
Executive Summary

Introduction

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Results

The proposed development is anticipated to generate the following weekday traffic volumes.

Time Period	Entering	Exiting	Total
Day	9,155	9,151	18,306
AM Peak Hour	1,576	369	1,945
PM Peak Hour	1,064	1,501	2,565

Results without the Eloy Business Center

Recommendations regarding intersection signalization without the Eloy Business Center are presented by intersection in **Table 1** (on the following page) where the year of anticipated construction is indicated. These intersections should be monitored to determine if and when the traffic signals are appropriate. Although the intersection of Sunshine/Alsdorf is anticipated to warrant a traffic signal in 2030, signalization of the intersection is not recommended because of its proximity to the intersection of Sunshine/Frontier.

In addition, multi-way stop signs are warranted at the intersection of Sunshine Boulevard and Frontier Road.

Executive Summary (continued)**Table 1: Signalization Without the Eloy Business Center**

Study Intersection	Year Warranted
Sunshine Boulevard and I-10 EB Ramp	2010
Sunshine Boulevard and I-10 WB Ramp	2006
Sunshine Boulevard and Alsdorf Road	2030
Sunshine Boulevard and Date Street	-
Sunshine Boulevard and Frontier Road	2010
La Palma Road and Frontier Road	-

Results with the Eloy Business Center

Recommendations regarding intersection signalization without the Eloy Business Center are presented by intersection in **Table 2** where the year of anticipated construction is indicated. These intersections should be monitored to determine if the traffic signals are appropriate.

Table 2: Signalization With the Eloy Business Center

Study Intersection	Year Warranted
Sunshine Boulevard and Date Street	2010
La Palma Road and Frontier Road	2010

The required lane configurations to provide acceptable levels-of-service at the adjacent major intersections and the project access intersections are provided for years 2010 and 2030 without and with the proposed Eloy Business Center project in **Figure 1** through **Figure 4**. The recommended lengths of the full-width turn-lanes are provided for the 2030 with site lane configuration in **Figure 4**.

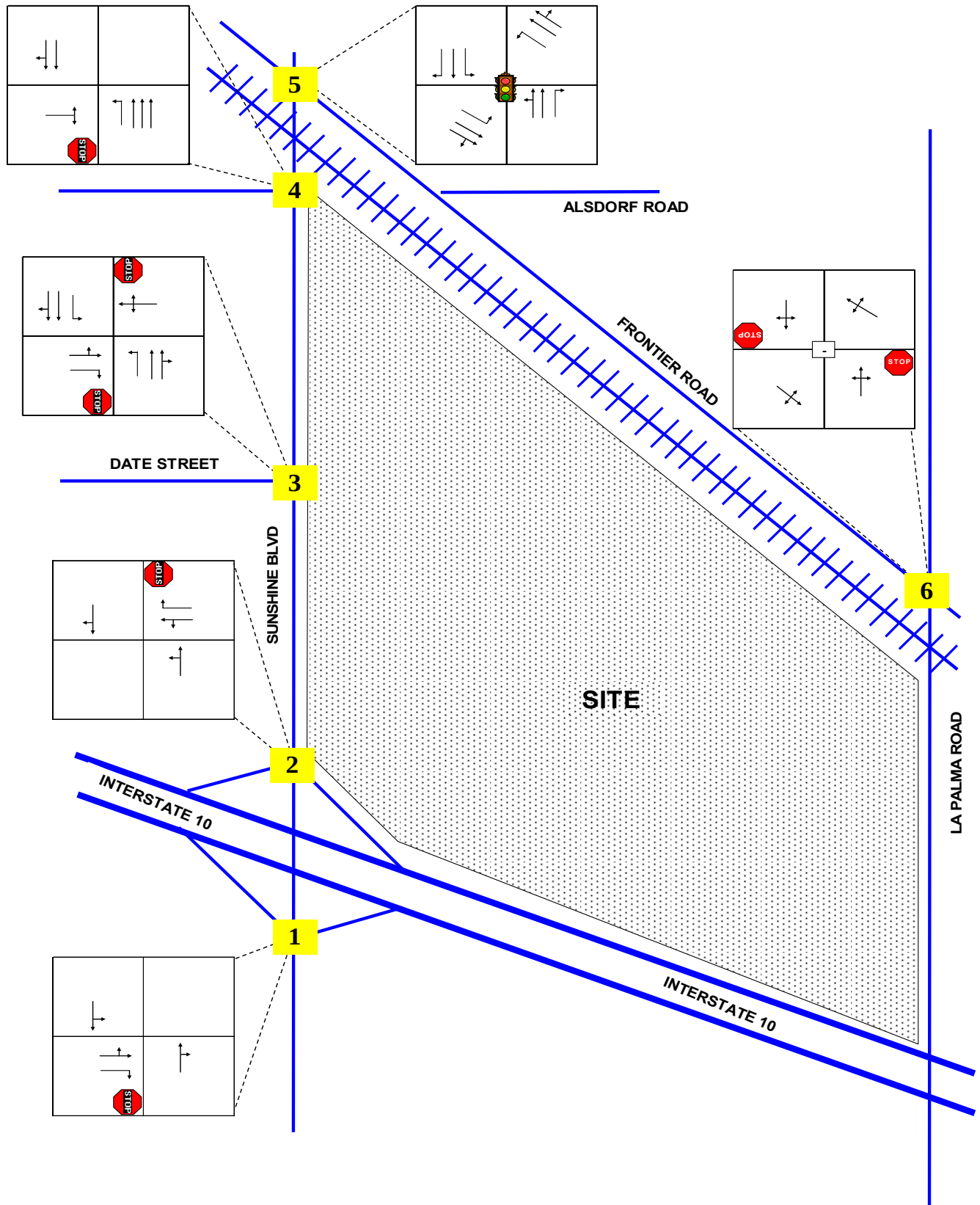


Figure 1: Recommended Lane Configurations for 2010 without Eloy Business Center

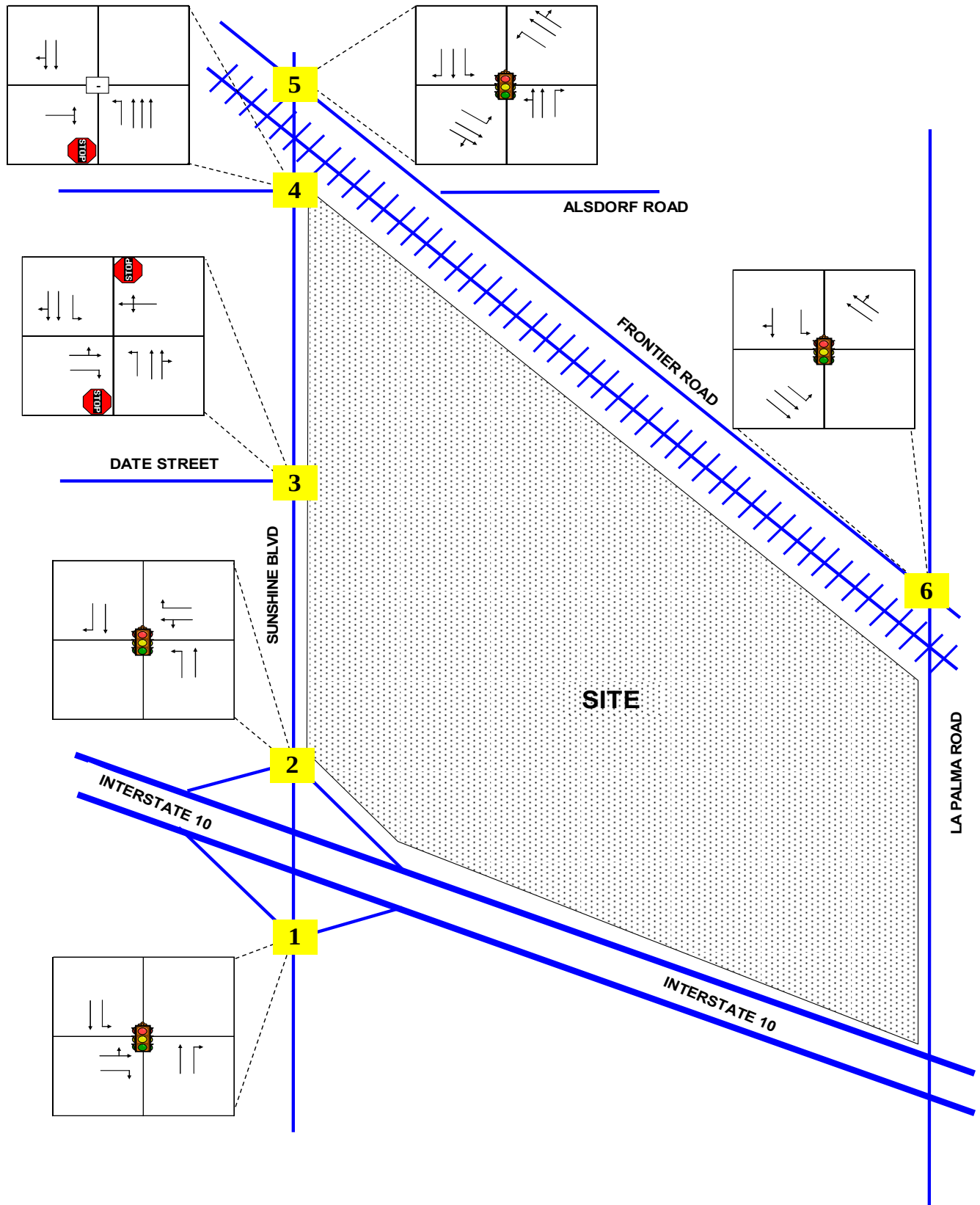


Figure 2: Recommended Lane Configurations for 2030 without Eloy Business Center

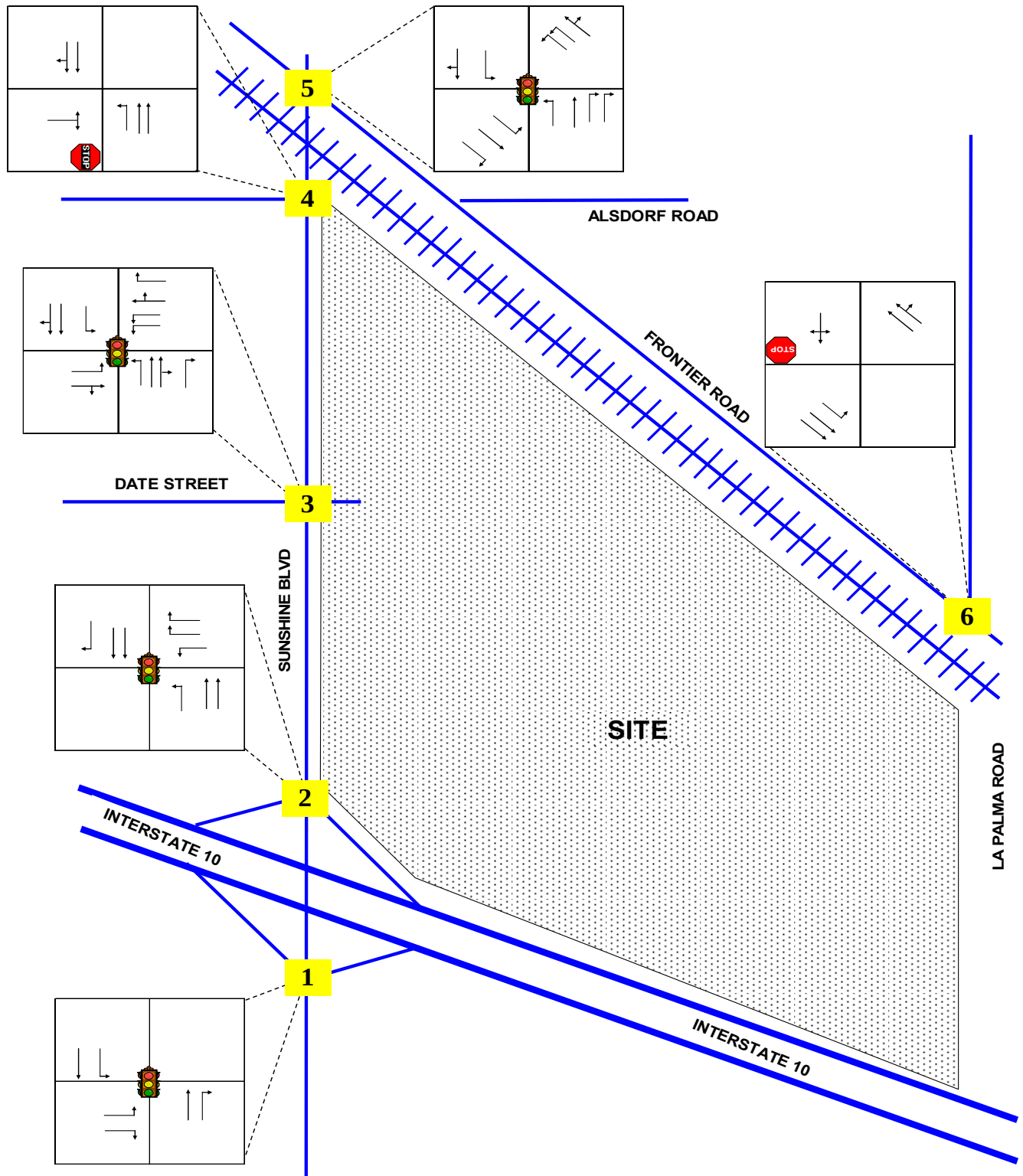


Figure 3: Recommended Lane Configurations for 2010 with Eloy Business Center

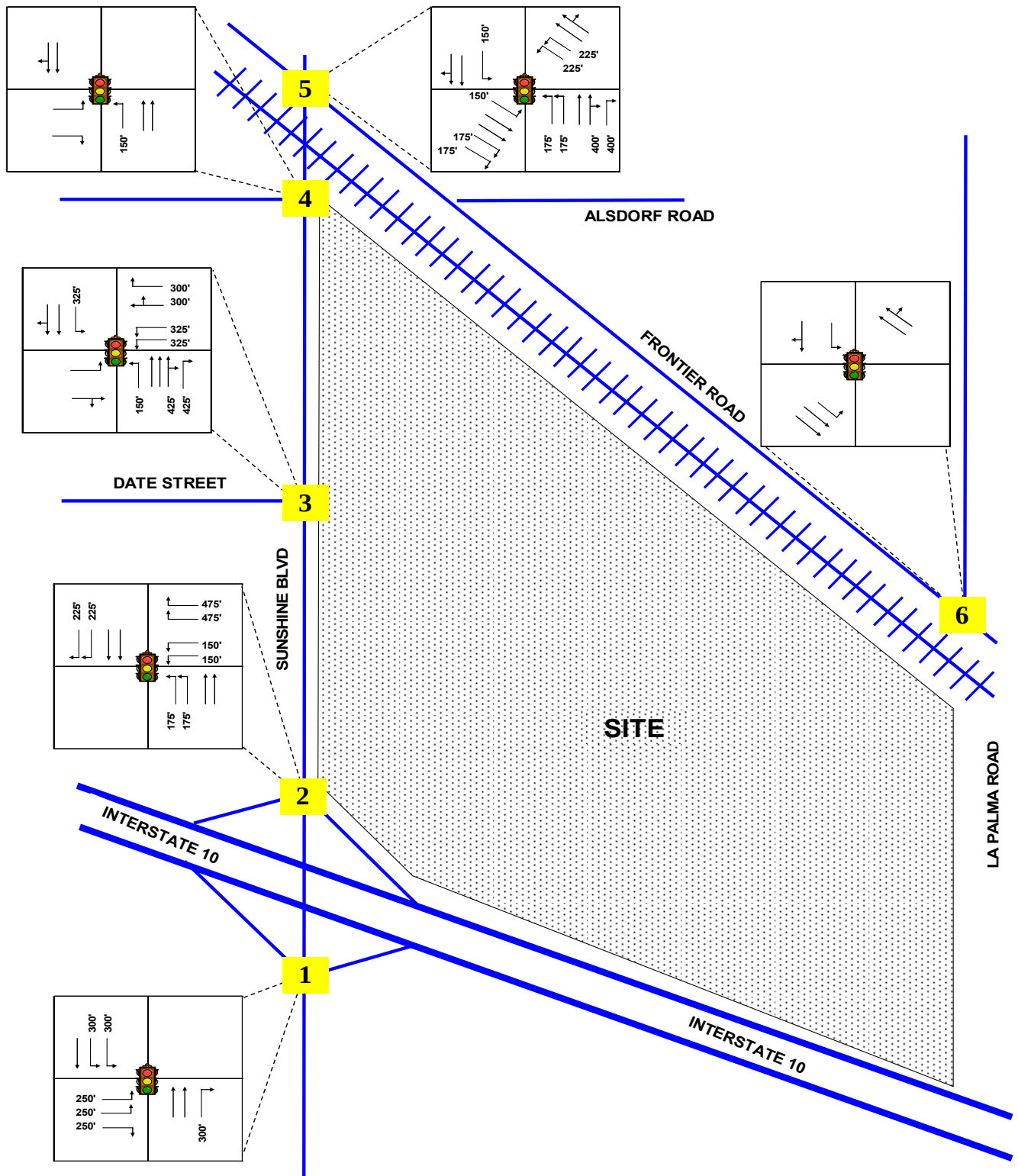


Figure 4: Recommended Lane Configurations for 2030 with Eloy Business Center

Eloy Business Center With National Gypsum Wallboard Facility Eloy, Arizona

Traffic Impact Analysis

September 2006

Prepared for:
BRALU, LLC

For Submittal to:
TOWN OF ELOY

M-M Project Number: 8584.001

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Sunshine Boulevard and Date Street	-
Sunshine Boulevard and Frontier Road	2010
La Palma Road and Frontier Road	-

Results with the Eloy Business Center

Recommendations regarding intersection signalization without the Eloy Business Center are presented by intersection in **Table 2** where the year of anticipated construction is indicated. These intersections should be monitored to determine if the traffic signals are appropriate.

