

VEKOL WASH TRIBUTARY
EXHIBIT B
REVISED DRAINAGE MAP
OCTOBER 2011

WOOD/PATEL
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA 85021
(602) 335-8500
PHOENIX MESA TUCSON

APPENDIX B

Offsite Hydraulic Documentation

CVL

B.1

Offsite Channel Sizing

CVL

Offsite Channel Calculations

Sunset Canyon – Pinal County

Channel ID	Corridor Width (ft)	Left Side Slope (ft/ft)	Right Side Slope (ft/ft)	Channel Depth (ft)	Left Width (ft)	Bottom Width (ft)	Right Width (ft)	Roughness [(1)]	Slope (ft/ft)	Discharge (cfs)	Normal Depth (ft)	Velocity (fps)	Freeboard Required[(2)] (ft)	Freeboard Provided (ft)	Channel Material
1	380	6	6	5.33	32.0	316.0	32.0	0.030	0.0015	6680	4.15	4.72	1.12	**1.18**	Earth
2	59	4	4	6.38	25.5	8.0	25.5	0.030	0.0018	604	5.05	4.24	1.33	**1.33**	Earth

Reference:

[1] Pinal County, "Drainage Manual Volume II: Design Methodology and Procedures," 2004

Notes:

1. Manning's roughness coefficient derived from Table 6-1 of [1]
2. Per [1], Section 6.3.8.3, minimum required freeboard is calculated as follows:

$$FB = 0.25\left(y + \frac{V^2}{2g}\right)$$

Worksheet for Channel 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.0015 ft/ft
Left Side Slope	6.000 H:V
Right Side Slope	6.000 H:V
Bottom Width	316.00 ft
Discharge	6,680.00 cfs

Results	
Normal Depth	4.15 ft
Flow Area	1,414.9 ft²
Wetted Perimeter	366.5 ft
Hydraulic Radius	3.86 ft
Top Width	365.81 ft
Critical Depth	2.37 ft
Critical Slope	0.0100 ft/ft
Velocity	4.72 ft/s
Velocity Head	0.35 ft
Specific Energy	4.50 ft
Froude Number	0.423
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.15 ft
Critical Depth	2.37 ft
Channel Slope	0.0015 ft/ft
Critical Slope	0.0100 ft/ft

Rating Table for Channel 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

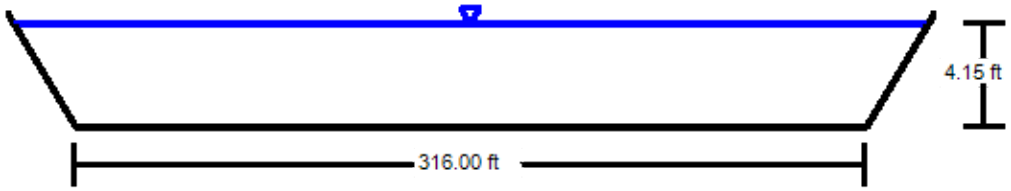
Input Data		
Roughness Coefficient	0.030	
Channel Slope	0.0015	ft/ft
Left Side Slope	6.000	H:V
Right Side Slope	6.000	H:V
Bottom Width	316.00	ft
Discharge	6,680.00	cfs

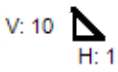
Channel Slope (ft/ft)	Normal Depth (ft)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.0010	4.68	4.15	1,609.1	372.9	372.12
0.0011	4.55	4.28	1,561.1	371.3	370.57
0.0012	4.43	4.40	1,518.6	369.9	369.19
0.0013	4.33	4.51	1,480.5	368.7	367.95
0.0014	4.24	4.62	1,446.2	367.5	366.83
0.0015	4.15	4.72	1,414.9	366.5	365.81
0.0016	4.07	4.82	1,386.5	365.5	364.87
0.0017	4.00	4.91	1,360.1	364.7	364.00
0.0018	3.93	5.00	1,335.8	363.9	363.20
0.0019	3.87	5.09	1,313.2	363.1	362.45
0.0020	3.81	5.17	1,292.1	362.4	361.76

Cross Section for Channel 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.030	
Channel Slope	0.0015	ft/ft
Normal Depth	4.15	ft
Left Side Slope	6.000	H:V
Right Side Slope	6.000	H:V
Bottom Width	316.00	ft
Discharge	6,680.00	cfs





Worksheet for Channel 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.0018 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	8.00 ft
Discharge	604.00 cfs

Results	
Normal Depth	5.05 ft
Flow Area	142.4 ft²
Wetted Perimeter	49.6 ft
Hydraulic Radius	2.87 ft
Top Width	48.39 ft
Critical Depth	3.41 ft
Critical Slope	0.0106 ft/ft
Velocity	4.24 ft/s
Velocity Head	0.28 ft
Specific Energy	5.33 ft
Froude Number	0.436
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	5.05 ft
Critical Depth	3.41 ft
Channel Slope	0.0018 ft/ft
Critical Slope	0.0106 ft/ft

Rating Table for Channel 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

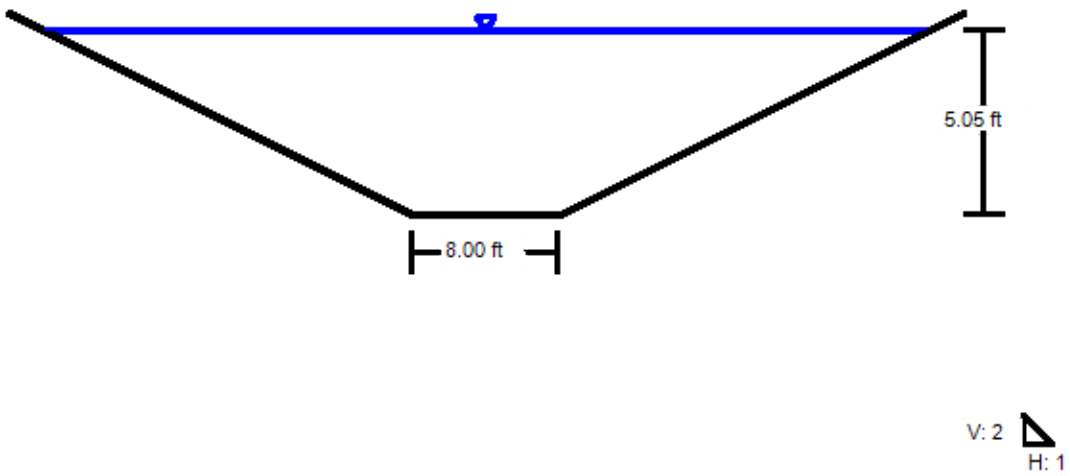
Input Data		
Roughness Coefficient	0.030	
Channel Slope	0.0018	ft/ft
Left Side Slope	4.000	H:V
Right Side Slope	4.000	H:V
Bottom Width	8.00	ft
Discharge	604.00	cfs

Channel Slope (ft/ft)	Normal Depth (ft)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
0.0008	6.01	3.13	192.7	57.6	56.10
0.0009	5.86	3.28	184.4	56.3	54.90
0.0010	5.73	3.41	177.3	55.3	53.86
0.0011	5.62	3.53	171.1	54.3	52.93
0.0012	5.51	3.65	165.6	53.5	52.10
0.0013	5.42	3.76	160.8	52.7	51.34
0.0014	5.33	3.86	156.4	52.0	50.65
0.0015	5.25	3.96	152.4	51.3	50.02
0.0016	5.18	4.06	148.8	50.7	49.44
0.0017	5.11	4.15	145.4	50.2	48.90
0.0018	5.05	4.24	142.4	49.6	48.39
0.0019	4.99	4.33	139.5	49.2	47.92
0.0020	4.93	4.41	136.9	48.7	47.48
0.0021	4.88	4.49	134.4	48.3	47.06
0.0022	4.83	4.57	132.1	47.9	46.67
0.0023	4.79	4.65	129.9	47.5	46.29
0.0024	4.74	4.72	127.9	47.1	45.94
0.0025	4.70	4.79	126.0	46.8	45.60
0.0026	4.66	4.87	124.1	46.4	45.28
0.0027	4.62	4.93	122.4	46.1	44.97
0.0028	4.58	5.00	120.8	45.8	44.68

Cross Section for Channel 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

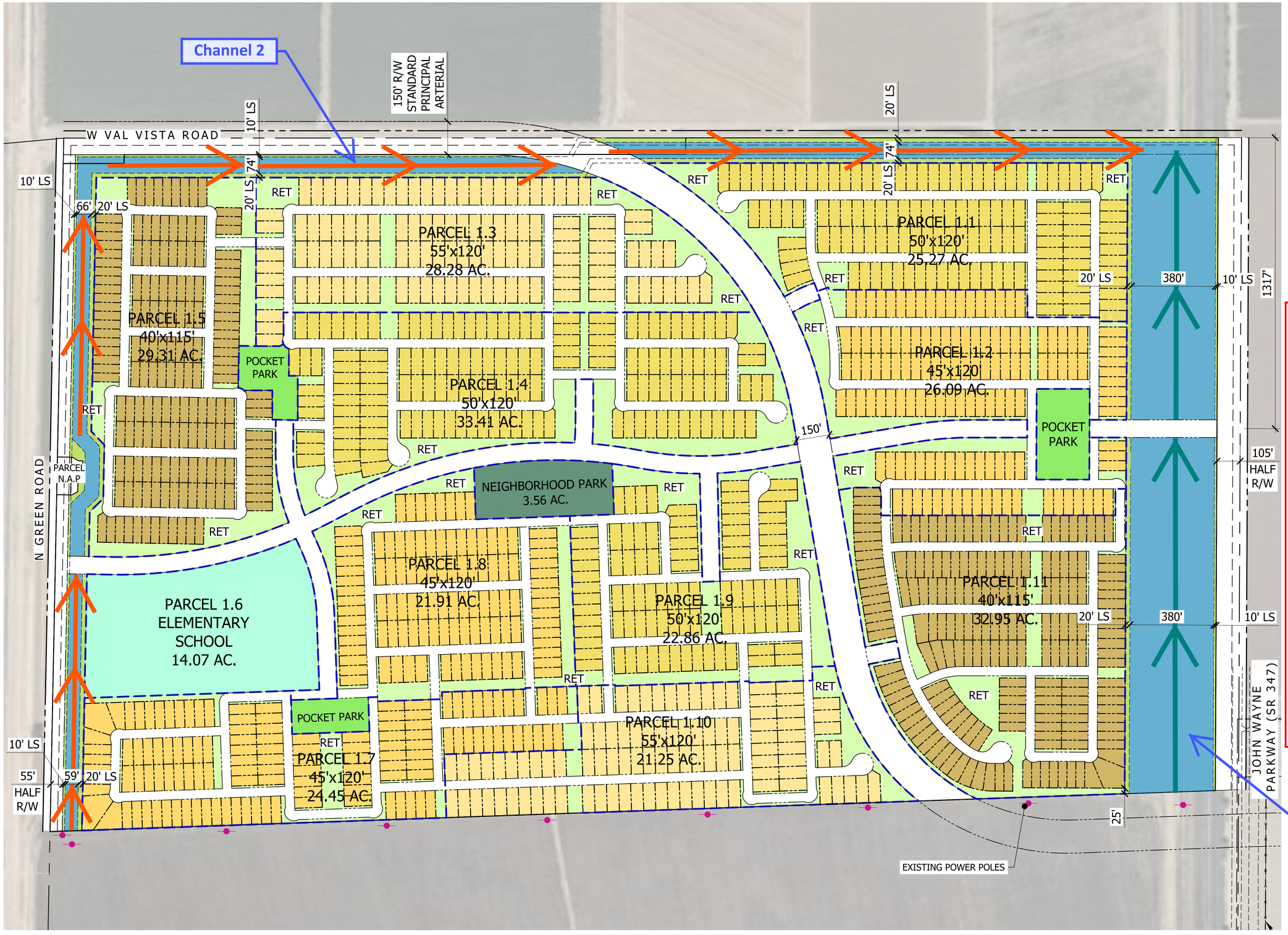
Input Data		
Roughness Coefficient	0.030	
Channel Slope	0.0018	ft/ft
Normal Depth	5.05	ft
Left Side Slope	4.000	H:V
Right Side Slope	4.000	H:V
Bottom Width	8.00	ft
Discharge	604.00	cfs



B.2

Conceptual Drainage Map

CVL



SITE DATA AS PER LOTTED				
GROSS ACREAGE	373.77 AC.	3.49 D.U./AC.		
NET ACREAGE	354.00 AC.			
RESIDENTIAL NET ACREAGE [3]	316.59 AC.			
DRAINAGE CHANNEL [2]	37.41 AC.			
DEDICATED OPEN SPACE	50.58 AC.			
TRAIL AREAS	8.77 AC.			
POCKET PARKS	4.96 AC.			
NEIGHBORHOOD PARK	3.56 AC.			
TOTAL OPEN SPACE [1]	105.28 AC.	33.25%		
DESCRIPTION	ACREAGE	USE	UNITS	UNIT PERCENTAGE
PARCEL 1.1	25.27 AC.	50'x120'	126 D.U.	9.65%
PARCEL 1.2	26.11 AC.	45'x120'	132 D.U.	10.11%
PARCEL 1.3	28.28 AC.	55'x120'	117 D.U.	8.96%
PARCEL 1.4	33.41 AC.	50'x120'	145 D.U.	11.10%
PARCEL 1.5	29.31 AC.	40'x115'	170 D.U.	13.02%
PARCEL 1.6	14.07 AC.	ES		
PARCEL 1.7	24.45 AC.	45'x120'	127 D.U.	9.72%
PARCEL 1.8	21.91 AC.	45'x120'	107 D.U.	8.19%
PARCEL 1.9	24.08 AC.	50'x120'	92 D.U.	7.04%
PARCEL 1.10	21.25 AC.	55'x120'	99 D.U.	7.58%
PARCEL 1.11	32.95 AC.	40'x115'	191 D.U.	14.62%
ELEMENTARY SCHOOL	14.07 AC.	ES		
40'X115'	62.26 AC.	40'x115'	361 D.U.	27.64%
45'X120'	72.47 AC.	45'x120'	366 D.U.	28.02%
50'X120'	82.76 AC.	50'x120'	363 D.U.	27.79%
55'X120'	49.53 AC.	55'x120'	216 D.U.	16.54%
SUNSET CANYON TOTAL	281.09 AC.		1,306 D.U.	

1. OPEN SPACE CALCULATIONS BASED OFF OF TOTAL RESIDENTIAL NET ACREAGE.

Summary:

– USGS topography used in analysis of offsite flows

– Channel slopes based on existing topography at proposed drainage easements.

– Channel 1 anticipated to receive 6680 cfs at the southeastern boundary.

– Channel 1 will have a 380-foot drainage easement, plus 10- to 20-foot landscape tract.

– Channel 2 anticipated to receive a combined 604 cfs at the southwestern and western boundary.

– Channel 2 will have a 59-foot drainage easement, plus 10- to 20-foot landscape tract.

– Outfall elevation 1216.56' (assumed)

ZEITLIN CAPITAL

SUNSET CANYON

Conceptual Site Plan Option 3B

Plan Scale 1:200' Date:05-02-2024

ABLASTUDIO.COM

ABLA

APPENDIX C

Onsite Hydrology Documentation

CVL

C.1

NOAA 14 Rainfall Data

CVL

NOAA Atlas 14, Volume 1, Version 5
Location name: Maricopa, Arizona, USA*
Latitude: 32.9667°, Longitude: -112.0565°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.202** (0.170-0.242)	**0.264** (0.223-0.318)	**0.358** (0.302-0.431)	**0.429** (0.359-0.513)	**0.524** (0.432-0.624)	**0.597** (0.486-0.707)	**0.669** (0.536-0.792)	**0.742** (0.585-0.878)	**0.839** (0.645-0.995)	**0.913** (0.688-1.09)
10-min	**0.307** (0.258-0.369)	**0.401** (0.340-0.484)	**0.545** (0.459-0.655)	**0.653** (0.546-0.781)	**0.798** (0.658-0.950)	**0.908** (0.740-1.08)	**1.02** (0.815-1.21)	**1.13** (0.891-1.34)	**1.28** (0.982-1.51)	**1.39** (1.05-1.66)
15-min	**0.380** (0.320-0.457)	**0.497** (0.421-0.600)	**0.676** (0.569-0.812)	**0.810** (0.677-0.968)	**0.989** (0.816-1.18)	**1.13** (0.918-1.33)	**1.26** (1.01-1.49)	**1.40** (1.11-1.66)	**1.58** (1.22-1.88)	**1.72** (1.30-2.05)
30-min	**0.512** (0.431-0.616)	**0.669** (0.567-0.808)	**0.911** (0.767-1.09)	**1.09** (0.912-1.30)	**1.33** (1.10-1.59)	**1.52** (1.24-1.80)	**1.70** (1.36-2.01)	**1.89** (1.49-2.23)	**2.13** (1.64-2.53)	**2.32** (1.75-2.76)
60-min	**0.634** (0.534-0.762)	**0.828** (0.702-1.00)	**1.13** (0.949-1.35)	**1.35** (1.13-1.61)	**1.65** (1.36-1.96)	**1.88** (1.53-2.22)	**2.10** (1.69-2.49)	**2.33** (1.84-2.76)	**2.64** (2.03-3.13)	**2.87** (2.16-3.42)
2-hr	**0.716** (0.613-0.846)	**0.929** (0.798-1.10)	**1.25** (1.06-1.47)	**1.49** (1.26-1.75)	**1.81** (1.52-2.12)	**2.06** (1.70-2.41)	**2.32** (1.89-2.71)	**2.58** (2.06-3.02)	**2.93** (2.28-3.44)	**3.20** (2.43-3.78)
3-hr	**0.766** (0.657-0.908)	**0.981** (0.846-1.17)	**1.29** (1.11-1.54)	**1.54** (1.31-1.82)	**1.89** (1.58-2.22)	**2.16** (1.78-2.54)	**2.45** (1.98-2.88)	**2.75** (2.19-3.23)	**3.17** (2.44-3.73)	**3.51** (2.63-4.15)
6-hr	**0.896** (0.783-1.04)	**1.14** (0.998-1.32)	**1.46** (1.28-1.70)	**1.73** (1.49-1.99)	**2.08** (1.78-2.39)	**2.37** (1.99-2.71)	**2.66** (2.19-3.05)	**2.96** (2.40-3.41)	**3.38** (2.66-3.89)	**3.71** (2.84-4.29)
12-hr	**0.993** (0.880-1.13)	**1.26** (1.11-1.43)	**1.60** (1.41-1.82)	**1.87** (1.64-2.12)	**2.24** (1.94-2.53)	**2.53** (2.17-2.85)	**2.82** (2.38-3.19)	**3.12** (2.59-3.54)	**3.53** (2.85-4.04)	**3.85** (3.05-4.44)
24-hr	**1.18** (1.06-1.32)	**1.50** (1.35-1.68)	**1.95** (1.74-2.18)	**2.31** (2.05-2.57)	**2.80** (2.48-3.11)	**3.19** (2.80-3.54)	**3.60** (3.13-3.98)	**4.01** (3.47-4.46)	**4.59** (3.92-5.12)	**5.06** (4.26-5.65)
2-day	**1.24** (1.12-1.38)	**1.59** (1.43-1.77)	**2.09** (1.87-2.32)	**2.48** (2.22-2.76)	**3.04** (2.70-3.37)	**3.47** (3.07-3.86)	**3.94** (3.45-4.37)	**4.42** (3.84-4.91)	**5.09** (4.36-5.68)	**5.63** (4.77-6.31)
3-day	**1.30** (1.17-1.44)	**1.66** (1.50-1.84)	**2.18** (1.97-2.41)	**2.60** (2.34-2.87)	**3.18** (2.85-3.51)	**3.65** (3.25-4.04)	**4.15** (3.67-4.59)	**4.68** (4.09-5.17)	**5.41** (4.67-6.00)	**6.01** (5.12-6.69)
4-day	**1.35** (1.23-1.49)	**1.72** (1.57-1.90)	**2.27** (2.06-2.50)	**2.71** (2.45-2.98)	**3.33** (3.00-3.66)	**3.83** (3.43-4.21)	**4.37** (3.88-4.81)	**4.93** (4.34-5.43)	**5.73** (4.98-6.32)	**6.38** (5.48-7.06)
7-day	**1.49** (1.36-1.64)	**1.90** (1.74-2.10)	**2.51** (2.28-2.76)	**2.99** (2.72-3.29)	**3.68** (3.32-4.03)	**4.23** (3.80-4.64)	**4.82** (4.30-5.29)	**5.44** (4.80-5.98)	**6.32** (5.50-6.95)	**7.02** (6.05-7.73)
10-day	**1.61** (1.47-1.76)	**2.06** (1.88-2.26)	**2.71** (2.47-2.97)	**3.23** (2.94-3.53)	**3.96** (3.58-4.32)	**4.54** (4.09-4.96)	**5.16** (4.60-5.64)	**5.80** (5.14-6.35)	**6.71** (5.88-7.37)	**7.44** (6.45-8.16)
20-day	**1.92** (1.76-2.11)	**2.47** (2.26-2.71)	**3.25** (2.97-3.55)	**3.85** (3.50-4.19)	**4.64** (4.21-5.06)	**5.25** (4.75-5.72)	**5.86** (5.28-6.41)	**6.49** (5.81-7.09)	**7.33** (6.49-8.03)	**7.96** (7.01-8.75)
30-day	**2.24** (2.05-2.44)	**2.88** (2.63-3.14)	**3.78** (3.46-4.12)	**4.46** (4.08-4.86)	**5.38** (4.90-5.86)	**6.09** (5.51-6.63)	**6.80** (6.13-7.40)	**7.53** (6.74-8.21)	**8.50** (7.54-9.28)	**9.24** (8.14-10.1)
45-day	**2.57** (2.35-2.80)	**3.31** (3.02-3.61)	**4.34** (3.96-4.72)	**5.10** (4.66-5.54)	**6.11** (5.55-6.62)	**6.85** (6.20-7.42)	**7.60** (6.86-8.24)	**8.34** (7.49-9.05)	**9.30** (8.31-10.1)	**10.0** (8.89-10.9)
60-day	**2.86** (2.61-3.12)	**3.69** (3.36-4.02)	**4.83** (4.40-5.26)	**5.66** (5.16-6.16)	**6.74** (6.12-7.32)	**7.53** (6.82-8.17)	**8.32** (7.50-9.04)	**9.09** (8.15-9.88)	**10.1** (8.99-11.0)	**10.8** (9.60-11.8)

