

**TRAFFIC REPORT
FOR
TIERRA RICA ESTATES SUBDIVISION**

Pinal County, Arizona

SEPTEMBER 29, 2000

Prepared by:

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I. Introduction

The Tierra Rica Estates development area consists of residential development covering 703 gross acres located in Pinal County. The study area is located in the north half of the southeast quarter of section 29, T-5-S, R-7-E of the Gila and Salt River Base and Meridian, Pinal County, Arizona. The general location of the project is shown in Figure 1.

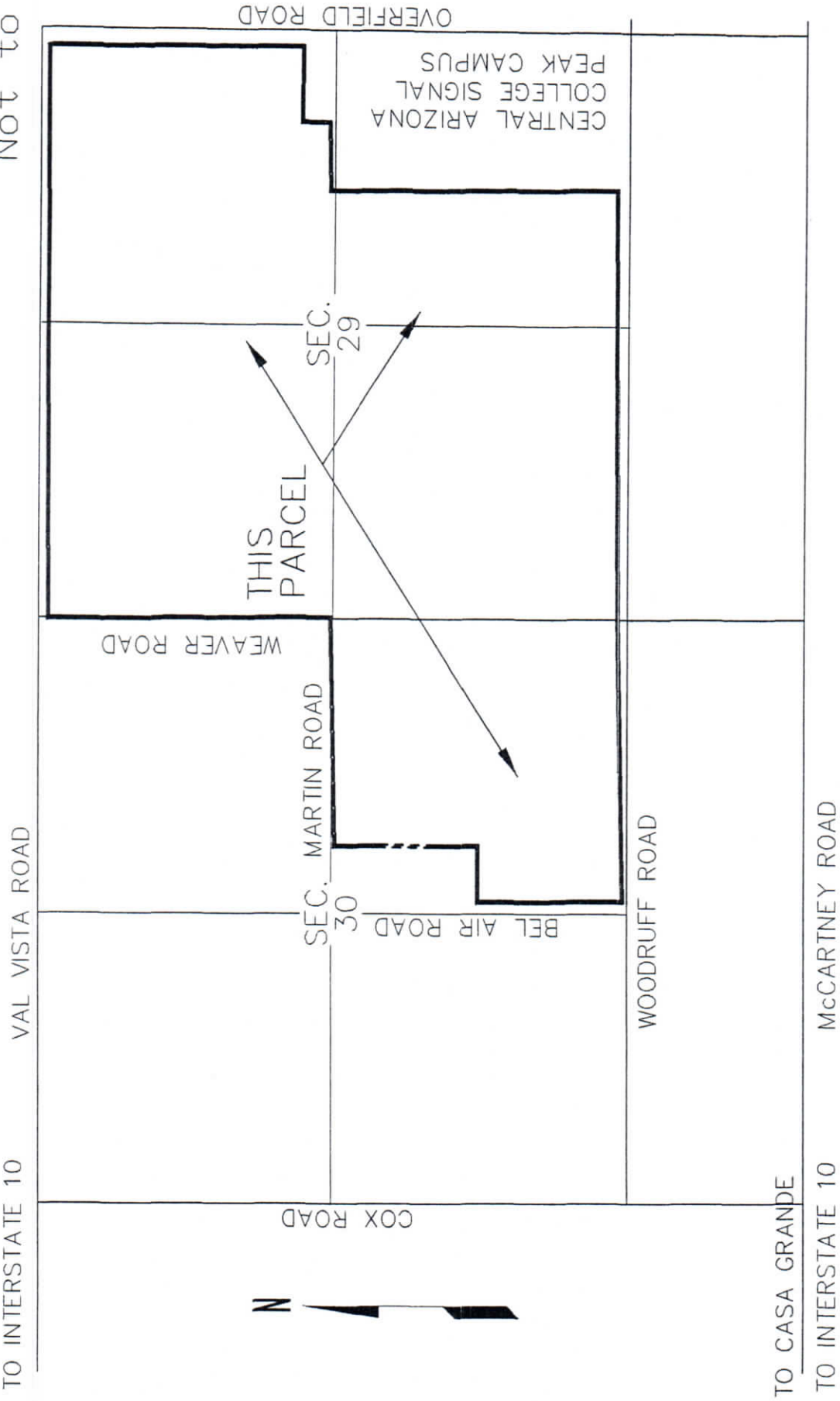
The proposed land use for Tierra Rica Estates is primarily single-family residential. Woodruff Road and Val Vista Road will primarily provide access to the area. The main traffic impacts from Tierra Rica Estates development will be on Woodruff Road and Val Vista Road.

This study was undertaken to determine the cumulative traffic impacts on the existing and proposed roadway network for the area. It focuses on the major roadway elements of the area. The results of the study provide a master circulation plan for the major street system within the study area. Intersection requirements for the site access along Woodruff Road and Val Vista Road are provided as well as the phasing of circulation improvements for the Tierra Rica Estates area.

