mitigate westbound turn movement operations to LOS C or better during peak traffic hours. Additionally, widening the roundabout to two travel lanes is shown to mitigate the LOS F operation anticipated during afternoon peak traffic hours to LOS C operations or better.

The unsignalized intersection of Woodcarver Road with Squadron Drive is shown to have turn movement operations at LOS A during both morning and afternoon peak traffic hours.

### **Queue Length Analysis**

Queue lengths for existing and proposed intersections along Baptist Road and Woodcarver Road were analyzed using Year 2040 total traffic conditions. The analysis yields estimate of 95<sup>th</sup> percentile queue lengths, which have only a five percent probability of being exceeded during the analysis time period. Queue lengths were modeled and are included with the Synchro worksheets in Appendix C.

No significant queue at the existing Interstate 25 Southbound Ramp intersection was indicated. Exceptions include the eastbound right turn movement which anticipates a queue length of approximately twenty vehicles during the afternoon peak hour. Additional analysis concludes allowing a shared through and right turn movement for the second eastbound through lane along Baptist Road improves projected 95<sup>th</sup> percentile queuing to approximately four vehicles for the eastbound right turn movement.

## VII. Additional Analysis

Additional examination was conducted to consider the influence on Baptist Road traffic operations with the potential right-in / right-out access at the existing curb cut approximately 550 feet west of Terrazzo Drive, and if the potential site access provides benefit to traffic operations.

### **Baptist Road Access**

The potential right-in / right-out access on Baptist Road accommodates vehicles to and from the proposed development and allows for a more efficient distribution to the adjacent roadway network.

The potential right-in / right-out access on Baptist Road is expected to operate at acceptable levels of service and cause no negative impact to traffic operations along Baptist Road.

The following is a summary of potential benefits achieved from proposed Baptist Road access:

- On-site queuing reduction of egress vehicles, primarily those vehicles making a right turn from Terrazzo Drive onto Baptist Road.
- Improved intersection delay at the Terrazzo Drive and Baptist Road intersection.
- Additional site access maximizes efficiency of internal traffic circulation to better use of proposed development.
- Reduction of vehicular delay with no negative impacts at the Baptist Road and Terrazzo Drive intersection.

It is not recommended that development access on Baptist Road be more limited than that proposed. Limited access will interfere with the development's ability to equally distribute traffic within the site and out to available roadways, thus impacting future traffic in the surrounding area and potentially causing the adjacent roadway network to be used in a manner not intended for or cause additional delay that could impact emergency response times.

## **VIII. Conclusion**

This traffic impact study addressed the capacity, geometric, and control requirements associated with the development entitled Falcon Commerce Center. This proposed mixed-use development consists of a variety of land uses including industrial, commercial, retail, office, and the potential for high-density residential. The development is located on the southwest side of the Interstate 25 and Baptist Road interchange in Monument, Colorado.

The study area examined in this analysis encompassed the Baptist Road intersections with Interstate 25 northbound and southbound ramps, Woodcarver Road, Terrazzo Drive, and proposed site accesses.

Analysis was conducted for critical AM Peak Hour and PM Peak Hour traffic operations for existing traffic conditions, Year 2025 and Year 2040 background traffic conditions, and Year 2025 and Year 2040 total traffic conditions.

Analysis of existing traffic conditions, per Table 1, indicates that the signalized intersection of Baptist Road with Interstate 25 Northbound Ramp has overall operations at LOS B during both morning and afternoon peak traffic hours. The signalized intersection of Baptist Road with Interstate 25 Southbound Ramp has overall operations at LOS C during both morning and afternoon peak traffic hours. The roundabout intersection of Baptist Road with Old Denver Road has turn movement operations at LOS A during both morning and afternoon peak traffic hours. The unsignalized intersection of Baptist Road with Terrazzo Drive has turn movement operations at or better than LOS C during morning peak traffic hours and LOS D or better during afternoon peak traffic hours.

A signal warrant analysis, using Year 2025 background traffic volumes, was conducted for the Baptist Road intersection with Terrazzo Drive in order to review potential for traffic signal control. Analysis results conclude that the intersection was found to be above the minimum vehicle volumes required to meet Warrant 3 – Peak Hour, from the Manual on Uniform Traffic Control Devices (MUTCD), for the installation of a traffic signal. As such, the Baptist Road and Terrazzo Drive intersection was analyzed under traffic signal control. Signal timing parameters for the Baptist Road and Terrazzo Drive intersection were referenced from the Pilot Travel Center traffic study.

Without the proposed development, Year 2025 background operational analysis results presented in Table 2 shows that the signalized intersection of Baptist Road with Interstate 25 Northbound Ramp has overall operations at LOS B during both morning and afternoon peak traffic periods. The signalized intersection of Baptist Road with Interstate 25 Southbound Ramp has over operations at LOS C during both morning and afternoon peak traffic periods. The signalized intersection of Baptist Road with Terrazzo Drive has overall operations at LOS B during both morning and afternoon peak traffic periods. The roundabout intersection of Baptist Road with Old Denver Road has turn movement operations at LOS A during morning peak traffic periods and LOS B or better during afternoon peak traffic periods.

Without the proposed development, an evaluation of auxiliary lane requirements, pursuant to Section 3.10(7)(b) of CDOT's code, reveals that an eastbound right turn deceleration along Baptist Road at Terrazzo Drive is required since the projected peak hour right turn ingress volume exceeds the State's threshold of 25 vehicles per hour.

By Year 2040 and without the proposed development, Table 3 shows the study intersection of Baptist Road and Interstate 25 Northbound Ramp experiences LOS B operations during morning peak traffic hours and LOS C operations during afternoon peak traffic hours. The study intersection of Baptist Road and Interstate 25 Southbound Ramp experiences LOS C operations during both morning and afternoon peak traffic hours. The signalized intersection of Baptist Road with Terrazzo Drive anticipates overall operations at LOS B during both morning and afternoon peak traffic hours. The roundabout intersection of Baptist Road with Old Denver Road anticipates turn movement operations at or better than LOS B during morning peak traffic hours and LOS D or better during afternoon peak traffic hours.

Analysis of future traffic conditions shown in Tables 7 and 8 indicates that the addition of site-generated traffic is expected to create minimal negative impact to traffic operations for the existing and surrounding roadway system upon consideration of the roadway and intersection control improvements assumed within this analysis. With all conservative assumptions defined in this analysis, the study intersections are projected to operate at future levels of service comparable to Year 2040 background traffic conditions.

No significant queue at the existing Interstate 25 Southbound Ramp intersection was indicated. Exceptions include the eastbound right turn movement which anticipates a queue length of approximately twenty vehicles during the afternoon peak hour. Additional analysis concludes allowing a shared through and right turn movement for the second eastbound through lane along Baptist Road improves projected 95<sup>th</sup> percentile queuing to approximately four vehicles for the eastbound right turn movement.