Table 2: Signalization With the Eloy Business Center

Study Intersection	Year Warranted
Sunshine Boulevard and Date Street	2010
La Palma Road and Frontier Road	2010

The required lane configurations to provide acceptable levels-of-service at the adjacent major intersections and the project access intersections are provided for years 2010 and 2030 without and with the proposed Eloy Business Center project in **Figure 1** through **Figure 4**. The recommended lengths of the full-width turn-lanes are provided for the 2030 with site lane configuration in **Figure 4**.

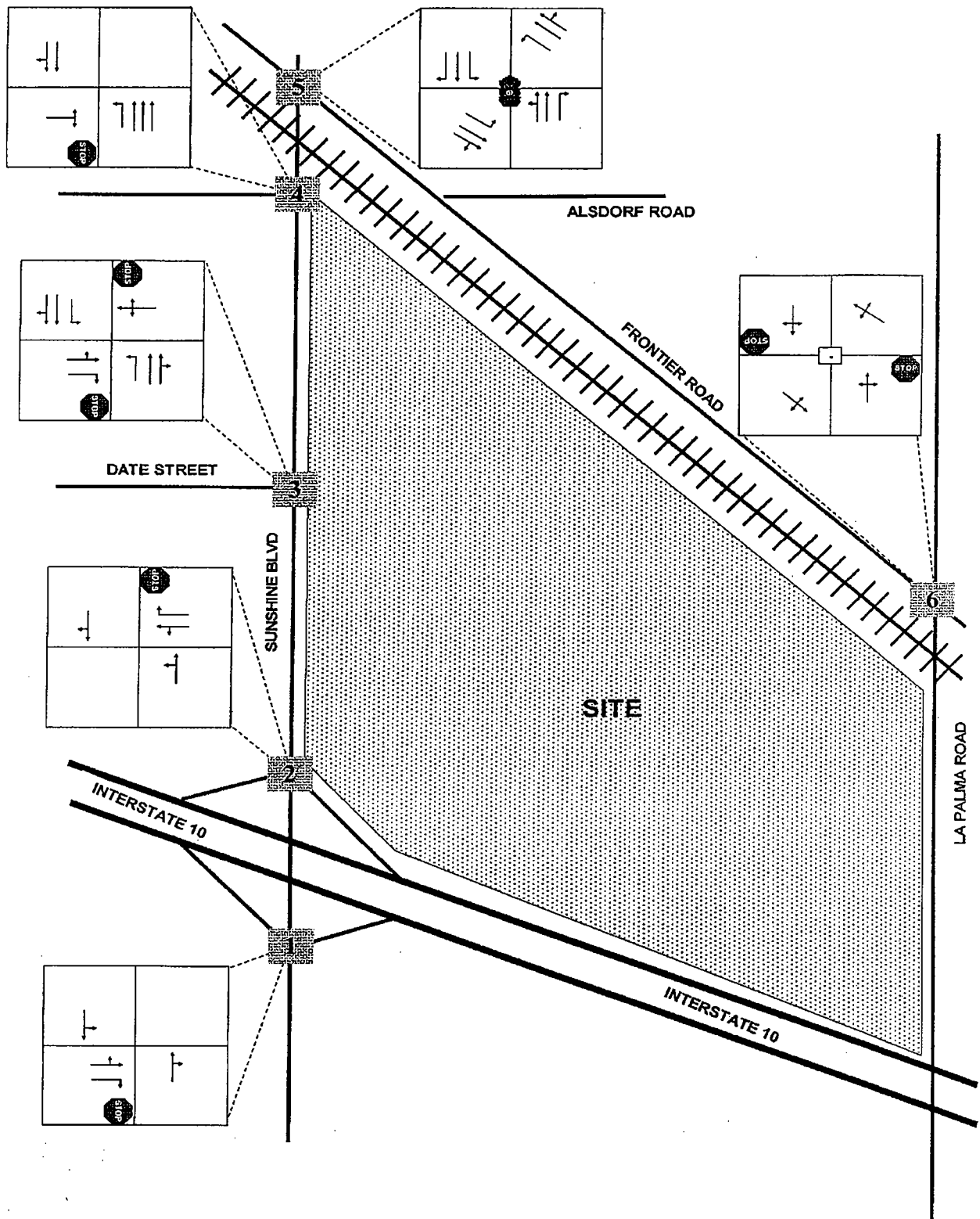


Figure 1: Recommended Lane Configurations for 2010 without Eloy Business Center

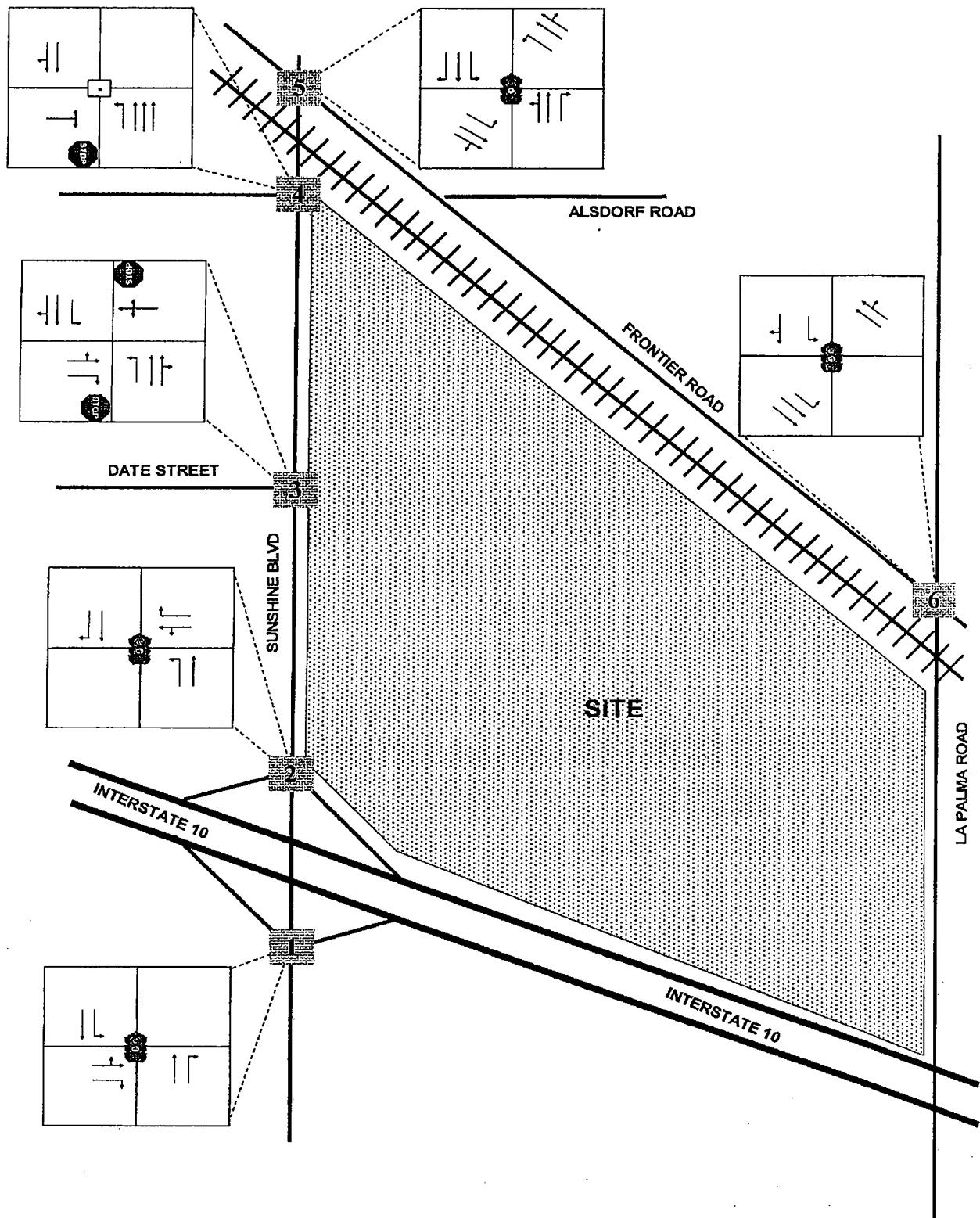


Figure 2: Recommended Lane Configurations for 2030 without Eloy Business Center

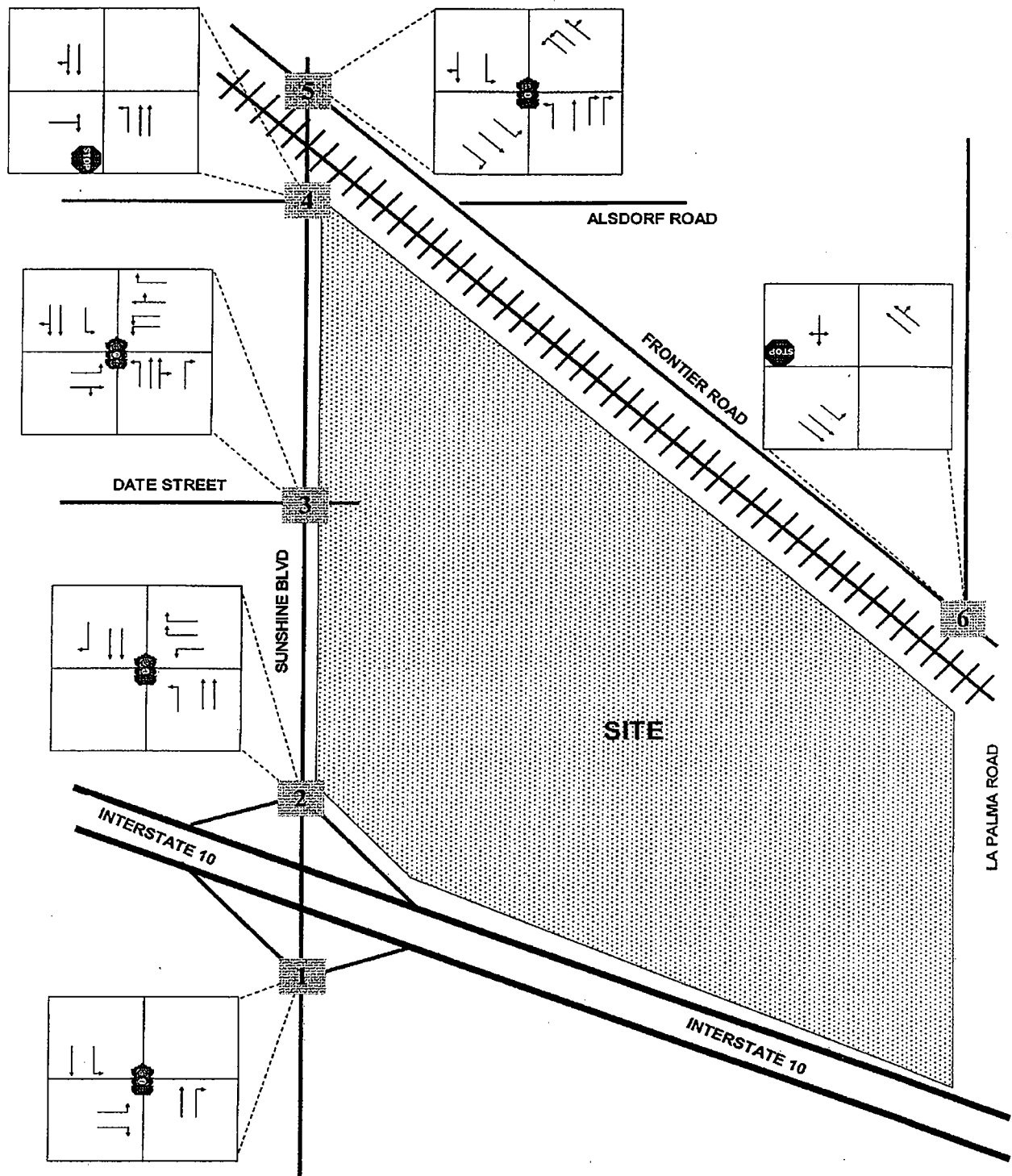


Figure 3: Recommended Lane Configurations for 2010 with Eloy Business Center

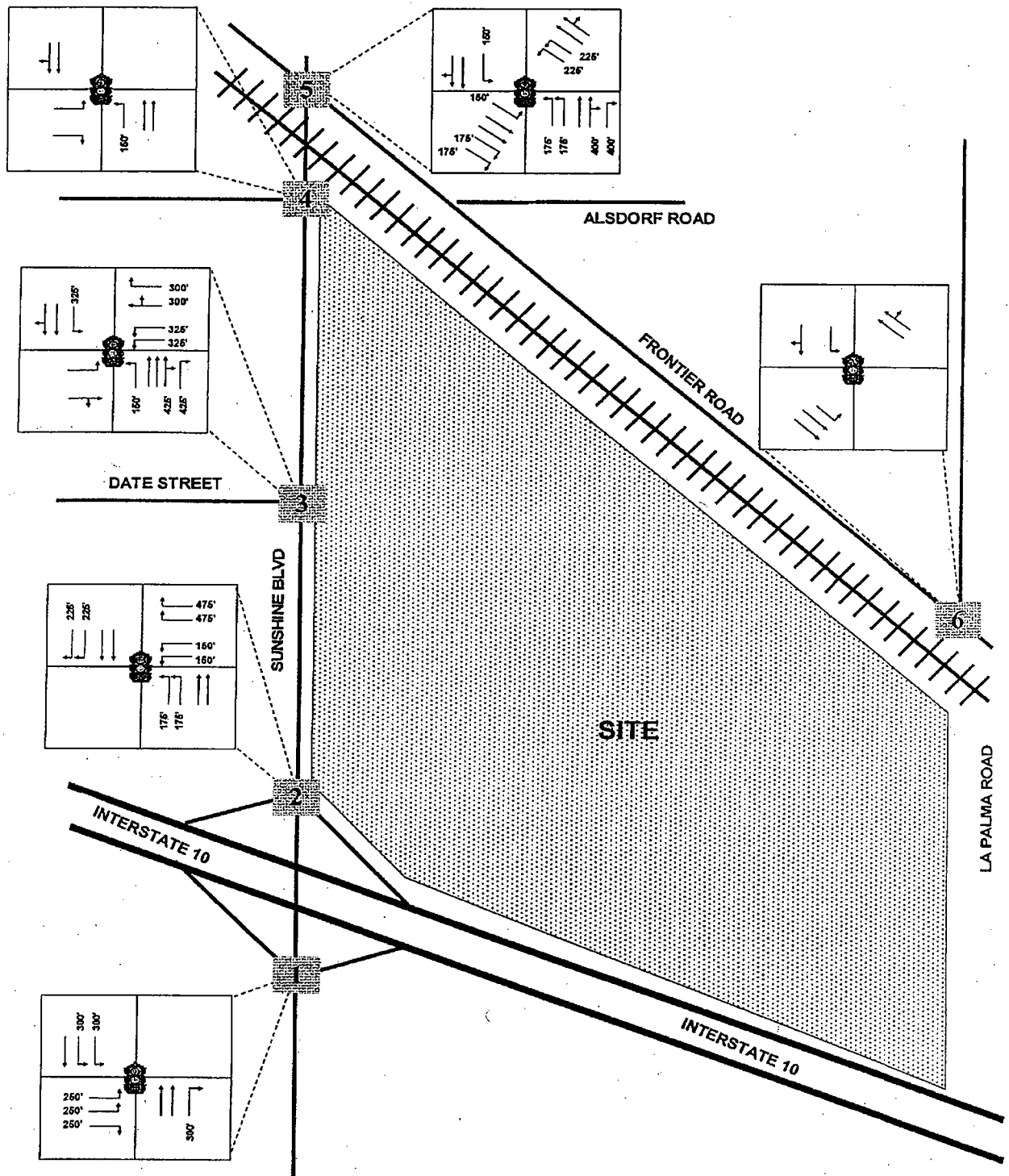


Figure 4: Recommended Lane Configurations for 2030 with Eloy Business Center

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Scope of Study

There are three (3) general purposes for this Traffic Impact Analysis.

- ❖ Analyze the existing traffic conditions of the intersections in the project vicinity.
- ❖ Estimate new traffic generated by the proposed development.
- ❖ Analyze future traffic conditions at the intersections in the project vicinity.

Description of Proposed Development

The proposed Eloy Business Center consists of seven (7) parcels that will be developed by the year 2010. **Table 3** indicates the type of land use and the acreage associated with each land use for each of the parcels within the site. **Figure 5** is a vicinity map of the site.

