



# TRAFFIC IMPACT STUDY

## OWL PLACE STORAGE TRAFFIC IMPACT STUDY

El Paso County, Colorado

TIS requires engineer's certification page, including developer's statement, per ECM B.8

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please add PCD File No. CS224



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Please number pages throughout the report (excluding appendixes).

## Executive Summary

This traffic impact study (TIS) analyzes the impact that the proposed Owl Place Storage development in El Paso County, CO will have on traffic operations at the intersections proximate to the site and determines whether any additional improvements are needed to accommodate the development through the study area. The effects of the several other nearby pipeline developments, as well as background growth, were incorporated into the future analysis.

## Site Location and Study Area

The Applicant, Meridian Storage, proposes to develop the site with 158 self-storage units as well as 96 RV/Boat storage spaces. Since the site will be rezoned, El Paso County has requested that the maximum trip generating land use allowed on the rezoned area be analyzed as well. As such, this study will analyze a scenario in which an 83,700 SF shopping plaza has been developed, although it should be noted that the developer has no intention of developing this higher trip generating option.

The site is bound by Owl Place to the south, Meridian Road to the east, and property lines to the north and west, as detailed in Figure 1-1. The study area for the project includes the following intersections that may see impacts to traffic operations as a result of the proposed development:

- Woodman Rd & Meridian Rd
- Meridian Rd & Eastonville Rd
- Meridian Rd & Bent Grass Meadows Dr
- Bent Grass Meadows Dr & Meridian Park Dr

## Conclusions and Recommendations

### Conclusions

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

- Under existing conditions, all intersections operate at LOS D or better. Queuing will not cause operational problems.
- In the background scenarios, the intersection of Woodmen Rd & Meridian Rd will operate at LOS D in 2024, and at LOS E in the 2040 PM peak. The other intersections will operate at LOS C or better.
- The proposed warehouse development will generate 3 weekday AM and 4 weekday PM peak hour vehicle trips as well as 46 weekday daily trips.
- As requested by El Paso County, the maximum trip generator allowed on a site zoned as Commercial Service was analyzed. This was found to be an 83,700 SF shopping plaza. In this scenario, the shopping plaza would generate 295 weekday AM and 761 weekday PM peak hour vehicle trips as well as 7,854 weekday daily trips.
- The total 2024 and 2040 scenarios, in which the proposed warehouse is being analyzed, has almost identical operations as the background scenarios. **No improvements are needed from the developer, as the development is shown to have a negligible effect on traffic operations.**

- The total 2024 and 2040 scenarios in which the maximum trip generator (shopping plaza) is being analyzed shows an increase in delays when compared to the background scenarios. The intersection of Woodmen Rd & Meridian Rd will operate at LOS E in the total 2024 scenario and at LOS F in the total 2040 scenario. The remaining intersections will operate acceptably. As the developer has no intention of building a shopping plaza on the site, no roadway improvements are needed.

## Recommendations

- It is recommended that the proposed development be designed as shown in the site plan.
- It is recommended that El Paso County monitor the intersection of Woodmen Rd & Meridian Rd, as it is forecasted to near capacity by 2040. This is due to background growth rather than site trips, so it is not the responsibility of the developer to provide improvements to the intersection.

parcel 5301001014 is also proposed to be rezoned per the zoning map. revise accordingly

and to the north with the inclusion of the 3rd parcel. revise accordingly and revise the subsequent statements below

## I. Introduction

### Overview

This Traffic Impact Study (TIS) was conducted in support of Meridian Storage proposed Owl Place Storage development in El Paso County, Colorado. This study evaluates an existing conditions scenario, year 2024 background and total scenarios, and year 2040 background and total scenarios. By analyzing and comparing the background and total future scenarios, this study will be able to assess the impact that the site will have on traffic operations through the immediate roadway network. In addition, El Paso County has requested that the maximum trip generator allowed on a site zoned as Commercial Service be analyzed. As such, this study will analyze a scenario in which the maximum trip generator has been constructed in place of the proposed storage use.

### Site Location and Study Area

The property that comprises the application area is located on El Paso County Parcel Numbers 5301001001 and 5301001002. Upon completion, the site will be bounded by Owl Place to the south, Meridian Road to the east, and property lines to the north and west. The site is currently zoned as Residential Rural (RR-5) and is mostly vacant with only two residential homes on site. The site is in the process of being rezoned to Commercial Service (CS). Access to the southern side of the proposed development will be provided via one full movement access along Owl Rd. In addition, Meridian Park Dr will be extended to the south, providing access to the northern side of the development. Place

The Applicant proposes to develop the site with 158 self-storage units as well as 96 RV/Boat storage spaces. A reduction of the Applicant's proposed conceptual site plan is provided in Figure 1-2. A full-size copy of the plan is provided in Appendix A.

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

1. The Applicant's proposed development plans and other background data were reviewed.
2. A virtual field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits was conducted.
3. Turning movement counts that were taken on Wednesday, June 1, 2022 for the Owl Place Commercial traffic study were used in this study.
4. Using Synchro 11, the Level of Service (LOS) for each intersection was reported based on the methodology prescribed by the Highway Capacity Guidelines 6<sup>th</sup> Edition.
5. The AM and PM peak hour background 2024 and background 2040 traffic volumes were forecasted by using the existing volumes, a background growth rate, and the trips expected to be generated from the identified pipeline developments.
6. The LOS for the background scenarios was reported by incorporating the forecasted background volumes.
7. The site trip generation was calculated utilizing the Institute of Transportation Engineers (ITE) Trip Generation 11<sup>th</sup> Ed.

8. The total 2024 and 2040 traffic forecasts were calculated by adding the background volume forecasts and the projected site trips.
9. The LOS was reported for the total scenarios by incorporating the forecasted total future volumes.
10. The trip generation for the maximum trip generating scenario was calculated utilizing the Institute of Transportation Engineers (ITE) Trip Generation 11<sup>th</sup> Ed.
11. The total 2024 and 2040 traffic forecasts were calculated by adding the background volume forecasts and the projected maximum use site.
12. The LOS was reported for the maximum use scenarios by incorporating the forecasted total future volumes.

Sources of data for this analysis included the Highway Capacity Guidelines (HCM) 6th, ITE 11<sup>th</sup> Ed, El Paso County, 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**

The site will have one full movement access on Owl Pl. Meridian Park Dr will be extended to the south, where it will provide a second access to the proposed site.

### **Existing Zoning**

The site is currently zoned as Residential Rural and is being rezoned to Commercial Service. The existing zoning is shown in Figure 1-3.

### **Nearby Uses**

The properties surrounding the subject site are primarily residential.

**TIS should mention that existing land uses immediately north of the site are commercial and that proposed land uses immediately south of the site are also commercial.**

**Parcel 5301001015 to the east is also being rezoned to commercial use**









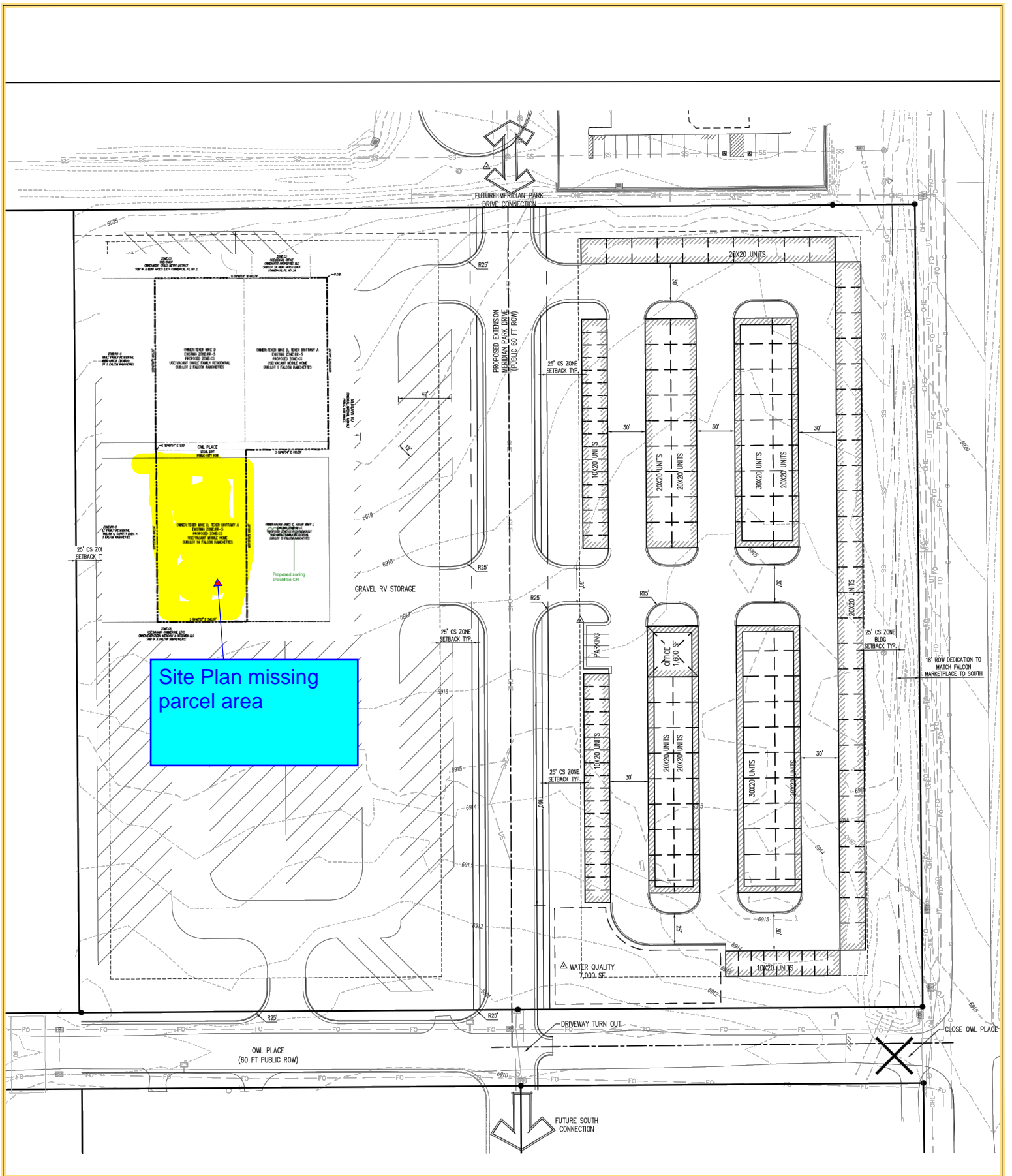


FIGURE 1-1  
Site Location

Meridian Storage  
El Paso County, CO

-  MOVEMENT
-  SIGNALIZED INTERSECTION
-  STOP SIGN
-  YIELD SIGN



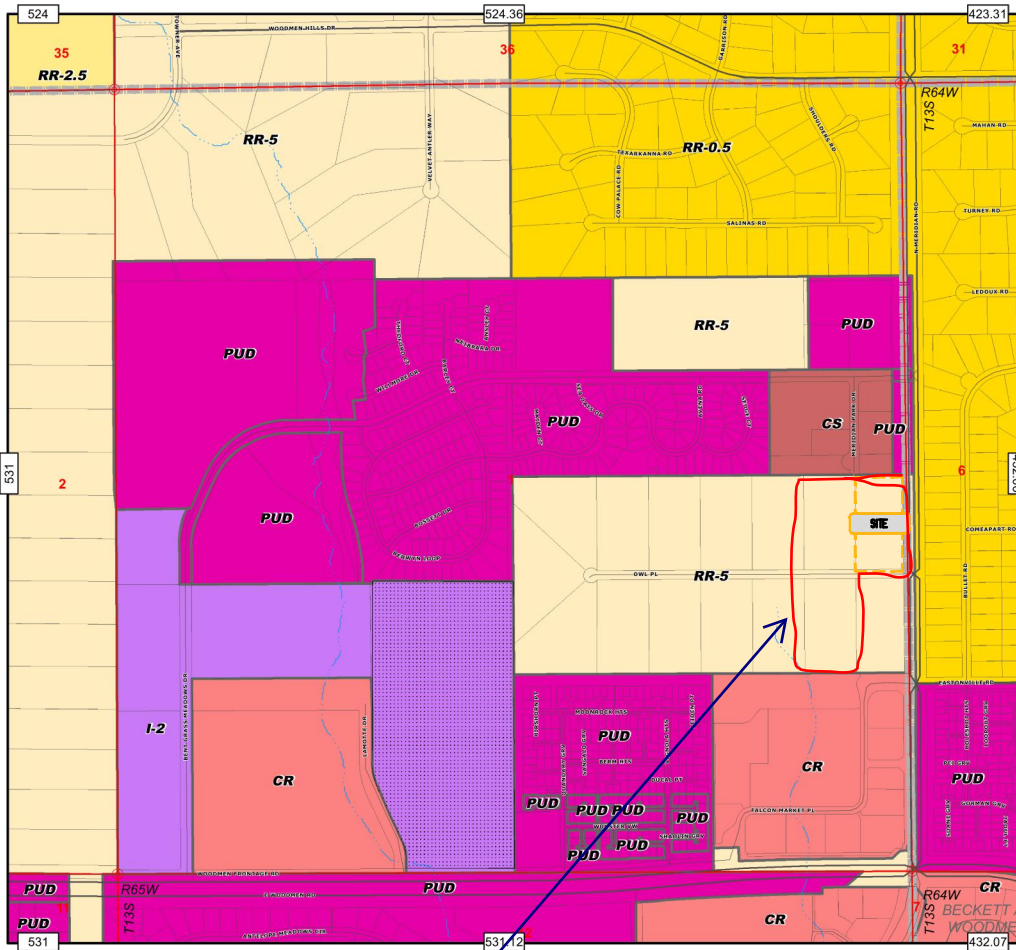


**FIGURE 1-2**  
**Site Plan**

Meridian Storage  
El Paso County, CO

-  MOVEMENT
-  SIGNALIZED INTERSECTION
-  STOP SIGN
-  YIELD SIGN





### Zone Map 531.01 - El Paso County - Development Services Department Zoning Designations

RS-2000: Residential Suburban (20,000 sq. ft.)	F-5: Forest & Recreation (5 acres)
RS-6000: Residential Suburban (6,000 sq. ft.)	PUD: Planned Unit Development
RS-8000: Residential Suburban (5,000 sq. ft.)	CC: Commercial Community
RM-12: Residential Multi-Dwelling (1/2 DU/acre)	CR: Commercial Regional
RM-30: Residential Multi-Dwelling (30 DU/acre)	CS: Commercial Service
RR-0.5: Residential Rural (0.5 acres)	I-2: Limited Industrial
RR-2.5: Residential Rural (2.5 acres)	I-3: Heavy Industrial
RR-8: Residential Rural (8 acres)	A-6: Agricultural (5 acres)
R-T: Residential - Topographic	A-35: Agricultural (35 acres)
MHP: Mobile Home Park	C-1: ** Commercial
MHP-R: Mobile Home Park, Rural	C-2: ** Commercial
MHS: Mobile Home Subdivision	M-** Industrial
RVP: Recreational Vehicle Park	R-4: ** Planned Development

\*\* Indicates an obsolete designation

#### Supporting Data

Highways	Sections	Incorporated Cities
Major Roadways	Parcels	Zone Map Boundary
Creeks - Perennial	Military	Zoning Overlay
Creeks - Intermittent	Pike National Forest	Special Uses
Section Corner Nodes		

1 inch = 600 feet

#### Vicinity Map

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include a proposed parcels



FIGURE 1-2  
Site Plan

Meridian Storage  
El Paso County, CO

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



## II. Background Information

### Study Area

The study area was determined by a review of intersections that would experience a significant portion of turning movement volumes generated by the site. The study area for the project includes the following intersections that may see impacts to traffic operations as a result of the proposed development:

#### **Study Intersections**

- Woodman Rd & Meridian Rd
- Meridian Rd & Eastonville Rd
- Meridian Rd & Bent Grass Meadows Dr
- Bent Grass Meadows Dr & Meridian Park Dr

### Study Assumptions

For purposes of this analysis only, it is assumed that the proposed development will be completed by 2024. It is assumed that the nearby pipeline developments of Falcon Meadows at Bent Grass, Owl Place Commercial, and Falcon Marketplace will be built and operating by year 2024. A background growth rate of 1 per year was applied to the existing turning movement counts.

This background growth rate appears low. It is half of the growth rate shown in one study in Appendix E. Revise or provide justification.

### 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 were taken from the Highway Capacity Manual (HCM) 6<sup>th</sup> reports, generated by Synchro 11. Level of service descriptions are included in Appendix B.

### Existing Roadway Network

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.

#### **Woodmen Rd**

Woodmen Rd is a four-lane, east/west, divided highway with a posted speed limit of 45 mph through the study area. It provides access to US-24 east of the site and to CO-21 west of the site.

#### **Meridian Rd**

Meridian Rd is a four-lane, north/south, divided highway with a posted speed limit of 55 mph through the study area. It provides access to many of the nearby residential developments.

Clarify adjacent land uses along Meridian Road per comment in previous section.

**Bent Grass Meadows Dr**

Bent Grass Meadows Dr is an east/west local road with a posted speed limit of 35 mph and provides access to the newly constructed housing development Falcon Meadows at Bent Grass.

**Meridian Park Dr**

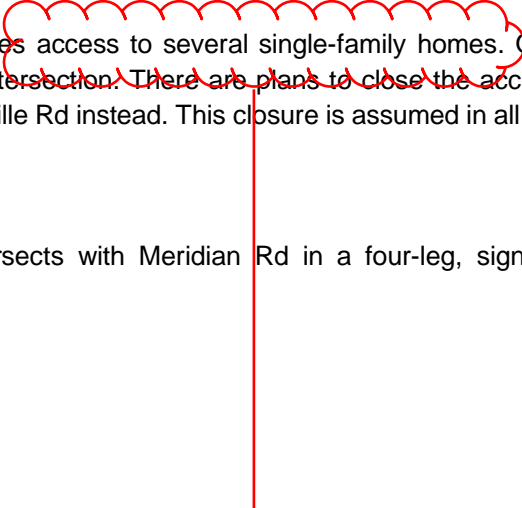
Meridian Park Dr is a two lane, north/south local road. It currently dead ends just north of the proposed development. Upon completion of the development, Meridian Park Dr will be extended to the south and will provide site access.

**Owl PI**

Owl PI is a two-lane, east/west, local road that provides access to several single-family homes. Owl PI currently intersects Meridian Rd in a stop-controlled intersection. There are plans to close the access to Meridian Rd and provide an extension south to Eastonville Rd instead. This closure is assumed in all future scenarios analyzed in this study.

**Eastonville Rd**

Eastonville Rd is a two-lane, east/west road. It intersects with Meridian Rd in a four-leg, signalized intersection.



How is access to these single family homes maintained?  
How are the trips associated with these homes (shown in Appendix E) redistributed in future scenarios?

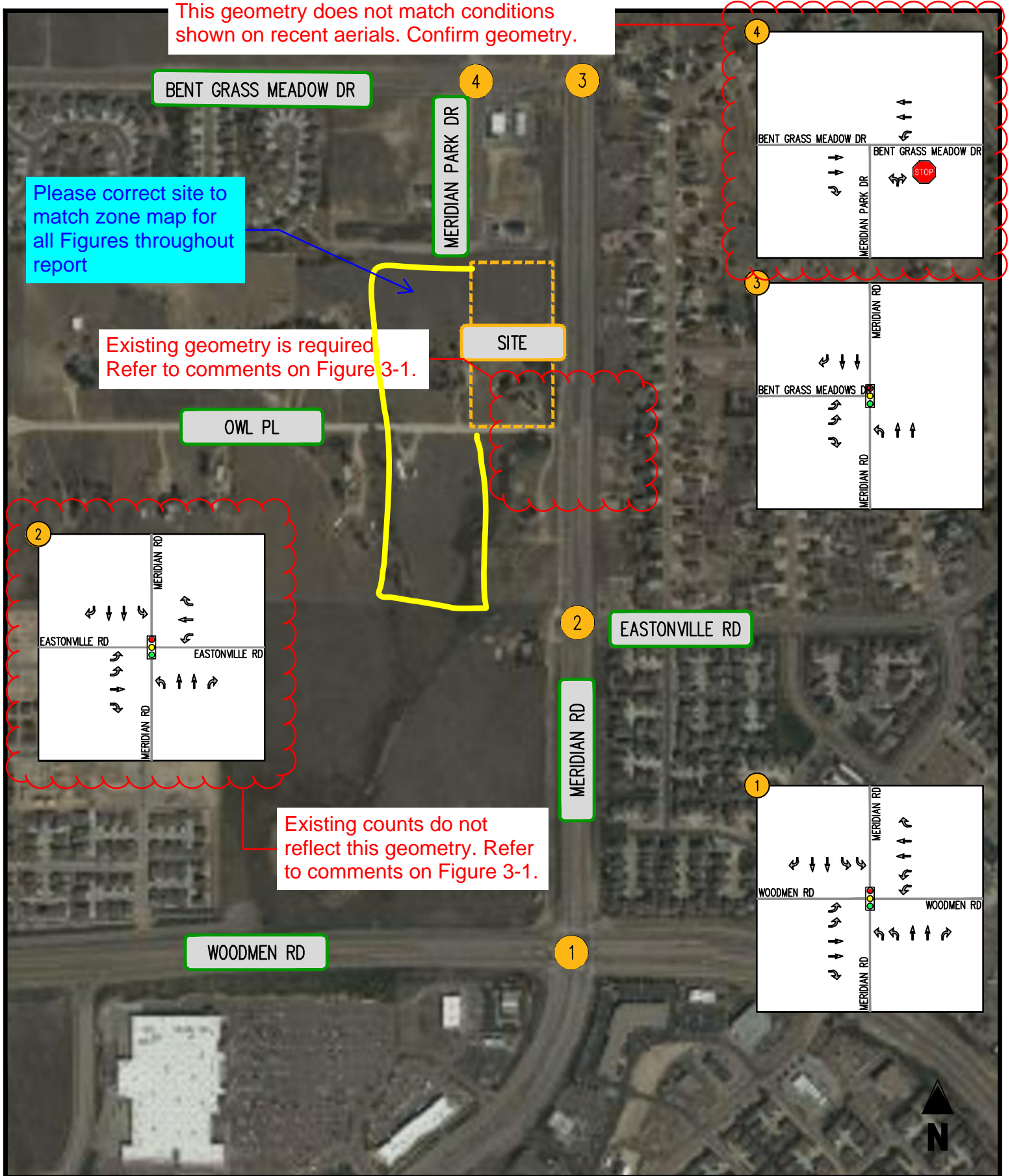


FIGURE 2-1  
Existing Lane Use and Traffic Control

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



Since not all counts were obtained from the same source, need to discuss selection of peak hours and balancing between intersections.

### III. Analysis of Existing Conditions

#### Traffic Volumes

The Owl Place Commercial traffic study, conducted by SM Rocha, LLC in September, 2022 studied the same intersections as this traffic study. The turning movement counts collected on Wednesday, June 1, 2022 for the SM Rocha study were used as the existing volumes in this study. The raw traffic counts are provided in Appendix C. The existing traffic volumes are presented in Figure 3-1.

#### Existing Operational Analysis

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown in Figure 2-1, and existing traffic volumes shown in Figure 3-1. The peak hour factors (PHF) were set to 0.92. The signal timings for the three signals in the study area were incorporated into the Synchro models. A detailed results report is presented in Appendix D and is summarized in Table 3-1 and in Figure 3-2.

The signalized intersection of Woodmen Rd & Meridian Rd operates at LOS D during both the AM and PM peak hours. The remaining two signals and the stop-controlled intersection of Bent Grass Meadows Dr & Meridian Park Dr operate at LOS A. There are no operational concerns.

#### Existing Intersection Queues

The 95% queue lengths were reported for each movement within the study area using the Synchro queuing reports. The results are summarized in Table 3-2. Generally, queuing is minor in the existing scenarios. All of the reported queues are able to fit within their respective storage lengths.

Meridian Park Drive at Bent Grass Meadows Drive is not included in that study. Where were these counts obtained?

This PHF does not meet ECM requirements. Revise accordingly.

Provide a progression analysis along Meridian Road per ECM requirements.

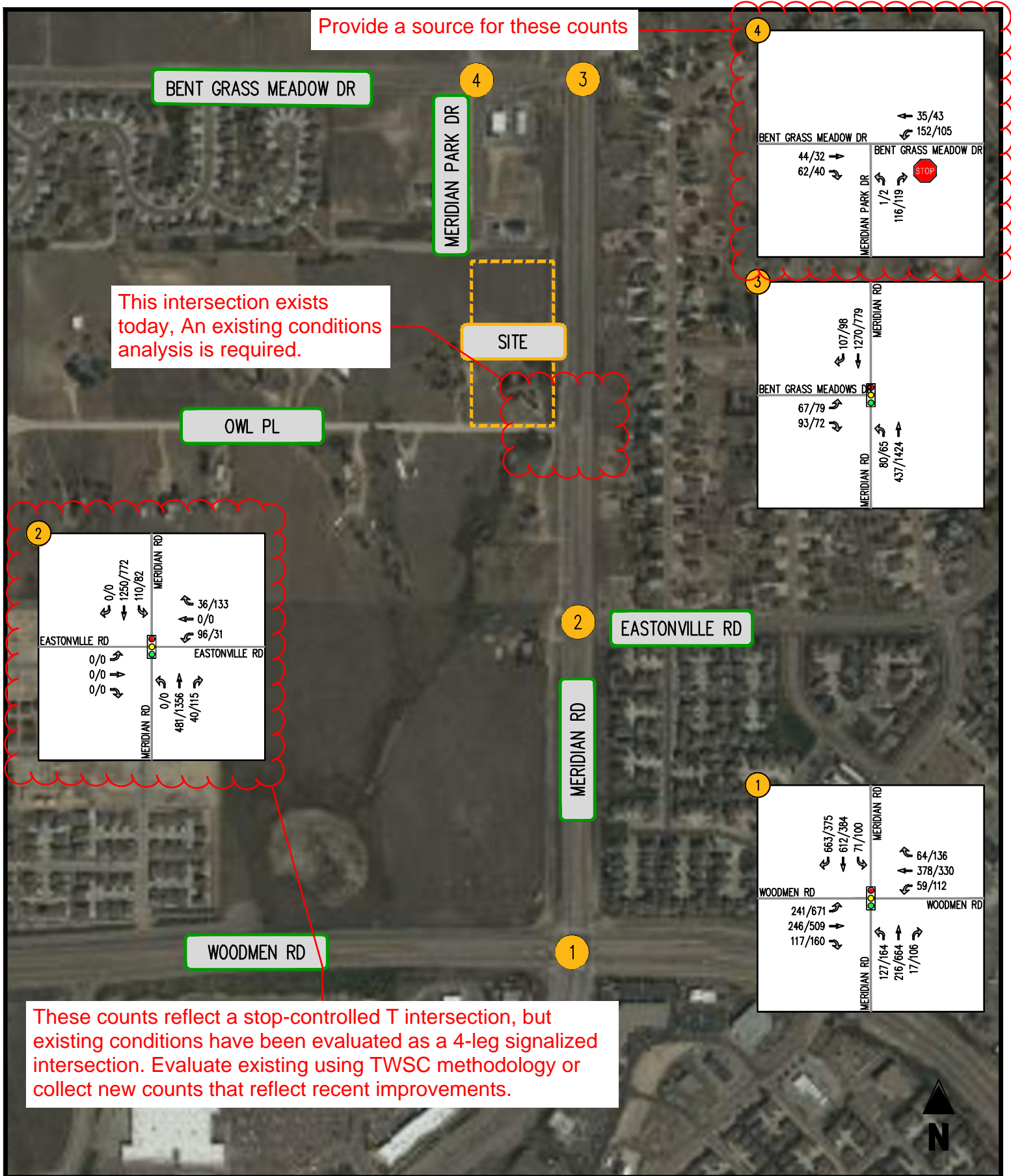


FIGURE 3-1  
Existing 2023 Volumes

Meridian Storage  
El Paso County, CO

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

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





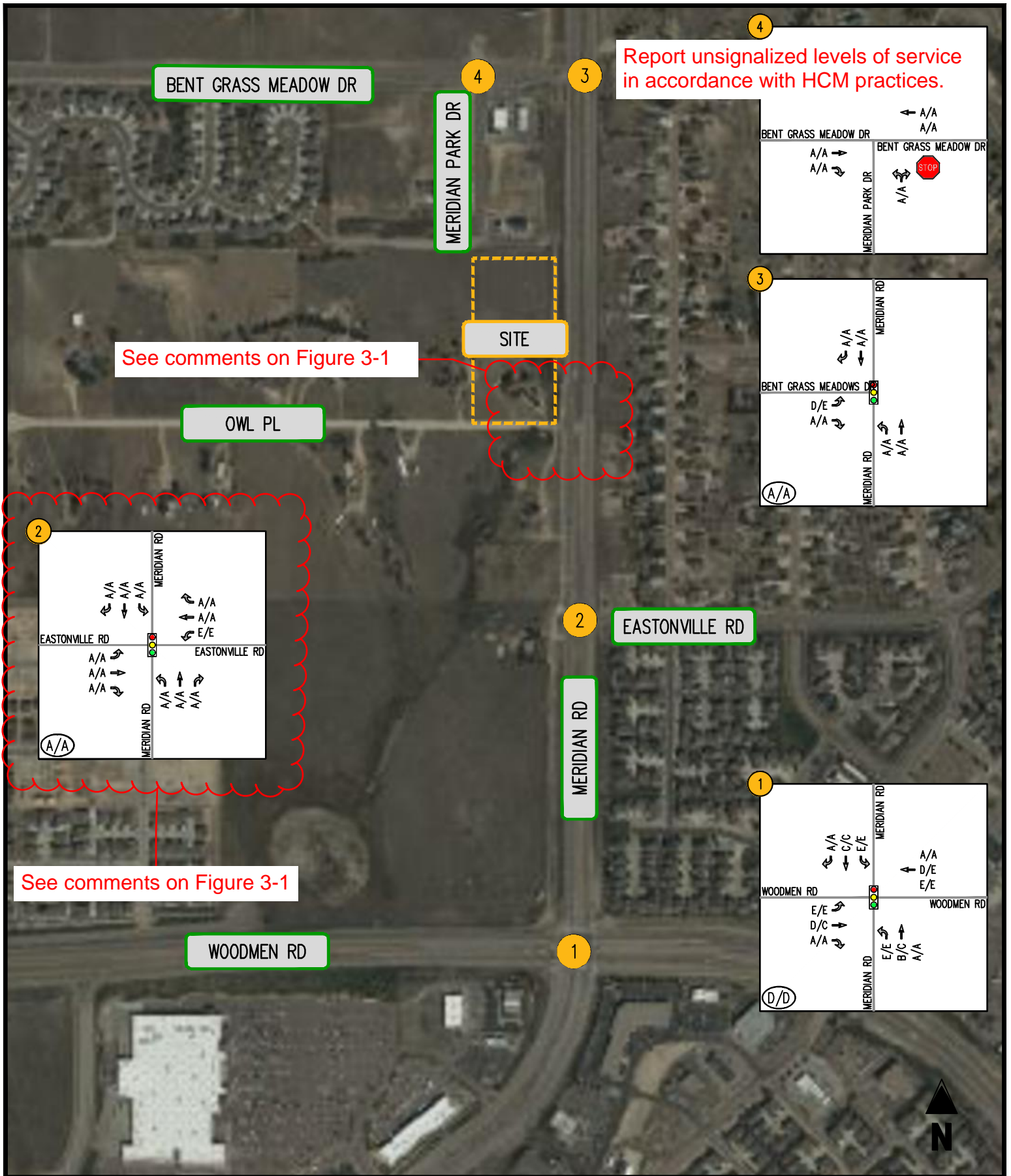


FIGURE 3-2  
Existing 2023 Level of Service

Meridian Storage  
El Paso County, CO

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

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



Table 3-1  
Meridian Storage  
Existing Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023	
				AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	E (57.5)	E (57.8)
			EBT	D (41.6)	C (34.8)
			EBR	A (0.0)	A (0.0)
		Woodmen Road	WBL	E (59.8)	E (60.1)
			WBT	D (53.6)	E (58.8)
			WBR	A (0.0)	A (0.0)
		Meridian Road	NBL	E (60.6)	E (65.1)
			NBT	B (18.0)	C (34.2)
			NBR	A (0.0)	A (0.0)
		Meridian Road	SBL	E (60.7)	E (60.9)
			SBT	C (22.7)	C (31.8)
			SBR	A (0.0)	A (0.0)
		<b>Overall</b>			<b>D (39.8)</b>
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	A (0.0)	A (0.0)
			EBT	A (0.0)	A (0.0)
			EBR	A (0.0)	A (0.0)
		Eastonville Road	WBL	E (57.2)	E (59.2)
			WBT	A (0.0)	A (0.0)
			WBR	A (0.0)	A (0.0)
		Meridian Road	NBL	A (0.0)	A (0.0)
			NBT	A (3.7)	A (8.0)
			NBR	A (3.2)	A (4.7)
		Meridian Road	SBL	A (2.1)	A (6.7)
			SBT	A (2.6)	A (2.1)
			SBR	A (0.0)	A (0.0)
		<b>Overall</b>			<b>A (5.5)</b>
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	D (55.0)	E (55.2)
			EBR	A (0.0)	A (0.0)
		Meridian Road	NBL	A (7.5)	A (4.6)
			NBT	A (2.5)	A (4.5)
		Meridian Road	SBT	A (9.5)	A (7.3)
			SBR	A (5.9)	A (5.8)
		<b>Overall</b>			<b>A (9.2)</b>
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	A [0.0]	A [0.0]
			EBR	A [0.0]	A [0.0]
		Bent Grass Meadows Drive	WBL	A [7.8]	A [7.6]
			WBT	A [0.0]	A [0.0]
		Meridian Park Drive	NBLR	A [9.0]	A [8.9]

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  
Meridian Storage  
Existing Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023	
					AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	500	140	352
			EBT	-	123	243
			EBR	630	0	0
		Woodmen Road	WBL	350	47	77
			WBT	-	205	193
			WBR	250	0	0
		Meridian Road	NBL	440	85	108
			NBT	-	104	344
			NBR	330	0	0
		Meridian Road	SBL	490	48	74
			SBT	-	276	215
SBR	450	26	0			
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	100	0	0
			EBT	-	0	0
			EBR	100	0	0
		Eastonville Road	WBL	120	136	59
			WBT	-	0	0
			WBR	100	0	0
		Meridian Road	NBL	100	0	0
			NBT	-	155	48
			NBR	400	16	0
		Meridian Road	SBL	375	35	37
			SBT	-	470	35
SBR	400	0	0			
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	150	51	59
			EBR	-	54	48
		Meridian Road	NBL	700	10	22
			NBT	-	3	486
		Meridian Road	SBT	-	366	181
			SBR	350	20	19
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	-	0	0
			EBR	150	0	0
		Bent Grass Meadows Drive	WBL	100	10	7.5
			WBT	-	0	0
		Meridian Park Drive	NBLR	-	10	10

Synchro reports this movement as over capacity with unreliable 95th percentile queue length. Flag this result in the table.

Yellow highlights show through queues that block turn lanes. Green highlights show queues that extend beyond turn pocket lengths. These blockages should be identified in the text and considered for mitigation.

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

Owl Place Storage El Paso County, CO **Discuss timing of this new connection versus closure of Owl Place since the Owl Place Storage project will not construct the connection to the south. Also, redistribute existing residential trips from Owl Place to new roadways as appropriate. Will some to these trips travel through the proposed storage facility site?**

## IV. Analysis of Background 2024 & 2040 Conditions

### Methodology

The background scenarios analyze traffic operations assuming that the site has not been developed but that traffic volumes have increased due to background growth.

### Roadway Improvements

The background scenarios assume that the connection between Owl PI and Meridian Rd has been closed. The proposed development (Owl Place Commercial) on the southwest corner of Meridian Rd & Owl PI will provide access between Owl PI and Eastonville Rd. Upon completion, vehicles that would have previously accessed Meridian Rd from Owl PI will have to travel south to Eastonville Rd to do so.

### Regional Growth

A 1% annual growth rate was applied to the existing traffic volumes. Since this study separately includes the volumes for three pipeline developments, a 1% annual growth rate is considered adequate as the pipelines will contribute significant volume growth to the background forecasts. The resulting increases in background traffic volumes within the study area are reflected in Figure 4-1 for the background 2024 scenario and in Figure 4-2 for the background 2040 scenario.

**The Owl Place Commercial Rezone TIS (see Appendix E) used 2% per year. Either revise or provide justification for using 1% per year.**

### Pipeline Developments

Three nearby pipeline developments were identified and analyzed to determine their volume contributions through the study area. An accompanying TIS for each development was provided. For purposes of this study, it is assumed that all three pipeline developments will be operational by 2024 and all planned roadway improvements associated with the developments will be completed by 2024. Figure 4-3 shows the location of the pipeline developments in respect to the proposed site.

The Owl Place Commercial development will be located on the southwest corner of US-34 & 65<sup>th</sup> Ave. The Owl Place Commercial Traffic Impact Study conducted by SM Rocha, LLC in September 2022 was referenced to determine the trip generation and distribution from the development. The development will consist of a fast food restaurant, a coffee/donut shop, a gas station with convenience store, and a car wash. When this development is constructed, access between Owl PI and Meridian Rd will be restricted. Vehicles will use the access road on the west side of the site to reach Eastonville Rd where they will be able to access Meridian Rd. Figure 4-4 details the trip distribution of the development through the study area.

The Falcon Ranch Development is located on the northwest corner of Woodmen Rd & Meridian Rd. The Falcon Ranch Development Traffic Impact Study conducted by LSC Transportation Consultants, INC in September 2018 was referenced to determine the trip generation and distribution. The table below shows the land uses that were analyzed in the LSC traffic study:

**The Owl Place Commercial TIS assumed that Owl Place would remain open. Discuss how the trips in that TIS have been reassigned to reflect the planned roadway closure and what effects the reassignments may have.**

**Owl Place Commercial is not on US34. Revise.**

Falcon Marketplace is the name of the development. Please update.  
Gallagher & Company, Inc.

**Falcon Ranch will not be complete by 2024. The 2024 analysis in the Owl Place TIS should not take advantage of operational benefits provided by long-range improvements in the Falcon Ranch TIS.**

ITE Code	Land Use	Size
866	Pet Supply Superstore	15 KSF
850	Supermarket	123 KSF
944	Gasoline/Service Station	18 VFP
934	Fast-Food Restaurant with Drive-Through Window	2.5 KSF
820	Shopping Center	5 KSF
848	Tire Store	7.72 KSF
934	Fast-Food Restaurant with Drive-Through Window	3.5 KSF
934	Fast-Food Restaurant with Drive-Through Window	2.5 KSF
610	Clinic	7.8 KSF
820	Shopping Center	8 KSF
937	Coffee/Donut Shop With Drive-Through Window	1.3 KSF

The Falcon Ranch Development will be constructed in two phases, with the first phase expected to be completed by 2024 and the second phase expected to be completed by 2040. Figure 4-5 shows the trip distribution for phase 1 of the development and Figure 4-6 shows phase 2 of the development.

The third identified pipeline is the Falcon Meadows at Bent Grass Development. This development was studied in the Falcon Meadows at Bent Grass (Filing Numbers 1-4) conducted by LSC Transportation Consultants, INC. Each filing was conducted for a section of the development, with the most recent Filing 4, conducted in October 2022. Filing 4 was referenced in this study, as it includes trip generation from the entire pipeline development. Falcon Meadows at Bent Grass will be located west of Bent Grass Meadows Dr, to the northwest of the proposed development. Falcon Meadows at Bent Grass is a large development that will consist of residential housing, a shopping center, a marketplace, and a school. Figure 4-7 shows the trip distribution for Falcon Meadows at Bent Grass.

The relevant pages from the pipeline development TIS's are included in Appendix E.

### Background 2024 & 2040 Traffic Forecasts

The background 2024 traffic forecast, shown in Figure 4-8, was calculated by taking the existing volumes from Figure 3-1 and adding the background 2024 growth (Figure 4-1) and the pipeline trip distributions (Figures 4-4, 4-5, and 4-7).

The background 2040 traffic forecast, shown in Figure 4-9, was calculated by taking the existing volumes from Figure 3-1 and adding the background 2040 growth (Figure 4-2) and the pipeline trip distributions (Figures 4-4, 4-6, and 4-7).

### Background 2024 & 2040 Levels of Service

Carry existing conditions analysis comments into future year analyses as appropriate.

Capacity analyses of the background scenarios are provided in Appendix F. The background 2024 forecasted levels of service are shown in Table 4-1 and depicted graphically in Figure 4-10. The background 2040 forecasted levels of service are shown in Table 4-1 and depicted graphically in Figure 4-11. The Synchro models were updated with the future background volumes. The splits and the signalized intersections were optimized, but the cycle lengths were kept the same. Signal progression analysis is required.

The delays at Woodmen Rd & Meridian Rd remain similar to existing in the background 2024 scenario, but by 2040, the intersection will operate at LOS E in the PM peak hour. It should be noted that the LOS E indicates that this intersection will be nearing capacity by 2040. The delays have also increased at the

signalized intersections of Meridian Rd & Bent Grass Meadows Dr and at Meridian Rd & Eastonville Rd, however, they are still expected to operate at LOS C or better. The stop-controlled intersection of Bent Grass Meadows Dr & Meridian Park Dr will operate at LOS A in all background scenarios.

### Background 2024 & 2040 Queueing

Using the Synchro queueing reports, the 95% queues for each movement are summarized in Table 4-2 for the background 2024 and 2040 scenarios. Although the queues are forecasted to increase by 2040, it is expected that most will be contained within their respective storage lengths. Notably, Table 4-2 shows several queues at Meridian Rd & Eastonville Rd exceeding their storage capacity. The storage lengths reported for this intersection were taken from the Owl Place Commercial traffic study, as Google Earth has not been updated to show the new intersection configuration. Since this signal operates well under capacity, the queues are expected to clear each cycle length, and therefore will not cause operational problems.

Refer to comments on queuing tables. Mitigations (by others) may be required.

Refer to existing conditions comments and revise future analyses accordingly.

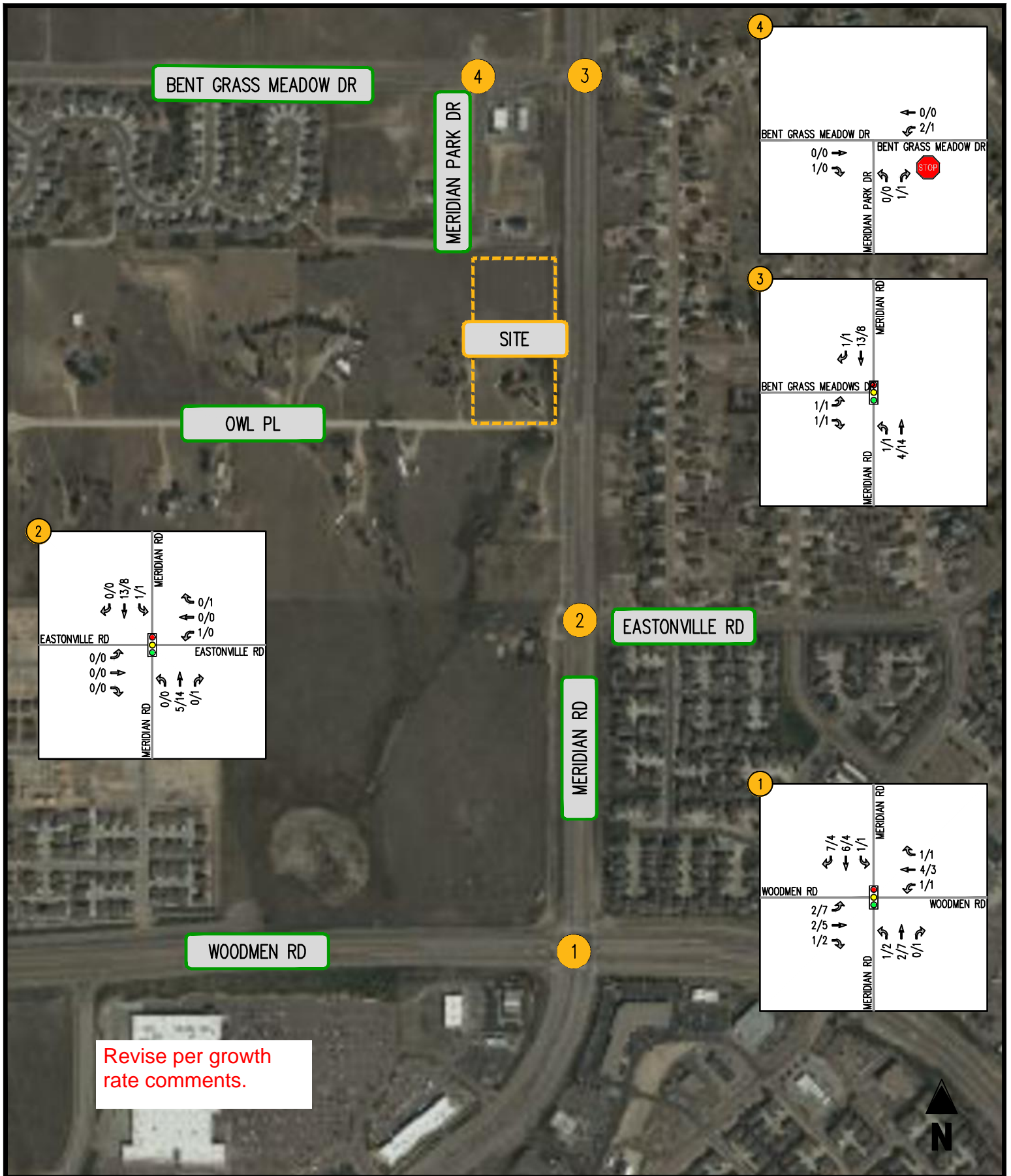


FIGURE 4-1  
Background 2024 Growth

Meridian Storage  
El Paso County, CO

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



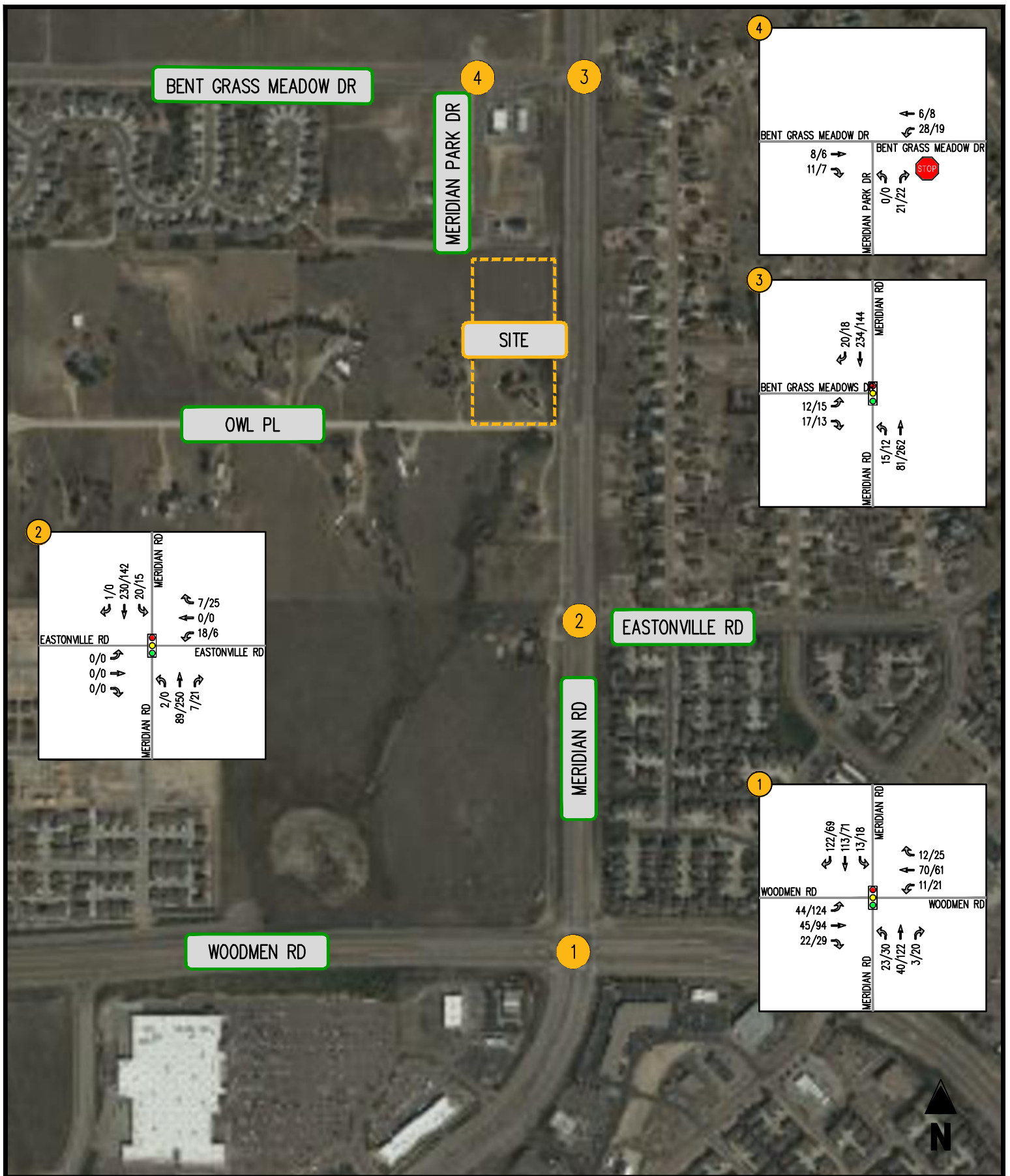


FIGURE 4-2  
Background 2040 Growth

Meridian Storage  
El Paso County, CO

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

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







FIGURE 4-3  
Pipeline Locations

Meridian Storage  
El Paso County, CO

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



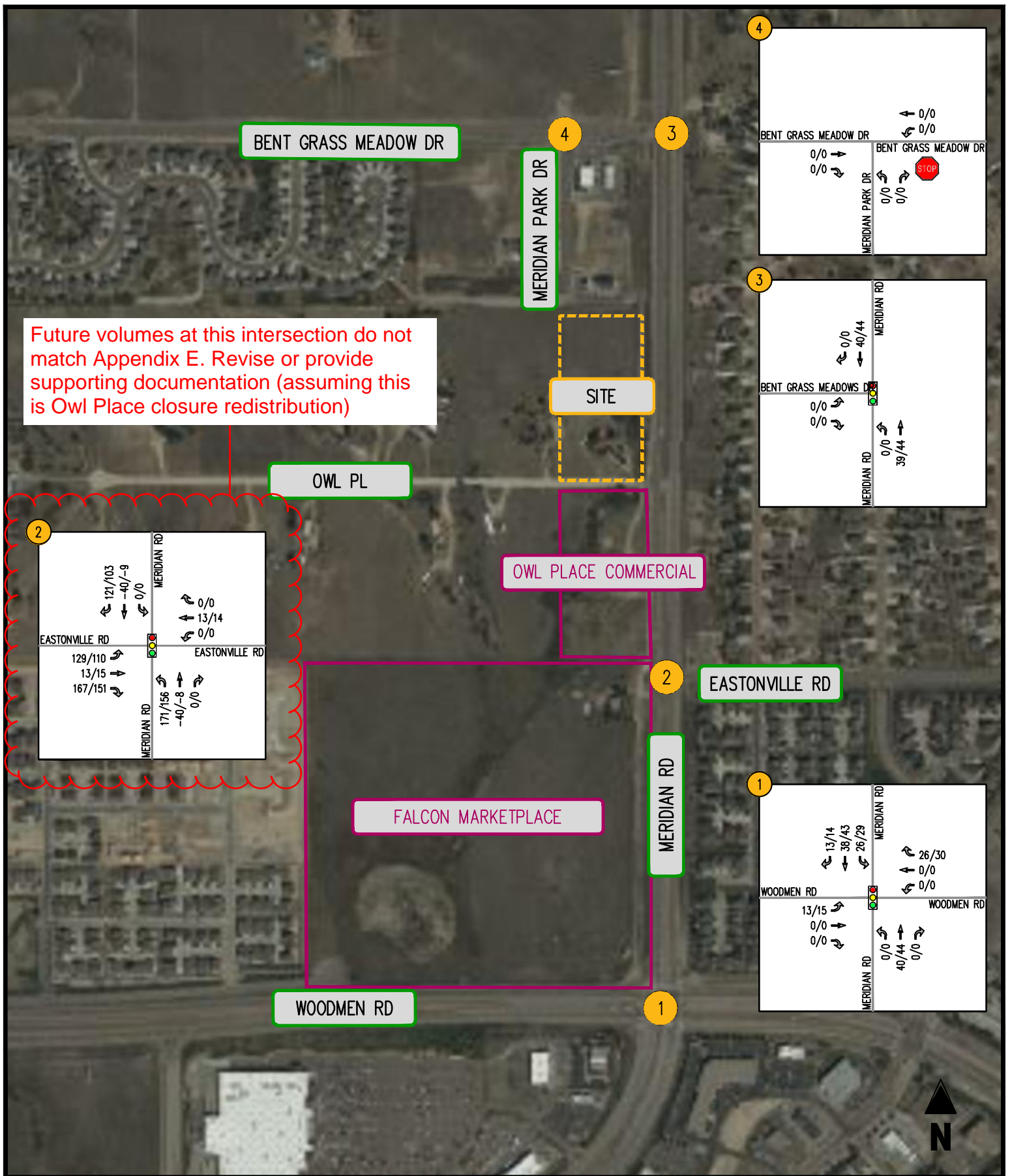


FIGURE 4-4  
Pipeline Site Trips: Owl Place Commercial

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



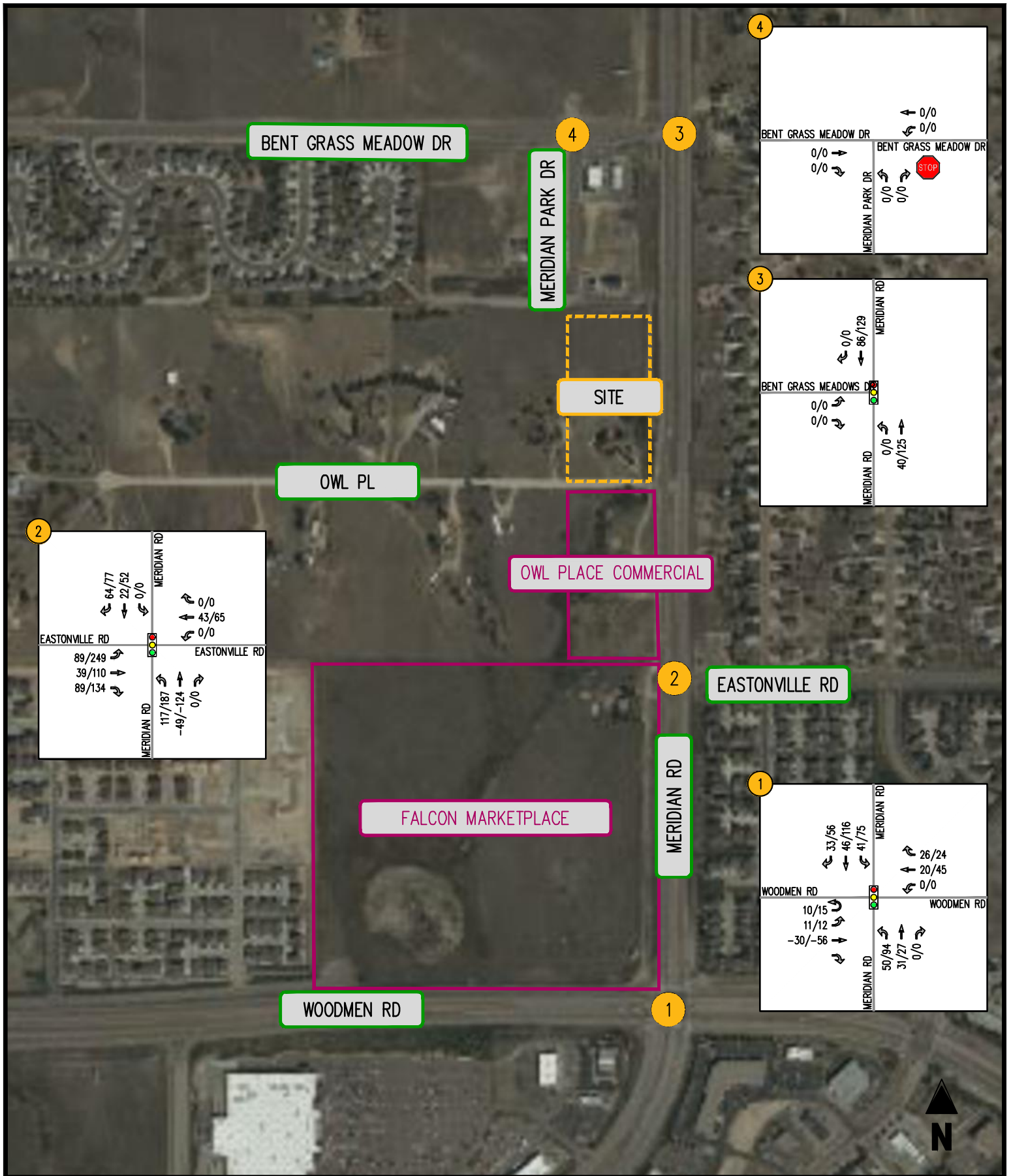


FIGURE 4-5  
 Pipeline Site Trips: Falcon Marketplace 2024

Meridian Storage  
 El Paso County, CO

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

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



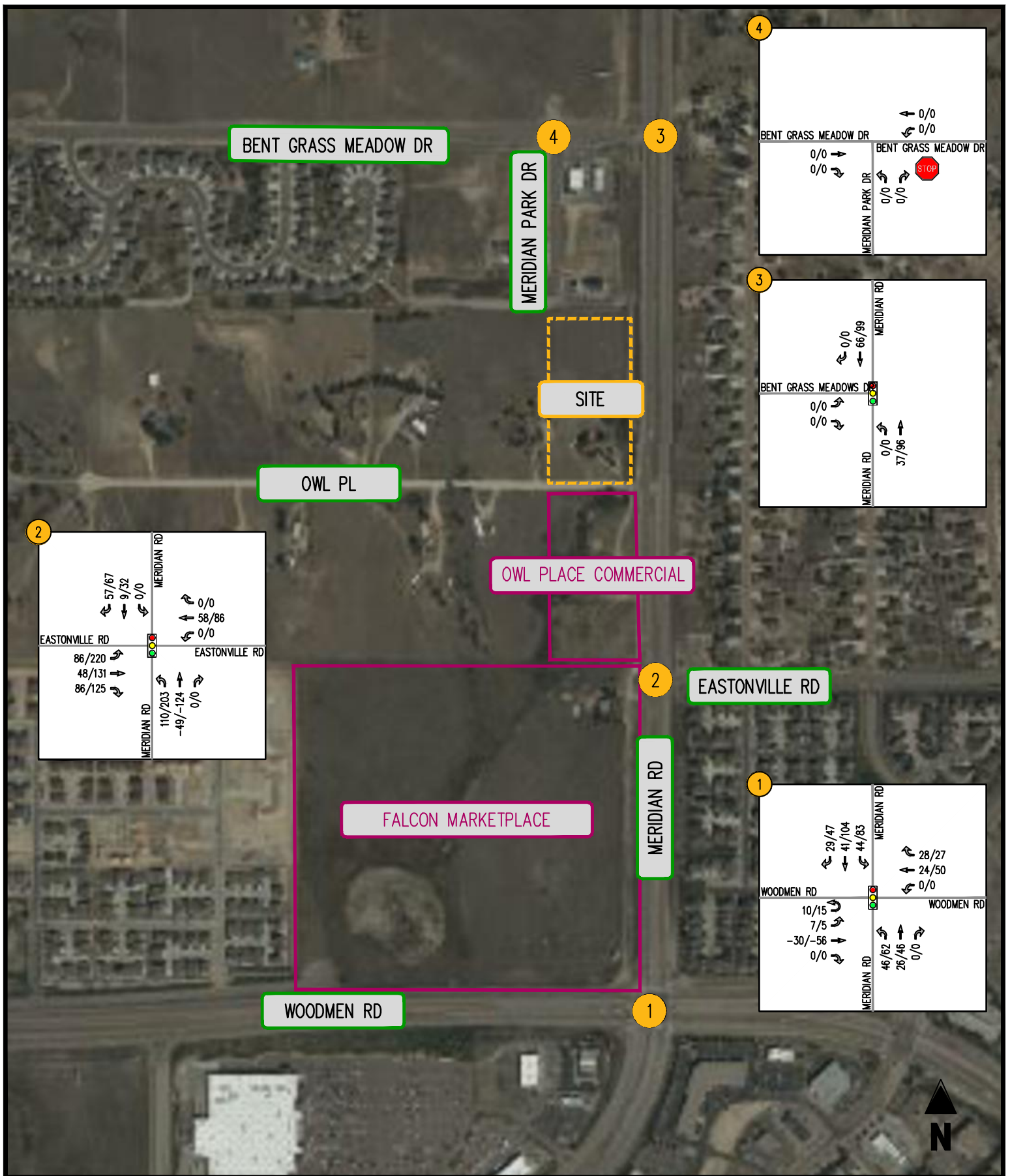


FIGURE 4-6  
Pipeline Site Trips: Falcon Marketplace 2040

Meridian Storage  
El Paso County, CO

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

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



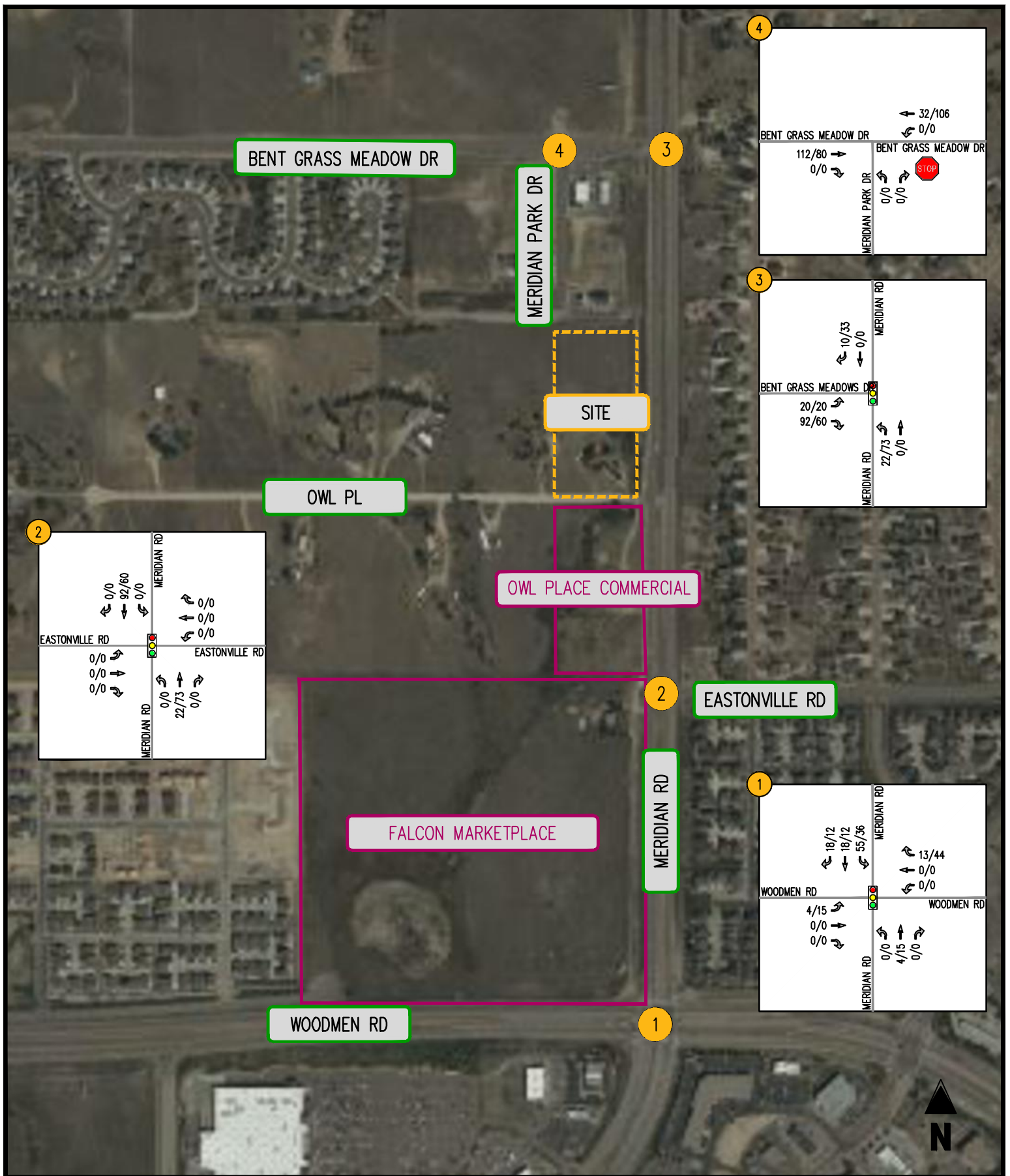


FIGURE 4-7  
Pipeline Site Trips: Bent Grass Filing 4

Meridian Storage  
El Paso County, CO

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

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



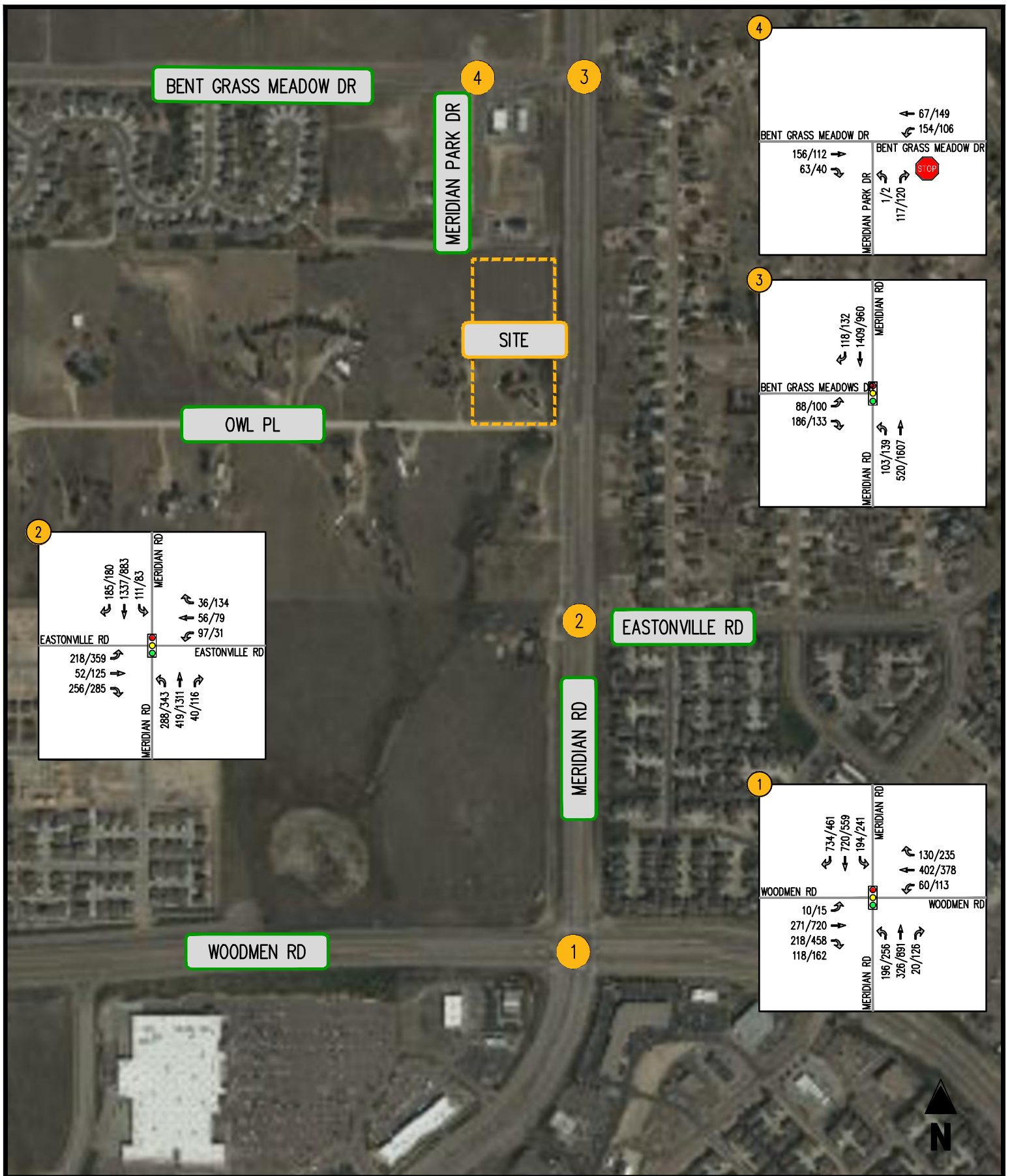


FIGURE 4-8  
Background 2024 Forecasts

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

← MOVEMENT

🚦 SIGNALIZED INTERSECTION

🛑 STOP SIGN

🚶 YIELD SIGN





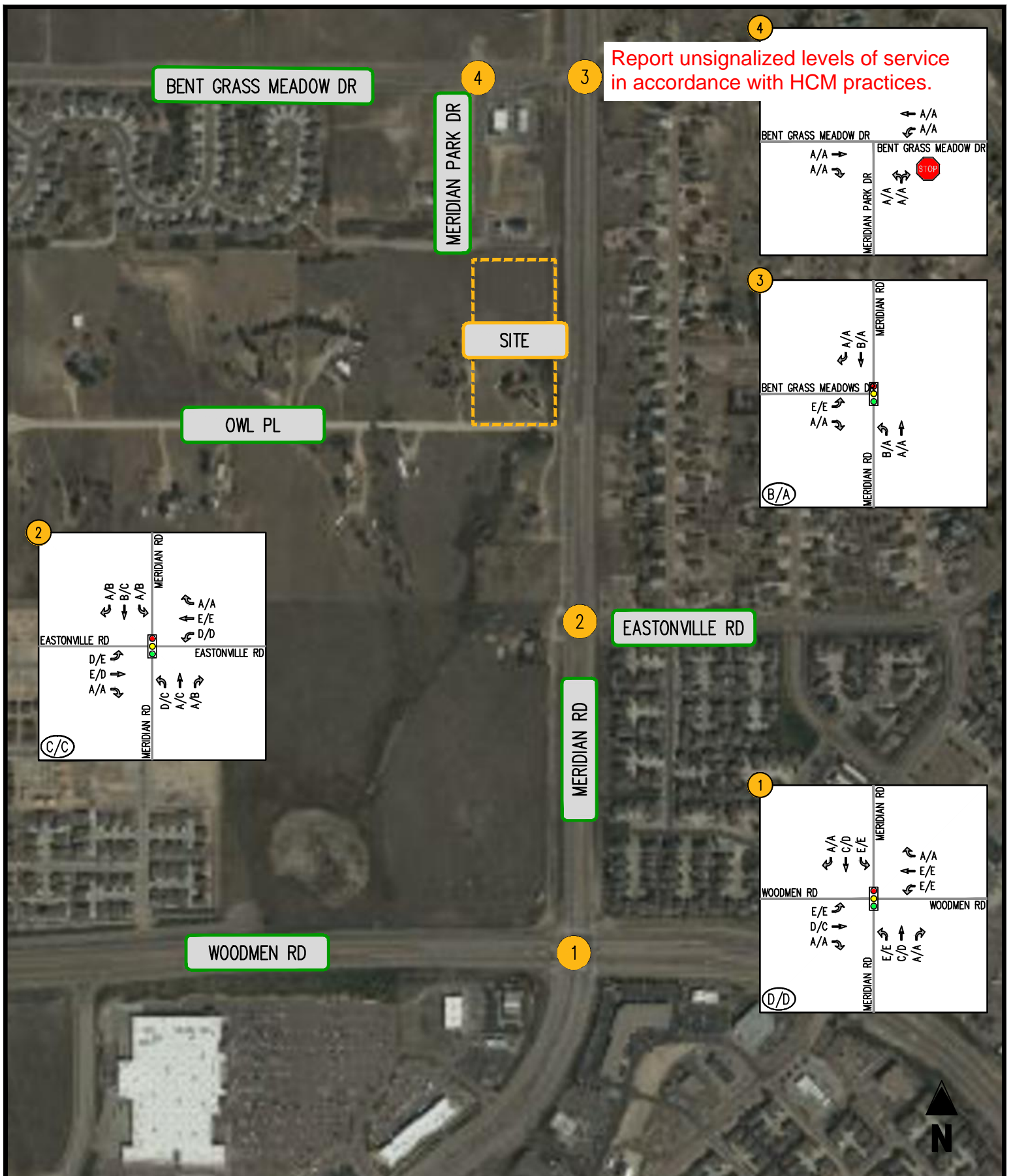
FIGURE 4-9  
Background 2040 Forecasts

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

Meridian Storage  
El Paso County, CO

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN





Report unsignalized levels of service in accordance with HCM practices.