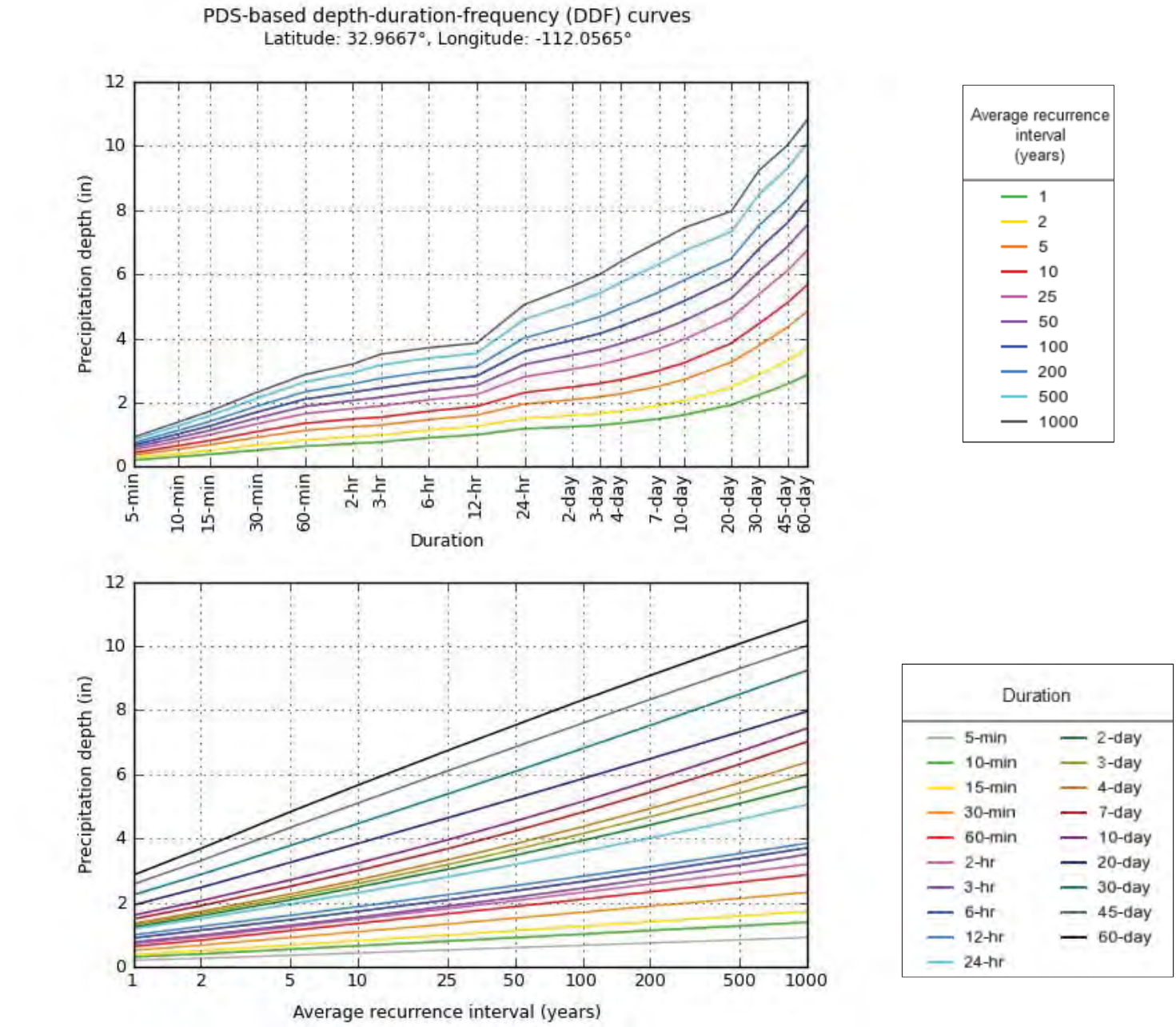
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



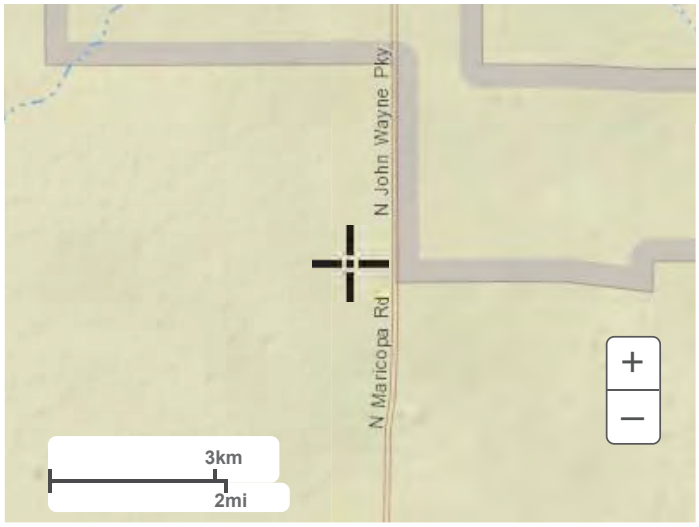
NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Tue Mar 28 16:15:59 2023

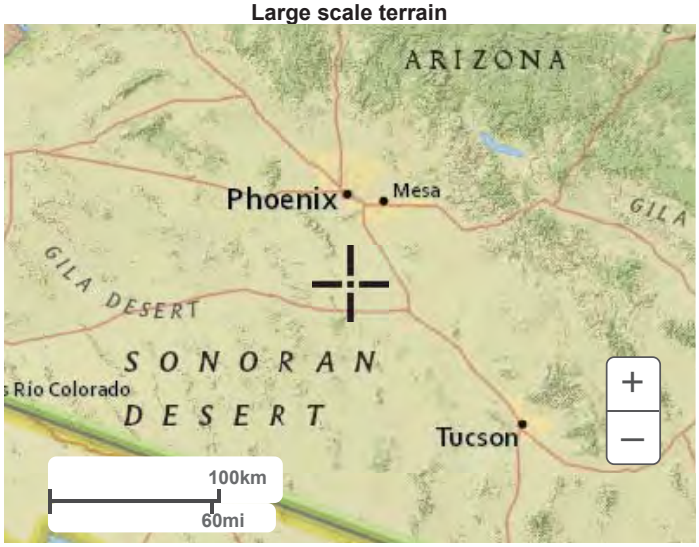
Back to Top

Maps & aerials

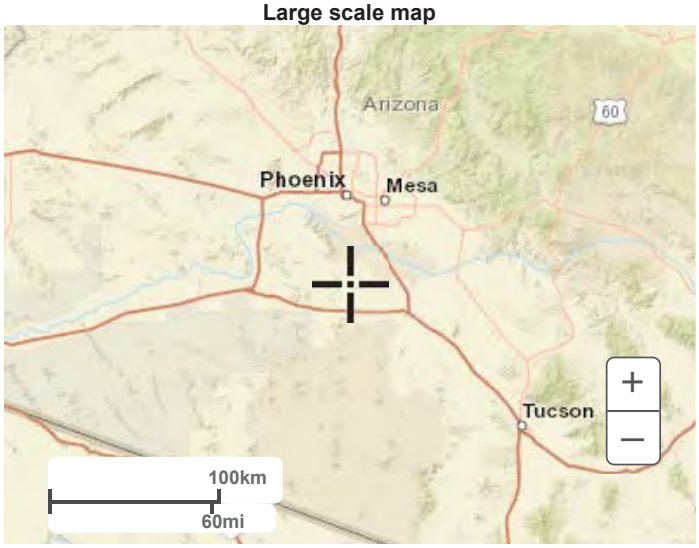
Small scale terrain



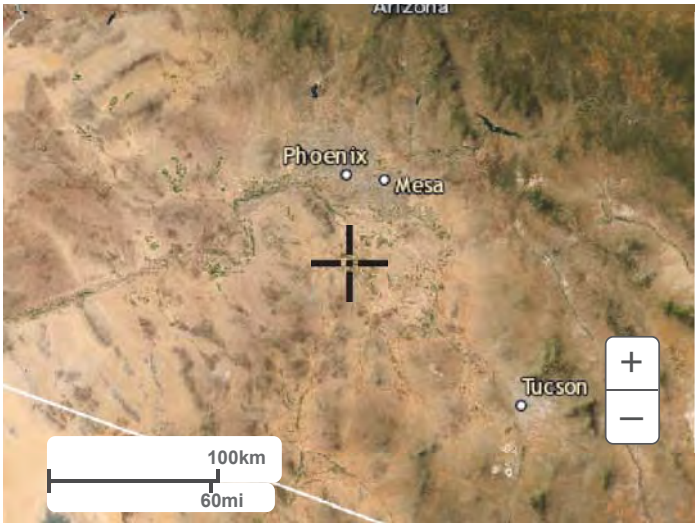
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

C.2

Soils Documentation

CVL

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pinal County, Arizona, Western Part



April 3, 2023

Custom Soil Resource Report
Soil Map



Map Scale: 1:8,840 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 19, Aug 26, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2021—Mar 3, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31	Mohall loam MLRA 40	236.3	65.3%
32	Mohall clay loam	87.1	24.1%
42	Sasco silt loam	38.7	10.7%
Totals for Area of Interest		**362.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

TRAFFIC IMPACT ANALYSIS

Sunset Canyon Development
SWC of State Route 347 and Val Vista Road
Pinal County, Arizona

April 18, 2023
Revision #1: November 20, 2023
Revision #2 (Major Site Plan Revision): May 24, 2024

PREPARED FOR
Zeitlin Capital
5050 North 40th Street, Suite 330
Phoenix, Arizona 85018

PREPARED BY

UCG
United Civil Group

APPROVED BY:

PINAL COUNTY ENGINEER — DATE
PINAL COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVAL EXPIRES: — DATE

County Case Numbers: PZ-PD-008-23
PZ-034-23

1st Review by John Kraft 7/20/2023

TRAFFIC IMPACT ANALYSIS

Sunset Canyon Development

SWC of State Route 347 and Val Vista Road
Pinal County, Arizona

April 18, 2023
Revision #1: November 20, 2023
Revision #2 (Major Site Plan Revision): May 24, 2024

UCG Project Number: TR22012

PREPARED FOR
Zeitlin Capital
5050 North 40th Street, Suite 330
Phoenix, Arizona 85018

PREPARED BY

United Civil Group
2803 N. 7th Avenue
Phoenix, Arizona 85007
602-265-6155



CONDUCTED BY _____
Sarah Simpson, PhD, PE
President

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY 1
A. Purpose of the Report 1
B. Study Objectives 2
C. Conclusions and Recommendations 2
II. PROPOSED DEVELOPMENT 6
A. Site Location 6
B. Land Use 6
C. Phasing and Timing 6
D. Site Accessibility 7
III. STUDY AREA CONDITIONS 12
A. Study Area 12
B. Study Area Land Use 12
C. Anticipated Future Development and Planned Improvements 12
IV. EXISTING ROADWAY CONDITIONS 15
A. Physical Characteristics 15
B. Existing Traffic Volumes 17
C. Existing Traffic Observations and Issues 17
D. Crash Data 19
E. Intersection Level of Service Analyses 21
E.1 HCM Capacity Analyses and Levels of Service 21
Source: United Civil Group, 2019E.2 Existing Intersection Level of Service 22
V. PROJECTED TRAFFIC 24
A. Trip Generation 24
B. Trip Distribution 25
C. Projected Background Traffic 30
VI. TRAFFIC AND IMPROVEMENT ANALYSIS 43
A. Accessibility to Sunset Canyon Development 43
B. Auxiliary Lane Analyses 44
B.1. Right Turn Lane Warrants 44
B.2. Right Lane Queue and Storage Length Analysis 45
B.3. Left Turn Lane Warrants 46
B.4. Left Lane Queue and Storage Length Analysis 47
C. Traffic Signal Warrant Analysis 49
D. Intersection Sight Distance 51
E. Total Traffic 51
F. Roadway and Intersection Geometric Improvements 67
VII. CONCLUSIONS AND RECOMMENDATIONS 78
VIII. LIMITATIONS 82
IX. SOURCES 83

LIST OF TABLES

Table 1: Phasing For Site Plan 8
Table 2: Injury Severity 19
Table 3: Collision Manner 20
Table 4: Intersection Levels Of Service And Delay 21
Table 5: 2024 Existing Conditions Intersection Levels Of Service 23
Table 6: Proposed Development Trip Generation 25
Table 7: Trip Distribution Percentages 26
Table 8: 2028 Background Conditions Intersection Levels Of Service 38
Table 9: 2032 Background Conditions Intersection Levels Of Service 39
Table 10: 2035 Background Conditions Intersection Levels Of Service 40
Table 12: 2040 Background Conditions Intersection Levels Of Service 41
Table 13: 2045 Background Conditions Intersection Levels Of Service 42
Table 14: Right Turn Lane Analysis 46
Table 15: Left Turn Lane Analysis 48
Table 16: 2028 Total Conditions Intersection Levels Of Service 65
Table 17: 2032 Total Conditions Intersection Levels Of Service 67
Table 18: 2035 Total Conditions Intersection Levels Of Service 69
Table 19: 2040 Total Conditions Intersection Levels Of Service 71
Table 20: 2045 Total Conditions Intersection Levels Of Service 73

LIST OF FIGURES

Figure 1: Vicinity Map 9
Figure 2: Aerial View 10
Figure 3: Site Plan 11
Figure 4: Existing Conditions And Traffic Volumes – Year 2024 18
Figure 5: Site Generated Traffic And Trip Distribution – Phase I 27
Figure 6: Site Generated Traffic And Trip Distribution – Phases I And II 28
Figure 7: Site Generated Traffic And Trip Distribution – Full Site Buildout 29
Figure 9: Background Traffic – Years 2025 31
Figure 10: Background Traffic – Years 2027 32
Figure 11: Background Traffic – Years 2030 33
Figure 12: Background Traffic – Years 2035 34
Figure 13: Background Traffic – Years 2040 35
Figure 14: Background Traffic – Years 2045 36
Figure 15a: Total Traffic – Year 2025 52
Figure 15b: Proposed Roadway Geometry – Year 2025 53
Figure 16a: Total Traffic – Year 2027 54
Figure 16b: Proposed Roadway Geometry – Year 2027 55
Figure 17a: Total Traffic – Year 2030 56
Figure 17b: Proposed Roadway Geometry – Year 2030 57
Figure 18a: Total Traffic – Year 2035 58
Figure 18b: Proposed Roadway Geometry – Year 2035 59
Figure 19a: Total Traffic – Year 2040 60
Figure 19b: Proposed Roadway Geometry – Year 2040 61
Figure 20a: Total Traffic – Year 2045 61
Figure 21: Driveway Spacing 76
Figure 22: Recommendations 77



APPENDIX A . . . Traffic Counts
APPENDIX B . . . Capacity Analyses
APPENDIX C . . . Maricopa Future Land Use Map
APPENDIX D . . . Signal Warrant Analyses
APPENDIX E . . . Other Developments in the Area
APPENDIX F . . . Comments and Responses

I. INTRODUCTION AND SUMMARY

A. Purpose of the Report

Zeitlin Capital retained United Civil Group to perform this Traffic Impact Analysis (TIA) for the proposed Sunset Canyon Residential Development. Sunset Canyon is located south of the existing Val Vista Road alignment, north of the Emerald Road alignment, west of State Route 347 (SR347) and east of Green Road in Pinal County, Arizona. The approximate 375-acre development is planned to include a total of 1,532 single family dwelling units and an elementary school. The development will be constructed in phases with full buildout of Sunset Canyon anticipated by 2035.

B. Guiding Standards

United Civil Group performed this TIA in general accordance with the requirements as specified in the Pinal County *Traffic Impact Assessment Guidelines & Procedures* dated January 2007, Arizona Department of Transportation (ADOT) Traffic Engineering Guidelines and Processes Section 240 Traffic Impact Analyses, locally accepted standards, and industry practice.

Per the Pinal County Guidelines & Procedures, this development is characterized as a large development with greater than 1,000 but less than 1,500 peak hour trips. Therefore, the study horizons are the opening of each phase of development plus 5 and 10 years after full buildout. The minimum study area limits include all site access driveways plus all state highways signalized intersections and/or major unsignalized street intersections within 2 miles of the site boundary.

Per the ADOT Table 240-1 Criteria for Determining Study Requirements dated August 2021, this development is categorized as a IIb large development with greater than 1,000 trips in the peak hour. Therefore, the study horizon years are defined as the opening year of each phase of development, 5 years after opening and 10 years after opening. The minimum study area is defined as the site access driveways and all state highways, signalized intersections and or major unsignalized intersection within a minimum of 1 mile.

Upon taking both guidelines into consideration, each phase of development is analyzed, years 2028, 2032, and 2035, plus 5- and 10-years after full buildout. The study area intersections are defined within 2 miles of the site and include the intersections of SR347/Miller Road, SR347/Papago Road, Papago Road/Amarillo Valley Road, Amarillo Valley Road/Val Vista Road, and Amarillo Valley Road/Miller Road.

C. Study Objectives

This study is intended to investigate the existing and future traffic conditions and identify any potential roadway improvements necessary to serve the Sunset Canyon Residential Development. These recommended improvements may include warrant studies and installation of new traffic signals, turn lanes and other offsite paving improvements to mitigate traffic. Major study objectives of this traffic report are as follows:

- Determine the existing morning and evening peak hour traffic volumes at the study area intersections.
- Analyze the study area intersections as well as the planned site access intersections for the development through the horizon years.
- Where applicable, recommend safety, intersection and/or roadway improvements sufficient to meet the needs of the development and adjacent roadway network due to the additional site generated traffic volumes.

D. Conclusions and Recommendations

The approximate 375-acre development is planned to include a total of 1,532 single family dwelling units and an elementary school. The development will be constructed in three phases with full buildout by 2035.

- Phase I consists of (parcels 1.1, 1.2 and 1.11) 539 single family homes - occupied by 2028.
- Phase II consists of (parcels 1.3, 1.4, and 1.5) 481 single family homes occupied by 2032.
- Phase III consists of (parcels 1.6, 1.7, 1.8, 1.9 and 1.10) 512 single family homes plus the elementary school with 600 students by 2035.
- Two additional horizon years, 5 years after full buildout (2040) and 10 years after full buildout (2045) were analyzed based on the County and State TIA guidelines to identify any foreseen traffic impacts 5 and 10 years after the development is fully built out and occupied.

The Sunset Canyon Development will have six accesses. Accesses A, C, D and E are located on Val Vista Road, Access B is located on SR347, and Access F is located on Green Road. Because Arizona Department of Transportation (ADOT) owns and maintains SR347, Access B was analyzed in accordance with ADOT's Traffic Policies and Guidelines. Val Vista Road and Green Road are owned and maintained by Pinal County. Therefore, Accesses A, C, D, E and F were analyzed using Pinal County Traffic Engineering Guidelines.

On a typical weekday, after full build-out, the Sunset Canyon development is forecasted to generate 15,128 total daily trips, with 1,294 trips in the morning peak hour and 1,488 trips in the evening peak hour, according to the 11th Edition of the Trip Generation Manual.

Traffic signals are warranted based on traffic generated by the surrounding developments including the Sunset Canyon Residential Development. Signals may be required at the intersections of SR347/Access B, SR347/Val Vista Road, Val Vista Road Accesses A & E, Green Road/Access F and Val Vista Road/Green Road. The developer should contribute their proportionate share of the signal costs for the design and construction of the signals. Signal warrants should be conducted to confirm signals are warranted prior to their installation.

Ten years after full buildout of the development, the study area intersections operate at acceptable levels of service, LOS D or better in the morning and evening peak hours. The exceptions are the signalized intersections of SR347/Papago Road, SR347/Miller Road/Louis Johnson Drive and Green Road/Papago Road operating with delay in the evening peak hour. When additional infrastructure is constructed throughout the study area, including Interstate 11 approximately 2.5 miles south of the site, traffic will redistribute on the roadway network, likely improving the LOS at the intersections with SR347.

Proper intersection sight distance and sight triangles shall be provided and maintained at all site access driveways of the proposed development to give drivers exiting the site a clear view of oncoming traffic. The landscape and hardscape (monument signs) within the sight triangles must not obstruct the driver's view of the adjacent travel lanes. The sight triangles shall be provided on the developer's landscape and design plans.

Any work performed in ADOT's right of way will require an Encroachment Permit. The Development Agreement between Pinal County and the Developer will need to be coordinated with ADOT to ensure recommendations and mitigations are achieved.

Based on this TIA, the following roadway and intersection improvements are proposed to be constructed.

PHASE I of the Sunset Canyon Residential Development– 2028

- Provide 75 feet of right of way and construct Val Vista Road as a three-lane roadway in the interim condition through the site tying into the proposed development to the south of Sunset Canyon that will connect Val Vista Road to SR 347. Tie Val Vista Road into the existing alignment on the northern boundary of the site. In the future, if required, Val Vista Road can be widened to accommodate traffic growth projections.
- Contribute an in-lieu fee of 50% for the construction of the signal at the intersection of Access B/SR 347
- Provide 80 feet of right of way and construct the proposed internal E-W major collector roadway as necessary to accommodate local traffic from SR347 to Val Vista Road. This E-W major collector roadway ties Access A to Access B.

PHASE II of the Sunset Canyon Development – 2032

- Construct the north half of the internal E-W collector road as necessary to accommodate site traffic. 40 feet of right of way will be required for this major collector roadway, measured centerline to right of way line.
- Provide 75 feet of right of way and construct the half street improvements for Val Vista Road principal arterial cross section from the northern boundary to the Phase III boundary. For Phase II, it is assumed that the full section of Val Vista Road will be constructed as two lanes in each direction with a raised median.
- Construct half street improvements along Green Road along the site's western boundary. This improvement should provide 55 feet of right of way for the future minor arterial cross section, measured centerline to right of way line. Construct the intersection of Access F/Green Road. Access F should be designed with right and left turn deceleration lanes exiting the development. Right and left turn lanes will be required on Green Road at Access F.
- Contribute an in-lieu fee of 25% for the construction of the signal at the intersection of Val Vista Road/SR347.

PHASE III of the Sunset Canyon Development – 2035

- Provide 75 feet of right of way and construct the half street improvements for Val Vista Road principal arterial cross section from the phase II boundary to the southern boundary of the site. For Phase III, it is assumed that the full section of Val Vista Road will be constructed as two lanes in each direction with a raised median.
- Construct the south half of the internal E-W collector road as necessary to accommodate site traffic. 40 feet of right of way will be required for this major collector roadway. By Phase III, the E-W collector roadway should tie to Green Road, Access F to Val Vista Road Access E.
- Construct half street improvements along Green Road along the site's western boundary. This improvement should provide 55 feet of right of way for the future minor arterial cross section, measured centerline to right of way line.
- Contribute an in-lieu fee of 100% of the construction cost for signalization at the intersection of Val Vista Road/Access A and Access E, when warranted.
- Contribute an in-lieu fee of 25% for the construction cost for signalization at the intersection of Green Road/Val Vista Road, when warranted.

This report concludes that when constructed, the offsite improvements recommended above will assist in maintaining an acceptable LOS. As this area grows and roadways are constructed or widened to their full capacity, traffic may redistribute to the new roadways from what was originally proposed.