Table 3: Development Land Use Description

Parcel	Land Use	Gross Acreage
A	Light Industrial	43
B	Light Industrial	45
C	Manufacturing	103
D	Industrial	100
E	Industrial Park	57
F	Commercial	12
G	Industrial	23

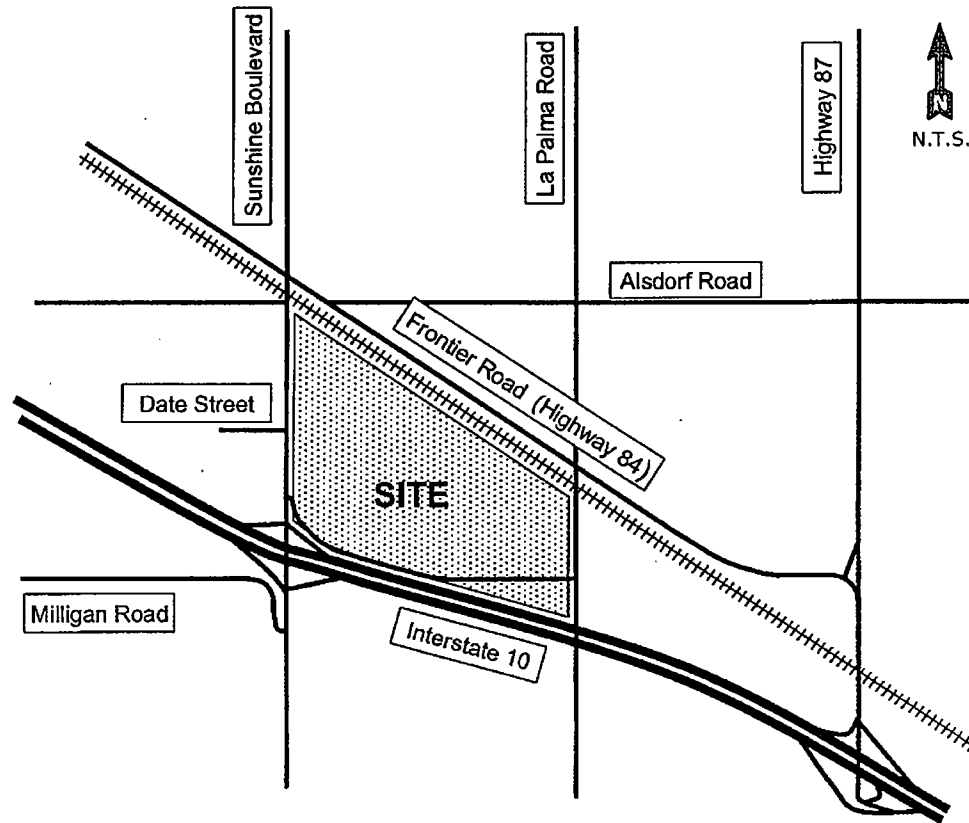


Figure 5: Local Vicinity Map

The proposed site has three (3) accesses, one primary access, a secondary access and an emergency access. The primary access is located on Sunshine Road at Date Street, which is currently a T-intersection. The site access will become the eastern leg of the intersection and serve as the principal access for site traffic. The secondary access will be located on the eastern edge of the property at the La Palma Road alignment, and is not anticipated to service any of the daily traffic demand. The emergency exit will be located on Sunshine Boulevard south of Date Street, and north of I-10. **Figure 6** is a conceptual plan of the proposed development.

Study Area

This study will analyze the following intersections:

- Interchange of Sunshine Boulevard and I-10
- Intersection of Sunshine Boulevard and Date Street
- Intersection of Sunshine Boulevard and Alsdorf Road
- Intersection of Sunshine Boulevard and Frontier Road
- Intersection of La Palma Road and Frontier Road

Description of Surrounding Land Use

The land surrounding the proposed development includes commercial, master planned residential communities, and some single-family homes on large properties. There is also a large portion of land dedicated to agricultural use.

Description of Surrounding Transportation System

The principle streets in the immediate vicinity of the site that will serve the Eloy Business Center development are Sunshine Boulevard and Frontier Road. Sunshine Boulevard borders the western edge of the development and has a fully directional traffic interchange with Interstate 10 which borders the southern edge of the site. To the north of the site is the Union Pacific Railroad which is also paralleled by Frontier Road (Highway 84). The eastern edge of the site is bordered by La Palma Road. The existing conditions at the study intersections are depicted in Figure 7 through Figure 10 shown on the following pages.