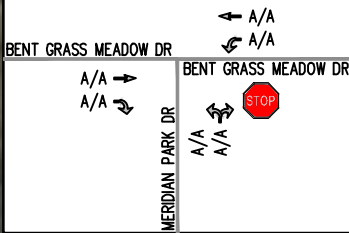
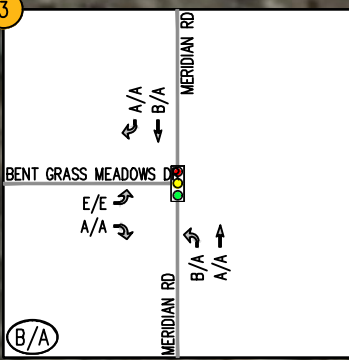
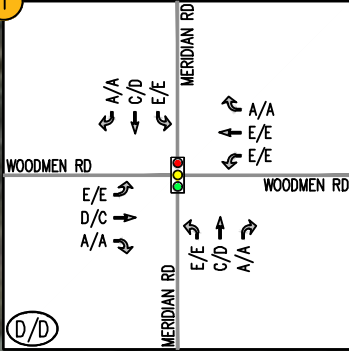
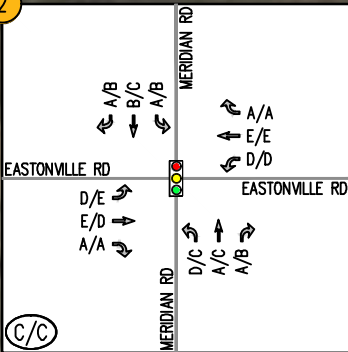


FIGURE 4-10  
Background 2024 Levels of Service

Meridian Storage  
El Paso County, CO

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

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





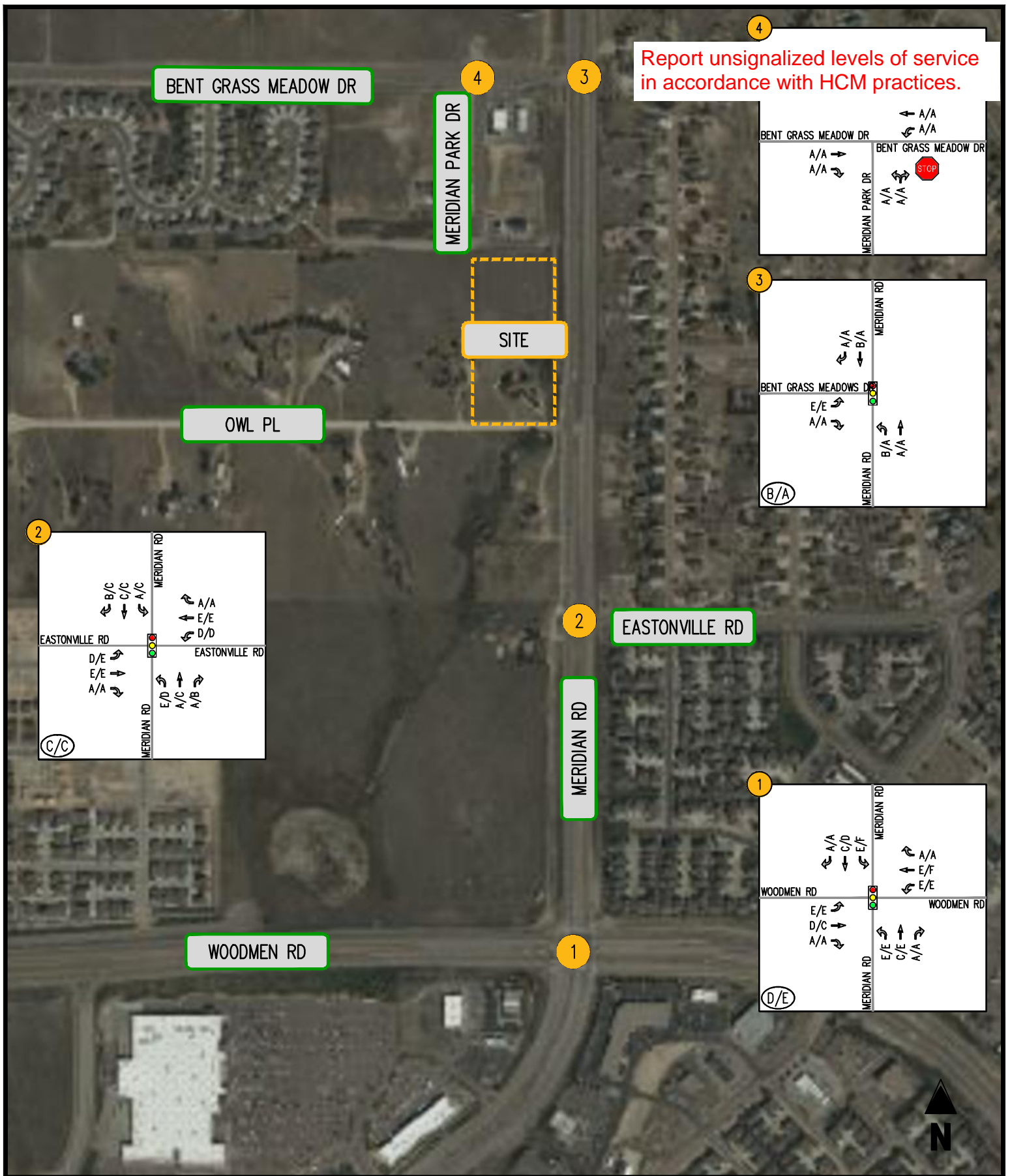


FIGURE 4-11  
Background 2040 Levels of Service

Meridian Storage  
El Paso County, CO

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

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



Table 4-1  
Meridian Storage  
Background Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023		Background 2024		Background 2040		
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	E (57.5)	E (57.8)	E (59.9)	E (60.0)	E (61.9)	E (72.6)	
			EBT	D (41.6)	C (34.8)	D (40.0)	C (32.8)	D (37.5)	C (32.8)	
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Woodmen Road	WBL	E (59.8)	E (60.1)	E (59.8)	E (60.8)	E (60.6)	E (60.8)	
			WBT	D (53.6)	E (58.8)	E (57.7)	E (77.2)	E (58.9)	F (117.8)	
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	NBL	E (60.6)	E (65.1)	E (61.5)	E (67.5)	E (64.1)	E (67.5)	
			NBT	B (18.0)	C (34.2)	C (22.4)	D (45.0)	C (25.7)	E (69.9)	
			NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	SBL	E (60.7)	E (60.9)	E (61.6)	E (76.3)	E (61.4)	F (94.4)	
			SBT	C (22.7)	C (31.8)	C (26.6)	D (39.9)	C (32.3)	D (44.2)	
			SBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		<b>Overall</b>			<b>D (39.8)</b>	<b>D (45.8)</b>	<b>D (43.0)</b>	<b>D (53.5)</b>	<b>D (45.5)</b>	<b>E (67.9)</b>
		2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	A (0.0)	A (0.0)	D (54.1)	E (60.2)	D (52.9)
EBT	A (0.0)				A (0.0)	E (63.5)	D (55.0)	E (63.4)	E (62.8)	
EBR	A (0.0)				A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
Eastonville Road	WBL			E (57.2)	E (59.2)	D (51.1)	D (49.1)	D (49.8)	D (48.7)	
	WBT			A (0.0)	A (0.0)	E (57.9)	E (61.5)	E (56.2)	E (73.6)	
	WBR			A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
Meridian Road	NBL			A (0.0)	A (0.0)	D (36.9)	C (30.0)	E (63.2)	D (45.9)	
	NBT			A (3.7)	A (8.0)	A (6.9)	C (22.1)	A (8.0)	C (28.7)	
	NBR			A (3.2)	A (4.7)	A (6.1)	B (13.2)	A (6.9)	B (14.0)	
Meridian Road	SBL			A (2.1)	A (6.7)	A (6.1)	B (19.9)	A (8.2)	C (28.9)	
	SBT			A (2.6)	A (2.1)	B (13.5)	C (23.6)	C (20.8)	C (28.2)	
	SBR			A (0.0)	A (0.0)	A (8.7)	B (19.4)	B (11.3)	C (21.3)	
<b>Overall</b>				<b>A (5.5)</b>	<b>A (6.5)</b>	<b>C (20.5)</b>	<b>C (29.0)</b>	<b>C (26.2)</b>	<b>C (34.6)</b>	
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL			Bent Grass Meadows Drive	EBL	D (55.0)	E (55.2)	E (55.4)	E (55.8)	E (55.8)
		EBR	A (0.0)		A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	NBL	A (7.5)	A (4.6)	B (10.5)	A (6.3)	B (18.3)	A (7.5)	
			NBT	A (2.5)	A (4.5)	A (2.7)	A (5.2)	A (2.8)	A (6.3)	
		Meridian Road	SBT	A (9.5)	A (7.3)	B (10.7)	A (8.3)	B (12.5)	A (8.9)	
			SBR	A (5.9)	A (5.8)	A (6.1)	A (6.3)	A (6.3)	A (6.5)	
		<b>Overall</b>			<b>A (9.2)</b>	<b>A (7.1)</b>	<b>B (10.3)</b>	<b>A (8.0)</b>	<b>B (11.8)</b>	<b>A (8.9)</b>
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
			EBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
		Bent Grass Meadows Drive	WBL	A [7.8]	A [7.6]	A [8.1]	A [8.2]	A [8.2]	A [7.9]	
			WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
		Meridian Park Drive	NBLR	A [9.0]	A [8.9]	A [9.4]	A [9.3]	A [9.6]	A [9.4]	

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  
Meridian Storage  
Background Intersection Queueing Summary (1)

Identify and address queue blockages in the text (refer to comment on Figure 3-2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023		Background 2024		Background 2040	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	500	140	352	164	425	185	516
			EBT	-	123	243	109	215	128	261
			EBR	630	0	0	0	0	0	0
		Woodmen Road	WBL	350	47	77	50	80	56	91
			WBT	-	205	193	225	266	262	328
			WBR	250	0	0	0	84	0	117
		Meridian Road	NBL	440	85	108	113	173	125	170
			NBT	-	104	344	136	392	155	540
			NBR	330	0	0	0	0	0	0
		Meridian Road	SBL	490	48	74	104	182	94	196
			SBT	-	276	215	334	318	306	348
		Meridian Road	SBR	450	26	0	105	0	53	0
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	100	0	0	104	186	98	179
			EBT	-	0	0	81	166	88	208
			EBR	100	0	0	80	86	108	85
		Eastonville Road	WBL	120	136	59	106	49	118	56
			WBT	-	0	0	78	119	90	165
			WBR	100	0	0	0	0	0	4
		Meridian Road	NBL	100	0	0	358	195	415	239
			NBT	-	155	48	135	392	161	505
			NBR	400	16	0	8	2	11	4
		Meridian Road	SBL	375	35	37	67	78	68	107
			SBT	-	470	35	776	432	934	481
		Meridian Road	SBR	400	0	0	135	87	78	59
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	150	51	59	60	70	65	77
			EBR	-	54	48	97	62	136	64
		Meridian Road	NBL	700	10	22	63	5	118	10
			NBT	-	3	486	46	144	45	643
		Meridian Road	SBT	-	366	181	544	264	686	310
			SBR	350	20	19	26	24	28	26
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	-	0	0	0	0	0	0
			EBR	150	0	0	0	0	0	0
		Bent Grass Meadows Drive	WBL	100	10	7.5	10	7.5	12.5	10
			WBT	-	0	0	0	0	0	0
		Meridian Park Drive	NBLR	-	10	10	12.5	12.5	15	15

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

the 3 parcels total 15.3 acres. please be sure to account for a 3 parcels developed to highest and best use. Update the analysis accordingly

although access points are not approved at this stage please also discuss any access on the 3rd southerly parcel proposed with the rezone

## V. Site Analysis

### Overview

The Applicant proposes to construct a development consisting of 158 self-storage units and 96 RV/Boat storage spaces. Since the site is currently zoned as Residential Rural and is being rezoned to Commercial Service, El Paso County has requested that this study also analyze the highest trip generating development that would be allowed on the proposed zoning. It was determined that a shopping plaza would be the highest realistic trip generator. Typically, this type of development is allowed to occupy 20% of a site's square footage. Since the site is 9.6 acres, it would allow for an 83,700 SF shopping plaza.

### Proposed Site Access

Upon completion, the proposed site will have two full movement accesses. One access will be located along Owl Pl. Meridian Park Dr will be extended to the south, where it will provide a second access to the site. A detailed site plan has been included in Appendix A. **Refer to previous comments regarding timing of access construction and clarify text here if needed.**

### Trip Generation

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 11<sup>th</sup> edition.

### **Site Trips**

The site trips for both the proposed development (Mini-Warehouse) and the maximum trip generator (Shopping Plaza) are shown in Table 5-1. As shown in Table 5-1, the proposed development will generate 3 vph in the AM peak hour, 4 vph in the PM peak hour, and 46 daily weekday trips. The maximum trip generator will generate 295 vph in the AM peak hour, 761 vph in the PM peak hour, and 7,854 daily weekday trips.

### **Site Trip Distributions**

The distribution of the generated trips was based on an examination of existing traffic counts as well as the development's location relative to nearby population centers and major roads. The following trip distribution was used for the site generated trips:

- To/from the north on Meridian Rd: 20%
- To/from the south on Meridian Rd: 20%
- To/from the east on Woodman Rd: 15%
- To/from the west on Woodman Rd: 45%

The site trips were distributed through the study area based on the distribution above. The trip distribution for the proposed warehouse is shown in Figure 5-1. The trip distribution for the maximum trip generator (shopping plaza) is shown in Figure 5-2.

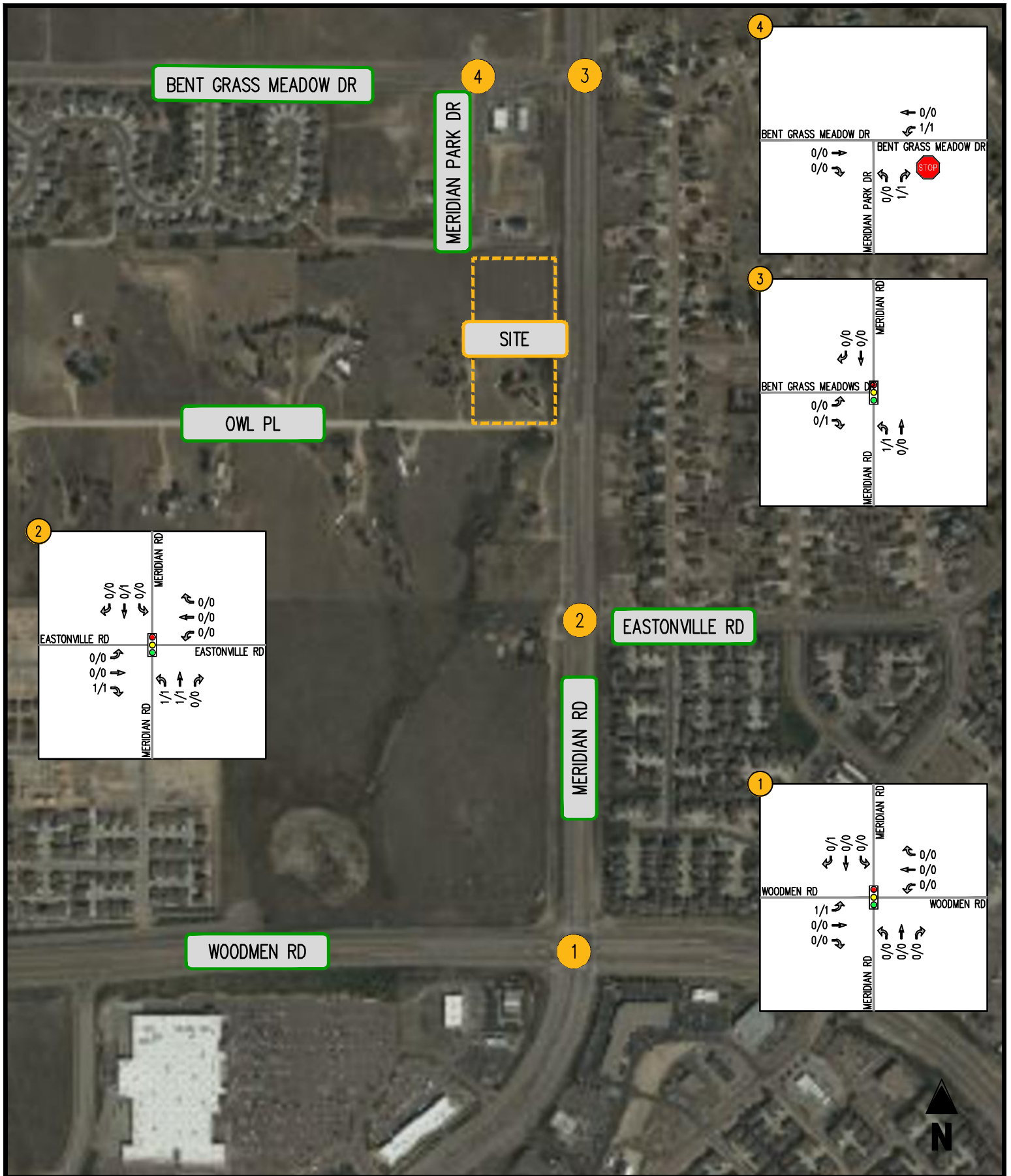


FIGURE 5-1  
Site Trips Warehouse

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

Meridian Storage  
El Paso County, CO

← MOVEMENT

🚦 SIGNALIZED INTERSECTION

🛑 STOP SIGN

🚧 YIELD SIGN





FIGURE 5-2  
Site Trips Shopping Center

Meridian Storage  
El Paso County, CO

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

← MOVEMENT

SIGNALIZED INTERSECTION

STOP SIGN

YIELD SIGN



Table 5-1

Meridian Storage  
Site Trip Generation

Land Use	Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<b>Proposed Development (Mini-Warehouse)</b>	151	254	Units	2	1	3	2	2	4	46
<b>Maximum Trip Generator (Shopping Plaza 40-150K)</b>	821	83,700	SF	183	112	295	365	396	761	7,854

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition

Please be sure to account for the third southerly parcel included in the zoning map and revise accordingly.

## VI. Analysis of Total 2024 & 2040 Conditions (Proposed Development)

### Total 2024 & 2040 Traffic Forecasts

The 2024 total traffic forecasts, shown in Figure 6-1, were developed by combining the background 2024 forecasts (Figure 4-8) and the proposed development site trip assignments (Figure 5-1). The 2040 total traffic forecasts, shown in Figure 6-2, were developed by combining the background 2040 forecasts (Figure 4-9) and the proposed development site trip assignments (Figure 5-1).

### Total 2024 & 2040 Levels of Service

Carry existing conditions analysis comments into future year analyses as appropriate.

Capacity analyses of the total scenarios are provided in Appendix G. The total 2024 forecasted levels of service are shown in Table 6-1 and depicted graphically in Figure 6-3. The total 2040 forecasted levels of service are shown in Table 6-1 and depicted graphically in Figure 6-4. The Synchro models were updated with the total volumes. The signal splits were optimized but the cycle lengths were kept the same.

Signal progression analysis is required.

Since the proposed warehouse use will generate very few trips, the total results are almost identical to the background results. As such, it can be concluded that the developer will not have to provide roadway improvements to the existing network, as the proposed development will have negligible impacts to traffic operations.

The extension of meridian park drive to the south will be required. Revise accordingly.

### Total 2024 & 2040 Queuing

Using the Synchro queueing reports, the 95% queues for each movement are summarized in Table 6-2 for the total 2024 scenario and the total 2040 scenario. The queues are almost identical to the queues reported in the background scenarios. Since the queues will not be increased by the proposed development, it is not the responsibility of the developer to provide mitigation measures to queues exceeding their storage, as they will do the same without the construction of the development.





FIGURE 6-1  
Total Future 2024 Forecasts Warehouse

Meridian Storage  
El Paso County, CO

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

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



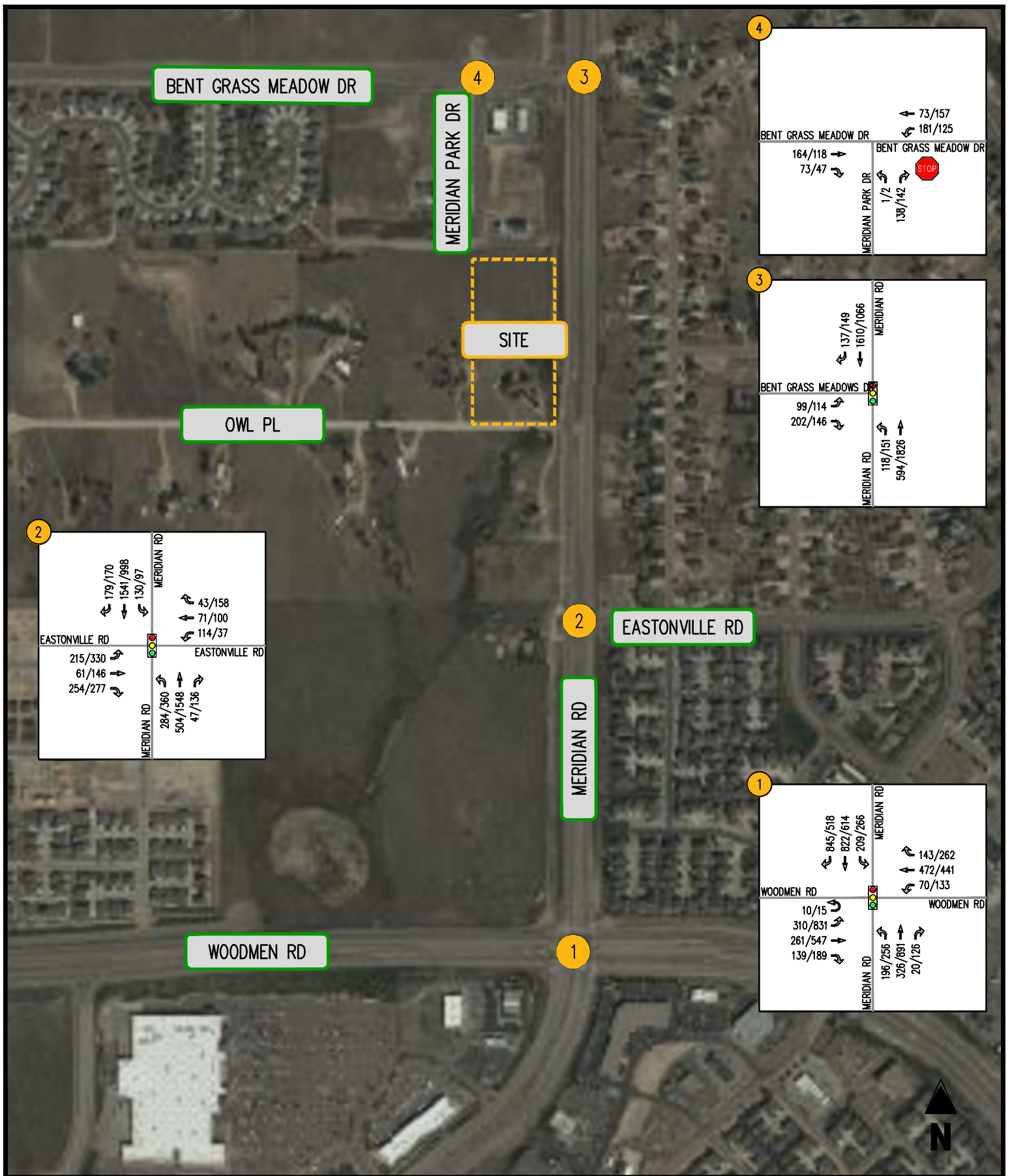


FIGURE 6-2  
Total Future 2040 Forecasts Warehouse

Meridian Storage  
El Paso County, CO

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

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



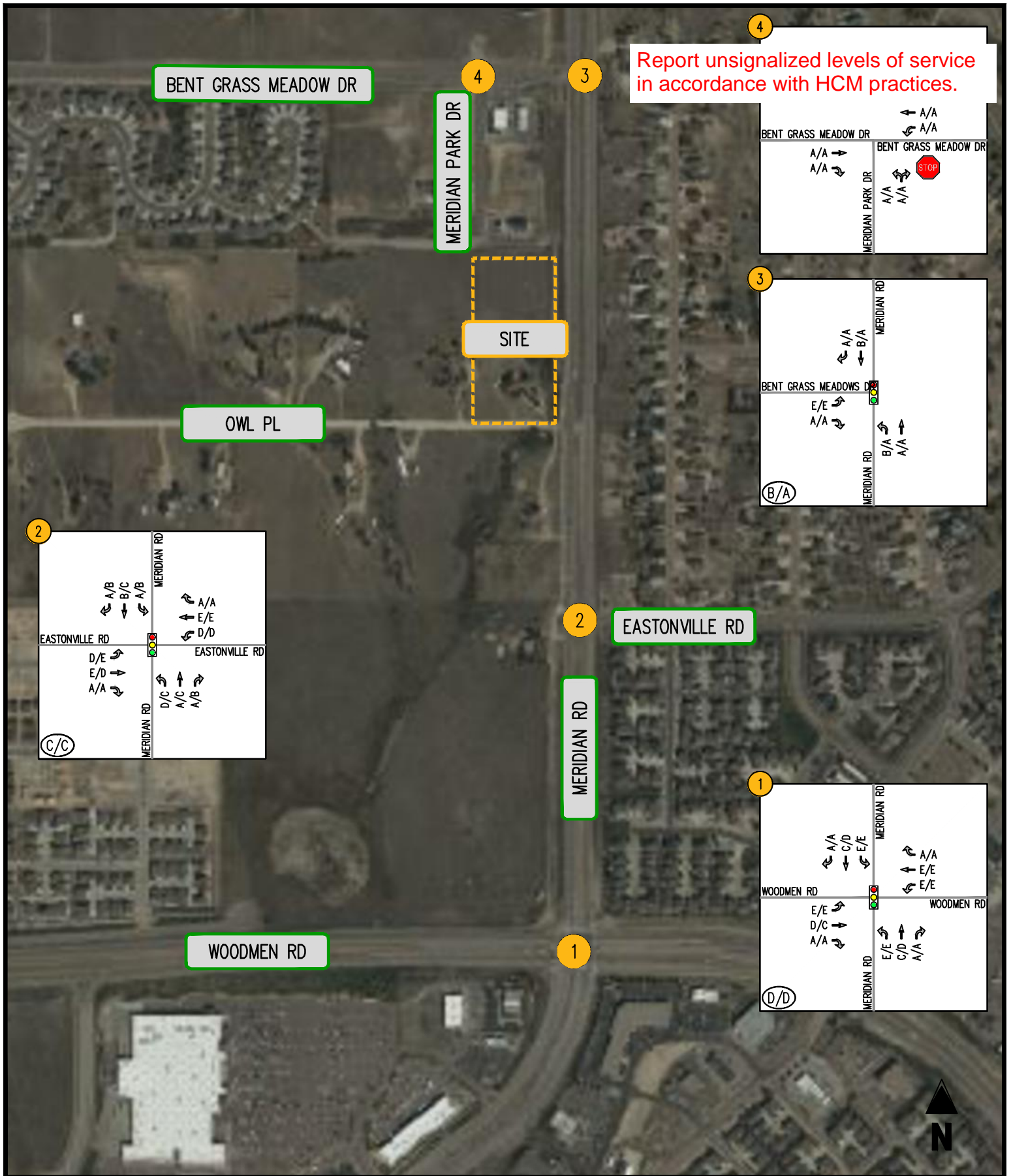


FIGURE 6-3  
Total Future 2024 Levels of Service Warehouse

Meridian Storage  
El Paso County, CO

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



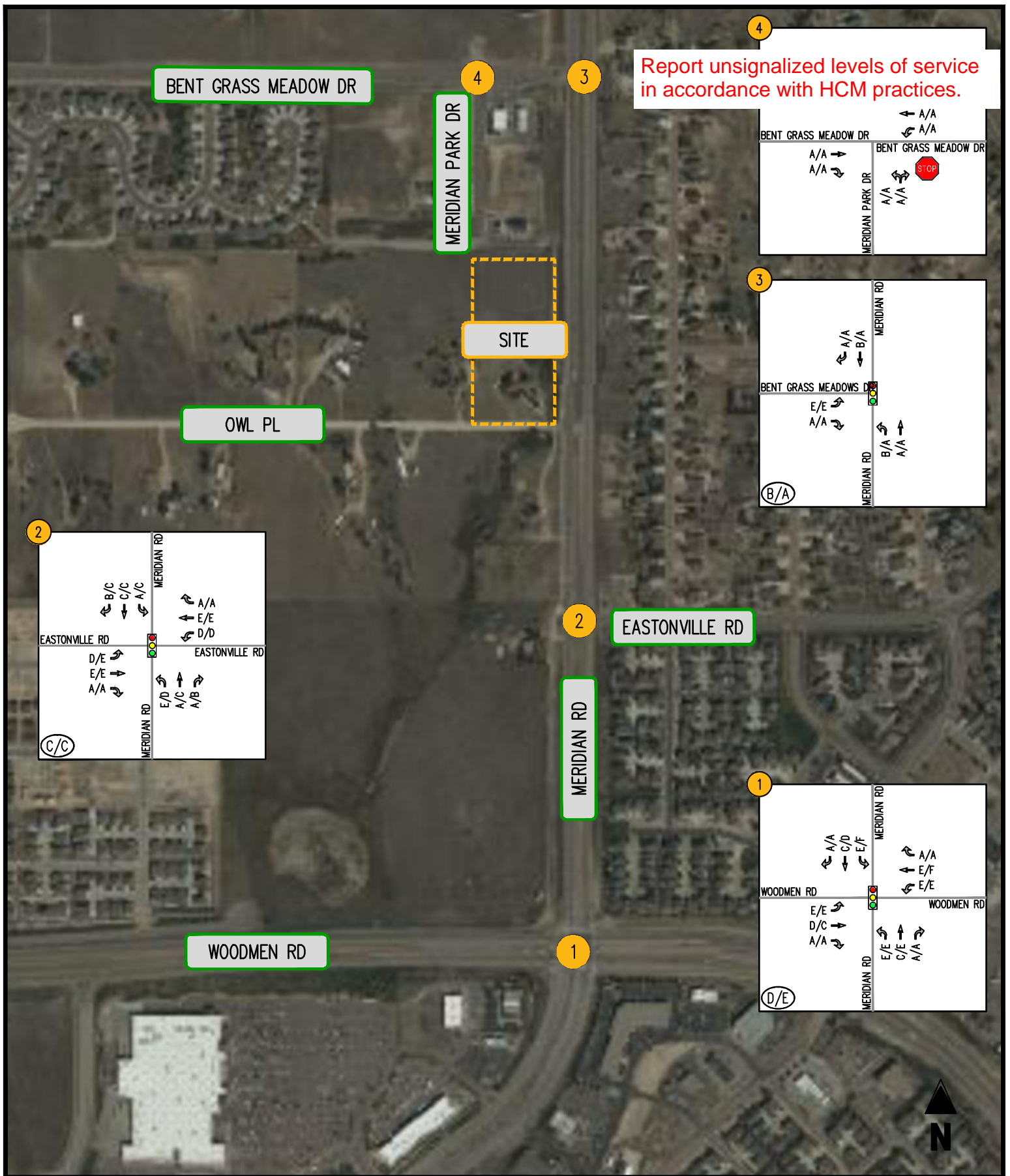


FIGURE 6-4  
Total Future 2040 Levels of Service Warehouse

Meridian Storage  
El Paso County, CO

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



Table 6-1  
Meridian Storage  
Total Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2024		Background 2040		Total Future 2024 Warehouse		Total Future 2040 Warehouse	
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	E (59.9)	E (60.0)	E (61.9)	E (72.6)	E (60.0)	E (60.0)	E (62.0)	E (72.9)
			EBT	D (40.0)	C (32.8)	D (37.5)	C (32.8)	D (39.9)	C (32.8)	D (37.4)	C (32.8)
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Woodmen Road	WBL	E (59.8)	E (60.8)	E (60.6)	E (60.8)	E (59.8)	E (60.8)	E (60.6)	E (60.8)
			WBT	E (57.7)	E (77.2)	E (58.9)	F (117.8)	E (57.7)	E (77.2)	E (58.9)	F (117.8)
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Meridian Road	NBL	E (61.5)	E (67.5)	E (64.1)	E (67.5)	E (61.5)	E (67.5)	E (64.1)	E (67.5)
			NBT	C (22.4)	D (45.0)	C (25.7)	E (69.9)	C (22.4)	D (45.1)	C (25.8)	E (69.9)
			NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Meridian Road	SBL	E (61.6)	E (76.3)	E (61.4)	F (94.4)	E (61.6)	E (76.3)	E (61.4)	F (94.4)
			SBT	C (26.6)	D (39.9)	C (32.3)	D (44.2)	C (26.6)	D (39.9)	C (32.3)	D (44.2)
			SBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		<b>Overall</b>				<b>D (43.0)</b>	<b>D (53.5)</b>	<b>D (45.5)</b>	<b>E (67.9)</b>	<b>D (43.0)</b>	<b>D (53.5)</b>
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	D (54.1)	E (60.2)	D (52.9)	E (60.1)	D (54.1)	E (60.2)	D (52.9)	E (60.1)
			EBT	E (63.5)	D (55.0)	E (63.4)	E (62.8)	E (63.5)	D (55.0)	E (63.4)	E (62.8)
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Eastonville Road	WBL	D (51.1)	D (49.1)	D (49.8)	D (48.7)	D (51.1)	D (49.1)	D (49.8)	D (48.7)
			WBT	E (57.9)	E (61.5)	E (56.2)	E (73.6)	E (57.9)	E (61.5)	E (56.2)	E (73.6)
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Meridian Road	NBL	D (36.9)	C (30.0)	E (63.2)	D (45.9)	D (37.2)	C (30.3)	E (63.5)	D (46.1)
			NBT	A (6.9)	C (22.1)	A (8.0)	C (28.7)	A (6.9)	C (22.1)	A (8.0)	C (28.7)
			NBR	A (6.1)	B (13.2)	A (6.9)	B (14.0)	A (6.1)	B (13.2)	A (6.9)	B (14.0)
		Meridian Road	SBL	A (6.1)	B (19.9)	A (8.2)	C (28.9)	A (6.1)	B (19.9)	A (8.2)	C (29.0)
			SBT	B (13.5)	C (23.6)	C (20.8)	C (28.2)	B (13.5)	C (23.7)	C (20.9)	C (28.4)
			SBR	A (8.7)	B (19.4)	B (11.3)	C (21.3)	A (8.7)	B (19.4)	B (11.3)	C (21.4)
		<b>Overall</b>				<b>C (20.5)</b>	<b>C (29.0)</b>	<b>C (26.2)</b>	<b>C (34.6)</b>	<b>C (20.5)</b>	<b>C (29.0)</b>
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	E (55.4)	E (55.8)	E (55.8)	E (56.4)	E (55.4)	E (55.8)	E (55.8)	E (56.4)
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)
		Meridian Road	NBL	B (10.5)	A (6.3)	B (18.3)	A (7.5)	B (10.5)	A (6.3)	B (18.4)	A (7.5)
			NBT	A (2.7)	A (5.2)	A (2.8)	A (6.3)	A (2.7)	A (5.2)	A (2.8)	A (6.3)
		Meridian Road	SBT	B (10.7)	A (8.3)	B (12.5)	A (8.9)	B (10.7)	A (8.3)	B (12.5)	A (8.9)
			SBR	A (6.1)	A (6.3)	A (6.3)	A (6.5)	A (6.1)	A (6.3)	A (6.3)	A (6.5)
		<b>Overall</b>				<b>B (10.3)</b>	<b>A (8.0)</b>	<b>B (11.8)</b>	<b>A (8.9)</b>	<b>B (10.3)</b>	<b>A (8.0)</b>
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			EBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Bent Grass Meadows Drive	WBL	A [8.1]	A [7.8]	A [8.2]	A [7.9]	A [8.1]	A [7.8]	A [8.2]	A [7.9]
			WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
		Meridian Park Drive	NBLR	A [9.4]	A [9.3]	A [9.6]	A [9.4]	A [9.4]	A [9.3]	A [9.6]	A [9.4]
			<b>Overall</b>				<b>A [0.0]</b>	<b>A [0.0]</b>	<b>A [0.0]</b>	<b>A [0.0]</b>	<b>A [0.0]</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  
Meridian Storage  
Total Intersection Queueing Summary (1)

Identify and address queue blockages in the text (refer to comment on Figure 3-2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Background 2024		Background 2040		Total Future 2024 Warehouse		Total Future 2040 Warehouse	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	500	164	425	185	516	164	426	185	517
			EBT	-	109	215	128	261	109	215	128	261
			EBR	630	0	0	0	0	0	0	0	0
		Woodmen Road	WBL	350	50	80	56	91	50	80	56	91
			WBT	-	225	266	262	328	225	266	262	328
			WBR	250	0	84	0	117	0	84	0	117
		Meridian Road	NBL	440	113	173	125	170	113	173	125	170
			NBT	-	136	392	155	540	136	392	155	540
			NBR	330	0	0	0	0	0	0	0	0
		Meridian Road	SBL	490	104	182	94	196	104	180	95	193
			SBT	-	334	318	306	348	327	315	305	350
			SBR	450	105	0	53	0	106	0	53	0
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	100	104	186	98	179	104	186	98	179
			EBT	-	81	166	88	208	81	166	88	208
			EBR	100	80	86	108	85	80	86	109	85
		Eastonville Road	WBL	120	106	49	118	56	106	49	117	56
			WBT	-	78	119	90	165	78	119	90	165
			WBR	100	0	0	0	4	0	0	0	4
		Meridian Road	NBL	100	358	195	415	239	359	227	421	240
			NBT	-	135	392	161	505	127	409	161	504
			NBR	400	8	2	11	4	9	3	11	4
		Meridian Road	SBL	375	67	78	68	107	89	49	68	106
			SBT	-	776	432	934	481	777	432	934	483
			SBR	400	135	87	78	59	138	87	78	58
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	150	60	70	65	77	60	70	65	77
			EBR	-	97	62	136	64	97	63	136	65
		Meridian Road	NBL	700	63	5	118	10	65	5	119	10
			NBT	-	46	144	45	643	46	147	44	657
		Meridian Road	SBT	-	544	264	686	310	547	264	686	312
			SBR	350	26	24	28	26	27	24	28	26
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	-	0	0	0	0	0	0	0	0
			EBR	150	0	0	0	0	0	0	0	0
		Bent Grass Meadows Drive	WBL	100	10	7.5	12.5	10	10	7.5	12.5	7.5
			WBT	-	0	0	0	0	0	0	0	0
		Meridian Park Drive	NBLR	-	12.5	12.5	15	15	12.5	12.5	15	15

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

Google Earth shows about 150 feet between the Meridian Park Drive roundabout and the Meridian Road stop bar. The EB queues in background scenarios will extend into the roundabout. Review geometry per Figure 3-1 comment and provide mitigation if needed.

Report unsignalized queues in accordance with HCM practices.

## VII. Analysis of Total 2024 & 2040 Conditions (Maximum Trip Generator)

Since the site is being rezoned to Commercial Service, El Paso County has requested that in addition to analyzing the study area with the proposed warehouse development, the study area be analyzed with the highest allowed trip generating land use. It was determined that out of the land uses allowed on an area zoned as Commercial Service, a shopping plaza would generate the most trips. It was assumed that 20% of the site would be occupied by the building, meaning that the shopping plaza would be 83,700 SF.

It should be noted that the developer has no intention of constructing a shopping plaza on the site and this is merely an exercise to show the extent to which the site would be allowed to develop.

update per previous comment

### Total 2024 & 2040 Traffic Forecasts

The 2024 total traffic forecasts, shown in Figure 7-1, were developed by combining the background 2024 forecasts (Figure 4-8) and the proposed development site trip assignments (Figure 5-2). The 2040 total traffic forecasts, shown in Figure 7-2, were developed by combining the background 2040 forecasts (Figure 4-9) and the proposed development site trip assignments (Figure 5-2).

### Total 2024 & 2040 Levels of Service

Capacity analyses of the total scenarios are provided in Appendix G. The total 2024 forecasted levels of service are shown in Table 7-1 and depicted graphically in Figure 7-3. The total 2040 forecasted levels of service are shown in Table 7-1 and depicted graphically in Figure 7-4. The Synchro models were updated with the total volumes. The signal splits were optimized but the cycle lengths were kept the same.

The intersection of Woodmen Rd & Meridian Rd will operate at LOS E in the total 2024 PM peak hour and at LOS F in the total 2040 PM peak hour. This indicates that if a shopping plaza were to be constructed in place of the warehouse, the intersection of Woodmen Rd & Meridian Rd would reach capacity sometime between 2024 and 2040. The other study intersections will operate at LOS D or better in all total scenarios and will not reach capacity.

This is a hypothetical scenario, and the developer has no intentions of constructing a shopping plaza in this location. In order for the intersection of Woodmen Rd & Meridian Rd to operate acceptably if a shopping plaza were to be constructed, there would likely need to be additional turn lanes built at the intersection and roadway widening along both Woodmen Rd and Meridian Rd which would require the purchase of ROW.

intentions

Refer to comments on queuing tables.  
Mitigations may be required.

### Total 2024 & 2040 Queuing

Using the Synchro queueing reports, the 95% queues for each movement are summarized in Table 7-2 for the total 2024 scenario and the total 2040 scenario. As can be seen in the table, several of the queues at Woodmen Rd & Meridian Rd will exceed capacity by 2040. This is to be expected as the intersection is shown to be operating over capacity. The remaining intersections are not expected to experience significant queues, and since the movements will remain under capacity, the queues will not cause operational issues.



FIGURE 7-1  
Total Future 2024 Forecasts Shopping Center

Meridian Storage  
El Paso County, CO

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

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN







FIGURE 7-2  
Total Future 2040 Forecasts Shopping Center

Meridian Storage  
El Paso County, CO

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

- MOVEMENT
- SIGNALIZED INTERSECTION
- STOP SIGN
- YIELD SIGN



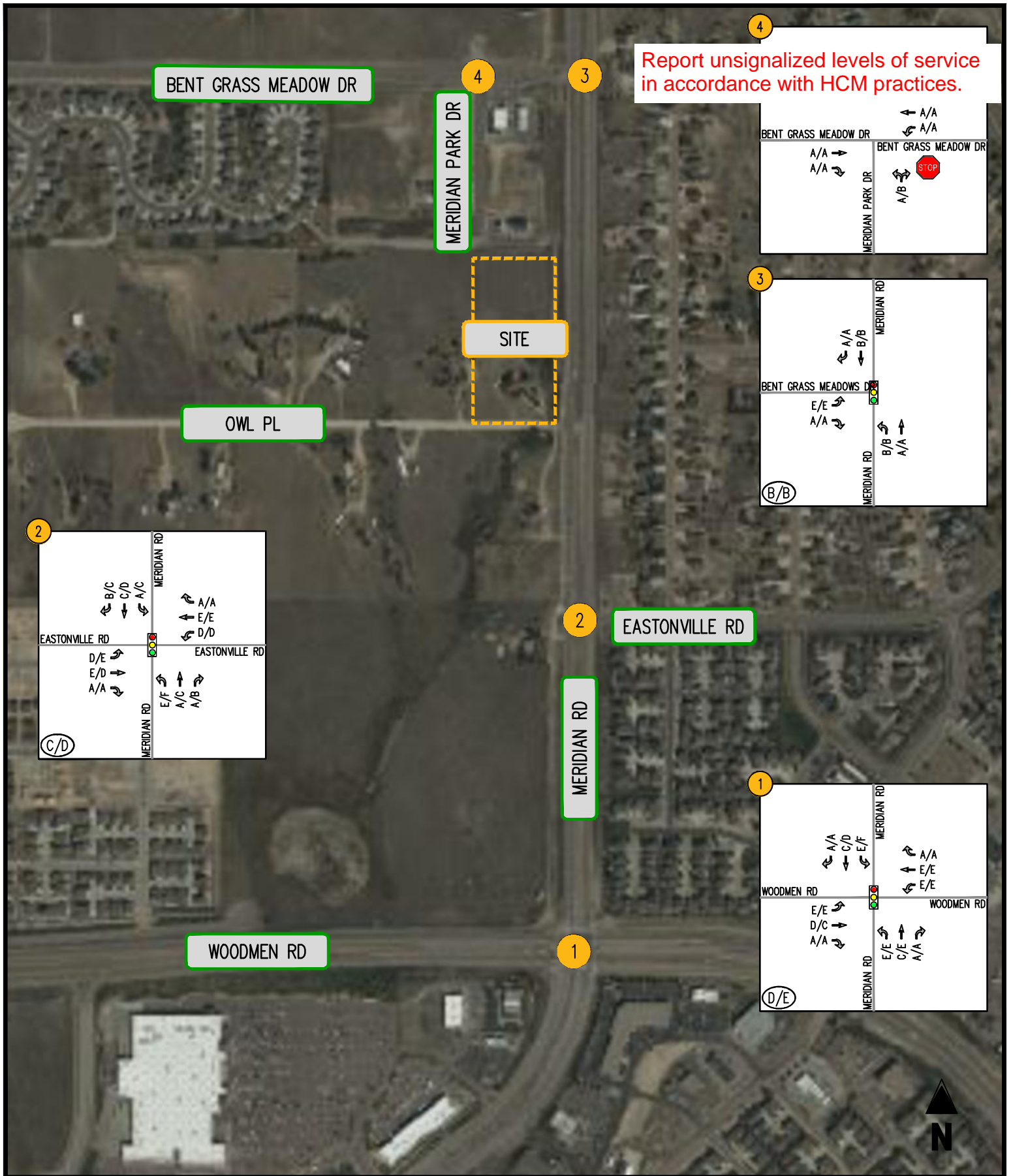


FIGURE 7-3  
Total Future 2024 Levels of Service Shopping Center

Meridian Storage  
El Paso County, CO

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

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



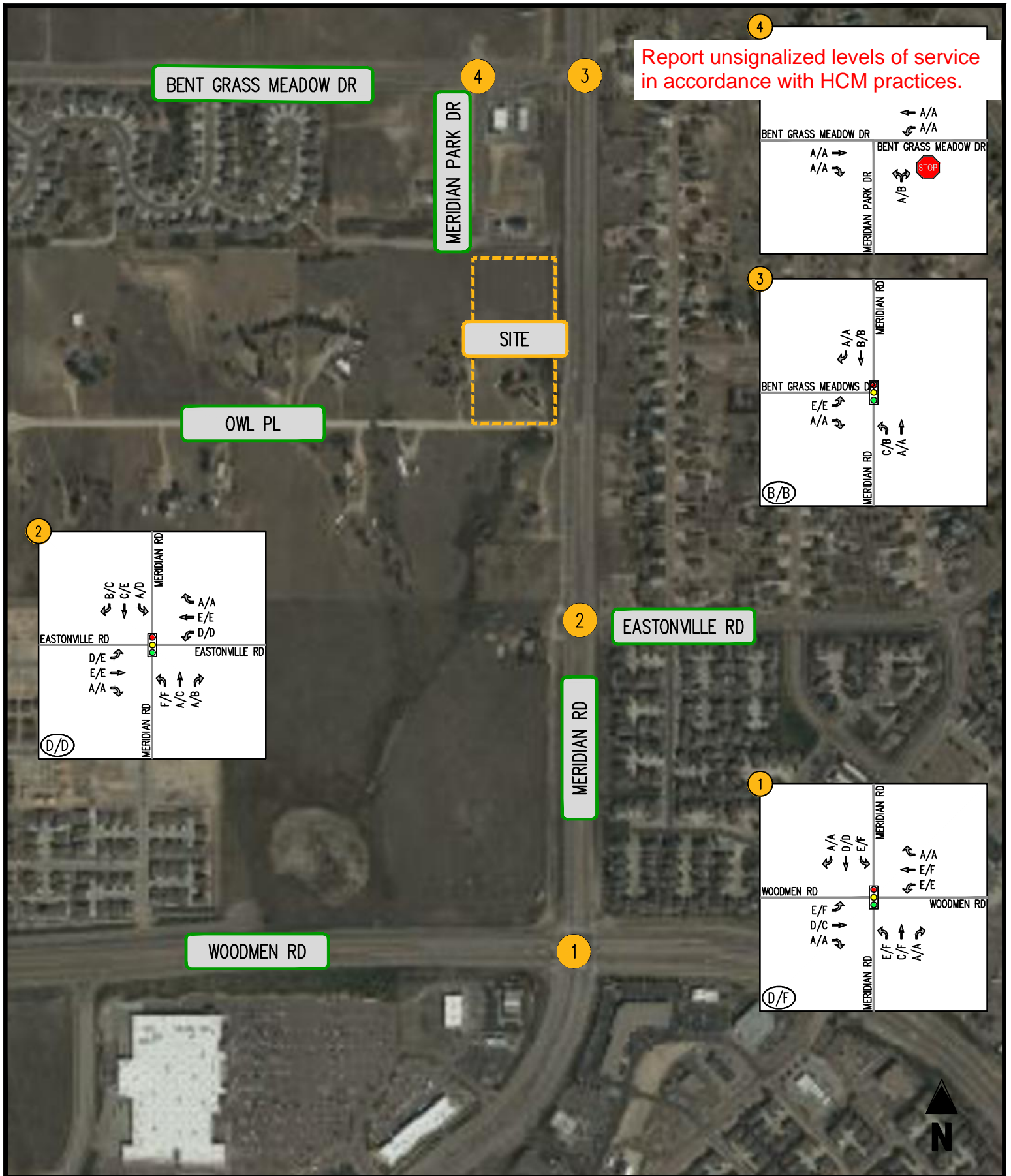


FIGURE 7-4  
 Total Future 2040 Levels of Service Shopping Center

Meridian Storage  
 El Paso County, CO

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

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



Table 7-1  
 Meridian Storage  
 Total Max Trip Generator Intersection Level of Service Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2024		Background 2040		Total Future 2024 Shopping Plaza		Total Future 2040 Shopping Plaza		
				AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	E (59.9)	E (60.0)	E (61.9)	E (72.6)	E (59.5)	E (72.9)	E (63.2)	F (141.0)	
			EBT	D (40.0)	C (32.8)	D (37.5)	C (32.8)	D (37.4)	C (29.6)	D (35.3)	C (32.8)	
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Woodmen Road	WBL	E (59.8)	E (60.8)	E (60.6)	E (60.8)	E (59.8)	E (60.8)	E (60.8)	E (60.6)	E (60.8)
			WBT	E (57.7)	E (77.2)	E (58.9)	F (117.8)	E (59.0)	E (77.2)	E (62.8)	F (117.8)	
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	NBL	E (61.5)	E (67.5)	E (64.1)	E (67.5)	E (61.9)	E (67.5)	E (66.4)	F (82.0)	
			NBT	C (22.4)	D (45.0)	C (25.7)	E (69.9)	C (25.3)	E (79.1)	C (28.6)	F (93.8)	
			NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	SBL	E (61.6)	E (76.3)	E (61.4)	F (94.4)	E (61.4)	F (94.2)	E (61.6)	F (159.8)	
			SBT	C (26.6)	D (39.9)	C (32.3)	D (44.2)	C (29.5)	D (48.8)	D (35.5)	D (46.2)	
			SBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		<b>Overall</b>			<b>D (43.0)</b>	<b>D (53.5)</b>	<b>D (45.5)</b>	<b>E (67.9)</b>	<b>D (44.4)</b>	<b>E (66.5)</b>	<b>D (47.8)</b>	<b>F (95.0)</b>
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	D (54.1)	E (60.2)	D (52.9)	E (60.1)	D (54.1)	E (60.2)	D (52.9)	E (69.9)	
			EBT	E (63.5)	D (55.0)	E (63.4)	E (62.8)	E (63.5)	D (54.7)	E (63.4)	E (68.7)	
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Eastonville Road	WBL	D (51.1)	D (49.1)	D (49.8)	D (48.7)	D (51.1)	D (49.1)	D (49.8)	D (48.9)	
			WBT	E (57.9)	E (61.5)	E (56.2)	E (73.6)	E (57.9)	E (61.4)	E (56.2)	E (68.2)	
			WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	NBL	D (36.9)	C (30.0)	E (63.2)	D (45.9)	E (61.3)	F (82.3)	F (117.8)	F (110.3)	
			NBT	A (6.9)	C (22.1)	A (8.0)	C (28.7)	A (7.2)	C (25.0)	A (8.4)	C (30.3)	
			NBR	A (6.1)	B (13.2)	A (6.9)	B (14.0)	A (6.2)	B (13.6)	A (7.0)	B (13.1)	
		Meridian Road	SBL	A (6.1)	B (19.9)	A (8.2)	C (28.9)	A (9.8)	C (27.0)	A (9.7)	D (38.6)	
			SBT	B (13.5)	C (23.6)	C (20.8)	C (28.2)	C (21.6)	D (49.2)	C (26.1)	E (57.0)	
			SBR	A (8.7)	B (19.4)	B (11.3)	C (21.3)	B (13.3)	C (31.9)	B (13.3)	C (30.1)	
		<b>Overall</b>			<b>C (20.5)</b>	<b>C (29.0)</b>	<b>C (26.2)</b>	<b>C (34.6)</b>	<b>C (28.0)</b>	<b>D (44.0)</b>	<b>D (35.7)</b>	<b>D (52.2)</b>
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	E (55.4)	E (55.8)	E (55.8)	E (56.4)	E (56.2)	E (58.4)	E (56.8)	E (58.2)	
			EBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
		Meridian Road	NBL	B (10.5)	A (6.3)	B (18.3)	A (7.5)	B (15.6)	B (10.4)	C (31.0)	B (15.7)	
			NBT	A (2.7)	A (5.2)	A (2.8)	A (6.3)	A (2.7)	A (5.8)	A (2.9)	A (7.2)	
		Meridian Road	SBT	B (10.7)	A (8.3)	B (12.5)	A (8.9)	B (11.1)	B (10.4)	B (13.1)	B (11.6)	
			SBR	A (6.1)	A (6.3)	A (6.3)	A (6.5)	A (6.6)	A (8.5)	A (6.9)	A (9.1)	
		<b>Overall</b>			<b>B (10.3)</b>	<b>A (8.0)</b>	<b>B (11.8)</b>	<b>A (8.9)</b>	<b>B (11.4)</b>	<b>B (10.7)</b>	<b>B (13.6)</b>	<b>B (12.0)</b>
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
			EBR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
		Bent Grass Meadows Drive	WBL	A [8.1]	A [7.8]	A [8.2]	A [7.9]	A [8.4]	A [8.3]	A [8.6]	A [8.4]	
			WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	
		Meridian Park Drive	NBLR	A [9.4]	A [9.3]	A [9.6]	A [9.4]	A [9.8]	B [10.8]	A [10.0]	B [11.0]	

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 7-2  
 Meridian Storage  
 Total Max Trip Generator Intersection Queueing Summary (1)

Intersection	Operating Condition	Street Name	Approach/Movement	Available Storage	Background 2024		Background 2040		Total Future 2024 Shopping Plaza		Total Future 2040 Shopping Plaza	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 Woodmen Rd/Meridian Rd	SIGNAL	Woodmen Road	EBL	500	164	425	185	516	203	545	229	668
			EBT	-	109	215	128	261	106	207	128	261
			EBR	630	0	0	0	0	0	0	0	0
		Woodmen Road	WBL	350	50	80	56	91	50	80	56	91
			WBT	-	225	266	262	328	227	266	284	328
			WBR	250	0	84	0	117	7	172	18	226
		Meridian Road	NBL	440	113	173	125	170	114	173	132	192
			NBT	-	136	392	155	540	160	520	174	610
			NBR	330	0	0	0	0	0	0	0	0
		Meridian Road	SBL	490	104	182	94	196	96	162	95	177
			SBT	-	334	318	306	348	305	313	309	316
			SBR	450	105	0	53	0	59	38	76	40
2 Meridian Rd/Eastonville Rd	SIGNAL	Eastonville Road	EBL	100	104	186	98	179	102	184	97	182
			EBT	-	81	166	88	208	80	166	87	203
			EBR	100	80	86	108	85	88	251	121	276
		Eastonville Road	WBL	120	106	49	118	56	104	49	116	55
			WBT	-	78	119	90	165	77	119	89	144
			WBR	100	0	0	0	4	0	0	0	4
		Meridian Road	NBL	100	358	195	415	239	508	445	556	399
			NBT	-	135	392	161	505	159	352	187	347
			NBR	400	8	2	11	4	8	2	10	3
		Meridian Road	SBL	375	67	78	68	107	57	78	63	129
			SBT	-	776	432	934	481	847	597	1018	677
			SBR	400	135	87	78	59	133	44	85	16
3 Meridian Rd/Bent Grass Meadows Dr	SIGNAL	Bent Grass Meadows Drive	EBL	150	60	70	65	77	72	110	77	118
			EBR	-	97	62	136	64	102	81	137	83
		Meridian Road	NBL	700	63	5	118	10	134	31	214	48
			NBT	-	46	144	45	643	43	361	41	763
		Meridian Road	SBT	-	544	264	686	310	590	367	738	451
			SBR	350	26	24	28	26	32	41	33	44
4 Bent Grass Meadows Dr/Meridian Park Dr	STOP	Bent Grass Meadows Drive	EBT	-	0	0	0	0	0	0	0	0
			EBR	150	0	0	0	0	0	0	0	0
		Bent Grass Meadows Drive	WBL	100	10	7.5	12.5	10	20	22.5	22.5	22.5
			WBT	-	0	0	0	0	0	0	0	0
		Meridian Park Drive	NBLR	-	12.5	12.5	15	15	17.5	40	22.5	45

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

## VIII. Conclusions and Recommendations

### Conclusions

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

- Under existing conditions, all intersections operate at LOS D or better. Queuing will not cause operational problems.
- In the background scenarios, the intersection of Woodmen Rd & Meridian Rd will operate at LOS D in 2024, and at LOS E in the 2040 PM peak. The other intersections will operate at LOS C or better.
- The proposed warehouse development will generate 3 weekday AM and 4 weekday PM peak hour vehicle trips as well as 46 weekday daily trips.
- As requested by El Paso County, the maximum trip generator allowed on a site zoned as Commercial Service was analyzed. This was found to be an 83,700 SF shopping plaza. In this scenario, the shopping plaza would generate 295 weekday AM and 761 weekday PM peak hour vehicle trips as well as 7,854 weekday daily trips.
- The total 2024 and 2040 scenarios, in which the proposed warehouse is being analyzed, has almost identical operations as the background scenarios. No improvements are needed from the developer, as the development is shown to have a negligible effect on traffic operations.
- The total 2024 and 2040 scenarios in which the maximum trip generator (shopping plaza) is being analyzed shows an increase in delays when compared to the background scenarios. The intersection of Woodmen Rd & Meridian Rd will operate at LOS E in the total 2024 scenario and at LOS F in the total 2040 scenario. The remaining intersections will operate acceptably. As the developer has no intention of building a shopping plaza on the site, no roadway improvements are needed.

Additional text may be required based on revisions throughout the study.

### Recommendations

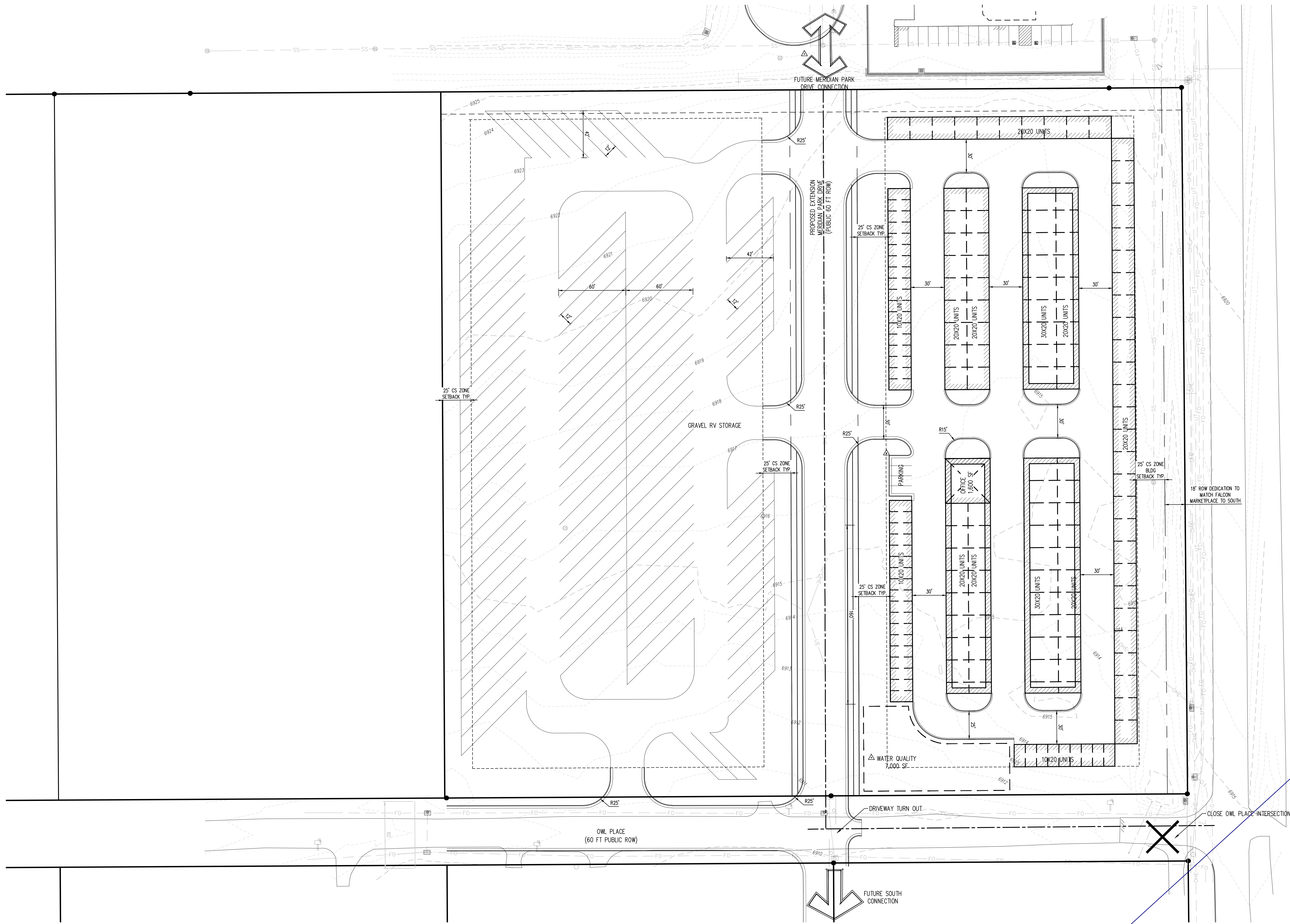
- It is recommended that the proposed development be designed as shown in the site plan.
- It is recommended that El Paso County monitor the intersection of Woodmen Rd & Meridian Rd, as it is forecasted to near capacity by 2040. This is due to background growth rather than site trips, so it is not the responsibility of the developer to provide improvements to the intersection.

Refer to comment letter for additional study elements, including:  
- Conformance with the County's MCTP  
- Roadway designation / classifications based on daily traffic  
- Bicycle / pedestrian analyses

please also discuss road impact fee.

## **APPENDIX A – Full Sized Site Plan**

MERIDIAN STORAGE PROPOSED UNIT COUNT	COUNT (LOT 1)	COUNT (LOT 2)
10x20	49	0
20x20	90	0
20x30	19	0
RV PARKING	0	96
TOTAL	158	96



update the conceptual site plan to include the third southerly parcel proposed to be rezoned



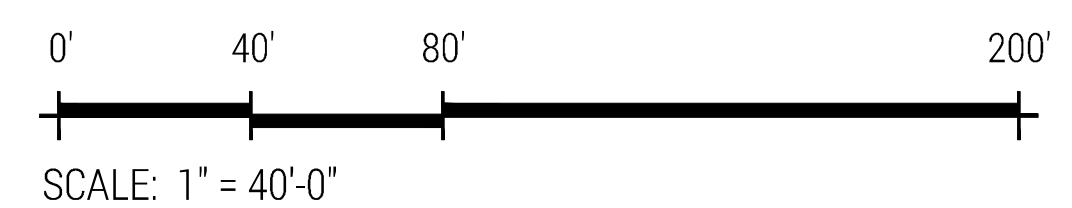
# OWL PLACE STORAGE

MERIDIAN STORAGE, LLC

## LOT 1 & 2 CONCEPTUAL SITE PLAN

10.28.2022

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## **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

Update this page - It does not reflect  
the current edition of the HCM.

## 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

**Update this page - It does not reflect  
the current edition of the HCM.**

## APPENDIX C – Traffic Counts

Cover sheet should note that these counts are reproduced from another study and were not collected specifically for this study.

Include counts for Meridian Park Drive / Bent Grass Meadow Drive intersection.