FIGURE 1

VICINITY MAP

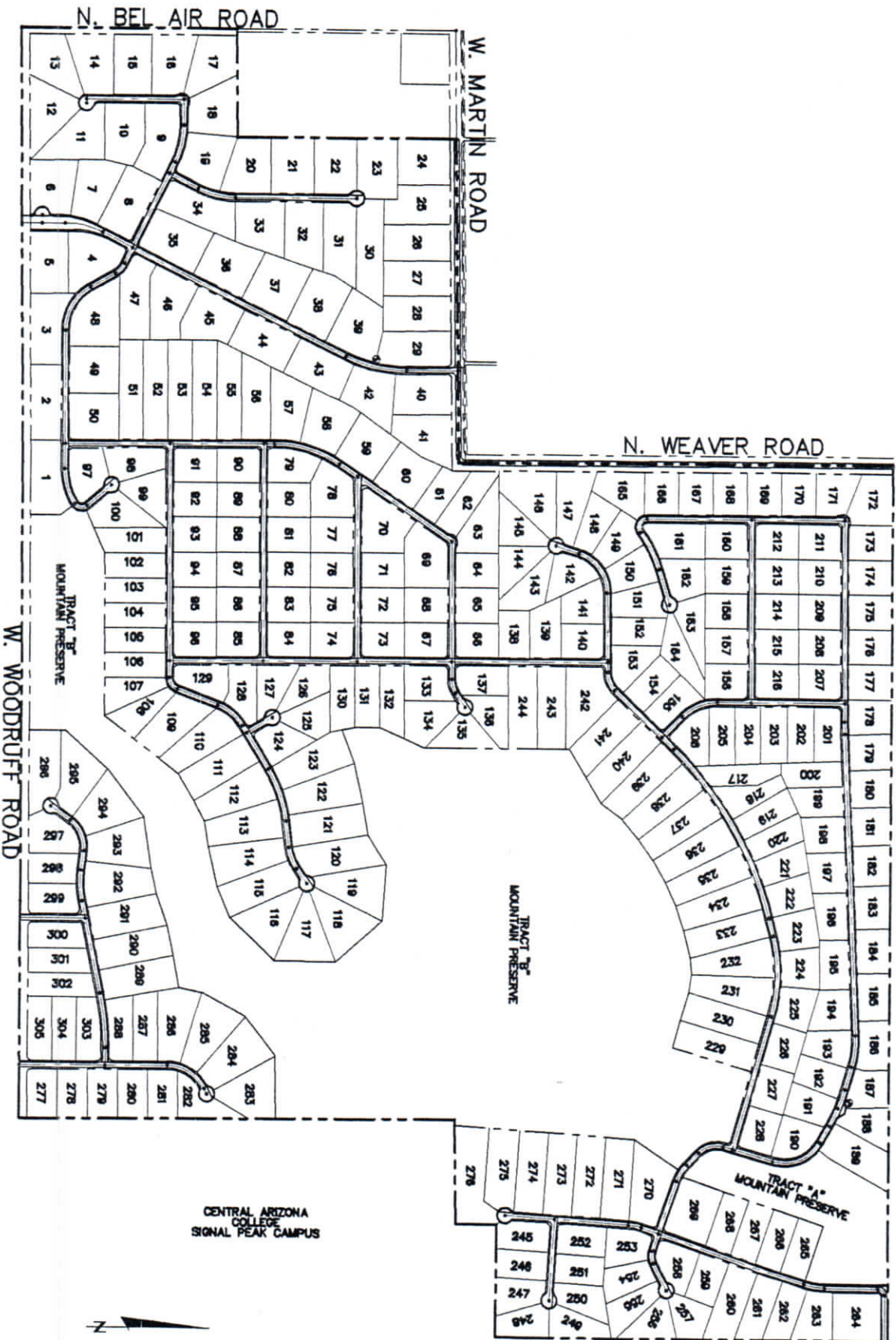
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II. Proposed Development

The project area is located in Pinal County north of Woodruff Road, south of Val Vista Road, east of Overfield Road, and west of Bel Air Road. The proposed site plan is shown in Figure 2. This development will consist of 305 dwelling units. There will also be approximately 143 acres of mountain preserve. Woodruff Road, Martin Road and Val Vista Road (through Overfield Road) provide access to the site. It is anticipated that the Tierra Rica Estates area will be developed by the year 2011.

FIGURE 2
SITE PLAN
Not to Scale



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III. Study Area Conditions

The study area, shown in Figure 2, incorporates an area of approximately 703 acres in Pinal County. The overall site is named Tierra Rica Estates with primarily residential development. The underlying zoning of the area is general rural (GR) (245 lots) and suburban homestead (SH) (60 lots) subdivision district.

IV. Existing Conditions

The proposed Tierra Rica Estates maximum traffic impact will occur at the following intersections: Zone 1/Woodruff Road, Zone 2/Martin Road, Zone 3/Overfield Road, Zone 4/Woodruff Road, and Zone 5/Woodruff Road. Val Vista Road will have a significant traffic impact for the development through Overfield Road. Woodruff Road and Val Vista Road are Pinal County Roadways with one lane in each direction. The posted speed limit on Val Vista Road and Woodruff Road in the project vicinity are 45 mph and 45 mph, respectively. The most recent counts available from Pinal County Department of Civil Works show an Average Daily Traffic (ADT) volume of 300 vehicles per day on Val Vista Road and 3700 vehicles per day on nearby McCartney Road in 1994. Val Vista Road and McCartney Road will provide access to I-10. There is currently no other information from Pinal County on the surrounding roadway system for the Tierra Rica Estates development.