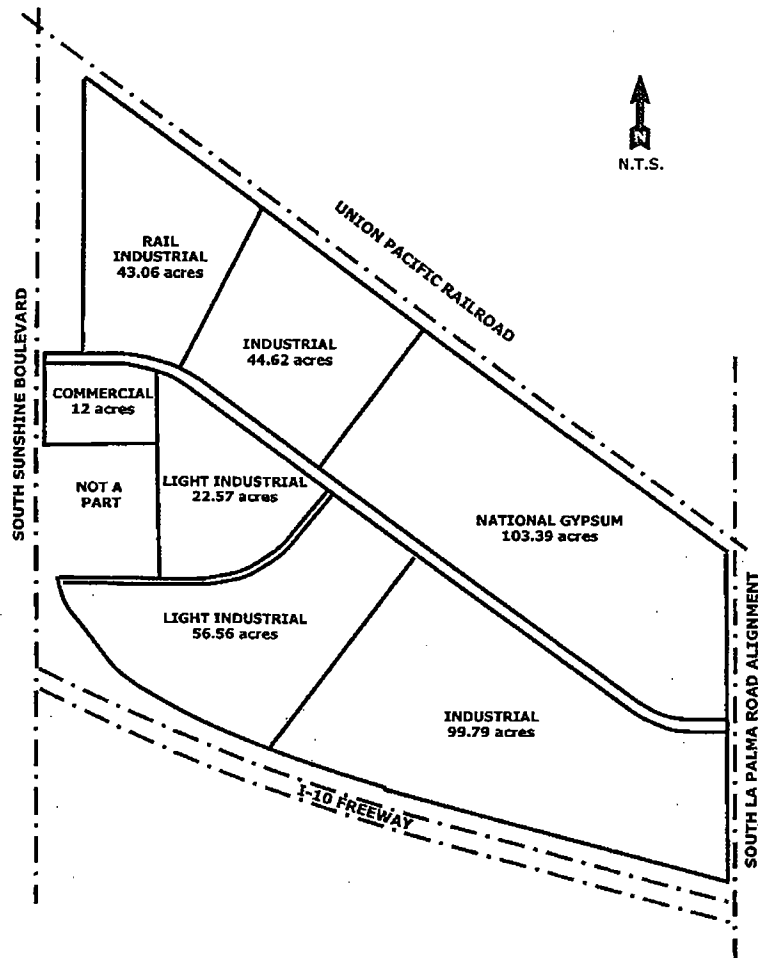


Figure 6: Conceptual Plan

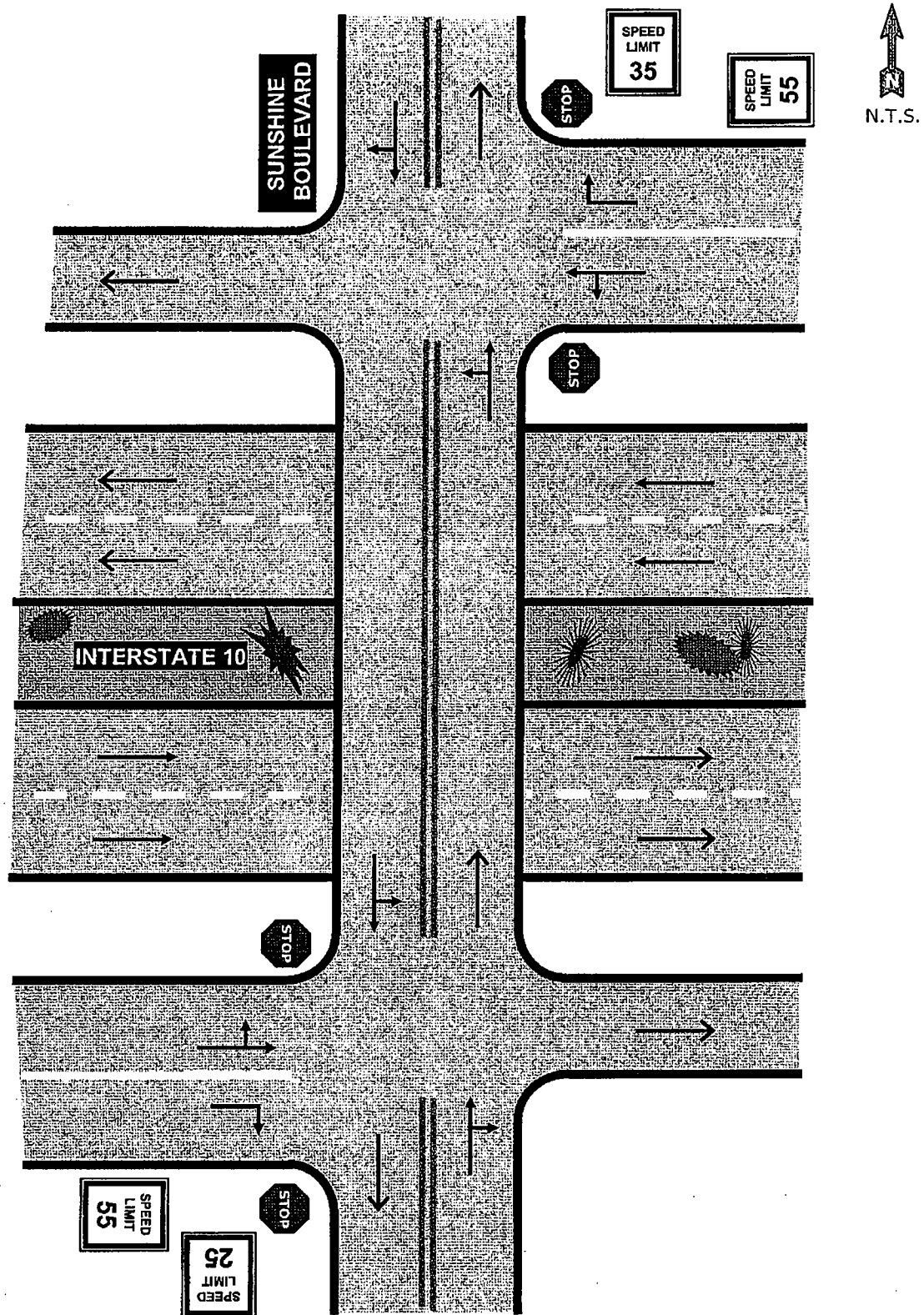


Figure 7: Existing Sunshine Boulevard and Interstate 10

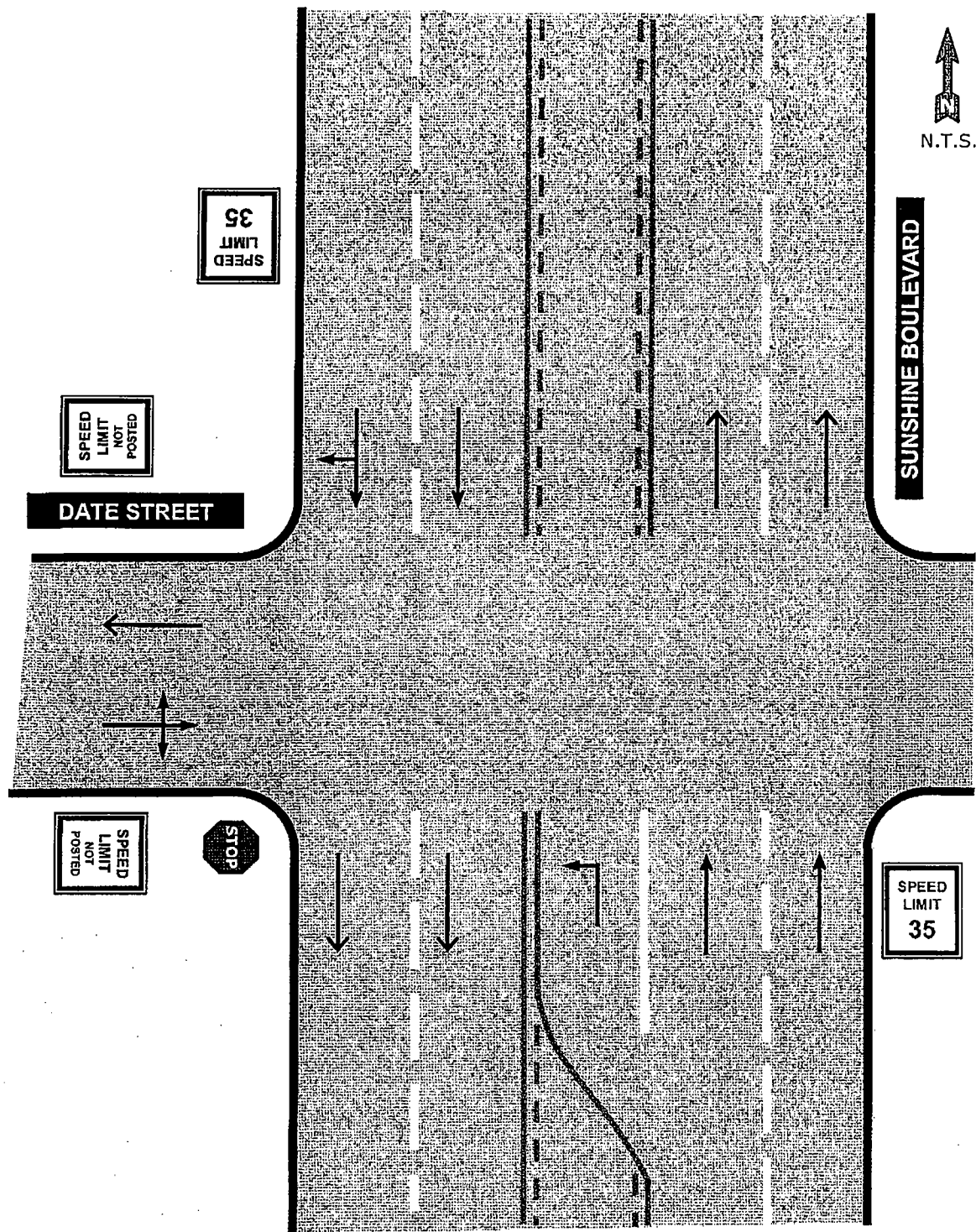


Figure 8: Existing Sunshine Boulevard and Date Street

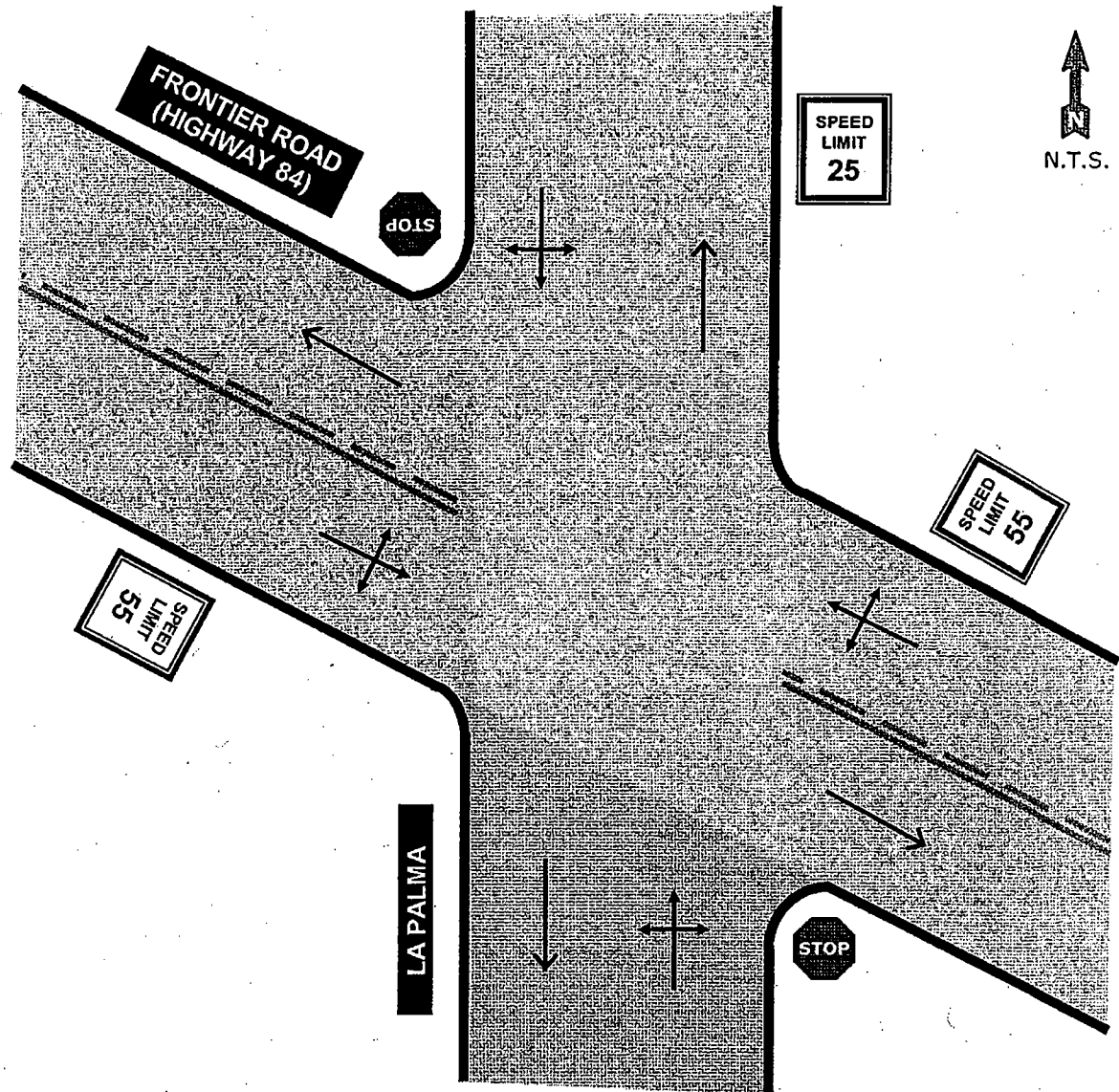


Figure 9: Existing La Palma Road and Frontier Road

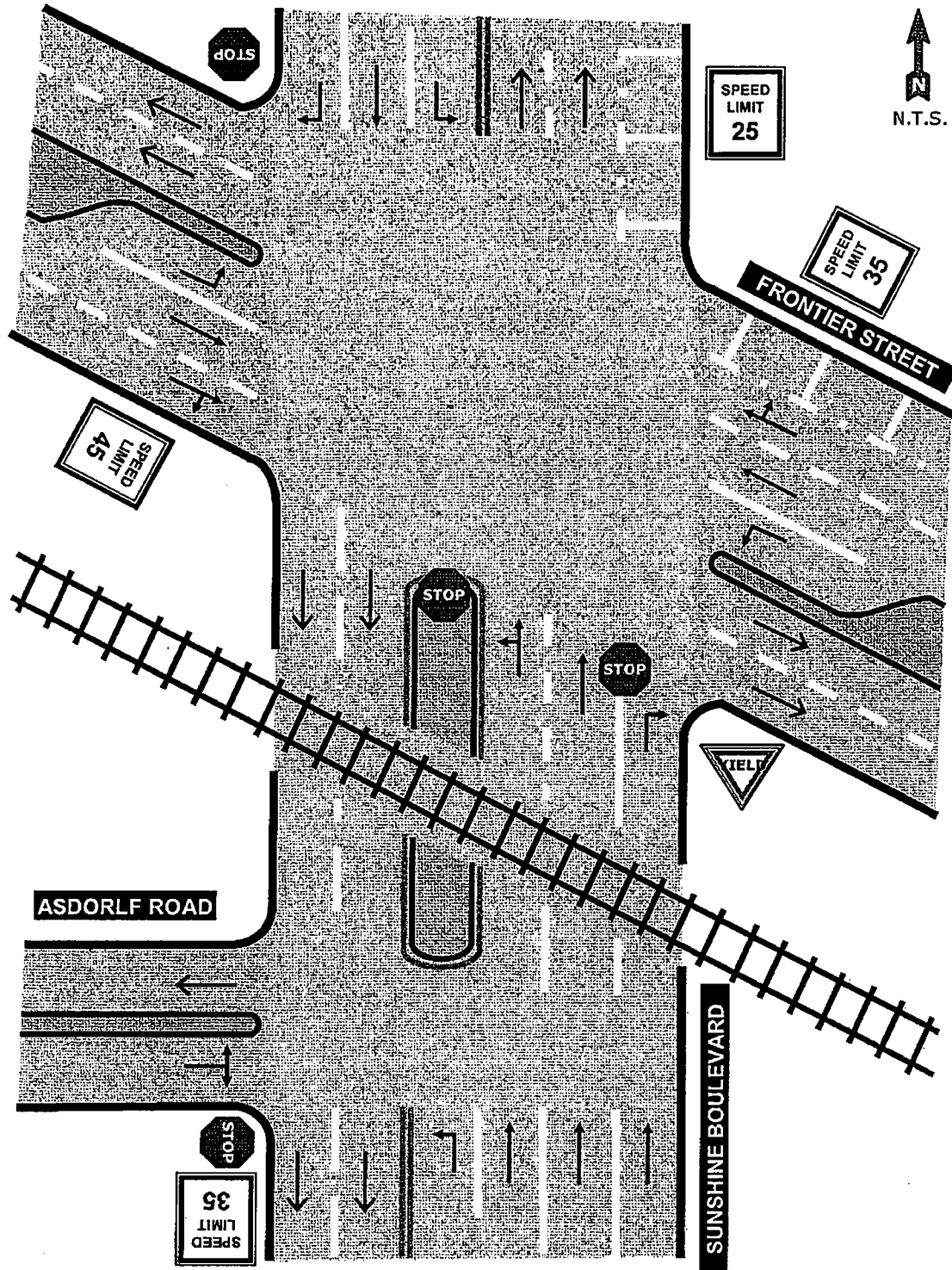


Figure 10: Existing Sunshine Boulevard and Alsdorf Road and Frontier Street

Existing Traffic Counts

Traffic Research and Analysis counted current traffic volumes on Wednesday, 17 May 2006 and Thursday, 18 May 2006 for this study through contract with Morrison-Maierle. Approach and departure traffic counts at the intersections of Sunshine/I10, Sunshine/Alsdorf, Sunshine/Frontier, Alsdorf/Frontier, and La Palma/Frontier, for daily and hourly intervals were obtained. Turning movement counts were also obtained at the intersections of Sunshine/I10, Sunshine/Date, Sunshine/Alsdorf, Sunshine/Frontier, and La Palma/Frontier in fifteen-minute intervals from 6:00 to 9:00 AM and from 4:00 to 7:00 PM.

The existing traffic volumes are provided in **Appendix A** to this report. Also included in **Appendix A** are tables providing the hourly counts by time of day, and graphs plotting the hourly traffic counts. **Appendix A.1** through **Appendix A.5** contain the approach and departure counts for the study intersections. Also included in these appendices are tables determining the maximum morning and evening hourly volumes and peak hour factors as determined from the approach counts. **Figure 11** below and **Figure 12** and **Figure 13** on the following page indicate the daily, the AM peak hour, and PM peak hour traffic volumes respectively for the study intersections. **Appendix A.6** contains the turning movement counts for the five (5) studied intersections

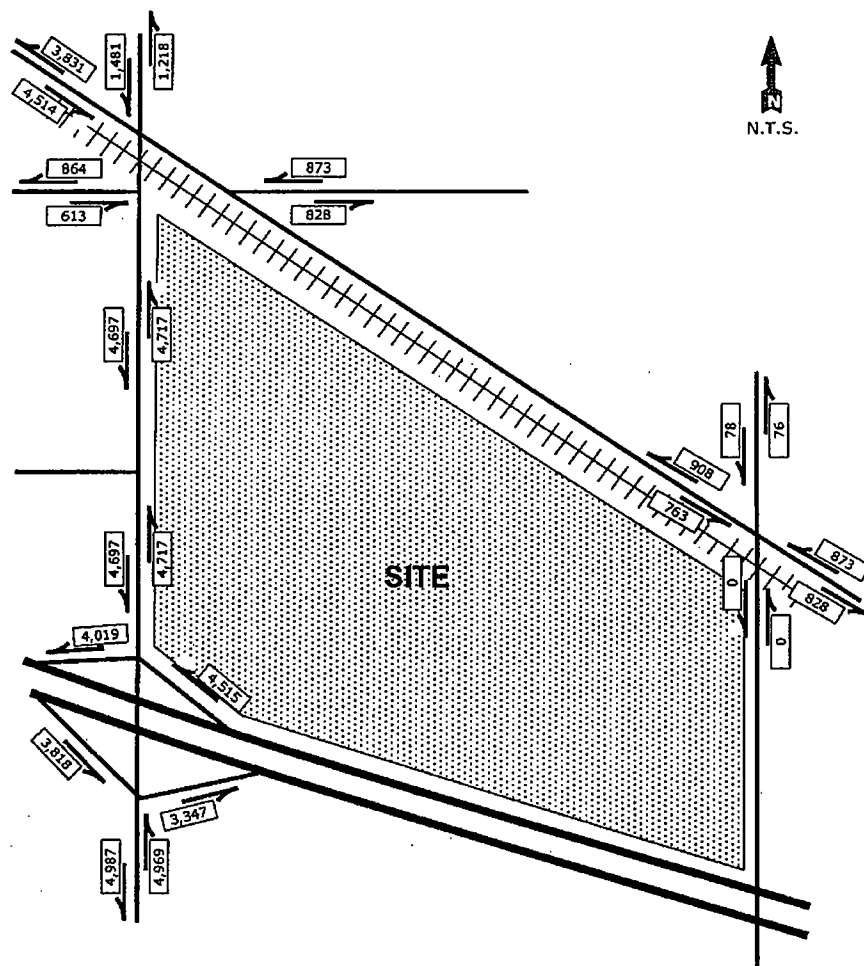


Figure 11: Existing 2006 Traffic Volumes – Day

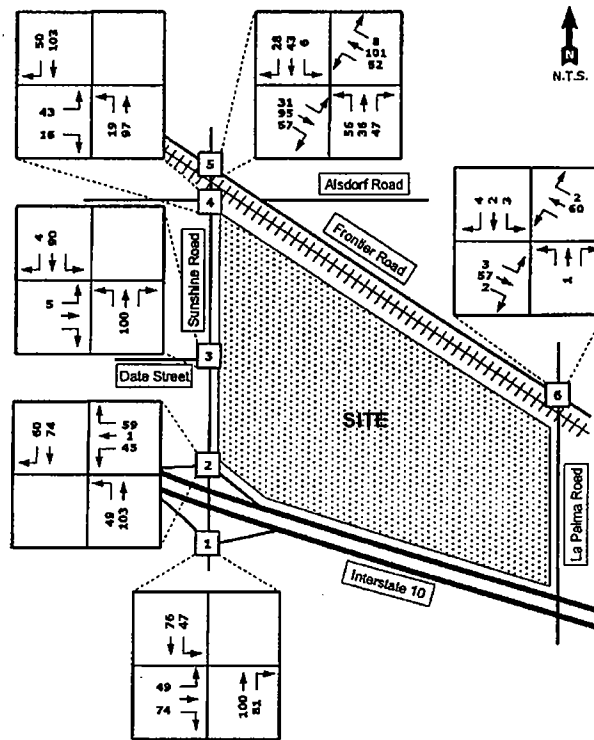


Figure 12: Existing 2006 Traffic Volumes – AM Peak Hour

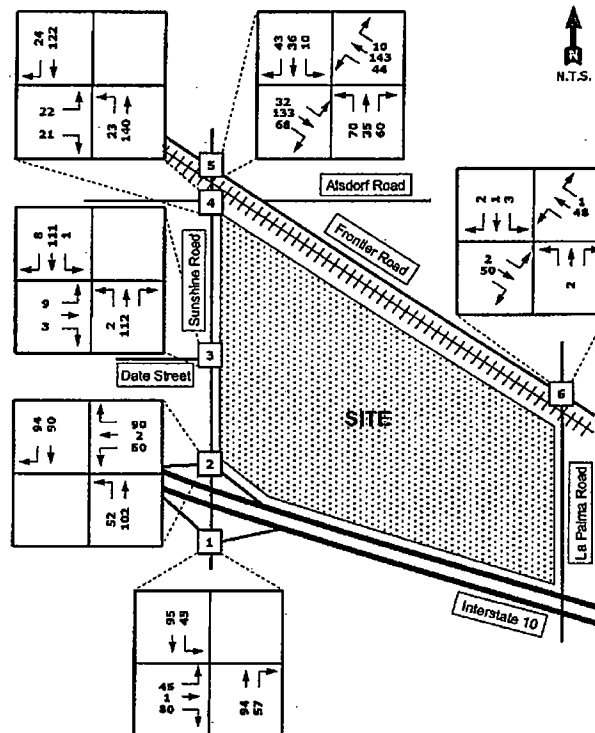


Figure 13: Existing 2006 Traffic Volumes – PM Peak Hour

Table 4 below indicates the peak 60-minute periods in the morning and evening peak three-hour periods at each of the counted intersections.

Table 4: Existing Traffic Counts – Peak 60-Minute Periods

INTERSECTION	AM PEAK HOUR	PM PEAK HOUR
Sunshine Boulevard and I-10 EB Ramp	8:00 to 9:00	4:00 to 5:00
Sunshine Boulevard and I-10 WB Ramp	8:00 to 9:00	4:30 to 5:30
Sunshine Boulevard and Date Street	not measured	not measured
Sunshine Boulevard and Alsdorf Road	7:30 to 8:30	4:00 to 5:00
Sunshine Boulevard and Frontier Road	7:30 to 8:30	4:00 to 5:00
La Palma Road and Frontier Road	7:15 to 8:15	5:15 to 6:15

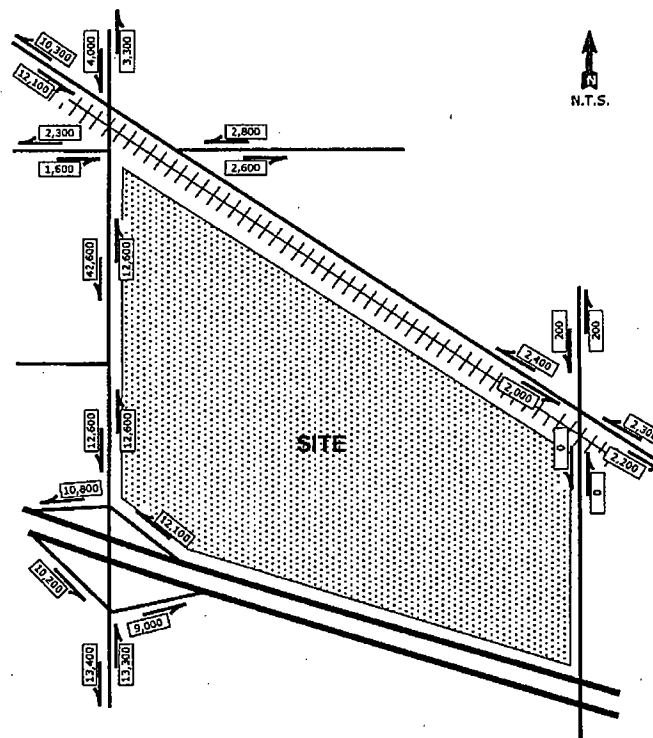
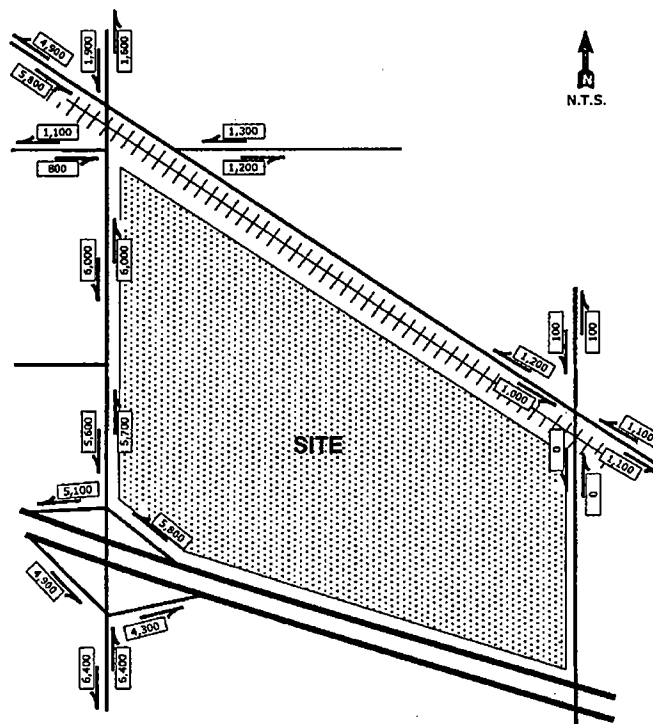
Horizon Year

The Town of Eloy does not currently have standards for traffic impact analyses and therefore, this analysis will utilize the Maricopa County Department of Transportation (MCDOT) standards for traffic impact analyses. Per the MCDOT standards, the horizon years for analysis are the build-out year and twenty (20) years after full build-out. These years are 2010 and 2030. Because of the current rapid development in the Town of Eloy, 2010 traffic volumes were utilized as the opening year.

Ambient Traffic

The ambient future traffic volumes were determined using linear annual percentage growth rates. Both the anticipated 2010 and 2030 traffic volumes for the roadways in the vicinity of the site were modeled using linear traffic growth rates of 7% and 12%. This methodology provided appropriately conservative assumptions for future traffic volumes.

The annual traffic growth rates for the streets in the study area were utilized to estimate the traffic volumes for the ambient traffic years of 2010 and 2030. All daily segment volumes were approximated to the nearest 100 vehicles. **Figure 14** and **Figure 15** on the following page provide the anticipated daily traffic volumes by segment for the study intersections.



Future Ambient Hourly Traffic Volumes

The future ambient hourly traffic volumes were determined assuming that the future daily directional distribution and hourly percentages of daily traffic for each roadway segment would be equal to the current values. The turning movement volumes were determined through an automated mathematical iteration process. This process assumed turning movement approaches for each approach, and then compared the resulting predicted departing volumes to the departing values calculated by summing the appropriate turning movement volumes. The turning movement percentages that resulted in the lowest value of the sum of the squares of the differences between the departing volumes were selected. These values were then compared with a minimum acceptable value of 25 trips in 2010 and 50 trips in 2030, as well as a minimum percent increase of 7% in 2010 and 12% in 2030, and the maximum of the three volumes was chosen for future turning movements to ensure a conservative analysis.

Figure 16 through **Figure 19** on the following pages provide the ambient turning movement traffic volumes for years 2010 and 2030 for the morning and evening peak hours.