II. PROPOSED DEVELOPMENT

A. Site Location

The Sunset Canyon Development is planned for the undeveloped parcel of land located south of the existing Val Vista Road alignment, north of the Emerald Road alignment, west of SR347 and east of Green Road in Pinal County, Arizona. **Figures 1 and 2** present the location of the proposed Sunset Canyon Development within the context of the immediate area and its location within Pinal County.

B. Land Use

The approximate 375-acre development is currently agricultural land. In the future, Sunset Canyon is planned to consist of 1,532 single family residential homes and an elementary school will be constructed with an assumed 600 student capacity. The elementary school is planned on the southeast corner of the intersection of Green Road/E-W Collector Road.

C. Phasing and Timing

The Sunset Canyon Residential Development is planned to be developed in three phases.

- Phase I consists of 539 single family homes - occupied by 2028.
- Phase II consists of 481 single family homes occupied by 2032.
- Phase III consists of 512 single family homes occupied by 2035 plus the elementary school.
- Two additional horizon years, 5 years after full buildout (2040) and 10 years after full buildout (2045) were analyzed based on Pinal County Traffic Impact Analysis Guidelines & Procedures to identify any foreseen traffic impacts 5 and 10 years after the site is fully built out.

D. Site Accessibility

The Sunset Canyon Development will have six accesses. Accesses A, C, D and E are located on Val Vista Road, Access B is located on SR 347 and Access F is located on Green Road. Because Arizona Department of Transportation (ADOT) owns and maintains SR347, Access B was analyzed in accordance with ADOT's Traffic Policies and Guidelines. Val Vista Road and Green Road are owned and maintained by Pinal County. Therefore, Accesses A, C, D, E and F were analyzed using Pinal County Traffic Engineering Guidelines.

- Access A is located on Val Vista Road and will be constructed and tie the E-W Collector Road to SR 347 at Access B. Access A is located approximately xx feet south of Access C and xx feet north of Access D. Access A/Val Vista Road is planned as a full movement intersection to be built with Phase I of the development. In the future, Access A/Val Vista Road may be signalized.
- Access B will be constructed as the E-W Collector Road into the Sunset Canyon residential single-family community and is located on SR 347. Access C is located approximately 1,735 feet north of the proposed Val Vista Road/SR347 intersection. Access B/SR 347 is planned as a full movement intersection that will accommodate the residential development and eventually become signalized. Access B is planned for construction with Phase I of the development.
- Access C will be constructed as full access into the Sunset Canyon residential single-family community and is located on Val Vista Road approximately xx feet south of the existing Val Vista Road alignment and xx feet north of the E-W Collector Road. Access C/Val Vista Road is planned as a full movement intersection to be built with Phase I of development.
- Access D will be constructed as full access into the Sunset Canyon residential single-family community and is located on Val Vista Road approximately xx feet south of the E-W Collector Road and xx feet north of the Val Vista Road/SR 347 intersection. Access D/Val Vista Road is planned as a full movement intersection to be built with Phase I of development.
- Access E will align with Access A and be constructed as the west leg of the intersection. This intersection is planned to be constructed with Phase II of development and will be signalized when the warrants are met.
- Access F is located on Green Road and will be constructed to tie the E-W Collector Road to Val Vista Road at Access E. Access F will provide full turning movements into the development and is located approximately 1,890 feet south of Val Vista Road.

Site Accesses A, C, D, E and F should be designed per Pinal County Subdivision & Infrastructure Design Manual. Per the Pinal County Access Management Manual Final Report dated February 2017, driveway spacing criteria per Table 1 (Access

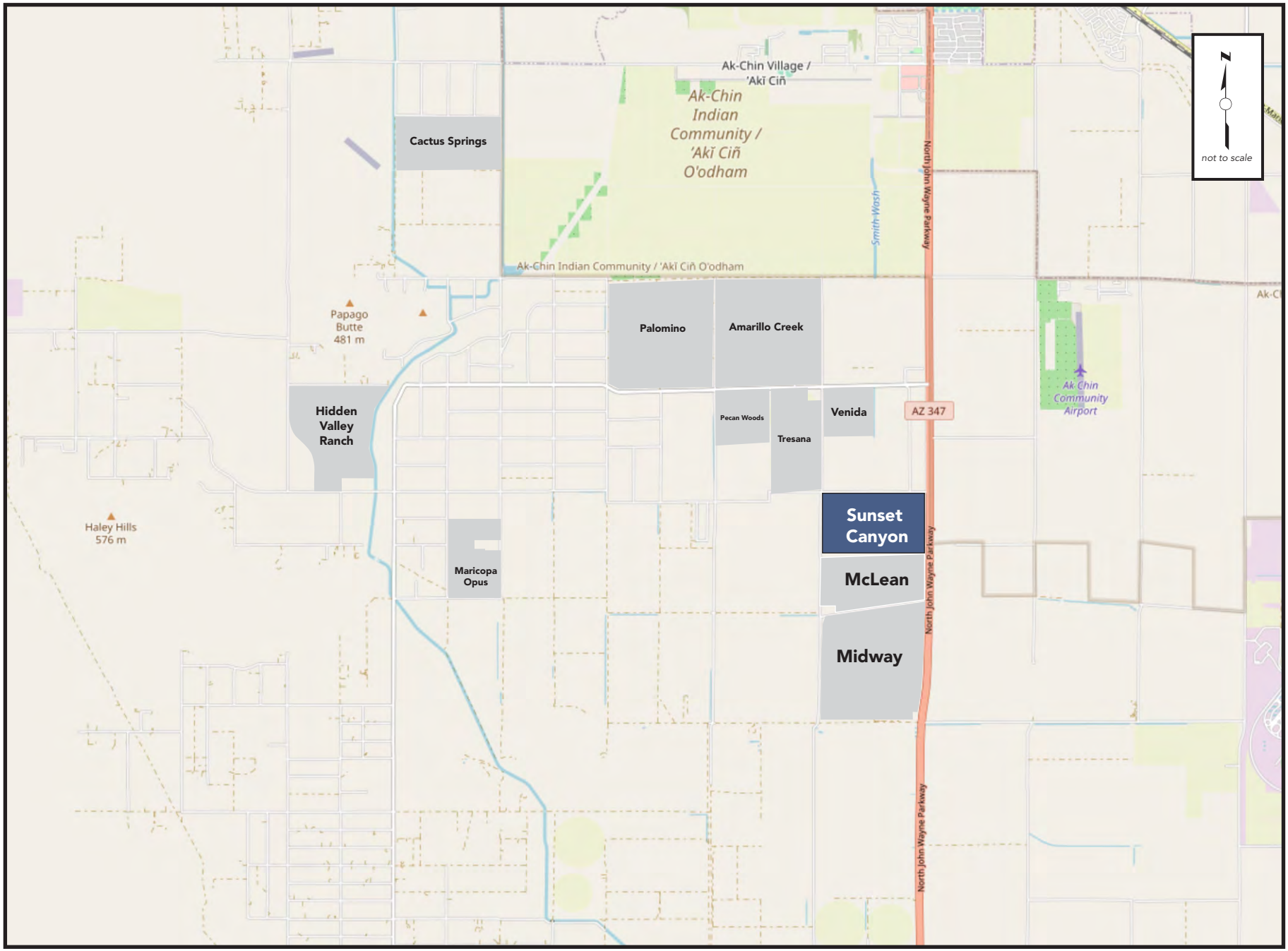
Management Manual) is met for the County accesses proposed with spacing of 660 feet or greater. The accesses on Val Vista Road, Access

Site Access B on SR347 should be designed per the per the ADOT Traffic Engineering Guidelines and Processes and current version of the ADOT Roadway Design Guidelines.

Figure 3 illustrates the layout of the proposed Sunset Canyon Residential Development in relation to the location of the site access points.

Table 1: Phasing for Site Plan

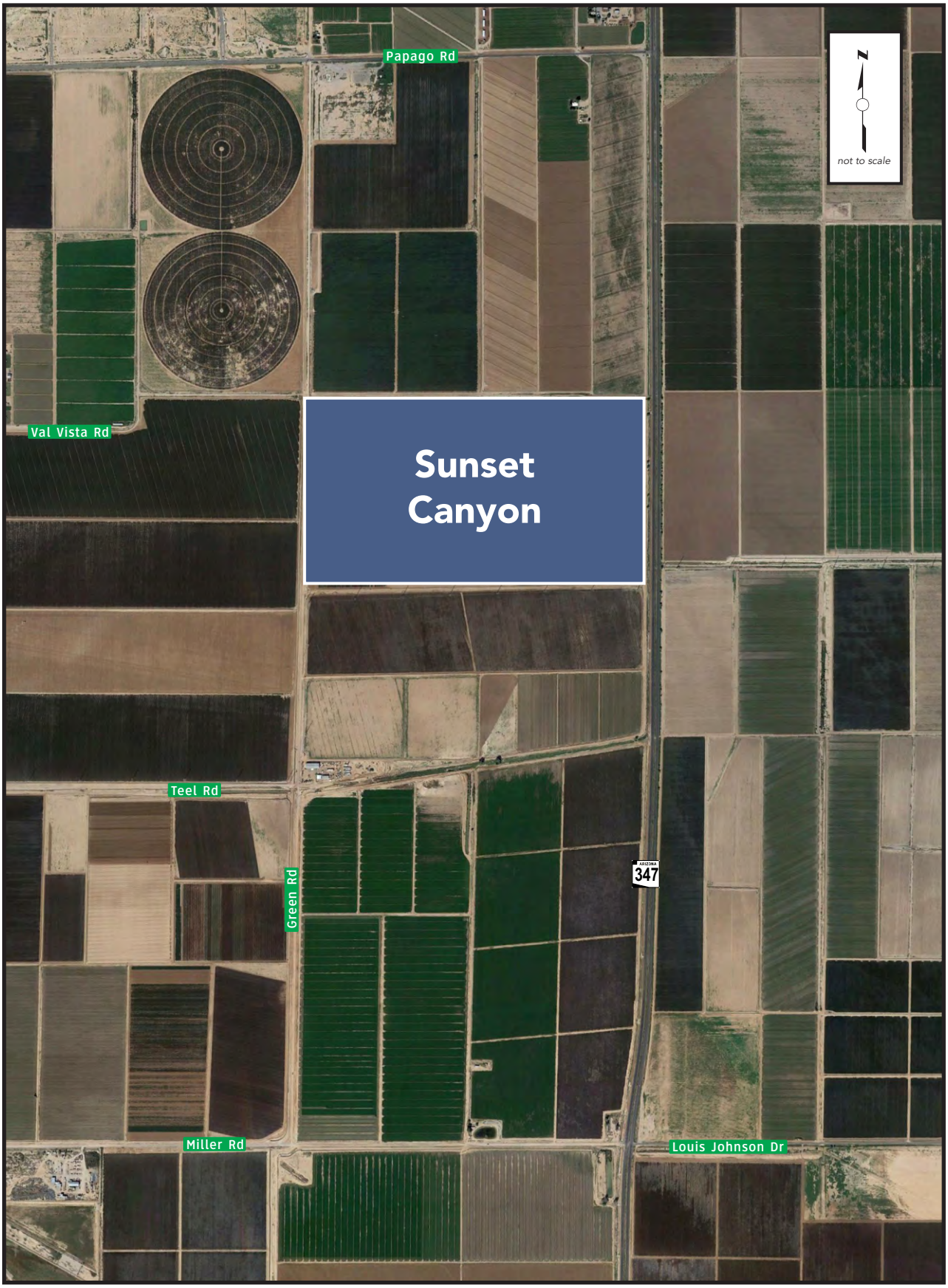
Phase	Parcels	Accesses/Internal Collector Roadways
I – 2028	1.1, 1.2 and 1.11 (539 single family homes)	½ street of Val Vista Road from northern property boundary to southern property boundary. Internal E-W Major Collector as required to provide access to residential development from Val Vista Road to SR 347
II – 2032	Parcels 1.3, 1.4 and 1.5 (481 single family homes)	½ street of Val Vista Road from northern property boundary to E-W Collector Road. ½ street E-W Major Collector as required to provide access to residential development from Val Vista Road to Green Road. ½ street Green Road from existing Val Vista Road alignment to E-W Collector Road
III – 2035	Parcels 1.6, 1.7, 1.8, 1.9 and 1.10 (512 single family homes plus elementary School)	½ street of Val Vista Road from E-W Collector Road to southern property boundary. ½ street E-W Major Collector as required to provide access to residential development from Val Vista Road to Green Road. ½ street of Green Road from E-W Collector Road to southern property boundary.



ArcGIS - 2022

Figure 1: Vicinity Map

United Civil Group



Permission for commercial use granted by Google Earth

Figure 2: Aerial View

UCG
United Civil Group



not to scale

Figure 3: Site Plan

United Civil Group

III. STUDY AREA CONDITIONS

A. Study Area

Based on the forecasted trip generation of the Sunset Canyon development (see Section V. Projected Traffic, Table 6), the proposed development falls under a Category IIb – Large Development per the County's *Traffic Impact Assessment Guidelines & Procedures, January 2007*, and a Category IIc – Large Development per ADOT's *Traffic Impact Analyses Guidelines*. According to these guidelines, the study area includes the intersections of:

- SR347/Papago Road
- SR347/Miller Road
- Amarillo Valley Road/Miller Road
- Amarillo Valley Road/Val Vista Road
- Amarillo Valley Road/Papago Road
- All site access intersections

The intersection of Papago Road/Green Road is an unpaved intersection that is added to the study area by 2028 with the first phase of the Amarillo Creek Development and a proposed storage facility located on the southwest corner of Papago Road and Green Road.

B. Study Area Land Use

The following describes the existing land uses of the subject site and surrounding area:
SUBJECT SITE: Undeveloped agricultural land
NORTH: Undeveloped agricultural land
SOUTH: Undeveloped agricultural land (planned as McLean Development)
EAST: SR347 followed by undeveloped agricultural land
WEST: Green Road followed by undeveloped agricultural land

C. Anticipated Future Development and Planned Improvements

Ten new residential developments are planned within the vicinity of Sunset Canyon Development. The other known developments are shown on Figure 1 in relation to Sunset Canyon.

Amarillo Creek is located north of Papago Road, south of the Peters and Nall Road alignment, east of Amarillo Valley Road and west of Green Road in Pinal County, Arizona. The development is planned to include 2,149 single family homes, an approximate 12-acre elementary school site with 600 students, and an approximate 14-acre junior high school site with 600 students.

Tresana is located north of Val Vista Road, south of Papago Road, east of the Liebre Road alignment and west of Green Road in Pinal County, Arizona. The development is planned to include 1,140 single family homes and an approximate 7-acre school site with 600 students.

Pecan Woods is located on the southeast corner of Papago Road and Amarillo Valley Road in Pinal County, Arizona. The development is planned to include 581 single-family detached homes.

Palomino Ranch is located north of Papago Road, south of the Ak-Chin Indian Community, west of Amarillo Valley Road and east of White Road in Pinal County, Arizona. The development is planned to include 2,102 single family homes, an approximate 12-acre elementary school site with 600 students, and an approximate 14-acre junior high school site with 600 students.

Midway is a single-family residential community that includes a school site in the middle of the property, with multifamily and commercial development near the intersection of SR347/Miller Road. The proposed Midway development will include 2,179 single family homes, 667 multi-family units, 17.05 acres of commercial use, and an approximate 10-acre school site with 600 students constructed in five phases.

Venida is a single-family residential community located south of Papago Road, north of Val Vista Road, west of SR347 and east of Green Road in Pinal County, Arizona. Venida will include 554 single family homes. The Venida development is planned to be constructed in two phases. Phase I includes 317 single family homes by 2025 and Phase II is planned to include 237 homes by 2030.

McLean Development will include 881 single family homes, 320 multifamily residential units, approximately 134,900 square feet of commercial use, constructed in four phases with buildout by 2035. McLean is located immediately south of the proposed Sunset Canyon Development.

Hidden Valley Ranch-Unit 1 is located north of Val Vista Road, south of the Papago Road alignment, west of Warren Road and east of Hidden Valley Road in Pinal County, Arizona. The development is planned to include 1,246 single family homes and an approximate 12-acre elementary school site with 600 students. The development will be constructed and occupied by 2030.

Maricopa Opus is located on the northwest corner of Ralston Road and Teel Road in Pinal County, Arizona. The development is planned on approximately 225 acres of land to include 686 single family homes. The development will be constructed and occupied by 2030.

Cactus Springs is located on the southwest corner of Ralston Road and Pima Road in Pinal County, Arizona. The development is planned on approximately 323 acres of land to include 1,050 single family homes and a neighborhood park. The development will be constructed and occupied by 2030.

Trip generation and recommendations from the known developments are included in the background traffic for this Sunset Canyon TIA. Trip generation and distribution are included in Appendix E.

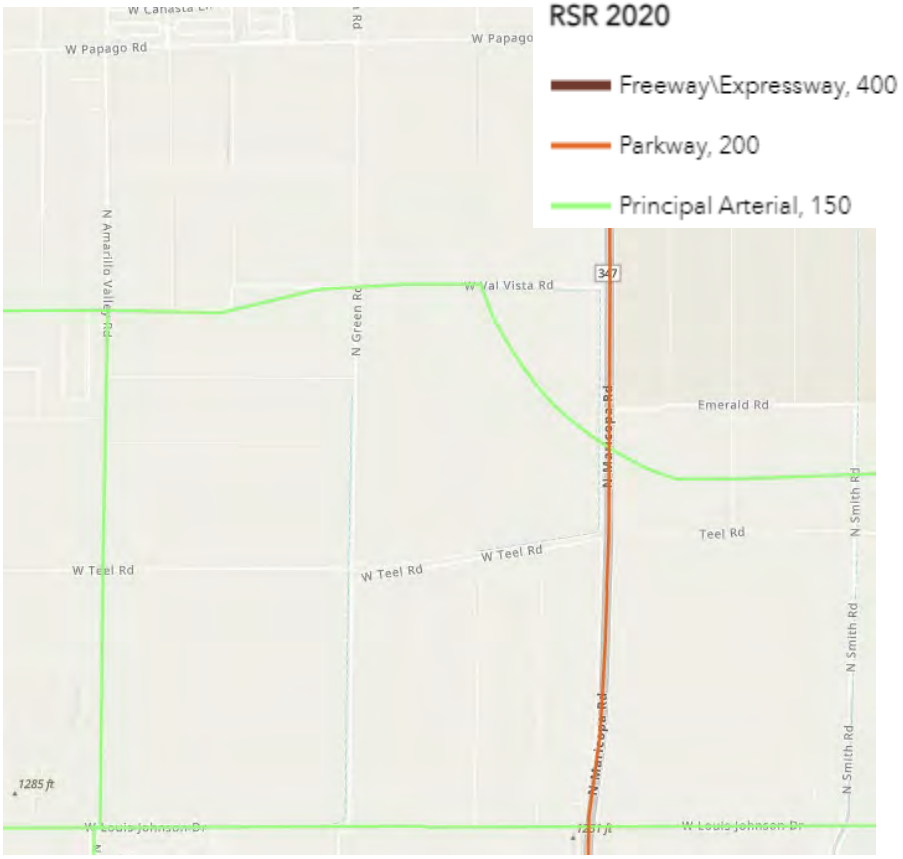
IV. EXISTING ROADWAY CONDITIONS

A. Physical Characteristics

State Route 347 (SR347), located on the mile section, SR347 is an ADOT state owned and maintained highway. SR347 has a north-south alignment in the vicinity of the site and regionally connects Interstate 10 to Interstate 8 via State Route 84. Per the Pinal County Regionally Significant Routes Report for Safety and Mobility, SR347 is shown as a regionally significant parkway. Adjacent to the subject site, SR347 is constructed as a four-lane section with two lanes in the north- and southbound directions, separated by an approximate 46-foot median. The posted speed limit on SR347 is 65 mph.

Val Vista Road, located on the mile section, is classified as a regionally significant principal arterial according to the Pinal County Development Services website accessed May 16, 2024. Adjacent to the subject site, Val Vista Road is unpaved with one-lane in each direction. In the future, Val Vista Road transition to the south to provide regional connectivity east of SR 347 and be constructed as three lanes in each direction separated by a raised median.

Green Road, located on the mile section, is classified as a north-south arterial in accordance with the Pinal County Development Services website accessed May 16, 2024 Adjacent to the subject site, Green Road is unpaved with one lane in each direction. In the future, Green Road will be constructed as a minor arterial with two lanes in each direction.



The intersection of SR347/Miller Road operates as an unsignalized intersection with the stop condition on the east- and westbound approaches. The northbound approach consists of an exclusive left turn lane (150 feet of storage and a 160-foot taper), two through lanes and a dedicated right turn lane (150 feet of storage and a 160-foot taper). The southbound approach consists of an exclusive left turn lane (150 feet of storage and a 160-foot taper), two through lanes and a dedicated right turn lane (150 feet of storage and a 160-foot taper). The east- and westbound approaches consist of one shared left-through-right lane. The west leg of the intersection is constructed over a box culvert over existing irrigation. Arizona Department of Transportation (ADOT) controls and maintains the intersection of SR347/Miller Road because it is under their jurisdiction. In the future, this intersection is planned to be signalized.

The intersection of SR347/Papago Road operates as an unsignalized intersection with the stop condition on the eastbound approach. The northbound approach consists of an exclusive left turn lane (170 feet of storage and a 160-foot taper) and two through lanes. The southbound approach consists of two through lanes and a dedicated right turn lane (165 feet of storage and a 1600-foot taper). The eastbound approach consists of one shared left-right lane as is constructed as a box culvert over existing irrigation. Arizona Department of Transportation (ADOT) controls and maintains the intersection of SR347/Papago Road because it is under their jurisdiction. In the future, this intersection is planned to be signalized.

The intersection of Papago Road/Green Road operates as a two-way stop controlled on the north- and southbound approaches. The north and southbound approaches are dirt roadways that currently service the agricultural land. The east and westbound approaches consist of one shared left, through, right lane. Pinal County controls and maintains the intersection of Papago Road/Green Road. In the future, this intersection is planned to be signalized.

The intersection of Papago Road/Amarillo Valley Road operates as two-way stop controlled on the north- and southbound approaches. The northbound approach consists of a shared left-through-right lane. The southbound lane consists of a left turn lane and a shared through-right lane. The east- and westbound lanes of a shared left-through-right lane. Pinal County controls and maintains the intersection of Papago Road/Amarillo Valley Road. In the future, this intersection is planned to be signalized.

The intersection of Val Vista Avenue/Green Avenue consists of dirt agricultural roadways that service the surrounding farmland.

B. Existing Traffic Volumes

Existing turning movement counts in 15-minute intervals were collected at the study area intersections of SR347/Miller Road, SR347/Papago Road, Papago Road/Amarillo Valley Road, Amarillo Valley Road Val Vista Road and Amarillo Valley Road/Miller Road on Thursday, January 18, 2024, during the morning peak period (7:00AM – 9:00AM) and evening peak period (4:00PM – 6:00PM).