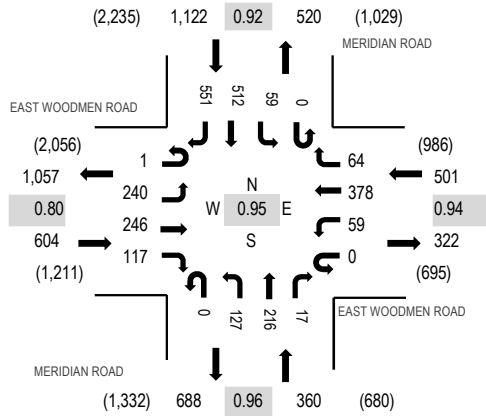
Location: 1 MERIDIAN ROAD & EAST WOODMEN ROAD AM

Date: Wednesday, June 1, 2022

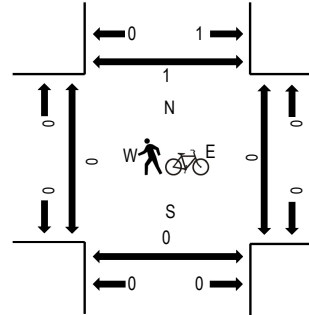
Peak Hour: 07:15 AM - 08:15 AM

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

### Peak Hour - All Vehicles



### Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

### Traffic Counts

Interval Start Time	EAST WOODMEN ROAD Eastbound				EAST WOODMEN ROAD Westbound				MERIDIAN ROAD Northbound			MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right	West	East	South	North
7:00 AM	0	41	45	41	0	9	112	15	0	26	47	7	0	9	165	127	644	2,584	0	0	0	0
7:15 AM	0	45	61	32	0	16	104	19	0	40	52	1	0	8	144	156	678	2,587	0	0	0	0
7:30 AM	0	55	64	26	0	8	113	17	0	32	52	6	0	13	150	142	678	2,550	0	0	0	0
7:45 AM	0	72	72	30	0	20	78	10	0	28	51	4	0	19	105	95	584	2,509	0	0	0	1
8:00 AM	1	68	49	29	0	15	83	18	0	27	61	6	0	19	113	158	647	2,528	0	0	0	0
8:15 AM	0	60	60	13	0	9	101	17	2	20	56	6	0	25	120	152	641		0	0	0	0
8:30 AM	0	71	67	14	0	15	73	19	0	27	47	7	0	17	123	157	637		0	0	0	0
8:45 AM	0	78	94	23	0	25	69	21	2	27	36	10	1	26	83	108	603		0	0	0	0
Count Total	1	490	512	208	0	117	733	136	4	227	402	47	1	136	1,003	1,095	5,112		0	0	0	1
Peak Hour	1	240	246	117	0	59	378	64	0	127	216	17	0	59	512	551	2,587		0	0	0	1

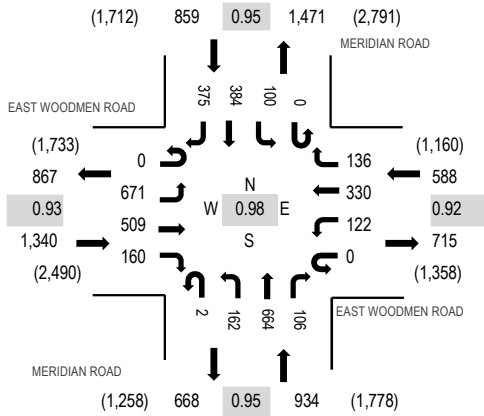
Location: 1 MERIDIAN ROAD & EAST WOODMEN ROAD PM

Date: Wednesday, June 1, 2022

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

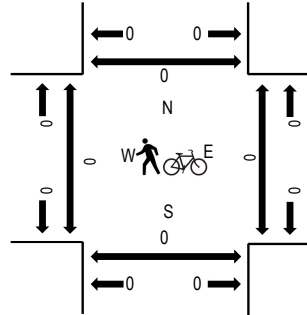
Peak 15-Minutes: 05:30 PM - 05:45 PM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	EAST WOODMEN ROAD Eastbound				EAST WOODMEN ROAD Westbound				MERIDIAN ROAD Northbound				MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	108	100	28	0	21	80	36	0	40	132	23	0	22	100	107	797	3,490	0	0	0	0
4:15 PM	0	142	136	41	1	31	75	33	2	31	141	22	0	24	85	104	868	3,609	0	0	0	0
4:30 PM	0	160	129	25	0	25	82	32	3	32	190	21	0	17	91	100	907	3,678	0	0	0	0
4:45 PM	0	166	113	48	0	26	75	35	1	45	158	32	0	23	100	96	918	3,721	0	0	0	0
5:00 PM	0	147	137	43	0	35	82	29	0	44	171	21	0	31	90	86	916	3,650	0	0	0	0
5:15 PM	0	180	119	27	0	31	89	45	0	30	164	27	0	21	110	94	937		0	0	0	0
5:30 PM	0	178	140	42	0	30	84	27	1	43	171	26	0	25	84	99	950		0	0	0	0
5:45 PM	0	154	101	26	1	24	94	37	0	30	155	22	0	24	88	91	847		0	0	0	0
Count Total	0	1,235	975	280	2	223	661	274	7	295	1,282	194	0	187	748	777	7,140		0	0	0	0
Peak Hour	0	671	509	160	0	122	330	136	2	162	664	106	0	100	384	375	3,721		0	0	0	0



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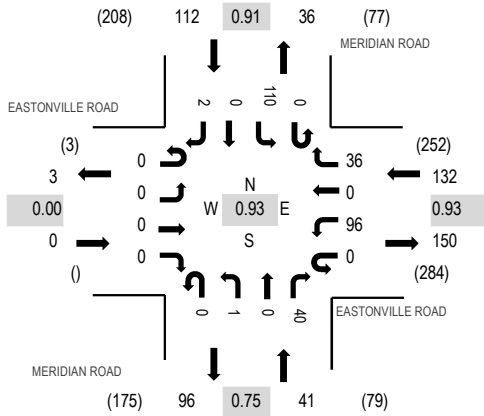
Location: 2 MERIDIAN ROAD & EASTONVILLE ROAD AM

Date: Wednesday, June 1, 2022

Peak Hour: 07:45 AM - 08:45 AM

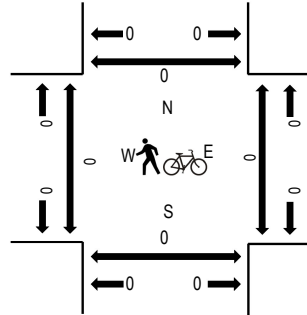
Peak 15-Minutes: 08:00 AM - 08:15 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	EASTONVILLE ROAD Eastbound				EASTONVILLE ROAD Westbound				MERIDIAN ROAD Northbound				MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	0	0	0	14	0	12	0	0	0	8	0	21	0	0	55	254	0	0	0	0
7:15 AM	0	0	0	0	0	17	0	11	0	0	0	9	0	24	0	0	61	276	0	0	0	0
7:30 AM	0	0	0	0	0	19	0	9	0	0	0	12	0	29	0	0	69	283	0	0	0	0
7:45 AM	0	0	0	0	0	21	0	7	0	0	0	9	0	31	0	1	69	285	0	0	0	0
8:00 AM	0	0	0	0	0	23	0	10	0	1	0	14	0	29	0	0	77	285	0	0	0	0
8:15 AM	0	0	0	0	0	27	0	8	0	0	0	7	0	26	0	0	68		0	0	0	0
8:30 AM	0	0	0	0	0	25	0	11	0	0	0	10	0	24	0	1	71		0	0	0	0
8:45 AM	0	0	0	0	0	29	0	9	0	0	0	9	0	22	0	0	69		0	0	0	0
Count Total	0	0	0	0	0	175	0	77	0	1	0	78	0	206	0	2	539		0	0	0	0
Peak Hour	0	0	0	0	0	96	0	36	0	1	0	40	0	110	0	2	285		0	0	0	0

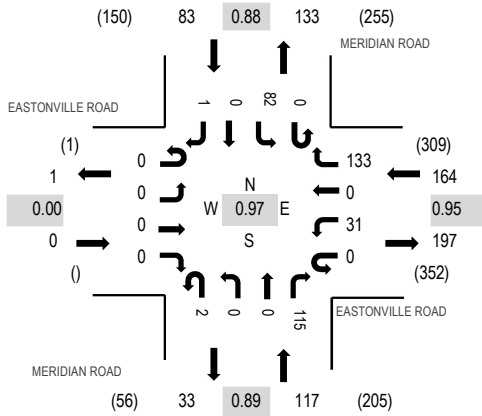
Location: 2 MERIDIAN ROAD & EASTONVILLE ROAD PM

Date: Wednesday, June 1, 2022

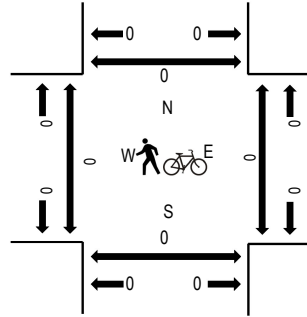
Peak Hour: 05:00 PM - 06:00 PM

Peak 15-Minutes: 05:15 PM - 05:30 PM

### Peak Hour - All Vehicles



### Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

### Traffic Counts

Interval Start Time	EASTONVILLE ROAD Eastbound				EASTONVILLE ROAD Westbound				MERIDIAN ROAD Northbound				MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	0	0	0	4	0	23	0	0	0	12	0	14	0	0	53	300	0	0	0	0
4:15 PM	0	0	0	0	0	7	0	27	0	0	0	23	0	13	0	0	70	336	0	0	0	0
4:30 PM	0	0	0	0	0	9	0	39	0	0	0	25	0	16	0	0	89	360	0	0	0	0
4:45 PM	0	0	0	0	0	3	0	33	0	0	0	28	0	24	0	0	88	359	0	0	0	0
5:00 PM	0	0	0	0	0	7	0	36	0	0	0	23	0	23	0	0	89	364	0	0	0	0
5:15 PM	0	0	0	0	0	5	0	31	2	0	0	31	0	24	0	1	94		0	0	0	0
5:30 PM	0	0	0	0	0	9	0	34	0	0	0	30	0	15	0	0	88		0	0	0	0
5:45 PM	0	0	0	0	0	10	0	32	0	0	0	31	0	20	0	0	93		0	0	0	0
Count Total	0	0	0	0	0	54	0	255	2	0	0	203	0	149	0	1	664		0	0	0	0
Peak Hour	0	0	0	0	0	31	0	133	2	0	0	115	0	82	0	1	364		0	0	0	0





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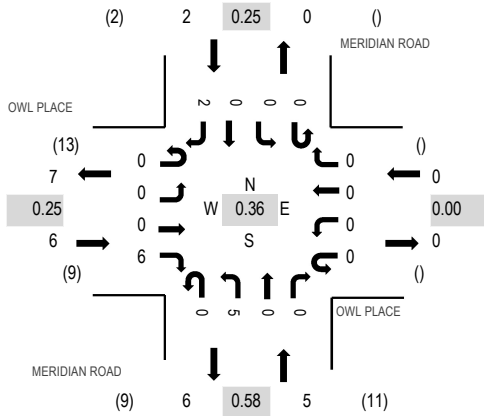
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Date: Wednesday, June 1, 2022

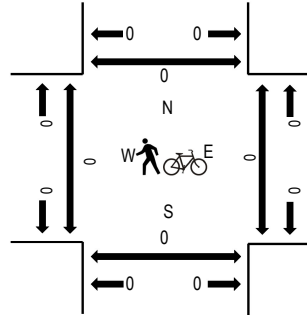
Peak Hour: 07:00 AM - 08:00 AM

Peak 15-Minutes: 07:00 AM - 07:15 AM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

Interval Start Time	OWL PLACE Eastbound				OWL PLACE Westbound				MERIDIAN ROAD Northbound			MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings							
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right	West	East	South	North			
7:00 AM	0	0	0	6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	9	13	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	7	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	8	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	8	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	9	0	0	0	0
8:15 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		0	0	0	0
8:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3		0	0	0	0
Count Total	0	0	0	9	0	0	0	0	0	0	11	0	0	0	0	0	0	0	2	22		0	0	0	0
Peak Hour	0	0	0	6	0	0	0	0	0	0	5	0	0	0	0	0	0	0	2	13		0	0	0	0

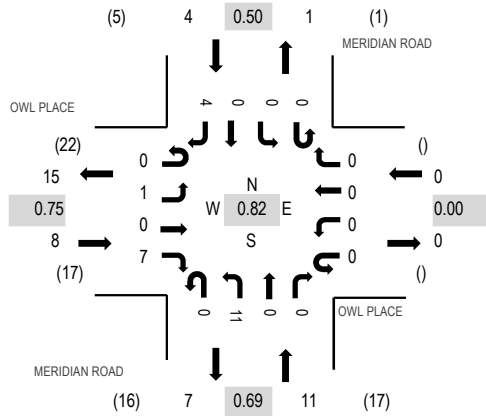
Location: 3 MERIDIAN ROAD & OWL PLACE PM

Date: Wednesday, June 1, 2022

Peak Hour: 04:00 PM - 05:00 PM

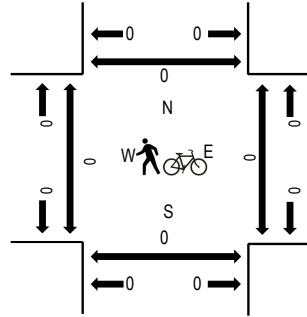
Peak 15-Minutes: 04:00 PM - 04:15 PM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	OWL PLACE Eastbound				OWL PLACE Westbound				MERIDIAN ROAD Northbound			MERIDIAN ROAD Southbound				Total	Rolling Hour	Pedestrian Crossings				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right	West	East	South	North
4:00 PM	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	2	7	23	0	0	0	0
4:15 PM	0	1	0	2	0	0	0	0	0	2	0	0	0	0	0	1	6	21	0	0	0	0
4:30 PM	0	0	0	2	0	0	0	0	0	4	0	0	0	0	0	0	6	18	0	0	0	0
4:45 PM	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	1	4	15	0	0	0	0
5:00 PM	0	0	0	3	0	0	0	0	0	2	0	0	0	0	0	0	5	16	0	0	0	0
5:15 PM	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3		0	0	0	0
5:30 PM	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	3		0	0	0	0
5:45 PM	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	1	5		0	0	0	0
Count Total	0	1	0	16	0	0	0	0	0	17	0	0	0	0	0	5	39		0	0	0	0
Peak Hour	0	1	0	7	0	0	0	0	0	11	0	0	0	0	0	4	23		0	0	0	0

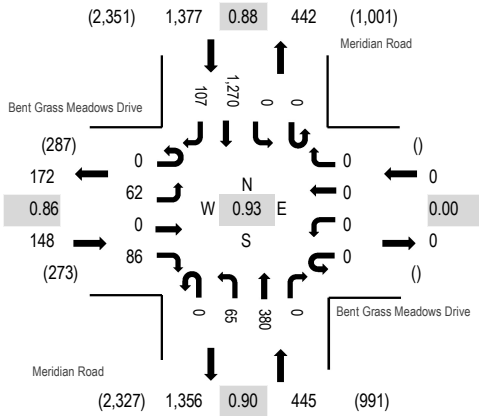
**Location:** 1 Meridian Road & Bent Grass Meadows Drive AM

**Date:** Tuesday, March 29, 2022

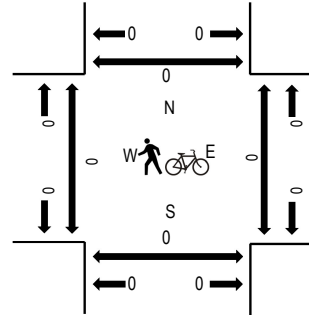
**Peak Hour:** 07:00 AM - 08:00 AM

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

### Peak Hour - All Vehicles



### Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

### Traffic Counts

Interval Start Time	Bent Grass Meadows Drive Eastbound				Bent Grass Meadows Drive Westbound				Meridian Road Northbound			Meridian Road Southbound				Total	Rolling Hour	Pedestrian Crossings					
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right	West	East	South	North	
7:00 AM	0	17	0	18	0	0	0	0	0	19	63	0	0	0	0	341	36	494	1,970	0	0	0	0
7:15 AM	0	14	0	29	0	0	0	0	0	17	79	0	0	0	0	366	26	531	1,912	0	0	0	0
7:30 AM	0	13	0	24	0	0	0	0	0	16	97	0	0	0	0	307	21	478	1,794	0	0	0	0
7:45 AM	0	18	0	15	0	0	0	0	0	13	141	0	0	0	0	256	24	467	1,718	0	0	0	0
8:00 AM	0	12	0	15	0	0	0	0	0	12	111	0	0	0	0	259	27	436	1,645	0	0	0	0
8:15 AM	0	16	0	15	0	0	0	0	0	16	138	0	0	0	0	210	18	413		0	0	0	0
8:30 AM	0	18	0	21	0	0	0	0	1	9	115	0	0	0	0	229	9	402		0	0	0	0
8:45 AM	0	13	0	15	0	0	0	0	1	7	136	0	0	0	0	205	17	394		0	0	0	0
Count Total	0	121	0	152	0	0	0	0	2	109	880	0	0	0	0	2,173	178	3,615		0	0	0	0
Peak Hour	0	62	0	86	0	0	0	0	0	65	380	0	0	0	0	1,270	107	1,970		0	0	0	0

**Location:** 1 Meridian Road & Bent Grass Meadows Drive PM

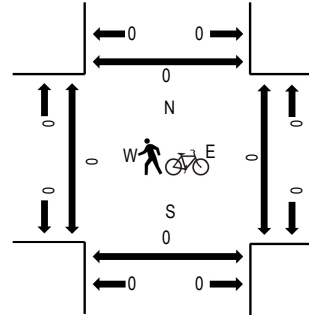
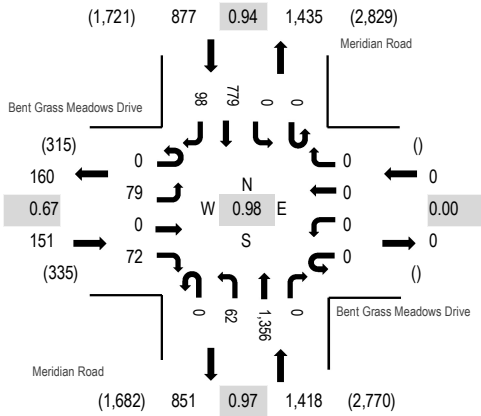
**Date:** Tuesday, March 29, 2022

**Peak Hour:** 04:30 PM - 05:30 PM

**Peak 15-Minutes:** 04:30 PM - 04:45 PM

**Peak Hour - All Vehicles**

**Peak Hour - Pedestrians/Bicycles on Crosswalk**



Note: Total study counts contained in parentheses.

**Traffic Counts**

Interval Start Time	Bent Grass Meadows Drive Eastbound				Bent Grass Meadows Drive Westbound				Meridian Road Northbound			Meridian Road Southbound				Total	Rolling Hour	Pedestrian Crossings				
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru			Right	West	East	South	North
4:00 PM	0	19	0	21	0	0	0	0	0	17	324	0	0	0	196	22	599	2,398	0	0	0	0
4:15 PM	0	21	0	23	0	0	0	0	0	13	308	0	0	0	171	31	567	2,417	0	0	0	0
4:30 PM	0	20	0	19	0	0	0	0	0	15	336	0	0	0	208	25	623	2,446	0	0	0	0
4:45 PM	0	19	0	17	0	0	0	0	0	17	348	0	0	0	182	26	609	2,446	0	0	0	0
5:00 PM	0	20	0	23	0	0	0	0	0	13	342	0	0	0	198	22	618	2,428	0	0	0	0
5:15 PM	0	20	0	13	0	0	0	0	0	17	330	0	0	0	191	25	596		0	0	0	0
5:30 PM	0	47	0	19	0	0	0	0	0	12	317	0	0	0	203	25	623		0	0	0	0
5:45 PM	0	17	0	17	0	0	0	0	0	20	341	0	0	0	181	15	591		0	0	0	0
Count Total	0	183	0	152	0	0	0	0	0	124	2,646	0	0	0	1,530	191	4,826		0	0	0	0
Peak Hour	0	79	0	72	0	0	0	0	0	62	1,356	0	0	0	779	98	2,446		0	0	0	0

**All Traffic Data Services**  
www.alltrafficdata.net

Date Start: 29-Mar-22  
Site Code: 3  
Station ID: 3  
MERIDIAN RD S.O. BENT GRASS MEADOWS DR

Start Time	29-Mar-22 Tue	NB	SB	Total
12:00 AM		50	15	65
01:00		19	11	30
02:00		12	18	30
03:00		11	45	56
04:00		24	138	162
05:00		58	358	416
06:00		211	1018	1229
07:00		447	1364	1811
08:00		547	967	1514
09:00		512	805	1317
10:00		562	757	1319
11:00		656	745	1401
12:00 PM		774	756	1530
01:00		798	723	1521
02:00		836	808	1644
03:00		1115	796	1911
04:00		1379	846	2225
05:00		1400	836	2236
06:00		1001	670	1671
07:00		782	438	1220
08:00		521	287	808
09:00		332	164	496
10:00		184	75	259
11:00		77	41	118
Total		12308	12681	24989
Percent		49.3%	50.7%	
AM Peak	-	11:00	07:00	-
Vol.	-	656	1364	-
PM Peak	-	17:00	16:00	-
Vol.	-	1400	846	-
Grand Total		12308	12681	24989
Percent		49.3%	50.7%	
ADT		ADT 24,989	ADT 24,989	

## APPENDIX D – Existing Synchro Outputs

Update per comments in text  
and comment letter.

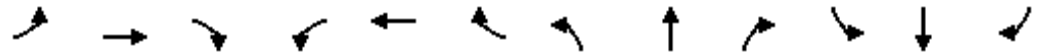


Queues

Existing AM

1: MERIDIAN ROAD & WOODMAN ROAD

01/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	262	267	127	64	411	70	138	235	18	77	665	721
v/c Ratio	0.64	0.31	0.08	0.29	0.71	0.17	0.48	0.16	0.01	0.33	0.49	0.46
Control Delay	57.2	38.4	0.1	56.6	54.4	0.9	58.0	24.7	0.0	77.2	13.4	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	38.4	0.1	56.6	54.4	0.9	58.0	24.7	0.0	77.2	13.4	2.5
Queue Length 50th (ft)	101	92	0	24	161	0	53	60	0	31	134	25
Queue Length 95th (ft)	140	123	0	47	205	0	85	104	0	48	276	26
Internal Link Dist (ft)		1165			1100			342			860	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	557	907	1583	472	766	485	300	1499	1583	275	1357	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.29	0.08	0.14	0.54	0.14	0.46	0.16	0.01	0.28	0.49	0.46

Intersection Summary



HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Existing AM  
01/24/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗↘	↑↑	↗	↗↘	↑↑	↗	↗↘	↑↑	↗	↗↘	↑↑	↗
Traffic Volume (veh/h)	241	246	117	59	378	64	127	216	17	71	612	663
Future Volume (veh/h)	241	246	117	59	378	64	127	216	17	71	612	663
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	262	267	0	64	411	0	138	235	0	77	665	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	330	717		127	509		194	1681		133	1618	
Arrive On Green	0.10	0.20	0.00	0.04	0.14	0.00	0.06	0.47	0.00	0.04	0.46	0.00
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	262	267	0	64	411	0	138	235	0	77	665	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.9	7.8	0.0	2.2	13.4	0.0	4.7	4.5	0.0	2.6	15.0	0.0
Cycle Q Clear(g_c), s	8.9	7.8	0.0	2.2	13.4	0.0	4.7	4.5	0.0	2.6	15.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	330	717		127	509		194	1681		133	1618	
V/C Ratio(X)	0.79	0.37		0.50	0.81		0.71	0.14		0.58	0.41	
Avail Cap(c_a), veh/h	562	859		475	770		274	1681		274	1618	
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	53.1	41.3	0.0	56.7	49.8	0.0	55.7	17.8	0.0	56.7	21.9	0.0
Incr Delay (d2), s/veh	4.4	0.3	0.0	3.1	3.8	0.0	4.9	0.2	0.0	3.9	0.8	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	4.0	3.4	0.0	1.0	6.1	0.0	2.2	1.9	0.0	1.2	6.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.5	41.6	0.0	59.8	53.6	0.0	60.6	18.0	0.0	60.7	22.7	0.0
LnGrp LOS	E	D		E	D		E	B		E	C	
Approach Vol, veh/h		529	A		475	A		373	A		742	A
Approach Delay, s/veh		49.5			54.5			33.8			26.6	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.1	63.8	11.9	31.2	15.2	61.6	19.0	24.2				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	9.5	35.0	16.5	29.0	9.5	35.0	19.5	26.0				
Max Q Clear Time (g_c+I1), s	4.6	6.5	4.2	9.8	6.7	17.0	10.9	15.4				
Green Ext Time (p_c), s	0.1	1.5	0.1	1.4	0.1	4.2	0.5	1.7				

Intersection Summary

HCM 6th Ctrl Delay	39.8
HCM 6th LOS	D

Notes

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

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

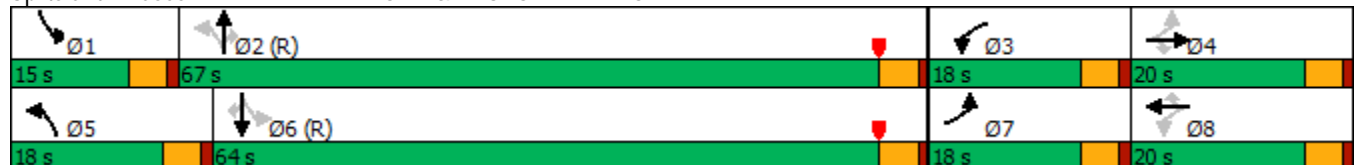
Existing AM  
01/24/2023

							Ø4	Ø5	Ø7
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations									
Traffic Volume (vph)	96	36	481	40	110	1250			
Future Volume (vph)	96	36	481	40	110	1250			
Turn Type	pm+pt	Perm	NA	Perm	pm+pt	NA			
Protected Phases	3		2		1	6	4	5	7
Permitted Phases	8	8		2	6				
Detector Phase	3	8	2	2	1	6			
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	9.5
Total Split (s)	18.0	20.0	67.0	67.0	15.0	64.0	20.0	18.0	18.0
Total Split (%)	15.0%	16.7%	55.8%	55.8%	12.5%	53.3%	17%	15%	15%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5			
Lead/Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None	None	None
Act Effect Green (s)	11.4	11.4	88.0	88.0	99.6	99.6			
Actuated g/C Ratio	0.10	0.10	0.73	0.73	0.83	0.83			
v/c Ratio	0.62	0.06	0.20	0.04	0.17	0.46			
Control Delay	67.9	0.2	9.2	3.7	3.9	10.5			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay	67.9	0.2	9.2	3.7	3.9	10.5			
LOS	E	A	A	A	A	B			
Approach Delay			8.7			10.0			
Approach LOS			A			A			

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 12.2  
 Intersection LOS: B  
 Intersection Capacity Utilization 55.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
**2: MERIDIAN ROAD & EASTONVILLE ROAD**

Existing AM  
 01/24/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	104	39	523	43	120	1359
v/c Ratio	0.62	0.06	0.20	0.04	0.17	0.46
Control Delay	67.9	0.2	9.2	3.7	3.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	0.2	9.2	3.7	3.9	10.5
Queue Length 50th (ft)	78	0	123	4	31	390
Queue Length 95th (ft)	136	0	155	m17	35	470
Internal Link Dist (ft)			231			776
Turn Bay Length (ft)	120	100		400	375	
Base Capacity (vph)	199	661	2596	1186	749	2936
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	0.52	0.06	0.20	0.04	0.16	0.46

**Intersection Summary**

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

# HCM 6th Signalized Intersection Summary

## 2: MERIDIAN ROAD & EASTONVILLE ROAD

Existing AM  
01/24/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	0	0	0	96	0	36	0	481	40	110	1250	0
Future Volume (veh/h)	0	0	0	96	0	36	0	481	40	110	1250	0
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	0	0	104	0	0	0	523	43	120	1359	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	2		189	136		366	2751	1227	754	3030	1351
Arrive On Green	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.77	0.77	0.04	0.85	0.00
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	0	0	0	104	0	0	0	523	43	120	1359	0
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	0.0	6.9	0.0	0.0	0.0	4.7	0.8	1.5	11.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	6.9	0.0	0.0	0.0	4.7	0.8	1.5	11.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	2		189	136		366	2751	1227	754	3030	1351
V/C Ratio(X)	0.00	0.00		0.55	0.00		0.00	0.19	0.04	0.16	0.45	0.00
Avail Cap(c_a), veh/h	509	242		260	242		565	2751	1227	837	3030	1351
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	0.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	54.7	0.0	0.0	0.0	3.6	3.1	2.0	2.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.2	0.1	0.1	0.5	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	0.0	0.0	3.2	0.0	0.0	0.0	1.1	0.2	0.2	1.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	57.2	0.0	0.0	0.0	3.7	3.2	2.1	2.6	0.0
LnGrp LOS	A	A		E	A		A	A	A	A	A	A
Approach Vol, veh/h		0	A		104	A		566			1479	
Approach Delay, s/veh		0.0			57.2			3.7			2.6	
Approach LOS					E			A			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.4	97.4	13.2	0.0	0.0	106.8	0.0	13.2				
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	10.5	62.5	13.5	15.5	13.5	59.5	13.5	15.5				
Max Q Clear Time (g_c+I1), s	3.5	6.7	8.9	0.0	0.0	13.0	0.0	0.0				
Green Ext Time (p_c), s	0.1	3.4	0.1	0.0	0.0	11.9	0.0	0.0				

### Intersection Summary

HCM 6th Ctrl Delay	5.5
HCM 6th LOS	A

### Notes

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

Timings  
**3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE**

Existing AM  
 01/24/2023

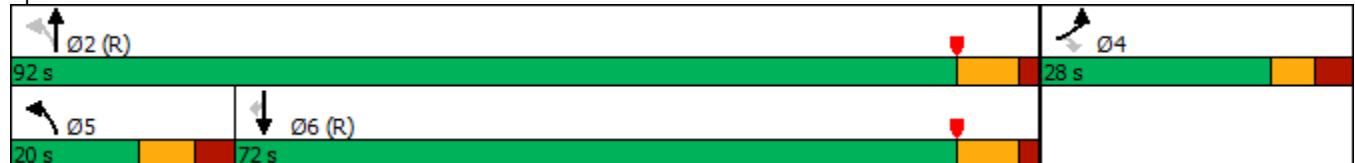


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	67	93	80	437	1270	107
Future Volume (vph)	67	93	80	437	1270	107
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	28.0	28.0	20.0	92.0	72.0	72.0
Total Split (%)	23.3%	23.3%	16.7%	76.7%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	8.8	8.8	95.2	96.2	80.9	80.9
Actuated g/C Ratio	0.07	0.07	0.79	0.80	0.67	0.67
v/c Ratio	0.29	0.48	0.30	0.17	0.58	0.10
Control Delay	55.4	18.1	4.9	1.4	11.9	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.4	18.1	4.9	1.4	11.9	1.6
LOS	E	B	A	A	B	A
Approach Delay	33.8			2.0	11.1	
Approach LOS	C			A	B	

**Intersection Summary**

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.58  
 Intersection Signal Delay: 10.6  
 Intersection Capacity Utilization 65.8%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

**Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE**



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/24/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	73	101	87	475	1380	116
v/c Ratio	0.29	0.48	0.30	0.17	0.58	0.10
Control Delay	55.4	18.1	4.9	1.4	11.9	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.4	18.1	4.9	1.4	11.9	1.6
Queue Length 50th (ft)	28	0	1	2	266	0
Queue Length 95th (ft)	51	54	10	3	366	20
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	586	354	346	2837	2386	1105
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	0.12	0.29	0.25	0.17	0.58	0.10

## Intersection Summary

# HCM 6th Signalized Intersection Summary

## 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Existing AM  
01/24/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶↶	↷	↶	↶↶	↶↶	↷
Traffic Volume (veh/h)	67	93	80	437	1270	107
Future Volume (veh/h)	67	93	80	437	1270	107
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	0	87	475	1380	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	210		311	2893	2502	1116
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	73	0	87	475	1380	116
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	2.4	0.0	1.5	3.4	22.6	2.8
Cycle Q Clear(g_c), s	2.4	0.0	1.5	3.4	22.6	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	210		311	2893	2502	1116
V/C Ratio(X)	0.35		0.28	0.16	0.55	0.10
Avail Cap(c_a), veh/h	590		412	2893	2502	1116
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.1	0.0	7.0	2.4	8.6	5.7
Incr Delay (d2), s/veh	1.0	0.0	0.5	0.1	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.5	1.0	8.2	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.0	0.0	7.5	2.5	9.5	5.9
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	73	A		562	1496	
Approach Delay, s/veh	55.0			3.3	9.2	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		105.2		14.8	13.2	92.0
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		84.5		20.5	11.5	64.5
Max Q Clear Time (g_c+I1), s		5.4		4.4	3.5	24.6
Green Ext Time (p_c), s		3.6		0.1	0.1	15.4

### Intersection Summary

HCM 6th Ctrl Delay	9.2
HCM 6th LOS	A

### Notes

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

HCM 6th TWSC  
 4: MERIDIAN PARK DRIVE & BENT GRASS MEADOWS DRIVE

Existing AM  
 01/24/2023

Intersection						
Int Delay, s/veh	5.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	44	62	152	35	1	116
Future Vol, veh/h	44	62	152	35	1	116
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	48	67	165	38	1	126

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	115	0	397
Stage 1	-	-	-	-	48
Stage 2	-	-	-	-	349
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1472	-	580
Stage 1	-	-	-	-	968
Stage 2	-	-	-	-	685
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1472	-	515
Mov Cap-2 Maneuver	-	-	-	-	515
Stage 1	-	-	-	-	968
Stage 2	-	-	-	-	608

Approach	EB	WB	NB
HCM Control Delay, s	0	6.3	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1038	-	-	1472	-
HCM Lane V/C Ratio	0.123	-	-	0.112	-
HCM Control Delay (s)	9	-	-	7.8	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.4	-



Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

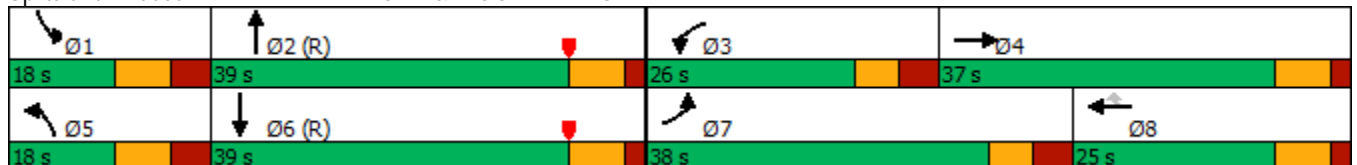
Existing PM  
01/24/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	671	509	160	112	330	136	164	664	106	100	384	375
Future Volume (vph)	671	509	160	112	330	136	164	664	106	100	384	375
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	38.0	37.0		26.0	25.0	25.0	18.0	39.0		18.0	39.0	
Total Split (%)	31.7%	30.8%		21.7%	20.8%	20.8%	15.0%	32.5%		15.0%	32.5%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	28.8	36.0	120.0	9.6	16.8	16.8	9.5	35.8	120.0	8.6	34.8	120.0
Actuated g/C Ratio	0.24	0.30	1.00	0.08	0.14	0.14	0.08	0.30	1.00	0.07	0.29	1.00
v/c Ratio	0.88	0.52	0.11	0.44	0.73	0.34	0.65	0.68	0.07	0.44	0.41	0.26
Control Delay	57.3	36.7	0.1	57.4	58.5	2.1	65.5	42.0	0.1	54.8	53.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	36.7	0.1	57.4	58.5	2.1	65.5	42.0	0.1	54.8	53.8	0.4
LOS	E	D	A	E	E	A	E	D	A	D	D	A
Approach Delay		42.6			45.0			41.4			30.6	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 39.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 78.7%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



## Queues

Existing PM

## 1: MERIDIAN ROAD &amp; WOODMAN ROAD

01/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	729	553	174	122	359	148	178	722	115	109	417	408
v/c Ratio	0.88	0.52	0.11	0.44	0.73	0.34	0.65	0.68	0.07	0.44	0.41	0.26
Control Delay	57.3	36.7	0.1	57.4	58.5	2.1	65.5	42.0	0.1	54.8	53.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	36.7	0.1	57.4	58.5	2.1	65.5	42.0	0.1	54.8	53.8	0.4
Queue Length 50th (ft)	276	181	0	47	141	0	69	268	0	42	169	0
Queue Length 95th (ft)	#352	243	0	77	193	0	108	344	0	74	215	0
Internal Link Dist (ft)		1165			1100			342			860	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	872	1061	1583	529	530	449	279	1055	1583	271	1027	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.52	0.11	0.23	0.68	0.33	0.64	0.68	0.07	0.40	0.41	0.26

## Intersection Summary

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

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Existing PM  
01/24/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑	↖	↖↗	↑↑	↖	↖↗	↑↑	↖	↖↗	↑↑	↖
Traffic Volume (veh/h)	671	509	160	112	330	136	164	664	106	100	384	375
Future Volume (veh/h)	671	509	160	112	330	136	164	664	106	100	384	375
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	729	553	0	122	359	0	178	722	0	109	417	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	800	1080		181	444		234	1231		163	1158	
Arrive On Green	0.23	0.30	0.00	0.05	0.13	0.00	0.07	0.35	0.00	0.05	0.33	0.00
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	729	553	0	122	359	0	178	722	0	109	417	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	24.7	15.4	0.0	4.2	11.8	0.0	6.1	20.0	0.0	3.7	10.8	0.0
Cycle Q Clear(g_c), s	24.7	15.4	0.0	4.2	11.8	0.0	6.1	20.0	0.0	3.7	10.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	800	1080		181	444		234	1231		163	1158	
V/C Ratio(X)	0.91	0.51		0.67	0.81		0.76	0.59		0.67	0.36	
Avail Cap(c_a), veh/h	878	1080		533	533		274	1231		274	1158	
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.9	34.4	0.0	55.8	51.1	0.0	55.0	32.2	0.0	56.2	30.9	0.0
Incr Delay (d2), s/veh	12.9	0.4	0.0	4.3	7.7	0.0	10.1	2.1	0.0	4.7	0.9	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	11.6	6.5	0.0	1.9	5.6	0.0	3.0	8.8	0.0	1.7	4.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.8	34.8	0.0	60.1	58.8	0.0	65.1	34.2	0.0	60.9	31.8	0.0
LnGrp LOS	E	C		E	E		E	C		E	C	
Approach Vol, veh/h		1282	A		481	A		900	A		526	A
Approach Delay, s/veh		47.9			59.1			40.3			37.8	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.2	48.6	13.8	43.5	16.6	46.1	35.3	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	9.5	32.0	18.5	30.0	9.5	32.0	30.5	18.0				
Max Q Clear Time (g_c+I1), s	5.7	22.0	6.2	17.4	8.1	12.8	26.7	13.8				
Green Ext Time (p_c), s	0.1	3.4	0.2	2.7	0.1	2.5	1.1	0.8				

Intersection Summary

HCM 6th Ctrl Delay	45.8
HCM 6th LOS	D

Notes

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

# Timings

## 2: MERIDIAN ROAD & EASTONVILLE ROAD

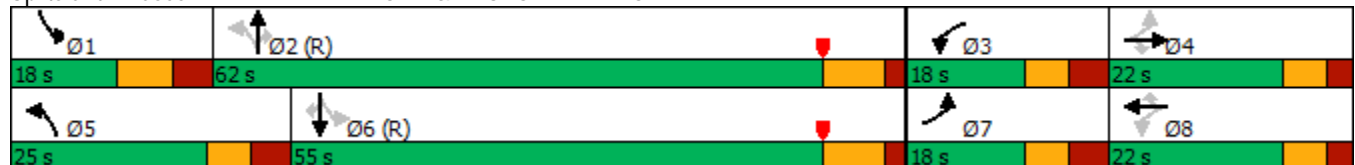
Existing PM  
01/24/2023

							Ø4	Ø5	Ø7
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations									
Traffic Volume (vph)	31	133	1356	115	82	772			
Future Volume (vph)	31	133	1356	115	82	772			
Turn Type	pm+pt	Perm	NA	Perm	pm+pt	NA			
Protected Phases	3		2		1	6	4	5	7
Permitted Phases	8	8		2	6				
Detector Phase	3	8	2	2	1	6			
Switch Phase									
Minimum Initial (s)	5.0	8.0	15.0	15.0	5.0	15.0	8.0	5.0	5.0
Minimum Split (s)	12.5	14.5	25.5	25.5	13.5	25.5	14.5	12.5	12.5
Total Split (s)	18.0	22.0	62.0	62.0	18.0	55.0	22.0	25.0	18.0
Total Split (%)	15.0%	18.3%	51.7%	51.7%	15.0%	45.8%	18%	21%	15%
Yellow Time (s)	4.0	4.0	5.5	5.5	5.0	5.5	4.0	4.0	4.0
All-Red Time (s)	3.5	2.5	2.0	2.0	3.5	2.0	2.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0			
Total Lost Time (s)	7.5	6.5	7.5	7.5	8.5	7.5			
Lead/Lag	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None	None	None
Act Effect Green (s)	8.2	9.2	80.4	80.4	95.8	96.8			
Actuated g/C Ratio	0.07	0.08	0.67	0.67	0.80	0.81			
v/c Ratio	0.29	0.34	0.62	0.11	0.35	0.29			
Control Delay	59.2	2.2	5.9	0.7	14.7	1.4			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay	59.2	2.2	5.9	0.7	14.7	1.4			
LOS	E	A	A	A	B	A			
Approach Delay			5.5			2.7			
Approach LOS			A			A			

### Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 5.0  
 Intersection LOS: A  
 Intersection Capacity Utilization 67.4%  
 ICU Level of Service C  
 Analysis Period (min) 15

### Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
**2: MERIDIAN ROAD & EASTONVILLE ROAD**

Existing PM  
 01/24/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	145	1474	125	89	839
v/c Ratio	0.29	0.34	0.62	0.11	0.35	0.29
Control Delay	59.2	2.2	5.9	0.7	14.7	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	2.2	5.9	0.7	14.7	1.4
Queue Length 50th (ft)	26	0	86	0	8	17
Queue Length 95th (ft)	59	0	144	m5	37	35
Internal Link Dist (ft)			231			776
Turn Bay Length (ft)	120	100		400	375	
Base Capacity (vph)	154	493	2369	1118	278	2856
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	0.29	0.62	0.11	0.32	0.29

**Intersection Summary**

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

HCM 6th Signalized Intersection Summary  
 2: MERIDIAN ROAD & EASTONVILLE ROAD

Existing PM  
 01/24/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	0	0	0	31	0	133	0	1356	115	82	772	0
Future Volume (veh/h)	0	0	0	31	0	133	0	1356	115	82	772	0
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	0	0	34	0	0	0	1474	125	89	839	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	2		110	68		544	2617	1167	305	3009	1342
Arrive On Green	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.74	0.74	0.04	0.85	0.00
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	0	0	0	34	0	0	0	1474	125	89	839	0
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	0.0	2.3	0.0	0.0	0.0	22.4	2.7	1.3	5.7	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.3	0.0	0.0	0.0	22.4	2.7	1.3	5.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	2		110	68		544	2617	1167	305	3009	1342
V/C Ratio(X)	0.00	0.00		0.31	0.00		0.00	0.56	0.11	0.29	0.28	0.00
Avail Cap(c_a), veh/h	422	242		216	242		802	2617	1167	376	3009	1342
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	0.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	57.7	0.0	0.0	0.0	7.1	4.5	6.2	1.8	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.9	0.2	0.5	0.2	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	0.0	0.0	1.1	0.0	0.0	0.0	6.3	0.9	0.4	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	59.2	0.0	0.0	0.0	8.0	4.7	6.7	2.1	0.0
LnGrp LOS	A	A		E	A		A	A	A	A	A	A
Approach Vol, veh/h		0	A		34	A		1599			928	
Approach Delay, s/veh		0.0			59.2			7.7			2.5	
Approach LOS					E			A			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.2	95.9	10.9	0.0	0.0	109.1	0.0	10.9				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	9.5	54.5	10.5	15.5	17.5	47.5	10.5	15.5				
Max Q Clear Time (g_c+I1), s	3.3	24.4	4.3	0.0	0.0	7.7	0.0	0.0				
Green Ext Time (p_c), s	0.1	12.6	0.0	0.0	0.0	5.7	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

Notes

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

Timings  
**3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE**

Existing PM  
 01/24/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	79	72	65	1424	779	98
Future Volume (vph)	79	72	65	1424	779	98
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	27.0	27.0	20.0	93.0	73.0	73.0
Total Split (%)	22.5%	22.5%	16.7%	77.5%	60.8%	60.8%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	8.9	8.9	95.1	96.1	83.9	83.9
Actuated g/C Ratio	0.07	0.07	0.79	0.80	0.70	0.70
v/c Ratio	0.34	0.41	0.15	0.55	0.34	0.09
Control Delay	56.3	18.2	3.4	8.6	8.3	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.3	18.2	3.4	8.6	8.3	1.6
LOS	E	B	A	A	A	A
Approach Delay	38.2			8.4	7.5	
Approach LOS	D			A	A	

**Intersection Summary**

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 9.9  
 Intersection Capacity Utilization 58.5%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/24/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	86	78	71	1548	847	107
v/c Ratio	0.34	0.41	0.15	0.55	0.34	0.09
Control Delay	56.3	18.2	3.4	8.6	8.3	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.3	18.2	3.4	8.6	8.3	1.6
Queue Length 50th (ft)	33	0	9	391	131	0
Queue Length 95th (ft)	59	48	m20	502	181	19
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	557	322	538	2835	2475	1139
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	0.15	0.24	0.13	0.55	0.34	0.09

## Intersection Summary

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



HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Existing PM  
 01/24/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	79	72	65	1424	779	98
Future Volume (veh/h)	79	72	65	1424	779	98
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	86	0	71	1548	847	107
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	217		487	2886	2500	1115
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	86	0	71	1548	847	107
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	2.9	0.0	1.2	17.4	11.1	2.6
Cycle Q Clear(g_c), s	2.9	0.0	1.2	17.4	11.1	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	217		487	2886	2500	1115
V/C Ratio(X)	0.40		0.15	0.54	0.34	0.10
Avail Cap(c_a), veh/h	562		590	2886	2500	1115
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.0	0.0	4.5	3.8	6.9	5.7
Incr Delay (d2), s/veh	1.2	0.0	0.1	0.7	0.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.4	4.9	4.0	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.2	0.0	4.6	4.5	7.3	5.8
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	86	A		1619	954	
Approach Delay, s/veh	55.2			4.5	7.1	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		105.0		15.0	13.0	91.9
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		85.5		19.5	11.5	65.5
Max Q Clear Time (g_c+I1), s		19.4		4.9	3.2	13.1
Green Ext Time (p_c), s		20.6		0.2	0.1	7.9
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			7.1			
HCM 6th LOS			A			

Notes

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

Intersection						
Int Delay, s/veh	5.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	32	40	116	47	2	119
Future Vol, veh/h	32	40	116	47	2	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	35	43	126	51	2	129

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	78	0	313 18
Stage 1	-	-	-	-	35 -
Stage 2	-	-	-	-	278 -
Critical Hdwy	-	-	4.14	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	2.22	-	3.52 3.32
Pot Cap-1 Maneuver	-	-	1518	-	655 1056
Stage 1	-	-	-	-	983 -
Stage 2	-	-	-	-	744 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1518	-	601 1056
Mov Cap-2 Maneuver	-	-	-	-	601 -
Stage 1	-	-	-	-	983 -
Stage 2	-	-	-	-	682 -

Approach	EB	WB	NB
HCM Control Delay, s	0	5.4	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1043	-	-	1518	-
HCM Lane V/C Ratio	0.126	-	-	0.083	-
HCM Control Delay (s)	8.9	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-

## **APPENDIX E – Pipeline TIS Excerpts**

# TRAFFIC IMPACT STUDY

For

**Owl Place Commercial  
El Paso County, Colorado  
PCD File No. CR221**

June 2022  
Revised:  
September 2022

Prepared for:

First Cup  
106 S Kyrene Road, Suite 2  
Chandler, AZ 85226

Prepared by:



**SM ROCHA, LLC**  
TRAFFIC AND TRANSPORTATION CONSULTANTS

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Project Engineer:  
Stephen Simon, EIT

Engineer in Responsible Charge:  
Fred Lantz, PE



22-051673

**Traffic Engineer's Statement**

The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.

---

*Fred Lantz, P.E. #23410*

---

Date

**Developer's Statement**

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

---

*Brian Zurek  
First Cup  
106 S Kyrene Road, Suite 2  
Chandler, AZ 85226*

---

Date

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## I. Introduction

### Project Overview

This traffic impact study is provided as a planning document and addresses the capacity, geometric, and control requirements associated with the development entitled Owl Place Commercial.

This traffic impact study has been revised to address County review comments made to the June 2022 version of the traffic impact study regarding inclusion of additional analyses and recommendations with corresponding revisions to figures and tables pursuant to the latest conceptual site plan.

This proposed commercial development consists of various potential uses including a gas station convenience store, coffee/donut shop with drive-through window, automated car wash, and quick-serve restaurants. The development is located at the southwest corner of the intersection of Meridian Road with Owl Place in El Paso County, Colorado.

### Study Area

The study area to be examined in this analysis encompasses Meridian Road between the intersections of Bent Grass Meadows Drive and E Woodmen Road.

Figure 1 illustrates location of the site and study intersections.

### Site Description

Land for the development is currently occupied by a single-family dwelling unit and is surrounded by a mix of residential, commercial, and open space land uses.

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 for an approximate 5,300 square foot gas station convenience store supporting up to 12 vehicle fueling positions, an approximate 2,000 square foot coffee/donut shop with drive-through window, a 4,170 square foot automated car wash with one wash tunnel, and an approximate 3,420 square foot high-turnover quick-serve restaurant.

Proposed access to the development is provided at the following locations: one full-movement access onto Owl Place (referred to as Access A), and one full-movement access onto Eastonville Road as an extension of Falcon Market Place (referred to as Access B). For analysis purposes and given the conceptual nature of proposed land uses, proposed accesses are considered to be internal to the overall development area and are not specifically analyzed. Access operations are generally considered to be comparable to or better than that of the closest major intersection.



For purposes of this study, it is anticipated that development construction would be completed by end of Year 2024. General site and access locations are shown on Figure 1.

A conceptual site plan, as prepared by Baseline Engineering Corporation, is shown on Figure 2. This plan is provided for illustrative purposes only.



**OWL PLACE COMMERCIAL**  
Traffic Impact Study

**SM ROCHA, LLC**  
Traffic and Transportation Consultants

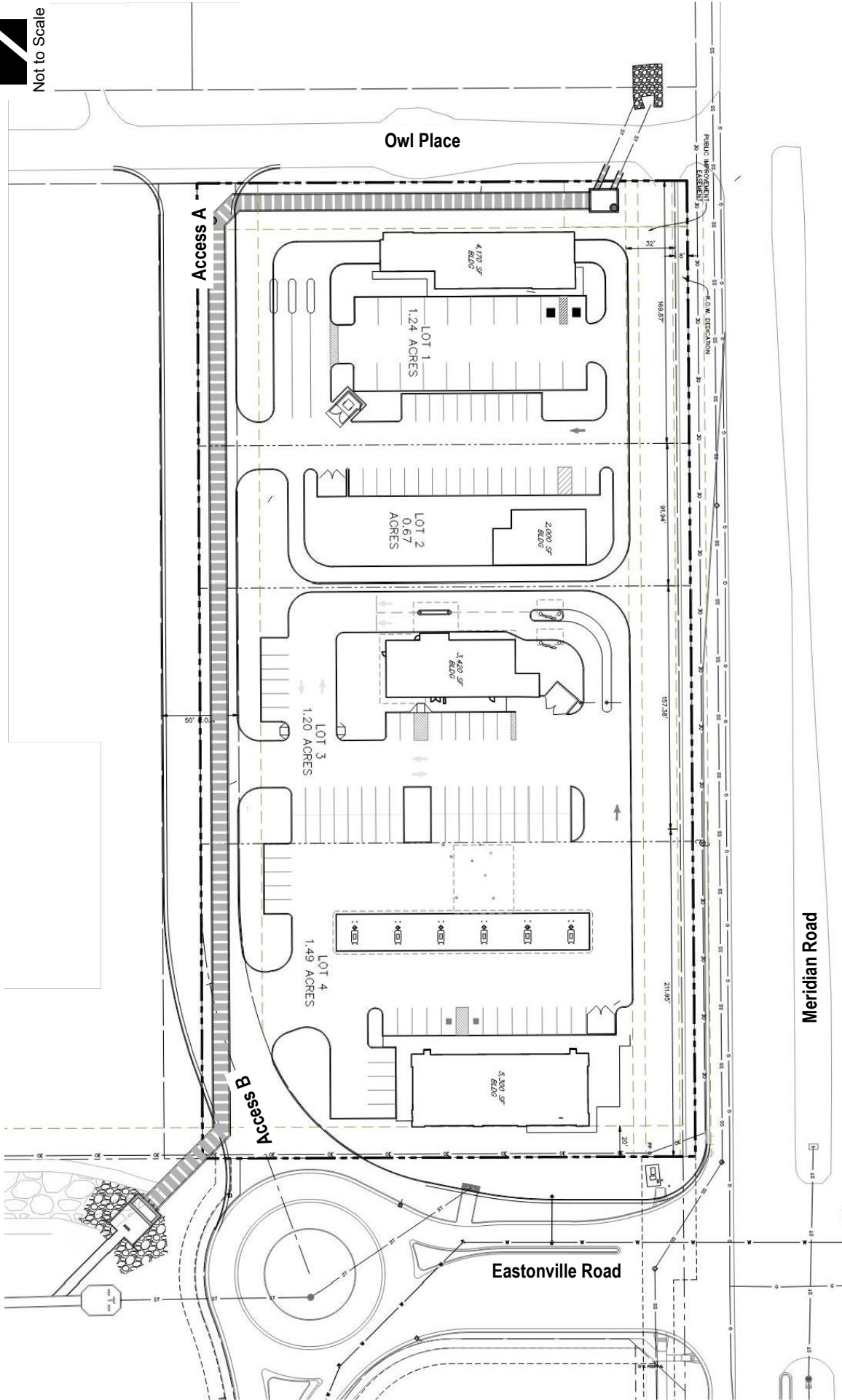
**Figure 1**  
**SITE LOCATION**

September 2022  
Page 3





Not to Scale



## Existing and Committed Surface Transportation Network

Within the study area, Meridian Road is the primary roadway that will accommodate traffic to and from the proposed development. The secondary roadways include E Woodmen Road, Eastonville Road, Owl Place, and Bent Grass Meadows Drive. A brief description of each roadway, based on the County's 2040 Major Transportation Corridors Plan (MTCP)<sup>1</sup> and Engineering Criteria Manual (ECM)<sup>2</sup>, is provided below:

Meridian Road is a north-south principal arterial roadway having four through lanes (two lanes in each direction) with exclusive turn lanes at the intersections within the study area. Meridian Road provides a posted speed limit of 55 MPH.

E Woodmen Road is an east-west principal arterial roadway having four through lanes (two lanes in each direction) with exclusive turn lanes at the intersection within the study area. E Woodmen Road provides a posted speed limit of 55 MPH.

Eastonville Road is an east-west arterial roadway having two through lanes (one lane in each direction) with a combination of shared and exclusive turn lanes at the intersection within the study area. Eastonville Road provides a posted speed limit of 35 MPH.

Owl Place is an east-west unpaved roadway having two through lanes (one lane in each direction) with shared turn lanes at the intersection within the study area. Owl Place is unclassified in County's MTCP. However, per Standard Drawing 2-10 of County ECM and the roadway's estimated ROW width, Owl Place is assumed to be classified as a local roadway and provides a posted speed limit of 30 MPH.

Bent Grass Meadows Drive is an east-west collector roadway having two through lanes (one lanes in each direction) with exclusive turn lanes at the intersections within the study area. Bent Grass Meadows Drive provides a posted speed limit of 35 MPH.

The study intersections of Meridian Road with E Woodmen Road, Eastonville Road, and Bent Grass Meadows Drive are signalized. 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.

---

<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.

It is however noted that signal installation at Eastonville Road and Meridian Road is a recent occurrence with associated extension of Eastonville Road west of Meridian Road. Due to the ongoing development within the area, the newly constructed west leg of the study intersection was observed to experience low volumes associated with construction traffic only. Therefore, for analysis purposes, the study intersection was assumed to not currently operate at its anticipated capacity and was considered as a three-leg stop-controlled intersection for existing conditions only.

In reference to the County's MTCP, E Woodmen Road is planned to become a six-lane, expressway by Year 2040. The remaining study area roadways appear to be built to their ultimate cross-sections excluding potential improvements required due to the proposed development.

## II. Existing Traffic Conditions

Morning (AM) and afternoon (PM) peak hour traffic counts were collected at the intersections of Meridian Road with E Woodmen Road, Eastonville Road, and Owl Place. Counts were collected on June 1, 2022, with AM peak hour counts being collected during the period of 7:00 a.m. to 9:00 a.m. and PM peak hour counts being collected during the period of 4:00 p.m. to 6:00 p.m.

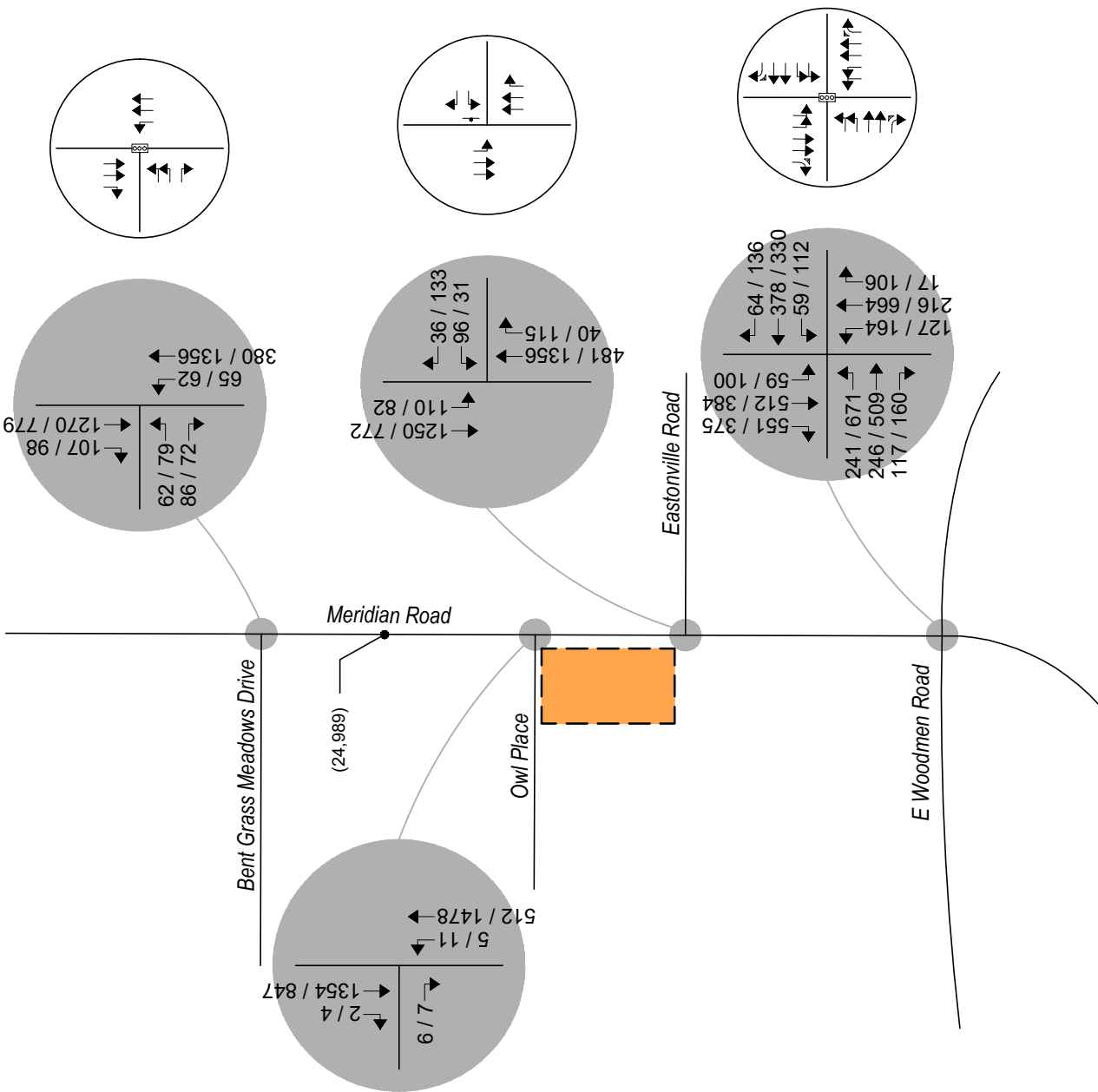
Peak hour traffic counts and 24-hour traffic volumes shown for Meridian Road and the intersection of Meridian Road with Bent Grass Meadows Drive were obtained from a previous traffic study<sup>3</sup>. Referenced counts were collected on March 29, 2022.

Newly collected and referenced counts representing existing traffic volumes, as well as existing intersection geometries, are shown on Figure 3.

Existing signal timing parameters for the intersections of Meridian Road with E Woodmen Road and Bent Grass Meadows Drive were obtained from County Staff and used throughout this study to the best extent possible in order to remain consistent with existing signal coordination plans. City signal timing information received is included for reference in Appendix A.

---

<sup>3</sup> Bent Grass Dunkin' Donuts, SM ROCHA, LLC, April 2022.



**LEGEND**

- Study Intersection
- Study Intersection Lane Geometry
- Development Site

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

## Peak Hour Intersection Levels of Service – Existing Traffic

The Signalized and Unsignalized Intersection Analysis techniques, as published in the Highway Capacity Manual (HCM), 6<sup>th</sup> Edition, by the Transportation Research Board and as incorporated into the SYNCHRO computer program, were used to analyze the study intersections for existing and future 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
Meridian Road / E Woodmen Road (Signalized)	C (30.5)	D (37.8)
Meridian Road / Bent Grass Meadows Drive (Signalized)	A (9.9)	A (7.6)
Meridian Road / Eastonville Road (Stop-Controlled)		
Westbound Left	B	F
Westbound Right	A	B
Southbound Left	A	B
Meridian Road / Owl Place (Stop-Controlled)		
Eastbound Right	B	A
Northbound Left	A	A

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

## Existing Traffic Analysis Results

Under existing conditions, operational analysis shows that the signalized intersection of Meridian Road with E Woodmen Road has overall operations at LOS C during the morning peak traffic hour and LOS D during the afternoon peak traffic hour.

The signalized intersection of Meridian Road with Bent Grass Meadows Drive has overall operations at LOS A during both the morning and afternoon peak traffic hours.



The unsignalized intersection of Meridian Road with Eastonville Road has turning movement operations at or better than LOS B during either peak traffic hour. Exceptions would include the westbound left turning movement which operates at LOS F during the PM peak traffic hour. The LOS F operation is attributed to the high through traffic volumes along Meridian Road and the stop-controlled nature of the intersection. However, as previously discussed, given the recent signalization of the study intersection, actual operations are expected to be better than shown.

The unsignalized intersection of Meridian Road with Owl Place has turning movement operations at or better than LOS B during the morning peak traffic hour and LOS A during the afternoon peak traffic hour.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during 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 2024 and 2040, a compounded annual growth rate was determined using population growth estimates provided by the Pikes Peak Area Council of Governments' (PPACG) 2045 Long Range Transportation Plan<sup>4</sup> which anticipates a 20-year growth rate of less than 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 previously prepared Falcon Marketplace Traffic Impact Analysis<sup>5</sup>, provided by the County's Electronic Development Application Review Program (EDARP), were added to background traffic volumes.

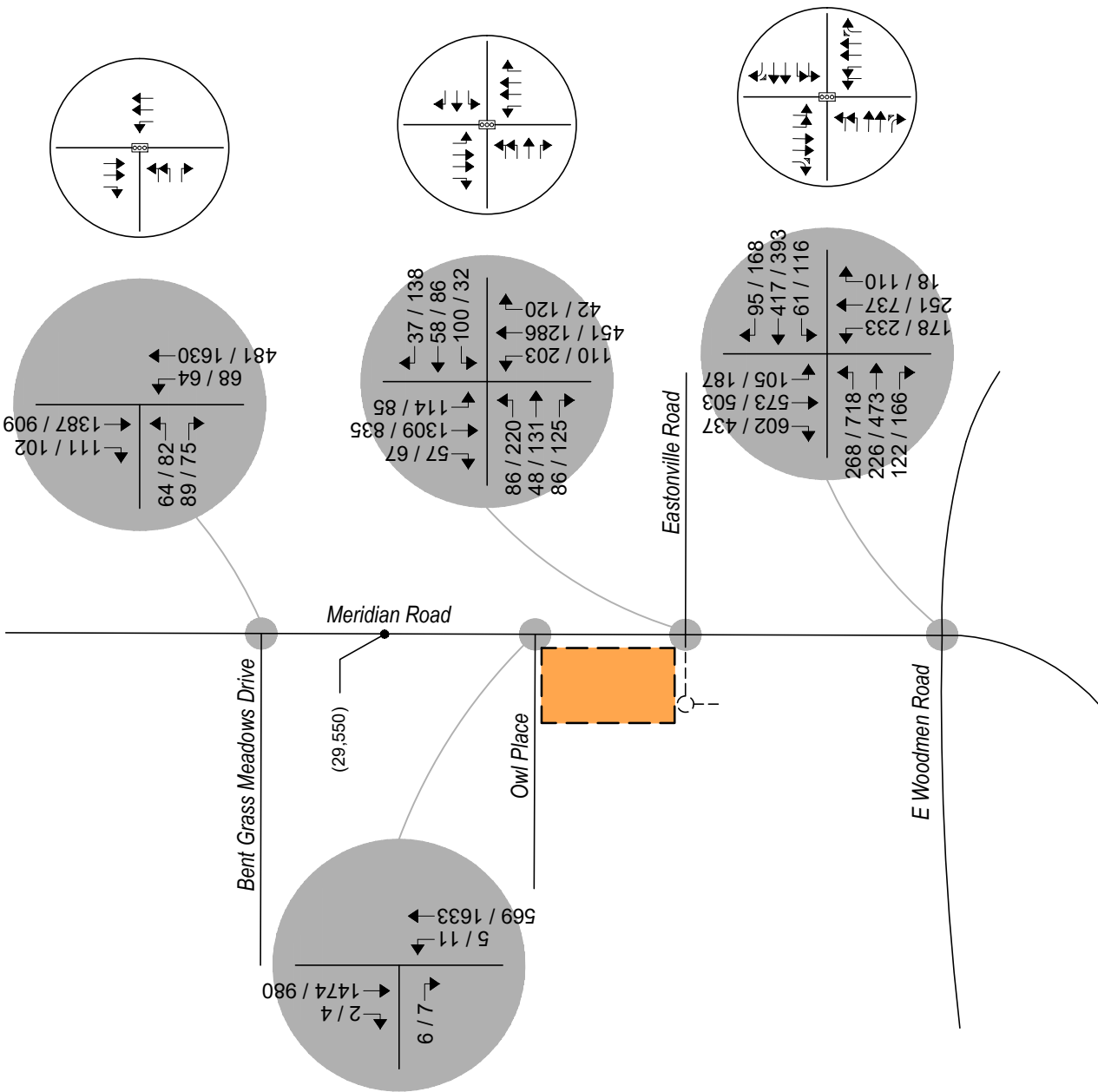
Pursuant to the proposed and committed area roadway improvements discussed in Section I, Year 2024 and Year 2040 background traffic conditions assume the completion of the Eastonville Road extension west of Meridian Road and the improvement of the intersection including signalization. Year 2040 also assumes signal timing parameters for the Meridian Road intersections with optimized intersection splits in effort to better long-term intersection performance.

Projected background traffic volumes and intersection geometry for Years 2024 and 2040 are shown on Figure 4 and Figure 5, respectively.

---

<sup>4</sup> Moving Forward 2045: Pikes Peak Area Regional Transportation Plan, PPACG, January 2020.

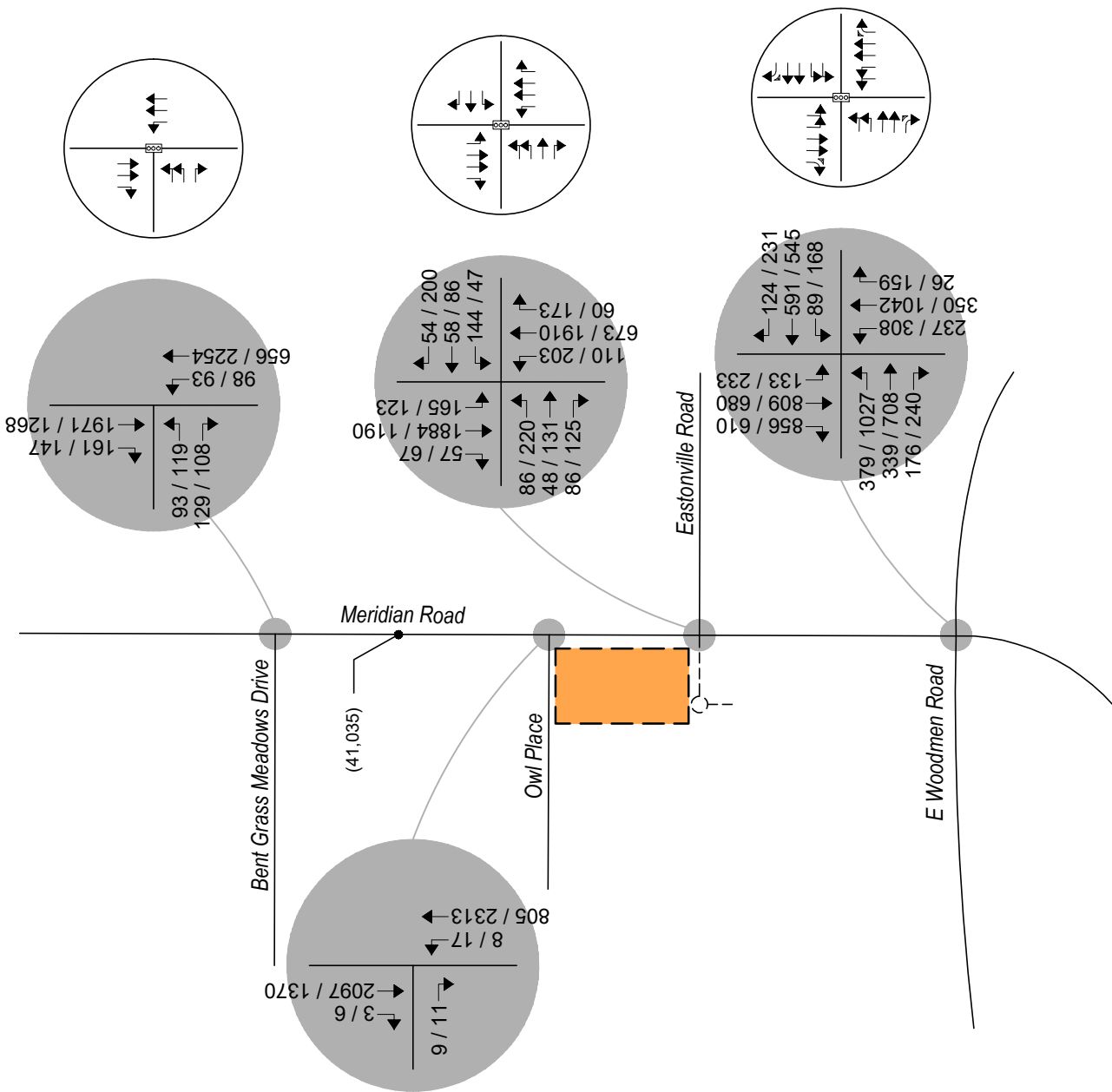
<sup>5</sup> Falcon Marketplace Traffic Impact Analysis, LSC Transportation Consultants Inc., September 2018.