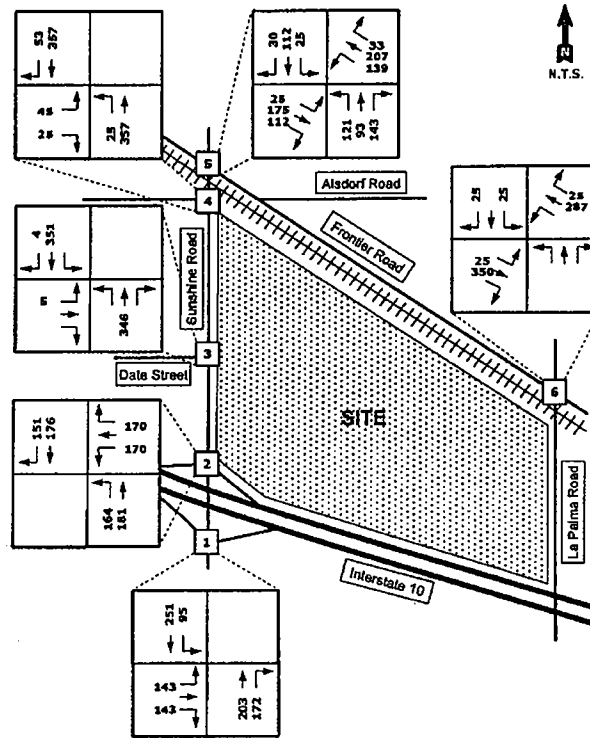


Figure 16: Ambient Year 2010 AM Peak Hour Volumes

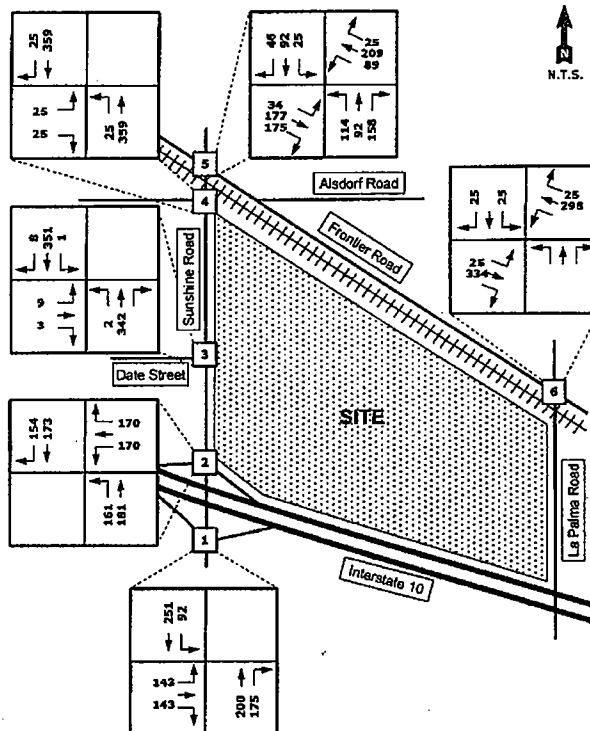


Figure 17: Ambient Year 2010 PM Peak Hour Volumes

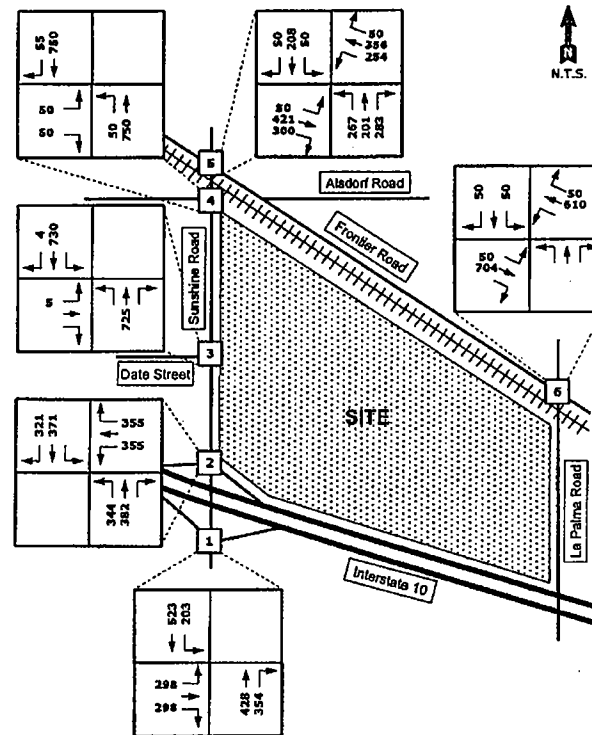


Figure 18: Ambient Year 2030 AM Peak Hour Volumes

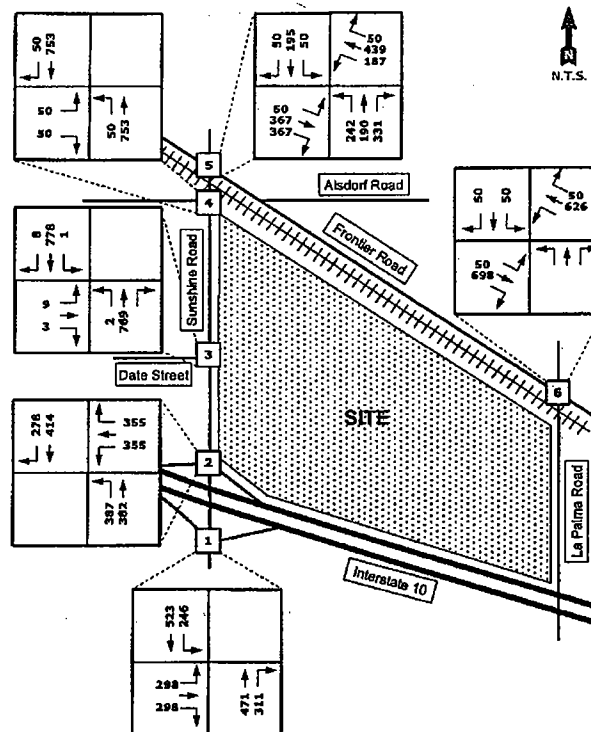


Figure 19: Ambient Year 2030 PM Peak Hour Volumes

Signal Warrant and Multiway Stop Analysis – Existing without Site

The *Manual on Uniform Traffic Control Devices (MUTCD)* as published by the United States Department of Transportation is the reference for determining the need for traffic signal installation throughout the United States. This document establishes eight separate, related sets of criteria termed “warrants”. If none of the eight warrants are satisfied, then a signal should not be installed. If one or more of the warrants are satisfied, then a signal might be appropriate

Appendix B provides the complete traffic signal warrant analyses. **Appendix B.1** through **Appendix B.5** provide the complete analyses for the five (5) study intersections. **Table 5** provides the names of the primary signal warrants. **Table 6** summarizes the results of the analyses of the primary warrants.

Table 5: Signal Warrant Names

Warrant	Name
1A	Minimum Vehicular Volume
1B	Interruption of Continuous Traffic
1A and 1B	Combination of Warrants
2	Four-Hour Vehicular Volume
3B	Peak Hour Volume

Table 6: Existing Signal Warrant Analyses Summary

Warrant	Actual number of hours met					Warrant
	1A	1B	1A & 1B	2	3B	
Required hours met	8	8	8	4	1	Satisfied?
Sunshine Boulevard and I-10 EB Ramp	7	0	0	1	0	NO
Sunshine Boulevard and I-10 WB Ramp	11	0	2	4	0	YES
Sunshine Boulevard and Alsdorf Road	0	0	0	0	0	NO
Sunshine Boulevard and Frontier Road	0	2	0	0	0	NO
La Palma Road and Frontier Road	0	0	0	0	0	NO

These analyses indicate that the existing study intersection of Sunshine Boulevard and I-10 WB satisfy the warrants for signal installation.

Each of the study intersections was also analyzed to determine if multiway stop signs should be installed in accordance with the requirements of the four warrants in the MUTCD. The complete results of these analyses are also provided in **Appendix B**. The only intersection that satisfied the multiway stop warrants was the same intersection of Sunshine Boulevard/I-10 WB that satisfied the signal warrant analysis. The results of the multiway stop analysis are shown below in **Table 7**.

Table 7: Existing Multiway Stop Warrant Analyses Summary

Warrant	Actual Number of Warrants Met				Satisfied?
	A	B	C	D	
Sunshine Boulevard and I-10 EB Ramp	NO	NO	NO	NO	NO
Sunshine Boulevard and I-10 WB Ramp	YES	NO	NO	NO	YES
Sunshine Boulevard and Alsdorf Road	NO	NO	NO	NO	NO
Sunshine Boulevard and Frontier Road	NO	NO	NO	NO	NO
La Palma Road and Frontier Road	NO	NO	NO	NO	NO

The remaining study intersections that do not warrant a multiway stop in the existing condition, are shown with adequate existing traffic control in **Figure 7** through **Figure 10**.

Signal Warrant Analysis – Ambient without Site

The MUTCD process was also utilized to determine if signals are likely to be warranted in the future at the study intersections that do not currently warrant signals. The warrants presuppose that a minimum of 16 hours of traffic counts are available. Only the daily and peak hourly traffic volumes for the future can be estimated directly. The three primary MUTCD warrants can utilize estimated traffic volumes to provide an indication of the likely need for a traffic signal at a particular location.

Three hourly volumes are necessary to analyze these three warrants – the hour with the highest traffic volumes, the hour with the fourth highest volume, and the hour with the eighth highest volume. The daily and peak hourly volumes have been estimated as described previously in this report. The fourth and eighth highest hourly volumes can be estimated as a percentage of the peak hourly traffic volume or the daily traffic volume. The values of these percentages for the existing traffic counts are provided in **Appendix A**. The values for the approaches to each intersection were averaged and utilized to estimate the future fourth and eighth highest hourly volumes for each approach to each intersection.

Warrants #1a and #1b have constant criteria. Warrants #2 and #3b utilize graphical procedures to determine if traffic signals may be appropriate. Therefore these warrants have criteria that vary with traffic volume. An exponential trendline equation was determined to duplicate the graphs provided in the MUTCD for these two warrants. The major street criterion is utilized as the major street estimated volume. The minor street criterion is then determined from the trendline equation (MUTCD graph), and compared to the estimated minor street volume. Warrant #3b was analyzed for both the morning and evening peak hours.

Appendix C provides the complete results of the future ambient signal warrant analyses including the results of the calculation of the fourth and eighth highest hourly volumes. **Table 8** and **Table 9** shown below and on the following page summarize the results of the signal warrant analyses.

Based on these analyses, traffic signals are likely to be warranted with the ambient 2010 conditions at the interchange of Sunshine Boulevard and the I-10 EB Exit Ramp, and the intersection of Sunshine Boulevard and Frontier Road.

Table 8: Ambient 2010 Signal Warrant Summary

Warrant	Warrants Satisfied?				
	1A	1B	2	3B - AM	3B - PM
Sunshine Boulevard and I-10 EB Ramp	YES	NO	YES	NO	NO
Sunshine Boulevard and Date Road	NO	NO	NO	NO	NO
Sunshine Boulevard and Alsdorf Road	NO	NO	NO	NO	NO
Sunshine Boulevard and Frontier Road	YES	NO	YES	YES	YES
La Palma Road and Frontier Road	NO	NO	NO	NO	NO

Table 9: Ambient 2030 Signal Warrant Summary

Warrant	Warrants Satisfied?				
	1A	1B	2	3B - AM	3B - PM
Sunshine Boulevard and Date Road	NO	NO	NO	NO	NO
Sunshine Boulevard and Alsdorf Road	NO	YES	YES	YES	YES
La Palma Road and Frontier Road	NO	NO	NO	NO	NO

Based on these analyses, a traffic signal is likely to be warranted at the intersection of Sunshine Boulevard and Alsdorf Road with ambient 2030 traffic volumes. However, due to the proximity of the intersection with the intersection of Sunshine/Frontier a traffic signal is not recommended for the intersection of Sunshine/Alsdorf.

Level-of-Service Analysis without Site

The ability of a transportation system to transmit the transportation demand is characterized as its level-of-service (LOS). Level-of-service is a rating system from "A", representing the best operation, to "F", representing the worst operation. Typically, level-of-service "D" is considered the minimum acceptable operation. The appropriate reference for level-of-service operation is the *Highway Capacity Manual*, published by the Transportation Research Board.

This manual considers the average delay per vehicle as the measure to determine the level-of-service of a signalized intersection. The delay and level-of-service are calculated for the intersection, each approach, and each turning movement.

Table 10 lists the level-of-service criteria for signalized intersections as stated in the *Highway Capacity Manual*.

Table 10: Level-of-Service Criteria for Signalized Intersections

Level-of-Service	Average Delay (seconds/vehicle)
A	≤ 10
B	> 10 to 20
C	> 20 to 35
D	> 35 to 55
E	> 55 to 80
F	> 80

Similar to signalized intersections, average delay per vehicle is the measure to determine the level-of-service for unsignalized intersections. Level-of-service is defined for each minor movement for two-way stop controls, and is not defined for the major street approaches or for the intersection as a whole. **Table 11** lists the level-of-service criteria for unsignalized intersections as stated in the *Highway Capacity Manual*.

Table 11: Level-of-Service Criteria for Unsignalized Intersections

Level-of-Service	Average Delay (seconds/vehicle)
A	≤ 10
B	> 10 to 15
C	> 15 to 25
D	> 25 to 35
E	> 35 to 50
F	> 50

Synchro software was utilized to calculate the average delay and level-of-service.

One of the important conditions for determining level-of-service at an intersection is the number of lanes provided for each movement on each approach at the intersection. The existing intersection geometry for each study intersection is discussed within the section of this report titled ***Description of Surrounding Transportation System***.

Each of the existing intersections was analyzed for its level-of-service for the existing traffic volumes, traffic control, and lane configurations. **Appendix D** provides the complete results of these analyses. **Appendix D.1** provides the results for the existing 2006 traffic volumes. **Appendix D.2** provides the results for the ambient 2010 traffic volumes and **Appendix D.3** provides the results for the ambient 2030 traffic volumes.

Figure 20 and **Figure 21** provide the existing 2006 level-of-service for the six study intersections for the morning and evening peak hours respectively. The current lane configurations and traffic control provide acceptable LOS for the study intersections under existing conditions.