The other roads in the development are currently undeveloped. At the time of this report, there were no proposed names for these roadways. Therefore, the intersections

are described as what zone that flow out of. They will primarily serve the residential development.

V. Traffic Projections

A. Site Trip Generation

Tierra Rica Estates is planned as a low density single-family development. The majority of the trips generated will be associated with trips made by residents of Tierra Rica Estates. The trip rates were taken from *The ITE Trip Generation Manual*, 1979, Edition.

Table 1 shows the daily traffic generated by the Tierra Rica Estates area at build-out for the horizon year of 2011. It was assumed from other similar studies that 95% of the site trips would be to destinations external to the site. Table 2 shows the calculated AM and PM peak hour traffic for the year 2011.

B. Site Trip Distribution and Assignment

In order to perform site trip distribution, the area was separated into five (5) traffic zones and the proposed major roadways were separated into six (6) roadway intersections. The tentative plat was used to determine the number of homes included in each traffic zone. The trips generated by each zone were directly assigned to the adjacent roadway intersection. The external trips from zones one (1), four (4), and five (5) are directed to Woodruff Road. Zones two (2) and three (3) are directed to Val Vista Road. The internal trips were circulated within the site. Figure 3 shows the traffic zones.

Tierra Rica Estates is primarily a residential development with a strong trip orientation to the Phoenix Metropolitan. The facility providing that connection is

Interstate 10 (I-10). The Tierra Rica Estates trip assignment departing the site was orientated 80% to the Phoenix Metropolitan/Casa Grande/ Tucson direction and 20% to the Florence/Coolidge/Central Arizona College direction. Casa Grande will be accessed using Cox Road to McCartney Road. Interstate 10 will access the Phoenix Metropolitan and Tucson. It will be assumed that there will be a 50% split between the use of Val Vista Road and McCartney Road to Interstate 10 (I-10).

C. Background Traffic

The non-site or background traffic is the traffic which will be on the roadways if the site was not developed. The average daily traffic for Val Vista Road is 300 vehicles per day from 1994. It is assumed that has not significantly changed. Since there was not information on Woodruff Road, Cox Road, Martin Road, and Bel Air Road, it will be assumed that the background traffic will be insignificant.

D. Total Traffic

2011 total daily traffic associated with the roadway network serving Tierra Rica Estates development is the combination of site generated traffic and background traffic. The 2011 projected average daily traffic is shown in Figure 4.

Tierra Rica Estates

Daily Trip Generation

Table 1

Zone No.	Dwelling Units	Total (1) (Trips/DU)	Total Trips	External (Trips/DU)	External Trips	Internal (Trips/DU)	Internal Trips
1	123	9.5	1169	9	1110	0.5	58
2	14	9.5	133	9	126	0.5	7
3	139	9.5	1321	9	1254	0.5	66
4	15	9.5	143	9	135	0.5	7
5	14	9.5	133	9	126	0.5	7
TOTAL	305		2898		2753		145

(1) Based on average rates presented in Institute of Transportation Engineer's Trip Generation, 1979.

(Based on 95% External Trips)

Tierra Rica Estates

Peak Hour Trip Generation

Table 2

PEAK HOUR TRIP GENERATION (AM)

Zone No.	Dwelling Units	Total (1) (Trips/DU)	Total Trips	External (Trips/DU)	External Trips	Internal (Trips/DU)	Internal Trips
1	123	1.1	135	1.05	129	0.06	7
2	14	1.1	15	1.05	15	0.06	1
3	139	1.1	153	1.05	145	0.06	8
4	15	1.1	17	1.05	16	0.06	1
5	14	1.1	15	1.05	15	0.06	1
TOTAL	305		336		319		17

(1) Based on average rates presented in Institute of Transportation Engineer's Trip Generation, 1979.

(based on 95% External Trips)

PEAK HOUR TRIP GENERATION (PM)

Zone No.	Dwelling Units	Total (1) (Trips/DU)	Total Trips	External (Trips/DU)	External Trips	Internal (Trips/DU)	Internal Trips
1	123	1.3	160	1.24	152	0.06	8
2	14	1.3	18	1.24	17	0.06	1
3	139	1.3	181	1.24	172	0.06	9
4	15	1.3	20	1.24	19	0.06	1
5	14	1.3	18	1.24	17	0.06	1
TOTAL	305		397		377		20

(1) Based on average rates presented in Institute of Transportation Engineer's Trip Generation, 1979.