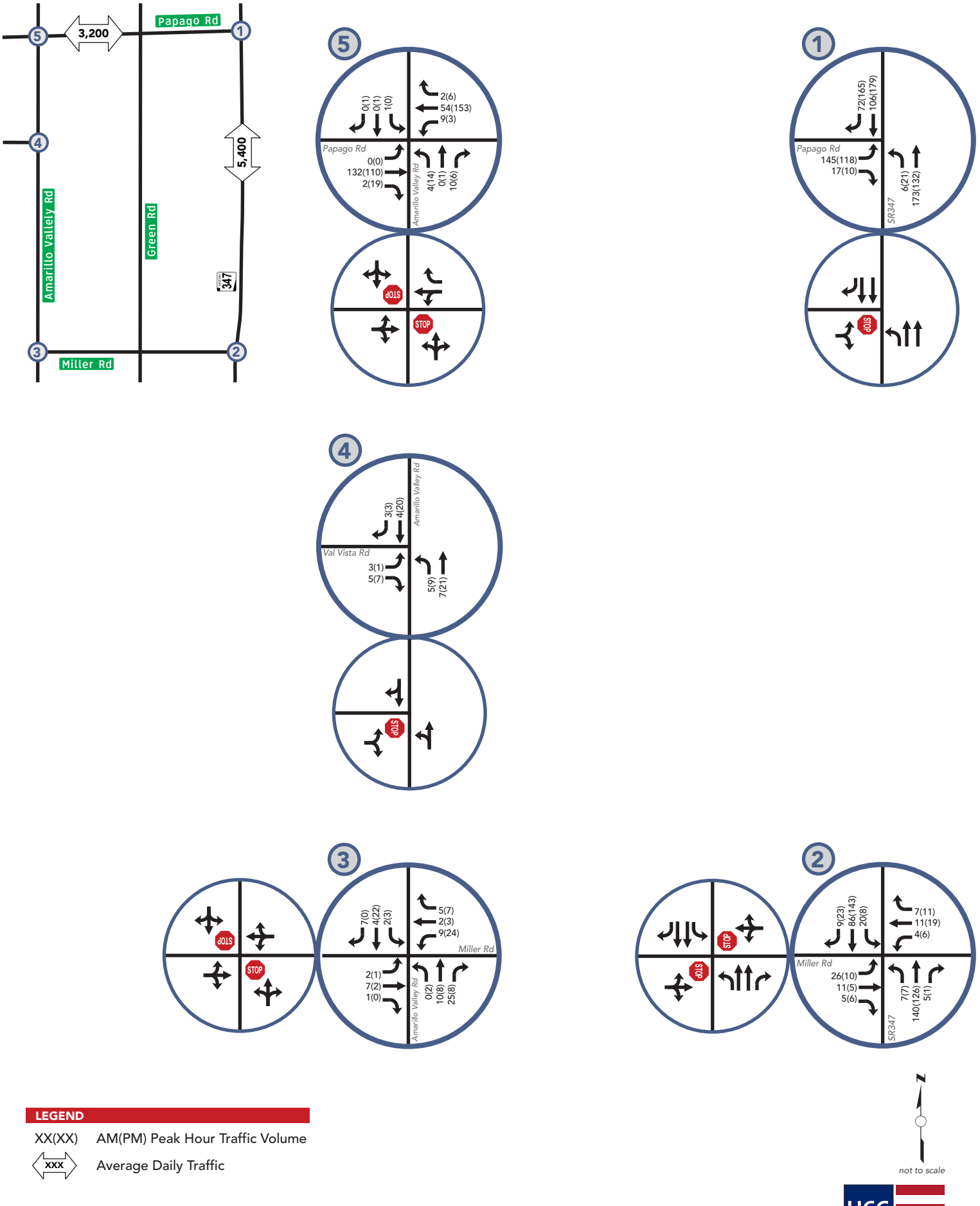
ADOT's Data Analytics Highway Performance Monitoring (HPMS) website was utilized to provide average daily traffic volumes for roadways within the vicinity of the site. The roadways within the study area that are currently included in HPMS are the paved roadways of SR347 and Papago Road.

The resulting morning and evening peak hour traffic volumes at the study area intersections along with the ADTs are presented in **Figure 4**. Complete traffic volume data can be found in *Appendix A: Traffic Counts*.

Figure 4 also graphically depicts the existing intersection geometry and the existing traffic volumes at the study area intersections.

C. Existing Traffic Observations and Issues

Traffic conditions and operations were observed at the study area intersections during the morning and evening peak periods and no traffic issues were noted.



LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

XXX Average Daily Traffic

N

not to scale

United Civil Group

Figure 4: Existing Geometrics

D. Crash Data

Three years of the most recently provided crash data (2019 – 2021) were obtained from the Arizona Department of Transportation (ADOT) Arizona Crash Information System (ACIS). The data was queried for the intersections of:

- SR347/Papago Road
- SR347/Miller Road
- Miller Road/Amarillo Valley Road
- Amarillo Valley Road/Val Vista Road
- Amarillo Valley Road/Papago Road

The crash data summarized in **Tables 2 and 3** for the study intersections are crashes that were reported to law enforcement. Table 2 summarizes the total number of crashes at the intersection by severity. Crash severity is determined by the reporting officer at the time of the crash or soon thereafter based on the most severe injury sustained by an involved party. Crashes are shown from most severe (Fatal) to least severe (No Injury). Table 3 summarizes the total number of crashes at the intersection by collision type. Crash type is designated by the reporting officer as the first injury or damage producing event that characterizes the crash type and identifies the nature of the crash. The categories within this report include Single Vehicle, Rear End, Left Turn, Angle (front to side, other than left turn), and Other/unknown.

An offset of 250 feet was used on all legs of each intersection. No reported crashes were queried or listed for the intersections of SR347/Miller Road and Amarillo Valley Road/Val Vista Road over the three-year study period.

Table 2: Injury Severity

Year	Fatal	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	No Injury	Total
SR347/Papago Road						
2019			1			**1**
2020					1	**1**
2021			1		1	**2**
Total	**0**	**0**	**2**	**0**	**2**	**4**
Miller Road/Amarillo Valley Road						
2019						**0**
2020						**0**
2021					**1**	**1**
Total	**0**	**0**	**0**	**0**	**1**	**1**
Amarillo Valley Road/Papago Road						
2019						**0**
2020					**1**	**1**
2021						**0**
Total	**0**	**0**	**0**	**0**	**1**	**1**

Table 3: Collision Manner

Year	Single Vehicle	Angle	Left Turn	Rear End	Head On	Sideswipe Same Direction	Sideswipe Opposite Direction	Rear to Side	Unknown /Other	Total
SR347/Papago Road										
2019	1									1
2020						1				1
2021	2									2
Total	**3**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**4**
Miller Road/Amarillo Valley Road										
2019										0
2020										0
2021	1									1
Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Amarillo Valley Road/Papago Road										
2019										0
2020		1								1
2021										0
Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

Based on the data provided in ACIS, it is difficult to determine if crash patterns exist at the study area intersection due to the variability in the data. To determine if crash patterns exist, individual crash records would be required, and a safety analysis performed.

E. Intersection Level of Service Analyses

E.1 HCM Capacity Analyses and Levels of Service

Intersection capacity analysis is a principal tool used in traffic engineering. Operation is characterized according to the amount of delay at an intersection approach and quantified into a level of service (LOS). The intersection LOS was determined using the methodologies presented in the Transportation Research Board's Highway Capacity Manual (HCM). The LOS grades quantify and categorize a driver's discomfort, frustration, fuel consumption, and travel times experienced because of intersection control and the resulting traffic queuing. Per the HCM, the signalized and unsignalized (all-way stop controlled or two-way stop-controlled intersection) delay and associated LOS is presented in **Table 4**. Pinal County strives to obtain a level of service C or better for both signalized and unsignalized intersection overall operations. Intersections having a LOS D, E, or F may warrant improvements or traffic reductions.

Table 4: Intersection Levels of Service and Delay

Level of Service	Description	Signalized Delay (Sec/Veh)	Unsignalized Delay (Sec/Veh)
A	Minimal control delay, traffic operates at primary free flow conditions, unimpeded movement within traffic stream	≤ 10	≤ 10
B	Minor control delay at signalized intersections, traffic operates at a fairly unimpeded level with slightly restricted movement within traffic stream	> 10 and ≤ 20	> 10 and ≤ 15
C	Moderate control delay, movement within traffic stream more restricted than LOS B, formation of queues contributes to lower average travel speeds	> 20 and ≤ 35	> 15 and ≤ 25
D	Considerable control delay that may be substantially increased by small increases in flow, average travel speeds continue to decrease.	> 35 and ≤ 55	> 25 and ≤ 35
E	High control delay, average travel speed no more than 22 percent of free flow speed	> 55 and ≤ 80	> 35 and ≤ 50
F	Extremely high control	> 80	> 50

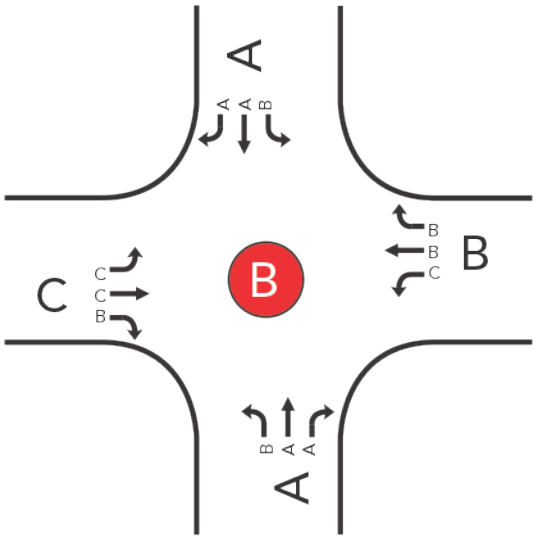
Source: Highway Capacity Manual 2010

For signalized and all-way stop controlled intersections, LOS is calculated for a movement (e.g., left, through, right), for the approach (e.g., northbound, southbound, eastbound, westbound) and for the overall intersection.

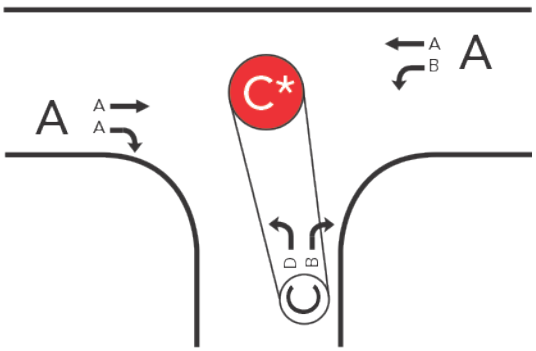
For two-way stop-controlled intersections, LOS is calculated for a movement and for the approach. However, for the overall intersection, LOS is reported as the lowest movement within the intersection. This is because most drivers are on the major roadway and do not experience delay traversing through the intersection. The example below illustrates the various LOS calculations completed for intersections.

EXAMPLE:

Signalized & All-Way Stop Controlled



Two-Way Stop Controlled



*Reported as approach LOS

Source: United Civil Group, 2019

E.2 Existing Intersection Level of Service

The level of service (LOS) and average delay at the existing study area intersections were evaluated using the 2024 intersection volumes, lane geometry, and existing traffic control as presented in Figure 4. PTV Vistro traffic modeling software, employing the methodologies as presented in the Highway Capacity Manual (HCM), was utilized for the capacity analyses to obtain the existing conditions levels of service. Summaries of the Vistro output calculations are included in *Appendix B: Capacity Analyses*.

The results of the existing levels of service analysis are presented in **Table 5**.

Table 5: 2024 Existing Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – One Way Stop Controlled																	
AM Peak Hour	A	A	-	A	-	A	A	A	B	-	B	B	-	-	-	-	11.23 B*
PM Peak Hour	A	A	-	A	-	A	A	A	B	-	B	B	-	-	-	-	12.03 B*
SR347/Miller Road/**Louis Johnson Drive** – Two Way Stop Controlled																	
AM Peak Hour	A	A	A	A	A	A	A	A	B	B	A	B	B	B	A	B	10.76 B*
PM Peak Hour	A	A	A	A	A	A	A	A	B	B	A	B	B	B	A	A	10.79 B*
Amarillo Valley Road/Miller Road – Two Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	8.76 A*
PM Peak Hour	A	A	A	A	A	A	-	A	A	A	-	A	A	A	A	A	9.53 A*
Amarillo Valley Road/Val Visa Road – One Way Stop Controlled																	
AM Peak Hour	A	A	-	A	-	A	A	A	A	-	A	A	-	-	-	-	8.48 A*
PM Peak Hour	A	A	-	A	-	A	A	A	A	-	-	A	-	-	-	-	8.50 A*
Amarillo Valley Road/Papago Road – Two Way Stop Controlled																	
AM Peak Hour	A	-	A	A	A	-	-	A	-	A	A	A	A	A	A	A	9.95 A*
PM Peak Hour	A	A	A	A	-	A	A	A	-	B	A	A	B	B	A	B	10.24 B*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

As shown, the study area intersections currently operate at acceptable levels of service, LOS B or better, in the morning and evening peak hours.

V. PROJECTED TRAFFIC

A. Trip Generation

Estimates of the traffic volumes that will be generated by the development were determined from transportation planning data taken from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition, 2021*. The ITE rates are based on studies that measure trip generation characteristics for various types of land uses. The rates are expressed in terms of trips per unit of land use type.

Single-family Detached Housing (210) - includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Elementary School (520) - An elementary school is a public school that typically serves students attending kindergarten through the fifth or sixth grade. An elementary school is usually centrally located in a residential community to facilitate student access. Bus service is commonly provided to students living beyond a specified distance from the school.

Table 6 presents the estimated daily and peak hour vehicle trips generated by the Sunset Canyon development for a typical weekday after full build out of each phase. The 15% shopping reduction is based on other planned residential developments with similar nearby facilities.

- Phase I consists of 539 single family homes - occupied by 2028.
- Phase II consists of 481 single family homes occupied by 2032.
- Phase III consists of 512 single family homes occupied by 2035 plus the elementary school.

Table 6: Proposed Development Trip Generation

Land Use	ITE Code	Units	Total Size	Daily	AM Peak			PM Peak		
					Total	In	Out	Total	In	Out
PHASE I										
Single-Family Detached Housing	210	Dwelling Units	539	5,083	377	94	283	507	319	188
PHASE II										
Single-Family Detached Housing	210	Dwelling Units	481	4,536	337	84	253	452	285	167
PHASE III										
Single-Family Detached Housing	210	Dwelling Units	512	4,828	358	90	268	481	303	178
Elementary School	520	students	600	1,362	444	240	204	96	44	52
50% interaction of elementary school traffic with the single-family development				-681	-222	-120	-102	-48	-22	-26
Phase III Subtotal				*5,509*	*580*	*210*	*370*	*529*	*325*	*204*
FULL BUILD OUT TOTAL				15,128	1,294	388	906	1,488	929	559

On a typical weekday, after full build-out, the Sunset Canyon development is forecasted to generate 15,128 total daily trips, with 1,294 trips in the morning peak hour and 1,488 trips in the evening peak hour, according to the 11th Edition of the Trip Generation Manual.

B. Trip Distribution

The trip distribution procedure determines the general pattern of travel for vehicles entering and leaving the subject site and the study area. The assumed trip distribution percentages for the development are shown in **Table 7**. For a development of this type, these percentages are mainly based on the type of land uses of the development, the location of the site within Pinal County, and the connectivity of the site to the region.

For the residential components, distribution of the home-to-work trips is generally based on the roadway connectivity and employment centers within 15 miles of the development. Pinal County's Small Area Study was utilized to determine future employment and residential areas surrounding the Sunset Canyon development. Trips generated from the single-family residential development were routed to and from future employment areas surrounding Sunset Canyon.

According to the City of Maricopa Future Land Use Map, low density residential, industrial/manufacturing, and open space is planned west of the Sunset Canyon development. Therefore, it is assumed that 10 percent of future residential trips will travel west to employment and shopping areas both north and south of the site. As development occurs within the Sunset Canyon development study area and also south of the development, the trip distribution will balance both north and south in the area.

Table 7: Trip Distribution Percentages

Direction	Trip Distribution Percentage	
	Arriving From	Departing To
SR347 north of site	35%	35%
SR347 south of Miller Road	30%	30%
Papago Road west of Amarillo Valley Road	10%	10%
Miller Road east of SR347	25%	25%

Figures 5 through 8 present the site generated traffic to and from Sunset Canyon for each phase of the proposed development.