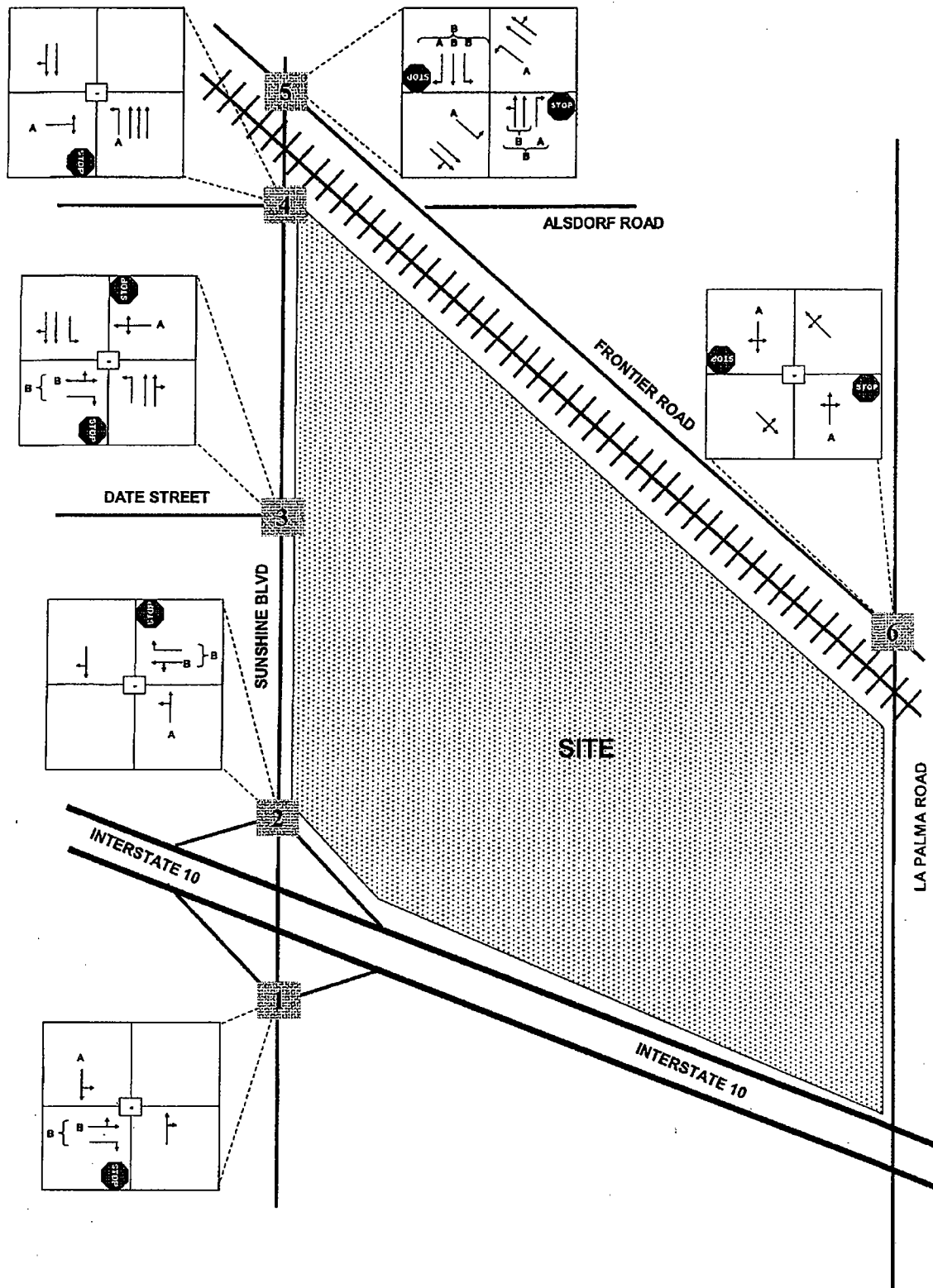


Figure 20: Existing 2006 Level-of-Service – AM Peak Hour

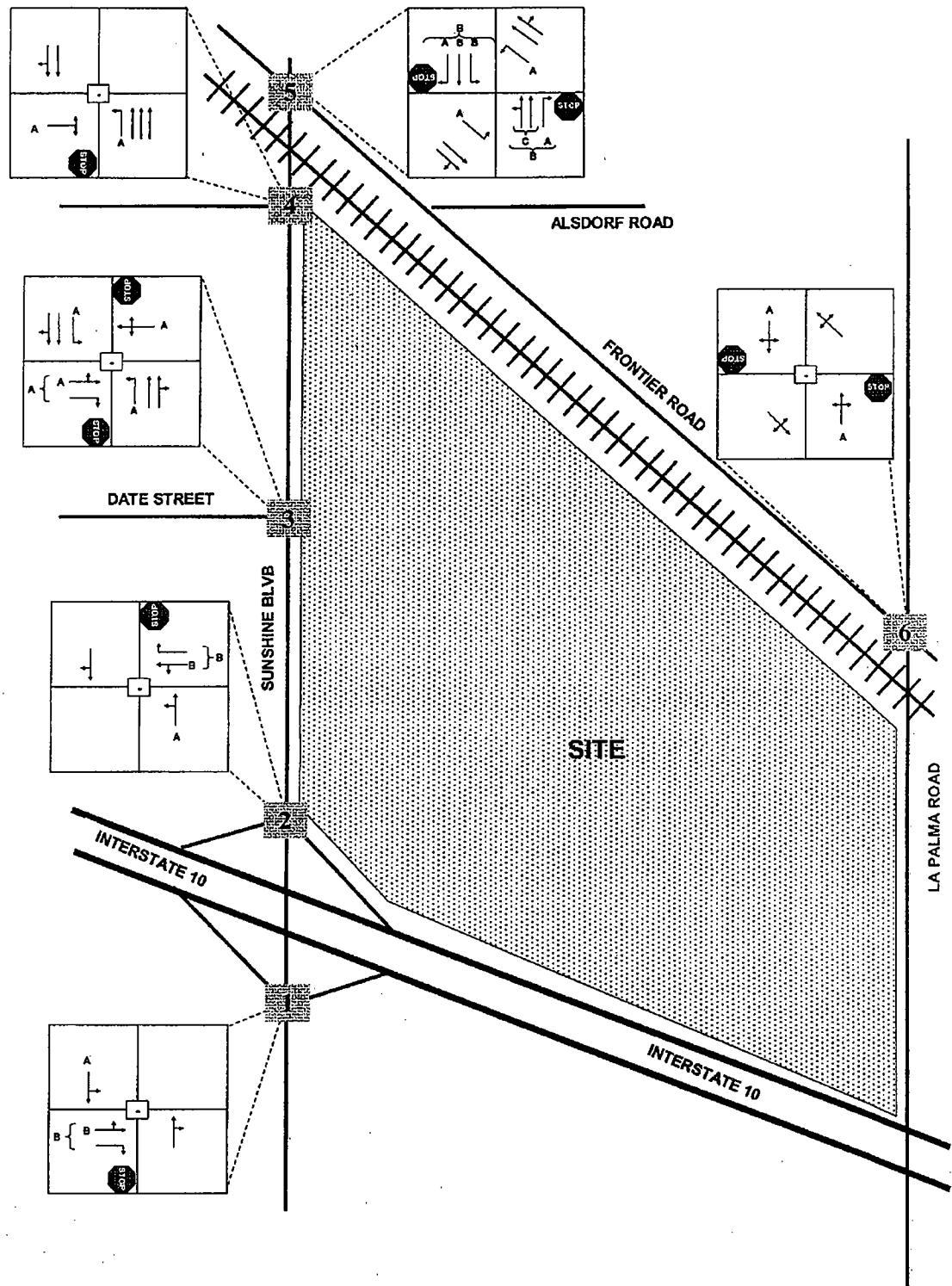


Figure 21: Existing 2006 Level-of-Service – PM Peak Hour

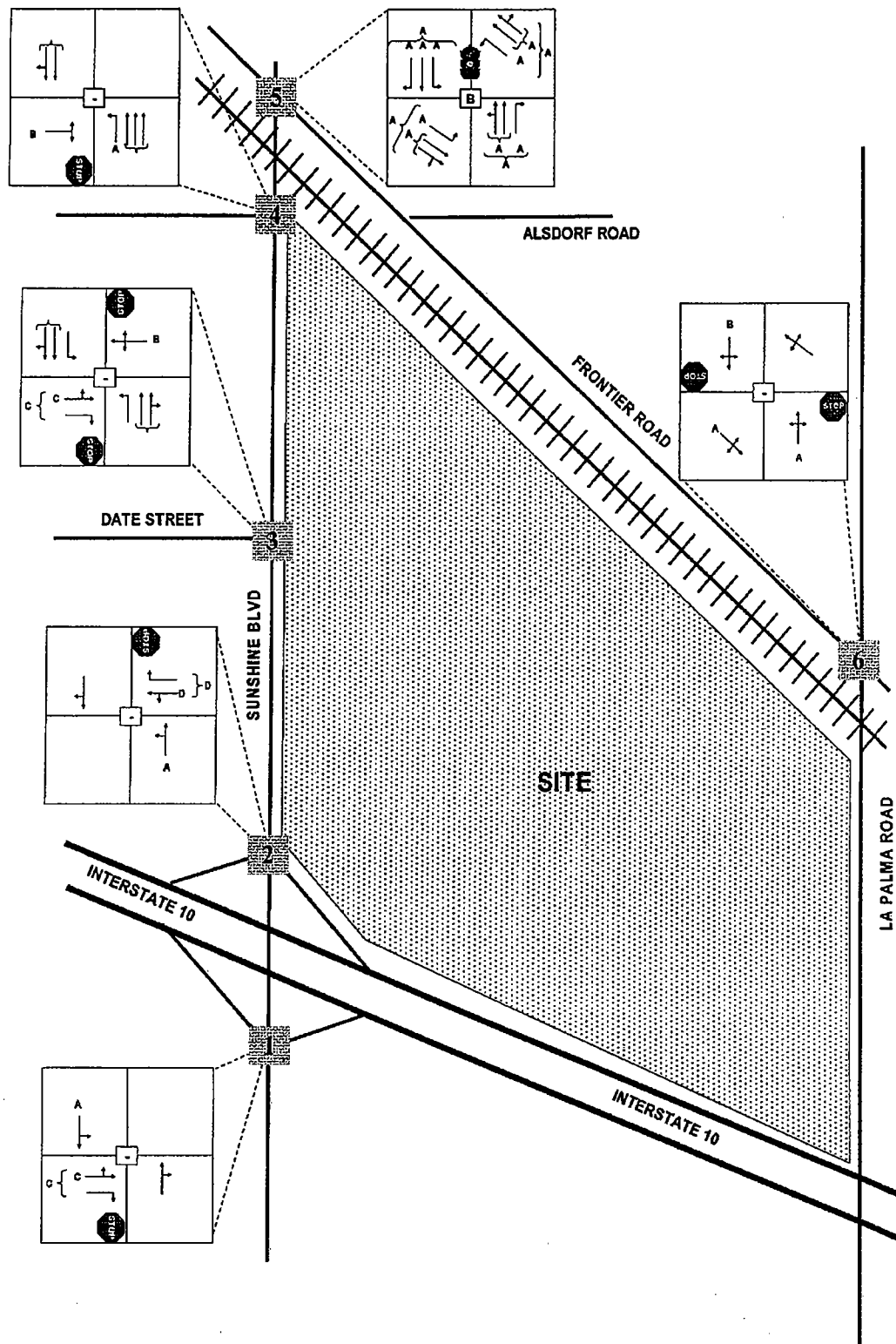


Figure 22: Ambient 2010 Level-of-Service – AM Peak Hour

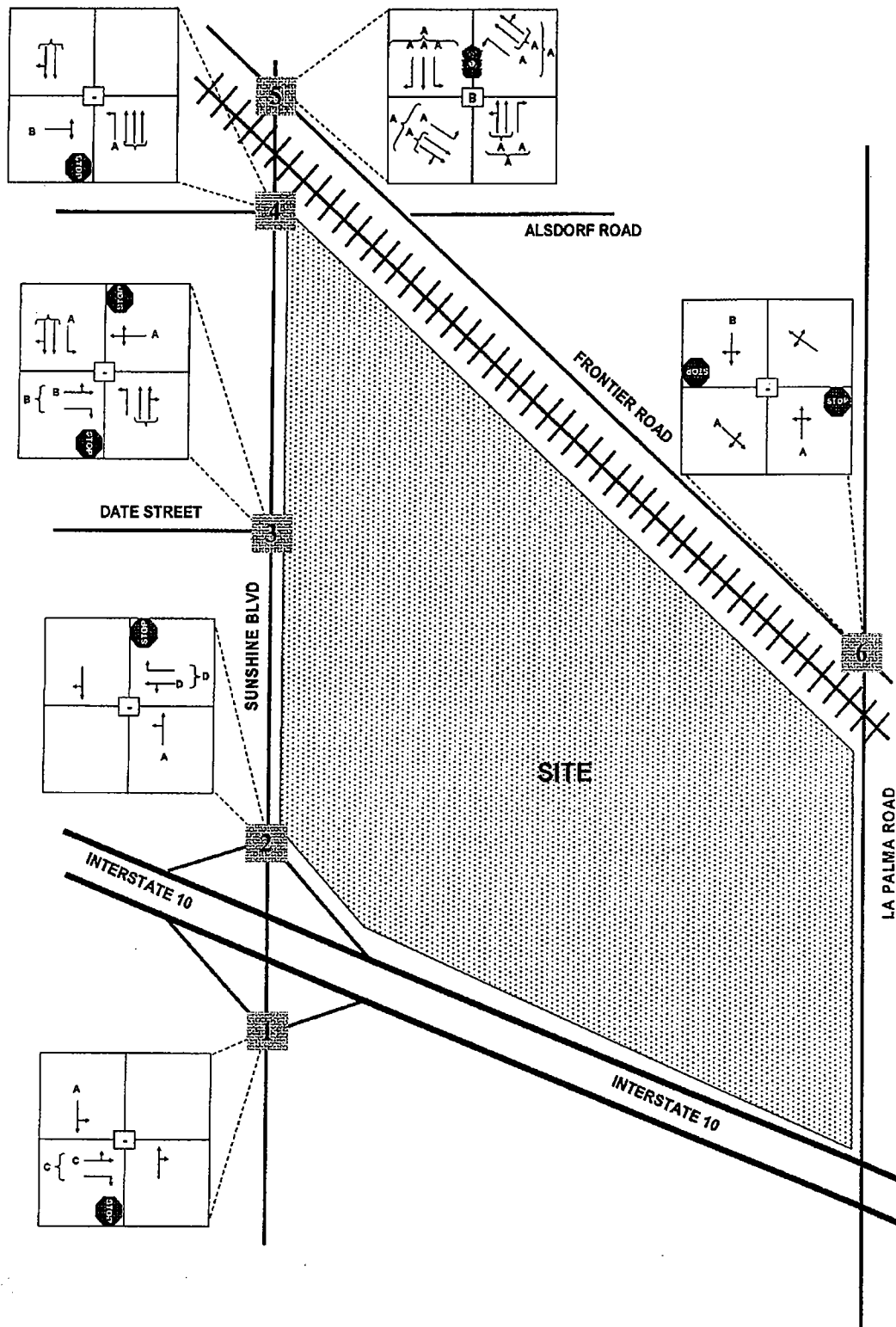


Figure 23: Ambient 2010 Level-of-Service – PM Peak Hour

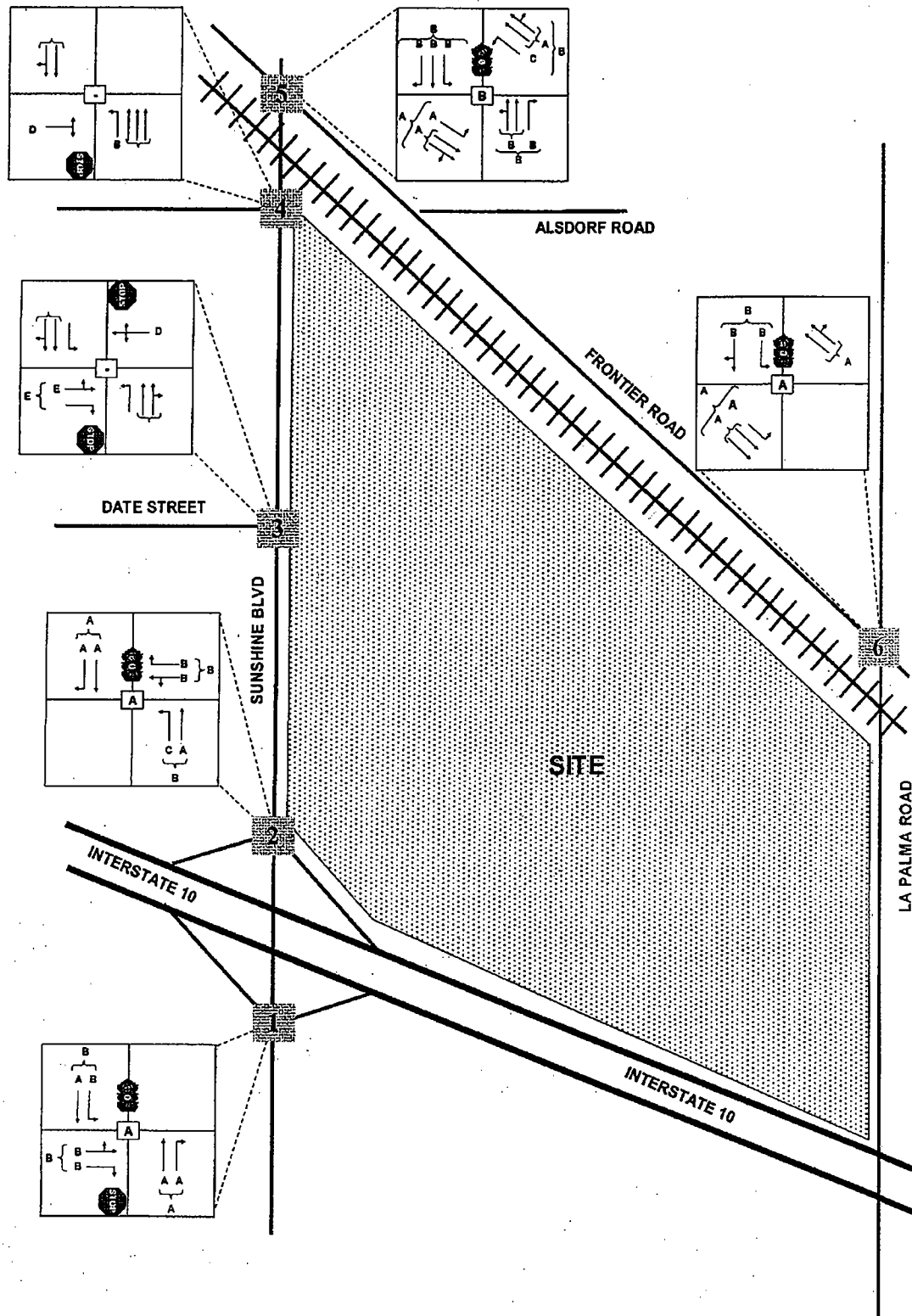


Figure 24: Ambient 2030 Level-of-Service – AM Peak Hour

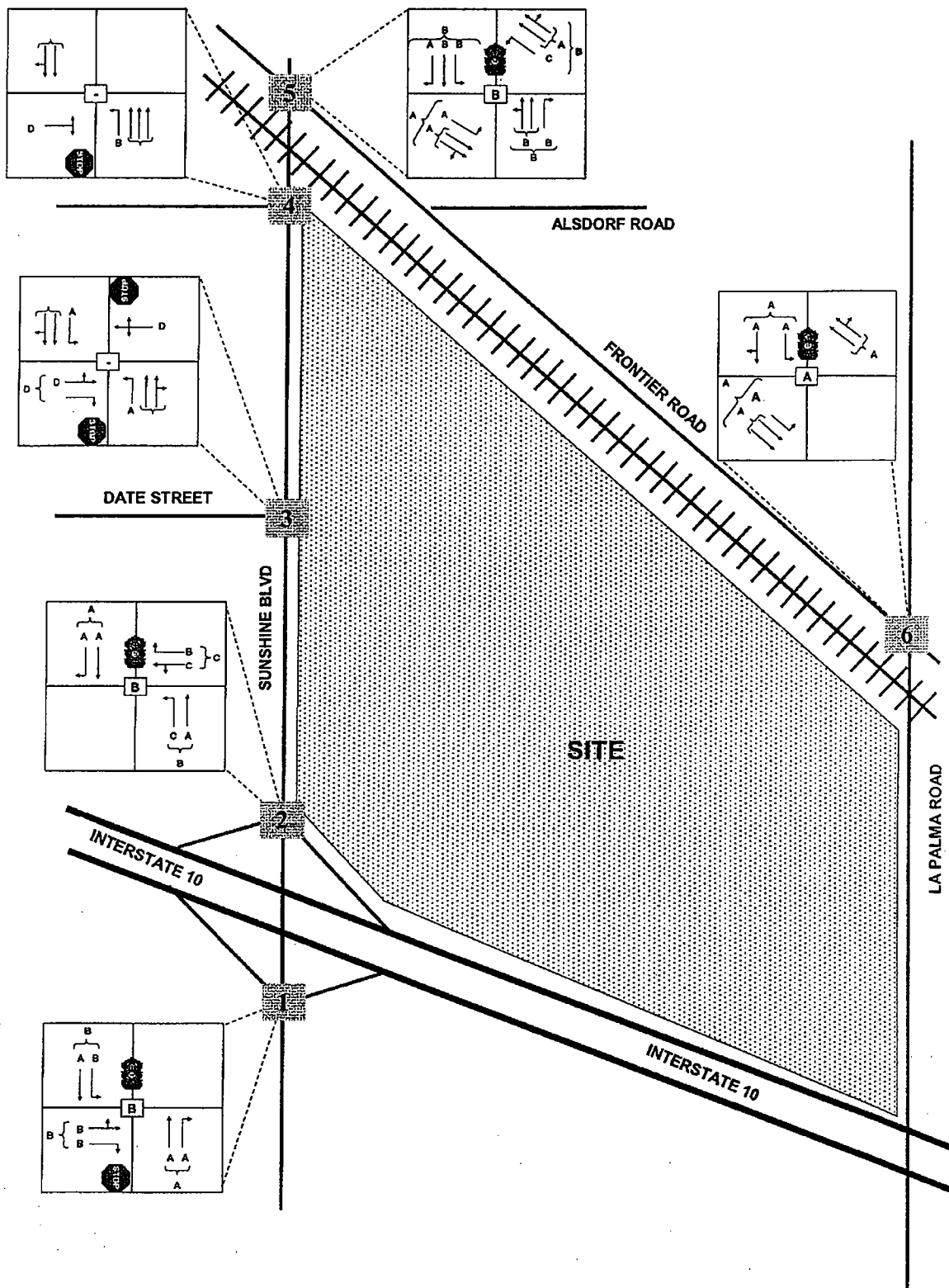


Figure 25: Ambient 2030 Level-of-Service – PM Peak Hour

Proposed Site – Trip Generation

The estimated trip generation for Eloy Business Center was determined through the procedures and data contained within the Institute of Transportation Engineers (ITE) *Trip Generation*, 7th Edition, published in 2003. This document provides traffic volume data from existing developments throughout North America that can be utilized to estimate vehicle trips that might be generated from proposed developments. The traffic data are provided for 152 different categories. The estimated traffic volume is dependent upon independent variables defined by the characteristics and size of each land use category. In each case where the land use category provided both an average trip generation rate and a trip generation equation, the procedure that resulted in the largest number of trips, with the exception of Parcel E, was selected. Weekday trips can also be predicted for morning and evening peak hour of the adjacent street, and morning and evening peak hour of the parcel (also known as generator). Furthermore, trips can also be predicted for Saturday and Sunday, both daily and peak hour.