(based on 95% External Trips)

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FIGURE 3

ZONE MAP

Not to Scale

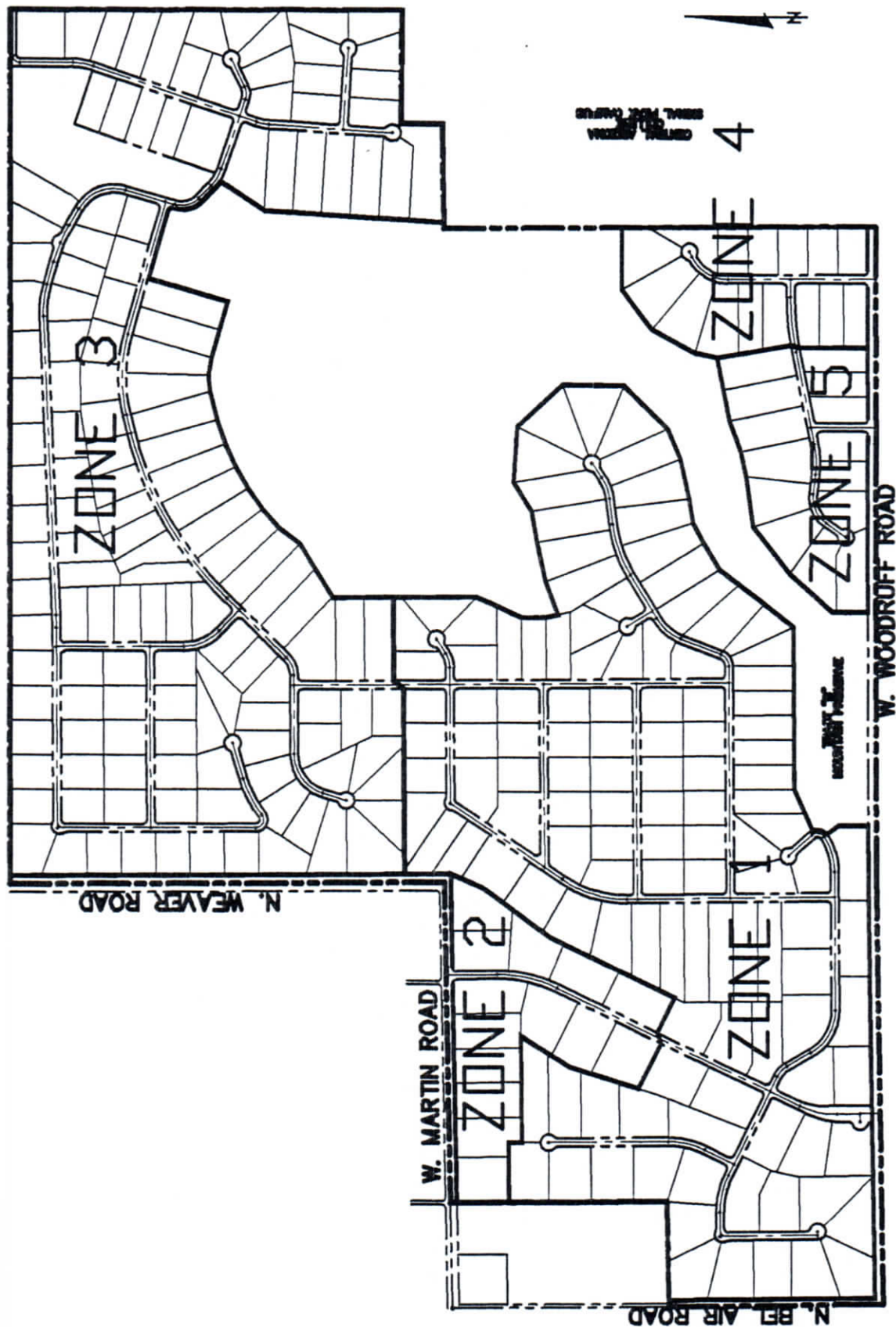
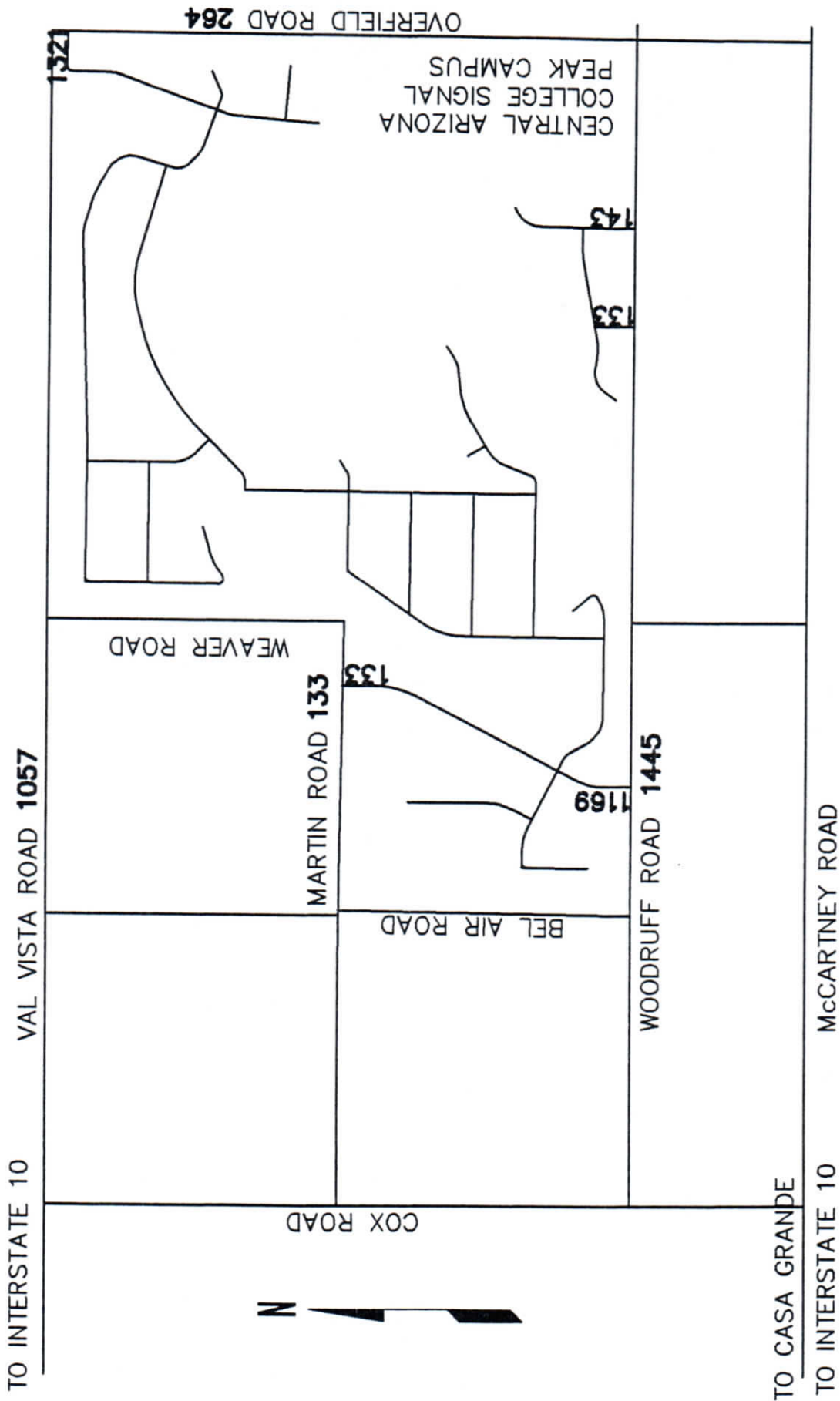