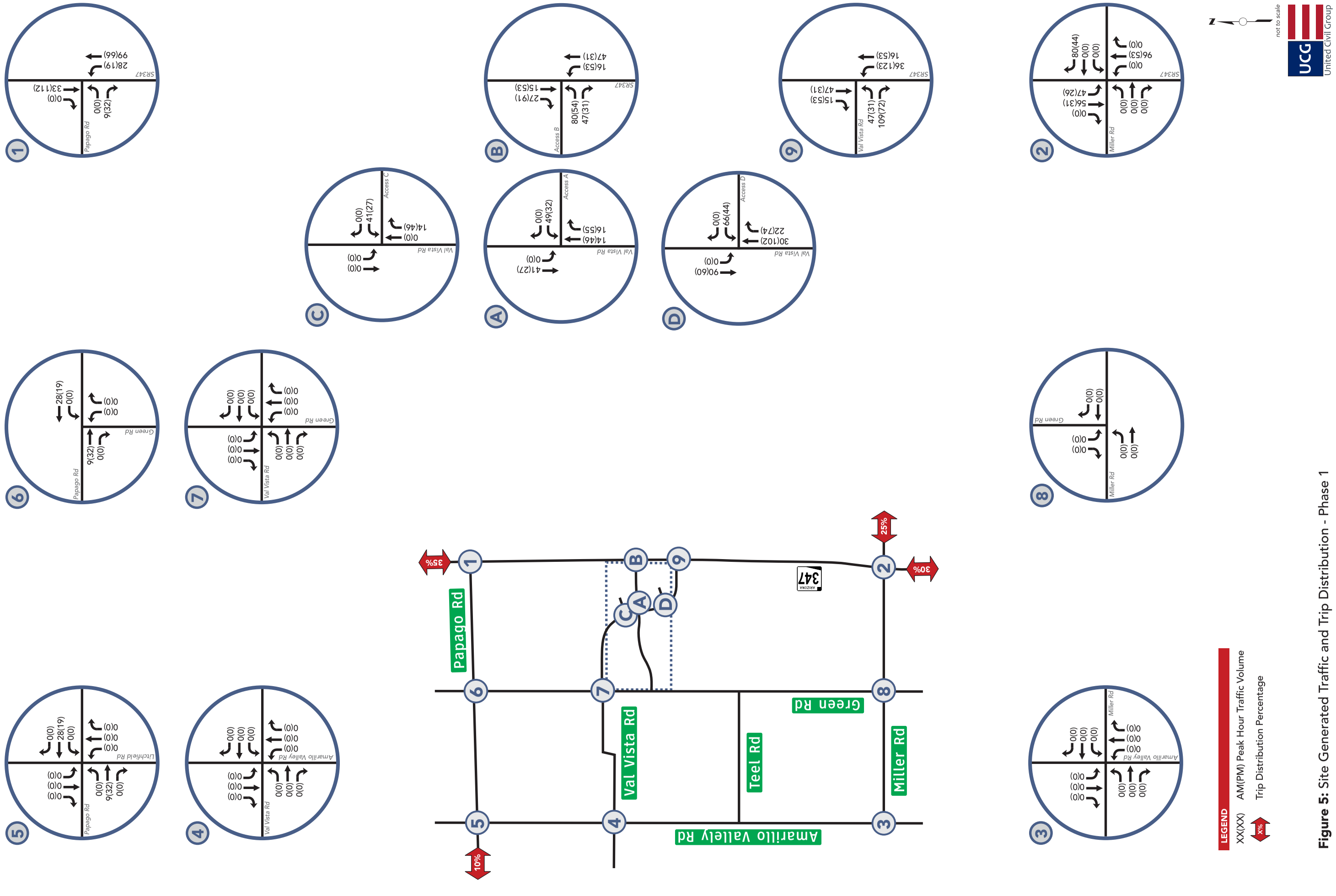


Figure 5: Site Generated Traffic and Trip Distribution - Phase 1

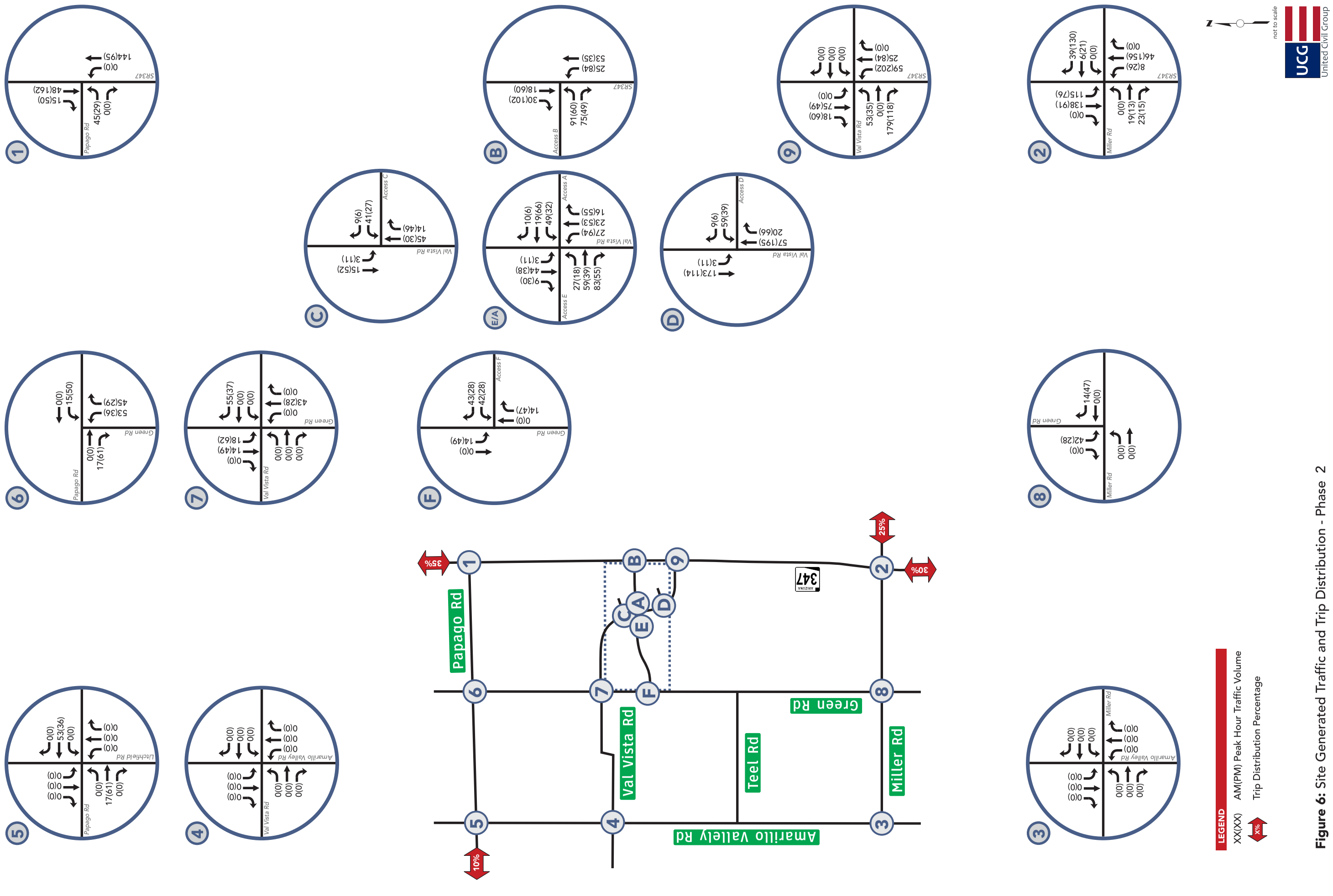


Figure 6: Site Generated Traffic and Trip Distribution - Phase 2

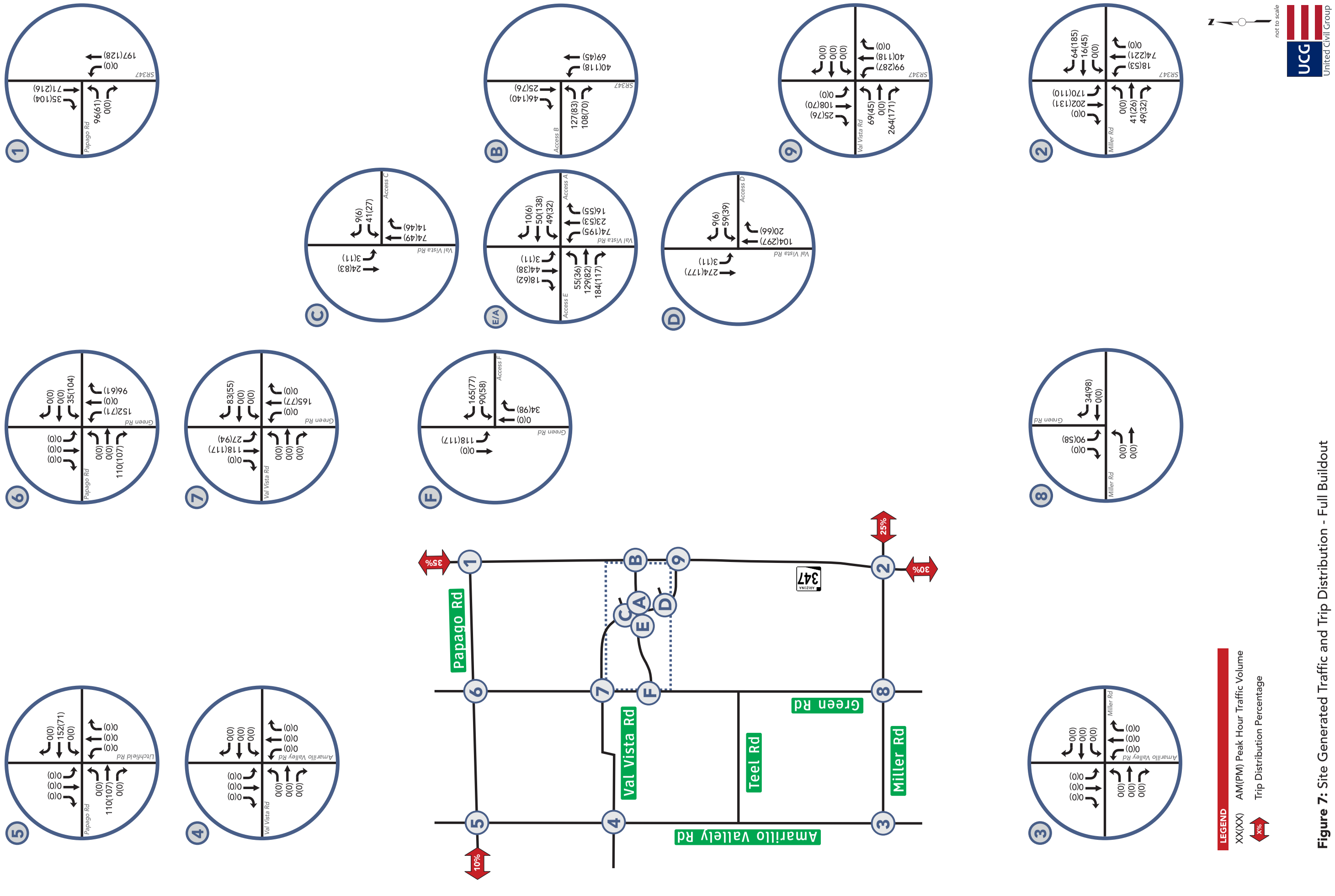
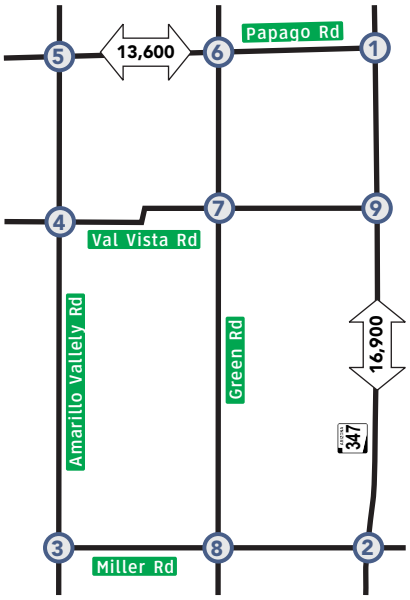


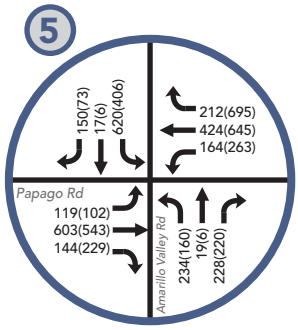
Figure 7: Site Generated Traffic and Trip Distribution - Full Buildout

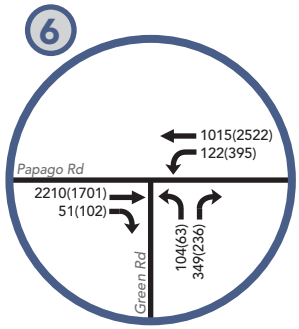
C. Projected Background Traffic

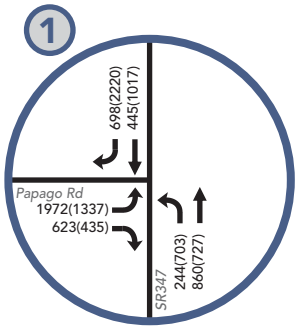
Non-site or background traffic volumes representing the amount of traffic estimated to be on the area roadway network without the proposed development within the study area were projected for the horizon years of the development, year 2028 (Phase I), year 2032 (Phase II), year 2035 (Phase III), and years 2040 and 2045 (five years and 10 years after full build-out). A yearly ambient growth rate for the area of two percent was assumed through each horizon year in addition to the trip generation for the anticipated future developments within the study area.

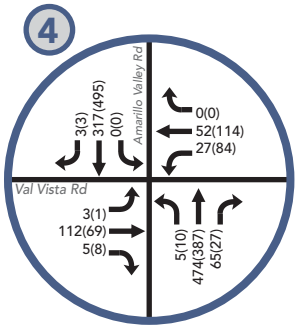
Capacity analyses at the existing study area intersections were performed for the forecasted background traffic for the horizon years of the study, as presented in Figures 9 through 14.

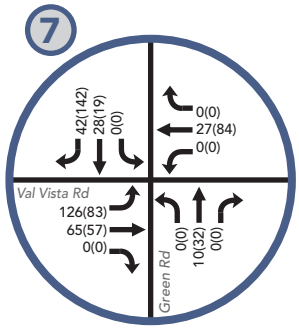


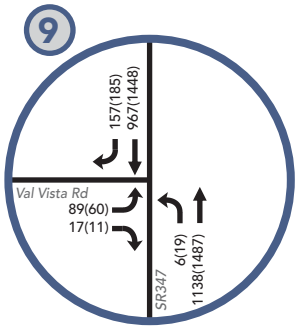


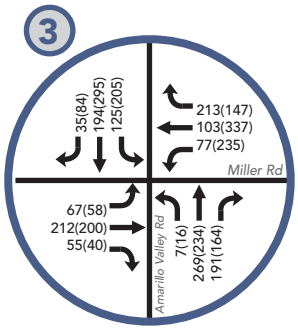


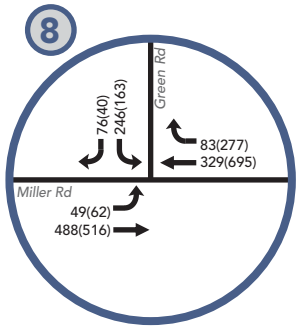


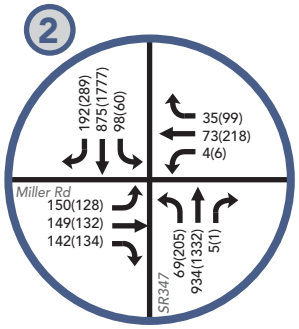












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

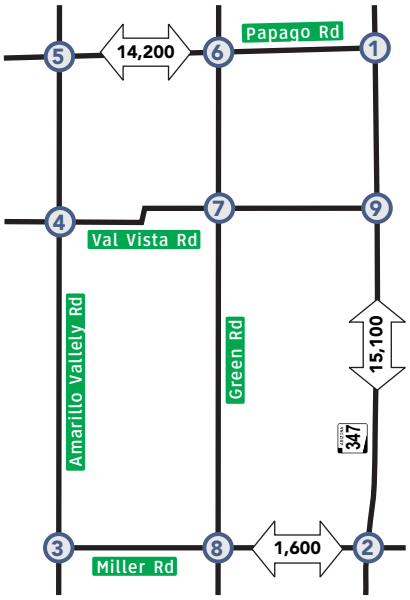
XXX Average Daily Traffic

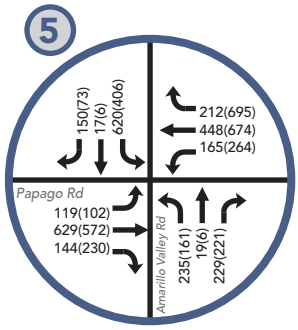
N

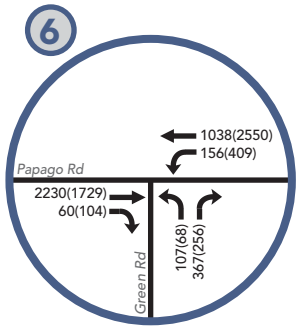
not to scale

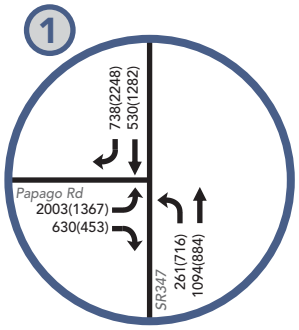
UCG
United Civil Group

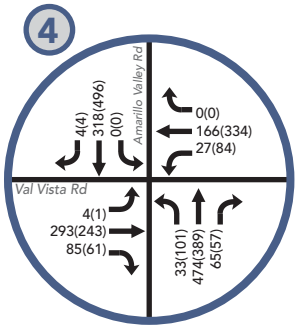
Figure 8: Background Traffic - Year 2028

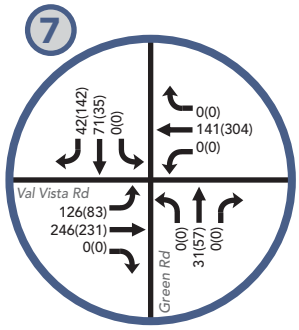


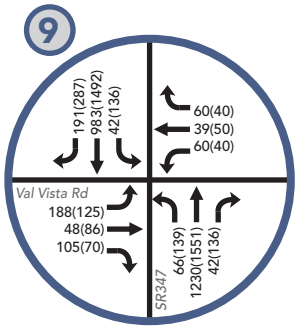


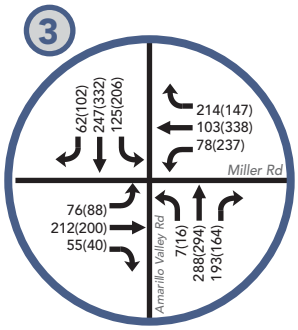


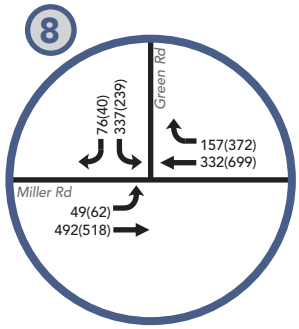


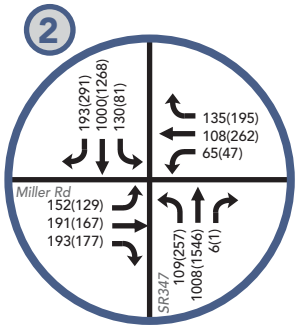












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

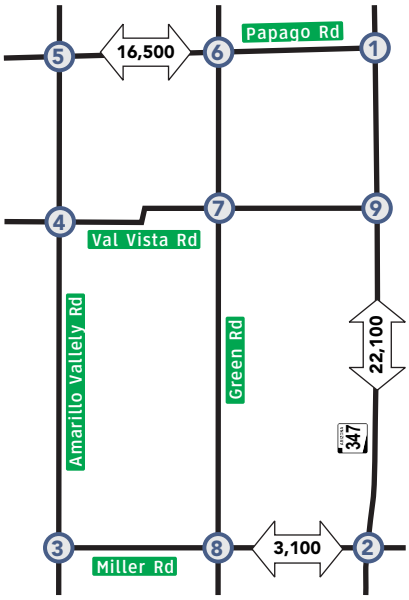
XXX Average Daily Traffic

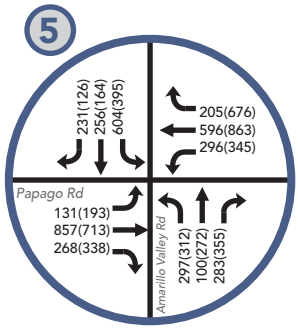
N

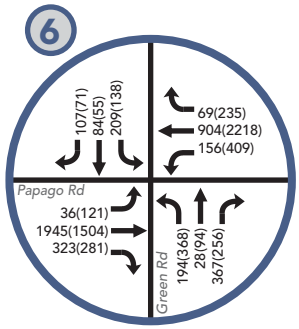
not to scale

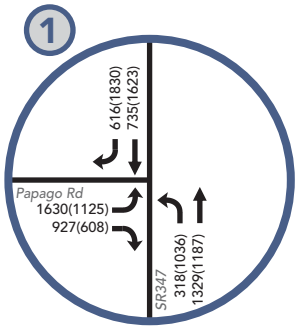
UCG
United Civil Group

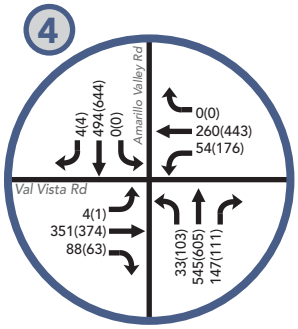
Figure 9: Background Traffic - Year 2027

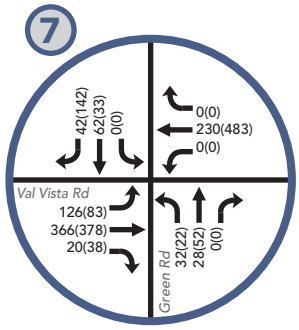


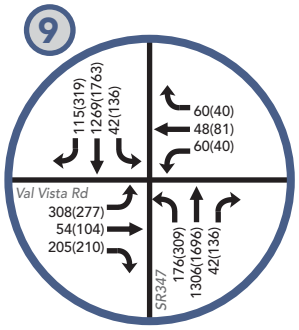


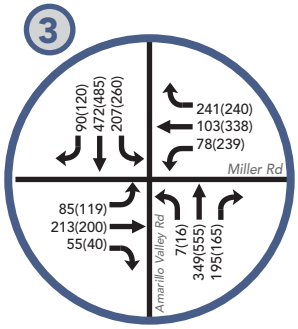


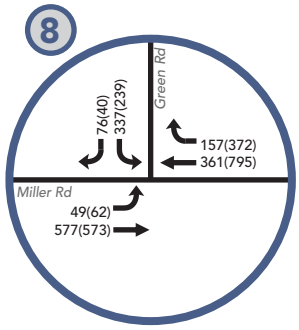


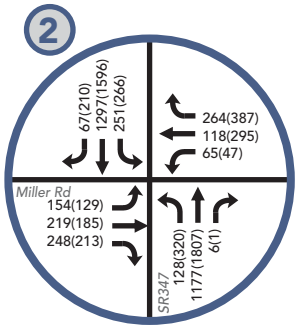












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

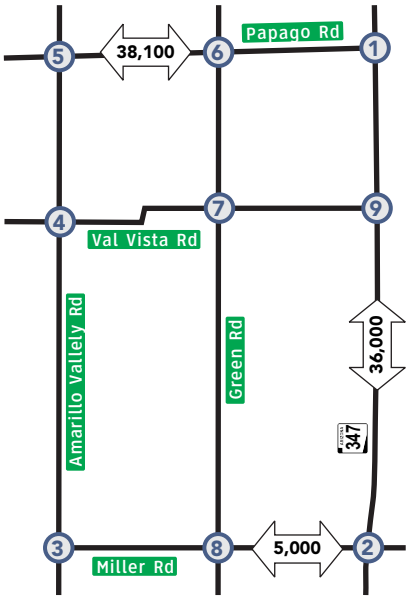
XXX Average Daily Traffic

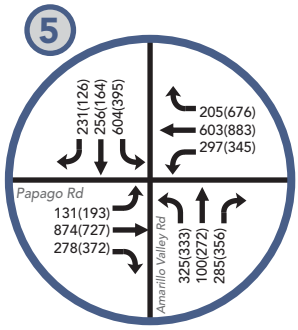
N

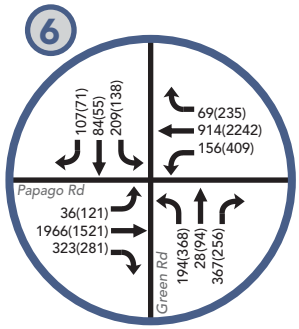
not to scale

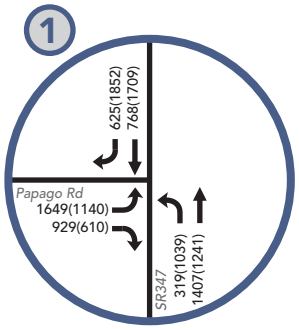
UCG
United Civil Group

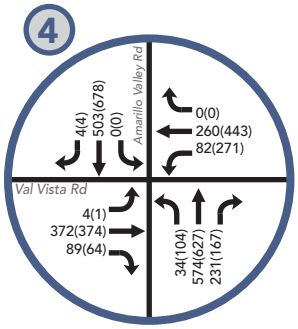
Figure 10: Background Traffic - Year 2035

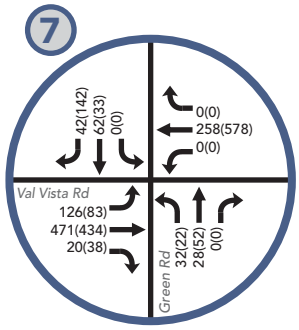


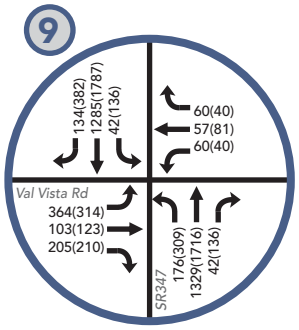


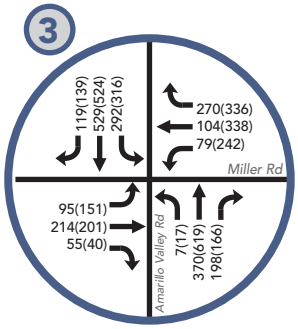


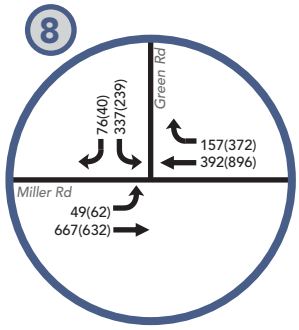


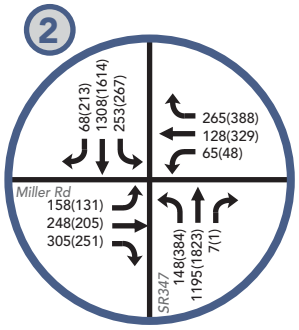












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

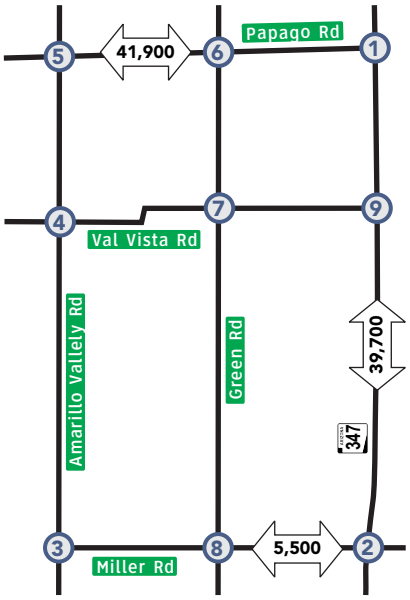
XXX Average Daily Traffic

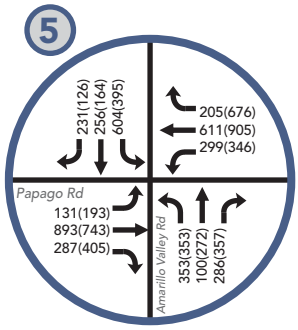
N

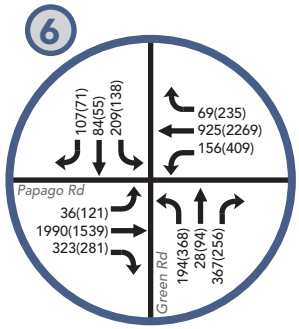
not to scale

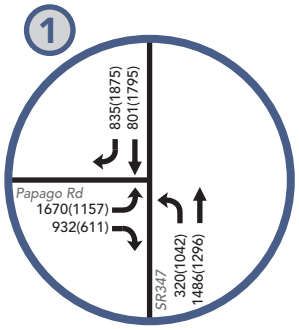
UCG
United Civil Group

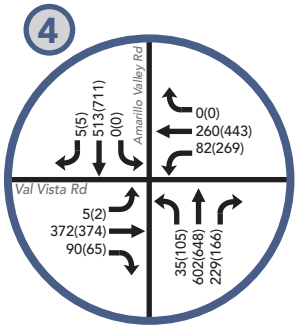
Figure 11: Background Traffic - Year 2040

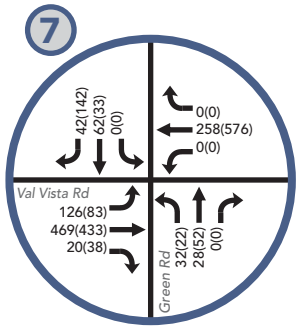


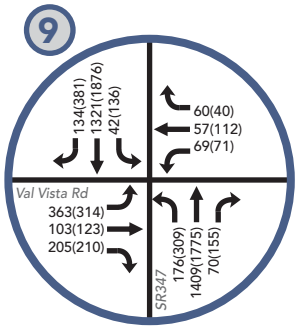


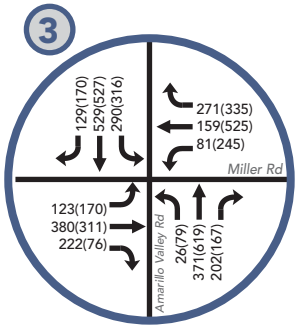


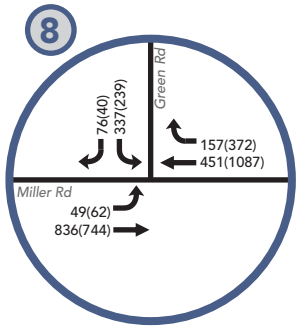


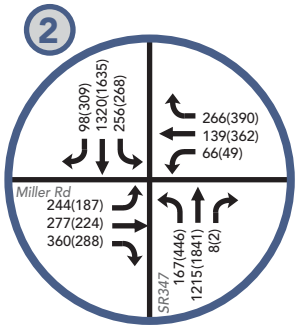












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

XXX Average Daily Traffic

N

not to scale

United Civil Group

Figure 12: Background Traffic - Year 2045

Tables 8 through 13 below present the background levels of service at the study area intersection without the proposed development and without any of the recommended improvements. Complete capacity analyses are provided in *Appendix B: Capacity Analyses*.