**LEGEND**

- Study Intersection Volumes
- Study Intersection Lane Geometry
- Development Site

**Figure 4**  
**BACKGROUND TRAFFIC - YEAR 2024**  
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



### Peak Hour Intersection Levels of Service – Background 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 2024 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 2024**

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Meridian Road / E Woodmen Road (Signalized)	C (31.6)	D (45.1)
Meridian Road / Bent Grass Meadows Drive (Signalized)	B (10.2)	A (5.9)
Meridian Road / Eastonville Road (Signalized)	D (35.3)	C (23.2)
Meridian Road / Owl Place (Stop-Controlled)		
Eastbound Right	B	B
Northbound Left	B	A

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

### Background Traffic Analysis Results – Year 2024

Year 2024 background traffic analysis indicates that the signalized intersection of Meridian Road with E Woodmen Road has overall operations at LOS C during the AM peak traffic hour and LOS D during the PM peak traffic hour.

The signalized intersection of Meridian Road with Bent Grass Meadows Drive has overall operations at LOS B during the AM peak traffic hour and LOS A during the PM peak traffic hour.

The signalized intersection of Meridian Road with Eastonville Road has overall operations at LOS D during the AM peak traffic hour and LOS C during the PM peak traffic hour.

The unsignalized intersection of Meridian Road with Owl Place operates at or better than LOS B during both AM and PM 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
Meridian Road / E Woodmen Road (Signalized)	D (39.0)	F (86.8)
Meridian Road / Bent Grass Meadows Drive (Signalized)	B (19.6)	B (11.9)
Meridian Road / Eastonville Road (Signalized)	D (38.6)	C (30.6)
Meridian Road / Owl Place (Stop-Controlled)		
Eastbound Right	C	B
Northbound Left	C	A

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

### Background Traffic Analysis Results – Year 2040

By Year 2040 and without the proposed development, the study intersection of Meridian Road with E Woodmen Road experiences LOS D operations during the AM peak traffic hour and LOS F during the PM peak traffic hour. The LOS F operation is primarily attributed to the high eastbound, northbound and southbound left turning volumes. In order to provide mitigation to the poor overall operation and increase available intersection capacity, potential improvements may include the widening of E Woodmen Road to six-lanes, pursuant to its future classification as an expressway, as well as further optimization of traffic signal timings to accommodate future regional demand. It is noted that long-term operations may be better than shown given the potential for future planned roadway connections to the west along E Woodmen Road to influence vehicle routes. As example, planned construction of future Banning Lewis Parkway within the City of Colorado Springs along E Woodmen Road will provide an additional major north-south arterial roadway which may reduce some of the volumes projected to utilize Meridian Road for north-south travel. It is recommended that County Staff continues to monitor the study intersection in order to determine what mitigation may be most applicable and when implementation of said improvements becomes necessary.

The study intersection of Meridian Road with Bent Grass Meadows Drive experiences LOS B operations during both the AM and PM peak traffic hours.

The study intersection of Meridian Road with Eastonville Road experiences LOS D operations during the AM peak traffic hour and LOS C operations during the PM peak traffic hour.

The study intersection of Meridian Road with Owl Place experiences LOS C operations during the AM peak traffic hour and LOS B or better operations during the PM peak traffic hour.

It is not recommended that access onto Meridian Road from Owl Place be more limited than that already existing. Limited access will interfere with the existing and proposed developments' ability to equally distribute traffic within the site and out to available roadways, thus impacting existing and future traffic in the surrounding area and potentially cause the adjacent roadway network to be used in a manner not intended or cause additional delay that could impact emergency response times.

## IV. Proposed Project Traffic

### Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation Manual, 11<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 934 (Fast-Food Restaurant with Drive-Through Window), 937 (Coffee/Donut Shop with Drive-Through Window), 945 (Convenience Store/Gas Station), and 948 (Automated Car Wash) were used for estimating trip generation because of their conservative rates and best fit to the anticipated land use descriptions.

As actual land uses, densities or site plans within the Owl Place Commercial development area 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
934	Fast-Food Restaurant w/DTW	KSF	467.48	22.75	21.86	44.61	17.18	15.85	33.03
937	Coffee/Donut Shop w/DTW	KSF	533.57	43.80	42.08	85.88	19.50	19.50	38.99
945	Convenience Store/Gas Station	KSF	700.43	28.26	28.26	56.52	27.26	27.26	54.52
948	Automated Car Wash	CWT	775.00	*	*	*	38.75	38.75	77.50

Key: KSF = Thousand Square Feet Gross Floor Area. CWT = Car Wash Tunnels.

\* = ITE does not report significant AM peak hour generation due to the nature of the business (ie, operating hours typically open after AM peak).

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

Table 5 illustrates projected 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
934	Fast-Food Restaurant w/DTW	3.4 KSF	1,599	78	75	153	59	54	113
937	Coffee/Donut Shop w/DTW	2.0 KSF	1,067	88	84	172	39	39	78
945	Convenience Store/Gas Station	5.3 KSF	3,712	150	150	300	144	144	289
948	Automated Car Wash	1 CWT	775	*	*	*	39	39	78
<i>Proposed Total:</i>			<i>7,153</i>	<i>315</i>	<i>309</i>	<i>624</i>	<i>281</i>	<i>276</i>	<i>557</i>

Key: KSF = Thousand Square Feet Gross Floor Area. CWT = Car Wash Tunnels.

\* = ITE does not report significant AM peak hour generation due to the nature of the business (ie, operating hours typically open after AM peak).

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 7,153 daily vehicle trips with 624 of those occurring during the morning peak hour and 557 during the afternoon peak hour.

### Adjustments to Trip Generation Rates

A development of this type is likely to attract pass-by trips from the adjacent roadway system. ITE defines a pass-by trip as an intermediate stop on the way from an origin to a primary trip destination without a route diversion. Due to this behavior, pass-by trips are not considered as “new” traffic generated by the development since the trips are already present on the roadway network enroute to their primary destination.

Pass-by trips are especially common to fast-food restaurant, coffee/donut shop, and gas station land uses given the convenience provided by these businesses on the way to another primary destination such as a place of work or home. As example, published ITE pass-by and diverted link trip data indicates an average trip generation reduction rate of 49 percent during the AM peak traffic hour and 50 percent during the PM peak traffic hour as typical to fast-food restaurants with drive-through window.

It is also considered likely that a mixed-use development of this type will attract trips from within area land uses as well as from the adjacent Falcon Marketplace development. However, due to the conceptual nature of proposed land uses, specific internal capture rates can only be assumed. Therefore, no trip reduction was taken in this analysis. This assumption provides for a conservative analysis.

Upon consideration of the proposed land use, reductions were applied pursuant to ITE average data to the proposed land use in order to account for the high probability of pass-by trip generation. ITE average pass-by trip percentages used are presented in Table 6.



Table 6 illustrates projected ADT, AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out with reductions applied due to pass-by trips. Average daily (24-Hour) pass-by trip percentages were estimated as the average between the AM and PM peak hour rates indicated by ITE.

**Table 6 – Trip Generation Summary with Pass-By Trip Reductions**

ITE CODE	LAND USE	SIZE	TOTAL NEW TRIPS GENERATED						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
<i>Pass-By Trip Reduction:</i>			50%	49%	49%	49%	50%	50%	50%
934	Fast-Food Restaurant w/DTW	3.4 KSF	807	40	38	78	29	27	56
<i>Pass-By Trip Reduction:</i>			60%	60%	60%	60%	60%	60%	60%
937	Coffee/Donut Shop w/DTW	2.0 KSF	427	35	34	69	16	16	31
<i>Pass-By Trip Reduction:</i>			59%	62%	62%	62%	56%	56%	56%
945	Convenience Store/Gas Station	5.3 KSF	1,522	57	57	114	64	64	127
<i>Pass-By Trip Reduction:</i>			0%	0%	0%	0%	0%	0%	0%
948	Automated Car Wash	1.0 CWT	775	*	*	*	39	39	78
<i>Proposed Total:</i>			3,531	132	129	260	147	145	292

Key: KSF = Thousand Square Feet Gross Floor Area. CWT = Car Wash Tunnels.

\* = ITE does not report significant AM peak hour generation due to the nature of the business (ie, operating hours typically open after AM peak).

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

Upon build-out and with consideration for pass-by trip reductions, Table 6 illustrates that the proposed development has the potential to generate approximately 3,531 new daily trips with 260 of those occurring during the morning peak hour and 292 during the afternoon peak hour.

### Trip Distribution

The overall directional distribution of site-generated traffic was determined based on the location of development site within the County, proposed and existing area land uses, allowed turning movements, available roadway network, assumptions made for previous studies within the area, and in reference to distribution patterns of existing traffic count data.

Additional pass-by trip distribution is assumed to include vehicle routes heading north-south along Meridian Road. Distribution percentages utilized for pass-by trips are anticipated to be 50 percent from the north and south.

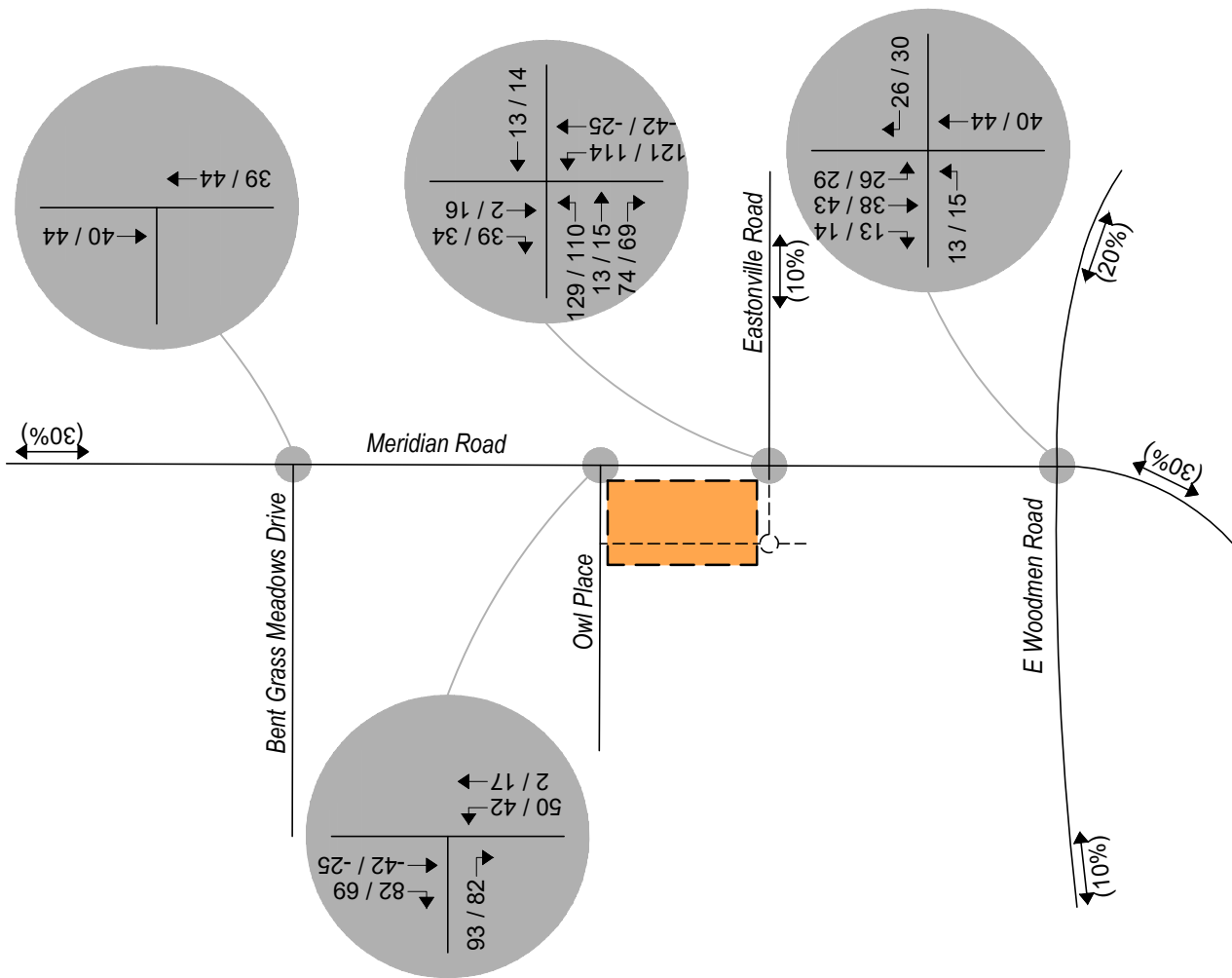
Overall trip distribution patterns for the development are shown on Figure 6.

## **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 overall site-generated trip assignments shown on Figure 6.

It is to be noted that the overall site-generated trip assignments shown on Figure 6 represent the combination of both primary trip generation and pass-by trips. Due to the application of pass-by trips, some negative site-generated trips are shown at the study intersections. These negative trips are the result of redistributing existing through volumes along Meridian Road to site-generated ingress volumes.



**LEGEND**

- Study Intersection
- Volumes
- Development Site

# Falcon Marketplace

## Updated Traffic Impact Analysis

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October 23, 2017  
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# Executive Summary

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## TRAFFIC REPORT

- This updated traffic report has been prepared to address staff comments.
- This report presents analysis of the proposed right-in-only access to Woodmen Road combined with a proposed roundabout intersection with the Woodmen Frontage Road in the southwest corner of the site.
- The report also includes, for comparison purposes, analysis assuming no right-in-only access.
- This report contains short- and long-term traffic projections for Falcon Marketplace, other area properties, and study area roadways and intersections. Traffic analysis has been performed based on the projected volumes.
- Based on the analysis, detailed findings and study area roadway improvements have been presented for both “**with**” and “**without**” the proposed **right-in access** (and accompanying roundabout) scenarios.
- The overall report recommendation is to approve the proposed right-in-only access from Woodmen Road and accompanying roundabout. **Analysis results indicate significantly improved area traffic circulation and benefits to operations at the study area intersections.**

## MATERIAL CHANGE TO THE RIGHT-IN DESIGN AND BENEFITS OF NEW DESIGN

- The inclusion of a roundabout into the design of the right-in access **will provide for public access to the westbound frontage road**—a significant change to the previous design. This enhancement will not only **provide better access** for these nearby residential and non-residential developments, but will also offer **superior access for emergency response vehicles** thereby reducing their response times to all properties on the north side of Woodmen between Meridian and Golden Sage—a significant and meaningful change.
- The new design for the right-in with a roundabout **allows for direct public access to the Woodmen Frontage Road** for passenger vehicles, trucks, and buses, as well as fire and emergency response vehicles as requested by the Falcon Fire Protection District. This accommodation will significantly improve the access to the Courtyards residential development, Mountain View Electric Association (MVEA), Falcon School District 49 (and other properties), which currently have poor access.
- Due to its configuration, the previously requested right-in-only access would have essentially served only the proposed Falcon Marketplace development as there was no public access from the right-in to the Woodmen Frontage Road. Additionally, the new configuration includes changing the required internal roadway (required by the 2008 BOCC-approved rezoning of the

site), which extends from Eastonville to the Woodmen Frontage Road, from a private access easement drive to a public right-of-way.

- The previously requested right-in-only was configured to direct traffic from westbound Woodmen northward into the site only, with no "direct" access for westbound travel to the neighboring residential and non-residential properties along the Woodmen Frontage Road west of the proposed Falcon Marketplace development. In the previous design, access for westbound travel along the Woodmen Frontage Road would have required a circuitous route into Falcon Marketplace in order to reverse direction.
- With this new design of the right-in combined with a roundabout, residents, employees, and other motorists traveling to the properties along the frontage road from westbound Woodmen or northbound Meridian (many traveling from eastbound US Highway 24) would have a **new direct connection to the east end of the Woodmen Frontage Road** and will no longer need to do either of the following to access their destination:
  - travel west for over a mile along Woodmen Road to the Golden Sage/Woodmen intersection, make a 180-degree turn and travel back to the east along the Woodmen Frontage Road, or alternatively,
  - travel north to the Eastonville/Meridian intersection, turn left and travel through the proposed Falcon Marketplace development, a route of over one-half mile including a traffic signal.
- The proposed right-in-only with the roundabout would also **benefit operations at the Woodmen/Golden Sage and Woodmen Frontage Road/Golden Sage** intersection by reducing existing and future traffic turning movements from these closely spaced intersections.
- This site is within the commercial "node" of Falcon as defined in the Falcon/Peyton Small Area Master Plan and an access from Woodmen Road at the proposed location is reasonable for a regional commercial development as allowed by the Commercial Regional zoning approved for the site in 2008. Furthermore, additional access points to Woodmen were contemplated by the BOCC-approved resolution adopting the Woodmen Road Access Management Plan.

## SUMMARY OF TRAFFIC OPERATIONS ANALYSIS AND COMPARISON

- The three key intersections within this study are (a) the southwest roundabout at the proposed right-in-only access from Woodmen, (b) the meridian/Eastonville intersection, and (3) the Meridian/Woodmen intersection.
- The comparison between the two analysis scenarios (**with** and **without** the proposed right-in-only access from Woodmen) with respect to operations at the Meridian/Eastonville intersection shows significantly better operations with the proposed Woodmen access/roundabout. In addition to the intersection analysis, the right-in-only access would significantly reduce overall travel times and emergency response times for those traveling to destinations along the frontage road and Falcon Marketplace.

### **Right-In-Only Access/Roundabout**

- The continuous lane along westbound Woodmen Road between Meridian and the access is projected to operate at weaving LOS C during the morning peak hour and LOS B during the afternoon peak hour.
- Multiple methods of analysis indicate level of service A for all roundabout approaches during the peak hours **based on 2040 volumes**.
- The southwest roundabout will see **minimal queuing** for traffic exiting Woodmen Road and entering the roundabout. A maximum queue during the peak hour of about 100-120 feet is projected and even this maximum queue will clear quickly as the queue will be more of a **“rolling” queue**.
- The proposed Woodmen access will have **little effect** on the operation of Woodmen Road as the turning movements will be right-turn in-only from westbound Woodmen Road with a continuous acceleration/deceleration lane between Meridian and the point of right-turn entry into the site.
- The roundabout has been designed to accommodate large tractor-trailer trucks/semis.

### **Meridian/Eastonville Intersection**

- The northbound left turn at this intersection is projected to operate at **LOS F** during the afternoon peak hour **without the right-in-only access off Woodmen. However, it will operate at LOS D** during the afternoon peak hour with the right-in-only access off of Woodmen with the roundabout.
- The northbound left-turn queue would be **significantly longer without the Woodmen-access** scenario. **Without the right-in-only access off of Woodmen** the projected maximum queue will fill the dual left-turn lanes (457-foot queue within the lanes) and will **overspill** into the adjacent northbound through lane during the peak analysis interval unless the lanes are lengthened. Any significant lengthening would reduce the storage length of the southbound left turn lane for the Woodmen/Meridian intersection to the south as this northbound left turn lane is "back-to-back" with the southbound left turn lane at the Woodmen/Meridian intersection. There is a shared transition taper for both lanes and any lengthening would require either shortening the shared taper and/or shortening of that southbound left turn lane at Woodmen/Meridian (likely both).

### **Meridian/Woodmen Intersection**

- The addition of the proposed right-in-only access off of Woodmen will provide motorists approaching from the south the option to utilize the existing dual left-turn lanes to go westbound on Woodmen to enter the project site. This allows motorists to adjust to the path of least congestion and will benefit the overall intersection. Providing this option will reduce the quantity of northbound through traffic. This will be especially helpful during the afternoon peak hour. Although the overall intersection delays shown in the table are comparable, the

analysis shows failure of the northbound through movement (with two northbound through lanes) **without** the right-in-only access off of Woodmen. A comparison with **three** northbound through lanes on this intersection approach has also been included in this report as required by staff. Analysis results with an additional northbound through lane indicate improvement to LOS D for this approach. However, the implementation of three through lanes at this one intersection in advance of an overall project to convert Meridian Road from a four to six-lane arterial would involve significant cost for improvements at this intersection and to the north to create three-northbound “receiving” lanes and a merge lane back to two northbound through lanes. Moreover, from an operational standpoint, although a third through lane would add capacity at the intersection, this would introduce a potentially confusing and awkward “lane-add” followed by a lane reduction/merge just downstream to the north.

- Without the requested right-in-only from Woodmen, the northbound through movement is projected to operate at **LOS F** during the 2040 afternoon peak hour (LOS D when analyzing assuming three northbound through lanes as explained in the previous paragraph).

## Introduction

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LSC Transportation Consultants, Inc. has prepared this updated traffic impact analysis for the 36-acre Falcon Marketplace to be located west of Meridian Road and north of Woodmen Road in the Falcon area of El Paso County, Colorado. The site is planned to be developed for a mixture of commercial and medical office land uses. Figure 1 shows the site location. Access is proposed to Meridian Road and the Woodmen Road Frontage Road. The previous report date was August 7, 2017.

The report has been updated to include analysis of a right-in-only access from Woodmen Road combined with a roundabout intersection with the Woodmen Frontage Road in the southwest corner of the site. This new right-in-only access with the proposed roundabout intersection connecting to the Woodmen Frontage Road would significantly improve access not only to the site, but also to the properties to the west along the Woodmen Frontage Road. This new provision for public access from westbound Woodmen Road to the westbound Woodmen Frontage Road is a **significant change** from the previously proposed right-in-only access configuration, which essentially only served the proposed Falcon Marketplace.

The salient points of the significant change are:

- Allows direct public access to east end of the frontage road.
- Provides badly needed access for emergency response vehicles.
- Takes traffic off of the Golden Sage intersection by providing access from the east.
- Addition of roundabout keeps traffic moving at a steady flow.
- Reduces potential backup on the frontage road.



Approximate Scale  
Scale: 1" = 1,200'

Figure 1  
**Vicinity Map**

Falcon Marketplace (LSC #164350)

## **REPORT CONTENTS**

The report contains the following:

- The proposed site land uses and circulation plan for the site.
- The proposed plan to allow for a public street connection through the site between the current terminus of the Woodmen Frontage Road and Meridian Road.
- The existing and planned roadways in the study area including the number of lanes, classifications, posted speed limits, lane geometries, traffic controls, etc.
- Traffic volumes for the Meridian/Woodmen and Meridian/Eastonville intersections plus added traffic count data for the intersection of Woodmen Road and Golden Sage Road.
- The projected future peak-hour traffic volumes for the access points, internal intersections and the intersections adjacent to the site, the intersection of Golden Sage/Woodmen and along the Woodmen Frontage Road with and without the proposed right-in-only access from Woodmen Road.
- The resulting traffic impacts. The traffic impacts have been quantified by determining the future levels of service at the access points, internal intersections and adjacent intersections with and without the proposed right-in-only access from Woodmen Road.
- Recommended improvements.

## Site Land Use and Access/Circulation Plan

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### SITE CONTEXT

The site is located within the downtown Falcon commercial/service area. This site is part of the Falcon “commercial node.” Several shopping centers exist south and southeast of this site on the south side of Woodmen Road. The Safeway shopping center is located to the east, and the Bent Grass Commercial Center is directly north of the site and the Owl Lane area.

### LAND USE

The 36-acre site is located north of Woodmen Road and west of Meridian Road. The site is planned to contain a large grocery store anchor with associated gas station. The peripheral development lots are planned to include a pet supply store, in-line retail buildings, three free-standing fast-food restaurants, a coffee shop with drive-through, and an urgent/primary care clinic.

### ACCESS AND CIRCULATION

Full-movement site access is proposed from Meridian Road aligning with Eastonville Road and via a connection to the current terminus of the Woodmen Frontage Road. A right-in/right-out access to Meridian Road is also proposed between Eastonville and Woodmen. In addition to the connection to the current terminus of the Woodmen Frontage Road, a right-in-only access from westbound Woodmen Road is also proposed in the southwest corner of the site.

Figures 2 and 3 show the access/intersection spacing for Woodmen Road and Meridian Road, respectively.

The site plan also shows a street stub to the property to the north to allow for a planned future connection to Bent Grass Meadows Drive. The access points and the proposed public street connection through the site is also shown on the site plan.

### INTERSECTION/ACCESS SIGHT DISTANCE ANALYSIS

Figure 4 shows the sight distance analysis for the Meridian Road access points. There are currently no posted speed limit signs for southbound traffic on the approach to Eastonville Road and the speed limit to the north is 55 miles per hour (mph). This analysis assumes (following development of the site) a future posted speed limit of 45 mph (design speed of 50 mph) for southbound Meridian in the vicinity of and adjacent to the site. This is based on the *Meridian Road North Corridor Plan* dated December 2009.

Sight distance analysis for the internal intersections within the Preliminary Plan is included with the deviation request for Falcon Market Place.



## **Truck Turning Analysis**

Truck turning analysis using AutoTurn for the internal intersections within the Preliminary Plan is included with the deviation request for Falcon Market Place. The truck turning analysis for the roundabout proposed for the southwest corner of the site is included in this report as it is directly associated with the driveway permit application.






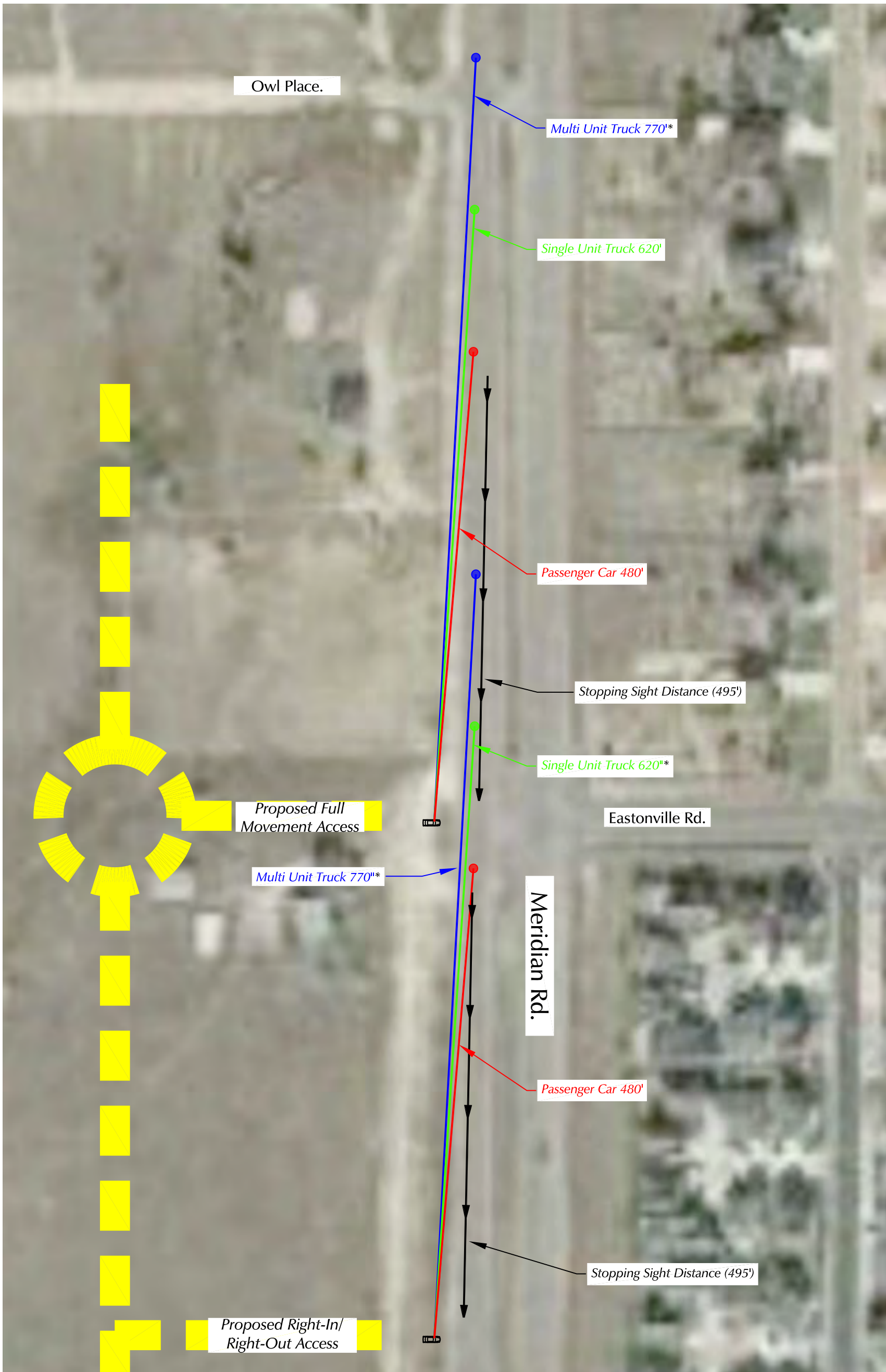
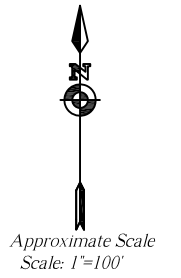
  
 Approximate Scale  
 Scale: 1"=60'

Figure 3  
**Meridian Road Intersection/Access Spacing**  
 Falcon Marketplace (LSC #164350)



LEGEND:

- = Required intersection sight distance for passenger cars
- = Required intersection sight distance for single-unit trucks
- = Required intersection sight distance for multi-unit trucks
- ↕ = Required stopping sight distance

Based on an anticipated post-development speed limit of 45mph (50 mph design speed)



Figure 4  
Sight Distance for Meridian Road

Falcon Marketplace (LSC #164350)

## Existing Roadway and Traffic Conditions

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### AREA ROADWAYS

The roadways in the study area are shown on Figure 1 and are described below.

- **US Highway (US) 24** is generally a two-lane State Highway extending east/west across Colorado connecting the Buena Vista, Colorado Springs, and Limon areas. US 24 is planned to be widened to four lanes through the Falcon area. US 24 is classified as an Expressway by the Colorado Department of Transportation (CDOT) and the *El Paso County Major Transportation Corridors Plan (MTCP)*. The posted speed limit on US 24 in the vicinity of Woodmen Road is 50 mph.
- **Woodmen Road** is shown on the *El Paso County 2040 Major Transportation Corridors Plan* and the *Preserved Corridor Network Plan* as a four-lane Expressway adjacent to and in the vicinity of the site. The posted speed limit on Woodmen Road adjacent to the site is 45 mph. The posted speed limit on Woodmen Road just west of the site is 55 mph.
- **Woodmen Frontage Road** is a paved two-lane frontage road along the north side of Woodmen Road. The Woodmen Frontage Road extends west from this site to its current terminus west of Golden Sage Road. The posted speed limit on the Woodmen Frontage Road is 30 mph.
- **Meridian Road** is shown on the MTCP as a four-lane Principal Arterial adjacent to the site. Meridian Road is currently four lanes plus some auxiliary turn lanes at intersections north of Rolling Thunder. There is a center median adjacent to the site. There are no speed limit signs specifically for the section of Meridian adjacent to the site. However, the posted limit on the section to the north is 55 mph. Meridian Road south of Rolling Thunder is not currently open and the road does not connect to US Highway 24. However, Meridian Road is planned to be opened south from Rolling Thunder to a new intersection with US 24 and extended south to Falcon Highway in the near future.
- **Eastonville Road** is a two-lane roadway extending northeast from Meridian Road to past Hodgen Road. It is shown as a two-lane Minor Arterial on the MTCP. The intersection of Meridian Road and Eastonville Road is currently stop-sign controlled.

## EXISTING TRAFFIC CONDITIONS

Figure 5 shows the morning and afternoon peak-hour traffic volumes at the intersections of Woodmen Road/Meridian Road, Woodmen Road/Golden Sage Road, and Eastonville Road/Meridian Road based on counts conducted by LSC in September 2015, February 2016, March 2017, and June 2017. The traffic count reports are attached. The traffic volumes at Woodmen/Meridian have been adjusted to balance with more recent counts to the west and north.

## ACCIDENT/CRASH HISTORY

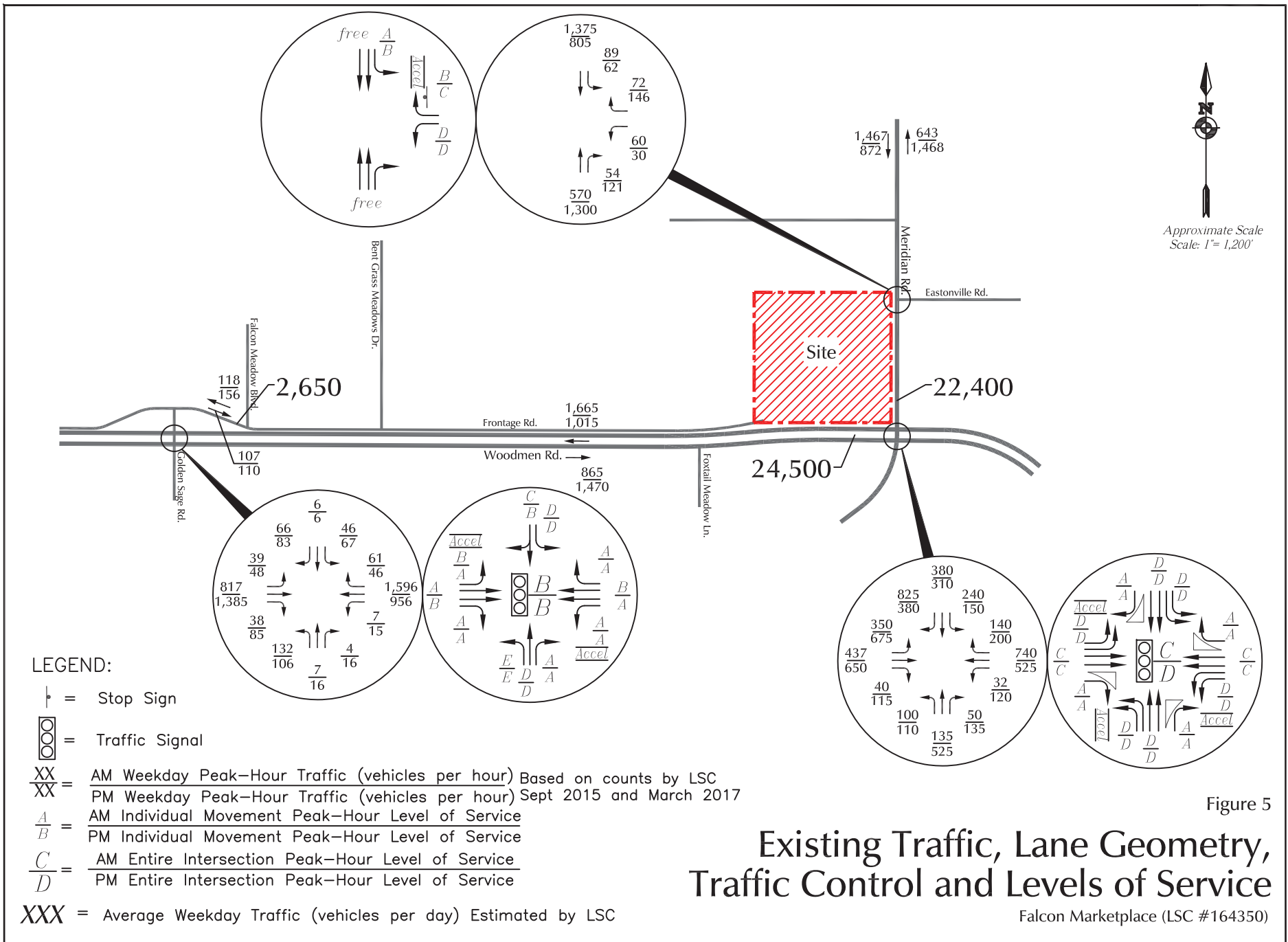
Traffic accident/crash data at study area intersections are attached. These have been provided by the Colorado State Patrol. The data show crashes by calendar year for 2014, 2015, and 2016 as well as year-to-date crashes for 2017.

There were seven reported crashes at the Woodmen/Golden Sage intersection in 2016. Five of the seven crashes in 2016 were non-intersection related. The remaining two crashes were rear-end crashes involving eastbound vehicles. The first crash resulted in property damage only and the second crash resulted in two injuries. There have also been seven crashes in 2017 (from January 1 to July 26). Of these crashes, two were non-intersection related. One involved an eastbound left-turning vehicle hitting a westbound through vehicle. This crash resulted in a fatality. The remaining four crashes were rear-end crashes (two involving westbound vehicles and two involving eastbound vehicles). These rear-end crashes all resulted in property damage only.

There were six reported crashes at the Woodmen/Meridian intersection in 2016. One of the crashes was non-intersection related. This was the only crash at this intersection in 2016 and 2017 that resulted in an injury. Three of the 2016 crashes were rear-end crashes (two involved vehicles in the westbound through lanes and one involved vehicles in the southbound to westbound acceleration lane). One 2016 crash involved a westbound vehicle that failed to stop for the red light and hit a northbound vehicle. The final 2016 crash involved a single vehicle traveling the wrong direction in the westbound acceleration lane hitting the pedestrian island in the northwest corner of the intersection. Based on the data provided, there has been one reported accident in 2017 (from January 1 to July 26). This crash was a rear-end accident involving vehicles in the eastbound left-turn lanes.

There were two reported crashes at the Eastonville/Meridian intersection in 2016. In the first crash, two vehicles were attempting to turn left from Eastonville Road onto Meridian Road. The first vehicle attempted a two-stage left turn, stopping in the median on Meridian Road, and was rear-ended by the second vehicle. This crash resulted in property damage only. The second crash involved an eastbound left-turn vehicle and a bicycle in the northbound shoulder. This crash resulted in an injury. There has been one crash at this intersection recorded in 2017 (from January 1 to July 26). This injury crash involved a southbound left-turning vehicle turning in front of a northbound through vehicle.

The estimated three-year crash/accident rate at Woodmen/Meridian is 0.46. This is based on an estimated average of 33,500 entering vehicles per day and 17 total intersection-related crashes in three years. **This is a relatively low accident rate.** For comparison, the Powers and Barnes intersection, which is one of the City of Colorado Springs' high accident locations, had a 2016 accident rate of about 2.25.



**EXISTING LEVELS OF SERVICE**

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from “A” to “F.” LOS A represents control delay of less than 10 seconds for unsignalized and signalized intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections and more than 80 seconds for signalized intersections. For reference, Table 1 shows the level of service delay ranges.

<b>Table 1 Intersection Levels of Service Delay Ranges</b>			
<b>Level of Service</b>	<b>Signalized Intersections</b>		<b>Unsignalized Intersections</b>
	<b>Average Control Delay (seconds per vehicle)</b>	<b>V/C<sup>(1)</sup></b>	<b>Average Control Delay (seconds per vehicle)<sup>(2)</sup></b>
A	10.0 sec or less	less than 0.60	10.0 sec or less
B	10.1-20.0 sec	0.60-0.69	10.1-15.0 sec
C	20.1-35.0 sec	0.70-0.79	15.1-25.0 sec
D	35.1-55.0 sec	0.80-0.89	25.1-35.0 sec
E	55.1-80.0 sec	0.90-0.99	35.1-50.0 sec
F	80.1 sec or more	1.00 and greater	50.1 sec or more

(1) Source: *Transportation Research Circular 212*  
 (2) For unsignalized intersections if V/C ratio is greater than 1.0 the level of service is LOS F regardless of the projected average control delay per vehicle.

The intersections of Woodmen Road/Meridian Road and Woodmen Road/Golden Sage Road were analyzed to determine the existing levels of service using Synchro. The intersection of Eastonville Road/Meridian Road was analyzed based on the unsignalized method of analysis procedures found in the *Highway Capacity Manual, 6<sup>th</sup> Edition* by the Transportation Research Board. As shown on Figure 5, these intersections are operating at acceptable levels of service during peak periods. **The detailed level of service analysis reports are attached.**



## Projected Future Background Traffic Conditions

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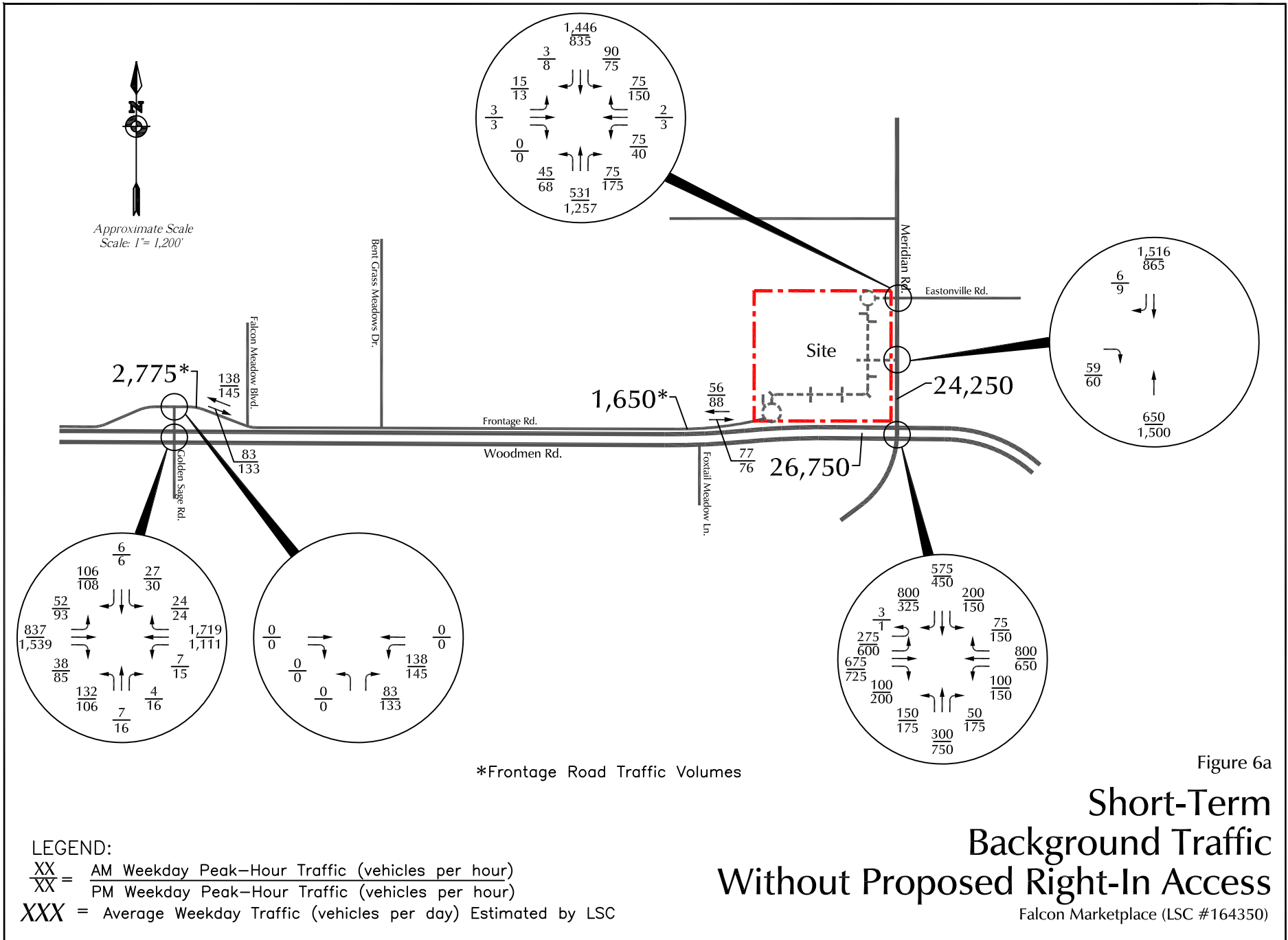
Baseline or “background” traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development’s trip generation and resulting added traffic volumes (site traffic is presented in the following chapter). New baseline/background traffic is the difference between future background traffic and existing traffic.

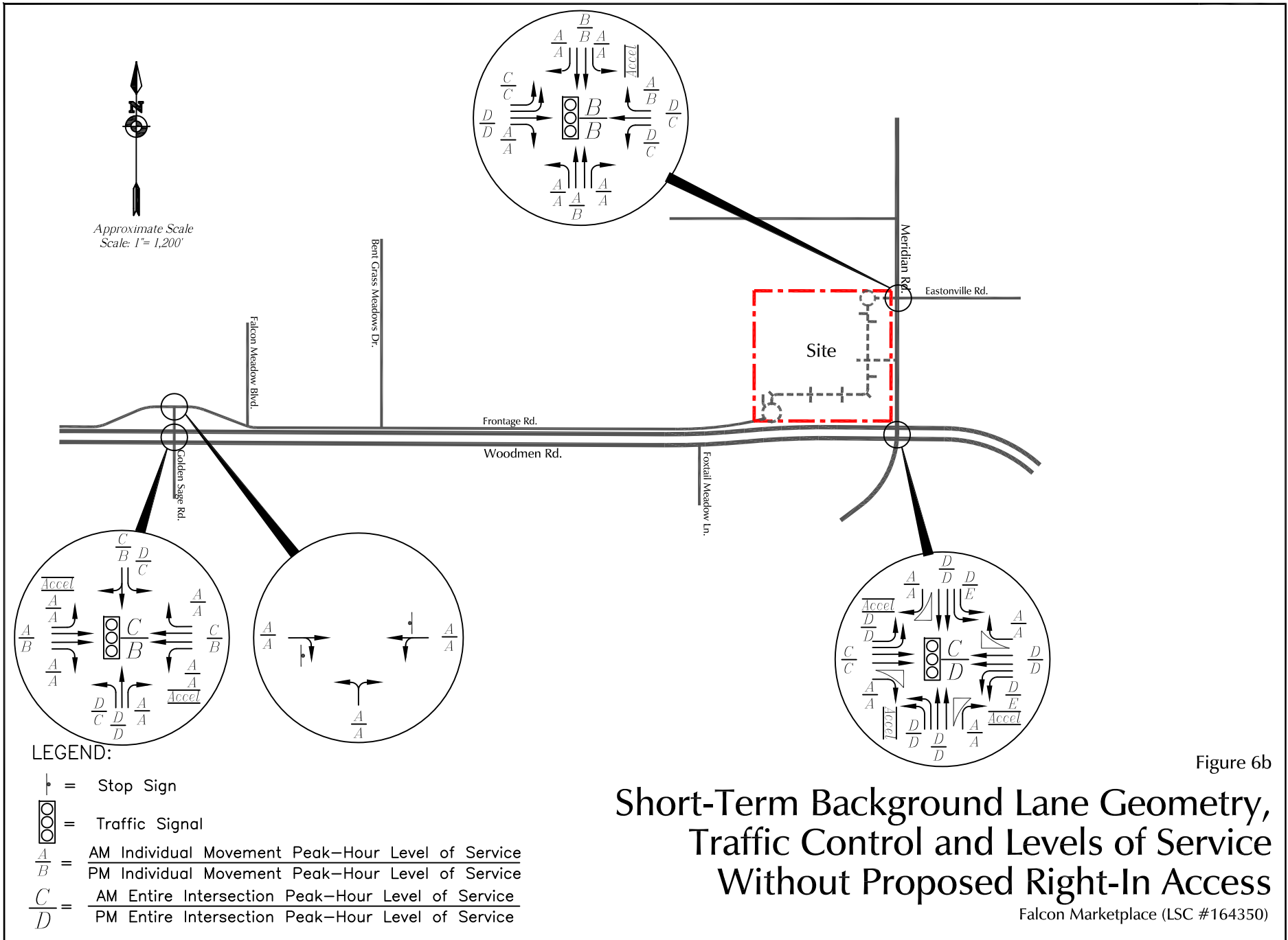
The background traffic analysis hypothetically assumes the site street connections and access points to be in place (but without site traffic). Background traffic includes the through traffic and the traffic generated by nearby developments, but hypothetically assumes zero traffic generated by the site for analysis purposes.

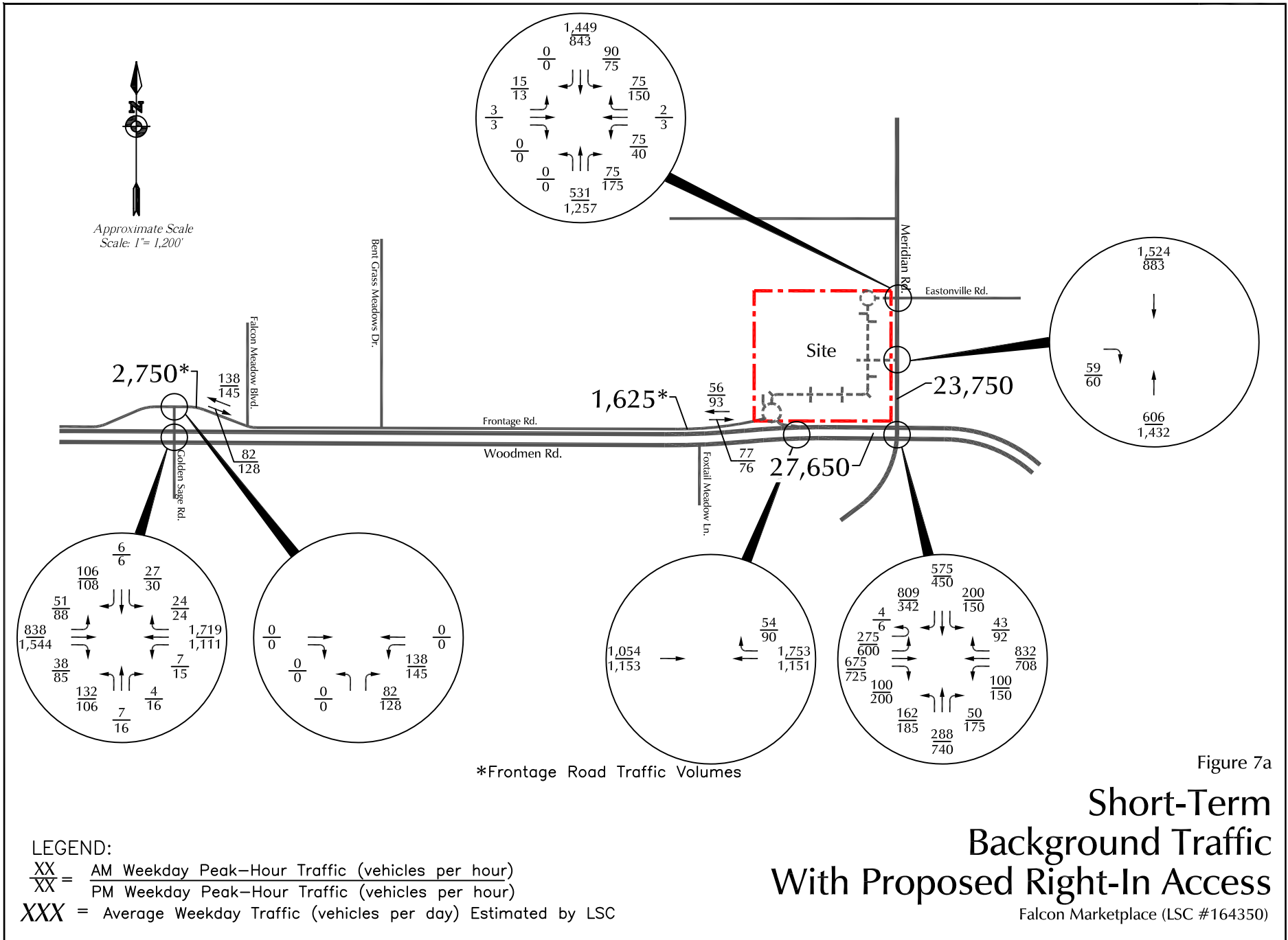
### SHORT-TERM BACKGROUND TRAFFIC

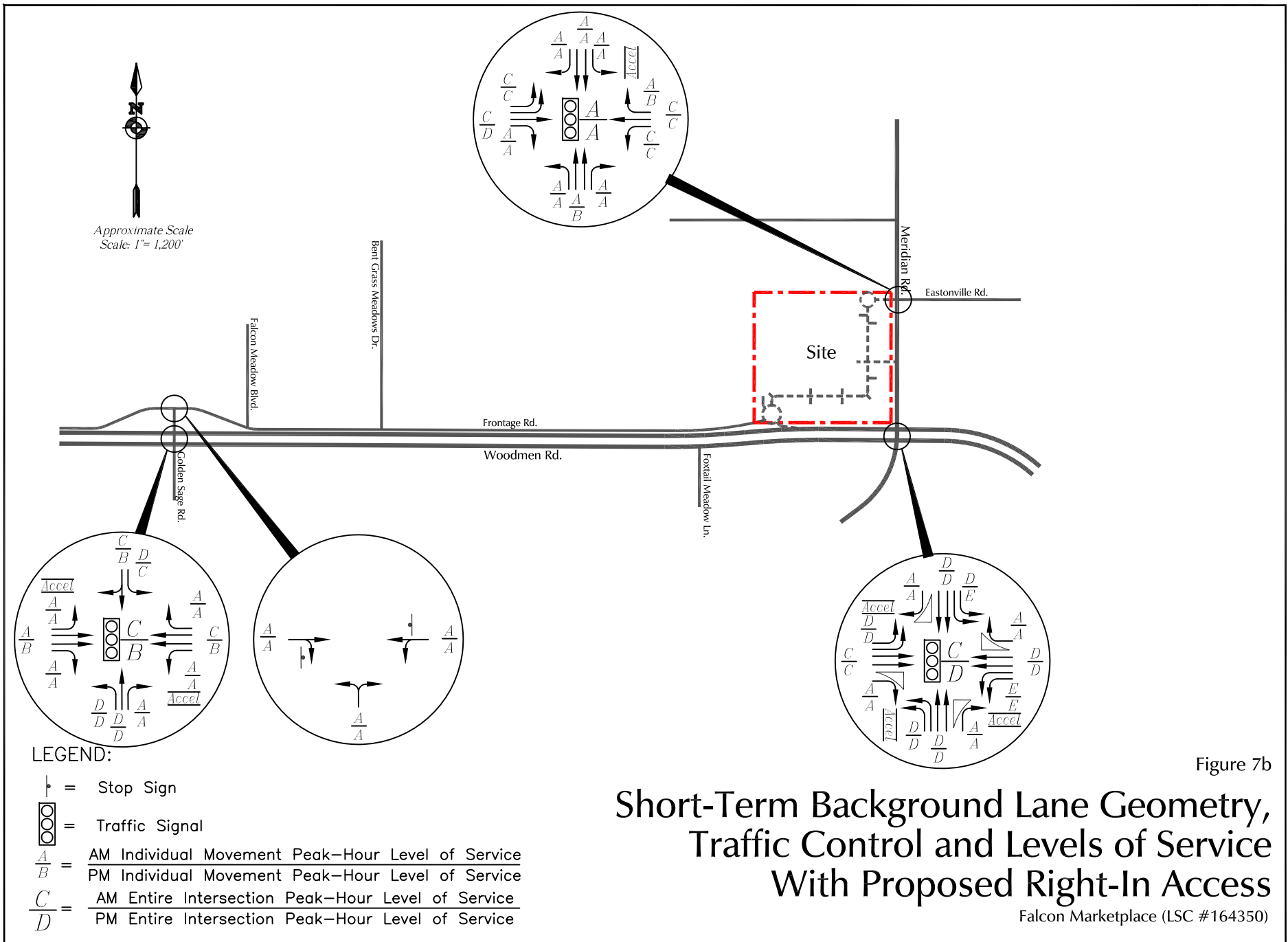
Background traffic is the traffic estimated to be on the adjacent roadways and at adjacent intersections without the proposed development’s trip generation and resulting site-generated traffic volumes. However, the site street connections and access points were assumed to be in place. Background traffic includes the through traffic and the traffic generated by nearby developments, but hypothetically assumes zero traffic generated by the site for analysis purposes. Figure 6a and 7a show the background traffic volumes traveling through the site and in the vicinity of the site for the short term. The short-term background traffic volumes were based on some growth in existing traffic volumes shown in Figure 5, with some adjustments to the existing traffic patterns due to the planned Meridian Road project to the south, the proposed vehicular connection through the site (between the end of the Woodmen Frontage Road and Eastonville Road) via access easement(s) and internal commercial drives, and the new west leg of the intersection of Meridian Road and Eastonville Road. The volumes shown in Figure 6a assume no access to Woodmen Road and the volumes shown in Figure 7a assume the proposed right-in-only access from Woodmen Road. The short-term background traffic volumes assume some additional traffic due to buildout of the Woodmen Courtyards development just west of the site.

Figures 6b and 7b show the lane geometry, traffic control, and level of service at the key intersections based on the short-term background volumes.





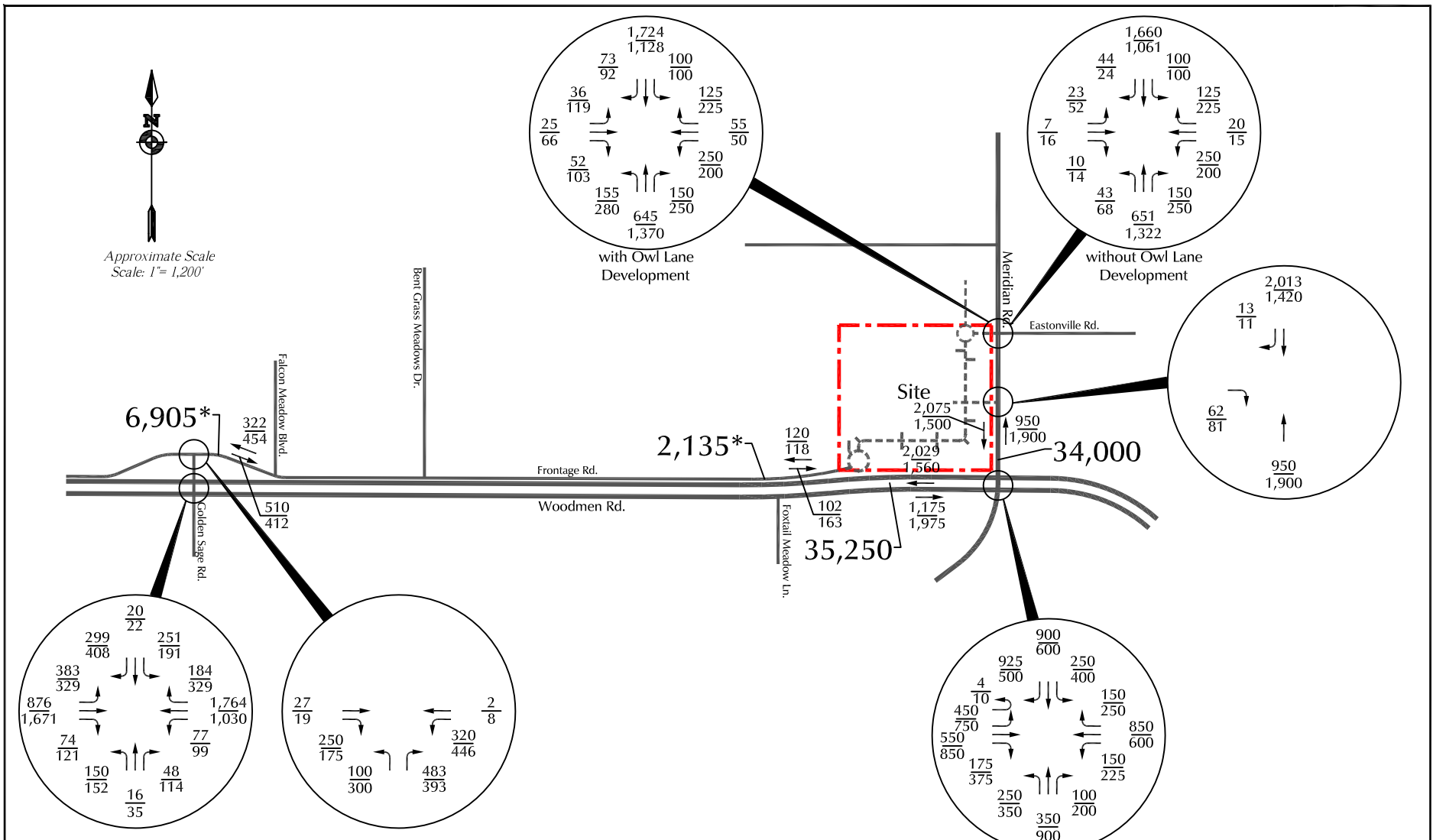




## **2040 BACKGROUND TRAFFIC**

Figures 8a and 9a show the background traffic volumes for the year 2040. The volumes shown in Figure 8a assume no access from Woodmen Road and the volumes shown in Figure 9a assume the proposed right-in-only access. The 2040 background traffic volume estimates were based on the *El Paso County Major Transportation Corridors Plan (MTCP) 2040* and previous work completed in the area by LSC, including the Bent Grass Subdivision PUD/Preliminary Plan Updated Traffic Impact Study and the previous studies for this site, other area traffic studies, and traffic count data. The 2040 background traffic includes buildout of the Bent Grass subdivision, the Latigo site northeast of Bent Grass Meadows Drive/Woodmen Frontage Road (assuming the current I-2 industrial zoning -- although previous reports have been prepared contemplating rezoning to commercial/shopping center land uses), and potential Owl Lane redevelopment for commercial land uses with the planned north/south street connection between Eastonville and Bent Grass Meadows Drive. Increases in through traffic are also included. The 2040 background traffic estimates also take into account the Stapleton Drive extension to the west to the Briargate Parkway/Black Forest Road intersection.

Figures 8b and 9b show the lane geometry, traffic control, and level of service at the key intersections based on the 2040 background volumes.



LEGEND:  
 $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
 $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)  
 XXX = Average Weekday Traffic (vehicles per day) Estimated by LSC

Figure 8a  
 Year 2040  
 Background Traffic  
 Without Proposed Right-In Access  
 Falcon Marketplce (LSC #164350)

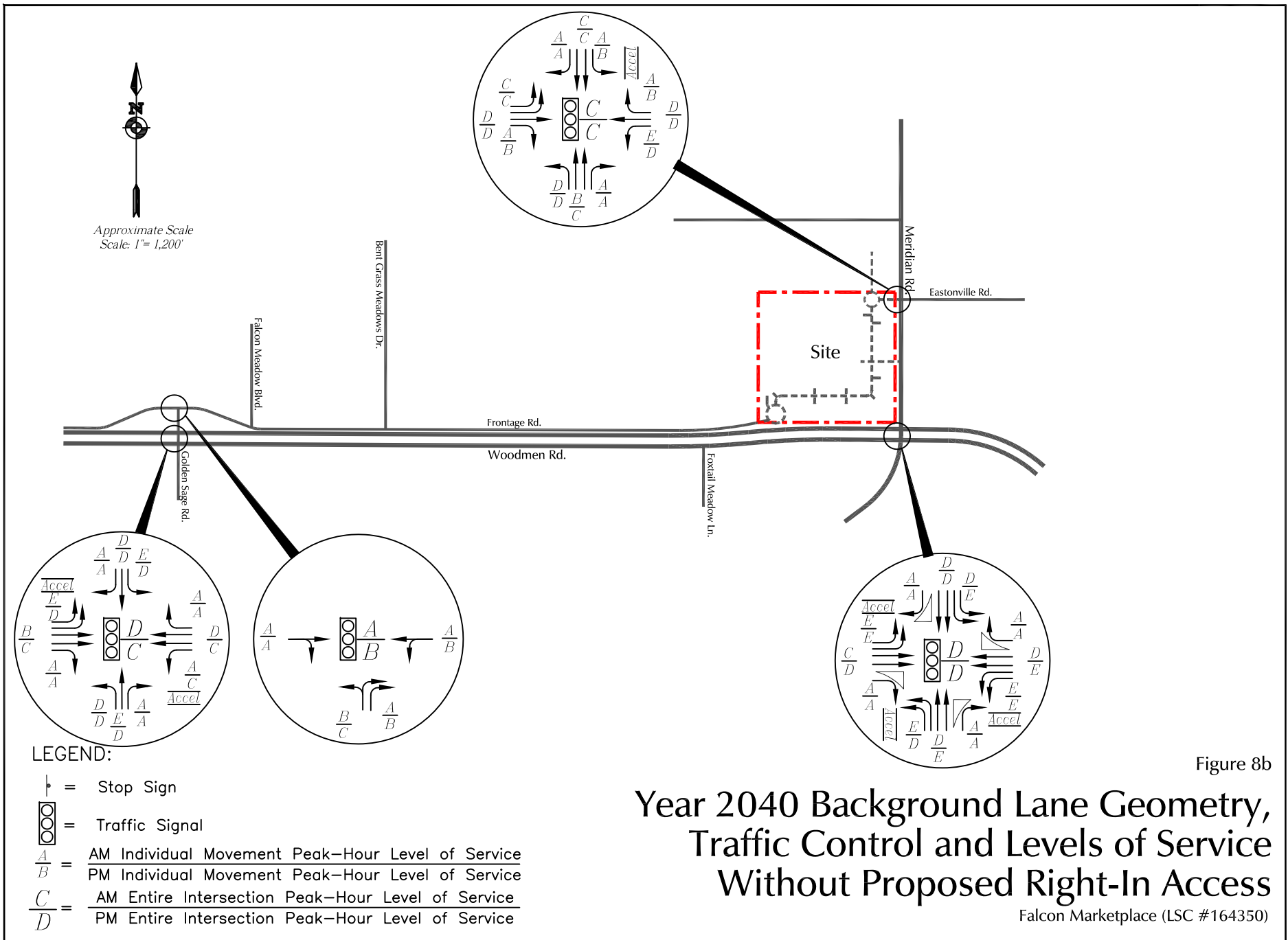
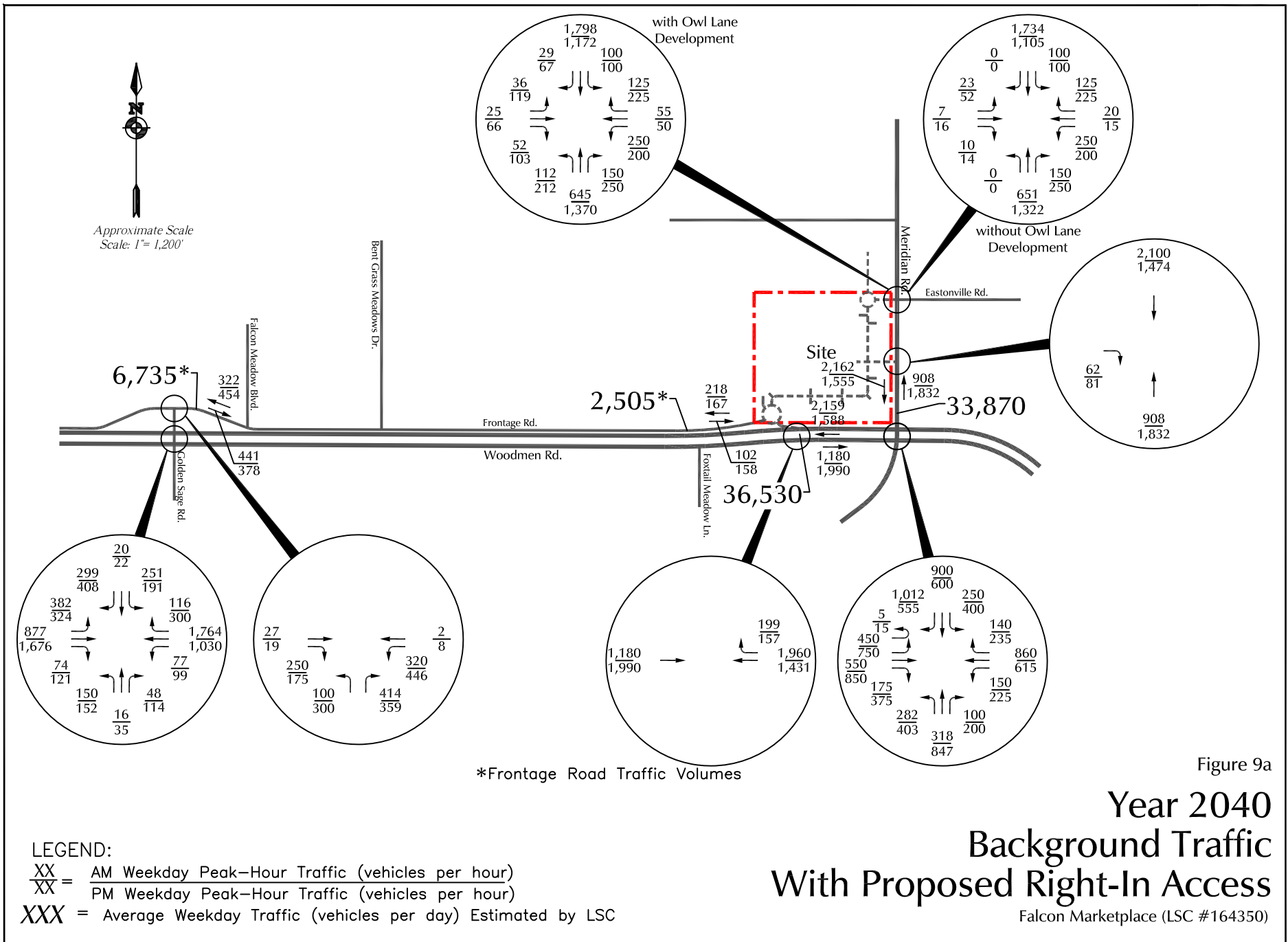


Figure 8b

# Year 2040 Background Lane Geometry, Traffic Control and Levels of Service Without Proposed Right-In Access

Falcon Marketplace (LSC #164350)





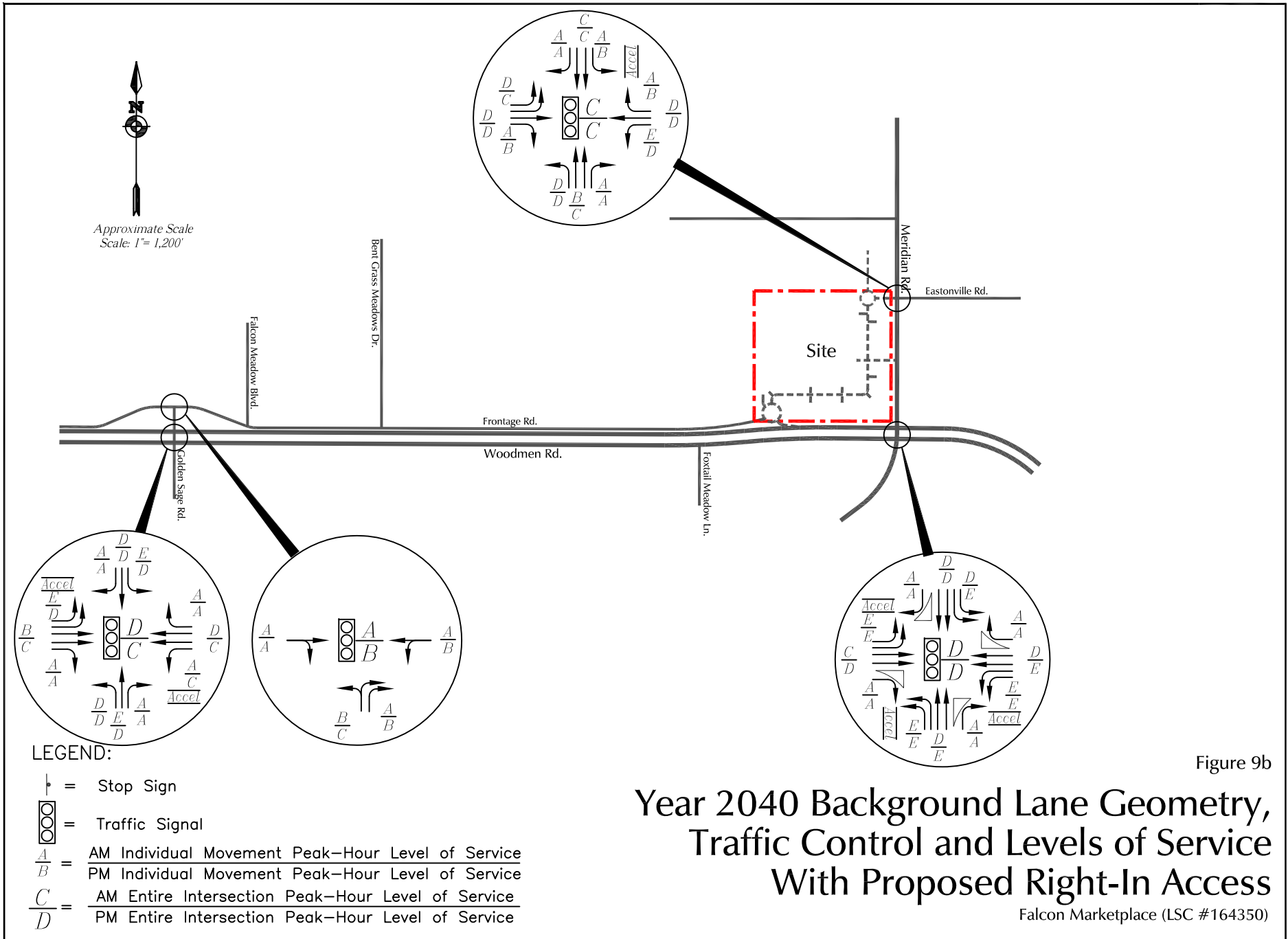


Figure 9b

# Year 2040 Background Lane Geometry, Traffic Control and Levels of Service With Proposed Right-In Access

Falcon Marketplace (LSC #164350)

# Trip Generation, Distribution, and Traffic Volume Estimates

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## TRIP GENERATION

Estimates of the traffic volumes expected to be generated by the existing and proposed land uses within the study area were made using the nationally published trip generation rates found in *Trip Generation, 9th Edition, 2012* by the Institute of Transportation Engineers (ITE). Table 2 shows the trip generation estimates.