As previously described in the report, the development of the Eloy Business Center consists of seven (7) parcels of varying land use. The first two parcels, Parcel A and B, are designated Rail Industrial on the site plan. To estimate the trip generation for Parcels A and B the ITE land use of Light Industrial - 110 with an independent variable of acres was used to calculate the number of trips generated for each parcel using their respective acreages.

Parcel C is also classified as Rail Industrial on the site plan. The land use for this parcel will be National Gypsum, a high technology manufacturing plant. It is anticipated that, parcel C, will generate 225 entering trucks and 225 exiting trucks per day, distributed evenly throughout the day, seven days each week. This truck traffic therefore represents nine vehicles entering and nine vehicles each hour. In addition, approximately 50 vehicles are expected to enter the site during the morning peak hour and exit the site during the evening peak hour.

Parcel D is a 100-acre parcel designated for use as Light Industrial. The ITE land use codes of Light Industrial – 110, Heavy Industrial – 120, Industrial Park – 130, and Manufacturing – 140 were each considered. The land use code of Heavy Industrial – 120 is the only code that has an average size that does not exceed 100 acres. Therefore, this code was utilized for this parcel. The independent variable of acres was utilized to calculate the number of trips generated.

Parcel E and Parcel G are classified as Light Industrial on the site plan. The ITE Land Use of Industrial Park – 130 with the independent variable of acres were utilized in predicting the number of trips that will be generated by these parcels.

Parcel F has been designated as commercial development on the site plan, and the ITE Land Use of Shopping Center – 820 with an independent variable of acres and a floor area ratio of 0.12 was used to calculate the number of trips generated. The majority of the trips for this land use will be generated by the adjacent parcels, and therefore the traffic volume generated by a low floor area ratio is appropriate.

Appendix E provides the complete results of these calculations, and a summary of the results is presented below and on the following page. **Table 12** summarizes the trip generation for the industrial parcels; **Table 13** summarizes the trip generation for the commercial parcel, and **Table 14** summarizes the trip generation for the entire proposed development.

Table 12: Trip Generation for Industrial Parcels of Proposed Development

Industrial Parcel	Area (Acres)	Day			AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
A	43	1,114	1,113	2,227	298	25	323	191	169	360
B	45	1,166	1,165	2,331	388	29	417	249	220	469
C	103	382	382	764	114	34	148	53	95	148
D	100	3,156	3,155	6,311	710	145	855	444	440	884
E	57	1,799	1,798	3,597	404	83	487	106	398	504
G	23	849	849	1,698	173	35	208	46	175	221
SUBTOTAL	180	8,466	8,462	16,928	2,087	351	2,438	1,089	1,497	2,586

Table 13: Trip Generation for Commercial Parcel of Proposed Development

Commercial Parcel	Area (S. F.)	Day			AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
F	130,680	4,048	4,048	8,096	115	73	188	360	389	749
SUBTOTAL	130,680	4,048	4,048	8,096	115	73	188	360	389	749

Table 14: Summary of Trip Generation for Proposed Development

Time Period	Entering	Exiting	Total
Day	12,514	12,510	25,024
AM Peak Hour	2,202	424	2,626
PM Peak Hour	1,449	1,886	3,335

Proposed Site – Trip Distribution

The final determination related to site traffic is the determination of the direction the generated traffic utilizes to enter and exit the site. The estimated distribution of the generated trips is shown in **Figure 26** and **Figure 27** on the following page for the morning and evening peak hours, respectively. **Figure 28** through **Figure 31** on the subsequent pages provide the 2010 and 2030 traffic volumes with the site for the morning and evening peak hours.

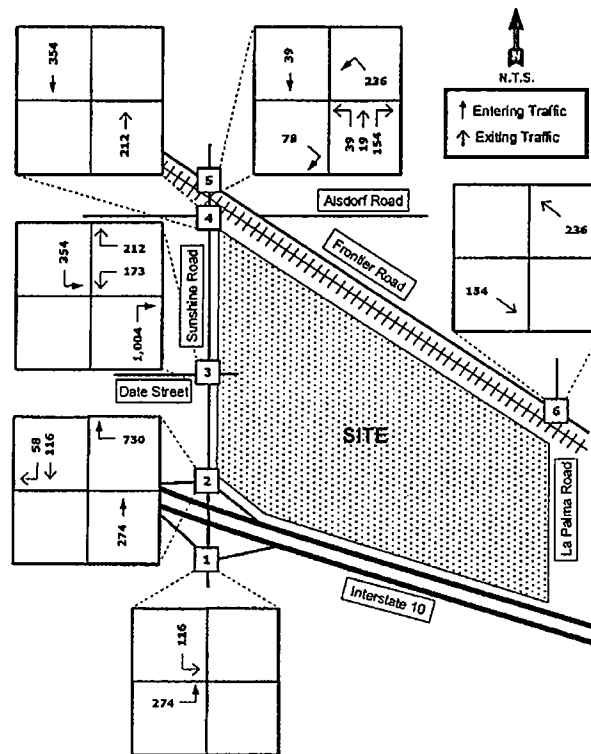


Figure 26: Site Traffic – AM Peak Hour

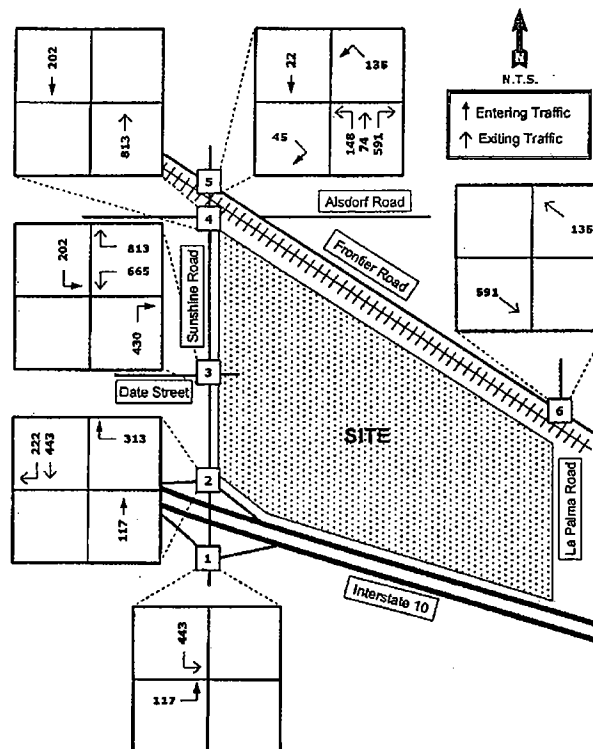
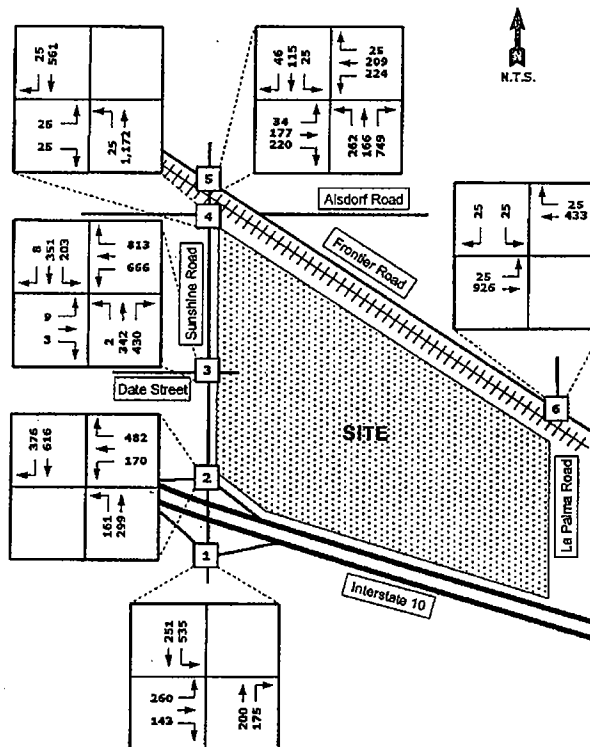
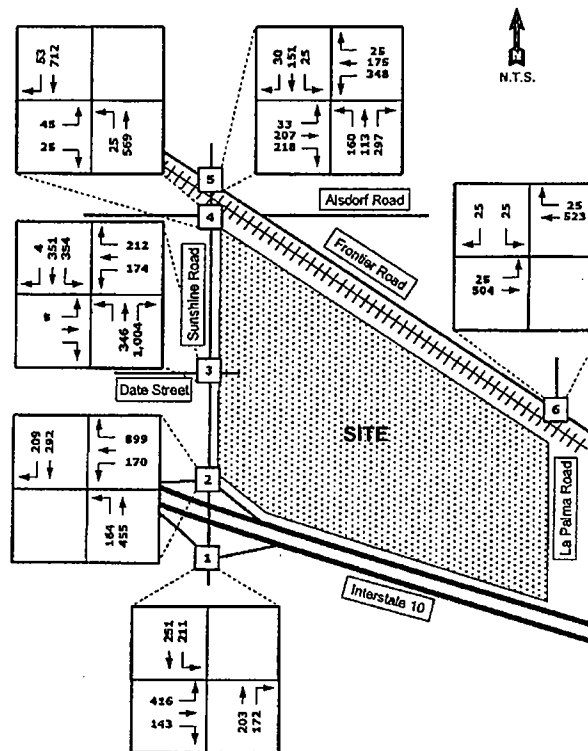


Figure 27: Site Traffic – PM Peak Hour



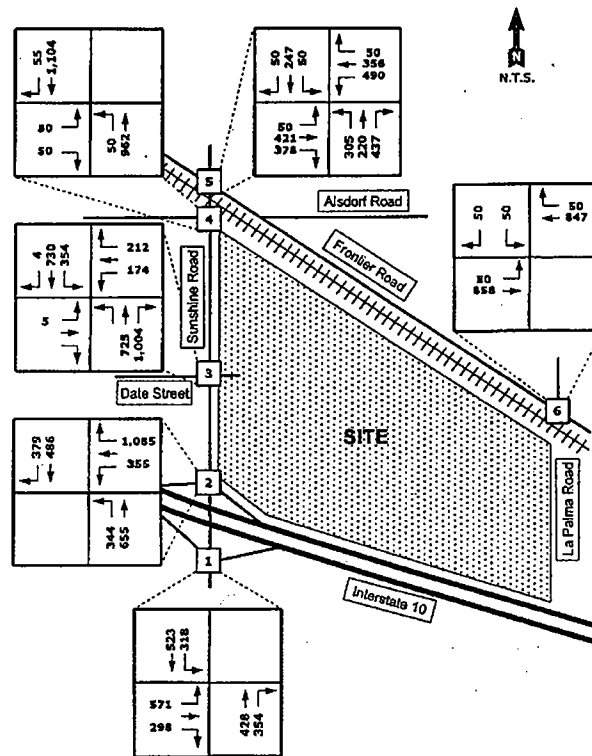


Figure 30: 2030 with Site Traffic – AM Peak Hour

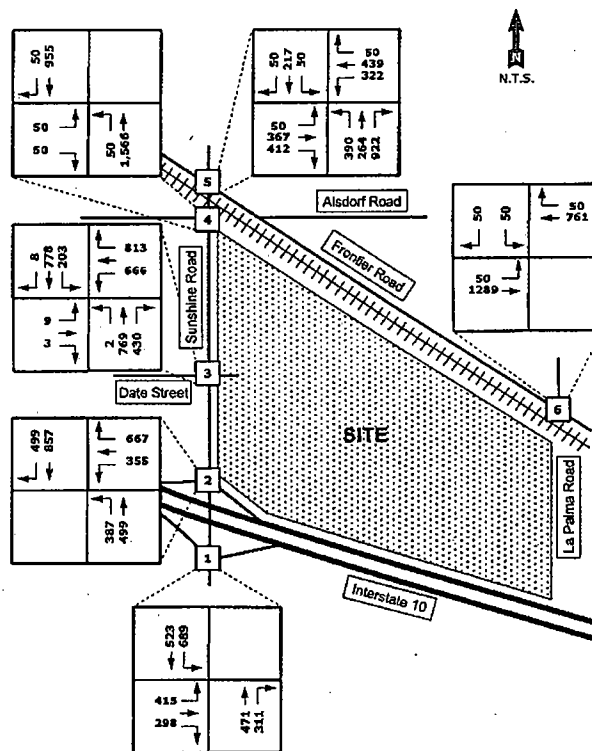


Figure 31: 2030 with Site Traffic – PM Peak Hour

Signal Warrant Analysis with Site

The MUTCD process was also utilized to determine if a signal is likely to be warranted with the proposed development at the intersections of Sunshine/I-10 EB, Sunshine/I-10 WB, Sunshine/Date, Sunshine/Alsdorf, Sunshine/Frontier, and La Palma/Frontier. The MUTCD process was also utilized to determine if a signal is likely to be warranted in the future at the study intersections.

Appendix F provides the results of the 2010 plus site signal warrant analysis for the study intersections. The results for 2010 plus site signal warrant analysis are summarized in **Table 15**. Those intersections that were warranted in 2010 without site traffic were not considered for the 2010 signal warrant analyses with site.

Table 15: Ambient with Site Signal Warrant Summary – 2010

Warrant	Warrants Satisfied?				
	1A	1B	2	3B - AM	3B - PM
Sunshine Boulevard and Date Road	YES	YES	YES	YES	YES
Sunshine Boulevard and Alsdorf Road	NO	NO	NO	NO	NO
La Palma Road and Frontier Road	NO	NO	NO	YES	YES

Based on these analyses, traffic signals are likely to be warranted at the intersections of Sunshine/Date and La Palma/Frontier with the proposed development in the year 2010.

A signal warrant analysis was not conducted for the 2030 ambient plus site condition because all study intersections were already anticipated to be warranted under previous analyses scenarios.

Turn Lane Analysis with Site

The reference utilized to determine the need for left-turn and right-turn lanes is the MCDOT publication, *Roadway Design Manual*. This document states that a right-turn deceleration lane should be installed on an intersection approach when the right-turn volume exceeds 300 vehicles per hour. This manual also states that a dual left-turn lane should be installed on an intersection approach when the design left-turn volume exceeds 300 vehicles per hour. This document also states that right-turn deceleration lanes should be provided at accesses when the right-turn volume exceeds 55 vehicles per hour and the outside vehicle lane volume exceeds 250 vehicles per hour.

Each of the approaches to each of the study intersections and site accesses was analyzed for 2010 and 2030 to determine if right-turn or left-turn lanes were required for the future with the site traffic conditions. **Table 16** through

Table 19 summarize the left and right turn-lane lengths for the horizon year 2030. The results are provided by indicating if right-turn lanes or dual left-turn lanes are required at each location.

The typical methodology for determining the storage length of turn lanes is described on pages 714 and 715 in the document *Policy on Geometric Design of Highways and Streets*, 2004 published by the American Association of State Highway and Transportation Officials. This publication recommends that turn lanes accommodate 1.5 to 2.0 times the number of vehicles likely to arrive in a two-minute period. For this analysis, the left-turn lane lengths were determined by estimating the number of vehicles arriving in a two-minute period for the morning and evening peak hour. The maximum estimated volume from the two time periods is used for the analyses. The estimated volume is multiplied by 1.5, approximated to the next largest integer, and multiplied by 25 feet for vehicle length and clearance for intersections servicing a normal percentage of heavy vehicles.

For the site entrance at Sunshine Boulevard and Date Street, a weighted average was used which considered 10% heavy vehicles utilizing the site. Using the AASHTO standard for WB-40 heavy vehicle, a storage length of 40 feet for the heavy vehicles was used in the weighted average to calculate storage lengths. The right-turn lane lengths were determined using the same methodology, with a factor of 1.25 instead of 1.5 used for the left-turn lanes.

Table 16: 2030 Access Right Turn-Lane Analysis

INTERSECTION	DIRECTION	NUMBER	RIGHT-TURN LANE LENGTH
Sunshine Blvd / Date Street	NB	2	325
Sunshine Blvd / Date Street	WB	2	350

Table 17: 2030 Access Left Turn-Lane Analysis

INTERSECTION	DIRECTION	NUMBER	LEFT-TURN LANE LENGTH
Sunshine Blvd / Date Street	NB	1	650
Sunshine Blvd / Date Street	WB	2	300

Table 18: 2030 Intersection Right Turn-Lane Analysis

INTERSECTION	DIRECTION	NUMBER	RIGHT-TURN LANE LENGTH
Sunshine Blvd / Frontier Street	NB	2	400
Sunshine Blvd / Frontier Street	SB	0	150
Sunshine Blvd / Frontier Street	EB	2	175
Sunshine Blvd / Date Street	NB	2	425
Sunshine Blvd / Date Street	SB	0	150
Sunshine Blvd / Date Street	EB	0	150
Sunshine Blvd / Date Street	WB	2	300
Sunshine Blvd / I-10 WB	SB	2	225
Sunshine Blvd / I-10 WB	WB	2	475
Sunshine Blvd / I-10 EB	NB	1	300
Sunshine Blvd / I-10 EB	EB	1	250

The intersection of Sunshine Boulevard and Date Street will require one exclusive northbound right-turn lane and one shared through and right-turn lane.

Table 19: 2030 Intersection Left Turn-Lane Analysis

INTERSECTION	DIRECTION	NUMBER	LEFT-TURN LANE LENGTH
Sunshine Blvd / Frontier Street	NB	2	175
Sunshine Blvd / Frontier Street	SB	1	150
Sunshine Blvd / Frontier Street	EB	1	150
Sunshine Blvd / Frontier Street	WB	2	225
Sunshine Blvd / Alsdorf Road	NB	1	150
Sunshine Blvd / Date Street	NB	1	150
Sunshine Blvd / Date Street	SB	1	325
Sunshine Blvd / Date Street	WB	2	325
Sunshine Blvd / I-10 WB	NB	2	175
Sunshine Blvd / I-10 WB	WB	2	150
Sunshine Blvd / I-10 EB	SB	2	300
Sunshine Blvd / I-10 EB	EB	2	250

Level-of-Service Analysis with Site

The level-of-service for the 2010 and 2030 conditions with the proposed development were analyzed for the six study intersections. Synchro software was utilized to calculate the average delay and level-of-service. The input and output for these analyses are provided as **Appendix H** to this report. **Figure 32** through **Figure 35** on the following pages provide the morning and evening peak hour level-of-service for the ambient plus site 2010 and ambient plus site 2030 traffic volumes and conditions.