Table 8: 2028 Background Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	C	E	-	E	-	E	A	E	C	-	B	C	-	-	-	-	39.09 D
PM Peak Hour	F	B	-	D	-	F	A	E	F	-	C	D	-	-	-	-	57.47 E
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	B	B	C	D	B	B	B	D	D	D	D	D	D	D	D	23.23 C
PM Peak Hour	D	C	A	C	E	C	B	C	E	D	D	D	D	D	D	D	28.38 C
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	B	B	B	C	C	C	C	B	D	D	C	26.68 C
PM Peak Hour	B	D	D	D	C	C	C	C	B	C	C	C	B	C	C	C	30.74 C
Amarillo Valley Road/Val Visa Road – Two Way Stop Controlled																	
AM Peak Hour	A	A	A	A	-	A	A	A	C	D	C	D	E	C	-	D	29.76 D*
PM Peak Hour	A	A	A	A	-	A	A	A	E	D	C	D	F	E	-	E	47.23 E*
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	C	C	C	B	B	B	B	B	B	B	B	23.45 C
PM Peak Hour	C	D	D	C	D	C	C	D	A	B	B	B	B	B	B	B	19.90 B
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	-	E	D	-	-	-	-	-	C	A	C	C	A	-	A	22.37 C
PM Peak Hour	D	-	D	D	-	-	-	-	-	A	A	A	F	B	-	C	26.03 C
Green Road/Val Vista Road – Two Way Stop Controlled																	
AM Peak Hour	-	B	-	B	-	B	A	B	A	A	-	A	-	A	-	A	12.22 B*
PM Peak Hour	-	B	-	B	-	B	A	B	A	A	-	A	-	A	-	A	11.98 B*
Green Road/Miller Road – One Way Stop Controlled																	
AM Peak Hour	-	-	-	-	C	-	A	C	A	A	-	A	-	A	A	A	20.29 C*
PM Peak Hour	-	-	-	-	D	-	B	D	B	A	-	A	-	A	A	A	29.33 D*
SR347/Val Vista Road – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	4.96 A
PM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	4.70 A

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

In the 2028 background condition, the study area intersections operate at acceptable levels of service, LOS D or better in the morning and evening peak hours, except for the intersections of SR347/Papago Road and Amarillo Valley Road/Val Vista Road. In the evening peak hours the intersection will operate with delay. It is assumed that the SR347/Papago Road geometry is not improved for the 2028 background conditions. However, by 2032, it is assumed that SR347 is widened to three lanes in each direction through the intersection. The intersection of Amarillo Valley/Val Vista Road will be signalized in the future. Therefore, these improvements will assist in reducing delay.

Table 9: 2032 Background Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	E	E	-	E	-	E	A	E	C	-	A	C	-	-	-	-	39.14 D
PM Peak Hour	E	B	-	D	-	E	A	E	F	-	C	E	-	-	-	-	50.45 D
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	B	A	B	D	B	B	B	D	C	D	D	D	C	D	D	21.92 C
PM Peak Hour	D	B	A	B	D	B	B	B	D	C	D	D	E	C	D	D	23.61 C
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	B	C	C	C	B	C	C	C	27.25 C
PM Peak Hour	B	D	D	D	C	C	C	C	B	C	C	C	B	D	D	C	31.58 C
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	B	C	C	C	A	C	C	C	B	C	C	C	B	C	C	B	22.15 C
PM Peak Hour	B	B	B	B	A	B	B	B	B	C	C	C	C	C	C	C	21.11 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	C	C	C	B	C	B	B	B	B	B	B	23.84 C
PM Peak Hour	C	D	D	C	D	C	C	D	B	B	B	B	B	B	B	B	19.88 B
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	-	F	F	-	-	-	-	-	C	A	C	D	A	-	A	24.27 C
PM Peak Hour	D	-	D	D	-	-	-	-	-	B	A	B	F	B	-	D	30.68 C
Green Road/Val Vista Road – Two Way Stop Controlled																	
AM Peak Hour	-	C	-	C	-	C	B	C	A	A	-	A	-	A	-	A	17.35 C*
PM Peak Hour	-	C	-	C	-	C	B	B	A	A	-	A	-	A	-	A	19.68 C*
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	B	B	B	-	B	-	B	C	C	17.92 B
PM Peak Hour	-	-	-	-	C	-	C	C	A	A	-	A	-	B	B	B	15.00 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	A	B	A	B	A	B	B	B	C	C	D	C	C	D	D	C	14.82 B
PM Peak Hour	B	B	A	B	B	B	A	B	C	D	D	D	C	D	D	D	13.73 B

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

In the 2032 background condition, all of the study area intersections operate at acceptable levels of service, LOS C or better in the morning and evening peak hours, except for the intersection of SR347/Papago which operates at an LOS D. Therefore, according to this analysis and assuming all other developments are being constructed, SR347 should be widened to three lanes to accommodate the projected traffic within the study area.

Table 10: 2035 Background Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	D	C	-	D	-	D	A	D	F	-	C	D	-	-	-	-	39.96 D
PM Peak Hour	F	B	-	E	-	F	A	F	F	-	D	F	-	-	-	-	100.23 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	B	B	B	D	B	A	B	D	D	D	D	D	D	D	D	22.69 C
PM Peak Hour	D	C	A	D	D	C	B	C	D	C	C	C	D	C	D	D	33.97 C
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	B	C	C	C	C	C	D	D	D	26.10 C
PM Peak Hour	B	F	F	F	F	D	D	E	C	C	C	C	C	F	F	F	70.05 E
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	A	A	A	A	A	A	A	C	D	D	D	C	C	C	C	20.68 C
PM Peak Hour	A	B	B	A	A	B	B	B	C	D	D	D	C	C	C	C	21.36 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	D	C	D	B	C	B	C	D	C	B	C	28.37 C
PM Peak Hour	B	C	C	C	C	C	C	C	B	C	C	C	B	C	C	C	23.87 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	D	F	E	D	D	D	D	A	F	A	D	D	B	A	B	33.69 C
PM Peak Hour	F	D	D	E	C	D	D	C	C	F	B	E	D	F	A	E	63.99 E
Green Road/Val Vista Road – All Way Stop Controlled																	
AM Peak Hour	B	B	B	B	B	B	B	B	C	C	C	C	B	B	B	B	16.64 C
PM Peak Hour	B	B	B	B	B	B	B	B	E	E	E	E	D	D	D	D	31.05 E
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	B	B	B	-	B	-	C	C	C	18.07 B
PM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	B	C	C	18.06 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	B	B	A	B	A	B	A	B	D	C	D	D	C	D	D	C	17.76 B
PM Peak Hour	D	B	B	C	C	C	B	C	C	C	D	C	C	D	D	C	24.15 C

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

In the 2035 background condition, the study area intersections continue to operate at acceptable levels of service, LOS C or better in the morning and evening peak hours. The exceptions are the signalized intersections of SR347/Papago Road, Amarillo Valley Road/Val Vista Road, Green Road/Papago Road and the all way stop at Green Road/Val Vista Road that are projected to operate with delay in the evening peak hour. As development occurs within the study area the intersection geometry will be improved which will reduce the delay.

Table 12: 2040 Background Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	D	C	-	D	-	D	A	D	F	-	C	D	-	-	-	-	42.00 D
PM Peak Hour	F	B	-	E	-	F	A	F	F	-	D	F	-	-	-	-	109.00 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	B	B	B	D	B	A	B	D	D	D	D	D	D	D	D	23.52 C
PM Peak Hour	D	D	A	D	D	D	B	D	D	C	C	C	D	C	D	D	38.82 C
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	D	C	C	C	C	C	C	C	B	D	D	D	31.75 C
PM Peak Hour	B	F	F	F	F	D	D	F	C	C	C	C	B	F	F	F	110.77 F
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	B	B	B	A	B	B	B	C	D	D	D	C	C	C	C	20.66 C
PM Peak Hour	A	B	B	B	A	B	B	B	C	D	D	D	E	C	C	D	24.51 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	B	C	D	C	D	C	C	C	C	C	C	C	F	C	C	D	36.16 D
PM Peak Hour	D	C	D	D	D	C	C	D	B	C	C	C	C	B	B	B	27.20 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	C	D	F	D	C	D	D	C	A	F	A	D	D	B	A	B	33.57 C
PM Peak Hour	E	D	D	E	C	D	D	C	C	F	B	E	D	F	A	E	66.60 E
Green Road/Val Vista Road – All Way Stop Controlled																	
AM Peak Hour	B	B	B	B	B	B	B	B	E	E	E	E	B	B	B	B	28.33 D
PM Peak Hour	B	B	B	B	B	B	B	B	F	F	F	F	F	F	F	F	58.65 F
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	B	B	B	-	B	-	C	C	C	18.31 B
PM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	C	C	C	18.57 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	B	B	A	B	A	B	A	B	D	C	D	D	C	D	D	C	19.39 B
PM Peak Hour	D	B	A	B	C	C	C	C	D	C	D	D	C	D	D	C	25.59 C

**The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.*

In the 2040 background condition, the study area intersections continue to operate at acceptable levels of service, LOS D or better in the morning and evening peak hours.

The exceptions are the signalized intersections of SR347/Papago Road, Amarillo Valley Road/Val Vista Road, Green Road/Papago Road and the all way stop at Green Road/Val Vista Road that are projected to operate with delay in the evening peak hour. As development occurs within the study area the intersection geometry will be improved which will reduce the delay.

Table 13: 2045 Background Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	D	D	-	D	-	D	A	D	F	-	C	D	-	-	-	-	42.47 D
PM Peak Hour	F	B	-	E	-	F	A	F	F	-	D	F	-	-	-	-	117.96 F
SR347/Miller Road/Louis Johnson Drive – Signalized																	
AM Peak Hour	D	B	B	C	D	B	B	B	D	C	D	D	D	D	D	D	25.20 C
PM Peak Hour	D	D	B	D	D	F	C	D	D	C	C	D	D	C	D	D	43.65 D
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	A	A	A	A	A	A	A	A	C	D	D	C	D	D	D	D	20.56 C
PM Peak Hour	B	B	B	B	C	B	B	C	B	C	C	C	D	C	D	C	24.81 C
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	A	A	A	A	A	A	A	C	D	D	D	C	C	C	C	19.29 B
PM Peak Hour	A	A	A	A	A	B	B	B	C	D	D	D	E	C	C	D	22.99 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	C	C	C	D	C	C	C	C	D	C	C	F	C	C	D	37.62 D
PM Peak Hour	C	C	C	C	D	C	C	D	C	C	B	C	D	C	C	C	28.56 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	C	C	E	D	C	C	D	C	A	F	A	D	D	B	A	B	38.01 D
PM Peak Hour	D	C	D	D	C	D	D	C	C	F	B	F	D	F	A	F	100.08 F
Green Road/Val Vista Road – All Way Stop Controlled																	
AM Peak Hour	B	B	B	B	B	B	B	B	E	E	E	E	B	B	B	B	28.01 D
PM Peak Hour	B	B	B	B	B	B	B	B	F	F	F	F	F	F	F	F	57.98 F
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	B	B	B	18.16 B
PM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	C	C	C	19.30 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	B	B	A	B	A	B	A	B	D	C	E	D	C	D	D	C	19.50 B
PM Peak Hour	D	B	B	B	C	D	C	C	D	C	D	D	C	D	D	C	28.81 C

**The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.*

As traffic volumes continue to increase, the 2045 background condition, will continue to operate at acceptable levels of service, LOS D or better in the morning and evening peak hours. The exceptions are the signalized intersections of SR347/Papago Road, Amarillo Valley Road/Val Vista Road, Green Road/Papago Road and the all way stop at Green Road/Val Vista Road that are projected to operate with delay in the evening peak hour. As development occurs within the study area the intersection geometry will be improved which will reduce the delay.

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

The purpose of this section is to show the relations between traffic operations and roadway geometrics; identify needs pertaining to progressive traffic flow and safety; and identify alternatives for further consideration, where applicable.

Within the total traffic volumes figures, the proposed lane configurations are presented. Figure 22 illustrates the recommendations from this section for the ultimate buildout conditions.

Val Vista Road will be constructed as a principal arterial with 75 feet of right of way, measured centerline to right of way line. In the future, if required, right of way should be reserved for an additional lane (3 lanes in each direction separated by a raised median) in each direction and associated deceleration lanes.

Green Road will be constructed as a minor arterial with 55 feet of right of way, measured centerline to right of way line.

The internal E-W collector road will be constructed as a major collector roadway with 80 feet of right of way, measured right of way line to right of way line. With the buildout of the development, the E-W Collector Roadway will traverse from Green Road to SR347 and provide connectivity throughout the development.

A. Accessibility to Sunset Canyon Development

Access to the Sunset Canyon development is provided via SR347, Val Vista Road, and Green Road through a collector road network. The Sunset Canyon Development will have six accesses. Accesses A, C, D and E are located on Val Vista Road, Access B is located on SR 347 and Access F is located on Green Road. Because Arizona Department of Transportation (ADOT) owns and maintains SR347, Access B was analyzed in accordance with ADOT's Traffic Policies and Guidelines. Val Vista Road and Green Road are owned and maintained by Pinal County. Therefore, Accesses A, C, D, E and F were analyzed using Pinal County Traffic Engineering Guidelines.

- Access A is located on Val Vista Road and will be constructed and tie the E-W Collector Road to SR 347 at Access B. Access A is located approximately xx feet south of Access C and xx feet north of Access D. Access A/Val Vista Road is planned as a full movement intersection to be built with Phase I of the development. In the future, Access A/Val Vista Road may be signalized.
- Access B will be constructed as the E-W Collector Road into the Sunset Canyon residential single-family community and is located on SR 347. Access C is located approximately 1,735 feet north of the proposed Val Vista Road/SR347 intersection. Access B/SR 347 is planned as a full movement

intersection that will accommodate the residential development and eventually become signalized. Access B is planned for construction with Phase I of the development.

- Access C will be constructed as full access into the Sunset Canyon residential single-family community and is located on Val Vista Road approximately xx feet south of the existing Val Vista Road alignment and xx feet north of the E-W Collector Road. Access C/Val Vista Road is planned as a full movement intersection to be built with Phase I of development.
- Access D will be constructed as full access into the Sunset Canyon residential single-family community and is located on Val Vista Road approximately xx feet south of the E-W Collector Road and xx feet north of the Val Vista Road/SR 347 intersection. Access D/Val Vista Road is planned as a full movement intersection to be built with Phase I of development.
- Access E will align with Access A and be constructed as the west leg of the intersection. This intersection is planned to be constructed with Phase II of development and will be signalized when the warrants are met.
- Access F is located on Green Road and will be constructed to tie the E-W Collector Road to Val Vista Road at Access E. Access F will provide full turning movements into the development and is located approximately 1,890 feet south of Val Vista Road.

Site Accesses A, C, D, E and F should be designed per Pinal County Subdivision & Infrastructure Design Manual. Per the Pinal County Access Management Manual Final Report dated February 2017, driveway spacing criteria per Table 1 (Access Management Manual) is met for the County accesses proposed.

B. Auxiliary Lane Analyses

B.1. Right Turn Lane Warrants

Per Pinal County Traffic Impact Assessment Guidelines & Procedures dated January 2007, right-turn lanes are warranted based on the right lane warrant chart which incorporates the right turn volume, the design hourly volume of the roadway and the posted speed. Therefore, exclusive right turn lanes are recommended in the following locations:

Northbound on Val Vista Road at Access D
Northbound on Val Vista Road at Access A
Northbound on Val Vista Road at Access C
Southbound on Val Vista Road at Access E
Eastbound on E-W Collector Road at Val Vista Road
Westbound on E-W Collector Road at Val Vista Road
Northbound on Green Road at Access F
Northbound on Green Road at Val Vista Road

Because ADOT controls and maintains the intersections of SR347/Val Vista Road and SR347/Access B, *ADOT Traffic Guidelines and Processes Section 245 – Turn Lane Warrants* were used to determine the need for right turn lanes per the Right Turn Lane Warrants Table on Page 245-1. Given the volume of right turning traffic at the accesses, right turn lanes are required at the following locations:

Southbound on SR347 at Access B
Southbound on SR347 at Val Vista Road

B.2. Right Lane Queue and Storage Length Analysis
Per *Section 5.12 Queuing Analysis* of the Pinal County Traffic Impact Assessment Guidelines & Procedures dated January 2007, desirable storage lengths for right turn lanes on arterials and major collectors were calculated per Pinal County requirements. The queuing analysis was conducted for all turn lanes under signal control using the methodology presented by the County.

For right turn lanes, the storage is calculated as the number of vehicles that arrive in a two-minute period. The average vehicle length is assumed to be 25 feet per vehicle.

Per *ADOT Traffic Engineering Guidelines and Processes Section 430 Turn Lane Design* the desirable storage lengths for the study intersections on SR347 and the accesses were calculated.

Table 14 presents the calculated desirable queue lengths and recommended storage lane lengths for the right turn deceleration lanes at the study intersections and site accesses.

Table 14: Right Turn Lane Analysis

Location		Turn Volume 2045	Calculated Queue (feet)	Desirable Braking Distance (feet)	Recommended Storage (feet)	Taper (feet)
On	At					
Pinal County Methodology – Section 5.12 Queuing Analysis						
Val Vista Road	Access D	NB Right: 66	55	-	125	120
Val Vista Road	Access A	NB Right: 55	45	-	125	120
Val Vista Road	Access C	NB Right: 46	38	-	125	120
Val Vista Road	Access E	SB Right: 62	52	-	125	120
E-W Collector	Val Vista Road	WB Right: 49	41	-	125	120
E-W Collector	Val Vista Road	EB Right: 55	45	-	125	120
Green Road	Access F	NB Right: 98	82	-	125	120
Green Road	Val Vista Road	NB Right: 35	29	-	125	120
*ADOT Methodology – Section 430 Turn Lane Design**						
SR347 (65 mph)	Val Vista Road	SB Right: 457*	85	415	500**	140
SR347 (65 mph)	Access B	SB Right: 140*	26	415	450**	140

**Storage calculated based on signalization with C = 90 sec with 0.7 g/C on the minor leg and demand of 1.5*
***Additional TIAs should be performed when the as the site develops for turn lane lengths. Continuous right turn deceleration lanes may be warranted between the accesses on SR347, depending upon ultimate storage.*

B.3. Left Turn Lane Warrants

Per Pinal County Traffic Impact Assessment Guidelines & Procedures dated January 2007, left-turn lanes are warranted based on the left lane warrant chart which incorporates the left turn volume, the design hourly volume of the roadway and the posted speed. Exclusive left turn lanes are recommended in the following locations:

Southbound on Val Vista Road at Access D
Northbound on Val Vista Road at Access E
Southbound on Val Vista Road at Access A
Eastbound on E-W Collector at Val Vista Road
Westbound on E-W Collector at Val Vista Road
Southbound on Val Vista Road at Access C
Southbound on Green Road at Access F
Westbound on Val Vista Road at Green Road

Because ADOT controls and maintains the intersections of SR347/Val Vista Road and SR347/Access C, *ADOT Traffic Guidelines and Processes Section 245 – Turn Lane Warrants* were used to determine the need for exclusive left turn lanes per the Left Turn Lane Warrants Table on Page 245-2. Given the volume of left turning traffic at the three accesses, left turn lanes are required at the following locations:

Northbound on SR347 at Access B

B.4. Left Lane Queue and Storage Length Analysis
Per *Section 5.12 Queuing Analysis* of the Pinal County Traffic Impact Assessment Guidelines & Procedures dated January 2007, desirable storage lengths for left turn lanes on arterials and major collectors were calculated per Pinal County requirements. The queuing analysis was conducted for all turn lanes under stop or signal control using the methodology presented by the County.

Per *ADOT Traffic Engineering Guidelines and Processes Section 430 Turn Lane Design* the desirable storage lengths for SR347 and the accesses were calculated.

Table 15 presents the calculated desirable queue lengths and recommended storage lane lengths for the left turn deceleration lanes at the study intersections and site accesses.