The total number of vehicle-trips generated by the land uses has been reduced to account for the internal vehicle-trips made within the site between land uses, without use of the external streets surrounding the site. Table 2 shows the number of internal trips assumed for each land use. The internal trip reduction is an estimate by LSC based on National Highway Cooperative Highway Research Program (NCHRP) Report 684 *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. The results of the spreadsheet model are attached.

The total number of external new impact vehicle-trips generated by the retail land uses has been reduced to take into account the “pass-by” and “diverted link” phenomena. A pass-by trip is made by a motorist who would already be on the adjacent roadways regardless of the proposed development, but who stops in at the site while passing by. The motorist would then continue on his or her way to a final destination in the original direction. The pass-by percentages shown on Table 2 are from the *Trip Generation Handbook - An ITE Proposed Recommended Practice, 3rd Edition, 2014* by ITE. A diverted link trip is one made by a motorist who would already be traveling on a nearby (but not adjacent) roadway regardless of this development who now uses another roadway to access the site before continuing on his or her way to a final destination in the original direction. Diverted link trips are included in the distribution percentages.

The site is projected to generate about 9,558 new external vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period.

Figure 8a

**Table 2  
Trip Generation Estimate  
Falcon Marketplace**

Lot	Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total Trips Generated				Internal Trips <sup>(7)</sup>				Total External Trips Generated				Pass-By Trips <sup>(2)</sup>	New External Trips Generated Average New Weekday Traffic				
				Average Weekday Traffic	Morning Peak Hour In	Afternoon Peak Hour Out	Afternoon Peak Hour In	Morning Peak Hour Out	Average Weekday Traffic	Morning Peak Hour In	Afternoon Peak Hour Out	Afternoon Peak Hour In	Morning Peak Hour Out	Average Weekday Traffic	Morning Peak Hour In	Afternoon Peak Hour Out	Afternoon Peak Hour In	Morning Peak Hour Out							
<b>Trip Generation Estimate Based on the Currently Proposed Plan</b>																									
1	866	Pet Supply Superstore <sup>(3)</sup>	15 KSF <sup>(4)</sup>	38.24	0.53	0.33	1.69	1.69	574	8	5	25	25	54	1	2	3	2	520	7	3	22	23	10%	468
2	850	Supermarket	123 KSF	78.26	2.11	1.29	3.76	3.62	9,626	259	159	463	445	909	17	26	48	37	8,717	242	133	415	408	36%	5,579
3	944	Gasoline/Service Station	18 VFP <sup>(5)</sup>	168.56	6.20	5.96	6.94	6.94	3,034	112	107	125	125	286	5	8	15	12	2,748	107	99	110	113	56%	1,209
4	934	Fast-Food Restaurant with Drive-Through Window <sup>(6)</sup>	2.5 KSF	496.12	0.42	0.39	16.98	15.67	1,240	1	1	42	39	380	0	0	12	17	860	1	1	30	22	50%	430
5	820	Shopping Center	5 KSF	55.14	0.77	0.47	2.36	2.51	276	4	2	12	13	26	1	0	1	1	250	3	2	11	12	34%	165
6	848	Tire Store	7.72 KSF	24.87	1.82	1.07	1.78	2.37	192	14	8	14	18	18	0	1	1	1	174	14	7	13	17	28%	125
7	934	Fast-Food Restaurant with Drive-Through Window	3.5 KSF	496.12	23.16	22.26	16.98	15.67	1,736	81	78	59	55	532	26	12	17	24	1,204	55	66	42	31	50%	602
8	934	Fast-Food Restaurant with Drive-Through Window <sup>(6)</sup>	2.5 KSF	496.12	0.42	0.39	16.98	15.67	1,240	1	1	42	39	380	0	0	12	17	860	1	1	30	22	50%	430
9	610	Clinic	7.8 KSF	31.45	2.19	2.19	2.12	3.06	245	17	17	17	24	40	3	16	10	5	205	14	1	7	19	0%	205
10	820	Shopping Center	8 KSF	55.14	0.77	0.47	2.36	2.51	441	6	4	19	20	42	1	1	2	2	399	5	3	17	18	34%	263
11	937	Coffee/Donut Shop With Drive-Through Window	1.3 KSF	818.58	51.30	49.28	21.40	21.40	1,064	67	64	28	28	326	21	10	9	12	738	46	54	19	16	89%	81
									<b>19,669</b>	<b>570</b>	<b>446</b>	<b>846</b>	<b>831</b>	<b>2,993</b>	<b>75</b>	<b>76</b>	<b>130</b>	<b>130</b>	<b>16,676</b>	<b>495</b>	<b>370</b>	<b>716</b>	<b>701</b>		<b>9,558</b>

Notes:

- (1) Source: "Trip Generation, 9th Edition, 2012" by the Institute of Transportation Engineers (ITE)
- (2) Source: "Trip Generation Handbook - An ITE Proposed Recommended Practice" 3rd Edition, 2014
- (3) Daily and morning peak-hour trip generation rates for Pet Supply Superstore are estimates by LSC
- (4) KSF = 1,000 square feet of floor space
- (5) VFP = vehicle fueling position
- (6) The AM peak-hour trip generation rates have been reduced by LSC as the proposed fast-food restaurant does not serve breakfast
- (6) See attached NCHRP 684 Internal Trip Capture Estimate Tool Sheets

Source: LSC Transportation Consultants, Inc.

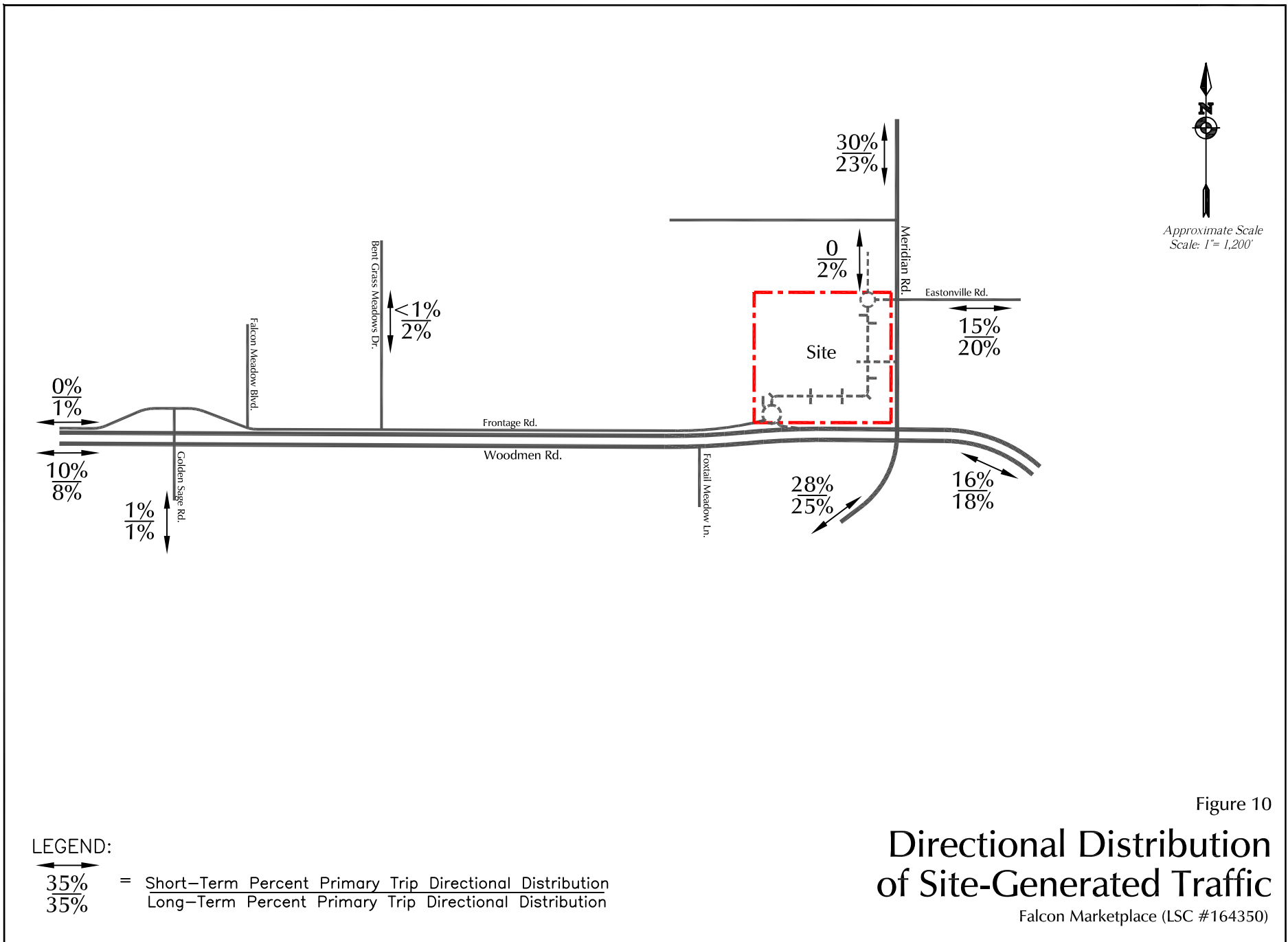
During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 495 vehicles would enter and 370 vehicles would exit the site.

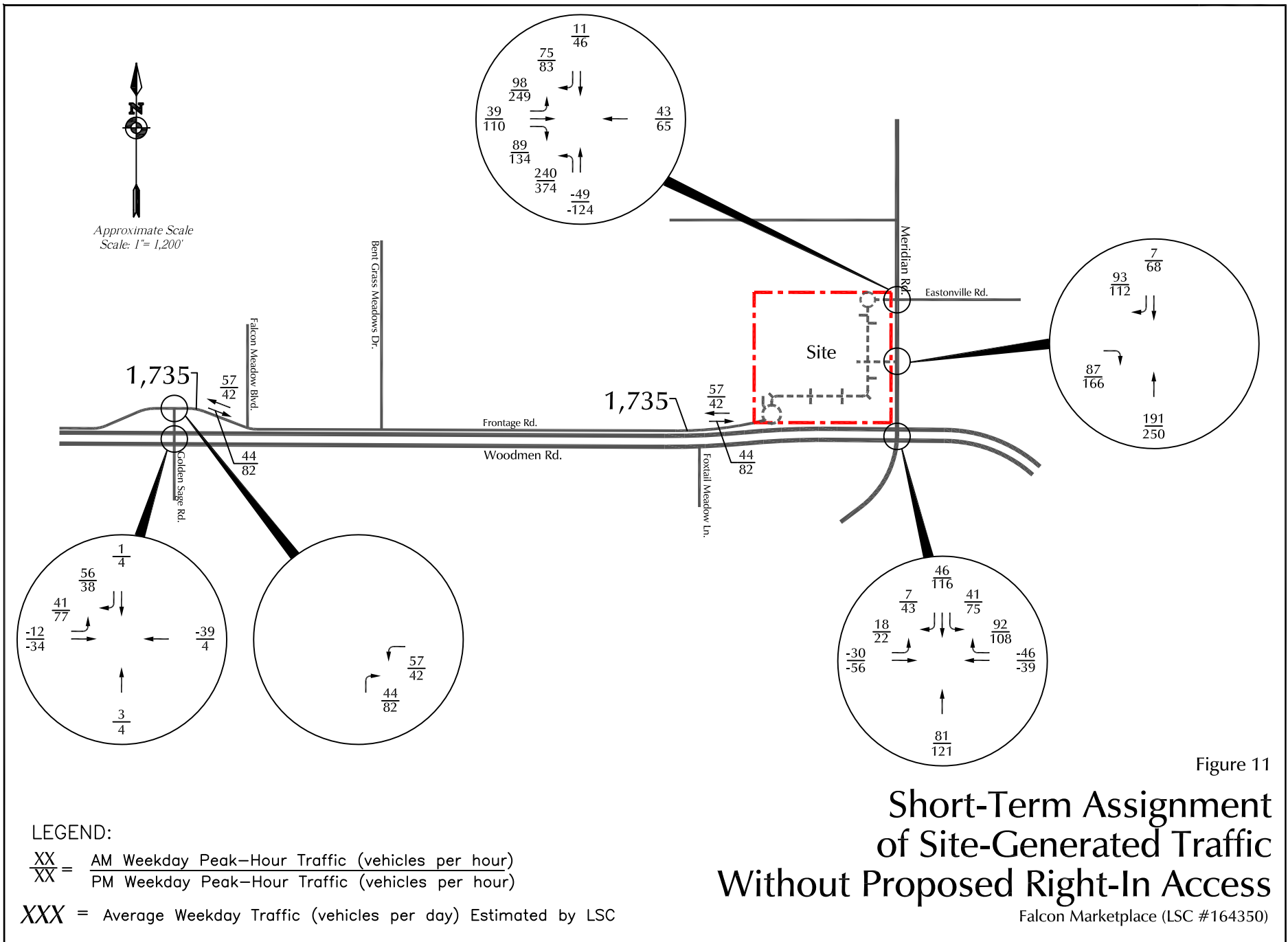
During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about 716 vehicles would enter and 701 vehicles would exit the site.

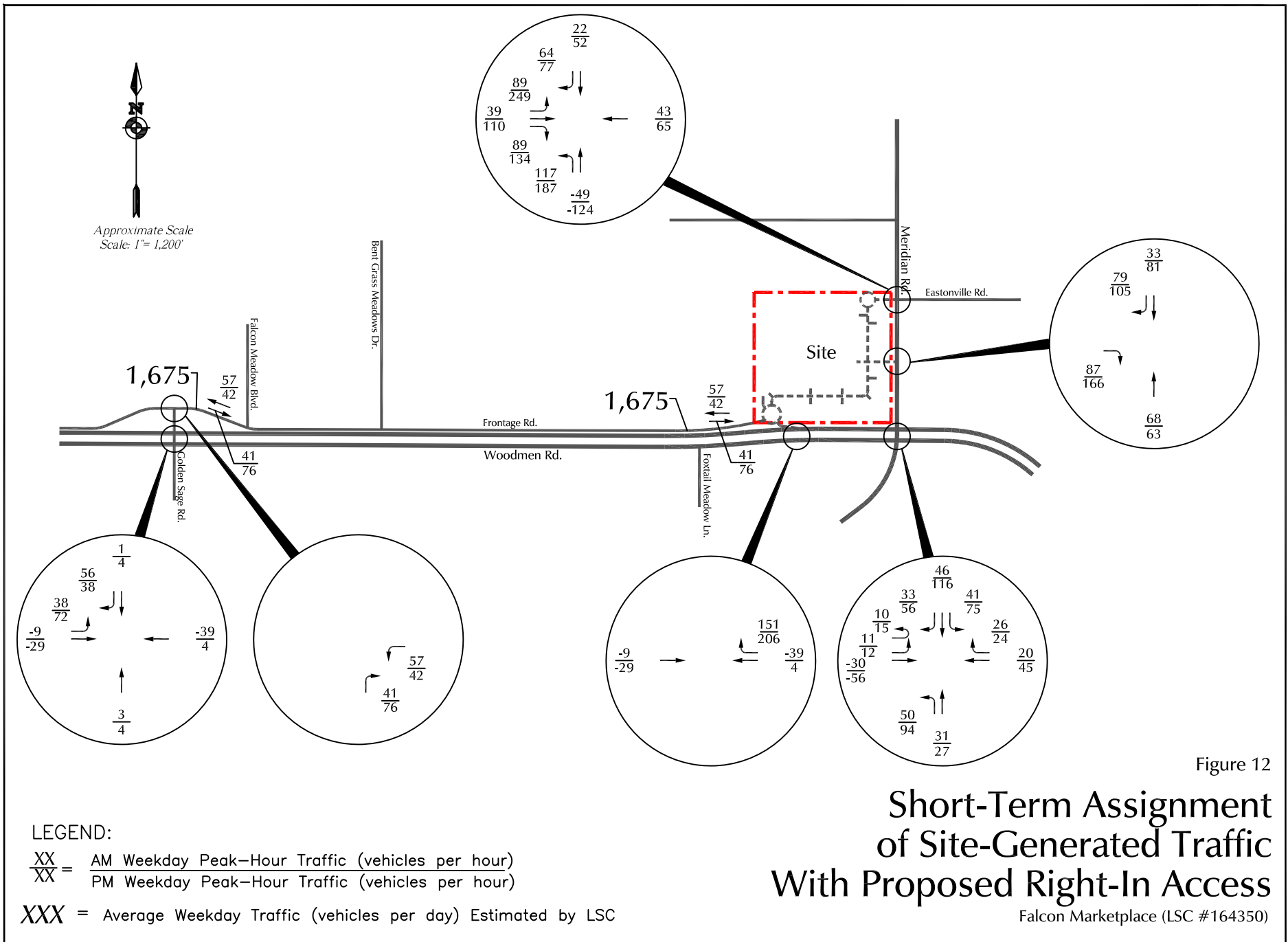
## **TRIP DISTRIBUTION AND ASSIGNMENT**

The estimated directional distribution of the site-generated traffic volumes on the adjacent roadways is an important factor in determining the site's traffic impacts. Figure 10 shows the directional distribution estimates for the primary site-generated traffic. The estimates have been based on the following factors: the site's location with respect to the Falcon area's residential, employment, and commercial areas; the balance of the northeast Colorado Springs metropolitan area and the rural areas of the county to the east; the site's proposed land uses; the site's proposed access and circulation system; and the roadway system serving the site. The short-term distribution estimate assumes the existing street network plus the Meridian Road project, and the long-term estimate assumes the future Stapleton extension to the west and additional east-west potential connections west of US 24 through Banning Lewis Ranch such as Dublin Boulevard. The pass-by trips and diverted trips were assigned based in large part on the magnitude and direction of the existing and projected background traffic volumes on the adjacent roadways.

When the distribution percentages (from Figure 10) were applied to the trip generation estimates (from Table 2), the site-generated traffic volumes on the area roadways were determined. Figures 11 and 12 show the short-term site-generated traffic volumes without and with the proposed right-in-only access from Woodmen Road, respectively. Figures 13 and 14 show the long-term site-generated traffic volumes with no access to Woodmen Road and with the proposed right-in-only access from Woodmen Road, respectively.









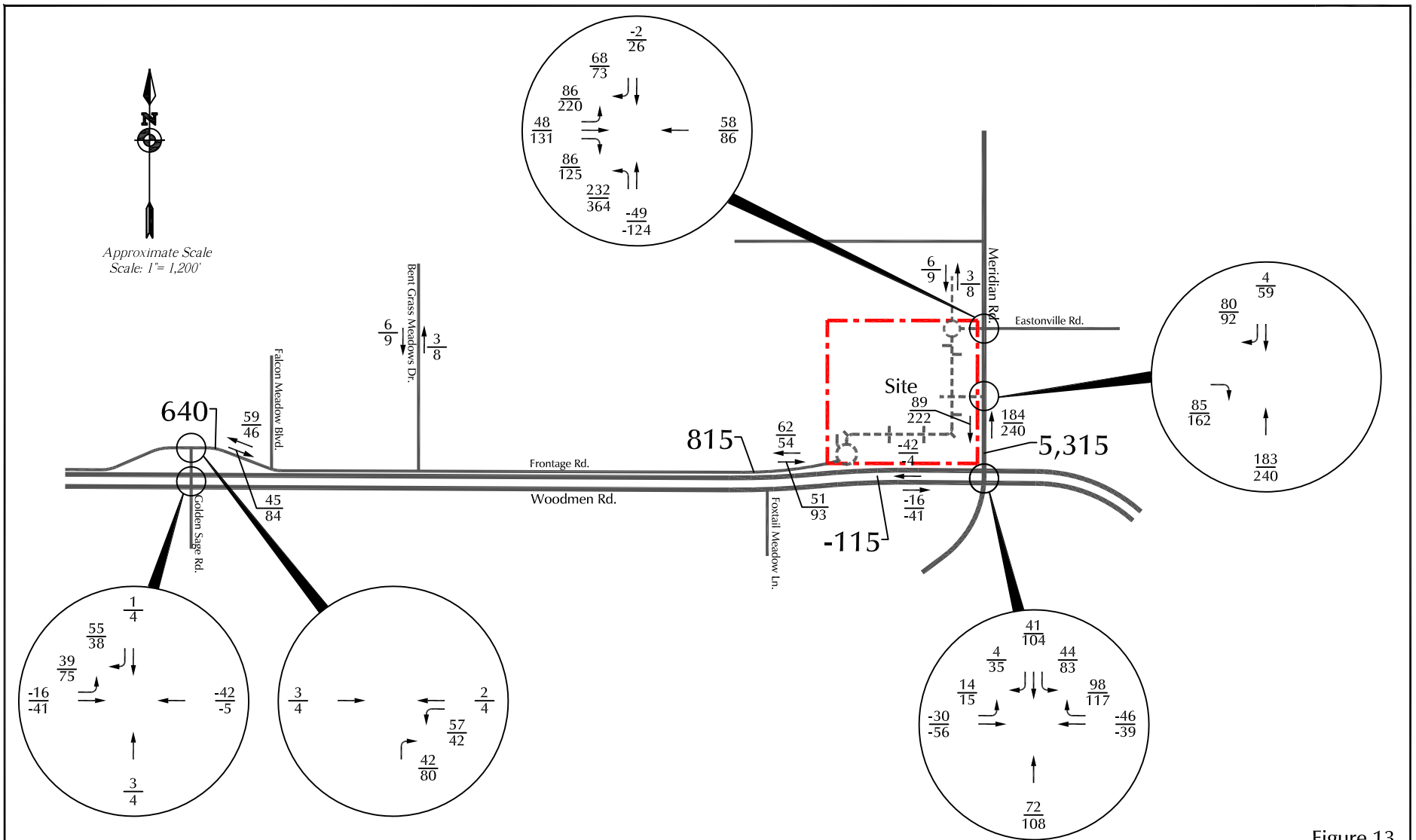


Figure 13

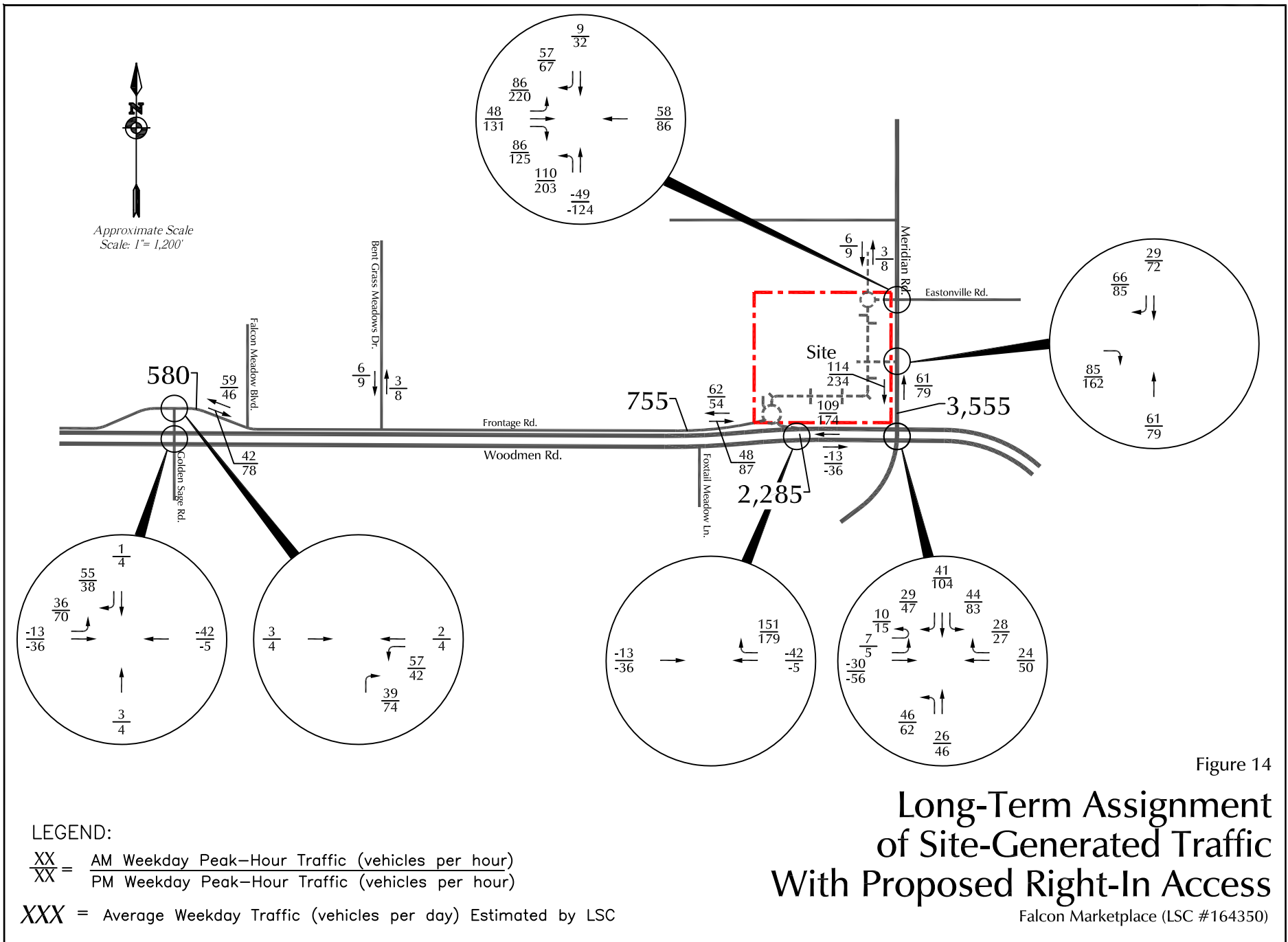
## Long-Term Assignment of Site-Generated Traffic Without Proposed Right-In Access

Falcon Marketplce (LSC #164350)

**LEGEND:**

$\frac{XX}{XX}$  =  $\frac{\text{AM Weekday Peak-Hour Traffic (vehicles per hour)}}{\text{PM Weekday Peak-Hour Traffic (vehicles per hour)}}$

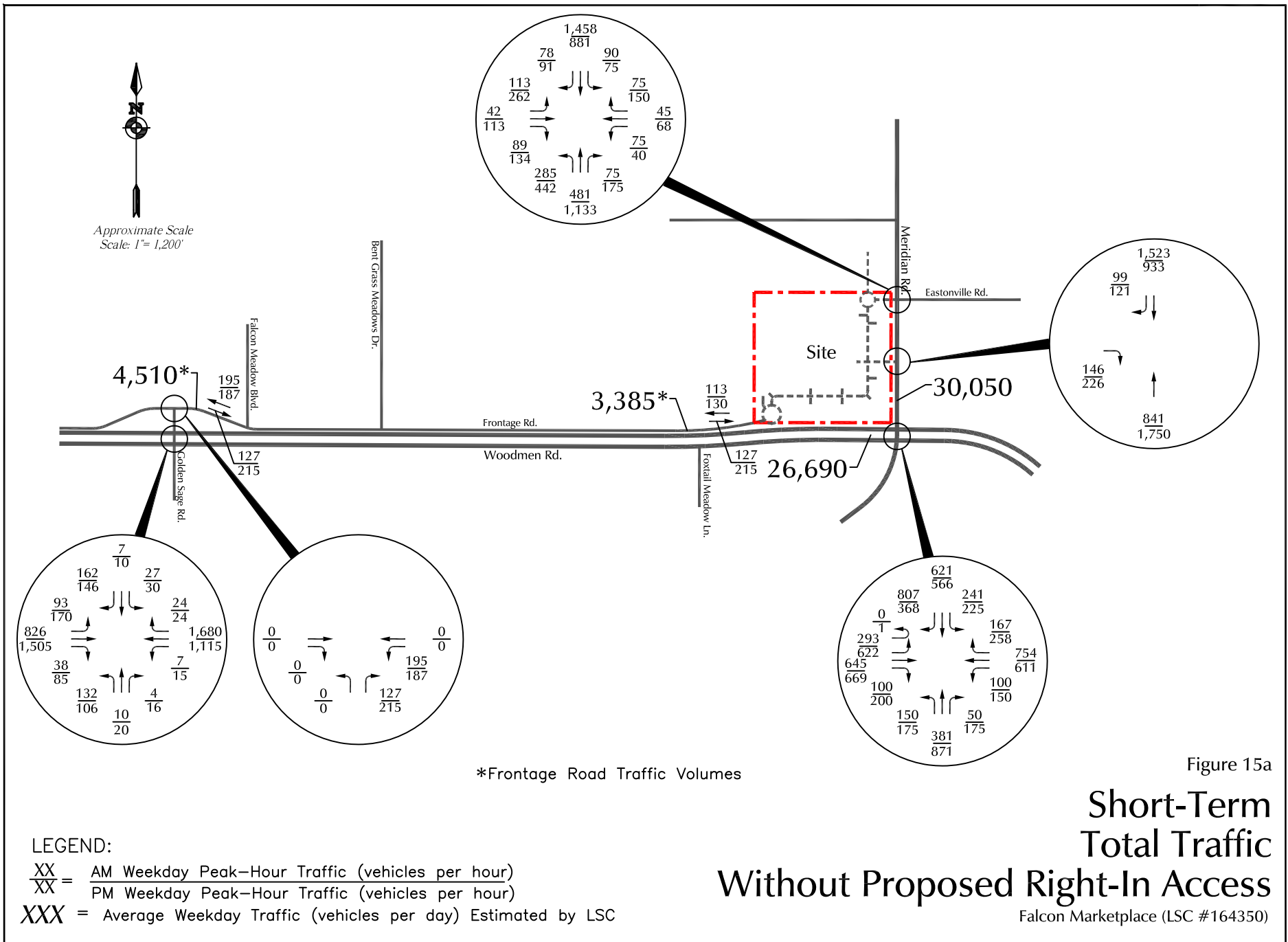
XXX = Average Weekday Traffic (vehicles per day) Estimated by LSC



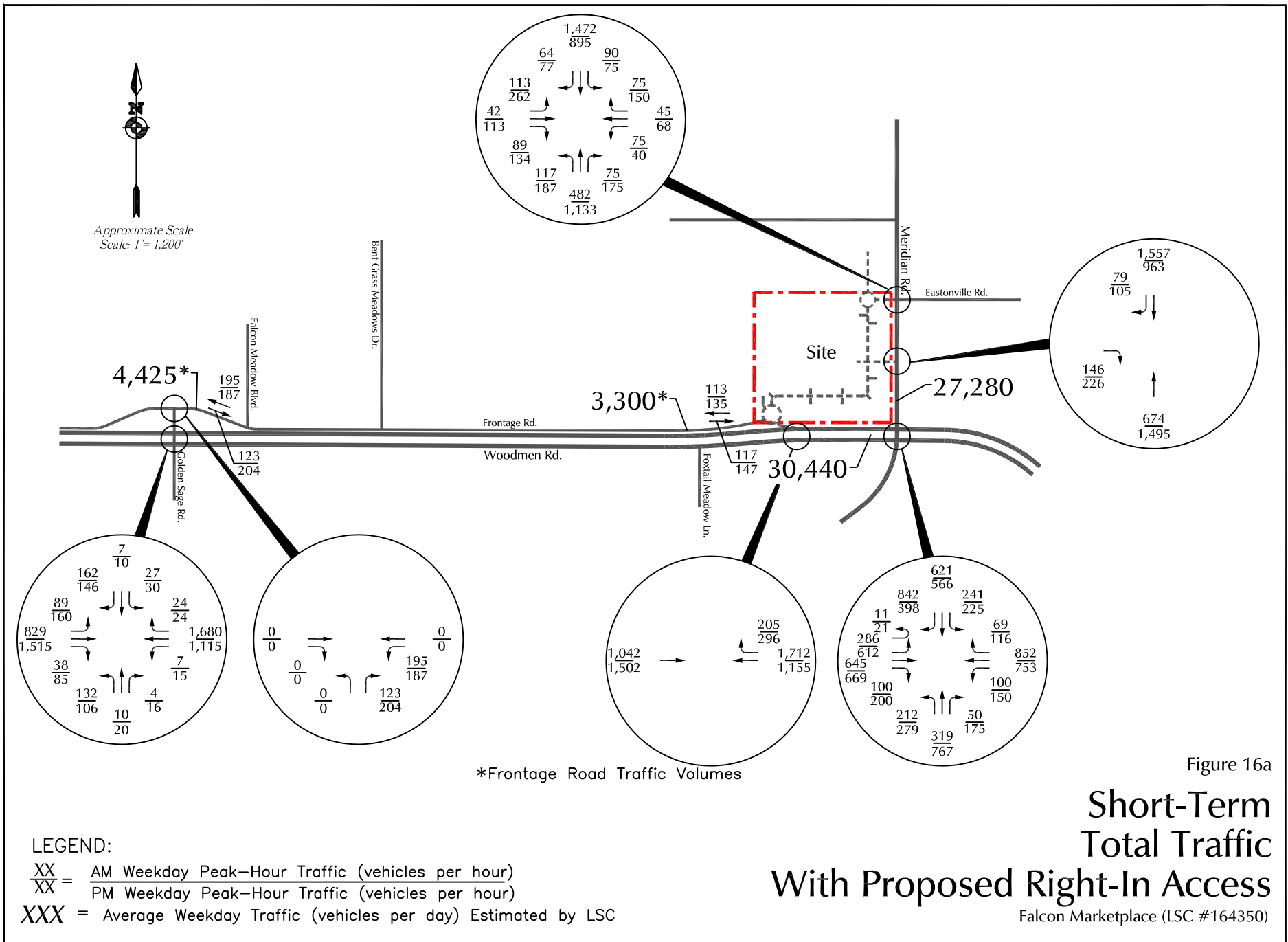
## **SHORT-TERM TOTAL TRAFFIC**

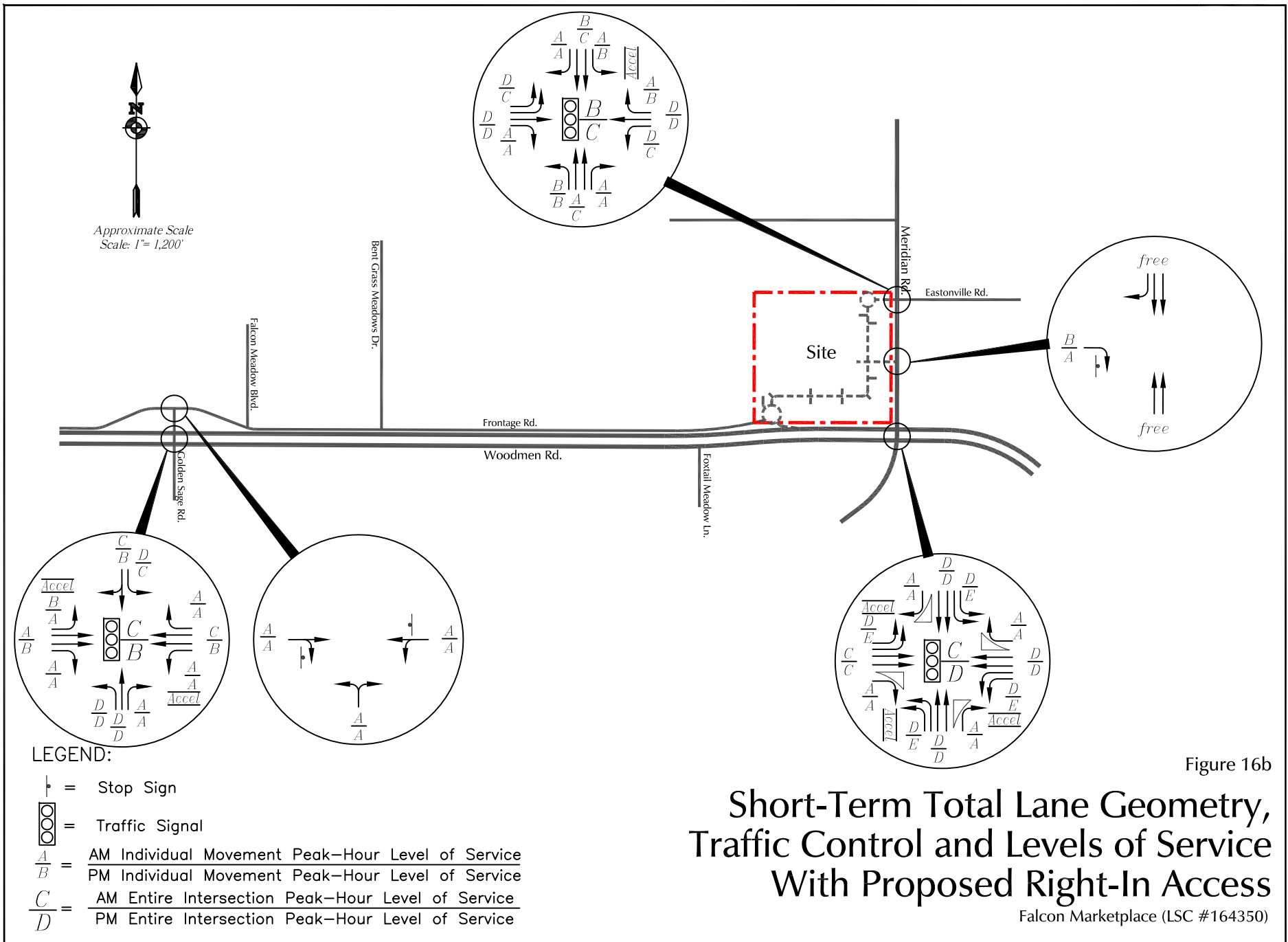
Figures 15a and 16a show the short-term total traffic volumes at the access points and key intersections adjacent to the site with no access to Woodmen Road and with the proposed right-in-only access from Woodmen Road, respectively. The volumes are the sum of the short-term background traffic volumes from Figures 6a and 7a, plus the short-term site-generated traffic volumes from Figures 11 and 12. The volumes shown in Figures 15a and 16a represent the short-term impacts of the development.

Figures 15b and 16b show the lane geometry, traffic control, and level of service at the key intersections based on the short-term total volumes.









## **2040 TOTAL TRAFFIC**

Figures 17a and 18a show the 2040 total traffic volumes at the site access points and key intersections adjacent to the site with no access to Woodmen Road and with the proposed right-in-only access from Woodmen Road, respectively. The volumes are the sum of the 2040 background traffic volumes from Figures 8a and 9a, plus the long-term site-generated traffic volumes from Figures 13 and 14. Figures 17b and 18b show the 2040 total traffic volumes at all of the proposed access points to the public internal road, which extends from the terminus of the Woodmen Frontage Road to Eastonville Road.

Figures 17c and 18c show the lane geometry, traffic control, and level of service at the site access points and key intersections adjacent to the site based on the 2040 total volumes. Figures 17d and 18d show the lane geometry, traffic control, and level of service at the site access points and key intersections adjacent to the site based on the 2040 total volumes. Figures 17d and 18d show the lane geometry, traffic control, and level of service at all of the proposed access points to the public internal road, which extends from the terminus of the Woodmen Frontage Road to Eastonville Road.



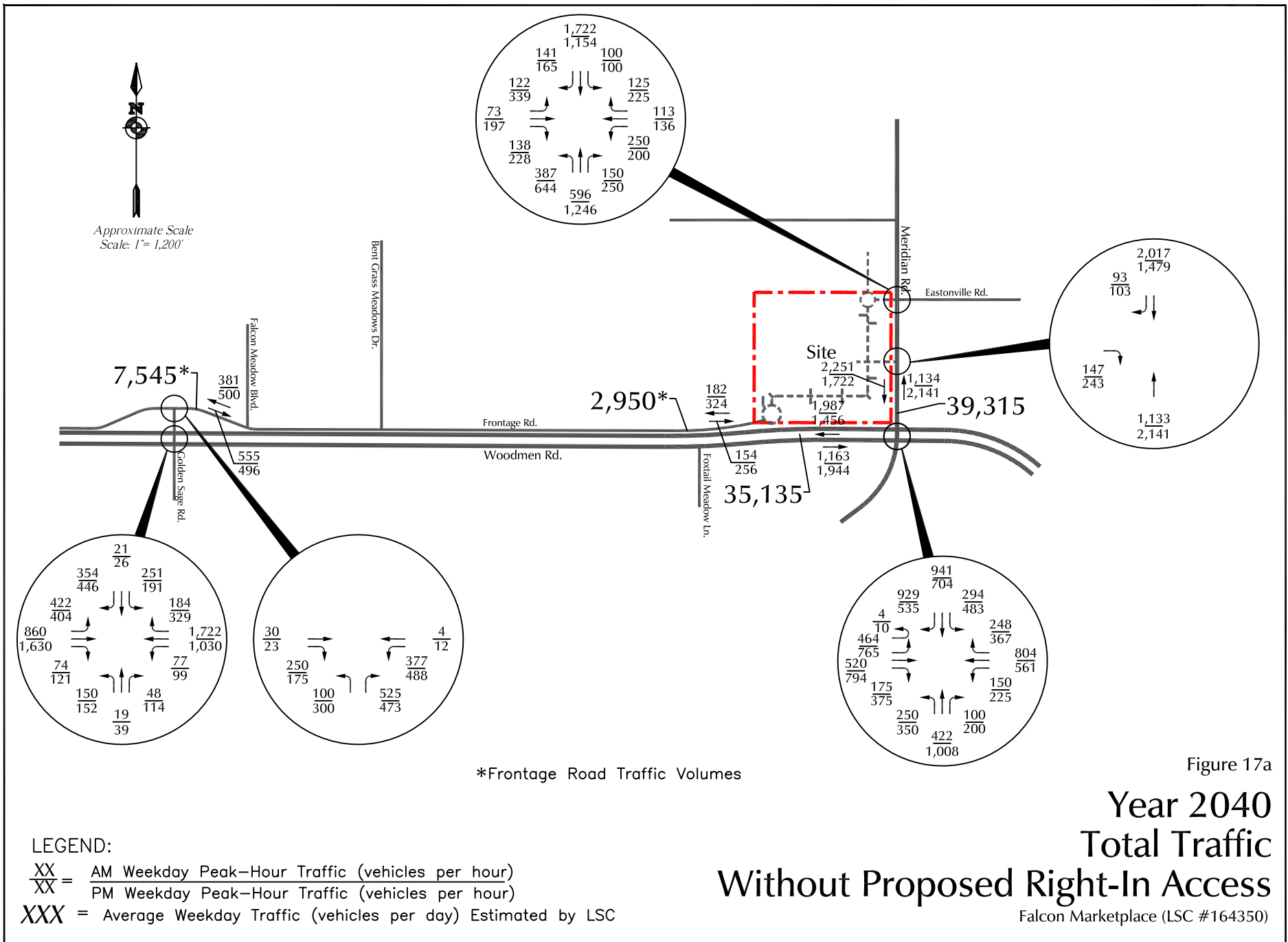


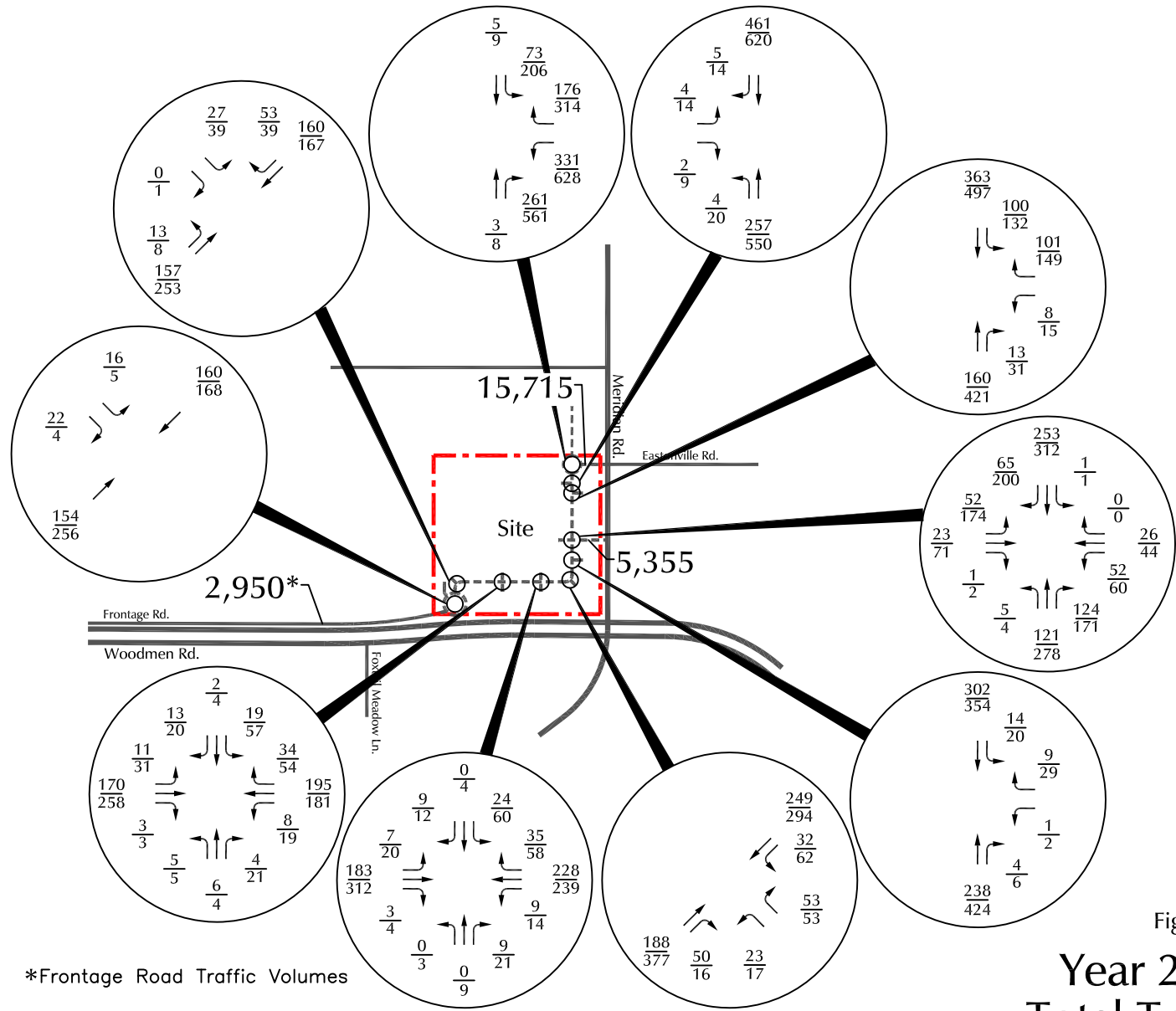
Figure 17a

# Year 2040 Total Traffic Without Proposed Right-In Access

Falcon Marketplace (LSC #164350)



Approximate Scale  
Scale: 1" = 1,200'



\*Frontage Road Traffic Volumes

LEGEND:

- $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)
- XXX = Average Weekday Traffic (vehicles per day) Estimated by LSC

Figure 17b  
**Year 2040  
 Total Traffic  
 Without Proposed Right-In Access**  
 Falcon MarketPlace (LSC #164350)

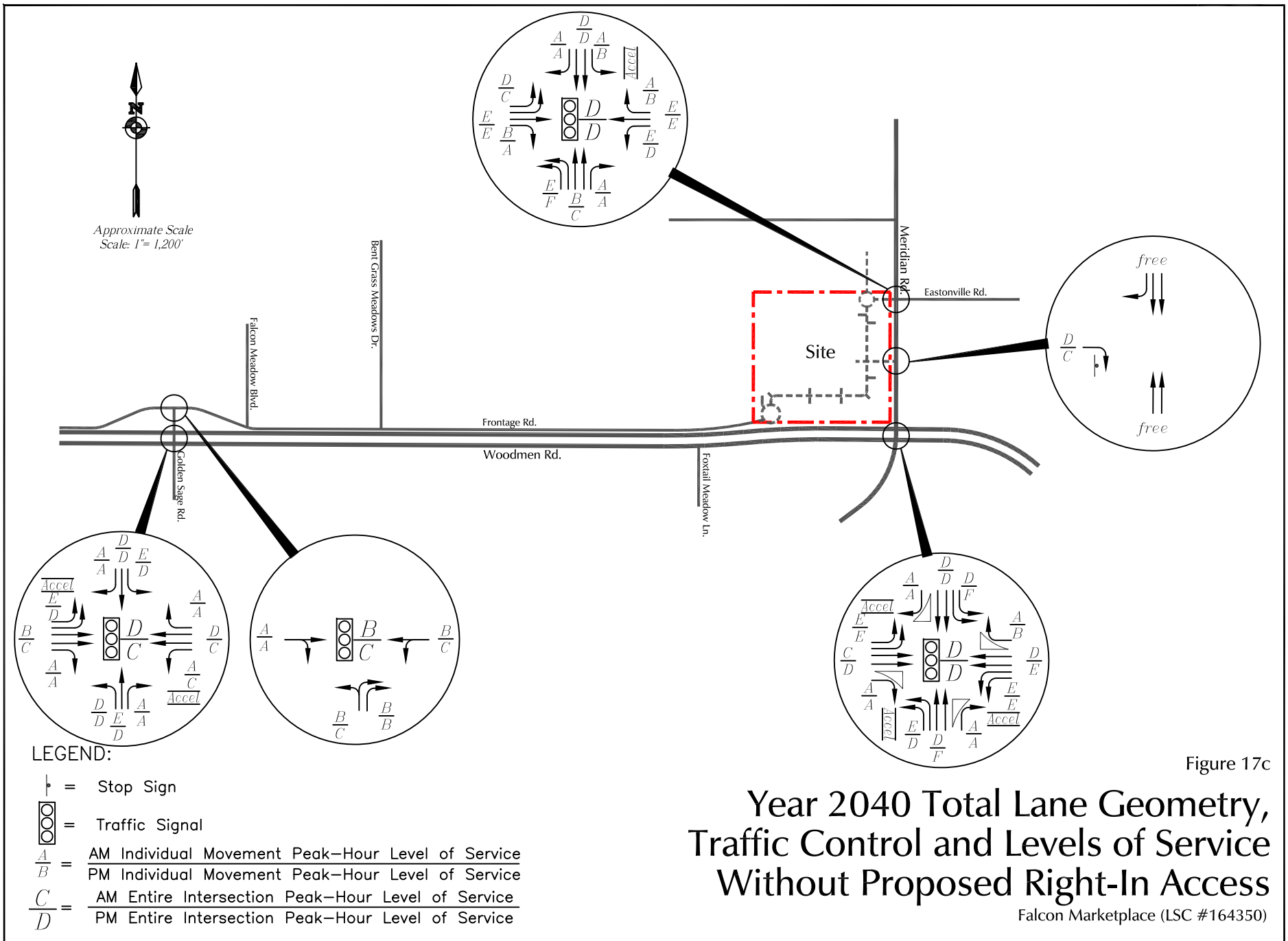
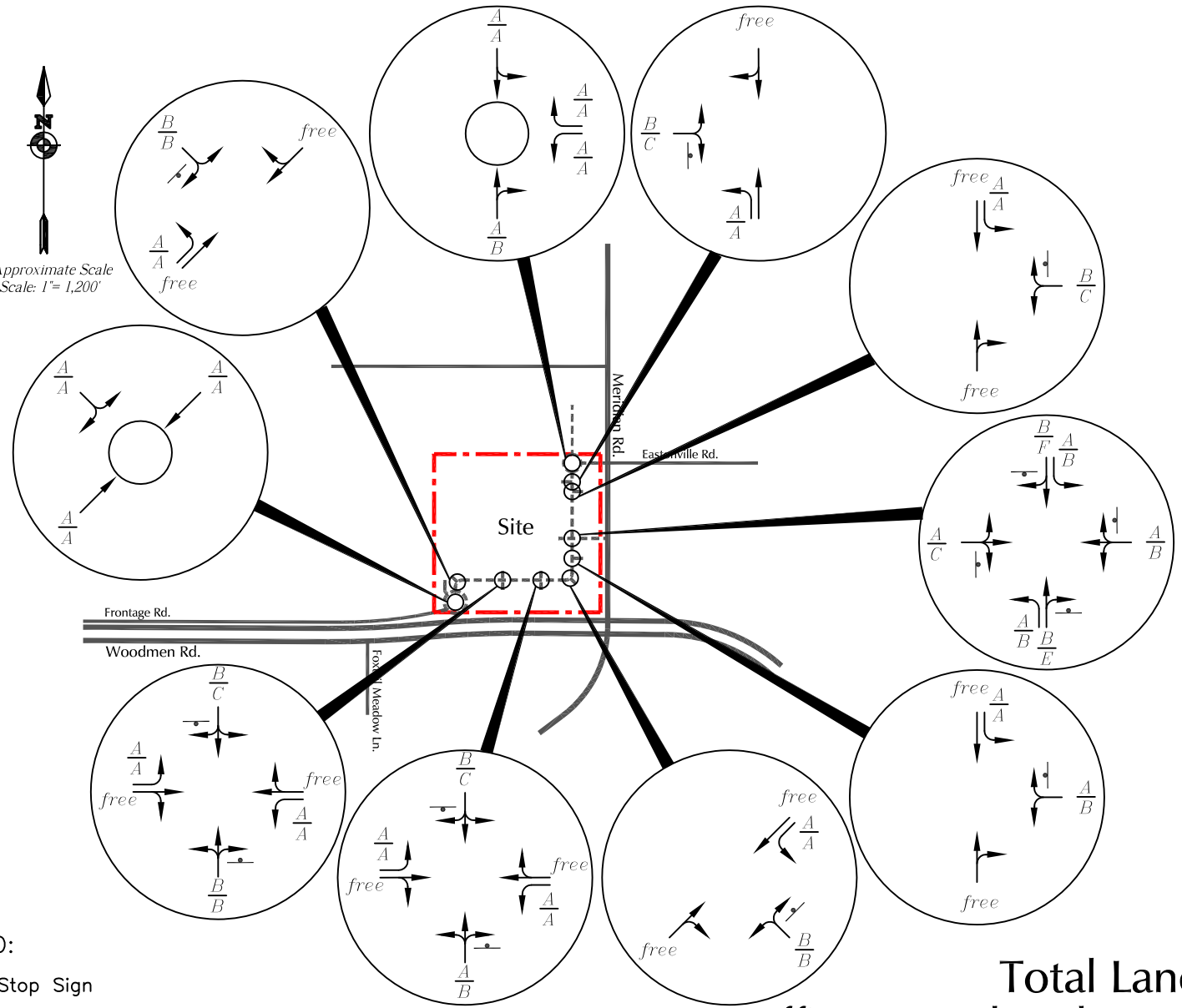


Figure 17c

Approximate Scale  
Scale: 1" = 1,200'



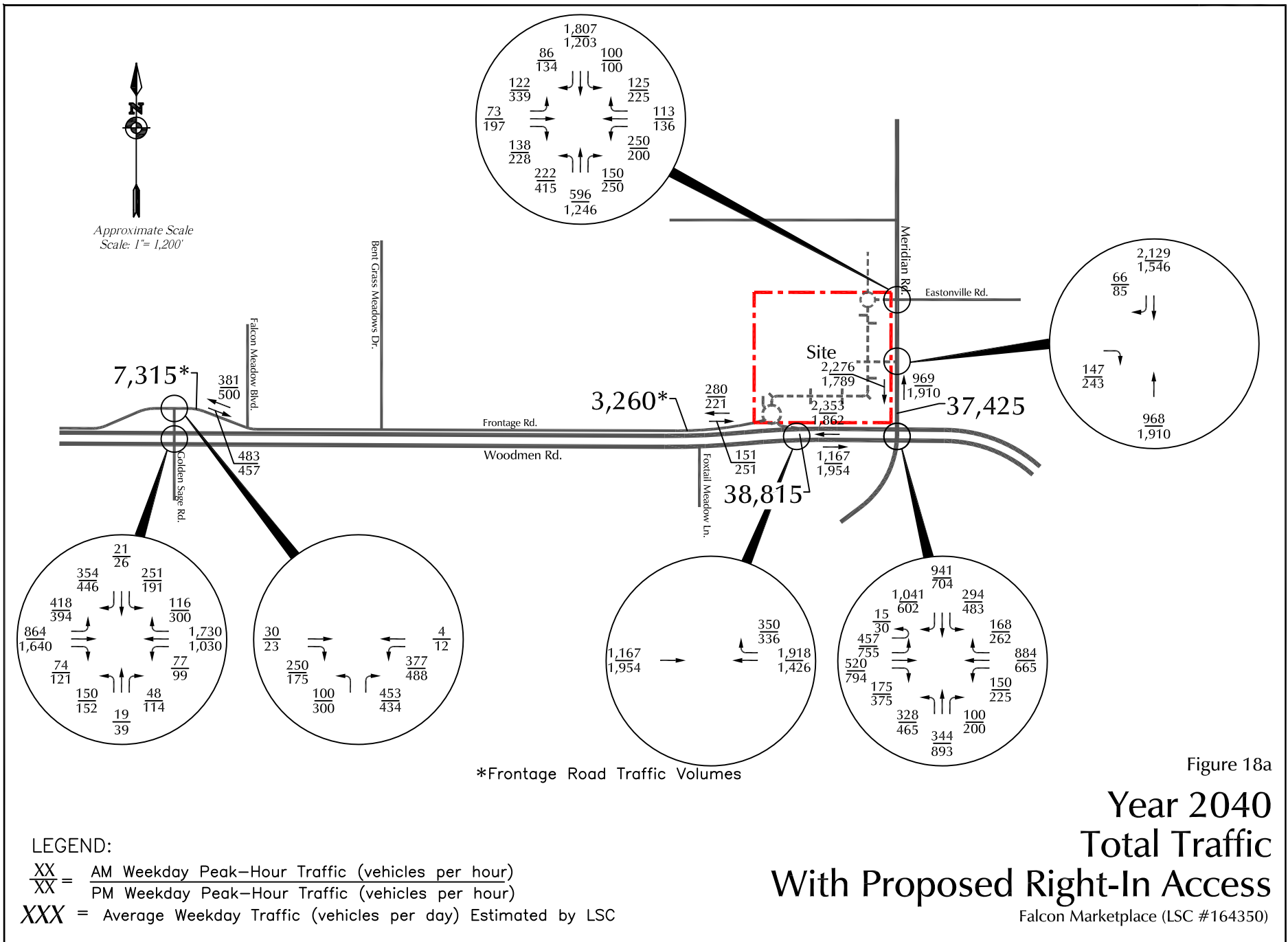
**LEGEND:**

- ⊥ = Stop Sign
- = Modern Roundabout

$\frac{A}{B}$  = AM Individual Movement Peak-Hour Level of Service  
 PM Individual Movement Peak-Hour Level of Service

Figure 17d  
**Year 2040**  
**Total Lane Geometry,**  
**Traffic Control and Levels of Service**  
**Without Proposed Right-In Access**

Falcon Marketplace (LSC #164350)





Approximate Scale  
Scale: 1" = 1,200'

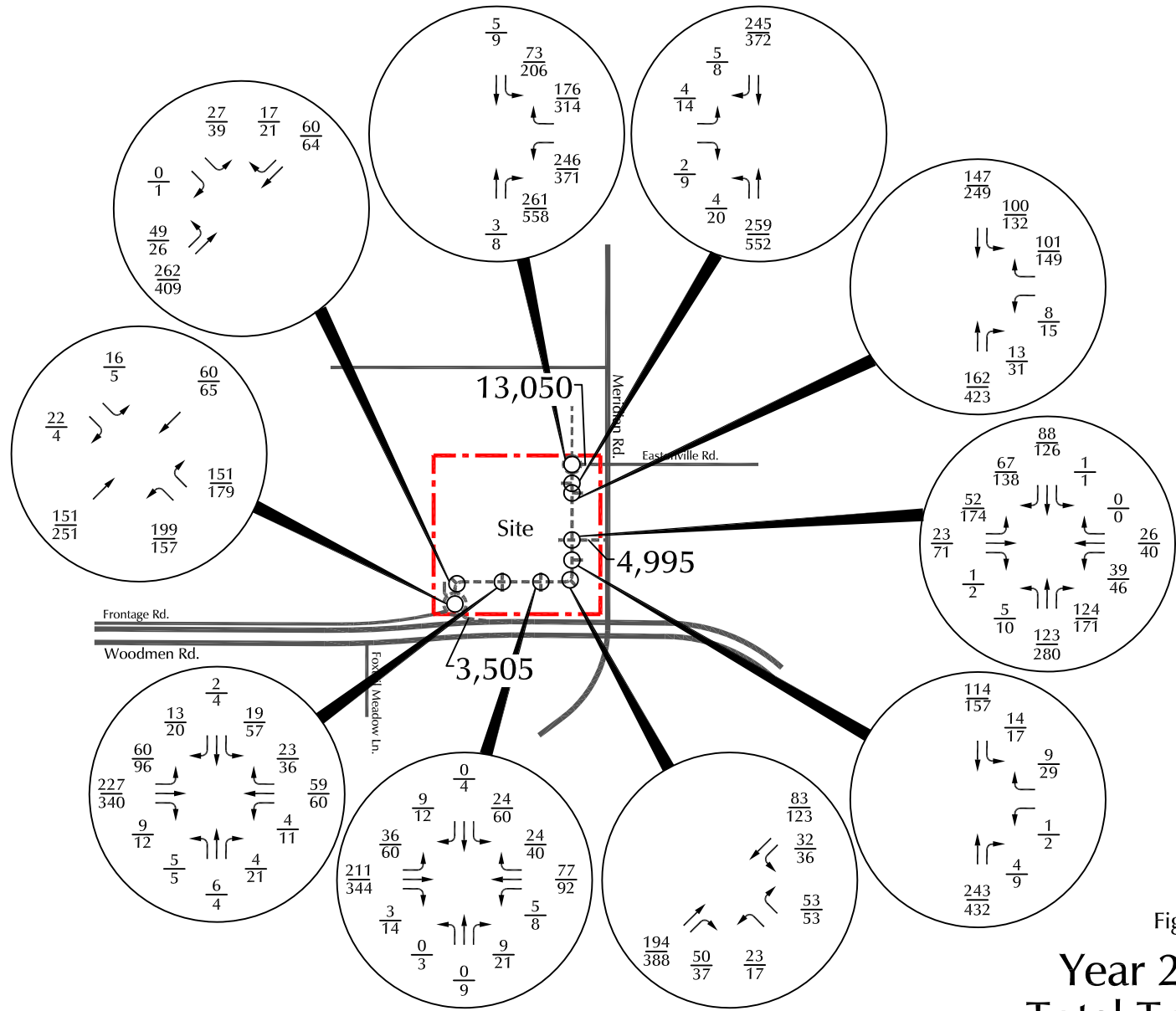


Figure 18b

# Year 2040 Total Traffic

## With Proposed Right-In Access

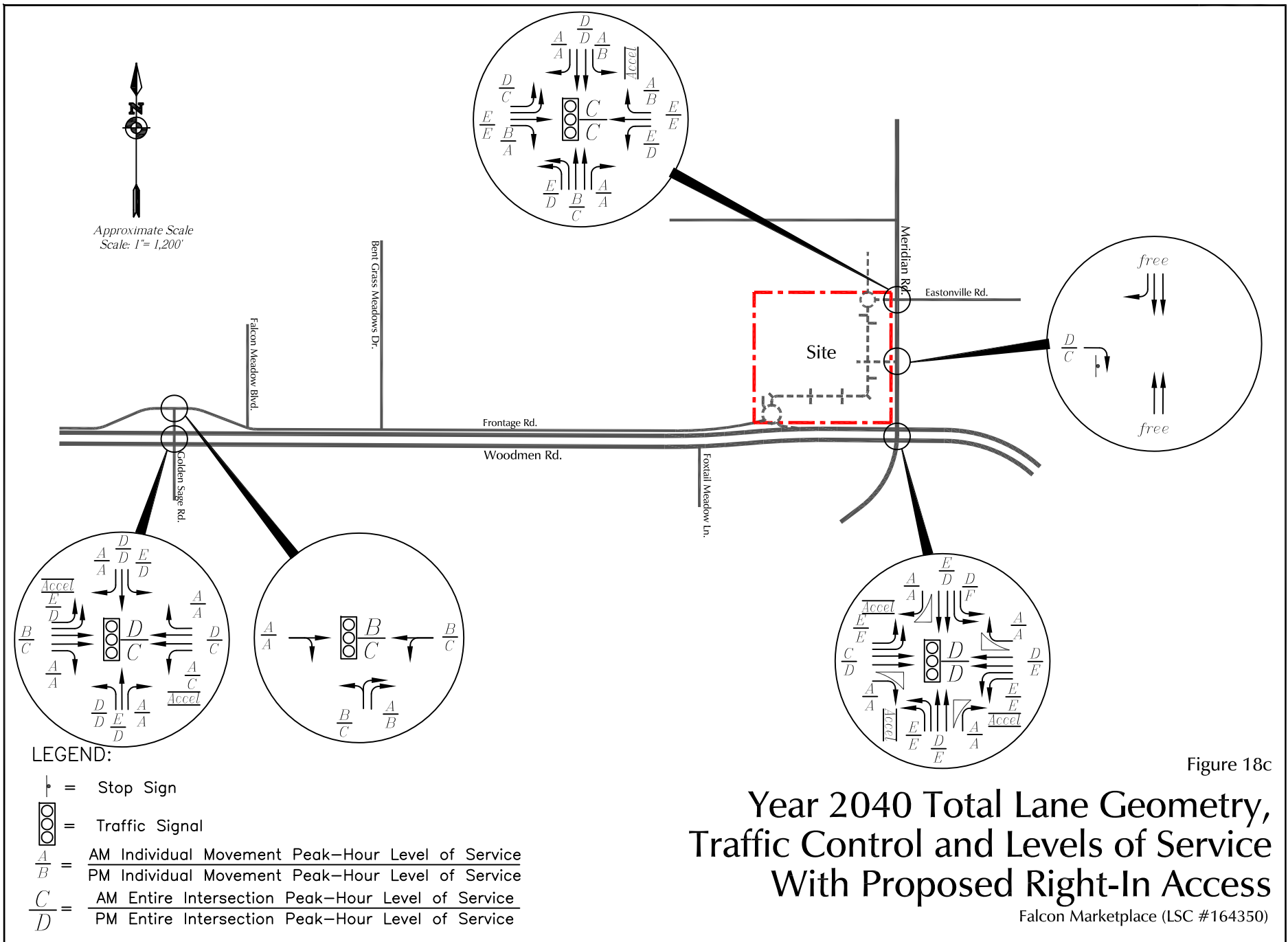
Falcon MarketPlace (LSC #164350)

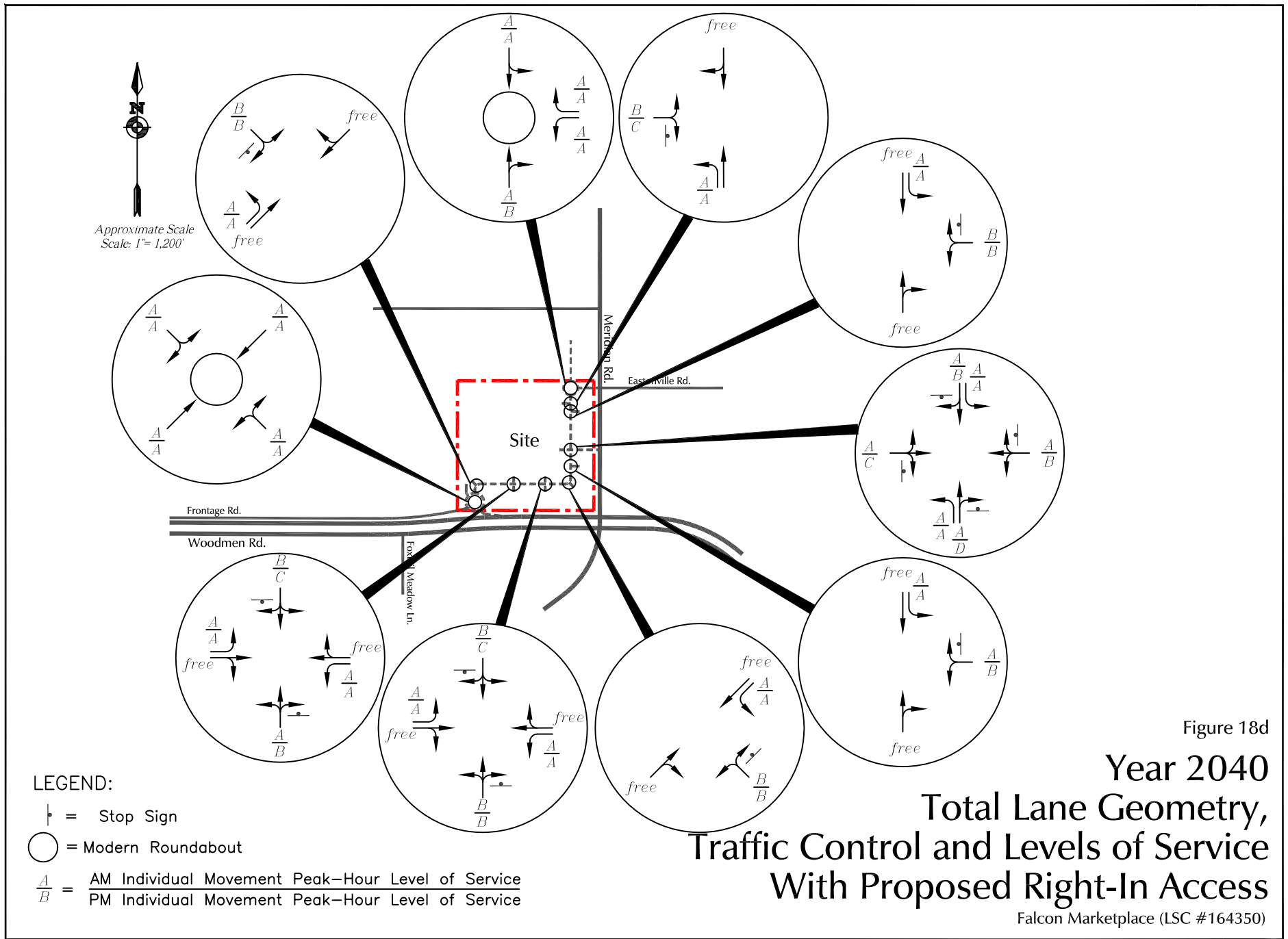
**LEGEND:**

$\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)

$\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)

XXX = Average Weekday Traffic (vehicles per day) Estimated by LSC









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Falcon Meadows at Bent Grass Filing No. 4  
Transportation Memorandum  
(LSC #S214333)  
October 7, 2022

**Traffic Engineer's Statement**

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



**Developer's Statement**

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

\_\_\_\_\_

\_\_\_\_\_

Date

# Falcon Meadows at Bent Grass

## Filing No. 4

### Transportation Memorandum

Prepared for:  
Mr. Jim Byers  
VP of Community Development  
Challenger Homes  
8605 Explorer Dr, Suite 250  
Colorado Springs, CO 80920

OCTOBER 7, 2022

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LSC Transportation Consultants  
Prepared by: Kirstin D. Ferrin, P.E.  
Reviewed by: Jeffrey C. Hodsdon, P.E.