FIGURE 4

PROJECTED AVERAGE DAILY TRAFFIC
Not to Scale



VI. Traffic and Improvement Analysis

A. Level of Service Analysis

The concept of Levels of Service (LOS) uses qualitative measures that characterize operational conditions within a traffic stream. The descriptions of the individual levels of service characterize these conditions in the terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions and driving comfort and convenience.

Six levels of services are defined for each type of facility for which analysis procedures are available. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions

In order to perform a level of service analysis for the major intersections within the development area, peak hour turning volumes must be estimated. These volumes were estimated by assuming that 10.9 percent of the Average Daily Traffic occurs during the peak hour. Figure 5 shows the projected 2011 AM peak hour volumes including site traffic and Figure 6 shows the projected 2011 PM peak hour volumes including site traffic

A planning analysis was performed to assess the levels of service at the major intersections within the study area. The peak hour volumes analyzed are shown in figures 5 and 6. The capacity analysis results are summarized in Table 3.

FIGURE 5
2011 AM PEAK HOUR
WITH SITE TRAFFIC

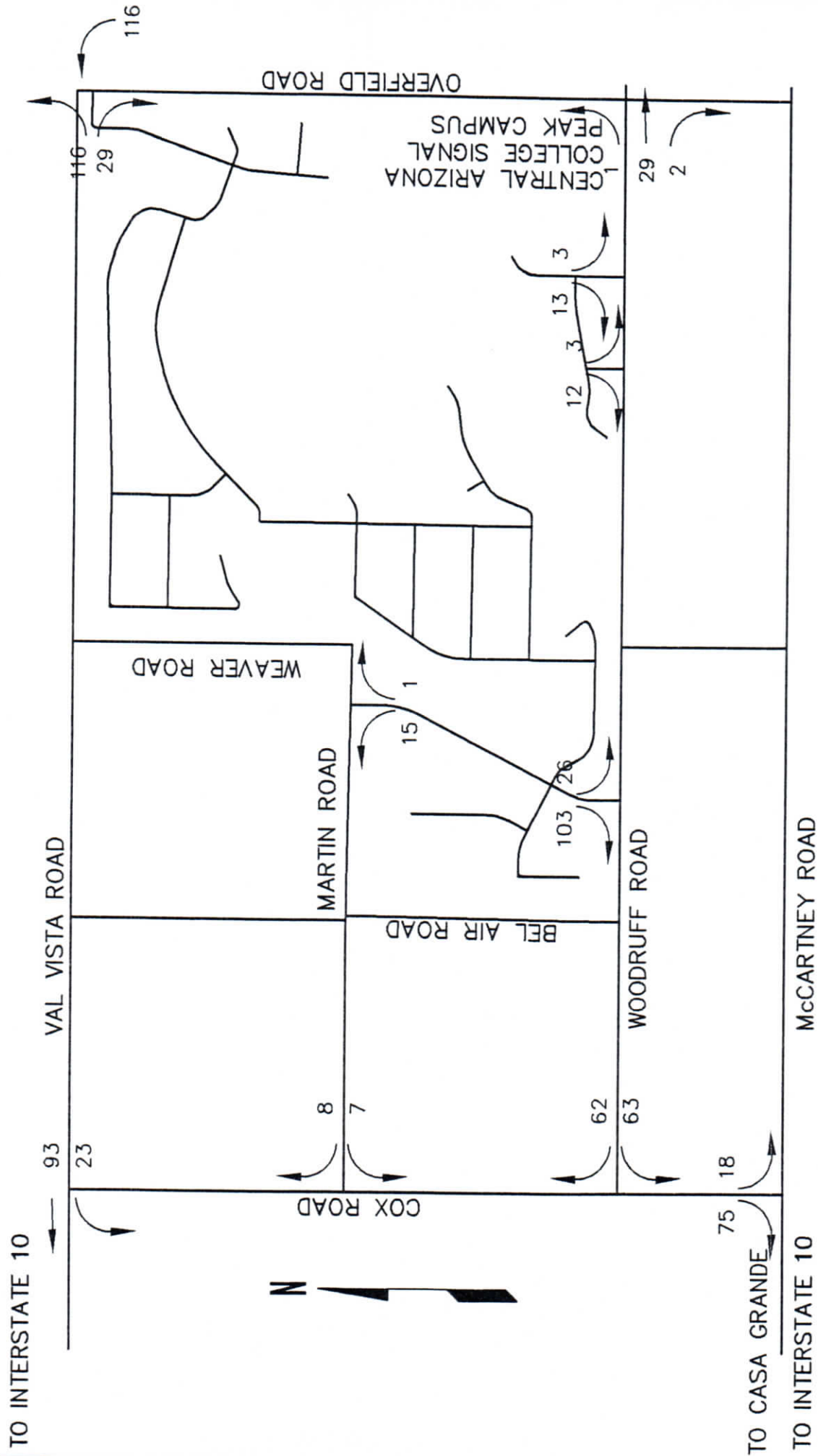
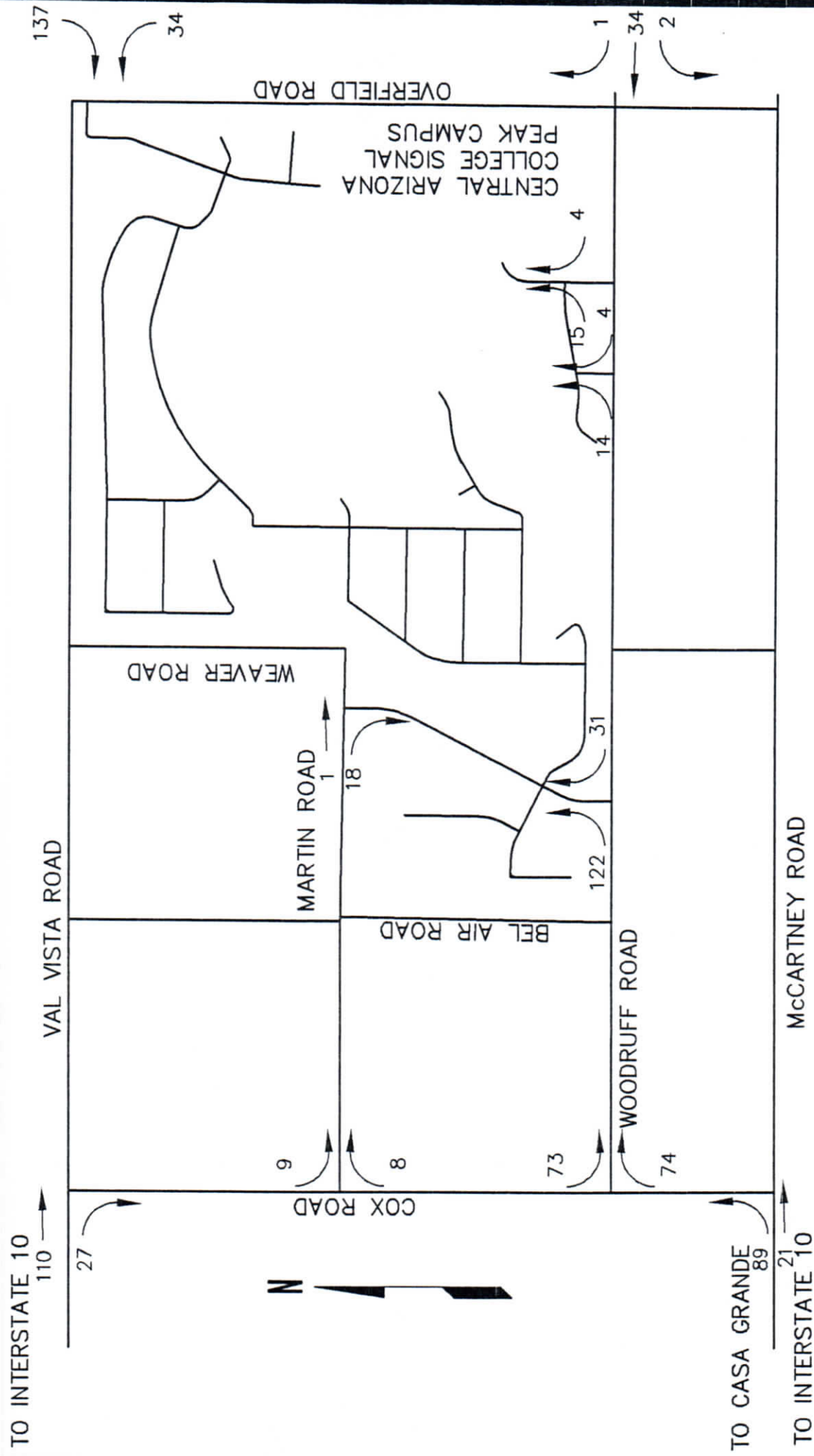