One of the principle considerations for this analysis was the higher portion of trucks and heavy vehicles that would be using the roadway infrastructure. Heavy vehicles require more time to perform turning movements at intersections, and longer storage lengths for auxiliary lanes. The percentage of heavy vehicles for the entire site was assumed to be 10%.

Another important condition for determining level-of-service at an intersection is the number of lanes provided for each movement on each approach at the intersection. The existing intersection geometry for each study intersection is discussed within the section of this report titled **Description of Surrounding Transportation System**. The new lane configurations necessary for the years 2010 and 2030 are shown in the LOS figures, **Figure 32** through **Figure 35** on the following pages. The length of the auxiliary lanes is within the section of this report entitled **Turn Lane Analysis with Site**.

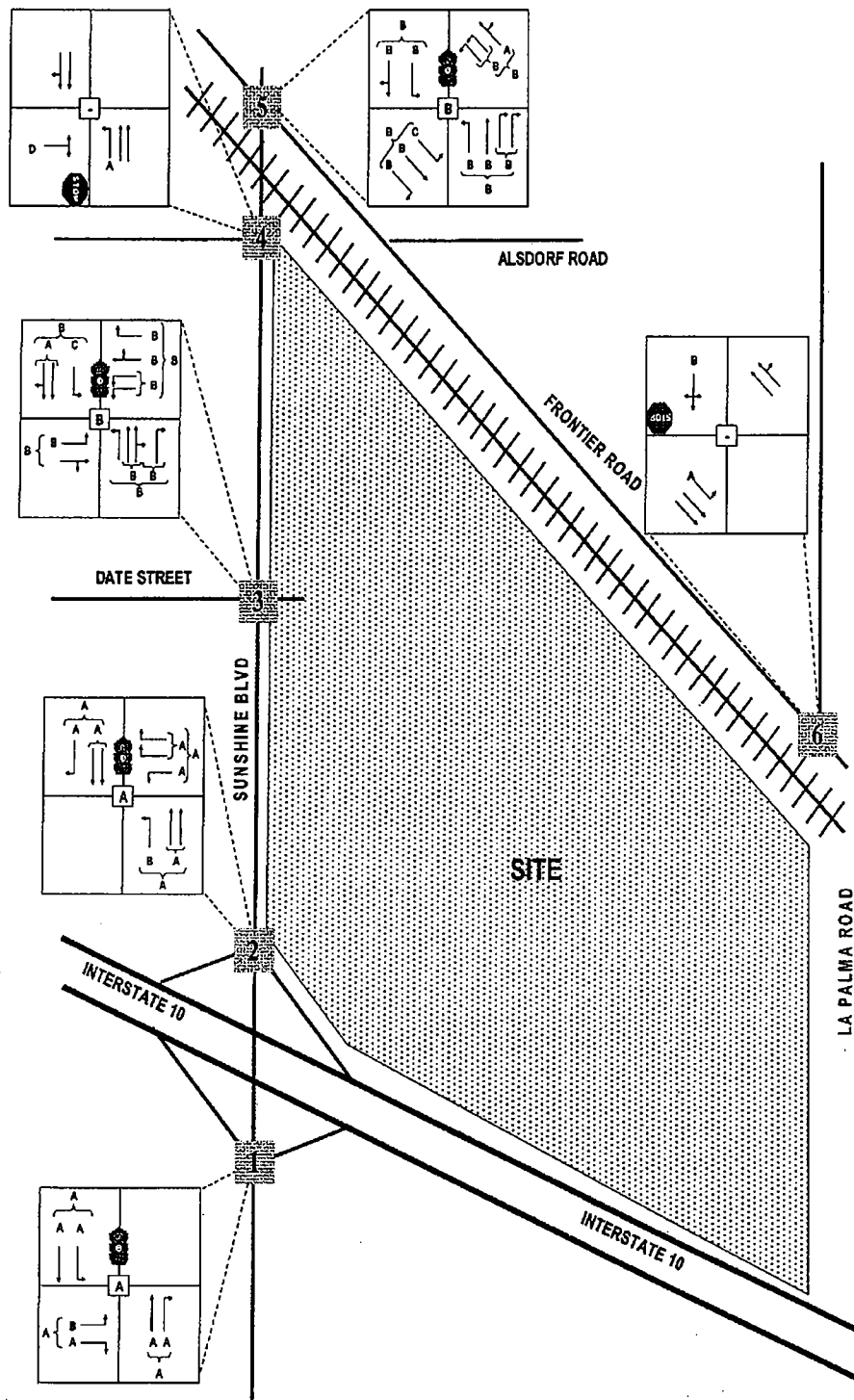


Figure 32: 2010 with Site Level-of-Service – AM Peak Hour

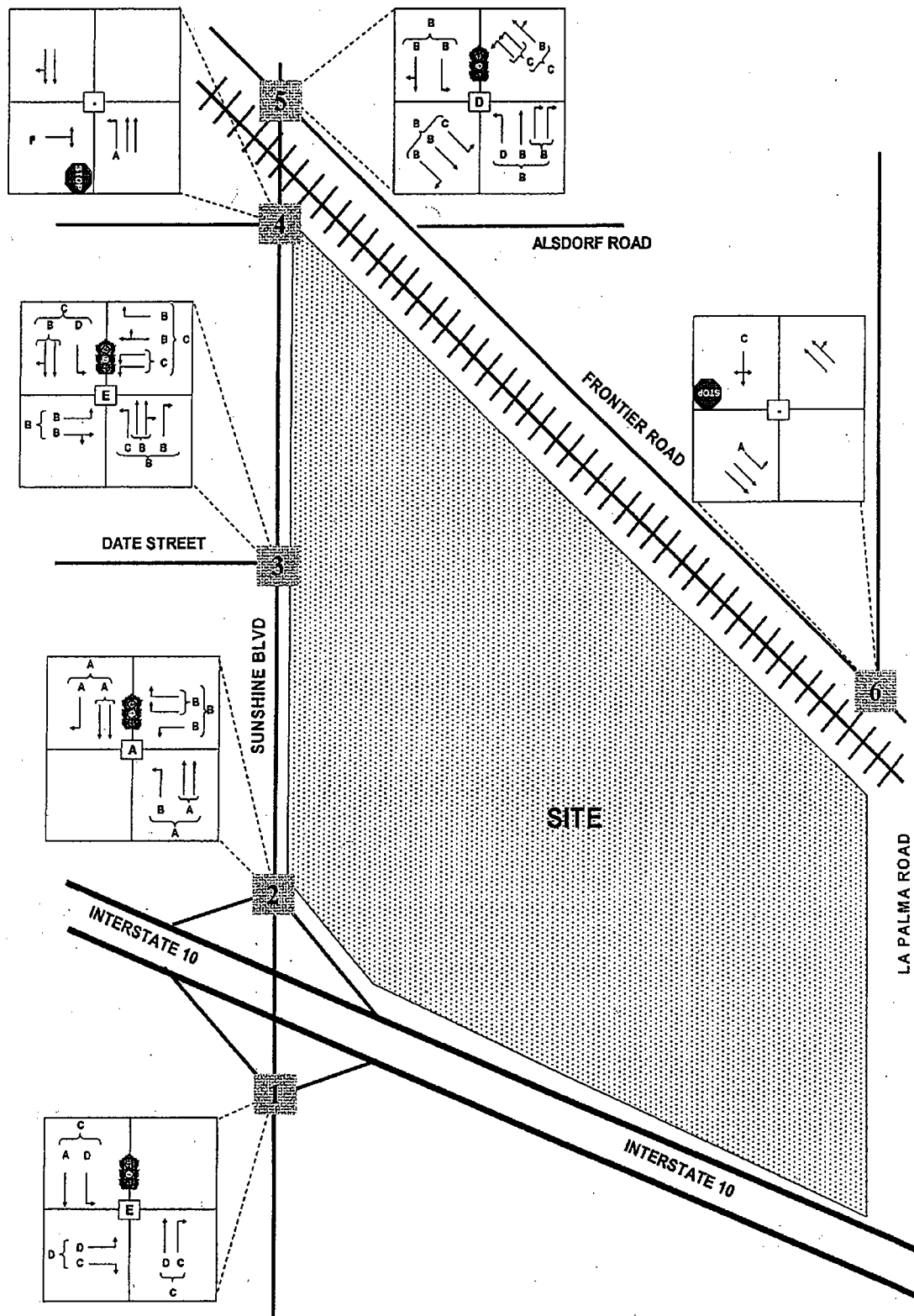


Figure 33: 2010 with Site Level-of-Service – PM Peak Hour

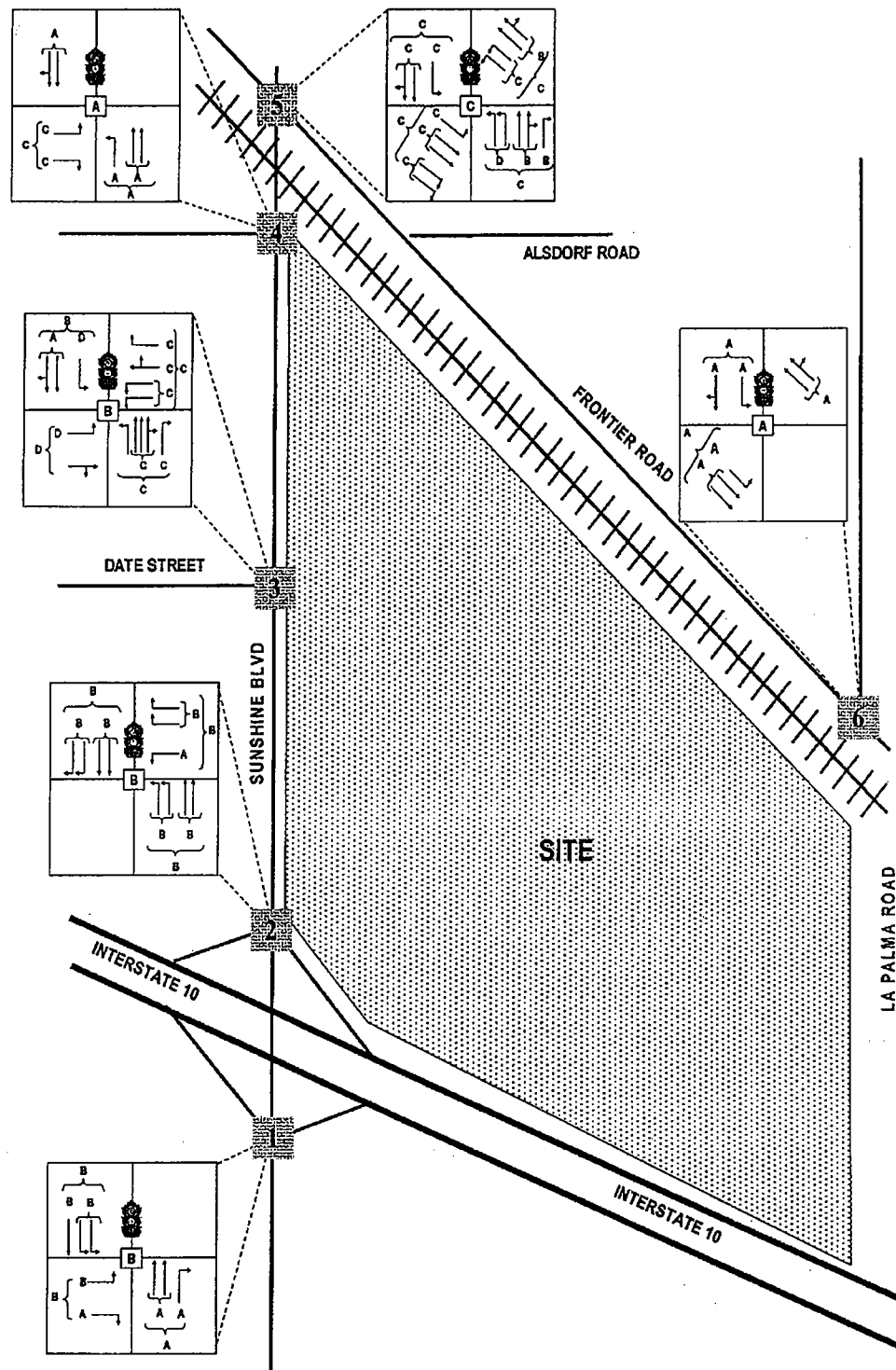


Figure 34: 2030 with Site Level-of-Service – AM Peak Hour

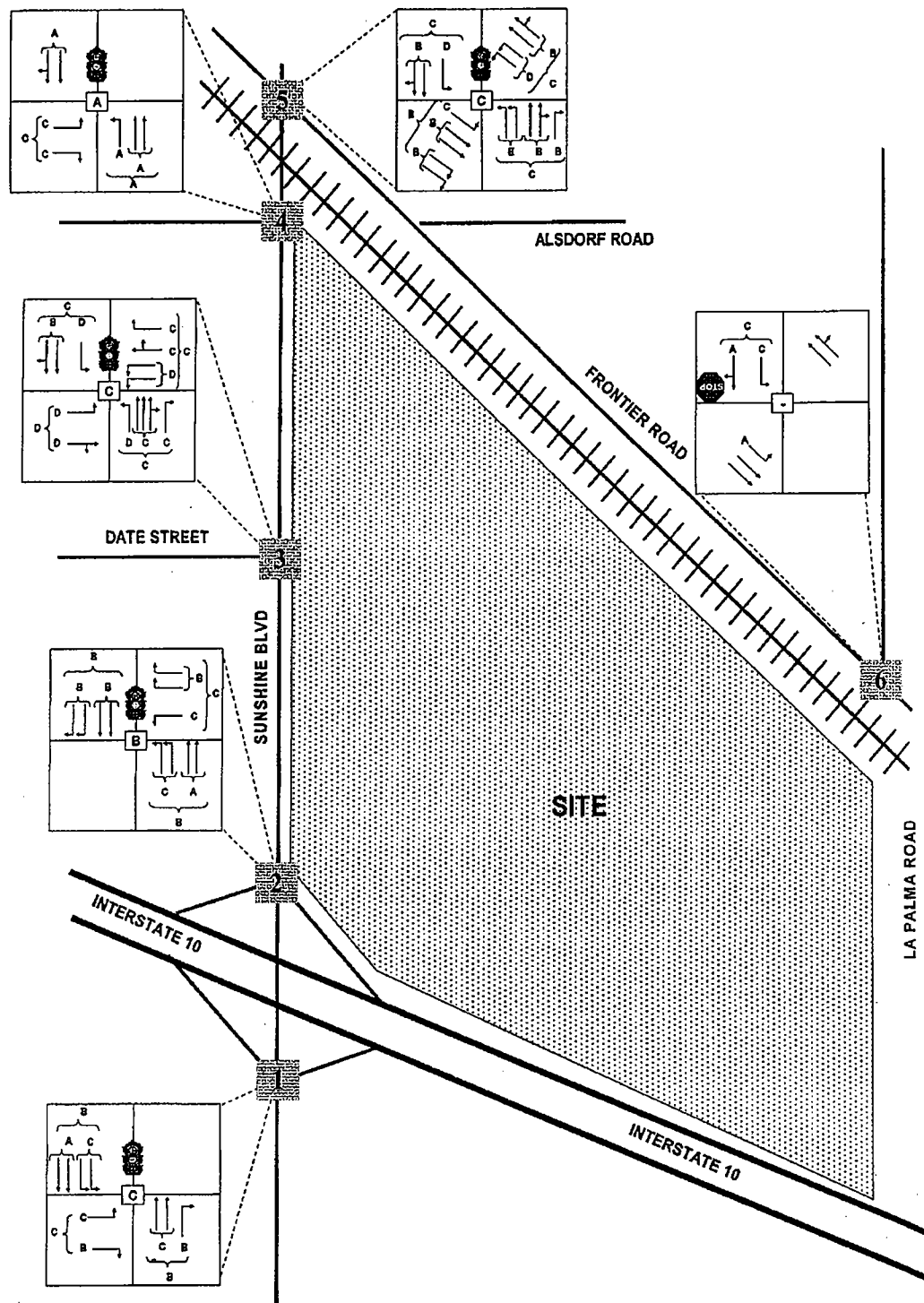


Figure 35: 2030 with Site Level-of-Service – PM Peak Hour

Conclusions

Recommendations without the Eloy Business Center

The existing traffic conditions at the intersection of Sunshine Boulevard and I-10 WB Ramp satisfied the warrants for a traffic signal without the development of the proposed Eloy Business Center project.

The estimated traffic conditions at the following intersections will satisfy warrants for traffic signals with ambient 2010 traffic volumes without the development of the proposed Eloy Business Center project:

Sunshine Boulevard and I-10 EB Ramp
Sunshine Boulevard and Frontier Road

In 2030, the anticipated ambient traffic at the intersection of Sunshine Boulevard and Alsdorf Road is expected to warrant a traffic signal without the development of the proposed Eloy Business Center project. However, due to the intersection's proximity to the intersection of Sunshine/Frontier the installation of a traffic signal is not recommended. Instead, the intersection of Sunshine/Frontier should be signalized.

Recommendations with the Eloy Business Center

The estimated traffic conditions at the following intersections will satisfy warrants for traffic signals with ambient 2010 traffic volumes with the development of the proposed Eloy Business Center project:

Sunshine Boulevard and Date Road
La Palma Road and Frontier Road

Signal warrant analyses for the 2030 ambient plus site traffic volumes with the development of the proposed Eloy Business Center project were not considered because all study intersections were warranted under previous conditions.