LSC #S214333



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Pages from the *Falcon Meadows at Bent Grass Updated Traffic Impact Study*  
December 11, 2020 (with updates noted)

Traffic Counts

Falcon Marketplace TIS Report Addendum



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October 7, 2022

Mr. Jim Byers  
VP of Community Development  
Challenger Homes  
8605 Explorer Dr, Suite 250  
Colorado Springs, CO 80920

RE: Falcon Meadows at Bent Grass Filing No. 4  
El Paso County, CO  
Updated Transportation Memorandum  
LSC #S214333

Dear Mr. Byers,

LSC Transportation Consultants, Inc. has prepared this updated Transportation Memorandum for Falcon Meadows at Bent Grass Filing No. 4. The location of the site is shown in Figure 1. This report is intended as a site-specific, final-plat traffic report for the currently-proposed Filing 4.

LSC recently completed a traffic impact study (TIS) for the Falcon Meadows at Bent Grass PUD (PUDSP-20-005). This report was dated December 11, 2020. The land use and access currently proposed for Filing No. 4 is consistent with the land use and trip generation estimated and evaluated in that report.

Memos were also prepared for Filing 1 (dated September 28, 2021), Filing 2 (dated March 18, 2022), and Filing 3 (dated April 7, 2022).

## **LAND USE AND ACCESS**

### **Land Use**

Filing No. 4 is planned to include a total of 39 lots for single-family homes. The location of the lots to be included as part of currently-proposed Filing No. 4 was included in traffic-analysis zone (TAZ) 1 in the PUD TIS.

### **Access**

Two full-movement access points (Rowena Way and Henzilee Place) to the recently-completed section of Bent Grass Meadows Drive were approved as part of Falcon Meadows at Bent Grass

Filing No. 2. An additional access point (Lemon Grass Road) is proposed to be constructed as part of Filing No. 4. Please refer to the attached site-plan exhibit. Figure 2 shows the location of the access points.

### **Sight Distance**

Figure 3 shows a sight-distance analysis at the proposed Falcon Meadows at Bent Grass access points to Bent Grass Meadows Drive. Based on a design speed of 40 miles per hour (mph) on Bent Grass Meadows Drive and the criteria contained in Table 2-21 of the *Engineering Criteria Manual (ECM)*, the required intersection sight distance at the proposed site-access points is 445 feet. The required stopping sight distance from *ECM* Table 2-17 is also shown in the figure. The required intersection sight distance and stopping sight distance can be met at both intersections if the areas between the sight-distance lines and the curb line have low-level landscaping and are kept free of other obstructions (such as monument signs and parking areas) that would restrict the drivers' line of sight. Landscaping should be low — about 18 inches or lower in height — to the east of the passenger-vehicle lines of sight shown. Please refer to *ECM* Sections 2.3.6.G.1 and 2.

### **Pedestrian Routes to Schools**

- Woodmen and Meridian are shown as proposed bike routes on the *Major Transportation Corridors Plan (MTCP)* Non-Motorized Plan. Also shown is a proposed secondary regional trail west of the site.
- Bent Grass Meadows Drive is sufficiently wide for bicycles with the paved shoulder.
- There are developing pedestrian connections along the north side of the Woodmen North Frontage Road, Bent Grass Meadows Drive, and Meridian Park Drive. Other area sections of sidewalk/trail connections are being added as development occurs.
- Sidewalks have been added along Bent Grass Meadows Drive with the connection south to the frontage road, adjacent to the School District 49 headquarters.
- The subdivision streets will all have sidewalks to connect to the sidewalk along Bent Grass Meadows Drive.

### **EXISTING TRAFFIC CONDITIONS**

Figure 4 shows the existing morning and afternoon peak-hour traffic volumes at the intersections of Woodmen Road/Golden Sage Road and Meridian Road/Bent Grass Meadows Drive. The counts at the intersection of Woodmen Road/Golden Sage Road were counted in January 2020 and again in December 2020. The January 2020 counts were conducted prior to the completion of Bent Grass Meadows Drive between the Woodmen frontage road and Meridian Road, but before the restrictions due to the COVID-19 pandemic were put in place. Figure 4 shows the results of both the October 2018 counts and the October 2020 counts, as the more current counts were likely impacted by the COVID-19 pandemic. The traffic-count reports are attached.

## **TRIP GENERATION**

The site-generated vehicle trips were estimated using the nationally-published trip-generation rates from *Trip Generation, 11th Edition, 2021* by the Institute of Transportation Engineers (ITE). Table 1 shows the trip-generation estimates for Falcon Meadows at Bent Grass Filing No. 4.

Falcon Meadows at Bent Grass Filing No. 4 is expected to generate about 368 vehicle trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 a.m. and 8:30 a.m., about 7 vehicles would enter and 22 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 p.m. and 6:15 p.m., about 24 vehicles would enter and 14 vehicles would exit the site.

## **PROJECTED SHORT-TERM ADDITIONAL TRAFFIC**

Figure 5 shows the projected additional traffic volumes at the intersections of Woodmen/Golden Sage and Meridian/Bent Grass Meadows due to Falcon Meadows at Bent Grass Filing No. 4. These volumes were calculated by applying the external trip-distribution percentages shown in Figure 7 of the PUD TIS to the trip generation shown in Table 1. Trips with destinations and/or origins within the area bound by Woodmen Road on the south and Meridian Road on the east have been assigned separately, based on the location of the future commercial and school uses within the study area.

Figure 5 also shows the projected additional traffic volumes at the intersections of Woodmen/Golden Sage and Meridian/Bent Grass Meadows due to Bent Grass Residential Filing 2 taken from the TIS dated January 24, 2020 (PCD File No. SF-1914), due to Falcon Meadows at Bent Grass Filing No. 1 taken from the September 2021 memorandum (PCD File NO. SF-2034), due to Falcon Meadows at Bent Grass Filing No. 2 taken from the March 2022 memorandum (PCD File NO. SF-2134), and due to Falcon Meadows at Bent Grass Filing No. 3 taken from the April 2022 memorandum (PCD File NO. SF-2216).

## **SHORT-TERM TOTAL TRAFFIC**

Figure 6 shows the projected short-term total traffic volumes at the intersections of Woodmen/Golden Sage and Meridian/Bent Grass Meadows. The volumes are the sum of the January 2020 traffic volumes (from Figure 4) plus the additional short-term traffic volumes (from Figure 5). Please refer to the PUD TIS for short-term total traffic volumes at the other area intersections and the short-term level of service analysis.

## **2040 TOTAL TRAFFIC**

Please refer to the PUD TIS for the 2040-total traffic volumes and level of service analysis.

## REQUIRED IMPROVEMENTS

Based on the projected short-term total traffic volumes from the PUD TIS, the classification of Bent Grass Meadows Drive as an Urban Non-Residential Collector, and the criteria contained in the *ECM*, right-turn deceleration lanes are **not** projected to be warranted on Bent Grass Meadows Drive approaching any of the Falcon Meadows at Bent Grass access points (Rowena Way, Henzlee Place, and Lemon Grass Road).

Based on the projected short-term total traffic volumes from the PUD TIS, the classification of Bent Grass Meadows Drive as an Urban Non-Residential Collector, and the criteria contained in the *ECM*, northeast-bound left-turn lanes are projected to be warranted on Bent Grass Meadows Drive approaching all of the Falcon Meadows at Bent Grass access points (Rowena Way, Henzlee Place, and Lemon Grass Road). Bent Grass Meadows Drive has been constructed with a center two-way, left-turn lane that will meet these criteria.

Please see a copy of Table 4 Roadway System Improvements from the PUD TIS with annotations added in September 2021 (as part of the Filing 1 memo), March 2022 (as part of the Filing 2 memo), April 2022 (as part of the Filing 3 memo) and June 2022 (for this memo) indicating the status of each improvement.

Regarding Improvement F, note that Bent Grass Meadows Drive has been completed between the Woodmen frontage road and Meridian Road since completion of the PUD TIS. The approved Filing 1 in Falcon Meadows at Bent Grass required construction, paving, and associated repairs to Bent Grass Meadows Drive south of the site, as deemed appropriate by the PCD Director and the County Engineer, including design and construction of an eastbound left-turn lane on Woodmen Frontage Road at Bent Grass Meadows Drive, if warranted, to meet the minimum standards of a Non-Residential Collector in accordance with the *Engineering Criteria Manual*. These road improvements may be eligible for cost recovery from adjacent developers.

Meeting were held with El Paso County PCD staff and City Traffic Engineering on March 14, 2022 and March 29, 2022 to discuss items G,H, I, and J in this table. The intersection is under city ownership/jurisdiction, however the ownership of the intersection of Golden Sage/N. Frontage Road is not clear. The city will be researching the ownership and the availability of potential additional ROW (if possible) to accommodate potential future alternative intersection options for the intersection of Golden Sage/N. Frontage Road and the approach legs to the south, east and west. It was determined that item H would not be needed at this time. Item I would likely be needed in the short term; however, it was agreed that Falcon Meadows at Bent Grass would only be required to provide escrow towards this improvement for future construction once ownership and the availability of potential additional ROW is determined.

As of the week of **June 20, 2022**, and a conversation with City Traffic staff, there are no updates to the above meeting notes. City staff indicated they would like the County to collect the escrow from this and all future Falcon Meadows at Bent Grass filings and then give the money to the City

to go towards future improvements at Golden Sage/Woodmen and Golden Sage/North Frontage Road.

Regarding Improvement G, protected/permitted phasing has been added to the intersection of Golden Sage/Woodmen. This improvement is complete.

Regarding Improvement H, the *Falcon Marketplace TIS Report Addendum* by LSC dated July 21, 2020 (PCD File No. SP-17-001/CDR-16-007) identified the trigger for the need to lengthen the current eastbound single left-turn deceleration lane on Woodmen Road approaching Golden Sage Road as when the eastbound left-turn volume is greater than 200 vehicles per hour (vph) during the afternoon peak hour. As shown in Figure 6, following buildout of Bent Grass Residential Filing No. 1 and Falcon Meadows at Bent Grass Filings Nos. 1, 2, 3 and 4, the projected volume for this movement is 222 vph during the afternoon peak hour. However, it should be noted that our understanding is that control over the intersection of Golden Sage/Woodmen has been transferred to the City of Colorado Springs as part of the Banning Lewis Ranch North Annexation (CPC A 19-00022). The outcome of a meeting with the city was that item H would not be needed at this time.

Regarding Improvement I, the *Falcon Marketplace TIS Report Addendum* by LSC dated July 21, 2020 (PCD File No. SP-17-001/CDR-16-007) identified the trigger for the need to for an exclusive southbound right-turn deceleration lane on Golden Sage Road approaching Woodmen Road as when the southbound left-turn volume is greater than 167 to 192 vph during the morning peak hour. As shown in Figure 6, following buildout of Bent Grass Residential Filing No. 1 and Falcon Meadows at Bent Grass Filings Nos. 1, 2, 3 and 4, the projected volume for this movement is 225 vph during the morning peak hour. This exceeds the estimated trigger identified that would require the construction of an exclusive southbound right-turn deceleration lane. However, recent analysis suggests that the existing laneage will accommodate Filing 4 traffic. Also note that control over the intersection of Golden Sage/Woodmen has transferred to the City of Colorado Springs as part of the Banning Lewis Ranch North Annexation (CPC A 19-00022). The outcome of meetings with the city was that escrow would be collected for improvement I for future construction once right-of-way and ownership issues are resolved.

Table 2 shows the percentage of the projected 2040 total traffic due to Falcon Meadows at Bent Grass Filing No 4 for Improvements H, I, and J. These percentages could be used to determine the pro-rata share of the cost of intersection improvements. However, it should be noted that control over the intersection of Golden Sage/Woodmen has been transferred to the City of Colorado Springs as part of the Banning Lewis Ranch North Annexation (CPC A 19-00022). Per the paragraph above, additional research is underway which will be helpful in determining a solution for Golden Sage/N. Frontage Road.



## **ROADWAY CLASSIFICATIONS**

Figure 7 shows the recommended internal street classifications.

## **ROAD IMPROVEMENT FEE PROGRAM**

Applicable fees will need to be paid to the Woodmen Road District pursuant to the agreement between El Paso County and the Woodmen Road District.

\* \* \* \* \*

Please contact me if you have any questions regarding this report.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E.  
Principal

JCH/KDF:jas

Enclosures: Tables 1-2  
Figures 1-7  
Pages from the *Falcon Meadows at Bent Grass Updated Traffic Impact Study*  
December 11, 2020 (with updates noted)  
Traffic Counts  
Falcon Marketplace TIS Report Addendum

# Tables 1-2

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**Table 1  
Trip Generation Estimate  
Falcon Meadows at Bent Grass Filing No. 4**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total Trips Generated					
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out	In	Out
210	Single-Family Detached Housing	39 DU <sup>(2)</sup>	9.44	0.19	0.56	0.62	0.37	368	7	22	24	14

Notes:  
(1) Source: "Trip Generation, 11th Edition, 2017" by the Institute of Transportation Engineers (ITE)  
(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc. Jun-22

**Table 2**  
**Prorata Share Contribution Calculations<sup>(1)</sup>**  
**Falcon Meadows at Bent Grass Filing No. 4**

Item	Improvement Description and Estimated Cost		AM	PM	AM + PM	
H	Lengthening of the current eastbound single left-turn deceleration lane on Woodmen approaching Golden Sage Road		Site-Generated Traffic <sup>(2)</sup> (vehicles per hour)	4	12	16
			2040 Total Traffic <sup>(2)</sup> (vehicles per hour)	319	447	766
			%	1.25%	2.68%	2.09%
	Estimated Improvement Cost:	\$ 200,000	Estimated Fair-Share Portion for this project based on calculated AM + PM percentage:	\$ 4,178		
I	Southbound exclusive right-turn lane on Golden Sage Road approaching Woodmen Road		Site-Generated Traffic <sup>(3)</sup> (vehicles per hour)	11	7	18
			2040 Total Traffic <sup>(3)</sup> (vehicles per hour)	392	391	783
			%	2.81%	1.79%	2.30%
	Estimated Improvement Cost:	\$ 100,000	Estimated Fair-Share Portion for this project based on calculated AM + PM percentage:	\$ 2,299		
J	Signalization of Golden Sage Road/Woodmen Frontage Road or reconstruction as a modern roundabout; Future additional laneage may be necessary at this intersection to accommodate vehicle queues and for traffic operations.		Site-Generated Traffic <sup>(4)</sup> (vehicles per hour)	15	19	34
			2040 Total Traffic <sup>(4)</sup> (vehicles per hour)	979	1183	2162
			%	1.53%	1.61%	1.57%
	Estimated Improvement Cost:	\$ 350,000	Estimated Fair-Share Portion for this project based on calculated AM + PM percentage:	\$ 5,504		

Notes:

(1) The improvements and fair shares are to be verified with an updated traffic impact analysis or memorandum as appropriate with each final plat in the Falcon Meadows at Bent Grass development. An escrow agreement, including a financial assurance estimate for the intersection improvements, as approved by the Planning and Community Development Department Director and the County Attorney's Office shall be completed and escrow deposited with each final plat for the respective improvements within the County's jurisdiction. It should be noted that our understanding is that control over the intersection of Golden Sage/Woodmen is being transferred to the City of Colorado Springs as part of the Banning Lewis Ranch North Annexation (CPC A 19-00022).

(2) Eastbound left-turn volume at the intersection of Woodmen/Golden Sage

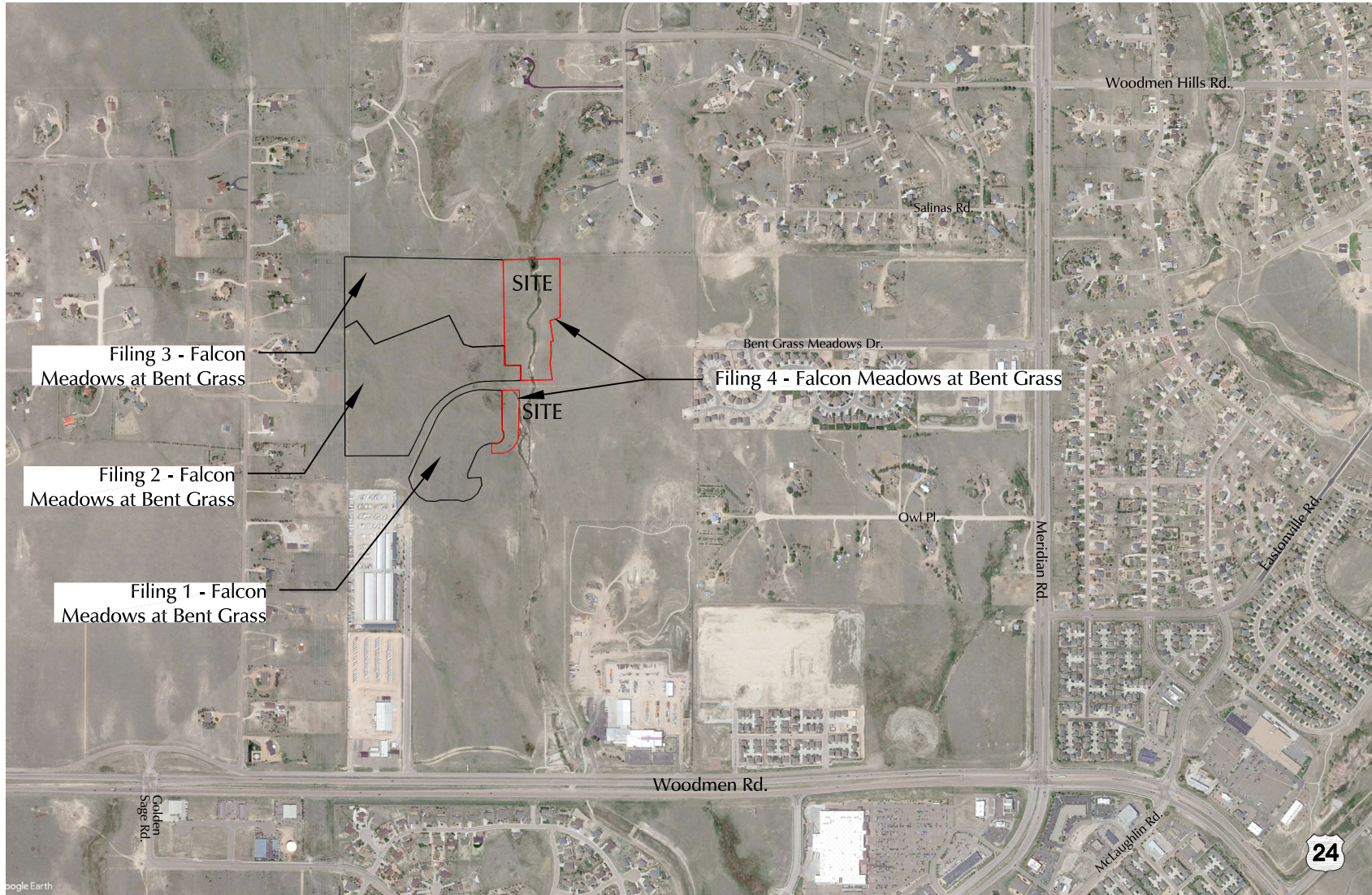
(3) Southbound right-turn volume at the intersection of Woodmen/Golden Sage

(4) Sum of all traffic volumes at the intersection of Golden Sage/Woodmen frontage road

# Figures 1-7

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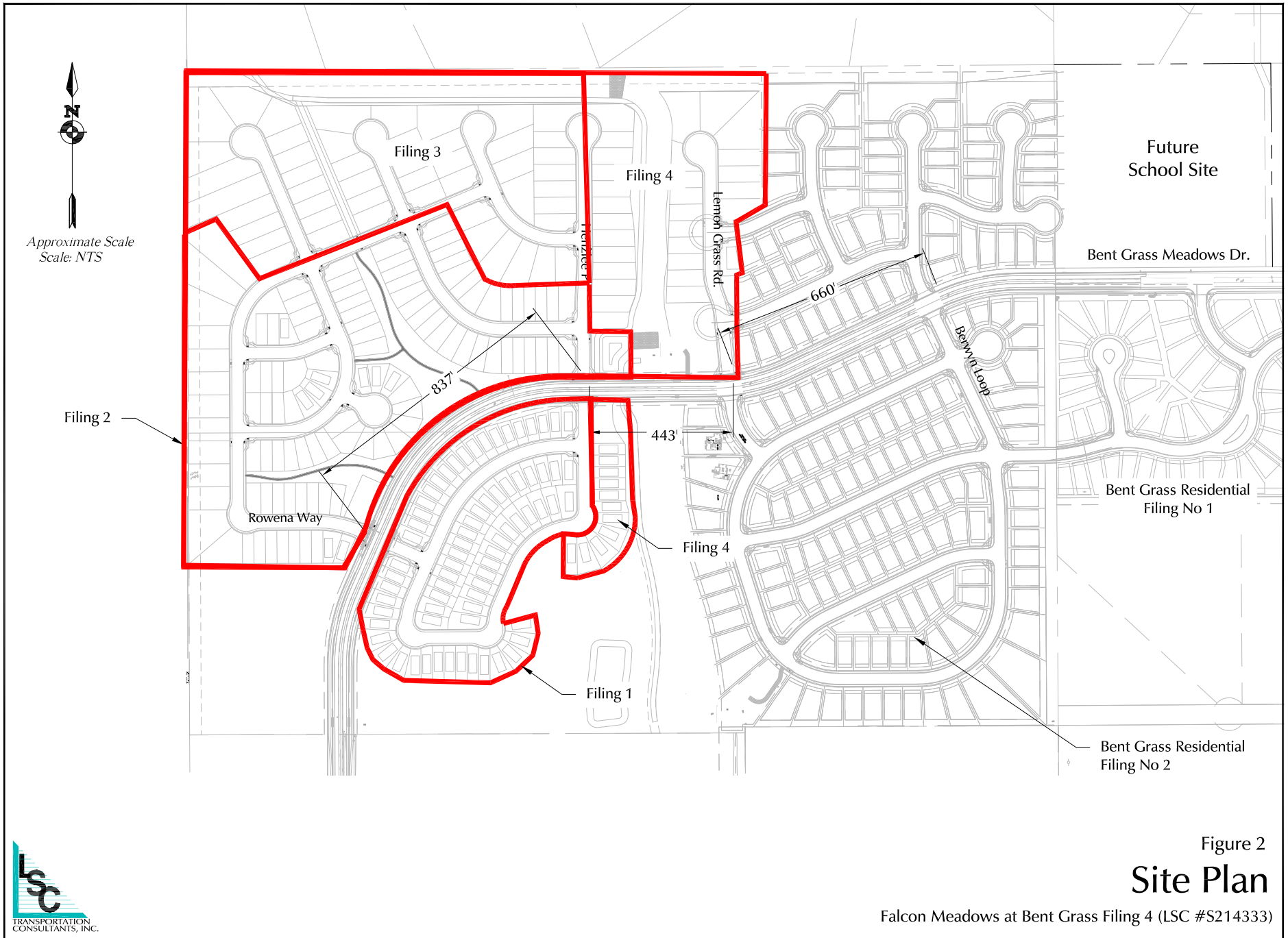
  
 Approximate Scale  
 Scale: 1" = 1,200'

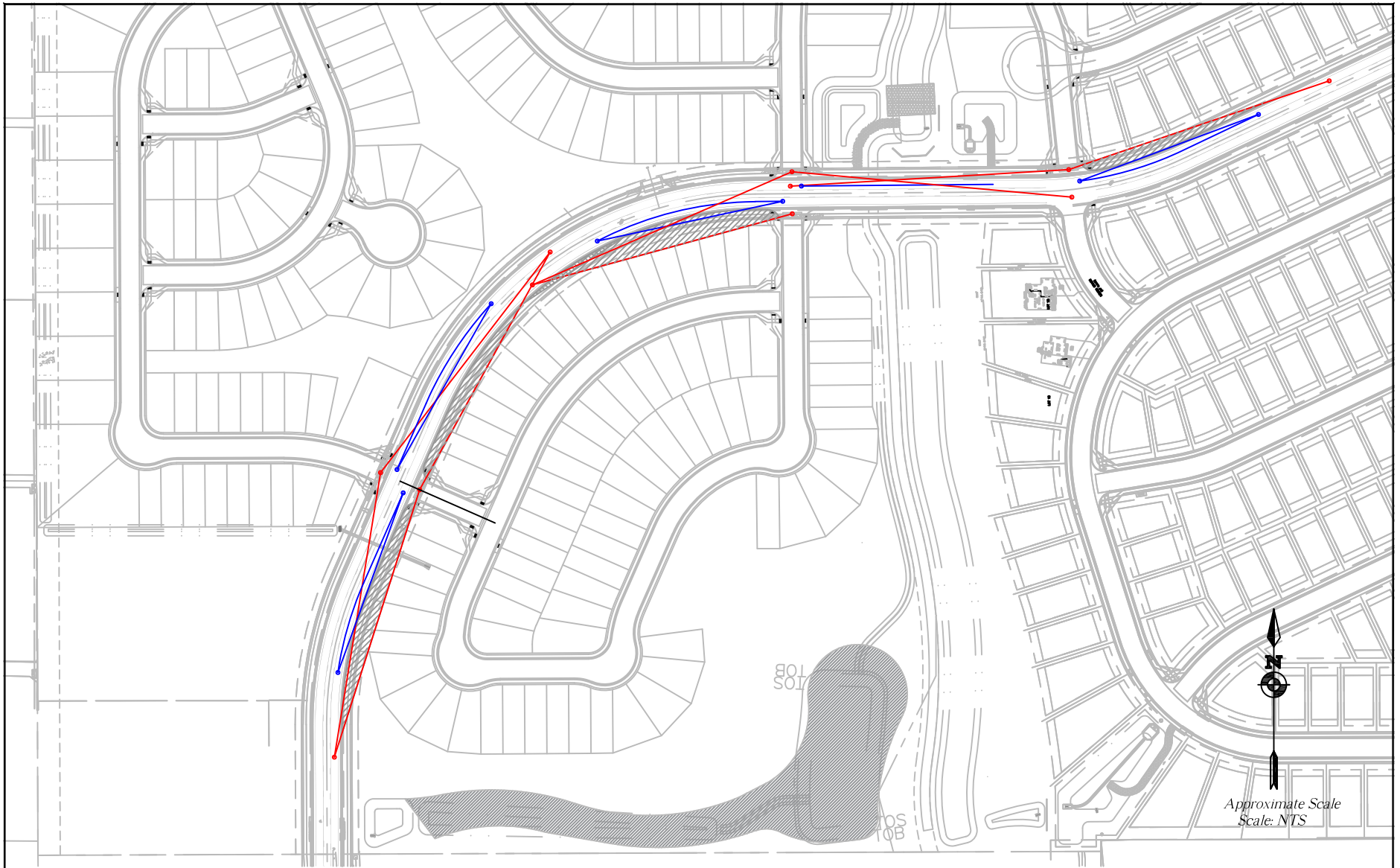
Figure 1

# Vicinity Map

Falcon Meadows at Bent Grass Filing 4 (LSC #S214333)







Approximate Scale  
Scale: NTS

LEGEND:

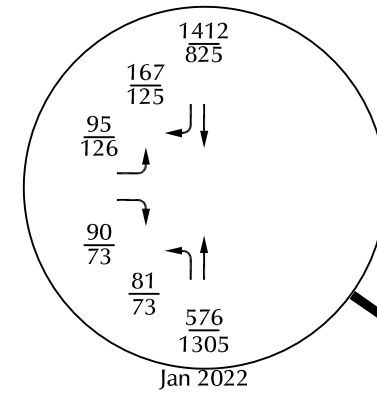
- = ECM Required Intersection Sight Distance (445' based on design speed of 40mph from Table 2-21)
- ←←← = ECM Required Stopping Sight Distance Travel Path (305' based on design speed of 40mph from Table 2-17)
- = Stopping Sight Distance Sight Line
- = Area must be kept clear of obstructions to intersection distance line of sight.



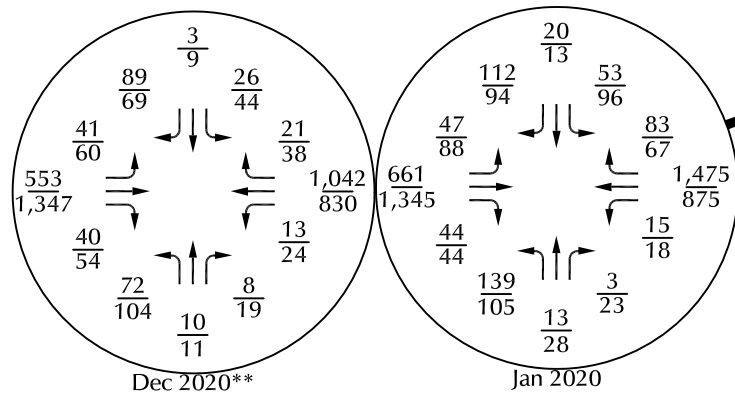
Figure 3  
**Sight Distance**  
Falcon Meadows at Bent Grass Filing 4 (LSC #S214333)



\*\*The January 2020 counts were conducted prior to the completion of Bent Grass Meadows Drive between the Woodmen frontage road and Meridian Ranch, but before impacts of the COVID-19 pandemic. The December 2020 counts were conducted following the completion of Bent Grass Meadows Drive between the Woodmen frontage road and Meridian Ranch, but during the COVID-19 pandemic.



Approximate Scale  
Scale: 1" = 1,200'



LEGEND:

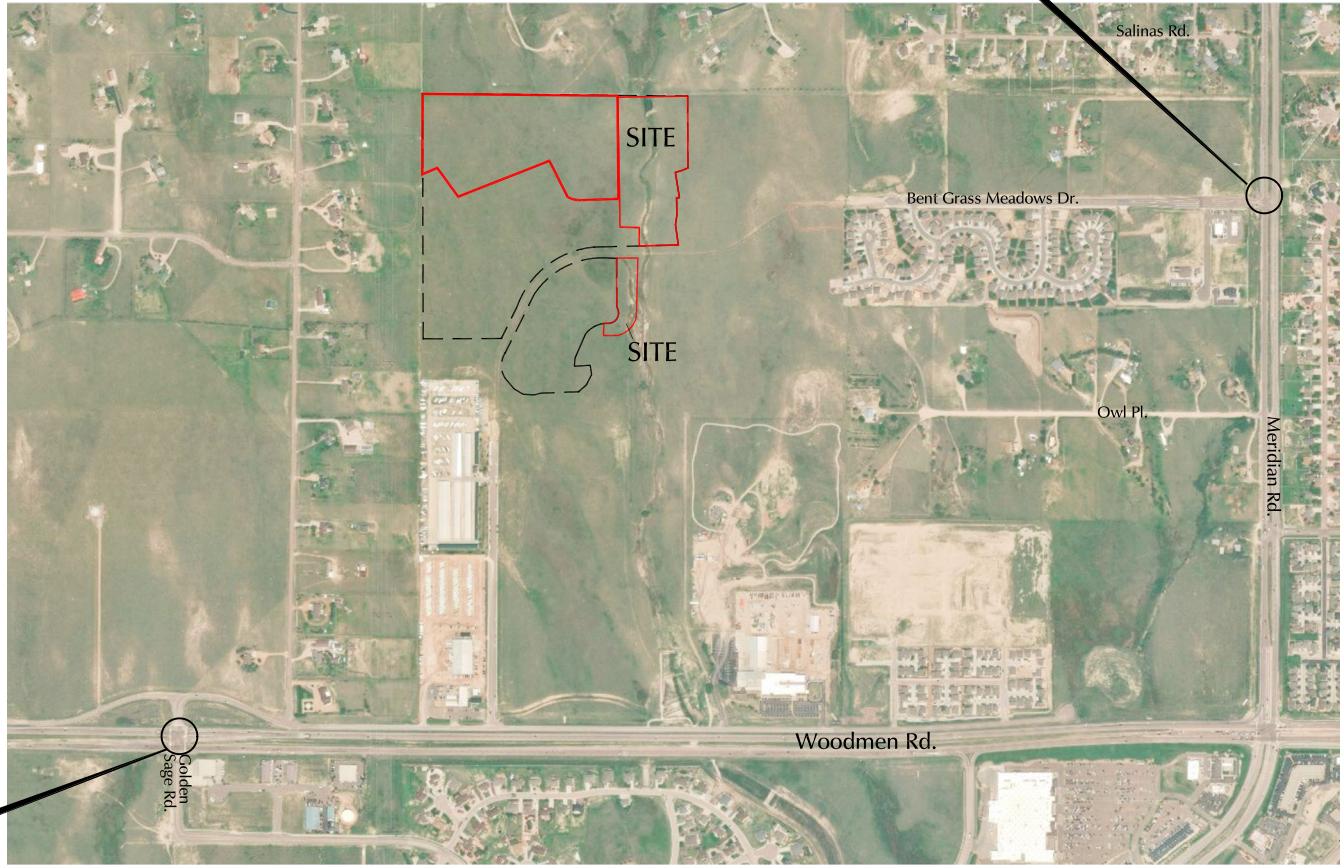
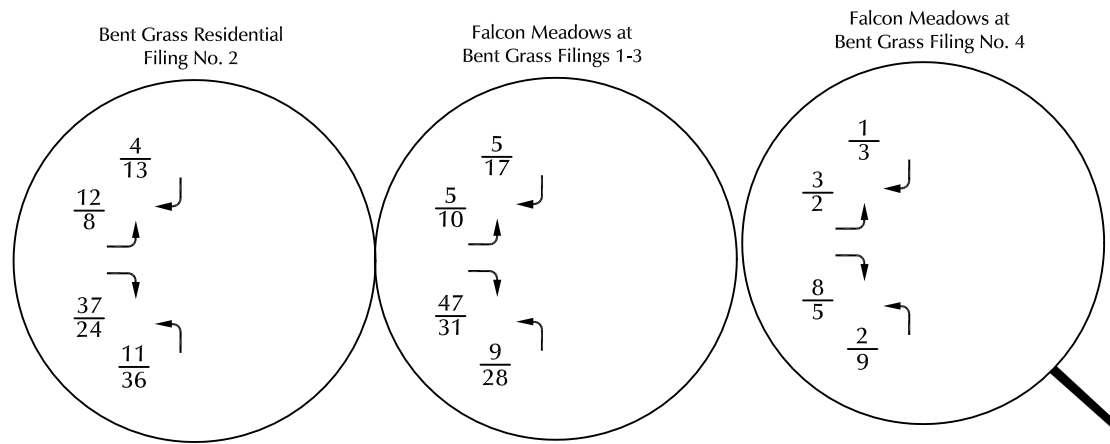
$\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
 $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)

X,XXX= Average Daily Traffic (vehicles per day)

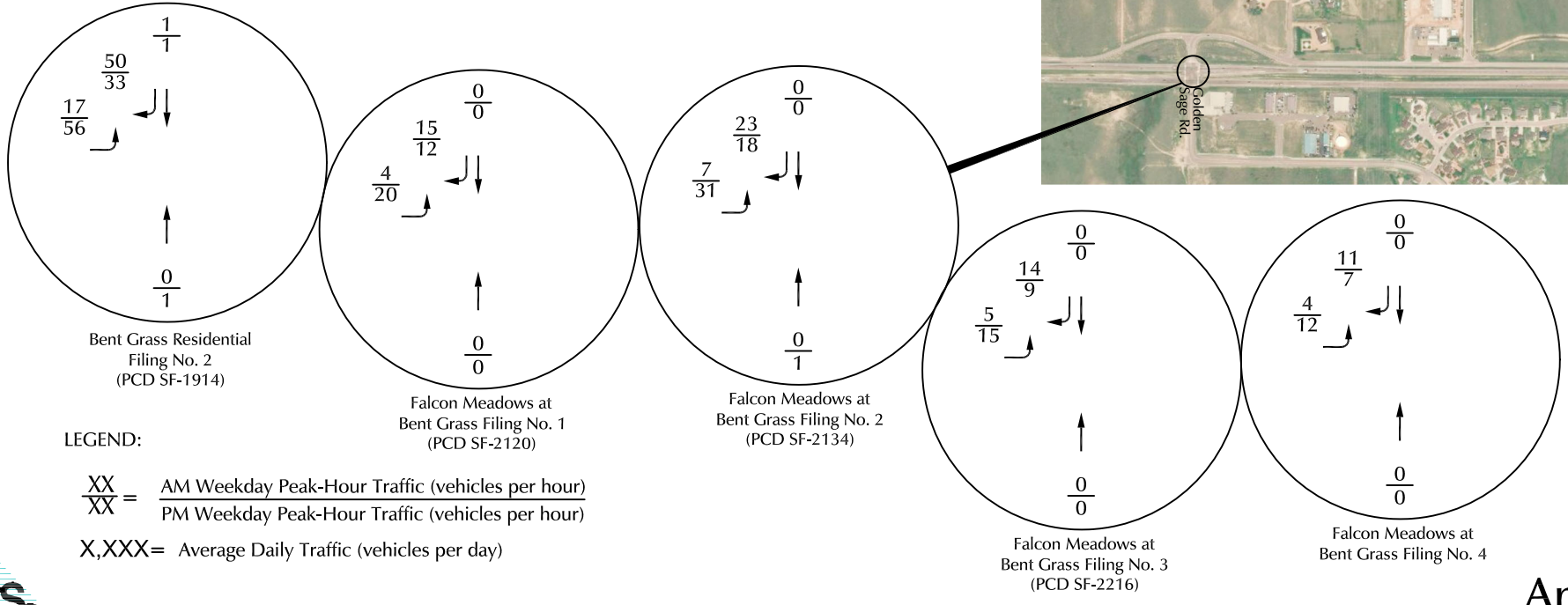


Figure 4  
Existing Traffic

Falcon Meadows at Bent Grass Filing 4 (LSC #S214333)



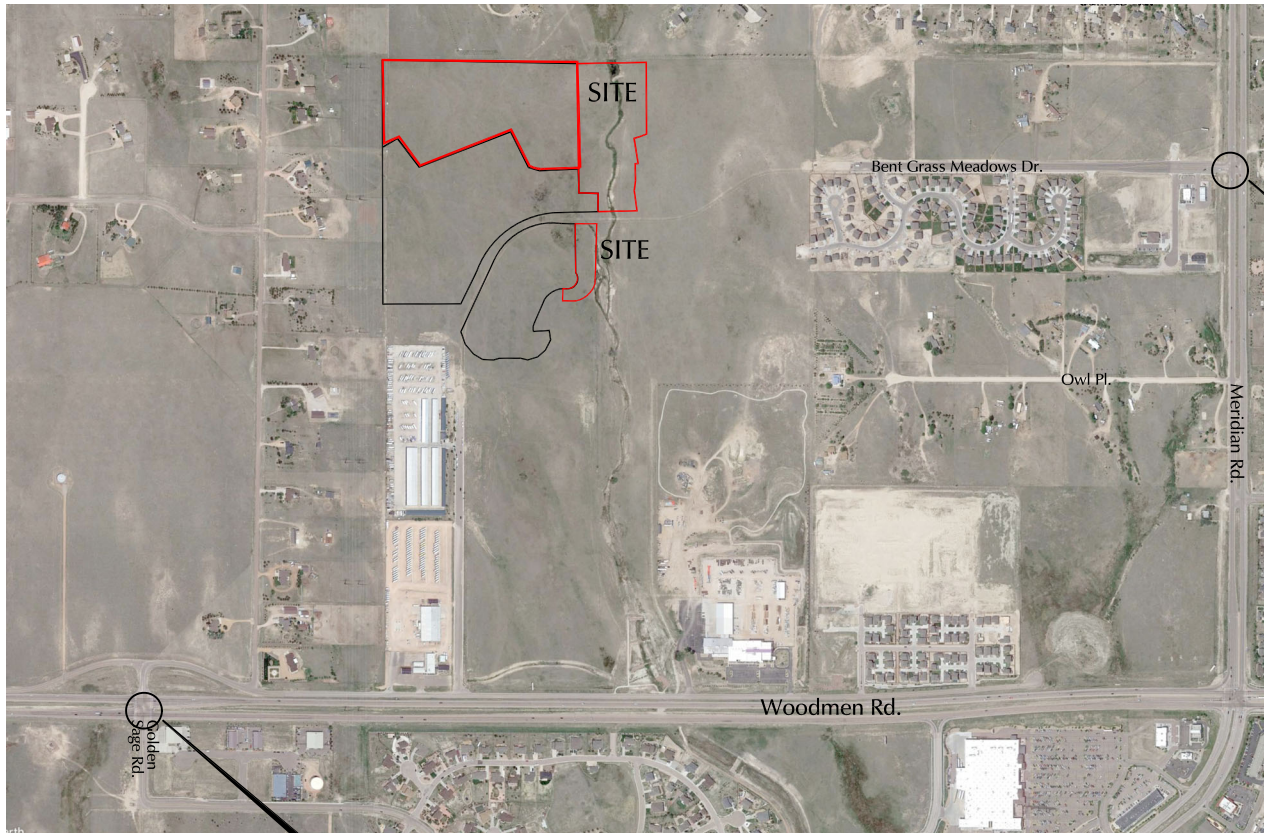
Approximate Scale  
Scale: 1" = 1,200'



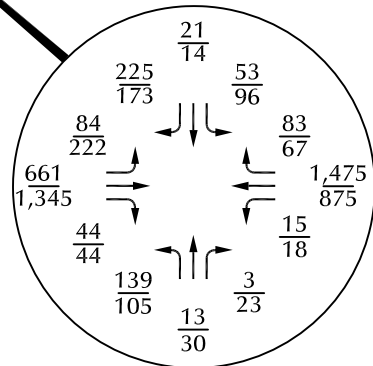
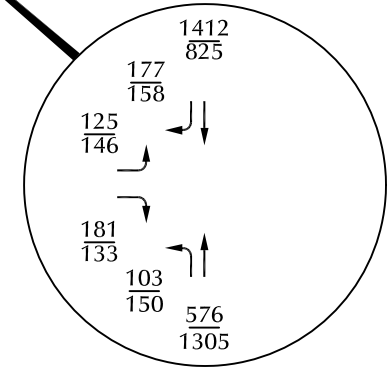
LEGEND:  
 $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
 $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)  
 X,XXX= Average Daily Traffic (vehicles per day)



Figure 5  
**Anticipated Additional Short-Term Traffic Volumes**  
 Falcon Meadows at Bent Grass Filing 4 (LSC #S214333)



Approximate Scale  
NTS



\*The short-term total traffic volumes are the sum of the January 2020 volumes from Figure 4 plus the anticipated additional short-term traffic volumes from Figure 5.



LEGEND:

$\frac{XX}{XX} =$  AM Weekday Peak-Hour Traffic (vehicles per hour)  
PM Weekday Peak-Hour Traffic (vehicles per hour)

Figure 6  
**Short-Term Total\* Traffic**  
Falcon Meadows at Bent Grass Filing 4 (LSC #S214333)

## APPENDIX F - Background 2024 & 2040 Synchro Outputs

Update per comments in text  
and comment letter.

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 AM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	271	218	118	60	402	130	178	293	17	194	720	734
Future Volume (vph)	271	218	118	60	402	130	178	293	17	194	720	734
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	25.0	40.9		13.1	29.0	29.0	20.4	44.8		21.2	45.6	
Total Split (%)	20.8%	34.1%		10.9%	24.2%	24.2%	17.0%	37.3%		17.7%	38.0%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	15.4	31.9	120.0	5.6	19.6	19.6	11.0	43.4	120.0	11.7	44.0	120.0
Actuated g/C Ratio	0.13	0.27	1.00	0.05	0.16	0.16	0.09	0.36	1.00	0.10	0.37	1.00
v/c Ratio	0.70	0.25	0.08	0.41	0.76	0.30	0.61	0.25	0.01	0.63	0.60	0.50
Control Delay	58.8	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.5	45.7	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.5	45.7	2.9
LOS	E	D	A	E	E	A	E	C	A	D	D	A
Approach Delay		39.3			45.4			39.6			27.7	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 34.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 70.5%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 AM  
01/23/2023



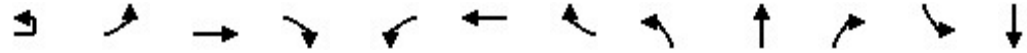
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	306	237	128	65	437	141	193	318	18	211	783	798
v/c Ratio	0.70	0.25	0.08	0.41	0.76	0.30	0.61	0.25	0.01	0.63	0.60	0.50
Control Delay	58.8	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.5	45.7	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.5	45.7	2.9
Queue Length 50th (ft)	118	76	0	25	170	0	74	93	0	89	243	24
Queue Length 95th (ft)	164	109	0	50	225	0	113	136	0	m104	m334	m105
Internal Link Dist (ft)		1165			1100			342				860
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	500	1001	1583	160	648	494	341	1279	1583	363	1299	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.24	0.08	0.41	0.67	0.29	0.57	0.25	0.01	0.58	0.60	0.50

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 AM  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↗↘	↕	↖	↗↘	↕	↖	↗↘	↕	↖	↗↘	↕
Traffic Volume (veh/h)	10	271	218	118	60	402	130	178	293	17	194	720
Future Volume (veh/h)	10	271	218	118	60	402	130	178	293	17	194	720
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		295	237	0	65	437	0	193	318	0	211	783
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		360	760		127	521		252	1496		271	1515
Arrive On Green		0.10	0.21	0.00	0.04	0.15	0.00	0.07	0.42	0.00	0.08	0.43
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		295	237	0	65	437	0	193	318	0	211	783
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		10.0	6.7	0.0	2.2	14.4	0.0	6.6	6.8	0.0	7.2	19.5
Cycle Q Clear(g_c), s		10.0	6.7	0.0	2.2	14.4	0.0	6.6	6.8	0.0	7.2	19.5
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		360	760		127	521		252	1496		271	1515
V/C Ratio(X)		0.82	0.31		0.51	0.84		0.77	0.21		0.78	0.52
Avail Cap(c_a), veh/h		504	1004		161	652		343	1496		366	1515
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		52.6	39.7	0.0	56.7	49.8	0.0	54.6	22.1	0.0	54.3	25.3
Incr Delay (d2), s/veh		7.3	0.2	0.0	3.1	7.9	0.0	6.9	0.3	0.0	7.4	1.3
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
%ile BackOfQ(50%),veh/ln		4.6	2.9	0.0	1.0	6.8	0.0	3.1	2.9	0.0	3.4	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		59.9	40.0	0.0	59.8	57.7	0.0	61.5	22.4	0.0	61.6	26.6
LnGrp LOS		E	D		E	E		E	C		E	C
Approach Vol, veh/h			532			502			511			994
Approach Delay, s/veh			51.0			58.0			37.2			34.0
Approach LOS			D			E			D			C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.9	57.5	11.9	32.7	17.2	58.2	20.0	24.6				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	12.7	37.8	5.6	33.9	11.9	38.6	17.5	22.0				
Max Q Clear Time (g_c+I1), s	9.2	8.8	4.2	8.7	8.6	21.5	12.0	16.4				
Green Ext Time (p_c), s	0.2	2.1	0.0	1.3	0.2	4.9	0.5	1.2				

Intersection Summary

HCM 6th Ctrl Delay	43.0
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	734
Future Volume (veh/h)	734
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	



Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

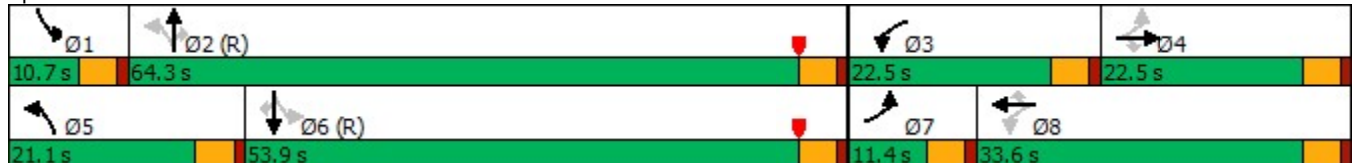
Background 2024 AM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	52	256	97	56	36	288	419	40	111	1337	185
Future Volume (vph)	218	52	256	97	56	36	288	419	40	111	1337	185
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	21.1	64.3	64.3	10.7	53.9	53.9
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	17.6%	53.6%	53.6%	8.9%	44.9%	44.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.9	9.9	9.9	23.5	14.3	14.3	85.2	72.6	72.6	64.9	56.8	56.8
Actuated g/C Ratio	0.15	0.08	0.08	0.20	0.12	0.12	0.71	0.60	0.60	0.54	0.47	0.47
v/c Ratio	0.53	0.37	0.72	0.38	0.27	0.13	0.75	0.21	0.04	0.22	0.87	0.24
Control Delay	44.5	57.3	17.0	41.9	48.4	0.8	46.0	15.8	2.1	11.6	51.1	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	57.3	17.0	41.9	48.4	0.8	46.0	15.8	2.1	11.6	51.1	13.9
LOS	D	E	B	D	D	A	D	B	A	B	D	B
Approach Delay		32.4			36.0			26.7			44.2	
Approach LOS		C			D			C			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 37.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 77.0%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2024 AM  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	237	57	278	105	61	39	313	455	43	121	1453	201
v/c Ratio	0.53	0.37	0.72	0.38	0.27	0.13	0.75	0.21	0.04	0.22	0.87	0.24
Control Delay	44.5	57.3	17.0	41.9	48.4	0.8	46.0	15.8	2.1	11.6	51.1	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	57.3	17.0	41.9	48.4	0.8	46.0	15.8	2.1	11.6	51.1	13.9
Queue Length 50th (ft)	80	43	0	69	44	0	211	98	2	51	628	43
Queue Length 95th (ft)	104	81	80	106	78	0	#358	135	m8	m67	#776	135
Internal Link Dist (ft)		508			1196			231				776
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	449	279	473	337	451	486	415	2139	1011	552	1675	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.20	0.59	0.31	0.14	0.08	0.75	0.21	0.04	0.22	0.87	0.24

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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2024 AM  
01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔	↑	↔	↔	↑↑	↔	↔	↑↑	↔
Traffic Volume (veh/h)	218	52	256	97	56	36	288	419	40	111	1337	185
Future Volume (veh/h)	218	52	256	97	56	36	288	419	40	111	1337	185
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	237	57	0	105	61	0	313	455	43	121	1453	201
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	401	89		214	118		347	2446	1091	711	2321	1035
Arrive On Green	0.06	0.05	0.00	0.07	0.06	0.00	0.08	0.69	0.69	0.04	0.65	0.65
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	237	57	0	105	61	0	313	455	43	121	1453	201
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	3.6	0.0	6.6	3.8	0.0	6.6	5.5	1.0	2.7	28.8	6.0
Cycle Q Clear(g_c), s	6.9	3.6	0.0	6.6	3.8	0.0	6.6	5.5	1.0	2.7	28.8	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	401	89		214	118		347	2446	1091	711	2321	1035
V/C Ratio(X)	0.59	0.64		0.49	0.52		0.90	0.19	0.04	0.17	0.63	0.19
Avail Cap(c_a), veh/h	401	281		351	454		458	2446	1091	730	2321	1035
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.8	56.1	0.0	49.3	54.4	0.0	19.5	6.7	6.0	6.0	12.2	8.3
Incr Delay (d2), s/veh	2.3	7.3	0.0	1.7	3.4	0.0	17.4	0.2	0.1	0.1	1.3	0.4
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	3.6	1.9	0.0	3.0	1.9	0.0	7.4	1.7	0.4	0.8	9.7	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.1	63.5	0.0	51.1	57.9	0.0	36.9	6.9	6.1	6.1	13.5	8.7
LnGrp LOS	D	E		D	E		D	A	A	A	B	A
Approach Vol, veh/h		294			166			811			1775	
Approach Delay, s/veh		55.9			53.6			18.4			12.4	
Approach LOS		E			D			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.4	87.1	13.3	10.2	13.6	82.9	11.4	12.1				
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	6.2	59.8	18.0	18.0	16.6	49.4	6.9	29.1				
Max Q Clear Time (g_c+I1), s	4.7	7.5	8.6	5.6	8.6	30.8	8.9	5.8				
Green Ext Time (p_c), s	0.0	2.9	0.1	0.1	0.6	10.0	0.0	0.2				

Intersection Summary

HCM 6th Ctrl Delay	20.5
HCM 6th LOS	C

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↖	↖	↑↑	↑↑	↖
Traffic Volume (vph)	88	186	103	520	1409	118
Future Volume (vph)	88	186	103	520	1409	118
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	26.0	26.0	19.0	94.0	75.0	75.0
Total Split (%)	21.7%	21.7%	15.8%	78.3%	62.5%	62.5%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.5	10.5	93.5	94.5	78.0	78.0
Actuated g/C Ratio	0.09	0.09	0.78	0.79	0.65	0.65
v/c Ratio	0.32	0.69	0.45	0.20	0.67	0.12
Control Delay	53.2	24.3	19.5	1.6	15.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	24.3	19.5	1.6	15.7	2.1
LOS	D	C	B	A	B	A
Approach Delay	33.6			4.5	14.6	
Approach LOS	C			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 14.2  
 Intersection Capacity Utilization 70.9%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	96	202	112	565	1532	128
v/c Ratio	0.32	0.69	0.45	0.20	0.67	0.12
Control Delay	53.2	24.3	19.5	1.6	15.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	24.3	19.5	1.6	15.7	2.1
Queue Length 50th (ft)	37	24	24	16	328	0
Queue Length 95th (ft)	60	97	63	46	544	26
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	529	387	286	2786	2301	1074
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	0.18	0.52	0.39	0.20	0.67	0.12

## Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Background 2024 AM  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	88	186	103	520	1409	118
Future Volume (veh/h)	88	186	103	520	1409	118
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	96	0	112	565	1532	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	221		274	2882	2486	1109
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	96	0	112	565	1532	128
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.2	0.0	2.0	4.3	27.3	3.2
Cycle Q Clear(g_c), s	3.2	0.0	2.0	4.3	27.3	3.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	221		274	2882	2486	1109
V/C Ratio(X)	0.43		0.41	0.20	0.62	0.12
Avail Cap(c_a), veh/h	533		357	2882	2486	1109
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.1	0.0	9.5	2.5	9.5	5.9
Incr Delay (d2), s/veh	1.3	0.0	1.0	0.2	1.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.0	1.2	10.0	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.4	0.0	10.5	2.7	10.7	6.1
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	96			677	1660	
Approach Delay, s/veh	55.4			4.0	10.3	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.8		15.2	13.4	91.4
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		86.5		18.5	10.5	67.5
Max Q Clear Time (g_c+I1), s		6.3		5.2	4.0	29.3
Green Ext Time (p_c), s		4.5		0.2	0.1	17.8

Intersection Summary

HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

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

Intersection						
Int Delay, s/veh	4.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	156	63	154	67	1	117
Future Vol, veh/h	156	63	154	67	1	117
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	170	68	167	73	1	127

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	238	0	541
Stage 1	-	-	-	-	170
Stage 2	-	-	-	-	371
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1326	-	471
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	668
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1326	-	412
Mov Cap-2 Maneuver	-	-	-	-	412
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	584

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	946	-	-	1326	-
HCM Lane V/C Ratio	0.136	-	-	0.126	-
HCM Control Delay (s)	9.4	-	-	8.1	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.4	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 PM  
01/23/2023

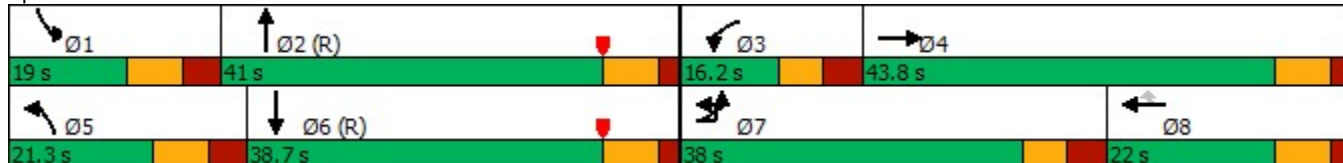
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	720	458	162	113	378	235	260	757	107	241	559	461
Future Volume (vph)	720	458	162	113	378	235	260	757	107	241	559	461
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	38.0	43.8		16.2	22.0	22.0	21.3	41.0		19.0	38.7	
Total Split (%)	31.7%	36.5%		13.5%	18.3%	18.3%	17.8%	34.2%		15.8%	32.3%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	29.9	36.8	120.0	8.3	15.2	15.2	12.5	34.2	120.0	10.7	32.3	120.0
Actuated g/C Ratio	0.25	0.31	1.00	0.07	0.13	0.13	0.10	0.28	1.00	0.09	0.27	1.00
v/c Ratio	0.93	0.46	0.11	0.52	0.92	0.61	0.79	0.82	0.07	0.86	0.64	0.32
Control Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.8	0.1	57.2	48.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.8	0.1	57.2	48.3	0.4
LOS	E	D	A	E	E	B	E	D	A	E	D	A
Approach Delay		45.9			54.6			48.2			32.5	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 44.1  
 Intersection Capacity Utilization 85.9%  
 Analysis Period (min) 15

Intersection LOS: D  
 ICU Level of Service E

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD





Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 PM  
01/23/2023



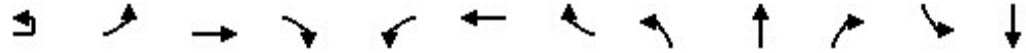
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	799	498	176	123	411	255	283	823	116	262	608	501
v/c Ratio	0.93	0.46	0.11	0.52	0.92	0.61	0.79	0.82	0.07	0.86	0.64	0.32
Control Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.8	0.1	57.2	48.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.8	0.1	57.2	48.3	0.4
Queue Length 50th (ft)	311	163	0	47	168	3	111	313	0	106	254	0
Queue Length 95th (ft)	#425	215	0	80	#266	84	#173	392	0	#182	318	0
Internal Link Dist (ft)		1165			1100			342			860	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	872	1086	1583	248	448	418	366	1007	1583	306	953	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.46	0.11	0.50	0.92	0.61	0.77	0.82	0.07	0.86	0.64	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  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2024 PM  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕
Traffic Volume (veh/h)	15	720	458	162	113	378	235	260	757	107	241	559
Future Volume (veh/h)	15	720	458	162	113	378	235	260	757	107	241	559
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		783	498	0	123	411	0	283	823	0	262	608
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		843	1128		178	444		339	1044		302	1006
Arrive On Green		0.24	0.32	0.00	0.05	0.13	0.00	0.10	0.29	0.00	0.09	0.28
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		783	498	0	123	411	0	283	823	0	262	608
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		26.6	13.3	0.0	4.2	13.7	0.0	9.7	25.5	0.0	9.0	17.8
Cycle Q Clear(g_c), s		26.6	13.3	0.0	4.2	13.7	0.0	9.7	25.5	0.0	9.0	17.8
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		843	1128		178	444		339	1044		302	1006
V/C Ratio(X)		0.93	0.44		0.69	0.93		0.83	0.79		0.87	0.60
Avail Cap(c_a), veh/h		878	1128		251	444		369	1044		302	1006
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		44.4	32.5	0.0	56.0	51.9	0.0	53.2	39.0	0.0	54.1	37.2
Incr Delay (d2), s/veh		15.6	0.3	0.0	4.8	25.3	0.0	14.3	6.1	0.0	22.3	2.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		12.8	5.6	0.0	1.9	7.5	0.0	4.8	11.8	0.0	4.8	8.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		60.0	32.8	0.0	60.8	77.2	0.0	67.5	45.0	0.0	76.3	39.9
LnGrp LOS		E	C		E	E		E	D		E	D
Approach Vol, veh/h			1281			534			1106			870
Approach Delay, s/veh			49.4			73.4			50.8			50.9
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	42.2	13.7	45.1	20.3	41.0	36.8	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	10.5	34.0	8.7	36.8	12.8	31.7	30.5	15.0				
Max Q Clear Time (g_c+I1), s	11.0	27.5	6.2	15.3	11.7	19.8	28.6	15.7				
Green Ext Time (p_c), s	0.0	2.9	0.1	2.9	0.1	3.1	0.7	0.0				

Intersection Summary

HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	461
Future Volume (veh/h)	461
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2024 PM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	359	125	285	31	79	134	343	1311	116	83	883	180
Future Volume (vph)	359	125	285	31	79	134	343	1311	116	83	883	180
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	18.0	23.0	23.0	12.5	17.5	17.5	35.0	68.5	68.5	16.0	49.5	49.5
Total Split (%)	15.0%	19.2%	19.2%	10.4%	14.6%	14.6%	29.2%	57.1%	57.1%	13.3%	41.3%	41.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	25.8	20.5	20.5	14.0	10.0	10.0	77.8	62.4	62.4	54.3	48.2	48.2
Actuated g/C Ratio	0.22	0.17	0.17	0.12	0.08	0.08	0.65	0.52	0.52	0.45	0.40	0.40
v/c Ratio	0.77	0.43	0.59	0.20	0.55	0.40	0.84	0.78	0.14	0.51	0.68	0.25
Control Delay	52.6	51.0	10.2	40.0	66.5	3.2	40.0	9.8	0.4	43.8	25.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	51.0	10.2	40.0	66.5	3.2	40.0	9.8	0.4	43.8	25.5	6.1
LOS	D	D	B	D	E	A	D	A	A	D	C	A
Approach Delay		36.6			28.4			15.1			23.8	
Approach LOS		D			C			B			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 22.7  
 Intersection Capacity Utilization 83.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2024 PM  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	390	136	310	34	86	146	373	1425	126	90	960	196
v/c Ratio	0.77	0.43	0.59	0.20	0.55	0.40	0.84	0.78	0.14	0.51	0.68	0.25
Control Delay	52.6	51.0	10.2	40.0	66.5	3.2	40.0	9.8	0.4	43.8	25.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	51.0	10.2	40.0	66.5	3.2	40.0	9.8	0.4	43.8	25.5	6.1
Queue Length 50th (ft)	135	99	0	21	65	0	130	326	2	27	328	33
Queue Length 95th (ft)	#186	166	86	49	119	0	m195	m392	m2	78	432	87
Internal Link Dist (ft)		508			1196			231			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	505	319	528	167	170	376	509	1838	907	182	1420	782
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.43	0.59	0.20	0.51	0.39	0.73	0.78	0.14	0.49	0.68	0.25

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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2024 PM  
01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔	↑	↔	↔	↑↑	↔	↔	↑↑	↔
Traffic Volume (veh/h)	359	125	285	31	79	134	343	1311	116	83	883	180
Future Volume (veh/h)	359	125	285	31	79	134	343	1311	116	83	883	180
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	390	136	0	34	86	0	373	1425	126	90	960	196
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	478	210		188	125		421	1974	880	218	1704	760
Arrive On Green	0.09	0.11	0.00	0.04	0.07	0.00	0.12	0.56	0.56	0.04	0.48	0.48
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	390	136	0	34	86	0	373	1425	126	90	960	196
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	10.5	8.4	0.0	2.1	5.4	0.0	12.1	35.7	4.6	3.1	23.1	8.8
Cycle Q Clear(g_c), s	10.5	8.4	0.0	2.1	5.4	0.0	12.1	35.7	4.6	3.1	23.1	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	478	210		188	125		421	1974	880	218	1704	760
V/C Ratio(X)	0.82	0.65		0.18	0.69		0.89	0.72	0.14	0.41	0.56	0.26
Avail Cap(c_a), veh/h	478	257		188	171		608	1974	880	257	1704	760
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	51.0	0.0	48.7	54.8	0.0	19.2	19.8	12.9	18.6	22.3	18.5
Incr Delay (d2), s/veh	10.6	4.0	0.0	0.5	6.7	0.0	10.8	2.3	0.3	1.3	1.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	4.1	0.0	1.0	2.8	0.0	5.9	13.5	1.7	1.2	9.1	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.2	55.0	0.0	49.1	61.5	0.0	30.0	22.1	13.2	19.9	23.6	19.4
LnGrp LOS	E	D		D	E		C	C	B	B	C	B
Approach Vol, veh/h		526			120			1924			1246	
Approach Delay, s/veh		58.8			58.0			23.1			22.7	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.3	74.2	12.5	20.0	22.4	65.1	18.0	14.5				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	7.5	61.0	5.0	16.5	27.5	42.0	10.5	11.0				
Max Q Clear Time (g_c+I1), s	5.1	37.7	4.1	10.4	14.1	25.1	12.5	7.4				
Green Ext Time (p_c), s	0.0	10.7	0.0	0.3	0.9	6.1	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	29.0
HCM 6th LOS	C

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

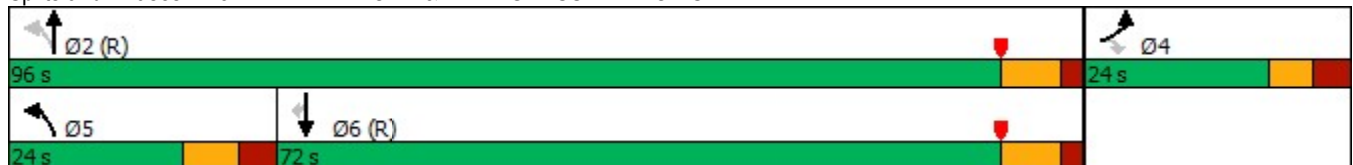


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	100	133	139	1607	960	132
Future Volume (vph)	100	133	139	1607	960	132
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	24.0	24.0	24.0	96.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	80.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	9.6	9.6	94.4	95.4	79.0	79.0
Actuated g/C Ratio	0.08	0.08	0.79	0.80	0.66	0.66
v/c Ratio	0.40	0.56	0.37	0.62	0.45	0.13
Control Delay	56.4	16.9	2.2	3.2	11.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	16.9	2.2	3.2	11.0	1.7
LOS	E	B	A	A	B	A
Approach Delay	33.9			3.1	9.9	
Approach LOS	C			A	A	

Intersection Summary

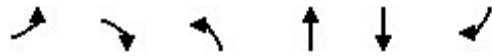
Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 7.9  
 Intersection Capacity Utilization 63.6%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	109	145	151	1747	1043	143
v/c Ratio	0.40	0.56	0.37	0.62	0.45	0.13
Control Delay	56.4	16.9	2.2	3.2	11.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	16.9	2.2	3.2	11.0	1.7
Queue Length 50th (ft)	42	0	2	8	186	0
Queue Length 95th (ft)	70	62	m5	144	264	24
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	472	342	491	2813	2329	1091
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	0.23	0.42	0.31	0.62	0.45	0.13

## Intersection Summary

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



HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Background 2024 PM  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	100	133	139	1607	960	132
Future Volume (veh/h)	100	133	139	1607	960	132
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	109	0	151	1747	1043	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	224		404	2879	2480	1106
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	109	0	151	1747	1043	143
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.7	0.0	2.7	22.0	15.1	3.6
Cycle Q Clear(g_c), s	3.7	0.0	2.7	22.0	15.1	3.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	224		404	2879	2480	1106
V/C Ratio(X)	0.49		0.37	0.61	0.42	0.13
Avail Cap(c_a), veh/h	475		560	2879	2480	1106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	5.7	4.3	7.8	6.0
Incr Delay (d2), s/veh	1.6	0.0	0.6	1.0	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.9	6.3	5.5	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.8	0.0	6.3	5.2	8.3	6.3
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	109			1898	1186	
Approach Delay, s/veh	55.8			5.3	8.0	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.7		15.3	13.5	91.2
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		88.5		16.5	15.5	64.5
Max Q Clear Time (g_c+I1), s		24.0		5.7	4.7	17.1
Green Ext Time (p_c), s		25.9		0.2	0.3	10.7
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			8.0			
HCM 6th LOS			A			

Notes

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

Intersection						
Int Delay, s/veh	3.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	112	40	117	153	2	120
Future Vol, veh/h	112	40	117	153	2	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	122	43	127	166	2	130

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	165	0	459 61
Stage 1	-	-	-	-	122 -
Stage 2	-	-	-	-	337 -
Critical Hdwy	-	-	4.14	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	2.22	-	3.52 3.32
Pot Cap-1 Maneuver	-	-	1411	-	531 991
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	695 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1411	-	483 991
Mov Cap-2 Maneuver	-	-	-	-	483 -
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	632 -

Approach	EB	WB	NB
HCM Control Delay, s	0	3.4	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	974	-	-	1411	-
HCM Lane V/C Ratio	0.136	-	-	0.09	-
HCM Control Delay (s)	9.3	-	-	7.8	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

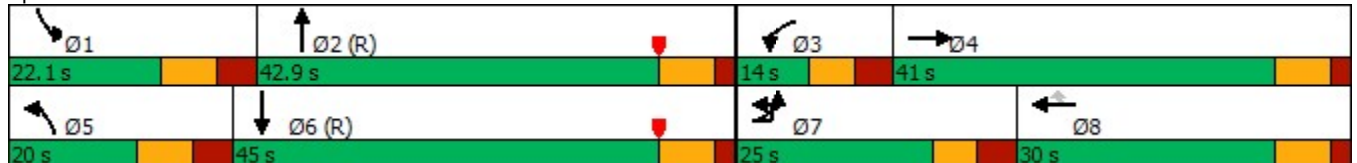
Background 2040 AM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	309	261	139	70	472	143	196	326	20	209	822	845
Future Volume (vph)	309	261	139	70	472	143	196	326	20	209	822	845
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	25.0	41.0		14.0	30.0	30.0	20.0	42.9		22.1	45.0	
Total Split (%)	20.8%	34.2%		11.7%	25.0%	25.0%	16.7%	35.8%		18.4%	37.5%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	16.1	33.9	120.0	6.4	21.5	21.5	11.0	40.0	120.0	12.3	41.4	120.0
Actuated g/C Ratio	0.13	0.28	1.00	0.05	0.18	0.18	0.09	0.33	1.00	0.10	0.34	1.00
v/c Ratio	0.75	0.28	0.10	0.42	0.81	0.32	0.68	0.30	0.01	0.64	0.73	0.58
Control Delay	60.8	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.8	52.1	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.8	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.8	52.1	4.8
LOS	E	C	A	E	E	A	E	C	A	D	D	A
Approach Delay		39.6			46.6			42.2			30.6	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 36.8  
 Intersection LOS: D  
 Intersection Capacity Utilization 75.5%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2040 AM  
01/23/2023



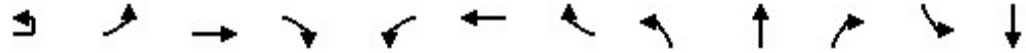
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	347	284	151	76	513	155	213	354	22	227	893	918
v/c Ratio	0.75	0.28	0.10	0.42	0.81	0.32	0.68	0.30	0.01	0.64	0.73	0.58
Control Delay	60.8	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.8	52.1	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.8	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.8	52.1	4.8
Queue Length 50th (ft)	133	90	0	29	199	0	83	111	0	95	311	82
Queue Length 95th (ft)	185	128	0	56	262	0	125	155	0	m94	m306	m53
Internal Link Dist (ft)		1165			1100			342			860	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	500	1023	1583	185	679	505	328	1180	1583	389	1219	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.28	0.10	0.41	0.76	0.31	0.65	0.30	0.01	0.58	0.73	0.58

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2040 AM  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕
Traffic Volume (veh/h)	10	309	261	139	70	472	143	196	326	20	209	822
Future Volume (veh/h)	10	309	261	139	70	472	143	196	326	20	209	822
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		336	284	0	76	513	0	213	354	0	227	893
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		400	868		133	593		271	1365		288	1383
Arrive On Green		0.12	0.24	0.00	0.04	0.17	0.00	0.08	0.38	0.00	0.08	0.39
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		336	284	0	76	513	0	213	354	0	227	893
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		11.4	7.9	0.0	2.6	16.9	0.0	7.3	8.2	0.0	7.7	24.6
Cycle Q Clear(g_c), s		11.4	7.9	0.0	2.6	16.9	0.0	7.3	8.2	0.0	7.7	24.6
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		400	868		133	593		271	1365		288	1383
V/C Ratio(X)		0.84	0.33		0.57	0.86		0.79	0.26		0.79	0.65
Avail Cap(c_a), veh/h		504	1007		187	681		331	1365		392	1383
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		52.0	37.2	0.0	56.7	48.7	0.0	54.3	25.3	0.0	54.0	29.9
Incr Delay (d2), s/veh		10.0	0.2	0.0	3.9	10.2	0.0	9.8	0.5	0.0	7.4	2.3
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
%ile BackOfQ(50%),veh/ln		5.4	3.4	0.0	1.2	8.1	0.0	3.5	3.5	0.0	3.6	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		61.9	37.5	0.0	60.6	58.9	0.0	64.1	25.7	0.0	61.4	32.3
LnGrp LOS		E	D		E	E		E	C		E	C
Approach Vol, veh/h			620			589			567			1120
Approach Delay, s/veh			50.7			59.1			40.1			38.2
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.5	53.1	12.1	36.3	17.9	53.7	21.4	27.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	13.6	35.9	6.5	34.0	11.5	38.0	17.5	23.0				
Max Q Clear Time (g_c+I1), s	9.7	10.2	4.6	9.9	9.3	26.6	13.4	18.9				
Green Ext Time (p_c), s	0.3	2.3	0.0	1.6	0.1	4.6	0.4	1.2				

Intersection Summary

HCM 6th Ctrl Delay	45.5
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	845
Future Volume (veh/h)	845
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

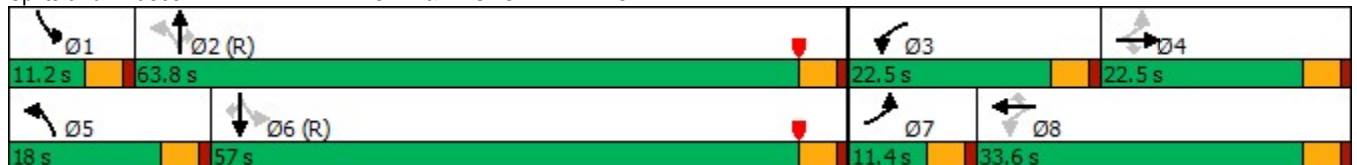
Background 2040 AM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	61	253	114	71	43	283	503	47	130	1541	179
Future Volume (vph)	215	61	253	114	71	43	283	503	47	130	1541	179
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	18.0	63.8	63.8	11.2	57.0	57.0
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	15.0%	53.2%	53.2%	9.3%	47.5%	47.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.2	11.1	11.1	25.8	16.4	16.4	83.0	70.5	70.5	61.0	53.0	53.0
Actuated g/C Ratio	0.16	0.09	0.09	0.22	0.14	0.14	0.69	0.59	0.59	0.51	0.44	0.44
v/c Ratio	0.49	0.38	0.75	0.41	0.30	0.14	0.70	0.26	0.05	0.29	1.07	0.24
Control Delay	41.5	55.8	22.7	40.9	46.9	0.9	43.4	17.2	2.8	12.0	86.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	55.8	22.7	40.9	46.9	0.9	43.4	17.2	2.8	12.0	86.6	11.2
LOS	D	E	C	D	D	A	D	B	A	B	F	B
Approach Delay		34.2			35.2			25.3			74.0	
Approach LOS		C			D			C			E	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 53.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 82.5%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2040 AM  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	234	66	275	124	77	47	308	547	51	141	1675	195
v/c Ratio	0.49	0.38	0.75	0.41	0.30	0.14	0.70	0.26	0.05	0.29	1.07	0.24
Control Delay	41.5	55.8	22.7	40.9	46.9	0.9	43.4	17.2	2.8	12.0	86.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	55.8	22.7	40.9	46.9	0.9	43.4	17.2	2.8	12.0	86.6	11.2
Queue Length 50th (ft)	78	50	24	81	55	0	210	122	3	46	~788	48
Queue Length 95th (ft)	98	88	108	118	90	0	#415	161	m11	m68	#934	m78
Internal Link Dist (ft)		508			1196			231			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	477	283	446	351	451	486	439	2079	986	487	1562	807
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.23	0.62	0.35	0.17	0.10	0.70	0.26	0.05	0.29	1.07	0.24

Intersection Summary

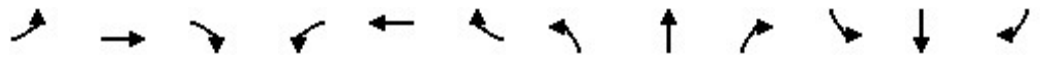
- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.