FIGURE 6
2011 PM PEAK HOUR
WITH SITE TRAFFIC



Tierra Rica Estates

Level of Service Analysis

Table 3

Intersection Number	ONSITE Location	LOS AM	LOS PM
1	Zone 1/Woodruff Road	A	A
2	Zone 2/ Martin Road	A	A
3	Zone 3/ Overfield Road	A	A
4	Zone 4/Woodruff Road	A	A
5	Zone 5/Woodruff Road	A	A

Intersection Number	OFFSITE Location	LOS AM	LOS PM
6	Val Vista Road/Overfield Road	A	A
7	Woodruff Road/Cox Road	A	A
8	Val Vista Road/Cox Road	A	A
9	Martin Road/Cox Road	A	A
10	McCartney Road/Cox Road	A	A
11	Woodruff Road/Overfield Road	A	A

LOS A is less than 420 pc/hr (passenger cars per hour)

LOS B is less than 750 phi/hr (passenger cars per hour)

B. Val Vista Road

Val Vista Road is a two-lane Pinal County Roadway that provides for the regional trips associated with the Tierra Rica Estates development. An arterial analysis of Val Vista Road adjacent to the study area was performed in addition to intersection analysis presented previously. A 2011 analysis was performed to determine the impacts to Val Vista road upon build out of the study area.

The 2011 AM and PM Peak Hour Traffic (Figures 5 and 6) shows the maximum traffic that would flow in and out from Val Vista Road would be 116 and 137. This would be an insignificant impact with the proposed lane geometry of the intersection of Zone three (3) and Overfield Road (connection to Val Vista Road). Therefore, the analysis revealed that Val Vista Road would operate at an acceptable level of service upon build out of the study area under its current lane configuration

C. Woodruff Road

Woodruff Road is a two-lane Pinal County roadway that provides for the regional trips associated with the Tierra Rica Estates development. An arterial analysis of Woodruff Road adjacent to the study area was performed in addition to intersection analysis presented previously. A 2011 analysis was performed to determine the impacts to Woodruff Road upon build out of the study area.

The 2011 AM and PM Peak Hour Traffic (Figures 5 and 6) shows the maximum traffic that would flow in and out from Woodruff Road would be 160 and 190. This would be an insignificant impact with the proposed lane geometry of the intersections of Zone one (1) and Woodruff Road, Zone four (4) and Woodruff, and Zone five (5) and Woodruff Road. Therefore, the analysis revealed that Woodruff Road would operate at

an acceptable level of service upon build out of the study area under its current lane configuration

D. Martin Road

Martin Road is a two-lane Pinal County Roadway that provides for the regional trips associated with the Tierra Rica Estates development. An arterial analysis of Martin Road adjacent to the study area was performed in addition to intersection analysis presented previously. A 2011 analysis was performed to determine the impacts to Martin Road upon build out of the study area.

The 2011 AM and PM Peak Hour Traffic (Figures 5 and 6) shows the maximum traffic that would flow in and out from Martin Road would be 16 and 19. This would be an insignificant impact with the proposed lane geometry of the intersection of Zone two (2) and Martin Road. Therefore, the analysis revealed that Martin Road would operate at an acceptable level of service upon build out of the study area under its current lane configuration

E. Typical Roadway Section Determination

A primary goal of this study was to determine the typical section requirements for the backbone roadway system serving the development area. This was accomplished by establishing daily volume thresholds for various roadway sections that would provide an appropriate level of service operation.

To determine the appropriate threshold values, the U.S. FHWA 1994 Highway Capacity Manual Arterial planning analysis was utilized. The method allows the determination of roadway capacities in terms of maximum average daily traffic (ADT) associated with a desired Level of Service (LOS) operation. Inputting specific parameters that affect roadway operation approximates the roadway characteristics. A Level of Service (LOS) "C" operation was used to establish threshold ADT volumes for each roadway section. For the analysis, the following assumptions were made:

- Design Category: Class 2
- 10.9 percent of the ADT Occurs in the Peak Hour
- 60/40 Direction Flow Split
- Peak Hour Factor=1.1
- Saturation Flow Rate=1600pcphgpl
- Free Flow Speed=30 mph
- Random Arrivals
- 60 Second Cycle length
- Ratio of Effective Green Time=0.42

Under the above assumptions desiring a Level of Service (LOS) "C" operation, the following sections were determined to have daily threshold volumes in Table 4.