Southbound on Val Vista Road at Access D
Northbound on Val Vista Road at Access E
Southbound on Val Vista Road at Access A
Eastbound on E-W Collector at Val Vista Road
Westbound on E-W Collector at Val Vista Road
Southbound on Val Vista Road at Access C
Southbound on Green Road at Access F
Westbound on Val Vista Road at Green Road

Table 15: Left Turn Lane Analysis

Location		Turn Volume	Calculated Queue (feet)	Desirable Braking Distance (feet)	Recommended Storage (feet)	Gap (feet)
On	At					
Pinal County Methodology – Section 5.12 Queuing Analysis						
Val Vista Road	Access D	SB Left: 11	14	-	125	90
Val Vista Road	Access E	NB Left: 195	243	-	250	90
Val Vista Road	Access A	SB Left: 11	14	-	125	90
E-W Collector	Val Vista Road	EB Left: 55	69	-	125	90
E-W Collector	Val Vista Road	WB Left: 49	62	-	125	90
Val Vista Road	Access C	SB Left:11	14	-	125	90
Green Road	Access F	SB Left:118	147	-	150	90
Val Vista Road	Green Road	WB Left:35	44	-	125	90
E-W Collector	Green Road	WB Left:90	113	-	125	90
ADOT Methodology - Section 430 Turn Lane Design						
SR347 (65 mph)	Access B	NB Left: 118	73	415	500	140

The taper for left turn lanes is based on the width of the transition x speed. For all tapers on SR347, the minimum is based on a 12-foot lane and a speed of 65 mph. If the taper is symmetrical, then a taper length of 390 feet will be required. Actual taper lengths shall be calculated when the civil design/signing and striping plans are completed to determine actual tapers based on required lane shifts.

C. Traffic Signal Warrant Analysis

The 2009 *Manual on Uniform Traffic Control Devices* (MUTCD) was used as the primary tool to determine if a traffic signal is warranted at the intersections of SR347/Val Vista Road, SR347/Access B, Val Vista Road/Access A-E, Val Vista Road/Green Road and by full buildout.

There are nine specific signal warrants in the MUTCD; however, not all warrants are applicable to this study. The warrants used in this analysis include:

Warrant 1 – Eight-Hour Vehicular Volume
Warrant 2 – Four-Hour Vehicular Volume

Appendix C: Traffic Signal Warrant Analyses presents the results of the signal warrant analyses.

Warrant 1 – Eight-Hour Vehicular Volume

The Minimum Vehicular Volume, Condition A, is intended for application where the volume of intersecting traffic from a side street or driveway is the principal reason for considering installation of a traffic signal. In this condition, the warrant would be satisfied when, for each of any eight hours of an average day, the traffic volumes on the major and minor approach are equal to or exceeds specified limits located on *Table 4C-1 Warrant 1 Eight-Hour Vehicular Volume* in the *MUTCD 2009*.

The Interruption of Continuous Traffic, Condition B, is intended for application where the traffic volume on a major street is so heavy that the traffic on a minor intersection street or driveway has excessive delay or hazard in entering or crossing the major street. This warrant is met when, for each of any eight hours of an average day, the traffic volumes on the major and minor approach is equal to or exceeds specified limits located on *Table 4C-1 Warrant 1, Eight-Hour Vehicular Volume* in the *MUTCD 2009*.

Volume projections for the eight highest hours on an average day were determined by applying hourly adjustment factors calculated from the available peak hour turning movement count data.

Warrant 1 Results:
SR347/Val Vista Road - Warrant 1 is met for both Condition A and Condition B when Phase II is developed.
SR347/Access B - Warrant 1 is met for both Condition A and Condition B when Phase I is developed.
Val Vista Road/Access A & E - Warrant 1 is met for both Condition A and Condition B when Phase III is developed.
Val Vista Road/Green Road – Warrant 1 is met for Condition B when Phase III is developed.

Warrant 2 – Four-Hour Vehicular Volume
The four-hour vehicular volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. This warrant is satisfied when, for each of any four hours of an average day, plotted points representing vehicles per hour on the major street (total of both approaches) and the vehicles per hour on the minor street approach (one direction only) all fall above the appropriate curve located on *Figure 4C-2 Warrant 2, Four-Hour Vehicular Volume* in the *MUTCD 2009*.

Warrant 2 Results:
SR347/Val Vista Road - Warrant 2 is met when Phase II is developed.
SR347/Access B - Warrant 2 is met when Phase I is developed.
Val Vista Road/Access A & E - Warrant 2 is met when Phase III is developed.
Val Vista Road/Green Road - Warrant 2 is met when Phase III is developed.

Signal Warrant Summary
The traffic signal warrant analyses within this TIA are based on forecasted traffic volumes and conceptual land plans, site access, and assumed land uses.

The developer will complete traffic signal warrant analyses once actual development is realized to confirm traffic signal needs at the study intersections. The developer will commit to performing the signal warrant analyses using actual traffic counts prior to completion of the phase of development at the time it is expected traffic is estimated to meet the warrants as presented in the recommendations of this report.

The developer is responsible for the completion of the signal design plans when the signal warrants are met.

Developer is responsible for their proportional share of the signal costs based on the development:

SR347/Val Vista Road – 25%
SR347/Access B – 50%
Val Vista Road/Access A & E – 100%
Val Vista Road/Green Road – 25%

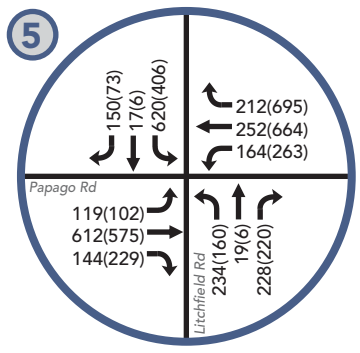
D. Intersection Sight Distance

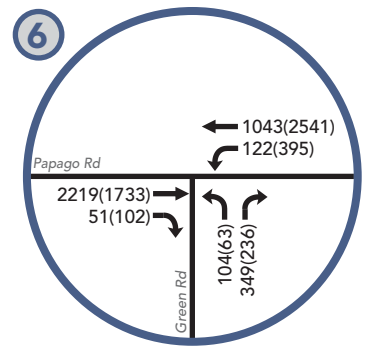
Proper intersection sight distance and sight triangles shall be provided and maintained at all site access driveways of the proposed development to give drivers exiting the site a clear view of oncoming traffic. The landscape and hardscape within the sight triangles must not obstruct the driver's view of the adjacent travel lanes. To ensure adequate sight distances and sight distance triangles are provided at the site access driveways per the most current edition of the American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets and the Pinal County TIA Guidelines.

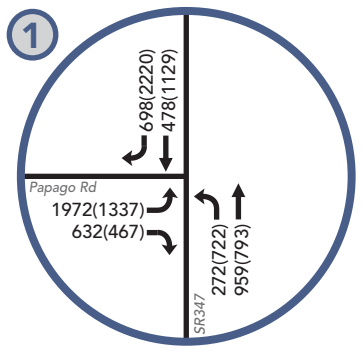
To ensure proper sight distance triangles are provided, design plans for landscape and hardscape shall include sight triangle provisions where needed prior to construction. Plans should not be approved that are exempt from these requirements.

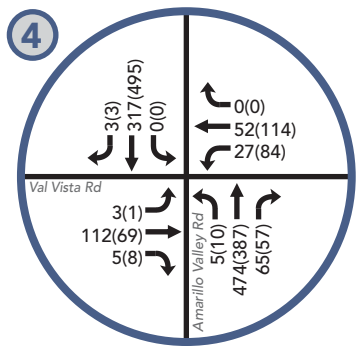
E. Total Traffic

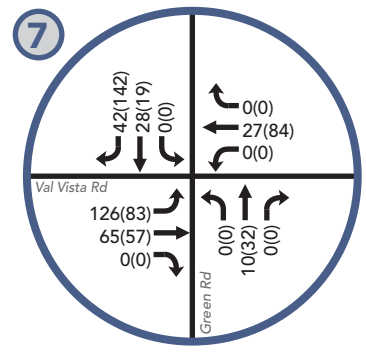
Total traffic projections for the horizon years were determined by adding the proposed development's site's generated traffic to the forecasted background traffic volumes for the corresponding phase. Figures 15 through 20 present the total traffic volumes during the morning and evening peak hours and the lane configurations that were modeled for each horizon year.

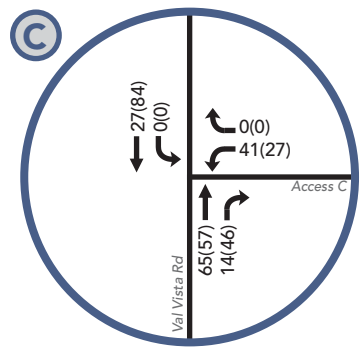


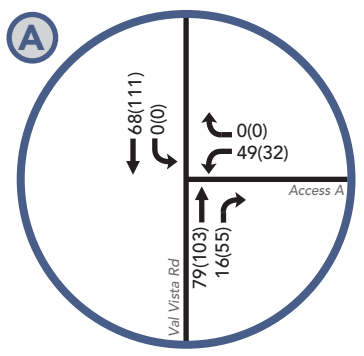


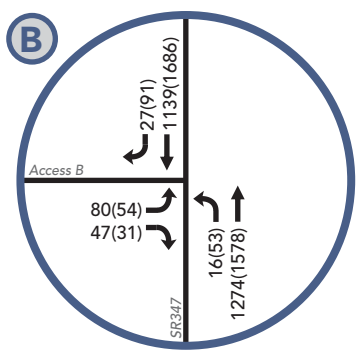


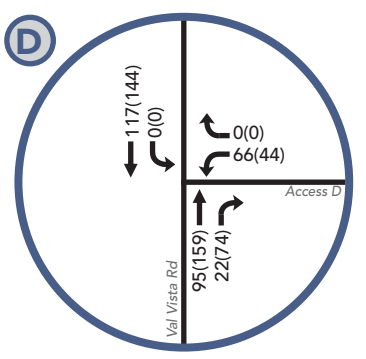


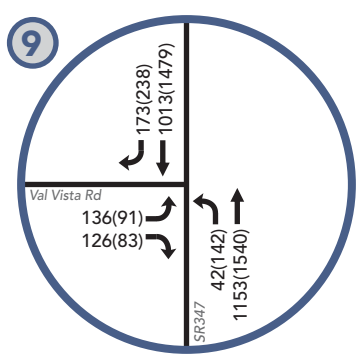


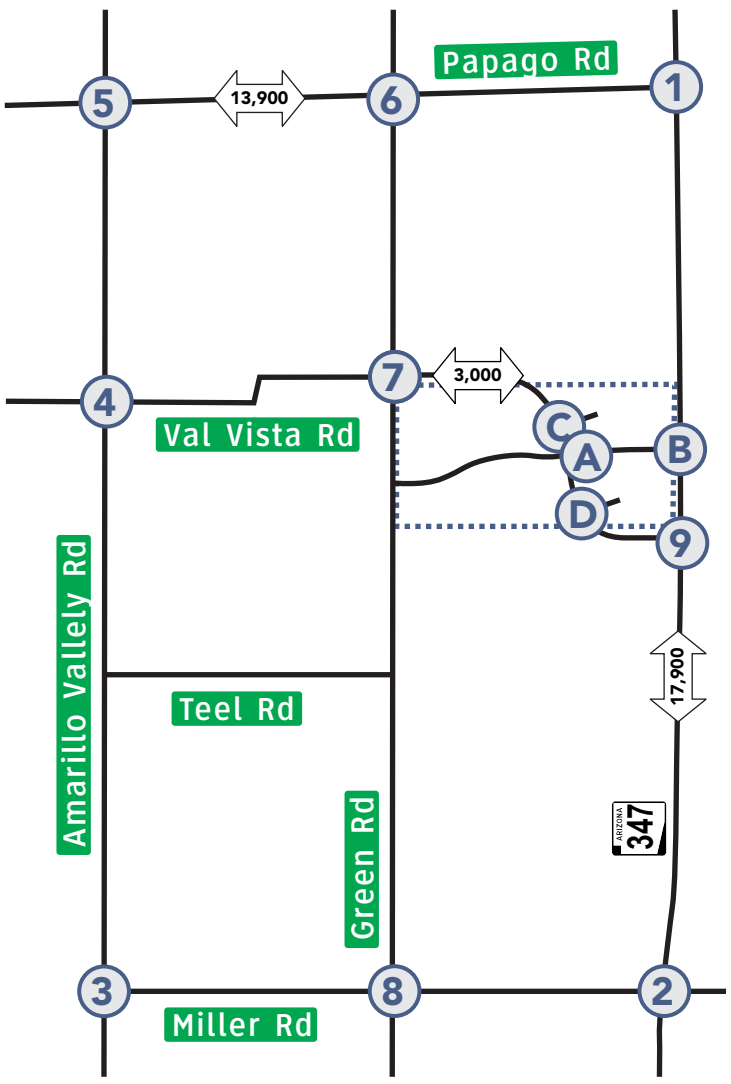


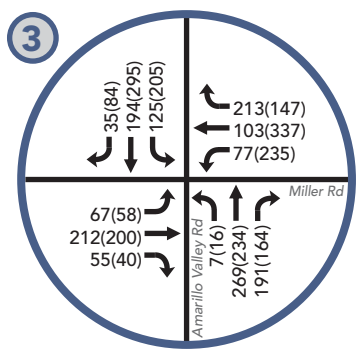


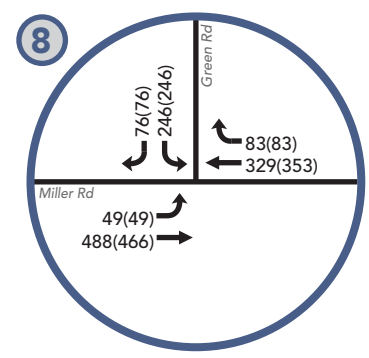


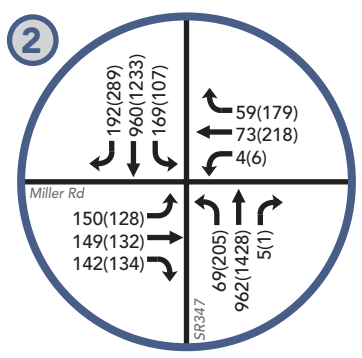












LEGEND

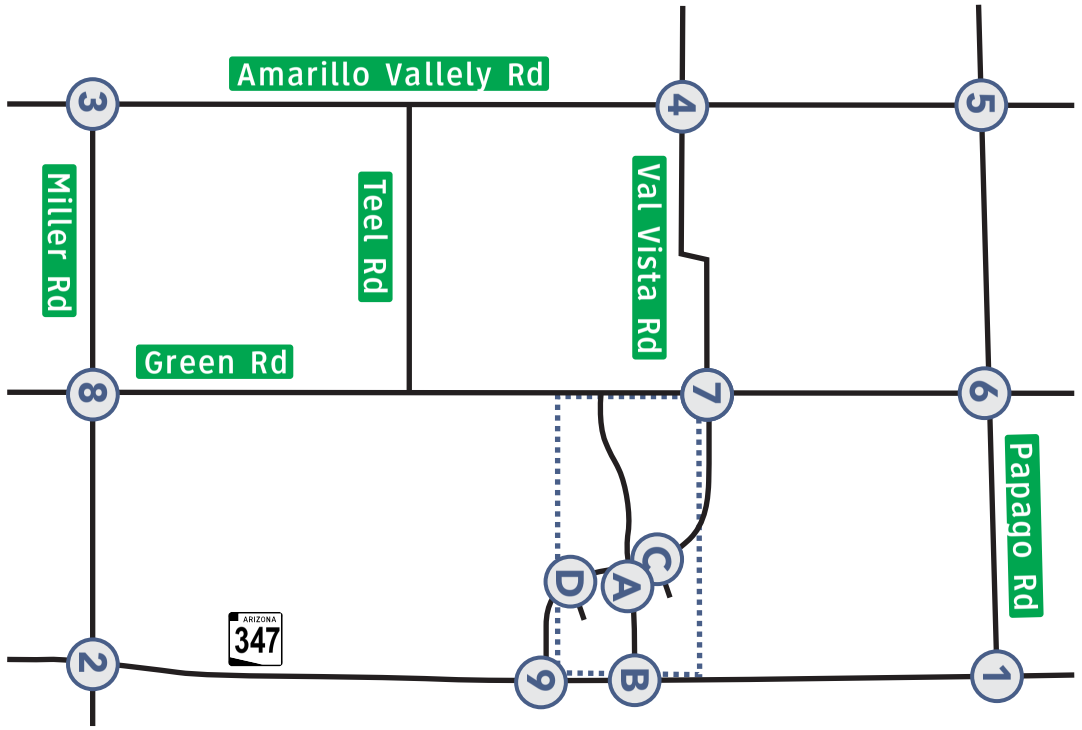
XX(XX) AM(PM) Peak Hour Traffic Volume

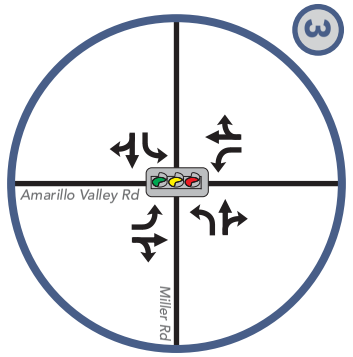
XXX Average Daily Traffic

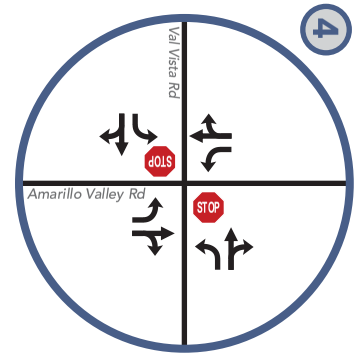
not to scale

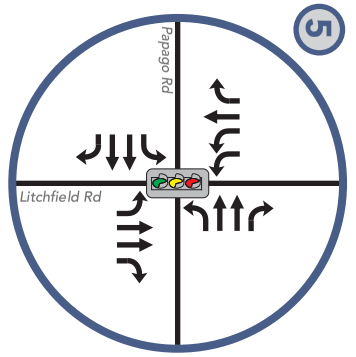
UCG
United Civil Group

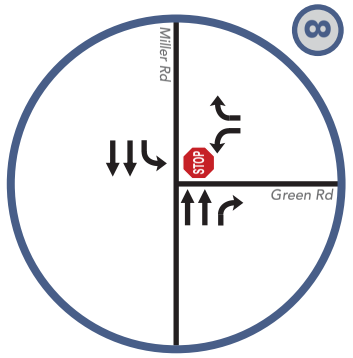
Figure 13a: Total Traffic - Year 2028

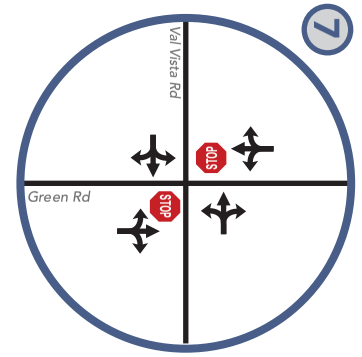


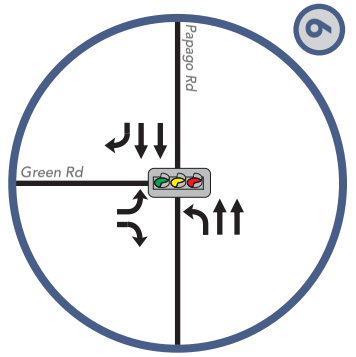


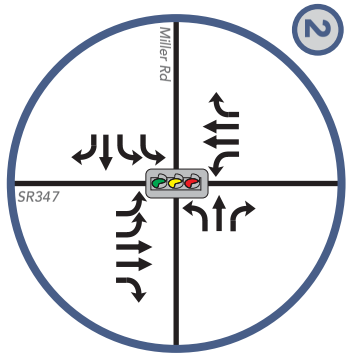


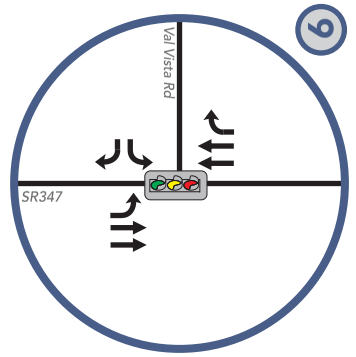


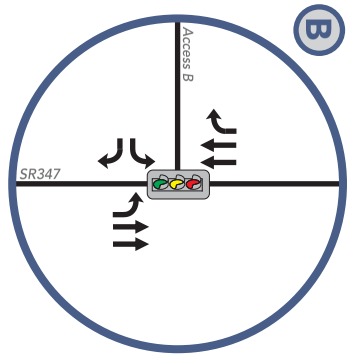


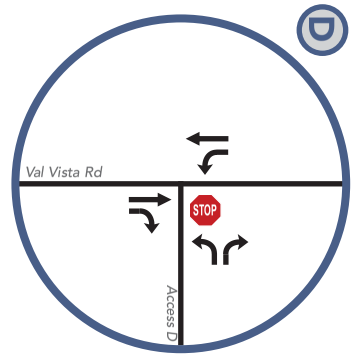


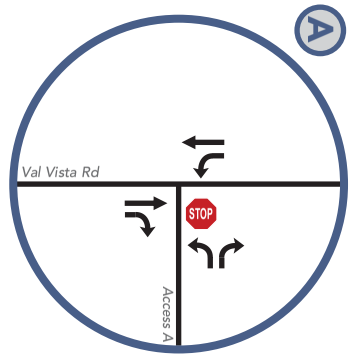


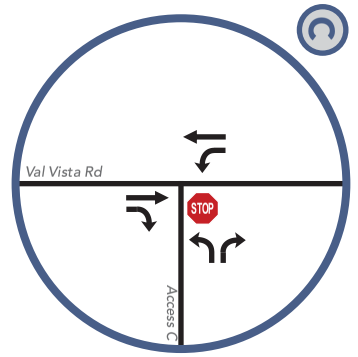


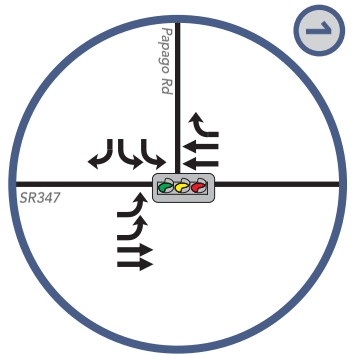








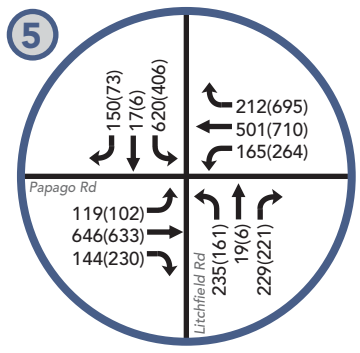


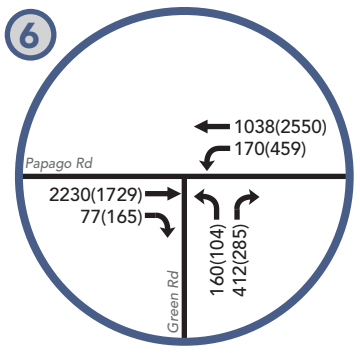


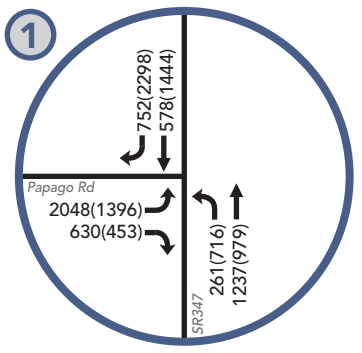
United Civil Group

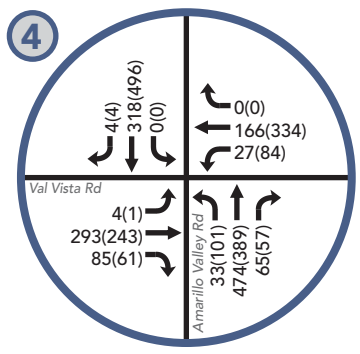
not to scale

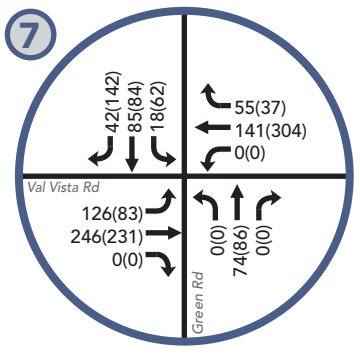
Figure 13b: Lane Configuration Background Traffic - Year 2028