HCM 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2040 AM

01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	215	61	253	114	71	43	283	503	47	130	1541	179
Future Volume (veh/h)	215	61	253	114	71	43	283	503	47	130	1541	179
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	234	66	0	124	77	0	308	547	51	141	1675	195
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	416	99		231	145		333	2374	1059	638	2143	956
Arrive On Green	0.06	0.05	0.00	0.08	0.08	0.00	0.11	0.67	0.67	0.05	0.60	0.60
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	234	66	0	124	77	0	308	547	51	141	1675	195
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	4.2	0.0	7.7	4.8	0.0	11.4	7.2	1.3	3.6	42.5	6.7
Cycle Q Clear(g_c), s	6.9	4.2	0.0	7.7	4.8	0.0	11.4	7.2	1.3	3.6	42.5	6.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	416	99		231	145		333	2374	1059	638	2143	956
V/C Ratio(X)	0.56	0.67		0.54	0.53		0.93	0.23	0.05	0.22	0.78	0.20
Avail Cap(c_a), veh/h	416	281		351	454		334	2374	1059	654	2143	956
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.2	55.8	0.0	47.9	53.2	0.0	32.4	7.8	6.8	8.0	17.9	10.8
Incr Delay (d2), s/veh	1.7	7.6	0.0	1.9	3.0	0.0	30.8	0.2	0.1	0.2	2.9	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.2	0.0	3.6	2.4	0.0	11.4	2.4	0.5	1.2	15.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	63.4	0.0	49.8	56.2	0.0	63.2	8.0	6.9	8.2	20.8	11.3
LnGrp LOS	D	E		D	E		E	A	A	A	C	B
Approach Vol, veh/h		300			201			906			2011	
Approach Delay, s/veh		55.2			52.2			26.7			19.0	
Approach LOS		E			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.1	84.7	14.4	10.8	17.9	76.9	11.4	13.8				
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	6.7	59.3	18.0	18.0	13.5	52.5	6.9	29.1				
Max Q Clear Time (g_c+I1), s	5.6	9.2	9.7	6.2	13.4	44.5	8.9	6.8				
Green Ext Time (p_c), s	0.0	3.6	0.2	0.2	0.0	6.1	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	26.2
HCM 6th LOS	C

Notes

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

Timings  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	99	202	117	594	1610	137
Future Volume (vph)	99	202	117	594	1610	137
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	25.5	25.5	18.0	94.5	76.5	76.5
Total Split (%)	21.3%	21.3%	15.0%	78.8%	63.8%	63.8%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	12.1	12.1	91.9	92.9	75.7	75.7
Actuated g/C Ratio	0.10	0.10	0.77	0.77	0.63	0.63
v/c Ratio	0.31	0.76	0.62	0.24	0.78	0.14
Control Delay	51.2	34.8	45.0	1.5	20.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	34.8	45.0	1.5	20.6	2.1
LOS	D	C	D	A	C	A
Approach Delay	40.2			8.7	19.1	
Approach LOS	D			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 77.2%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	108	220	127	646	1750	149
v/c Ratio	0.31	0.76	0.62	0.24	0.78	0.14
Control Delay	51.2	34.8	45.0	1.5	20.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	34.8	45.0	1.5	20.6	2.1
Queue Length 50th (ft)	40	55	43	16	482	0
Queue Length 95th (ft)	65	136	118	45	686	28
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	514	362	221	2740	2233	1053
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	0.61	0.57	0.24	0.78	0.14

## Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Background 2040 AM  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	99	202	117	594	1610	137
Future Volume (veh/h)	99	202	117	594	1610	137
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	0	127	646	1750	149
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	224		230	2879	2481	1107
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	108	0	127	646	1750	149
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.6	0.0	2.2	5.1	35.1	3.8
Cycle Q Clear(g_c), s	3.6	0.0	2.2	5.1	35.1	3.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	224		230	2879	2481	1107
V/C Ratio(X)	0.48		0.55	0.22	0.71	0.13
Avail Cap(c_a), veh/h	518		297	2879	2481	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	16.2	2.6	10.8	6.0
Incr Delay (d2), s/veh	1.6	0.0	2.1	0.2	1.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	2.2	1.4	13.0	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.8	0.0	18.3	2.8	12.5	6.3
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	108			773	1899	
Approach Delay, s/veh	55.8			5.4	12.0	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.7		15.3	13.4	91.3
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		87.0		18.0	9.5	69.0
Max Q Clear Time (g_c+I1), s		7.1		5.6	4.2	37.1
Green Ext Time (p_c), s		5.3		0.2	0.1	19.5

Intersection Summary

HCM 6th Ctrl Delay	11.8
HCM 6th LOS	B

Notes

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

Intersection						
Int Delay, s/veh	4.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	164	73	180	73	1	137
Future Vol, veh/h	164	73	180	73	1	137
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	178	79	196	79	1	149

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	0	0	257	610
Stage 1	-	-	-	178
Stage 2	-	-	-	432
Critical Hdwy	-	-	4.14	6.84
Critical Hdwy Stg 1	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	3.52
Pot Cap-1 Maneuver	-	-	1305	426
Stage 1	-	-	-	835
Stage 2	-	-	-	622
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	1305	362
Mov Cap-2 Maneuver	-	-	-	362
Stage 1	-	-	-	835
Stage 2	-	-	-	529

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	940	-	-	1305	-
HCM Lane V/C Ratio	0.16	-	-	0.15	-
HCM Control Delay (s)	9.6	-	-	8.2	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.5	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

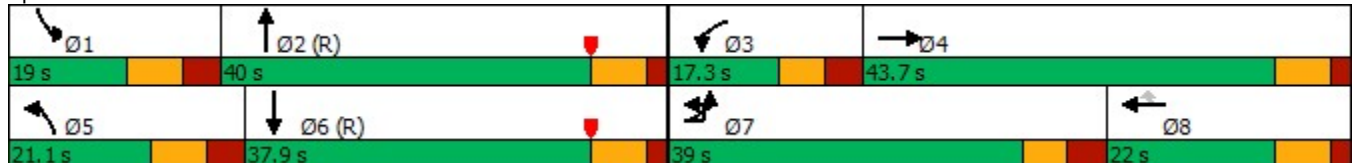
Background 2040 PM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	830	547	189	133	441	262	256	891	126	266	614	517
Future Volume (vph)	830	547	189	133	441	262	256	891	126	266	614	517
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	39.0	43.7		17.3	22.0	22.0	21.1	40.0		19.0	37.9	
Total Split (%)	32.5%	36.4%		14.4%	18.3%	18.3%	17.6%	33.3%		15.8%	31.6%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	31.5	37.3	120.0	9.2	15.0	15.0	12.3	33.0	120.0	10.5	31.2	120.0
Actuated g/C Ratio	0.26	0.31	1.00	0.08	0.12	0.12	0.10	0.28	1.00	0.09	0.26	1.00
v/c Ratio	1.02	0.54	0.13	0.55	1.08	0.69	0.79	0.99	0.09	0.96	0.73	0.36
Control Delay	78.7	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.3	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.7	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.3	0.5
LOS	E	D	A	E	F	B	E	E	A	E	D	A
Approach Delay		54.8			76.9			63.8			36.1	
Approach LOS		D			E			E			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 55.5  
 Intersection Capacity Utilization 93.4%  
 Analysis Period (min) 15  
 Intersection LOS: E  
 ICU Level of Service F

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2040 PM  
01/23/2023



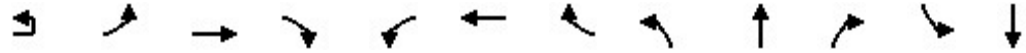
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	918	595	205	145	479	285	278	968	137	289	667	562
v/c Ratio	1.02	0.54	0.13	0.55	1.08	0.69	0.79	0.99	0.09	0.96	0.73	0.36
Control Delay	78.7	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.3	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.7	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.3	0.5
Queue Length 50th (ft)	~388	202	0	56	~218	25	109	394	0	118	282	0
Queue Length 95th (ft)	#516	261	0	91	#328	117	#170	#540	0	m#196	348	0
Internal Link Dist (ft)		1165			1100			342			860	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	901	1099	1583	280	442	416	360	973	1583	300	919	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.54	0.13	0.52	1.08	0.69	0.77	0.99	0.09	0.96	0.73	0.36

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Background 2040 PM  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↔	↔↔	↕↕	↔↔	↔	↔↔	↔	↔↔	↕↕
Traffic Volume (veh/h)	15	830	547	189	133	441	262	256	891	126	266	614
Future Volume (veh/h)	15	830	547	189	133	441	262	256	891	126	266	614
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		902	595	0	145	479	0	278	968	0	289	667
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		907	1170		201	444		334	977		302	945
Arrive On Green		0.26	0.33	0.00	0.06	0.13	0.00	0.10	0.28	0.00	0.09	0.27
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		902	595	0	145	479	0	278	968	0	289	667
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		31.3	16.2	0.0	4.9	15.0	0.0	9.5	32.6	0.0	10.0	20.4
Cycle Q Clear(g_c), s		31.3	16.2	0.0	4.9	15.0	0.0	9.5	32.6	0.0	10.0	20.4
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		907	1170		201	444		334	977		302	945
V/C Ratio(X)		0.99	0.51		0.72	1.08		0.83	0.99		0.96	0.71
Avail Cap(c_a), veh/h		907	1170		282	444		363	977		302	945
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		44.2	32.4	0.0	55.5	52.5	0.0	53.2	43.3	0.0	54.5	39.8
Incr Delay (d2), s/veh		28.4	0.4	0.0	5.2	65.3	0.0	14.3	26.6	0.0	39.9	4.4
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
%ile BackOfQ(50%),veh/ln		16.4	6.8	0.0	2.3	10.5	0.0	4.7	17.6	0.0	6.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		72.6	32.8	0.0	60.8	117.8	0.0	67.5	69.9	0.0	94.4	44.2
LnGrp LOS		E	C		E	F		E	E		F	D
Approach Vol, veh/h			1497			624			1246			956
Approach Delay, s/veh			56.8			104.6			69.4			59.4
Approach LOS			E			F			E			E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	40.0	14.5	46.5	20.1	38.9	39.0	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	10.5	33.0	9.8	36.7	12.6	30.9	31.5	15.0				
Max Q Clear Time (g_c+I1), s	12.0	34.6	6.9	18.2	11.5	22.4	33.3	17.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	3.4	0.1	2.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	67.9
HCM 6th LOS	E

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	517
Future Volume (veh/h)	517
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

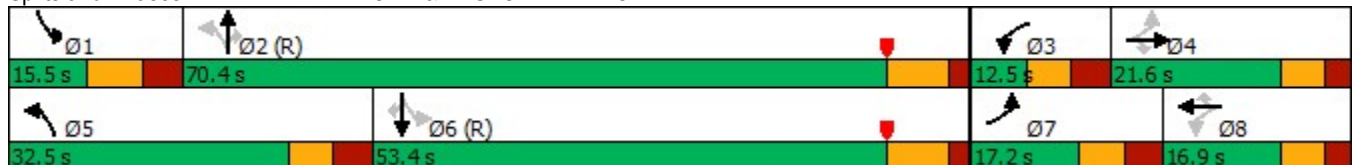
Background 2040 PM  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	146	276	37	100	158	359	1547	136	97	997	170
Future Volume (vph)	330	146	276	37	100	158	359	1547	136	97	997	170
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	17.2	21.6	21.6	12.5	16.9	16.9	32.5	70.4	70.4	15.5	53.4	53.4
Total Split (%)	14.3%	18.0%	18.0%	10.4%	14.1%	14.1%	27.1%	58.7%	58.7%	12.9%	44.5%	44.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	23.9	17.1	17.1	13.9	9.9	9.9	78.9	63.5	63.5	54.0	48.1	48.1
Actuated g/C Ratio	0.20	0.14	0.14	0.12	0.08	0.08	0.66	0.53	0.53	0.45	0.40	0.40
v/c Ratio	0.77	0.60	0.62	0.24	0.71	0.47	0.91	0.90	0.16	0.64	0.76	0.24
Control Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.1	18.0	0.9	58.3	26.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.1	18.0	0.9	58.3	26.7	4.6
LOS	D	E	B	D	E	A	E	B	A	E	C	A
Approach Delay		39.6			34.3			23.9			26.2	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 28.0  
 Intersection Capacity Utilization 88.4%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2040 PM  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	359	159	300	40	109	172	390	1682	148	105	1084	185
v/c Ratio	0.77	0.60	0.62	0.24	0.71	0.47	0.91	0.90	0.16	0.64	0.76	0.24
Control Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.1	18.0	0.9	58.3	26.7	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.1	18.0	0.9	58.3	26.7	4.6
Queue Length 50th (ft)	125	119	0	25	83	0	225	449	3	39	389	31
Queue Length 95th (ft)	#179	#208	85	56	#165	4	m239	m505	m4	#107	481	59
Internal Link Dist (ft)		508			1196			231			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	464	266	483	164	161	370	451	1871	920	166	1419	781
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.60	0.62	0.24	0.68	0.46	0.86	0.90	0.16	0.63	0.76	0.24

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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Background 2040 PM  
01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	330	146	276	37	100	158	359	1547	136	97	997	170
Future Volume (veh/h)	330	146	276	37	100	158	359	1547	136	97	997	170
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	359	159	0	40	109	0	390	1682	148	105	1084	185
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	442	212		173	139		422	1947	868	179	1606	716
Arrive On Green	0.08	0.11	0.00	0.04	0.07	0.00	0.15	0.55	0.55	0.05	0.45	0.45
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	359	159	0	40	109	0	390	1682	148	105	1084	185
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	9.7	9.9	0.0	2.4	6.9	0.0	15.4	48.8	5.6	3.8	28.9	8.7
Cycle Q Clear(g_c), s	9.7	9.9	0.0	2.4	6.9	0.0	15.4	48.8	5.6	3.8	28.9	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	442	212		173	139		422	1947	868	179	1606	716
V/C Ratio(X)	0.81	0.75		0.23	0.78		0.93	0.86	0.17	0.59	0.68	0.26
Avail Cap(c_a), veh/h	442	235		173	162		523	1947	868	200	1606	716
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.2	51.5	0.0	48.1	54.6	0.0	26.0	23.3	13.5	25.4	25.9	20.4
Incr Delay (d2), s/veh	11.0	11.3	0.0	0.7	19.0	0.0	19.9	5.4	0.4	3.6	2.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	5.3	0.0	1.1	4.0	0.0	8.0	19.1	2.1	1.6	11.6	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	62.8	0.0	48.7	73.6	0.0	45.9	28.7	14.0	28.9	28.2	21.3
LnGrp LOS	E	E		D	E		D	C	B	C	C	C
Approach Vol, veh/h		518			149			2220			1374	
Approach Delay, s/veh		60.9			66.9			30.7			27.3	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.1	73.3	12.5	20.1	25.6	61.7	17.2	15.4				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	7.0	62.9	5.0	15.1	25.0	45.9	9.7	10.4				
Max Q Clear Time (g_c+I1), s	5.8	50.8	4.4	11.9	17.4	30.9	11.7	8.9				
Green Ext Time (p_c), s	0.0	8.4	0.0	0.2	0.7	6.5	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	114	145	150	1826	1066	149
Future Volume (vph)	114	145	150	1826	1066	149
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	22.0	22.0	22.0	98.0	76.0	76.0
Total Split (%)	18.3%	18.3%	18.3%	81.7%	63.3%	63.3%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0	94.0	95.0	78.3	78.3
Actuated g/C Ratio	0.08	0.08	0.78	0.79	0.65	0.65
v/c Ratio	0.44	0.57	0.45	0.71	0.50	0.15
Control Delay	56.8	16.4	3.2	5.5	12.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	16.4	3.2	5.5	12.1	1.7
LOS	E	B	A	A	B	A
Approach Delay	34.2			5.3	10.8	
Approach LOS	C			A	B	

Intersection Summary

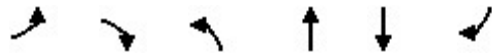
Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 9.4  
 Intersection Capacity Utilization 69.6%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	124	158	163	1985	1159	162
v/c Ratio	0.44	0.57	0.45	0.71	0.50	0.15
Control Delay	56.8	16.4	3.2	5.5	12.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	16.4	3.2	5.5	12.1	1.7
Queue Length 50th (ft)	47	0	2	193	222	0
Queue Length 95th (ft)	77	64	m10	643	310	26
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	414	330	426	2802	2310	1089
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	0.30	0.48	0.38	0.71	0.50	0.15

## Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Background 2040 PM  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	114	145	150	1826	1066	149
Future Volume (veh/h)	114	145	150	1826	1066	149
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	124	0	163	1985	1159	162
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	227		365	2876	2471	1102
Arrive On Green	0.07	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	124	0	163	1985	1159	162
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	4.2	0.0	3.0	28.9	17.7	4.2
Cycle Q Clear(g_c), s	4.2	0.0	3.0	28.9	17.7	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	227		365	2876	2471	1102
V/C Ratio(X)	0.55		0.45	0.69	0.47	0.15
Avail Cap(c_a), veh/h	418		488	2876	2471	1102
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	6.6	4.9	8.3	6.2
Incr Delay (d2), s/veh	2.1	0.0	0.9	1.4	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.0	8.4	6.5	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.4	0.0	7.5	6.3	8.9	6.5
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	124			2148	1321	
Approach Delay, s/veh	56.4			6.4	8.6	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.6		15.4	13.7	90.9
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		90.5		14.5	13.5	68.5
Max Q Clear Time (g_c+I1), s		30.9		6.2	5.0	19.7
Green Ext Time (p_c), s		32.0		0.2	0.3	12.7

Intersection Summary

HCM 6th Ctrl Delay	8.9
HCM 6th LOS	A

Notes

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

Intersection						
Int Delay, s/veh	4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	118	47	137	162	2	141
Future Vol, veh/h	118	47	137	162	2	141
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	128	51	149	176	2	153

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	179	0	514
Stage 1	-	-	-	-	128
Stage 2	-	-	-	-	386
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1394	-	490
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	656
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1394	-	438
Mov Cap-2 Maneuver	-	-	-	-	438
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	586

Approach	EB	WB	NB
HCM Control Delay, s	0	3.6	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	970	-	-	1394	-
HCM Lane V/C Ratio	0.16	-	-	0.107	-
HCM Control Delay (s)	9.4	-	-	7.9	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-



## APPENDIX G – Total 2024 & 2040 Synchro Outputs

Update per comments in text  
and comment letter.

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Shopping Plaza  
01/23/2023

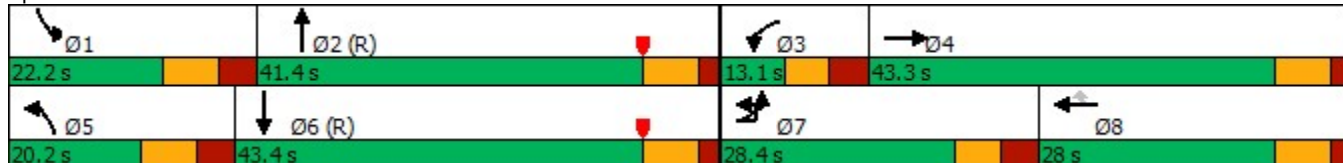
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	353	218	118	60	402	157	178	330	17	211	742	784
Future Volume (vph)	353	218	118	60	402	157	178	330	17	211	742	784
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	28.4	43.3		13.1	28.0	28.0	20.2	41.4		22.2	43.4	
Total Split (%)	23.7%	36.1%		10.9%	23.3%	23.3%	16.8%	34.5%		18.5%	36.2%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	18.4	34.6	120.0	5.6	19.2	19.2	11.0	40.0	120.0	12.4	41.5	120.0
Actuated g/C Ratio	0.15	0.29	1.00	0.05	0.16	0.16	0.09	0.33	1.00	0.10	0.35	1.00
v/c Ratio	0.75	0.23	0.08	0.41	0.77	0.37	0.62	0.30	0.01	0.65	0.66	0.54
Control Delay	58.0	33.2	0.1	63.5	58.2	2.9	61.3	31.9	0.0	48.8	56.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	33.2	0.1	63.5	58.2	2.9	61.3	31.9	0.0	48.8	56.9	4.6
LOS	E	C	A	E	E	A	E	C	A	D	E	A
Approach Delay		40.5			44.6			40.9			32.3	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 37.3  
 Intersection Capacity Utilization 73.4%  
 Analysis Period (min) 15

Intersection LOS: D  
 ICU Level of Service D

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Shopping Plaza  
01/23/2023



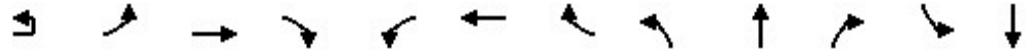
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	395	237	128	65	437	171	193	359	18	229	807	852
v/c Ratio	0.75	0.23	0.08	0.41	0.77	0.37	0.62	0.30	0.01	0.65	0.66	0.54
Control Delay	58.0	33.2	0.1	63.5	58.2	2.9	61.3	31.9	0.0	48.8	56.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	33.2	0.1	63.5	58.2	2.9	61.3	31.9	0.0	48.8	56.9	4.6
Queue Length 50th (ft)	152	74	0	25	170	0	74	112	0	96	306	87
Queue Length 95th (ft)	203	106	0	50	227	7	114	160	0	m96	m305	m59
Internal Link Dist (ft)		1165			1100			342				861
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	597	1072	1583	160	619	483	336	1180	1583	391	1223	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.22	0.08	0.41	0.71	0.35	0.57	0.30	0.01	0.59	0.66	0.54

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Shopping Plaza  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↑↑	↔	↔↔	↑↑	↔	↔↔	↑↑	↔	↔↔	↑↑
Traffic Volume (veh/h)	10	353	218	118	60	402	157	178	330	17	211	742
Future Volume (veh/h)	10	353	218	118	60	402	157	178	330	17	211	742
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		384	237	0	65	437	0	193	359	0	229	807
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		453	851		127	516		252	1385		290	1424
Arrive On Green		0.13	0.24	0.00	0.04	0.15	0.00	0.07	0.39	0.00	0.08	0.40
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		384	237	0	65	437	0	193	359	0	229	807
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		13.0	6.5	0.0	2.2	14.4	0.0	6.6	8.2	0.0	7.8	21.1
Cycle Q Clear(g_c), s		13.0	6.5	0.0	2.2	14.4	0.0	6.6	8.2	0.0	7.8	21.1
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		453	851		127	516		252	1385		290	1424
V/C Ratio(X)		0.85	0.28		0.51	0.85		0.77	0.26		0.79	0.57
Avail Cap(c_a), veh/h		602	1075		161	622		337	1385		395	1424
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		51.0	37.2	0.0	56.7	50.0	0.0	54.6	24.9	0.0	53.9	27.9
Incr Delay (d2), s/veh		8.5	0.2	0.0	3.1	9.1	0.0	7.3	0.5	0.0	7.4	1.6
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		6.0	2.8	0.0	1.0	6.9	0.0	3.1	3.5	0.0	3.7	9.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		59.5	37.4	0.0	59.8	59.0	0.0	61.9	25.3	0.0	61.4	29.5
LnGrp LOS		E	D		E	E		E	C		E	C
Approach Vol, veh/h			621			502			552			1036
Approach Delay, s/veh			51.0			59.1			38.1			36.6
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.6	53.8	11.9	35.7	17.2	55.1	23.2	24.4				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	13.7	34.4	5.6	36.3	11.7	36.4	20.9	21.0				
Max Q Clear Time (g_c+I1), s	9.8	10.2	4.2	8.5	8.6	23.1	15.0	16.4				
Green Ext Time (p_c), s	0.3	2.3	0.0	1.4	0.2	4.5	0.7	1.1				

Intersection Summary

HCM 6th Ctrl Delay	44.4
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	784
Future Volume (veh/h)	784
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

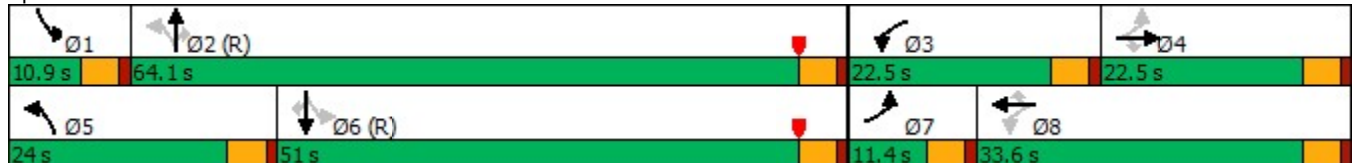
Total Future 2024 AM Shopping Plaza  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	52	312	97	56	36	380	474	40	111	1371	185
Future Volume (vph)	218	52	312	97	56	36	380	474	40	111	1371	185
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	24.0	64.1	64.1	10.9	51.0	51.0
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	20.0%	53.4%	53.4%	9.1%	42.5%	42.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	18.4	10.5	10.5	23.9	14.8	14.8	84.7	72.3	72.3	54.4	46.5	46.5
Actuated g/C Ratio	0.15	0.09	0.09	0.20	0.12	0.12	0.71	0.60	0.60	0.45	0.39	0.39
v/c Ratio	0.52	0.35	0.76	0.37	0.27	0.12	0.74	0.24	0.04	0.27	1.09	0.27
Control Delay	43.6	55.7	16.7	41.2	47.5	0.8	43.2	16.5	2.1	12.9	96.8	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	55.7	16.7	41.2	47.5	0.8	43.2	16.5	2.1	12.9	96.8	14.8
LOS	D	E	B	D	D	A	D	B	A	B	F	B
Approach Delay		30.3			35.4			27.2			82.1	
Approach LOS		C			D			C			F	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 55.7  
 Intersection Capacity Utilization 83.1%  
 Analysis Period (min) 15  
 Intersection LOS: E  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 AM Shopping Plaza  
01/23/2023





































Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	237	57	339	105	61	39	413	515	43	121	1490	201
v/c Ratio	0.52	0.35	0.76	0.37	0.27	0.12	0.74	0.24	0.04	0.27	1.09	0.27
Control Delay	43.6	55.7	16.7	41.2	47.5	0.8	43.2	16.5	2.1	12.9	96.8	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	55.7	16.7	41.2	47.5	0.8	43.2	16.5	2.1	12.9	96.8	14.8
Queue Length 50th (ft)	80	43	0	69	44	0	289	118	1	41	~703	49
Queue Length 95th (ft)	102	80	88	104	77	0	#508	159	m8	m57	#847	m133
Internal Link Dist (ft)		508			1196			230			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	460	281	526	343	451	486	560	2133	1008	451	1372	736
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.20	0.64	0.31	0.14	0.08	0.74	0.24	0.04	0.27	1.09	0.27

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 AM Shopping Plaza  
01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 	 	 
Traffic Volume (veh/h)	218	52	312	97	56	36	380	474	40	111	1371	185
Future Volume (veh/h)	218	52	312	97	56	36	380	474	40	111	1371	185
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	237	57	0	105	61	0	413	515	43	121	1490	201
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	401	89		214	118		436	2434	1086	623	2022	902
Arrive On Green	0.06	0.05	0.00	0.07	0.06	0.00	0.16	0.69	0.69	0.04	0.57	0.57
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	237	57	0	105	61	0	413	515	43	121	1490	201
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	3.6	0.0	6.6	3.8	0.0	17.2	6.4	1.1	3.4	37.3	7.5
Cycle Q Clear(g_c), s	6.9	3.6	0.0	6.6	3.8	0.0	17.2	6.4	1.1	3.4	37.3	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	401	89		214	118		436	2434	1086	623	2022	902
V/C Ratio(X)	0.59	0.64		0.49	0.52		0.95	0.21	0.04	0.19	0.74	0.22
Avail Cap(c_a), veh/h	401	281		351	454		441	2434	1086	639	2022	902
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.8	56.1	0.0	49.3	54.4	0.0	31.8	7.0	6.1	9.6	19.2	12.8
Incr Delay (d2), s/veh	2.3	7.3	0.0	1.7	3.4	0.0	29.5	0.2	0.1	0.2	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	1.9	0.0	3.0	1.9	0.0	14.9	2.0	0.4	1.2	14.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.1	63.5	0.0	51.1	57.9	0.0	61.3	7.2	6.2	9.8	21.6	13.3
LnGrp LOS	D	E		D	E		E	A	A	A	C	B
Approach Vol, veh/h		294			166			971			1812	
Approach Delay, s/veh		55.9			53.6			30.2			19.9	
Approach LOS		E			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.8	86.7	13.3	10.2	23.7	72.8	11.4	12.1				
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	6.4	59.6	18.0	18.0	19.5	46.5	6.9	29.1				
Max Q Clear Time (g_c+I1), s	5.4	8.4	8.6	5.6	19.2	39.3	8.9	5.8				
Green Ext Time (p_c), s	0.0	3.3	0.1	0.1	0.1	5.1	0.0	0.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			28.0									
HCM 6th LOS			C									
<b>Notes</b>												
User approved pedestrian interval to be less than phase max green.												
Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.												



Timings  
**3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE**



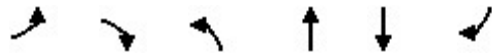
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	110	220	158	520	1409	155
Future Volume (vph)	110	220	158	520	1409	155
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	26.0	26.0	22.0	94.0	72.0	72.0
Total Split (%)	21.7%	21.7%	18.3%	78.3%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	11.1	11.1	92.9	93.9	74.4	74.4
Actuated g/C Ratio	0.09	0.09	0.77	0.78	0.62	0.62
v/c Ratio	0.38	0.71	0.62	0.20	0.70	0.16
Control Delay	53.7	22.6	34.2	1.5	18.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.7	22.6	34.2	1.5	18.7	2.3
LOS	D	C	C	A	B	A
Approach Delay	33.0			9.2	17.1	
Approach LOS	C			A	B	

**Intersection Summary**

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 17.0  
 Intersection LOS: B  
 Intersection Capacity Utilization 74.0%  
 ICU Level of Service D  
 Analysis Period (min) 15

**Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE**





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	120	239	172	565	1532	168
v/c Ratio	0.38	0.71	0.62	0.20	0.70	0.16
Control Delay	53.7	22.6	34.2	1.5	18.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.7	22.6	34.2	1.5	18.7	2.3
Queue Length 50th (ft)	46	23	40	15	379	0
Queue Length 95th (ft)	72	102	134	43	590	32
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	529	419	316	2769	2194	1045
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	0.23	0.57	0.54	0.20	0.70	0.16

## Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2024 AM Shopping Plaza  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	110	220	158	520	1409	155
Future Volume (veh/h)	110	220	158	520	1409	155
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	120	0	172	565	1532	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	226		273	2877	2465	1100
Arrive On Green	0.07	0.00	0.04	0.81	0.69	0.69
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	120	0	172	565	1532	168
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	4.0	0.0	3.1	4.3	27.8	4.4
Cycle Q Clear(g_c), s	4.0	0.0	3.1	4.3	27.8	4.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	226		273	2877	2465	1100
V/C Ratio(X)	0.53		0.63	0.20	0.62	0.15
Avail Cap(c_a), veh/h	533		394	2877	2465	1100
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	13.2	2.6	9.9	6.3
Incr Delay (d2), s/veh	1.9	0.0	2.4	0.2	1.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	2.5	1.2	10.3	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.2	0.0	15.6	2.7	11.1	6.6
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	120			737	1700	
Approach Delay, s/veh	56.2			5.7	10.6	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.6		15.4	13.9	90.7
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		86.5		18.5	13.5	64.5
Max Q Clear Time (g_c+I1), s		6.3		6.0	5.1	29.8
Green Ext Time (p_c), s		4.5		0.3	0.3	17.2

Intersection Summary

HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

Notes

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

HCM 6th TWSC  
 4: MERIDIAN PARK DRIVE & BENT GRASS MEADOWS DRIVE

Intersection						
Int Delay, s/veh	5.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	156	63	246	67	1	173
Future Vol, veh/h	156	63	246	67	1	173
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	170	68	267	73	1	188

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	238	0	741
Stage 1	-	-	-	-	170
Stage 2	-	-	-	-	571
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1326	-	352
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	529
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1326	-	281
Mov Cap-2 Maneuver	-	-	-	-	281
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	423

Approach	EB	WB	NB
HCM Control Delay, s	0	6.6	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	944	-	-	1326	-
HCM Lane V/C Ratio	0.2	-	-	0.202	-
HCM Control Delay (s)	9.8	-	-	8.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0.8	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Warehouse  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	218	118	60	402	130	178	293	17	194	720	734
Future Volume (vph)	272	218	118	60	402	130	178	293	17	194	720	734
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	25.0	40.9		13.1	29.0	29.0	20.4	44.8		21.2	45.6	
Total Split (%)	20.8%	34.1%		10.9%	24.2%	24.2%	17.0%	37.3%		17.7%	38.0%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	15.4	31.9	120.0	5.6	19.6	19.6	11.0	43.4	120.0	11.7	44.0	120.0
Actuated g/C Ratio	0.13	0.27	1.00	0.05	0.16	0.16	0.09	0.36	1.00	0.10	0.37	1.00
v/c Ratio	0.70	0.25	0.08	0.41	0.76	0.30	0.61	0.25	0.01	0.63	0.60	0.50
Control Delay	58.9	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.8	43.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.9	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.8	43.8	2.9
LOS	E	D	A	E	E	A	E	C	A	D	D	A
Approach Delay		39.4			45.4			39.6			26.9	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 34.3  
 Intersection Capacity Utilization 70.5%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service C

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Warehouse  
01/23/2023



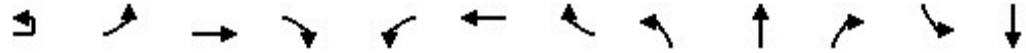
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	307	237	128	65	437	141	193	318	18	211	783	798
v/c Ratio	0.70	0.25	0.08	0.41	0.76	0.30	0.61	0.25	0.01	0.63	0.60	0.50
Control Delay	58.9	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.8	43.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.9	35.3	0.1	63.5	56.8	1.7	61.0	28.9	0.0	54.8	43.8	2.9
Queue Length 50th (ft)	118	76	0	25	170	0	74	93	0	89	237	21
Queue Length 95th (ft)	164	109	0	50	225	0	113	136	0	m104	m327	m106
Internal Link Dist (ft)		1165			1100			342				861
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	500	1001	1583	160	648	494	341	1279	1583	363	1299	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.24	0.08	0.41	0.67	0.29	0.57	0.25	0.01	0.58	0.60	0.50

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Warehouse  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↗	↖↗	↕↕	↗	↖↗	↕↕	↗	↖↗	↕↕
Traffic Volume (veh/h)	10	272	218	118	60	402	130	178	293	17	194	720
Future Volume (veh/h)	10	272	218	118	60	402	130	178	293	17	194	720
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		296	237	0	65	437	0	193	318	0	211	783
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		361	761		127	521		252	1495		271	1514
Arrive On Green		0.10	0.21	0.00	0.04	0.15	0.00	0.07	0.42	0.00	0.08	0.43
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		296	237	0	65	437	0	193	318	0	211	783
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		10.1	6.7	0.0	2.2	14.4	0.0	6.6	6.8	0.0	7.2	19.5
Cycle Q Clear(g_c), s		10.1	6.7	0.0	2.2	14.4	0.0	6.6	6.8	0.0	7.2	19.5
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		361	761		127	521		252	1495		271	1514
V/C Ratio(X)		0.82	0.31		0.51	0.84		0.77	0.21		0.78	0.52
Avail Cap(c_a), veh/h		504	1004		161	652		343	1495		366	1514
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		52.6	39.7	0.0	56.7	49.8	0.0	54.6	22.1	0.0	54.3	25.4
Incr Delay (d2), s/veh		7.3	0.2	0.0	3.1	7.9	0.0	6.9	0.3	0.0	7.4	1.3
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
%ile BackOfQ(50%),veh/ln		4.6	2.9	0.0	1.0	6.8	0.0	3.1	2.9	0.0	3.4	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		60.0	39.9	0.0	59.8	57.7	0.0	61.5	22.4	0.0	61.6	26.6
LnGrp LOS		E	D		E	E		E	C		E	C
Approach Vol, veh/h			533			502			511			994
Approach Delay, s/veh			51.1			58.0			37.2			34.1
Approach LOS			D			E			D			C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.9	57.5	11.9	32.7	17.2	58.1	20.0	24.6				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	12.7	37.8	5.6	33.9	11.9	38.6	17.5	22.0				
Max Q Clear Time (g_c+I1), s	9.2	8.8	4.2	8.7	8.6	21.5	12.1	16.4				
Green Ext Time (p_c), s	0.2	2.1	0.0	1.3	0.2	4.9	0.5	1.2				

Intersection Summary

HCM 6th Ctrl Delay	43.0
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary  
 1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 AM Warehouse  
 01/23/2023

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	734
Future Volume (veh/h)	734
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	



Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 AM Warehouse

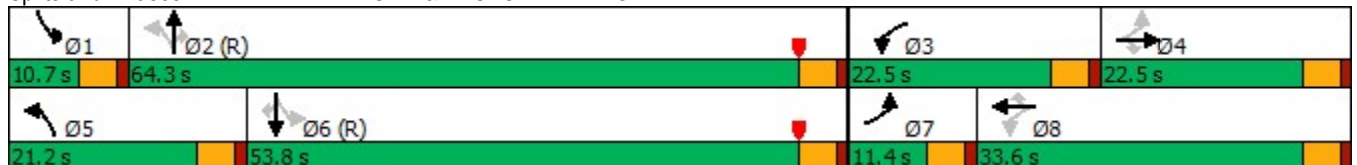
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	218	52	257	97	56	36	289	420	40	111	1337	185
Future Volume (vph)	218	52	257	97	56	36	289	420	40	111	1337	185
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	21.2	64.3	64.3	10.7	53.8	53.8
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	17.7%	53.6%	53.6%	8.9%	44.8%	44.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.9	9.9	9.9	23.5	14.3	14.3	85.2	72.6	72.6	64.9	56.8	56.8
Actuated g/C Ratio	0.15	0.08	0.08	0.20	0.12	0.12	0.71	0.60	0.60	0.54	0.47	0.47
v/c Ratio	0.53	0.37	0.72	0.38	0.27	0.13	0.76	0.21	0.04	0.22	0.87	0.24
Control Delay	44.5	57.3	17.0	41.9	48.4	0.8	52.0	17.7	2.2	14.6	52.2	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	57.3	17.0	41.9	48.4	0.8	52.0	17.7	2.2	14.6	52.2	15.3
LOS	D	E	B	D	D	A	D	B	A	B	D	B
Approach Delay		32.4			36.0			30.1			45.4	
Approach LOS		C			D			C			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 38.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 77.1%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 AM Warehouse

01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	237	57	279	105	61	39	314	457	43	121	1453	201
v/c Ratio	0.53	0.37	0.72	0.38	0.27	0.13	0.76	0.21	0.04	0.22	0.87	0.24
Control Delay	44.5	57.3	17.0	41.9	48.4	0.8	52.0	17.7	2.2	14.6	52.2	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	57.3	17.0	41.9	48.4	0.8	52.0	17.7	2.2	14.6	52.2	15.3
Queue Length 50th (ft)	80	43	0	69	44	0	209	92	2	51	575	35
Queue Length 95th (ft)	104	81	80	106	78	0	#359	127	m9	m89	#777	138
Internal Link Dist (ft)		508			1196			230				776
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	449	279	474	337	451	486	414	2139	1011	551	1675	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.20	0.59	0.31	0.14	0.08	0.76	0.21	0.04	0.22	0.87	0.24




























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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 AM Warehouse

01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 			 	
Traffic Volume (veh/h)	218	52	257	97	56	36	289	420	40	111	1337	185
Future Volume (veh/h)	218	52	257	97	56	36	289	420	40	111	1337	185
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	237	57	0	105	61	0	314	457	43	121	1453	201
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	401	89		214	118		347	2446	1091	710	2321	1035
Arrive On Green	0.06	0.05	0.00	0.07	0.06	0.00	0.08	0.69	0.69	0.04	0.65	0.65
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	237	57	0	105	61	0	314	457	43	121	1453	201
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	3.6	0.0	6.6	3.8	0.0	6.6	5.5	1.0	2.7	28.8	6.0
Cycle Q Clear(g_c), s	6.9	3.6	0.0	6.6	3.8	0.0	6.6	5.5	1.0	2.7	28.8	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	401	89		214	118		347	2446	1091	710	2321	1035
V/C Ratio(X)	0.59	0.64		0.49	0.52		0.90	0.19	0.04	0.17	0.63	0.19
Avail Cap(c_a), veh/h	401	281		351	454		459	2446	1091	729	2321	1035
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.8	56.1	0.0	49.3	54.4	0.0	19.6	6.7	6.0	6.0	12.2	8.3
Incr Delay (d2), s/veh	2.3	7.3	0.0	1.7	3.4	0.0	17.6	0.2	0.1	0.1	1.3	0.4
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	3.6	1.9	0.0	3.0	1.9	0.0	7.4	1.7	0.4	0.8	9.7	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.1	63.5	0.0	51.1	57.9	0.0	37.2	6.9	6.1	6.1	13.5	8.7
LnGrp LOS	D	E		D	E		D	A	A	A	B	A
Approach Vol, veh/h		294			166			814			1775	
Approach Delay, s/veh		55.9			53.6			18.5			12.5	
Approach LOS		E			D			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.4	87.1	13.3	10.2	13.6	82.9	11.4	12.1				
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	6.2	59.8	18.0	18.0	16.7	49.3	6.9	29.1				
Max Q Clear Time (g_c+I1), s	4.7	7.5	8.6	5.6	8.6	30.8	8.9	5.8				
Green Ext Time (p_c), s	0.0	2.9	0.1	0.1	0.6	9.9	0.0	0.2				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			20.5									
HCM 6th LOS			C									
<b>Notes</b>												
User approved pedestrian interval to be less than phase max green.												
Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.												

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

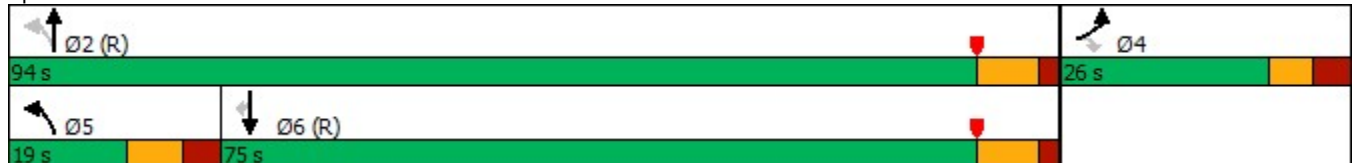


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↖	↖	↑↑	↑↑	↖
Traffic Volume (vph)	88	186	104	520	1409	118
Future Volume (vph)	88	186	104	520	1409	118
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	26.0	26.0	19.0	94.0	75.0	75.0
Total Split (%)	21.7%	21.7%	15.8%	78.3%	62.5%	62.5%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.5	10.5	93.5	94.5	78.0	78.0
Actuated g/C Ratio	0.09	0.09	0.78	0.79	0.65	0.65
v/c Ratio	0.32	0.69	0.45	0.20	0.67	0.12
Control Delay	53.2	24.3	20.0	1.6	15.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	24.3	20.0	1.6	15.7	2.1
LOS	D	C	B	A	B	A
Approach Delay	33.6			4.6	14.7	
Approach LOS	C			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 14.2  
 Intersection Capacity Utilization 71.0%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Queues

3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	96	202	113	565	1532	128
v/c Ratio	0.32	0.69	0.45	0.20	0.67	0.12
Control Delay	53.2	24.3	20.0	1.6	15.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	24.3	20.0	1.6	15.7	2.1
Queue Length 50th (ft)	37	24	24	16	328	0
Queue Length 95th (ft)	60	97	65	46	547	27
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	529	387	287	2786	2299	1073
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	0.18	0.52	0.39	0.20	0.67	0.12

Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2024 AM Warehouse  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	88	186	104	520	1409	118
Future Volume (veh/h)	88	186	104	520	1409	118
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	96	0	113	565	1532	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	221		274	2882	2486	1109
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	96	0	113	565	1532	128
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.2	0.0	2.0	4.3	27.3	3.2
Cycle Q Clear(g_c), s	3.2	0.0	2.0	4.3	27.3	3.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	221		274	2882	2486	1109
V/C Ratio(X)	0.43		0.41	0.20	0.62	0.12
Avail Cap(c_a), veh/h	533		357	2882	2486	1109
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.1	0.0	9.5	2.5	9.5	5.9
Incr Delay (d2), s/veh	1.3	0.0	1.0	0.2	1.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.0	1.2	10.0	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.4	0.0	10.5	2.7	10.7	6.1
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	96			678	1660	
Approach Delay, s/veh	55.4			4.0	10.3	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.8		15.2	13.4	91.4
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		86.5		18.5	10.5	67.5
Max Q Clear Time (g_c+I1), s		6.3		5.2	4.0	29.3
Green Ext Time (p_c), s		4.5		0.2	0.1	17.8
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			10.3			
HCM 6th LOS			B			

Notes

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

Intersection						
Int Delay, s/veh	4.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	156	63	155	67	1	118
Future Vol, veh/h	156	63	155	67	1	118
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	170	68	168	73	1	128

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	238	0	543
Stage 1	-	-	-	-	170
Stage 2	-	-	-	-	373
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1326	-	470
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	666
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1326	-	410
Mov Cap-2 Maneuver	-	-	-	-	410
Stage 1	-	-	-	-	843
Stage 2	-	-	-	-	581

Approach	EB	WB	NB
HCM Control Delay, s	0	5.7	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	946	-	-	1326	-
HCM Lane V/C Ratio	0.137	-	-	0.127	-
HCM Control Delay (s)	9.4	-	-	8.1	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.4	-





Queues  
1: MERIDIAN ROAD & WOODMAN ROAD



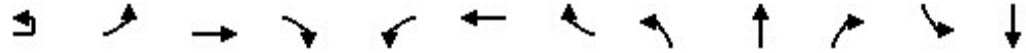
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	977	498	176	123	411	315	283	902	116	326	693	695
v/c Ratio	1.03	0.42	0.11	0.52	0.93	0.76	0.79	1.02	0.07	0.98	0.81	0.44
Control Delay	78.9	32.5	0.1	61.8	80.7	24.7	68.9	80.1	0.1	63.3	45.6	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.9	32.5	0.1	61.8	80.7	24.7	68.9	80.1	0.1	63.3	45.6	2.0
Queue Length 50th (ft)	~415	157	0	47	168	47	111	~390	0	131	293	14
Queue Length 95th (ft)	#545	207	0	80	#266	#172	#173	#520	0	m#162	m313	m38
Internal Link Dist (ft)		1165			1100			342				861
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	952	1178	1583	248	442	416	366	884	1583	334	860	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.42	0.11	0.50	0.93	0.76	0.77	1.02	0.07	0.98	0.81	0.44

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 PM Shopping Plaza  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕
Traffic Volume (veh/h)	15	884	458	162	113	378	290	260	830	107	300	638
Future Volume (veh/h)	15	884	458	162	113	378	290	260	830	107	300	638
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		961	498	0	123	411	0	283	902	0	326	693
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		959	1248		178	444		339	888		337	886
Arrive On Green		0.28	0.35	0.00	0.05	0.13	0.00	0.10	0.25	0.00	0.10	0.25
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		961	498	0	123	411	0	283	902	0	326	693
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		33.3	12.7	0.0	4.2	13.7	0.0	9.7	30.0	0.0	11.3	21.8
Cycle Q Clear(g_c), s		33.3	12.7	0.0	4.2	13.7	0.0	9.7	30.0	0.0	11.3	21.8
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		959	1248		178	444		339	888		337	886
V/C Ratio(X)		1.00	0.40		0.69	0.93		0.83	1.02		0.97	0.78
Avail Cap(c_a), veh/h		959	1248		251	444		369	888		337	886
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		43.4	29.4	0.0	56.0	51.9	0.0	53.2	45.0	0.0	54.0	42.0
Incr Delay (d2), s/veh		29.6	0.2	0.0	4.8	25.3	0.0	14.3	34.1	0.0	40.2	6.8
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		17.6	5.3	0.0	1.9	7.5	0.0	4.8	17.2	0.0	6.7	10.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		72.9	29.6	0.0	60.8	77.2	0.0	67.5	79.1	0.0	94.2	48.8
LnGrp LOS		F	C		E	E		E	F		F	D
Approach Vol, veh/h			1459			534			1185			1019
Approach Delay, s/veh			58.1			73.4			76.3			63.3
Approach LOS			E			E			E			E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.2	37.0	13.7	49.1	20.3	36.9	40.8	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	11.7	30.0	8.7	39.6	12.8	28.9	33.3	15.0				
Max Q Clear Time (g_c+I1), s	13.3	32.0	6.2	14.7	11.7	23.8	35.3	15.7				
Green Ext Time (p_c), s	0.0	0.0	0.1	3.1	0.1	2.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	66.5
HCM 6th LOS	E

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	639
Future Volume (veh/h)	639
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

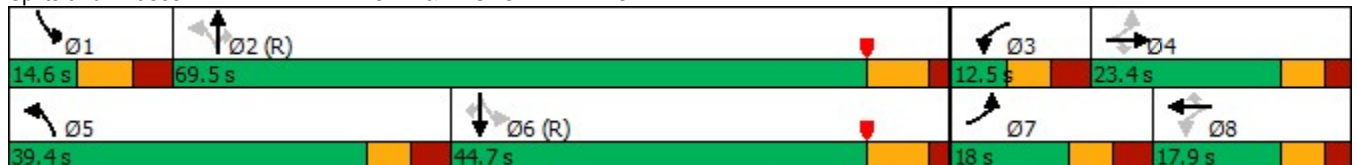
Total Future 2024 PM Shopping Plaza  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	359	125	483	31	79	134	526	1421	116	83	1002	180
Future Volume (vph)	359	125	483	31	79	134	526	1421	116	83	1002	180
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	18.0	23.4	23.4	12.5	17.9	17.9	39.4	69.5	69.5	14.6	44.7	44.7
Total Split (%)	15.0%	19.5%	19.5%	10.4%	14.9%	14.9%	32.8%	57.9%	57.9%	12.2%	37.3%	37.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	26.0	20.7	20.7	14.2	10.2	10.2	77.8	62.9	62.9	42.6	37.2	37.2
Actuated g/C Ratio	0.22	0.17	0.17	0.12	0.08	0.08	0.65	0.52	0.52	0.36	0.31	0.31
v/c Ratio	0.77	0.42	0.82	0.20	0.54	0.40	1.03	0.83	0.14	0.57	0.99	0.30
Control Delay	52.0	50.6	20.2	39.7	65.6	3.2	73.1	17.0	0.8	48.4	55.3	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	50.6	20.2	39.7	65.6	3.2	73.1	17.0	0.8	48.4	55.3	5.0
LOS	D	D	C	D	E	A	E	B	A	D	E	A
Approach Delay		36.0			28.0			30.4			47.7	
Approach LOS		D			C			C			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 36.3  
 Intersection Capacity Utilization 97.1%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service F

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 PM Shopping Plaza  
01/23/2023





































Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	390	136	525	34	86	146	572	1545	126	90	1089	196
v/c Ratio	0.77	0.42	0.82	0.20	0.54	0.40	1.03	0.83	0.14	0.57	0.99	0.30
Control Delay	52.0	50.6	20.2	39.7	65.6	3.2	73.1	17.0	0.8	48.4	55.3	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	50.6	20.2	39.7	65.6	3.2	73.1	17.0	0.8	48.4	55.3	5.0
Queue Length 50th (ft)	135	99	55	21	65	0	~419	327	2	40	442	37
Queue Length 95th (ft)	184	166	#251	49	119	0	m#445	m352	m2	#78	#597	44
Internal Link Dist (ft)		508			1196			230			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	508	322	644	169	176	381	555	1855	914	159	1097	659
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.42	0.82	0.20	0.49	0.38	1.03	0.83	0.14	0.57	0.99	0.30

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 PM Shopping Plaza  
01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 	 	 
Traffic Volume (veh/h)	359	125	483	31	79	134	526	1421	116	83	1002	180
Future Volume (veh/h)	359	125	483	31	79	134	526	1421	116	83	1002	180
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	390	136	0	34	86	0	572	1545	126	90	1089	196
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	478	210		188	125		553	1951	870	204	1202	536
Arrive On Green	0.09	0.11	0.00	0.04	0.07	0.00	0.27	0.55	0.55	0.05	0.34	0.34
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	390	136	0	34	86	0	572	1545	126	90	1089	196
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	10.5	8.4	0.0	2.1	5.4	0.0	31.9	41.6	4.7	3.9	35.1	11.2
Cycle Q Clear(g_c), s	10.5	8.4	0.0	2.1	5.4	0.0	31.9	41.6	4.7	3.9	35.1	11.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	478	210		188	125		553	1951	870	204	1202	536
V/C Ratio(X)	0.82	0.65		0.18	0.69		1.03	0.79	0.14	0.44	0.91	0.37
Avail Cap(c_a), veh/h	478	263		188	178		553	1951	870	210	1202	536
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	51.0	0.0	48.7	54.8	0.0	35.1	21.6	13.3	25.5	37.9	30.0
Incr Delay (d2), s/veh	10.6	3.7	0.0	0.5	6.6	0.0	47.2	3.4	0.4	1.5	11.3	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	4.1	0.0	1.0	2.8	0.0	22.5	16.0	1.7	1.6	16.1	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.2	54.7	0.0	49.1	61.4	0.0	82.3	25.0	13.6	27.0	49.2	31.9
LnGrp LOS	E	D		D	E		F	C	B	C	D	C
Approach Vol, veh/h		526			120			2243			1375	
Approach Delay, s/veh		58.7			57.9			39.0			45.3	
Approach LOS		E			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.1	73.4	12.5	20.0	39.4	48.1	18.0	14.5				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	6.1	62.0	5.0	16.9	31.9	37.2	10.5	11.4				
Max Q Clear Time (g_c+I1), s	5.9	43.6	4.1	10.4	33.9	37.1	12.5	7.4				
Green Ext Time (p_c), s	0.0	10.3	0.0	0.3	0.0	0.1	0.0	0.1				

Intersection Summary												
HCM 6th Ctrl Delay			44.0									
HCM 6th LOS			D									

Notes

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

Timings

3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	179	252	249	1607	960	205
Future Volume (vph)	179	252	249	1607	960	205
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	30.0	30.0	32.0	90.0	58.0	58.0
Total Split (%)	25.0%	25.0%	26.7%	75.0%	48.3%	48.3%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	12.2	12.2	91.8	92.8	70.8	70.8
Actuated g/C Ratio	0.10	0.10	0.76	0.77	0.59	0.59
v/c Ratio	0.56	0.67	0.62	0.64	0.50	0.22
Control Delay	57.2	14.6	8.0	4.9	16.6	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	14.6	8.0	4.9	16.6	2.5
LOS	E	B	A	A	B	A
Approach Delay	32.3			5.3	14.1	
Approach LOS	C			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.67  
 Intersection Signal Delay: 11.6  
 Intersection Capacity Utilization 66.6%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	195	274	271	1747	1043	223
v/c Ratio	0.56	0.67	0.62	0.64	0.50	0.22
Control Delay	57.2	14.6	8.0	4.9	16.6	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	14.6	8.0	4.9	16.6	2.5
Queue Length 50th (ft)	75	0	11	213	226	0
Queue Length 95th (ft)	110	81	m31	361	367	41
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	643	519	554	2736	2088	1025
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	0.30	0.53	0.49	0.64	0.50	0.22

Intersection Summary

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



HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2024 PM Shopping Plaza  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	179	252	249	1607	960	205
Future Volume (veh/h)	179	252	249	1607	960	205
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	195	0	271	1747	1043	223
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	263		409	2839	2345	1046
Arrive On Green	0.08	0.00	0.07	0.80	0.66	0.66
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	195	0	271	1747	1043	223
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	6.6	0.0	5.5	23.3	17.0	6.7
Cycle Q Clear(g_c), s	6.6	0.0	5.5	23.3	17.0	6.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	263		409	2839	2345	1046
V/C Ratio(X)	0.74		0.66	0.62	0.44	0.21
Avail Cap(c_a), veh/h	648		636	2839	2345	1046
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	8.5	4.8	9.8	8.1
Incr Delay (d2), s/veh	4.1	0.0	1.9	1.0	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	2.0	7.0	6.4	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	58.4	0.0	10.4	5.8	10.4	8.5
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	195			2018	1266	
Approach Delay, s/veh	58.4			6.4	10.1	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		103.4		16.6	16.7	86.7
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		82.5		22.5	23.5	50.5
Max Q Clear Time (g_c+I1), s		25.3		8.6	7.5	19.0
Green Ext Time (p_c), s		24.9		0.5	0.7	10.2

Intersection Summary

HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Notes

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

Intersection						
Int Delay, s/veh	6.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	112	40	289	149	2	318
Future Vol, veh/h	112	40	289	149	2	318
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	122	43	314	162	2	346

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	165	0	831
Stage 1	-	-	-	-	122
Stage 2	-	-	-	-	709
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1411	-	308
Stage 1	-	-	-	-	890
Stage 2	-	-	-	-	449
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1411	-	239
Mov Cap-2 Maneuver	-	-	-	-	239
Stage 1	-	-	-	-	890
Stage 2	-	-	-	-	349

Approach	EB	WB	NB
HCM Control Delay, s	0	5.5	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	972	-	-	1411	-
HCM Lane V/C Ratio	0.358	-	-	0.223	-
HCM Control Delay (s)	10.8	-	-	8.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1.6	-	-	0.9	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

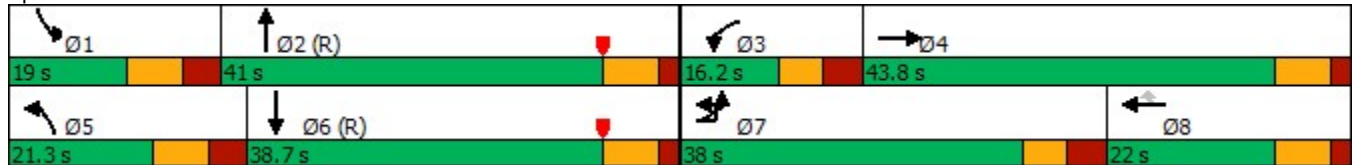
Total Future 2024 PM Warehouse  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	721	458	162	113	378	235	260	757	107	241	559	462
Future Volume (vph)	721	458	162	113	378	235	260	757	107	241	559	462
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	38.0	43.8		16.2	22.0	22.0	21.3	41.0		19.0	38.7	
Total Split (%)	31.7%	36.5%		13.5%	18.3%	18.3%	17.8%	34.2%		15.8%	32.3%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	29.9	36.8	120.0	8.3	15.2	15.2	12.5	34.1	120.0	10.7	32.3	120.0
Actuated g/C Ratio	0.25	0.31	1.00	0.07	0.13	0.13	0.10	0.28	1.00	0.09	0.27	1.00
v/c Ratio	0.93	0.46	0.11	0.52	0.92	0.61	0.79	0.82	0.07	0.86	0.64	0.32
Control Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.9	0.1	56.5	47.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.9	0.1	56.5	47.6	0.4
LOS	E	D	A	E	E	B	E	D	A	E	D	A
Approach Delay		46.0			54.6			48.2			32.0	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 44.0  
 Intersection Capacity Utilization 85.9%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service E