Typical sections recommended for each roadway classification are provided in Figure 7. Based on the analysis performed for this study, the major roadway network required to serve the Tierra Rica Estates development area can be accomplished through the recommended section.

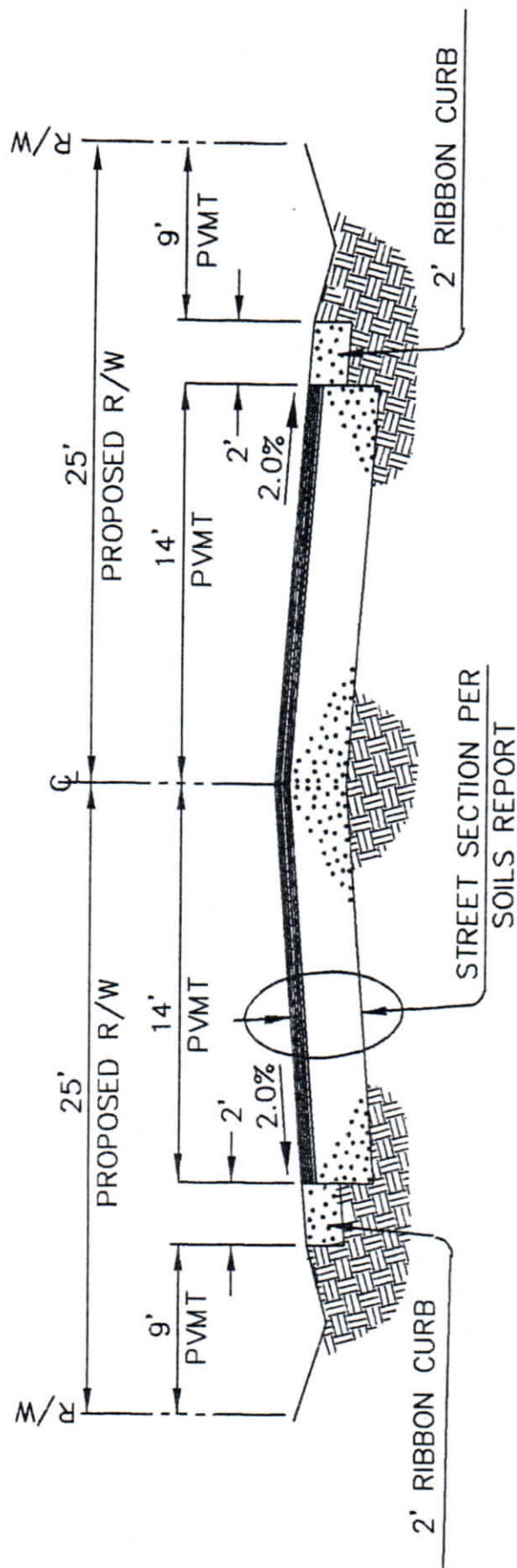
Tierra Rica Estates
Roadway Threshold Volumes

Table 4

Function	Roadway Section	ADT Range
Local Collector	2 Lanes-no left turn lane	100 - 7,000
Minor Collector	2 Lanes-with separate left turn lane	6,500 - 12,000
Major Collector	4 Lanes-with left turn lane	>11,500

FIGURE 7

TYPICAL ROADWAY SECTION



RESIDENTIAL STREETS

N.T.S.

VII. Recommended Improvements

The analyses performed for this study provide the basis of roadway improvements required within the Tierra Rica Estates study area upon build out. These recommendations reflect the needs of the development area based upon the tentative plat provided for the individual developments contained within the study area.

A. Roadway Section Requirements

Using the threshold traffic volumes provided in Table 4, the internal street system for the Tierra Rica Estates study area was sized to meet the projected traffic volumes upon build out. All of the residential streets in the development will be local collectors.

B. Intersection Requirements

Intersection improvements and traffic control needs were based on the analysis of the 2011 build out peak volumes four internal site intersections and six external intersection were analyzed for the study (See table 3). The analysis revealed that all of the intersections would not be signalized. The intersections will operate satisfactory under stop sign control.

Storage length requirements were determined for all left turn lanes at the seven intersections. For the intersections, the procedure identified in the *American Association of State Highway and Transportation Officials, "A Policy on Geometric Design of Highway and Streets"*, 1994 Edition, was utilized. This method calculates the number of vehicles to arrive in a two-minute period and then multiplies that number by an average vehicle length of 25 feet to determine the minimum storage length. This calculation

gives the minimum required storage length. There will be no turn lanes required for the Tierra Rica Estates development.

C. Phase Improvements

The main objective of the traffic analysis for the Tierra Rica Estates development was to make sure the roadway segment could operate at acceptable LOS. Applying the threshold Average Daily Traffic (ADT) volumes and peak hour data, the tentative plat for the Tierra Rica Estates development allows for the acceptable LOS.

D. Traffic Safety

The roadways that will make up the backbone system for the Tierra Rica Estates study area are general terrain with vary little turns or changes in direction. This allows for acceptable sight distance at intersecting roadways, which is critical to safe operation. The design of the Tierra Rica Estates roadway system provides for the traffic safety needed for the study area.