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 PM Warehouse

01/23/2023



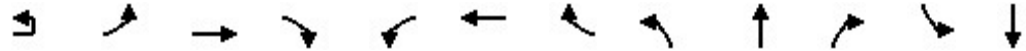
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	800	498	176	123	411	255	283	823	116	262	608	502
v/c Ratio	0.93	0.46	0.11	0.52	0.92	0.61	0.79	0.82	0.07	0.86	0.64	0.32
Control Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.9	0.1	56.5	47.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	35.2	0.1	61.8	78.2	13.2	68.9	47.9	0.1	56.5	47.6	0.4
Queue Length 50th (ft)	311	163	0	47	168	3	111	313	0	105	254	0
Queue Length 95th (ft)	#426	215	0	80	#266	84	#173	392	0	#180	315	0
Internal Link Dist (ft)		1165			1100			342			861	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	872	1086	1583	248	448	418	366	1006	1583	306	952	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.46	0.11	0.50	0.92	0.61	0.77	0.82	0.07	0.86	0.64	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  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 PM Warehouse  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕
Traffic Volume (veh/h)	15	721	458	162	113	378	235	260	757	107	241	559
Future Volume (veh/h)	15	721	458	162	113	378	235	260	757	107	241	559
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		784	498	0	123	411	0	283	823	0	262	608
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		843	1129		178	444		339	1043		302	1005
Arrive On Green		0.24	0.32	0.00	0.05	0.13	0.00	0.10	0.29	0.00	0.09	0.28
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		784	498	0	123	411	0	283	823	0	262	608
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		26.6	13.3	0.0	4.2	13.7	0.0	9.7	25.6	0.0	9.0	17.8
Cycle Q Clear(g_c), s		26.6	13.3	0.0	4.2	13.7	0.0	9.7	25.6	0.0	9.0	17.8
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		843	1129		178	444		339	1043		302	1005
V/C Ratio(X)		0.93	0.44		0.69	0.93		0.83	0.79		0.87	0.60
Avail Cap(c_a), veh/h		878	1129		251	444		369	1043		302	1005
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		44.3	32.5	0.0	56.0	51.9	0.0	53.2	39.0	0.0	54.1	37.2
Incr Delay (d2), s/veh		15.7	0.3	0.0	4.8	25.3	0.0	14.3	6.1	0.0	22.3	2.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		12.8	5.6	0.0	1.9	7.5	0.0	4.8	11.8	0.0	4.8	8.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		60.0	32.8	0.0	60.8	77.2	0.0	67.5	45.1	0.0	76.3	39.9
LnGrp LOS		E	C		E	E		E	D		E	D
Approach Vol, veh/h			1282			534			1106			870
Approach Delay, s/veh			49.4			73.4			50.8			50.9
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	42.2	13.7	45.1	20.3	40.9	36.8	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	10.5	34.0	8.7	36.8	12.8	31.7	30.5	15.0				
Max Q Clear Time (g_c+I1), s	11.0	27.6	6.2	15.3	11.7	19.8	28.6	15.7				
Green Ext Time (p_c), s	0.0	2.9	0.1	2.9	0.1	3.1	0.7	0.0				

Intersection Summary

HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary  
 1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2024 PM Warehouse  
 01/23/2023

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	462
Future Volume (veh/h)	462
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 PM Warehouse

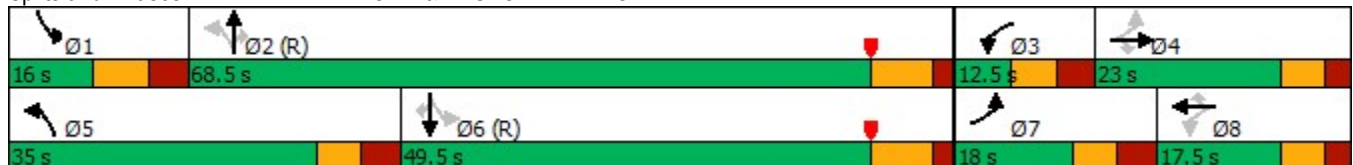
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	359	125	286	31	79	134	344	1312	116	83	884	180
Future Volume (vph)	359	125	286	31	79	134	344	1312	116	83	884	180
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	18.0	23.0	23.0	12.5	17.5	17.5	35.0	68.5	68.5	16.0	49.5	49.5
Total Split (%)	15.0%	19.2%	19.2%	10.4%	14.6%	14.6%	29.2%	57.1%	57.1%	13.3%	41.3%	41.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	25.8	20.5	20.5	14.0	10.0	10.0	77.8	62.4	62.4	54.2	48.1	48.1
Actuated g/C Ratio	0.22	0.17	0.17	0.12	0.08	0.08	0.65	0.52	0.52	0.45	0.40	0.40
v/c Ratio	0.77	0.43	0.59	0.20	0.55	0.40	0.84	0.78	0.14	0.51	0.68	0.25
Control Delay	52.6	51.0	10.2	40.0	66.5	3.2	48.3	14.3	0.7	44.0	25.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	51.0	10.2	40.0	66.5	3.2	48.3	14.3	0.7	44.0	25.6	6.1
LOS	D	D	B	D	E	A	D	B	A	D	C	A
Approach Delay		36.6			28.4			20.0			23.9	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 24.9  
 Intersection Capacity Utilization 83.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

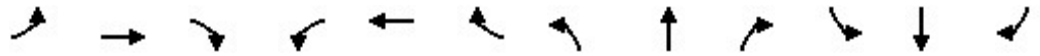
Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 PM Warehouse

01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	390	136	311	34	86	146	374	1426	126	90	961	196
v/c Ratio	0.77	0.43	0.59	0.20	0.55	0.40	0.84	0.78	0.14	0.51	0.68	0.25
Control Delay	52.6	51.0	10.2	40.0	66.5	3.2	48.3	14.3	0.7	44.0	25.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	51.0	10.2	40.0	66.5	3.2	48.3	14.3	0.7	44.0	25.6	6.1
Queue Length 50th (ft)	135	99	0	21	65	0	178	320	1	27	330	33
Queue Length 95th (ft)	#186	166	86	49	119	0	m227	m409	m3	79	432	87
Internal Link Dist (ft)		508			1196			230			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	505	319	528	167	170	376	509	1838	907	182	1418	781
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.43	0.59	0.20	0.51	0.39	0.73	0.78	0.14	0.49	0.68	0.25

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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2024 PM Warehouse

01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	359	125	286	31	79	134	344	1312	116	83	884	180
Future Volume (veh/h)	359	125	286	31	79	134	344	1312	116	83	884	180
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	390	136	0	34	86	0	374	1426	126	90	961	196
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	478	210		188	125		421	1974	880	218	1703	760
Arrive On Green	0.09	0.11	0.00	0.04	0.07	0.00	0.12	0.56	0.56	0.04	0.48	0.48
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	390	136	0	34	86	0	374	1426	126	90	961	196
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	10.5	8.4	0.0	2.1	5.4	0.0	12.1	35.8	4.6	3.1	23.2	8.8
Cycle Q Clear(g_c), s	10.5	8.4	0.0	2.1	5.4	0.0	12.1	35.8	4.6	3.1	23.2	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	478	210		188	125		421	1974	880	218	1703	760
V/C Ratio(X)	0.82	0.65		0.18	0.69		0.89	0.72	0.14	0.41	0.56	0.26
Avail Cap(c_a), veh/h	478	257		188	171		607	1974	880	257	1703	760
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	51.0	0.0	48.7	54.8	0.0	19.3	19.8	12.9	18.6	22.3	18.6
Incr Delay (d2), s/veh	10.6	4.0	0.0	0.5	6.7	0.0	11.0	2.3	0.3	1.3	1.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	4.1	0.0	1.0	2.8	0.0	6.0	13.5	1.7	1.2	9.1	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.2	55.0	0.0	49.1	61.5	0.0	30.3	22.1	13.2	19.9	23.7	19.4
LnGrp LOS	E	D		D	E		C	C	B	B	C	B
Approach Vol, veh/h		526			120			1926			1247	
Approach Delay, s/veh		58.8			58.0			23.1			22.7	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.3	74.2	12.5	20.0	22.5	65.0	18.0	14.5				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	7.5	61.0	5.0	16.5	27.5	42.0	10.5	11.0				
Max Q Clear Time (g_c+I1), s	5.1	37.8	4.1	10.4	14.1	25.2	12.5	7.4				
Green Ext Time (p_c), s	0.0	10.7	0.0	0.3	0.9	6.1	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	29.0
HCM 6th LOS	C

Notes

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

Timings  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

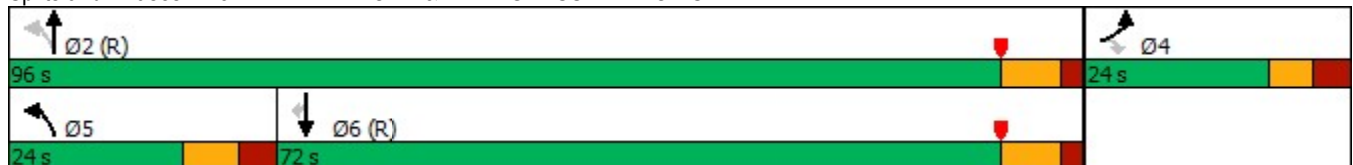


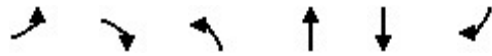
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	100	134	140	1607	960	132
Future Volume (vph)	100	134	140	1607	960	132
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	24.0	24.0	24.0	96.0	72.0	72.0
Total Split (%)	20.0%	20.0%	20.0%	80.0%	60.0%	60.0%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	9.6	9.6	94.4	95.4	79.0	79.0
Actuated g/C Ratio	0.08	0.08	0.79	0.80	0.66	0.66
v/c Ratio	0.40	0.56	0.38	0.62	0.45	0.13
Control Delay	56.4	16.9	2.2	3.3	11.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	16.9	2.2	3.3	11.0	1.7
LOS	E	B	A	A	B	A
Approach Delay	33.8			3.2	9.9	
Approach LOS	C			A	A	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.62  
 Intersection Signal Delay: 7.9  
 Intersection Capacity Utilization 63.6%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	109	146	152	1747	1043	143
v/c Ratio	0.40	0.56	0.38	0.62	0.45	0.13
Control Delay	56.4	16.9	2.2	3.3	11.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	16.9	2.2	3.3	11.0	1.7
Queue Length 50th (ft)	42	0	2	8	186	0
Queue Length 95th (ft)	70	63	m5	147	264	24
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	472	343	491	2813	2328	1090
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	0.23	0.43	0.31	0.62	0.45	0.13

#### Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2024 PM Warehouse  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	100	134	140	1607	960	132
Future Volume (veh/h)	100	134	140	1607	960	132
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	109	0	152	1747	1043	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	224		404	2879	2480	1106
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	109	0	152	1747	1043	143
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.7	0.0	2.7	22.0	15.1	3.6
Cycle Q Clear(g_c), s	3.7	0.0	2.7	22.0	15.1	3.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	224		404	2879	2480	1106
V/C Ratio(X)	0.49		0.38	0.61	0.42	0.13
Avail Cap(c_a), veh/h	475		560	2879	2480	1106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	5.7	4.3	7.8	6.0
Incr Delay (d2), s/veh	1.6	0.0	0.6	1.0	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.9	6.3	5.5	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.8	0.0	6.3	5.2	8.3	6.3
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	109			1899	1186	
Approach Delay, s/veh	55.8			5.3	8.0	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.7		15.3	13.5	91.2
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		88.5		16.5	15.5	64.5
Max Q Clear Time (g_c+I1), s		24.0		5.7	4.7	17.1
Green Ext Time (p_c), s		25.9		0.2	0.3	10.7

Intersection Summary

HCM 6th Ctrl Delay	8.0
HCM 6th LOS	A

Notes

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

Intersection						
Int Delay, s/veh	3.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	112	40	107	149	2	121
Future Vol, veh/h	112	40	107	149	2	121
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	122	43	116	162	2	132

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	165	0	435 61
Stage 1	-	-	-	-	122 -
Stage 2	-	-	-	-	313 -
Critical Hdwy	-	-	4.14	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	2.22	-	3.52 3.32
Pot Cap-1 Maneuver	-	-	1411	-	549 991
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	715 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1411	-	504 991
Mov Cap-2 Maneuver	-	-	-	-	504 -
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	656 -

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	976	-	-	1411	-
HCM Lane V/C Ratio	0.137	-	-	0.082	-
HCM Control Delay (s)	9.3	-	-	7.8	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.3	-

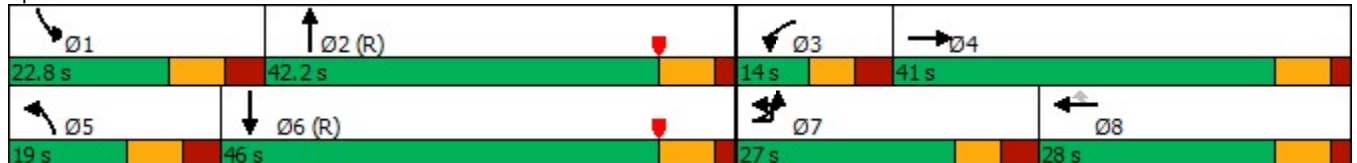
Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	391	261	139	70	472	170	196	363	20	226	844	895
Future Volume (vph)	391	261	139	70	472	170	196	363	20	226	844	895
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	27.0	41.0		14.0	28.0	28.0	19.0	42.2		22.8	46.0	
Total Split (%)	22.5%	34.2%		11.7%	23.3%	23.3%	15.8%	35.2%		19.0%	38.3%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	18.5	35.3	120.0	6.4	20.5	20.5	10.4	38.1	120.0	13.0	40.7	120.0
Actuated g/C Ratio	0.15	0.29	1.00	0.05	0.17	0.17	0.09	0.32	1.00	0.11	0.34	1.00
v/c Ratio	0.82	0.27	0.10	0.42	0.85	0.39	0.72	0.35	0.01	0.66	0.76	0.61
Control Delay	62.8	33.9	0.1	62.2	62.5	3.8	67.8	33.4	0.0	48.2	56.1	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	33.9	0.1	62.2	62.5	3.8	67.8	33.4	0.0	48.2	56.1	7.2
LOS	E	C	A	E	E	A	E	C	A	D	E	A
Approach Delay		42.5			48.4			43.9			32.9	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 39.1  
 Intersection Capacity Utilization 78.4%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service D

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Shopping Plaza  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	436	284	151	76	513	185	213	395	22	246	917	973
v/c Ratio	0.82	0.27	0.10	0.42	0.85	0.39	0.72	0.35	0.01	0.66	0.76	0.61
Control Delay	62.8	33.9	0.1	62.2	62.5	3.8	67.8	33.4	0.0	48.2	56.1	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	33.9	0.1	62.2	62.5	3.8	67.8	33.4	0.0	48.2	56.1	7.2
Queue Length 50th (ft)	169	90	0	29	203	0	84	127	0	103	340	202
Queue Length 95th (ft)	#229	128	0	56	#284	18	#132	174	0	m95	m309	m76
Internal Link Dist (ft)		1165			1100			342			861	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	557	1042	1583	185	623	484	302	1122	1583	409	1199	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.27	0.10	0.41	0.82	0.38	0.71	0.35	0.01	0.60	0.76	0.61

Intersection Summary

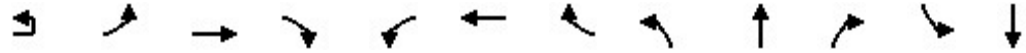
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Shopping Plaza  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕
Traffic Volume (veh/h)	10	391	261	139	70	472	170	196	363	20	226	844
Future Volume (veh/h)	10	391	261	139	70	472	170	196	363	20	226	844
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		425	284	0	76	513	0	213	395	0	246	917
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		488	945		133	580		269	1268		307	1307
Arrive On Green		0.14	0.27	0.00	0.04	0.16	0.00	0.08	0.36	0.00	0.09	0.37
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		425	284	0	76	513	0	213	395	0	246	917
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		14.5	7.7	0.0	2.6	16.9	0.0	7.3	9.7	0.0	8.4	26.4
Cycle Q Clear(g_c), s		14.5	7.7	0.0	2.6	16.9	0.0	7.3	9.7	0.0	8.4	26.4
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		488	945		133	580		269	1268		307	1307
V/C Ratio(X)		0.87	0.30		0.57	0.88		0.79	0.31		0.80	0.70
Avail Cap(c_a), veh/h		562	1007		187	622		302	1268		412	1307
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		50.5	35.1	0.0	56.7	49.1	0.0	54.4	27.9	0.0	53.6	32.3
Incr Delay (d2), s/veh		12.7	0.2	0.0	3.9	13.7	0.0	12.1	0.6	0.0	8.0	3.2
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
%ile BackOfQ(50%),veh/ln		6.9	3.2	0.0	1.2	8.4	0.0	3.6	4.2	0.0	4.0	11.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		63.2	35.3	0.0	60.6	62.8	0.0	66.4	28.6	0.0	61.6	35.5
LnGrp LOS		E	D		E	E		E	C		E	D
Approach Vol, veh/h			709			589			608			1163
Approach Delay, s/veh			52.0			62.5			41.8			41.0
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.2	49.8	12.1	38.9	17.8	51.1	24.4	26.6				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	14.3	35.2	6.5	34.0	10.5	39.0	19.5	21.0				
Max Q Clear Time (g_c+I1), s	10.4	11.7	4.6	9.7	9.3	28.4	16.5	18.9				
Green Ext Time (p_c), s	0.3	2.5	0.0	1.6	0.1	4.5	0.5	0.6				

Intersection Summary

HCM 6th Ctrl Delay	47.8
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	895
Future Volume (veh/h)	895
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

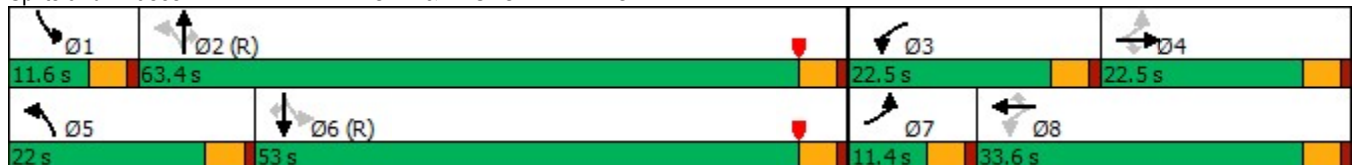
Total Future 2040 AM Shopping Plaza  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	61	309	114	71	43	375	558	47	130	1575	179
Future Volume (vph)	215	61	309	114	71	43	375	558	47	130	1575	179
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	22.0	63.4	63.4	11.6	53.0	53.0
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	18.3%	52.8%	52.8%	9.7%	44.2%	44.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.9	11.8	11.8	26.4	16.9	16.9	82.4	70.0	70.0	56.4	48.5	48.5
Actuated g/C Ratio	0.17	0.10	0.10	0.22	0.14	0.14	0.69	0.58	0.58	0.47	0.40	0.40
v/c Ratio	0.48	0.36	0.79	0.40	0.29	0.14	0.82	0.29	0.05	0.32	1.20	0.26
Control Delay	40.6	54.0	22.5	40.1	45.9	0.9	49.9	18.1	2.8	13.1	135.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	54.0	22.5	40.1	45.9	0.9	49.9	18.1	2.8	13.1	135.0	12.6
LOS	D	D	C	D	D	A	D	B	A	B	F	B
Approach Delay		32.4			34.4			29.5			115.0	
Approach LOS		C			C			C			F	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.20  
 Intersection Signal Delay: 74.1  
 Intersection Capacity Utilization 88.5%  
 Analysis Period (min) 15  
 Intersection LOS: E  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 AM Shopping Plaza  
01/23/2023

































Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	234	66	336	124	77	47	408	607	51	141	1712	195
v/c Ratio	0.48	0.36	0.79	0.40	0.29	0.14	0.82	0.29	0.05	0.32	1.20	0.26
Control Delay	40.6	54.0	22.5	40.1	45.9	0.9	49.9	18.1	2.8	13.1	135.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	54.0	22.5	40.1	45.9	0.9	49.9	18.1	2.8	13.1	135.0	12.6
Queue Length 50th (ft)	78	50	27	81	55	0	288	142	2	38	~872	57
Queue Length 95th (ft)	97	87	121	116	89	0	m#556	187	m10	m63	#1018	m85
Internal Link Dist (ft)		508			1196			230				776
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	491	286	496	358	451	486	497	2064	980	436	1430	750
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.23	0.68	0.35	0.17	0.10	0.82	0.29	0.05	0.32	1.20	0.26

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 AM Shopping Plaza  
01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 		
Traffic Volume (veh/h)	215	61	309	114	71	43	375	558	47	130	1575	179
Future Volume (veh/h)	215	61	309	114	71	43	375	558	47	130	1575	179
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	234	66	0	124	77	0	408	607	51	141	1712	195
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	416	99		231	145		368	2365	1055	589	2022	902
Arrive On Green	0.06	0.05	0.00	0.08	0.08	0.00	0.15	0.67	0.67	0.05	0.57	0.57
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	234	66	0	124	77	0	408	607	51	141	1712	195
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	4.2	0.0	7.7	4.8	0.0	17.5	8.3	1.3	3.9	48.1	7.3
Cycle Q Clear(g_c), s	6.9	4.2	0.0	7.7	4.8	0.0	17.5	8.3	1.3	3.9	48.1	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	416	99		231	145		368	2365	1055	589	2022	902
V/C Ratio(X)	0.56	0.67		0.54	0.53		1.11	0.26	0.05	0.24	0.85	0.22
Avail Cap(c_a), veh/h	416	281		351	454		368	2365	1055	607	2022	902
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.2	55.8	0.0	47.9	53.2	0.0	37.9	8.1	6.9	9.5	21.5	12.7
Incr Delay (d2), s/veh	1.7	7.6	0.0	1.9	3.0	0.0	79.9	0.3	0.1	0.2	4.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.2	0.0	3.6	2.4	0.0	18.5	2.7	0.5	1.4	18.4	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	63.4	0.0	49.8	56.2	0.0	117.8	8.4	7.0	9.7	26.1	13.3
LnGrp LOS	D	E		D	E		F	A	A	A	C	B
Approach Vol, veh/h		300			201			1066			2048	
Approach Delay, s/veh		55.2			52.2			50.2			23.8	
Approach LOS		E			D			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.4	84.4	14.4	10.8	22.0	72.8	11.4	13.8				
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	7.1	58.9	18.0	18.0	17.5	48.5	6.9	29.1				
Max Q Clear Time (g_c+I1), s	5.9	10.3	9.7	6.2	19.5	50.1	8.9	6.8				
Green Ext Time (p_c), s	0.0	4.0	0.2	0.2	0.0	0.0	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	35.7
HCM 6th LOS	D

Notes

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

Timings  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 AM Shopping Plaza  
 01/23/2023

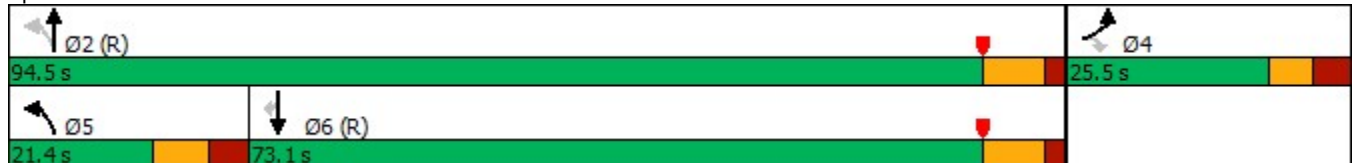


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	121	236	172	594	1610	174
Future Volume (vph)	121	236	172	594	1610	174
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	25.5	25.5	21.4	94.5	73.1	73.1
Total Split (%)	21.3%	21.3%	17.8%	78.8%	60.9%	60.9%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	12.1	12.1	91.9	92.9	72.2	72.2
Actuated g/C Ratio	0.10	0.10	0.77	0.77	0.60	0.60
v/c Ratio	0.38	0.78	0.78	0.24	0.82	0.18
Control Delay	52.5	31.0	64.2	1.4	24.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	31.0	64.2	1.4	24.3	2.3
LOS	D	C	E	A	C	A
Approach Delay	38.3			15.5	22.2	
Approach LOS	D			B	C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 22.4  
 Intersection Capacity Utilization 80.3%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	132	257	187	646	1750	189
v/c Ratio	0.38	0.78	0.78	0.24	0.82	0.18
Control Delay	52.5	31.0	64.2	1.4	24.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	31.0	64.2	1.4	24.3	2.3
Queue Length 50th (ft)	50	49	92	14	534	0
Queue Length 95th (ft)	77	137	#214	41	738	33
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	514	399	262	2738	2129	1028
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	0.26	0.64	0.71	0.24	0.82	0.18

#### Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 AM Shopping Plaza  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	121	236	172	594	1610	174
Future Volume (veh/h)	121	236	172	594	1610	174
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	132	0	187	646	1750	189
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	228		234	2875	2454	1095
Arrive On Green	0.07	0.00	0.05	0.81	0.69	0.69
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	132	0	187	646	1750	189
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	4.5	0.0	3.4	5.1	36.0	5.0
Cycle Q Clear(g_c), s	4.5	0.0	3.4	5.1	36.0	5.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	228		234	2875	2454	1095
V/C Ratio(X)	0.58		0.80	0.22	0.71	0.17
Avail Cap(c_a), veh/h	518		341	2875	2454	1095
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.4	0.0	22.9	2.7	11.3	6.5
Incr Delay (d2), s/veh	2.3	0.0	8.2	0.2	1.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	4.4	1.4	13.4	1.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.8	0.0	31.0	2.9	13.1	6.9
LnGrp LOS	E		C	A	B	A
Approach Vol, veh/h	132			833	1939	
Approach Delay, s/veh	56.8			9.2	12.5	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.6		15.4	14.2	90.4
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		87.0		18.0	12.9	65.6
Max Q Clear Time (g_c+I1), s		7.1		6.5	5.4	38.0
Green Ext Time (p_c), s		5.3		0.3	0.3	17.9

Intersection Summary

HCM 6th Ctrl Delay	13.6
HCM 6th LOS	B

Notes

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

**Intersection**

Int Delay, s/veh 5.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	164	73	272	73	1	193
Future Vol, veh/h	164	73	272	73	1	193
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	178	79	296	79	1	210

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	810
Stage 1	-	-	178
Stage 2	-	-	632
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1305	318
Stage 1	-	-	835
Stage 2	-	-	492
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1305	246
Mov Cap-2 Maneuver	-	-	246
Stage 1	-	-	835
Stage 2	-	-	380

Approach	EB	WB	NB
HCM Control Delay, s	0	6.8	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	937	-	-	1305	-
HCM Lane V/C Ratio	0.225	-	-	0.227	-
HCM Control Delay (s)	10	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.9	-



Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Warehouse  
01/23/2023

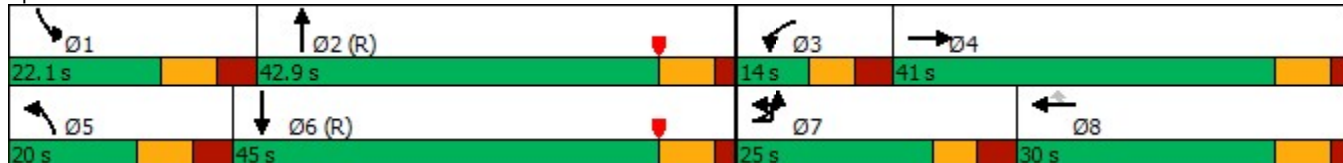
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	310	261	139	70	472	143	196	326	20	209	822	845
Future Volume (vph)	310	261	139	70	472	143	196	326	20	209	822	845
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	25.0	41.0		14.0	30.0	30.0	20.0	42.9		22.1	45.0	
Total Split (%)	20.8%	34.2%		11.7%	25.0%	25.0%	16.7%	35.8%		18.4%	37.5%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	16.1	34.0	120.0	6.4	21.5	21.5	11.0	40.0	120.0	12.3	41.3	120.0
Actuated g/C Ratio	0.13	0.28	1.00	0.05	0.18	0.18	0.09	0.33	1.00	0.10	0.34	1.00
v/c Ratio	0.75	0.28	0.10	0.42	0.81	0.32	0.68	0.30	0.01	0.64	0.73	0.58
Control Delay	60.9	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.9	52.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.9	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.9	52.1	4.7
LOS	E	C	A	E	E	A	E	C	A	D	D	A
Approach Delay		39.7			46.6			42.2			30.6	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 30 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 36.8  
 Intersection Capacity Utilization 75.5%  
 Analysis Period (min) 15

Intersection LOS: D  
 ICU Level of Service D

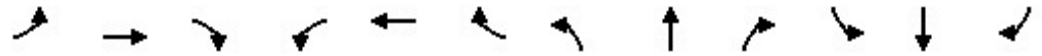
Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Warehouse

01/23/2023



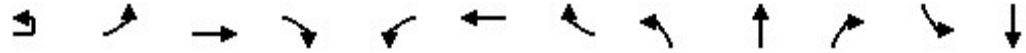
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	348	284	151	76	513	155	213	354	22	227	893	918
v/c Ratio	0.75	0.28	0.10	0.42	0.81	0.32	0.68	0.30	0.01	0.64	0.73	0.58
Control Delay	60.9	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.9	52.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.9	34.7	0.1	62.2	57.9	1.7	64.1	31.6	0.0	50.9	52.1	4.7
Queue Length 50th (ft)	134	90	0	29	199	0	83	111	0	95	311	82
Queue Length 95th (ft)	185	128	0	56	262	0	125	155	0	m95	m305	m53
Internal Link Dist (ft)		1165			1100			342			861	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	500	1023	1583	185	679	505	328	1179	1583	389	1219	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.28	0.10	0.41	0.76	0.31	0.65	0.30	0.01	0.58	0.73	0.58

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Warehouse  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕
Traffic Volume (veh/h)	10	310	261	139	70	472	143	196	326	20	209	822
Future Volume (veh/h)	10	310	261	139	70	472	143	196	326	20	209	822
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		337	284	0	76	513	0	213	354	0	227	893
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		401	869		133	593		271	1364		288	1382
Arrive On Green		0.12	0.24	0.00	0.04	0.17	0.00	0.08	0.38	0.00	0.08	0.39
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		337	284	0	76	513	0	213	354	0	227	893
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		11.5	7.9	0.0	2.6	16.9	0.0	7.3	8.2	0.0	7.7	24.6
Cycle Q Clear(g_c), s		11.5	7.9	0.0	2.6	16.9	0.0	7.3	8.2	0.0	7.7	24.6
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		401	869		133	593		271	1364		288	1382
V/C Ratio(X)		0.84	0.33		0.57	0.86		0.79	0.26		0.79	0.65
Avail Cap(c_a), veh/h		504	1007		187	681		331	1364		392	1382
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		52.0	37.2	0.0	56.7	48.7	0.0	54.3	25.3	0.0	54.0	29.9
Incr Delay (d2), s/veh		10.0	0.2	0.0	3.9	10.2	0.0	9.8	0.5	0.0	7.4	2.3
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
%ile BackOfQ(50%),veh/ln		5.4	3.4	0.0	1.2	8.1	0.0	3.5	3.5	0.0	3.6	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		62.0	37.4	0.0	60.6	58.9	0.0	64.1	25.8	0.0	61.4	32.3
LnGrp LOS		E	D		E	E		E	C		E	C
Approach Vol, veh/h			621			589			567			1120
Approach Delay, s/veh			50.8			59.1			40.2			38.2
Approach LOS			D			E			D			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.5	53.1	12.1	36.3	17.9	53.7	21.4	27.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	13.6	35.9	6.5	34.0	11.5	38.0	17.5	23.0				
Max Q Clear Time (g_c+I1), s	9.7	10.2	4.6	9.9	9.3	26.6	13.5	18.9				
Green Ext Time (p_c), s	0.3	2.3	0.0	1.6	0.1	4.6	0.4	1.2				

Intersection Summary

HCM 6th Ctrl Delay	45.5
HCM 6th LOS	D

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary  
 1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 AM Warehouse  
 01/23/2023

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	845
Future Volume (veh/h)	845
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

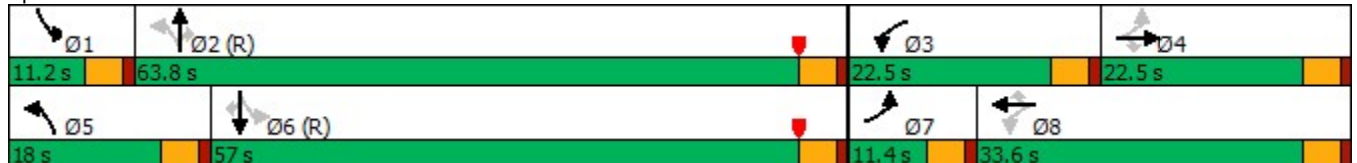
Total Future 2040 AM Warehouse  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	61	254	114	71	43	284	504	47	130	1541	179
Future Volume (vph)	215	61	254	114	71	43	284	504	47	130	1541	179
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.4	22.5	22.5	22.5	33.6	33.6	18.0	63.8	63.8	11.2	57.0	57.0
Total Split (%)	9.5%	18.8%	18.8%	18.8%	28.0%	28.0%	15.0%	53.2%	53.2%	9.3%	47.5%	47.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.3	11.2	11.2	25.8	16.4	16.4	82.9	70.5	70.5	60.8	52.9	52.9
Actuated g/C Ratio	0.16	0.09	0.09	0.22	0.14	0.14	0.69	0.59	0.59	0.51	0.44	0.44
v/c Ratio	0.49	0.38	0.75	0.41	0.30	0.14	0.70	0.26	0.05	0.29	1.07	0.24
Control Delay	41.4	55.6	22.9	40.9	46.7	0.9	43.6	17.3	2.8	12.1	87.5	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.4	55.6	22.9	40.9	46.7	0.9	43.6	17.3	2.8	12.1	87.5	11.2
LOS	D	E	C	D	D	A	D	B	A	B	F	B
Approach Delay		34.2			35.1			25.4			74.8	
Approach LOS		C			D			C			E	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 54.0  
 Intersection Capacity Utilization 82.6%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 AM Warehouse  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	234	66	276	124	77	47	309	548	51	141	1675	195
v/c Ratio	0.49	0.38	0.75	0.41	0.30	0.14	0.70	0.26	0.05	0.29	1.07	0.24
Control Delay	41.4	55.6	22.9	40.9	46.7	0.9	43.6	17.3	2.8	12.1	87.5	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.4	55.6	22.9	40.9	46.7	0.9	43.6	17.3	2.8	12.1	87.5	11.2
Queue Length 50th (ft)	78	50	25	81	55	0	210	122	3	46	~788	48
Queue Length 95th (ft)	98	88	109	117	90	0	#421	161	m11	m68	#934	m78
Internal Link Dist (ft)		508			1196			230			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	478	284	446	352	451	486	440	2078	986	484	1559	806
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.23	0.62	0.35	0.17	0.10	0.70	0.26	0.05	0.29	1.07	0.24



































Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 AM Warehouse

01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 	 	 
Traffic Volume (veh/h)	215	61	254	114	71	43	284	504	47	130	1541	179
Future Volume (veh/h)	215	61	254	114	71	43	284	504	47	130	1541	179
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	234	66	0	124	77	0	309	548	51	141	1675	195
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	416	99		231	145		334	2374	1059	637	2140	955
Arrive On Green	0.06	0.05	0.00	0.08	0.08	0.00	0.11	0.67	0.67	0.05	0.60	0.60
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	234	66	0	124	77	0	309	548	51	141	1675	195
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.9	4.2	0.0	7.7	4.8	0.0	11.5	7.3	1.3	3.6	42.5	6.7
Cycle Q Clear(g_c), s	6.9	4.2	0.0	7.7	4.8	0.0	11.5	7.3	1.3	3.6	42.5	6.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	416	99		231	145		334	2374	1059	637	2140	955
V/C Ratio(X)	0.56	0.67		0.54	0.53		0.93	0.23	0.05	0.22	0.78	0.20
Avail Cap(c_a), veh/h	416	281		351	454		334	2374	1059	653	2140	955
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.2	55.8	0.0	47.9	53.2	0.0	32.5	7.8	6.8	8.0	17.9	10.8
Incr Delay (d2), s/veh	1.7	7.6	0.0	1.9	3.0	0.0	31.0	0.2	0.1	0.2	2.9	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.2	0.0	3.6	2.4	0.0	11.5	2.4	0.5	1.2	15.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	63.4	0.0	49.8	56.2	0.0	63.5	8.0	6.9	8.2	20.9	11.3
LnGrp LOS	D	E		D	E		E	A	A	A	C	B
Approach Vol, veh/h		300			201			908			2011	
Approach Delay, s/veh		55.2			52.2			26.8			19.1	
Approach LOS		E			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.1	84.7	14.4	10.8	18.0	76.8	11.4	13.8				
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	6.7	59.3	18.0	18.0	13.5	52.5	6.9	29.1				
Max Q Clear Time (g_c+I1), s	5.6	9.3	9.7	6.2	13.5	44.5	8.9	6.8				
Green Ext Time (p_c), s	0.0	3.6	0.2	0.2	0.0	6.0	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 AM Warehouse

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↖	↖	↑↑	↑↑	↖
Traffic Volume (vph)	99	202	118	594	1610	137
Future Volume (vph)	99	202	118	594	1610	137
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	25.5	25.5	13.5	25.5	25.5	25.5
Total Split (s)	25.5	25.5	18.0	94.5	76.5	76.5
Total Split (%)	21.3%	21.3%	15.0%	78.8%	63.8%	63.8%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	12.1	12.1	91.9	92.9	75.7	75.7
Actuated g/C Ratio	0.10	0.10	0.77	0.77	0.63	0.63
v/c Ratio	0.31	0.76	0.62	0.24	0.78	0.14
Control Delay	51.2	34.8	45.3	1.5	20.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	34.8	45.3	1.5	20.6	2.1
LOS	D	C	D	A	C	A
Approach Delay	40.2			8.8	19.2	
Approach LOS	D			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 18.8  
 Intersection Capacity Utilization 77.3%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



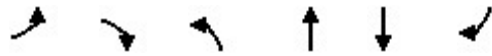


## Queues

Total Future 2040 AM Warehouse

## 3: MERIDIAN ROAD &amp; BENT GRASS MEADOWS DRIVE

01/23/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	108	220	128	646	1750	149
v/c Ratio	0.31	0.76	0.62	0.24	0.78	0.14
Control Delay	51.2	34.8	45.3	1.5	20.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	34.8	45.3	1.5	20.6	2.1
Queue Length 50th (ft)	40	55	43	16	483	0
Queue Length 95th (ft)	65	136	119	44	686	28
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	514	362	222	2740	2231	1053
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	0.61	0.58	0.24	0.78	0.14

## Intersection Summary

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 AM Warehouse  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	99	202	118	594	1610	137
Future Volume (veh/h)	99	202	118	594	1610	137
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	0	128	646	1750	149
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	224		230	2879	2481	1107
Arrive On Green	0.06	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	108	0	128	646	1750	149
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.6	0.0	2.3	5.1	35.1	3.8
Cycle Q Clear(g_c), s	3.6	0.0	2.3	5.1	35.1	3.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	224		230	2879	2481	1107
V/C Ratio(X)	0.48		0.56	0.22	0.71	0.13
Avail Cap(c_a), veh/h	518		297	2879	2481	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	16.3	2.6	10.8	6.0
Incr Delay (d2), s/veh	1.6	0.0	2.1	0.2	1.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	2.2	1.4	13.0	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.8	0.0	18.4	2.8	12.5	6.3
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	108			774	1899	
Approach Delay, s/veh	55.8			5.4	12.0	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.7		15.3	13.4	91.3
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		87.0		18.0	9.5	69.0
Max Q Clear Time (g_c+I1), s		7.1		5.6	4.3	37.1
Green Ext Time (p_c), s		5.3		0.2	0.1	19.5
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			11.9			
HCM 6th LOS			B			

Notes

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

Intersection						
Int Delay, s/veh	4.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	164	73	181	73	1	138
Future Vol, veh/h	164	73	181	73	1	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	178	79	197	79	1	150

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	257	0	612
Stage 1	-	-	-	-	178
Stage 2	-	-	-	-	434
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1305	-	425
Stage 1	-	-	-	-	835
Stage 2	-	-	-	-	621
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1305	-	361
Mov Cap-2 Maneuver	-	-	-	-	361
Stage 1	-	-	-	-	835
Stage 2	-	-	-	-	527

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	940	-	-	1305	-
HCM Lane V/C Ratio	0.161	-	-	0.151	-
HCM Control Delay (s)	9.6	-	-	8.2	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.5	-

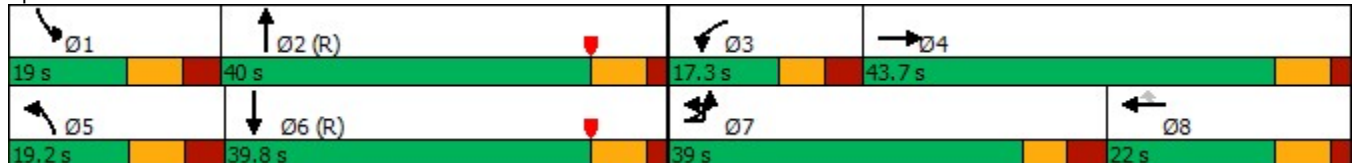
Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	994	547	189	133	441	317	256	964	126	325	693	695
Future Volume (vph)	994	547	189	133	441	317	256	964	126	325	693	695
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	39.0	43.7		17.3	22.0	22.0	19.2	40.0		19.0	39.8	
Total Split (%)	32.5%	36.4%		14.4%	18.3%	18.3%	16.0%	33.3%		15.8%	33.2%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	31.5	37.3	120.0	9.2	15.0	15.0	10.7	33.0	120.0	10.5	32.8	120.0
Actuated g/C Ratio	0.26	0.31	1.00	0.08	0.12	0.12	0.09	0.28	1.00	0.09	0.27	1.00
v/c Ratio	1.22	0.54	0.13	0.55	1.08	0.83	0.91	1.08	0.09	1.18	0.78	0.48
Control Delay	146.2	36.6	0.2	61.5	116.3	32.6	87.0	93.5	0.1	123.8	42.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	146.2	36.6	0.2	61.5	116.3	32.6	87.0	93.5	0.1	123.8	42.1	2.6
LOS	F	D	A	E	F	C	F	F	A	F	D	A
Approach Delay		96.0			78.3			83.5			41.6	
Approach LOS		F			E			F			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.22  
 Intersection Signal Delay: 73.9  
 Intersection LOS: E  
 Intersection Capacity Utilization 101.8%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 PM Shopping Plaza  
01/23/2023



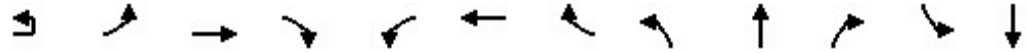
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	1096	595	205	145	479	345	278	1048	137	353	753	755
v/c Ratio	1.22	0.54	0.13	0.55	1.08	0.83	0.91	1.08	0.09	1.18	0.78	0.48
Control Delay	146.2	36.6	0.2	61.5	116.3	32.6	87.0	93.5	0.1	123.8	42.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	146.2	36.6	0.2	61.5	116.3	32.6	87.0	93.5	0.1	123.8	42.1	2.6
Queue Length 50th (ft)	~536	202	0	56	~218	70	111	~476	0	~166	317	33
Queue Length 95th (ft)	#668	261	0	91	#328	#226	#192	#610	0	m#177	m316	m40
Internal Link Dist (ft)		1165			1100			342				861
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	901	1099	1583	280	442	416	306	973	1583	300	967	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.54	0.13	0.52	1.08	0.83	0.91	1.08	0.09	1.18	0.78	0.48

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 PM Shopping Plaza  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕	↔	↔↔	↕↕
Traffic Volume (veh/h)	15	994	547	189	133	441	317	256	964	126	325	693
Future Volume (veh/h)	15	994	547	189	133	441	317	256	964	126	325	693
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		1080	595	0	145	479	0	278	1048	0	353	753
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		907	1170		201	444		308	977		302	971
Arrive On Green		0.26	0.33	0.00	0.06	0.13	0.00	0.09	0.28	0.00	0.09	0.27
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		1080	595	0	145	479	0	278	1048	0	353	753
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		31.5	16.2	0.0	4.9	15.0	0.0	9.6	33.0	0.0	10.5	23.4
Cycle Q Clear(g_c), s		31.5	16.2	0.0	4.9	15.0	0.0	9.6	33.0	0.0	10.5	23.4
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		907	1170		201	444		308	977		302	971
V/C Ratio(X)		1.19	0.51		0.72	1.08		0.90	1.07		1.17	0.78
Avail Cap(c_a), veh/h		907	1170		282	444		308	977		302	971
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		44.3	32.4	0.0	55.5	52.5	0.0	54.1	43.5	0.0	54.8	40.2
Incr Delay (d2), s/veh		96.7	0.4	0.0	5.2	65.3	0.0	27.9	50.3	0.0	105.1	6.0
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
%ile BackOfQ(50%),veh/ln		25.1	6.8	0.0	2.3	10.5	0.0	5.3	21.0	0.0	8.9	10.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		141.0	32.8	0.0	60.8	117.8	0.0	82.0	93.8	0.0	159.8	46.2
LnGrp LOS		F	C		E	F		F	F		F	D
Approach Vol, veh/h			1675			624			1326			1106
Approach Delay, s/veh			102.6			104.6			91.3			82.5
Approach LOS			F			F			F			F
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	40.0	14.5	46.5	19.2	39.8	39.0	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	10.5	33.0	9.8	36.7	10.7	32.8	31.5	15.0				
Max Q Clear Time (g_c+I1), s	12.5	35.0	6.9	18.2	11.6	25.4	33.5	17.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	3.4	0.0	2.9	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	95.0
HCM 6th LOS	F

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	695
Future Volume (veh/h)	695
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Shopping Plaza  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	146	474	37	100	158	542	1657	136	97	1116	170
Future Volume (vph)	330	146	474	37	100	158	542	1657	136	97	1116	170
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	16.0	22.0	22.0	12.5	18.5	18.5	38.7	72.0	72.0	13.5	46.8	46.8
Total Split (%)	13.3%	18.3%	18.3%	10.4%	15.4%	15.4%	32.3%	60.0%	60.0%	11.3%	39.0%	39.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	22.7	16.9	16.9	14.9	10.9	10.9	79.1	64.9	64.9	44.0	39.3	39.3
Actuated g/C Ratio	0.19	0.14	0.14	0.12	0.09	0.09	0.66	0.54	0.54	0.37	0.33	0.33
v/c Ratio	0.80	0.61	0.88	0.23	0.64	0.46	1.09	0.94	0.16	0.72	1.05	0.27
Control Delay	56.5	60.0	27.8	41.0	70.0	4.5	86.5	18.2	0.9	60.1	65.3	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	60.0	27.8	41.0	70.0	4.5	86.5	18.2	0.9	60.1	65.3	3.0
LOS	E	E	C	D	E	A	F	B	A	E	E	A
Approach Delay		42.7			31.3			33.0			57.3	
Approach LOS		D			C			C			E	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 150  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 41.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 100.3%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD





Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Shopping Plaza  
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





























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	359	159	515	40	109	172	589	1801	148	105	1213	185
v/c Ratio	0.80	0.61	0.88	0.23	0.64	0.46	1.09	0.94	0.16	0.72	1.05	0.27
Control Delay	56.5	60.0	27.8	41.0	70.0	4.5	86.5	18.2	0.9	60.1	65.3	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.5	60.0	27.8	41.0	70.0	4.5	86.5	18.2	0.9	60.1	65.3	3.0
Queue Length 50th (ft)	124	119	67	25	82	0	~465	517	3	45	~538	34
Queue Length 95th (ft)	#182	#203	#276	55	144	4	m#399	m347	m3	#129	#677	16
Internal Link Dist (ft)		508			1196			230			776	
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	451	266	589	174	186	387	540	1913	936	146	1159	683
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.60	0.87	0.23	0.59	0.44	1.09	0.94	0.16	0.72	1.05	0.27

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Shopping Plaza  
01/23/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 		
Traffic Volume (veh/h)	330	146	474	37	100	158	542	1657	136	97	1116	170
Future Volume (veh/h)	330	146	474	37	100	158	542	1657	136	97	1116	170
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	359	159	0	40	109	0	589	1801	148	105	1213	185
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	409	195		160	140		530	1999	892	160	1253	559
Arrive On Green	0.07	0.10	0.00	0.04	0.07	0.00	0.26	0.56	0.56	0.04	0.35	0.35
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	359	159	0	40	109	0	589	1801	148	105	1213	185
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	8.5	10.0	0.0	2.4	6.9	0.0	31.2	53.9	5.4	4.6	40.3	10.3
Cycle Q Clear(g_c), s	8.5	10.0	0.0	2.4	6.9	0.0	31.2	53.9	5.4	4.6	40.3	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	409	195		160	140		530	1999	892	160	1253	559
V/C Ratio(X)	0.88	0.82		0.25	0.78		1.11	0.90	0.17	0.66	0.97	0.33
Avail Cap(c_a), veh/h	409	242		160	187		530	1999	892	160	1253	559
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.8	52.6	0.0	48.1	54.5	0.0	36.8	23.3	12.7	29.2	38.2	28.5
Incr Delay (d2), s/veh	19.1	16.0	0.0	0.8	13.7	0.0	73.5	7.1	0.4	9.4	18.8	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	5.5	0.0	1.1	3.8	0.0	25.4	21.2	2.0	2.2	19.5	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.9	68.7	0.0	48.9	68.2	0.0	110.3	30.3	13.1	38.6	57.0	30.1
LnGrp LOS	E	E		D	E		F	C	B	D	E	C
Approach Vol, veh/h		518			149			2538			1503	
Approach Delay, s/veh		69.5			63.0			47.9			52.4	
Approach LOS		E			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.5	75.0	12.5	19.0	38.7	49.8	16.0	15.5				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	5.0	64.5	5.0	15.5	31.2	39.3	8.5	12.0				
Max Q Clear Time (g_c+I1), s	6.6	55.9	4.4	12.0	33.2	42.3	10.5	8.9				
Green Ext Time (p_c), s	0.0	6.7	0.0	0.2	0.0	0.0	0.0	0.1				

Intersection Summary												
HCM 6th Ctrl Delay				52.2								
HCM 6th LOS				D								

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 PM Shopping Plaza  
01/23/2023

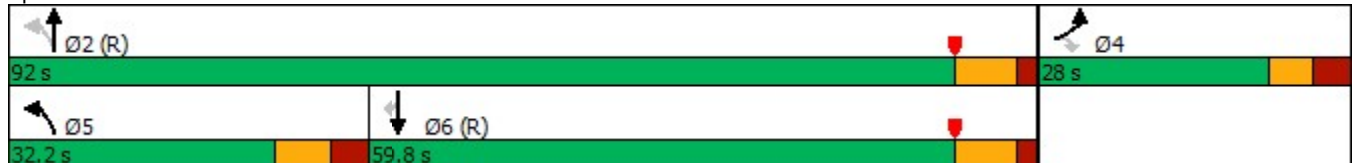


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	193	264	260	1826	1066	222
Future Volume (vph)	193	264	260	1826	1066	222
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	28.0	28.0	32.2	92.0	59.8	59.8
Total Split (%)	23.3%	23.3%	26.8%	76.7%	49.8%	49.8%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	12.6	12.6	91.4	92.4	67.7	67.7
Actuated g/C Ratio	0.10	0.10	0.76	0.77	0.56	0.56
v/c Ratio	0.58	0.68	0.68	0.73	0.58	0.24
Control Delay	57.4	14.2	13.1	8.2	20.0	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	14.2	13.1	8.2	20.0	2.8
LOS	E	B	B	A	C	A
Approach Delay	32.5			8.8	17.0	
Approach LOS	C			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 14.4  
 Intersection Capacity Utilization 70.1%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	210	287	283	1985	1159	241
v/c Ratio	0.58	0.68	0.68	0.73	0.58	0.24
Control Delay	57.4	14.2	13.1	8.2	20.0	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	14.2	13.1	8.2	20.0	2.8
Queue Length 50th (ft)	80	0	26	510	290	0
Queue Length 95th (ft)	118	83	m48	m763	451	44
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	586	508	515	2723	1996	998
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	0.36	0.56	0.55	0.73	0.58	0.24

#### Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 PM Shopping Plaza  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	193	264	260	1826	1066	222
Future Volume (veh/h)	193	264	260	1826	1066	222
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	210	0	283	1985	1159	241
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	277		374	2824	2317	1034
Arrive On Green	0.08	0.00	0.07	0.79	0.65	0.65
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	210	0	283	1985	1159	241
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	7.1	0.0	5.9	31.2	20.2	7.5
Cycle Q Clear(g_c), s	7.1	0.0	5.9	31.2	20.2	7.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	277		374	2824	2317	1034
V/C Ratio(X)	0.76		0.76	0.70	0.50	0.23
Avail Cap(c_a), veh/h	590		598	2824	2317	1034
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.0	0.0	12.5	5.7	10.8	8.6
Incr Delay (d2), s/veh	4.2	0.0	3.1	1.5	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	3.8	9.5	7.7	2.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	58.2	0.0	15.7	7.2	11.6	9.1
LnGrp LOS	E		B	A	B	A
Approach Vol, veh/h	210			2268	1400	
Approach Delay, s/veh	58.2			8.3	11.1	
Approach LOS	E			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		102.9		17.1	17.1	85.8
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		84.5		20.5	23.7	52.3
Max Q Clear Time (g_c+I1), s		33.2		9.1	7.9	22.2
Green Ext Time (p_c), s		29.6		0.5	0.7	11.6

Intersection Summary

HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Notes

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

Intersection						
Int Delay, s/veh	6.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	118	47	307	157	2	339
Future Vol, veh/h	118	47	307	157	2	339
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	128	51	334	171	2	368

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	179	0	882
Stage 1	-	-	-	-	128
Stage 2	-	-	-	-	754
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1394	-	286
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	425
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1394	-	217
Mov Cap-2 Maneuver	-	-	-	-	217
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	323

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	967	-	-	1394	-
HCM Lane V/C Ratio	0.383	-	-	0.239	-
HCM Control Delay (s)	11	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1.8	-	-	0.9	-

Timings  
1: MERIDIAN ROAD & WOODMAN ROAD

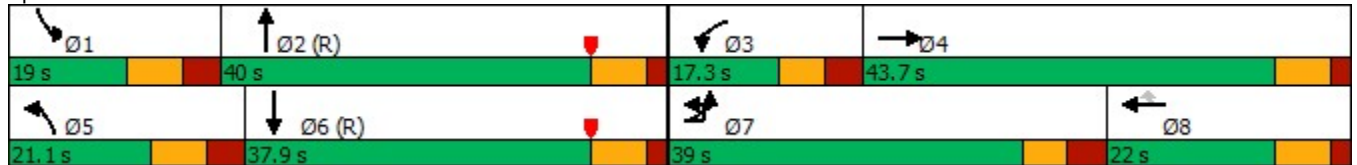
Total Future 2040 PM Warehouse  
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	831	547	189	133	441	262	256	891	126	266	614	518
Future Volume (vph)	831	547	189	133	441	262	256	891	126	266	614	518
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			8			Free			Free
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	12.5	22.0		12.5	22.0	22.0	13.5	22.0		13.5	22.0	
Total Split (s)	39.0	43.7		17.3	22.0	22.0	21.1	40.0		19.0	37.9	
Total Split (%)	32.5%	36.4%		14.4%	18.3%	18.3%	17.6%	33.3%		15.8%	31.6%	
Yellow Time (s)	4.0	5.0		4.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.5	2.0		3.5	2.0	2.0	3.5	2.0		3.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0	7.0	8.5	7.0		8.5	7.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	31.5	37.3	120.0	9.2	15.0	15.0	12.3	33.0	120.0	10.5	31.2	120.0
Actuated g/C Ratio	0.26	0.31	1.00	0.08	0.12	0.12	0.10	0.28	1.00	0.09	0.26	1.00
v/c Ratio	1.02	0.54	0.13	0.55	1.08	0.69	0.79	0.99	0.09	0.96	0.73	0.36
Control Delay	79.0	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.0	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.2	0.5
LOS	E	D	A	E	F	B	E	E	A	E	D	A
Approach Delay		54.9			76.9			63.8			36.0	
Approach LOS		D			E			E			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 37 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 130  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 55.6  
 Intersection Capacity Utilization 93.4%  
 Analysis Period (min) 15  
 Intersection LOS: E  
 ICU Level of Service F

Splits and Phases: 1: MERIDIAN ROAD & WOODMAN ROAD



Queues  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 PM Warehouse  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	919	595	205	145	479	285	278	968	137	289	667	563
v/c Ratio	1.02	0.54	0.13	0.55	1.08	0.69	0.79	0.99	0.09	0.96	0.73	0.36
Control Delay	79.0	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.0	36.6	0.2	61.5	116.3	18.5	69.2	71.3	0.1	72.5	50.2	0.5
Queue Length 50th (ft)	~389	202	0	56	~218	25	109	394	0	118	282	0
Queue Length 95th (ft)	#517	261	0	91	#328	117	#170	#540	0	m#193	350	0
Internal Link Dist (ft)		1165			1100			342			861	
Turn Bay Length (ft)	500		630	350		250	440		330	490		450
Base Capacity (vph)	901	1099	1583	280	442	416	360	973	1583	300	919	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.54	0.13	0.52	1.08	0.69	0.77	0.99	0.09	0.96	0.73	0.36

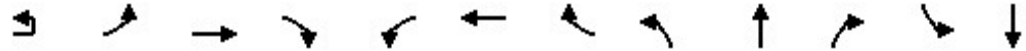
Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 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 6th Signalized Intersection Summary  
1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 PM Warehouse  
01/23/2023



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↔↔	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕	↗	↖↖	↕↕
Traffic Volume (veh/h)	15	831	547	189	133	441	262	256	891	126	266	614
Future Volume (veh/h)	15	831	547	189	133	441	262	256	891	126	266	614
Initial Q (Qb), veh		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	
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
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
Adj Flow Rate, veh/h		903	595	0	145	479	0	278	968	0	289	667
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
Percent Heavy Veh, %		2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h		907	1170		201	444		334	977		302	945
Arrive On Green		0.26	0.33	0.00	0.06	0.13	0.00	0.10	0.28	0.00	0.09	0.27
Sat Flow, veh/h		3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554
Grp Volume(v), veh/h		903	595	0	145	479	0	278	968	0	289	667
Grp Sat Flow(s),veh/h/ln		1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777
Q Serve(g_s), s		31.3	16.2	0.0	4.9	15.0	0.0	9.5	32.6	0.0	10.0	20.4
Cycle Q Clear(g_c), s		31.3	16.2	0.0	4.9	15.0	0.0	9.5	32.6	0.0	10.0	20.4
Prop In Lane		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h		907	1170		201	444		334	977		302	945
V/C Ratio(X)		1.00	0.51		0.72	1.08		0.83	0.99		0.96	0.71
Avail Cap(c_a), veh/h		907	1170		282	444		363	977		302	945
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
Upstream Filter(I)		1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		44.2	32.4	0.0	55.5	52.5	0.0	53.2	43.3	0.0	54.5	39.8
Incr Delay (d2), s/veh		28.7	0.4	0.0	5.2	65.3	0.0	14.3	26.6	0.0	39.9	4.4
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
%ile BackOfQ(50%),veh/ln		16.5	6.8	0.0	2.3	10.5	0.0	4.7	17.6	0.0	6.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh		72.9	32.8	0.0	60.8	117.8	0.0	67.5	69.9	0.0	94.4	44.2
LnGrp LOS		E	C		E	F		E	E		F	D
Approach Vol, veh/h			1498			624			1246			956
Approach Delay, s/veh			57.0			104.6			69.4			59.4
Approach LOS			E			F			E			E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	40.0	14.5	46.5	20.1	38.9	39.0	22.0				
Change Period (Y+Rc), s	8.5	7.0	7.5	7.0	8.5	7.0	7.5	7.0				
Max Green Setting (Gmax), s	10.5	33.0	9.8	36.7	12.6	30.9	31.5	15.0				
Max Q Clear Time (g_c+I1), s	12.0	34.6	6.9	18.2	11.5	22.4	33.3	17.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	3.4	0.1	2.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	68.0
HCM 6th LOS	E

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved ignoring U-Turning movement.
- Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary  
 1: MERIDIAN ROAD & WOODMAN ROAD

Total Future 2040 PM Warehouse  
 01/23/2023

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	518
Future Volume (veh/h)	518
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	
Arrive On Green	0.00
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	
V/C Ratio(X)	
Avail Cap(c_a), veh/h	
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Timings  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Warehouse

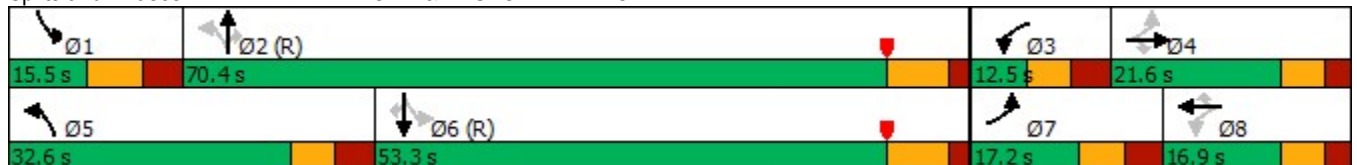
01/23/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	146	277	37	100	158	360	1548	136	97	998	170
Future Volume (vph)	330	146	277	37	100	158	360	1548	136	97	998	170
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	12.5	14.5	14.5	12.5	14.5	14.5	12.5	25.5	25.5	13.5	25.5	25.5
Total Split (s)	17.2	21.6	21.6	12.5	16.9	16.9	32.6	70.4	70.4	15.5	53.3	53.3
Total Split (%)	14.3%	18.0%	18.0%	10.4%	14.1%	14.1%	27.2%	58.7%	58.7%	12.9%	44.4%	44.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.5	5.5	5.0	5.5	5.5
All-Red Time (s)	3.5	2.5	2.5	3.5	2.5	2.5	3.5	2.0	2.0	3.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	6.5	6.5	7.5	6.5	6.5	7.5	7.5	7.5	8.5	7.5	7.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	23.9	17.1	17.1	13.9	9.9	9.9	78.9	63.5	63.5	53.9	48.0	48.0
Actuated g/C Ratio	0.20	0.14	0.14	0.12	0.08	0.08	0.66	0.53	0.53	0.45	0.40	0.40
v/c Ratio	0.77	0.60	0.62	0.24	0.71	0.47	0.91	0.90	0.16	0.64	0.77	0.24
Control Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.2	17.9	0.9	58.4	26.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.2	17.9	0.9	58.4	26.9	4.6
LOS	D	E	B	D	E	A	E	B	A	E	C	A
Approach Delay		39.6			34.3			23.9			26.3	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 89 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 28.0  
 Intersection Capacity Utilization 88.4%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 2: MERIDIAN ROAD & EASTONVILLE ROAD



Queues  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Warehouse  
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	359	159	301	40	109	172	391	1683	148	105	1085	185
v/c Ratio	0.77	0.60	0.62	0.24	0.71	0.47	0.91	0.90	0.16	0.64	0.77	0.24
Control Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.2	17.9	0.9	58.4	26.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	59.7	11.6	41.8	78.0	4.8	58.2	17.9	0.9	58.4	26.9	4.6
Queue Length 50th (ft)	125	119	0	25	83	0	226	454	3	39	390	31
Queue Length 95th (ft)	#179	#208	85	56	#165	4	m240	m504	m4	#106	483	58
Internal Link Dist (ft)		508			1196			230				776
Turn Bay Length (ft)	100		100	120		100	100		400	375		400
Base Capacity (vph)	464	266	484	164	161	370	451	1871	920	165	1414	779
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.60	0.62	0.24	0.68	0.46	0.87	0.90	0.16	0.64	0.77	0.24

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 6th Signalized Intersection Summary  
2: MERIDIAN ROAD & EASTONVILLE ROAD

Total Future 2040 PM Warehouse

01/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↑	↖	↖	↑↑	↖	↖	↑↑	↖
Traffic Volume (veh/h)	330	146	277	37	100	158	360	1548	136	97	998	170
Future Volume (veh/h)	330	146	277	37	100	158	360	1548	136	97	998	170
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	359	159	0	40	109	0	391	1683	148	105	1085	185
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	442	212		173	139		423	1947	868	179	1602	715
Arrive On Green	0.08	0.11	0.00	0.04	0.07	0.00	0.15	0.55	0.55	0.05	0.45	0.45
Sat Flow, veh/h	3456	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	359	159	0	40	109	0	391	1683	148	105	1085	185
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	9.7	9.9	0.0	2.4	6.9	0.0	15.5	48.8	5.6	3.8	29.0	8.7
Cycle Q Clear(g_c), s	9.7	9.9	0.0	2.4	6.9	0.0	15.5	48.8	5.6	3.8	29.0	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	442	212		173	139		423	1947	868	179	1602	715
V/C Ratio(X)	0.81	0.75		0.23	0.78		0.93	0.86	0.17	0.59	0.68	0.26
Avail Cap(c_a), veh/h	442	235		173	162		524	1947	868	200	1602	715
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.2	51.5	0.0	48.1	54.6	0.0	26.1	23.3	13.5	25.4	26.0	20.5
Incr Delay (d2), s/veh	11.0	11.3	0.0	0.7	19.0	0.0	20.0	5.4	0.4	3.6	2.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	5.3	0.0	1.1	4.0	0.0	8.0	19.1	2.1	1.6	11.7	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	62.8	0.0	48.7	73.6	0.0	46.1	28.7	14.0	29.0	28.4	21.4
LnGrp LOS	E	E		D	E		D	C	B	C	C	C
Approach Vol, veh/h		518			149			2222			1375	
Approach Delay, s/veh		60.9			66.9			30.8			27.5	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.1	73.2	12.5	20.1	25.8	61.6	17.2	15.4				
Change Period (Y+Rc), s	8.5	7.5	7.5	6.5	7.5	7.5	7.5	6.5				
Max Green Setting (Gmax), s	7.0	62.9	5.0	15.1	25.1	45.8	9.7	10.4				
Max Q Clear Time (g_c+I1), s	5.8	50.8	4.4	11.9	17.5	31.0	11.7	8.9				
Green Ext Time (p_c), s	0.0	8.4	0.0	0.2	0.7	6.4	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

Notes

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

Timings  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

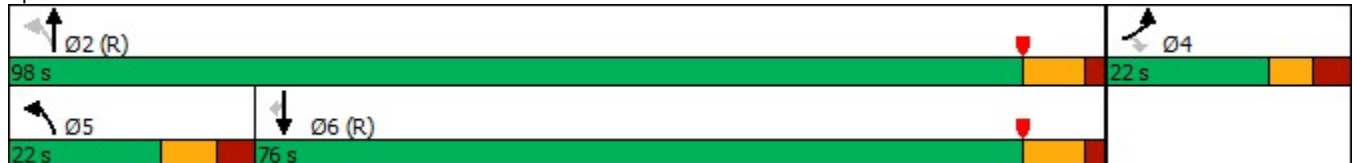


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗	↖	↑↑	↑↑	↗
Traffic Volume (vph)	114	146	151	1826	1066	149
Future Volume (vph)	114	146	151	1826	1066	149
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	15.0	15.0	15.0
Minimum Split (s)	15.5	15.5	13.5	22.5	22.5	22.5
Total Split (s)	22.0	22.0	22.0	98.0	76.0	76.0
Total Split (%)	18.3%	18.3%	18.3%	81.7%	63.3%	63.3%
Yellow Time (s)	4.0	4.0	5.0	5.5	5.5	5.5
All-Red Time (s)	3.5	3.5	3.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.5	8.5	7.5	7.5	7.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0	94.0	95.0	78.3	78.3
Actuated g/C Ratio	0.08	0.08	0.78	0.79	0.65	0.65
v/c Ratio	0.44	0.57	0.45	0.71	0.50	0.15
Control Delay	56.8	16.4	3.3	5.5	12.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	16.4	3.3	5.5	12.1	1.7
LOS	E	B	A	A	B	A
Approach Delay	34.1			5.4	10.8	
Approach LOS	C			A	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 9.5  
 Intersection Capacity Utilization 69.6%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service C

Splits and Phases: 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE



Queues  
3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 PM Warehouse

01/23/2023



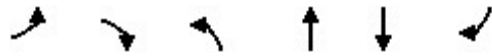
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	124	159	164	1985	1159	162
v/c Ratio	0.44	0.57	0.45	0.71	0.50	0.15
Control Delay	56.8	16.4	3.3	5.5	12.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.8	16.4	3.3	5.5	12.1	1.7
Queue Length 50th (ft)	47	0	2	190	222	0
Queue Length 95th (ft)	77	65	m10	657	312	26
Internal Link Dist (ft)	310			750	1921	
Turn Bay Length (ft)	150		700			350
Base Capacity (vph)	414	331	426	2802	2308	1089
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	0.30	0.48	0.38	0.71	0.50	0.15

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: MERIDIAN ROAD & BENT GRASS MEADOWS DRIVE

Total Future 2040 PM Warehouse  
 01/23/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖	↑↑	↑↑	↗
Traffic Volume (veh/h)	114	146	151	1826	1066	149
Future Volume (veh/h)	114	146	151	1826	1066	149
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	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	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	124	0	164	1985	1159	162
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	227		365	2876	2470	1102
Arrive On Green	0.07	0.00	0.04	0.81	0.70	0.70
Sat Flow, veh/h	3456	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	124	0	164	1985	1159	162
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1585
Q Serve(g_s), s	4.2	0.0	3.0	28.9	17.7	4.2
Cycle Q Clear(g_c), s	4.2	0.0	3.0	28.9	17.7	4.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	227		365	2876	2470	1102
V/C Ratio(X)	0.55		0.45	0.69	0.47	0.15
Avail Cap(c_a), veh/h	418		488	2876	2470	1102
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	6.6	4.9	8.3	6.2
Incr Delay (d2), s/veh	2.1	0.0	0.9	1.4	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.0	8.4	6.5	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.4	0.0	7.5	6.3	8.9	6.5
LnGrp LOS	E		A	A	A	A
Approach Vol, veh/h	124			2149	1321	
Approach Delay, s/veh	56.4			6.4	8.6	
Approach LOS	E			A	A	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		104.6		15.4	13.7	90.9
Change Period (Y+Rc), s		7.5		7.5	8.5	7.5
Max Green Setting (Gmax), s		90.5		14.5	13.5	68.5
Max Q Clear Time (g_c+I1), s		30.9		6.2	5.0	19.7
Green Ext Time (p_c), s		32.0		0.2	0.3	12.7

Intersection Summary

HCM 6th Ctrl Delay	8.9
HCM 6th LOS	A

Notes

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



Intersection						
Int Delay, s/veh	4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	118	47	125	157	2	142
Future Vol, veh/h	118	47	125	157	2	142
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	100	-	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	128	51	136	171	2	154

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	179	0	486
Stage 1	-	-	-	-	128
Stage 2	-	-	-	-	358
Critical Hdwy	-	-	4.14	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.22	-	3.52
Pot Cap-1 Maneuver	-	-	1394	-	510
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	678
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1394	-	460
Mov Cap-2 Maneuver	-	-	-	-	460
Stage 1	-	-	-	-	884
Stage 2	-	-	-	-	612

Approach	EB	WB	NB
HCM Control Delay, s	0	3.5	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	972	-	-	1394	-
HCM Lane V/C Ratio	0.161	-	-	0.097	-
HCM Control Delay (s)	9.4	-	-	7.9	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.3	-