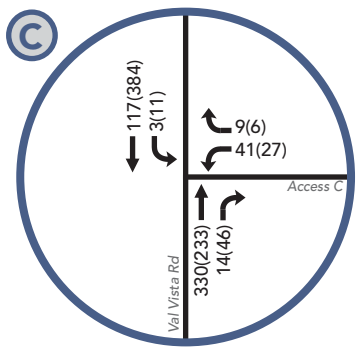


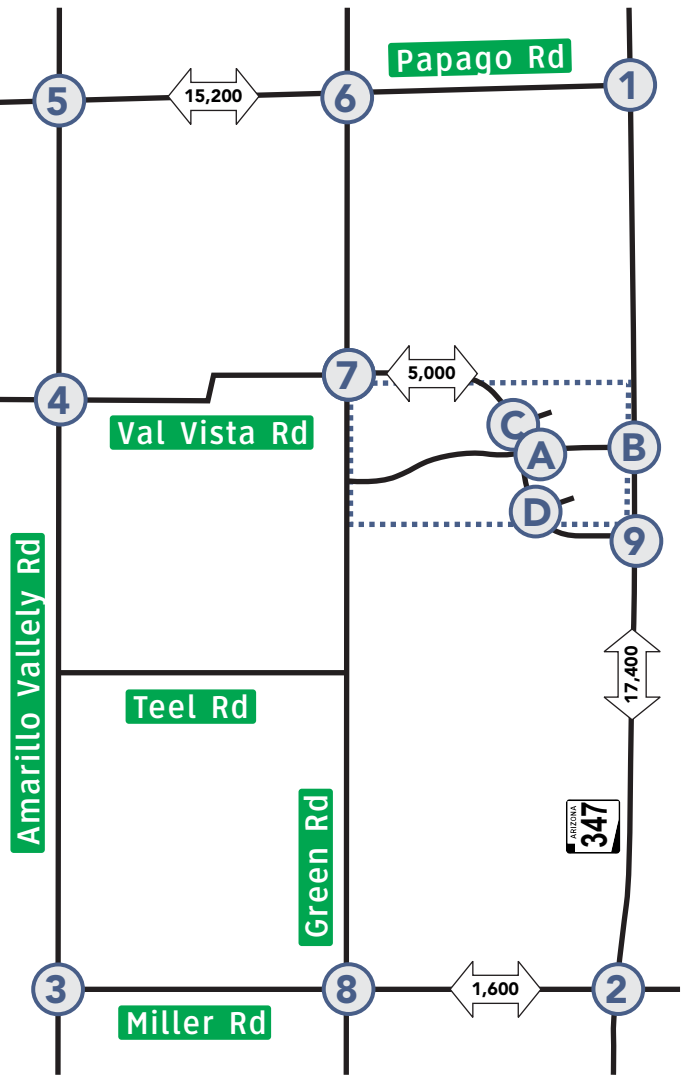


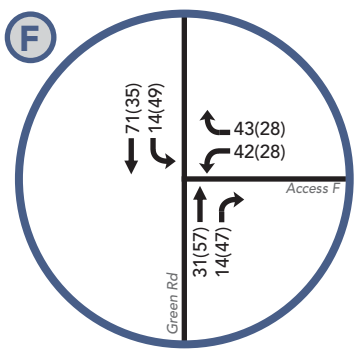


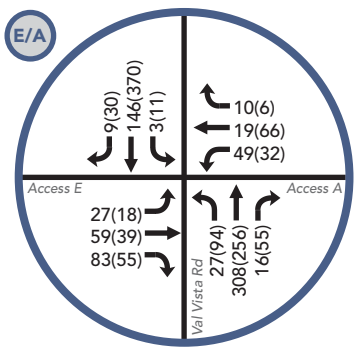


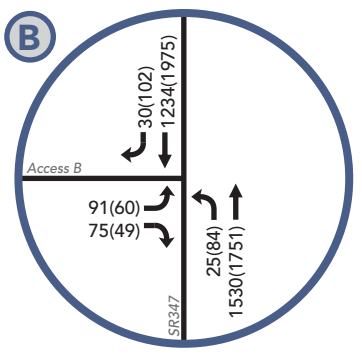


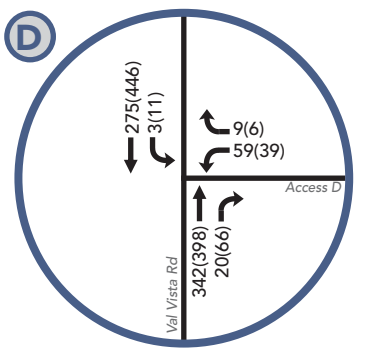


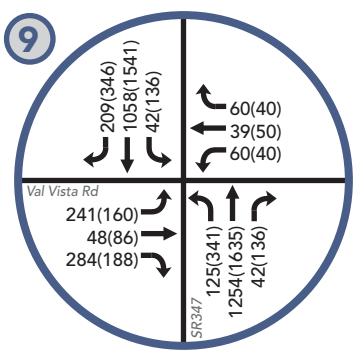


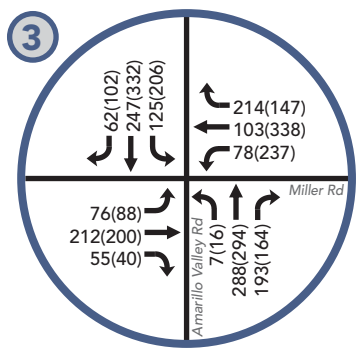


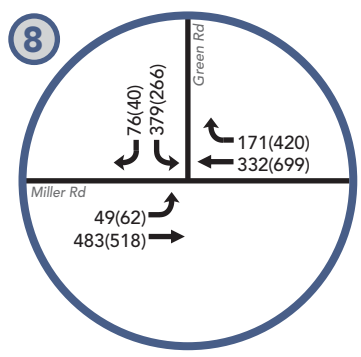


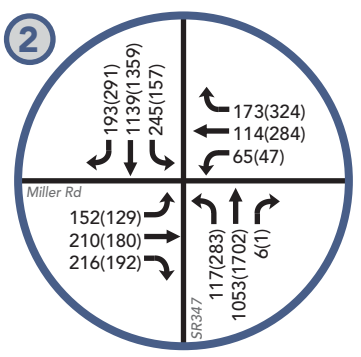












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

XXX Average Daily Traffic

not to scale

UCG
United Civil Group

Figure 14a: Total Traffic - Year 2032

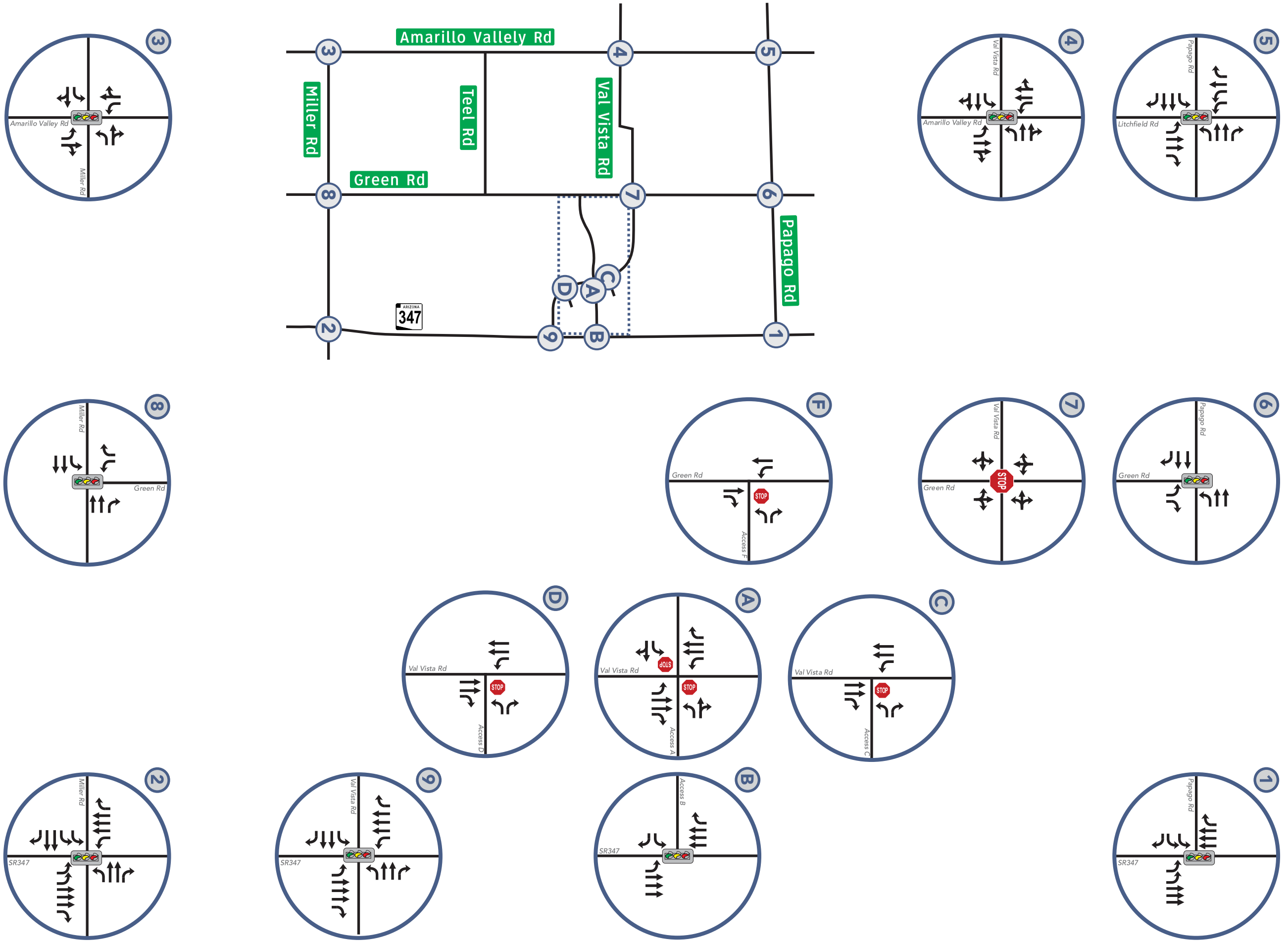
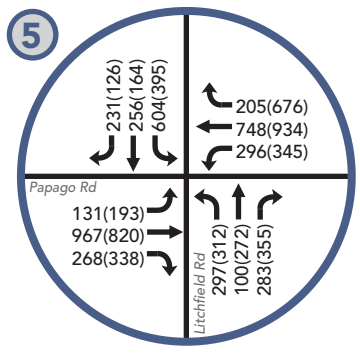
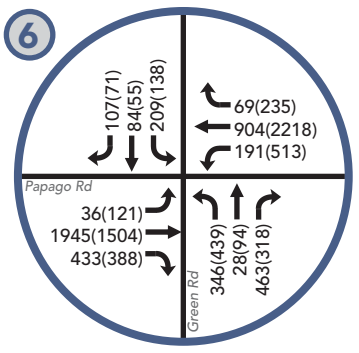
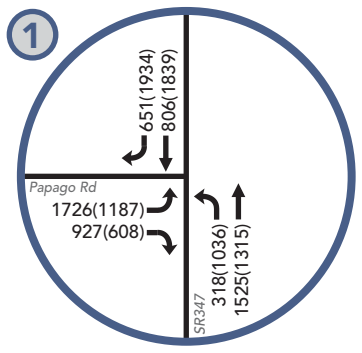
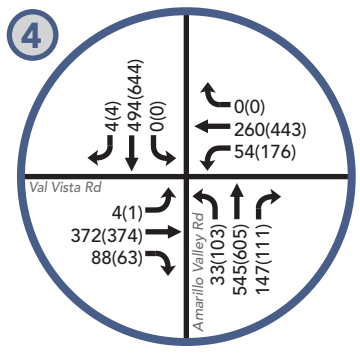


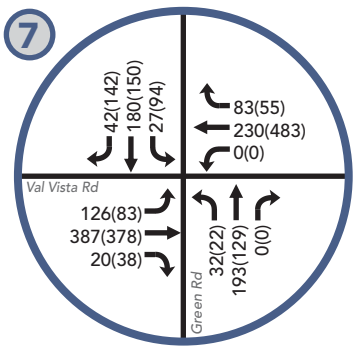
Figure 14b: Lane Configuration Background Traffic - Year 2032

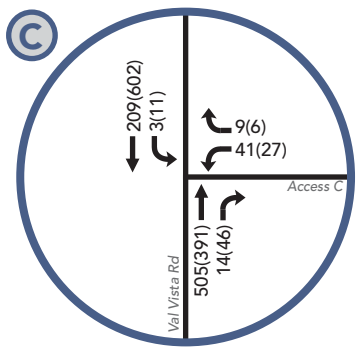


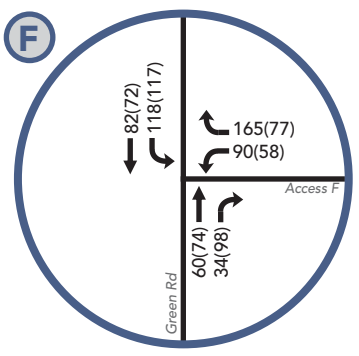


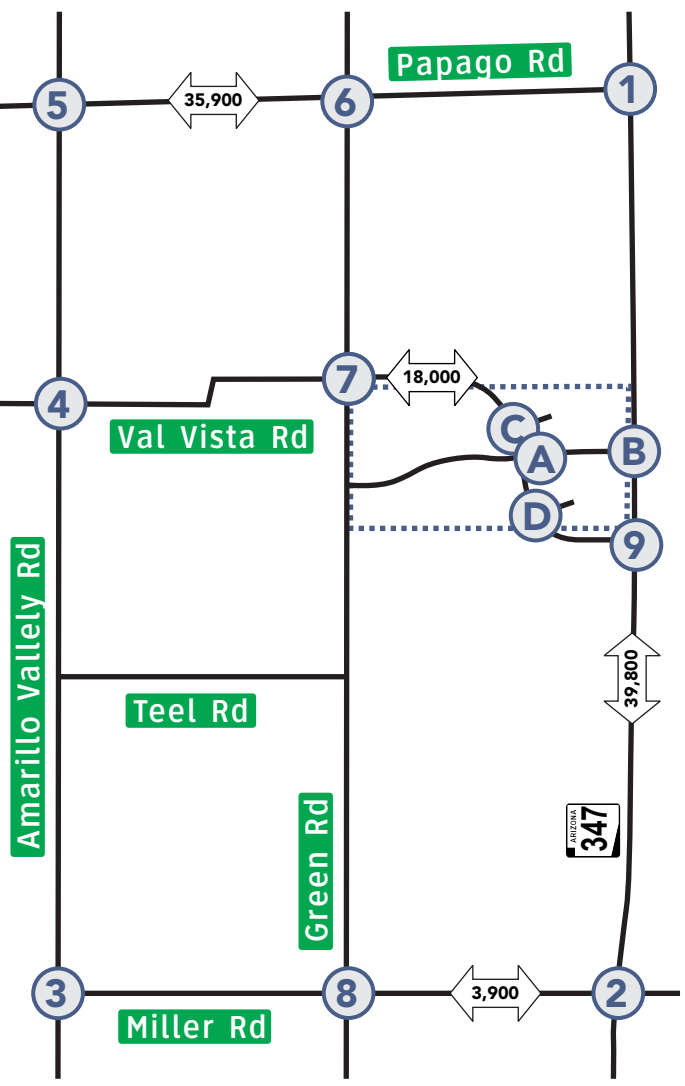


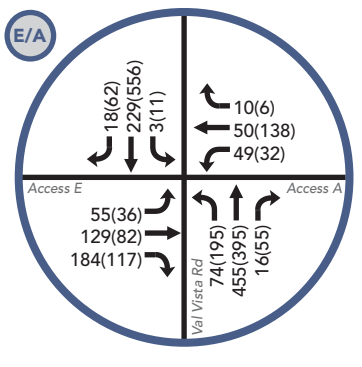


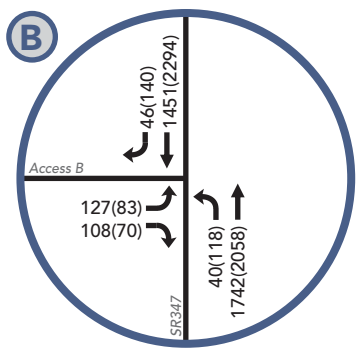


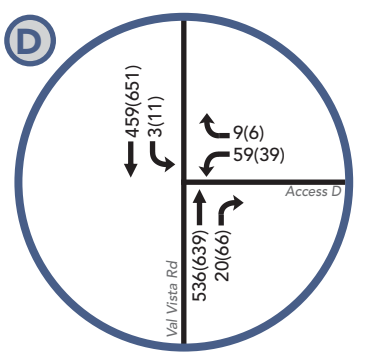


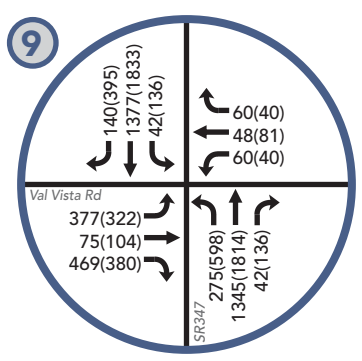


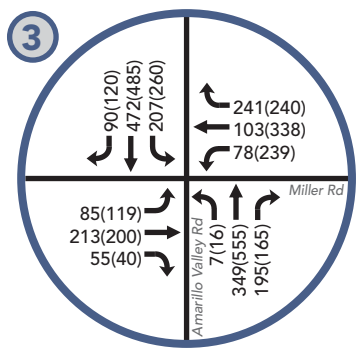


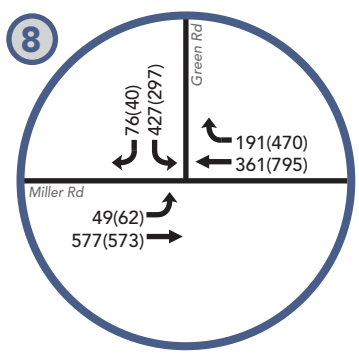


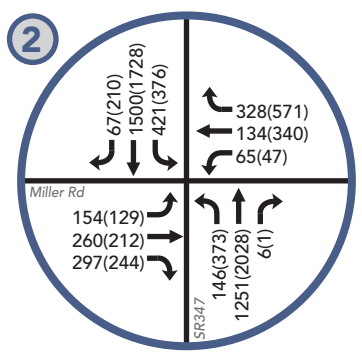








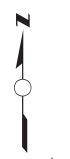




LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

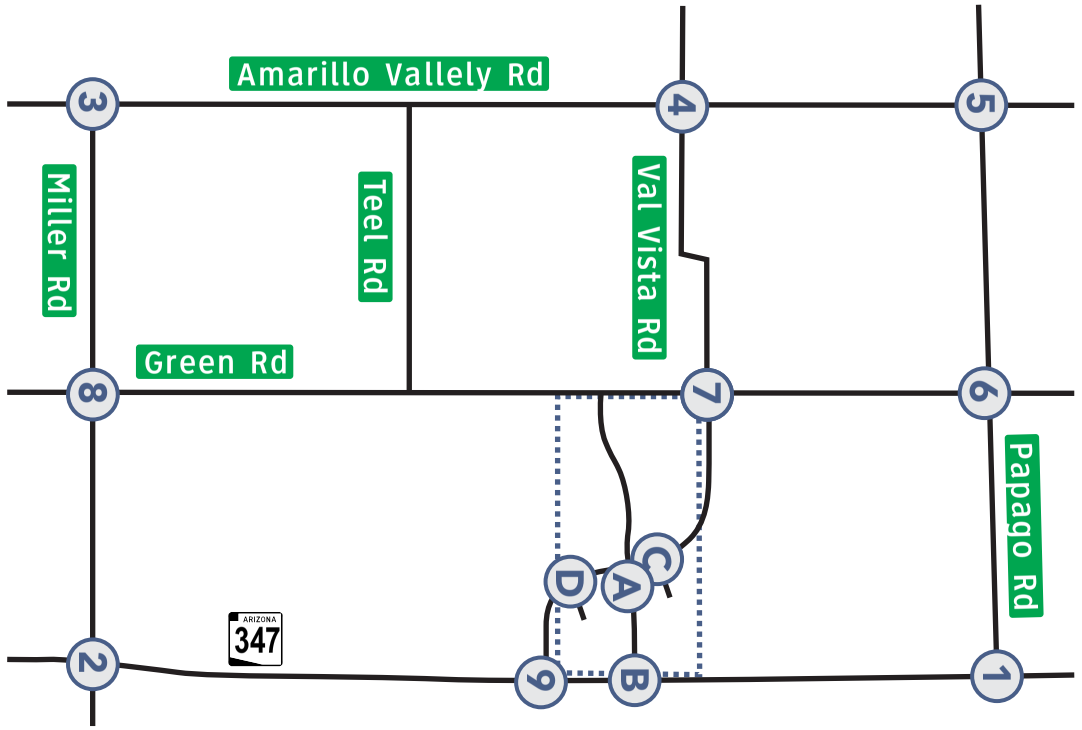
XXX Average Daily Traffic

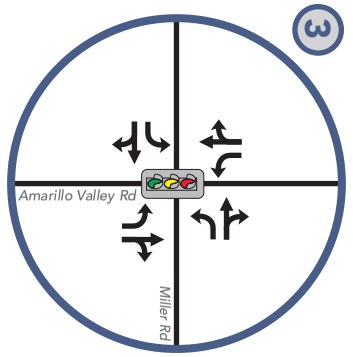


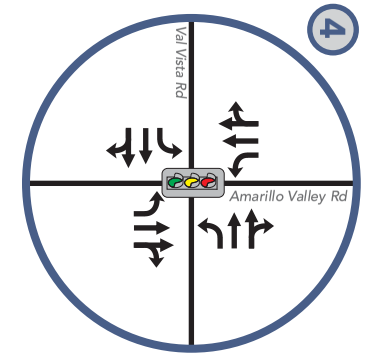
not to scale

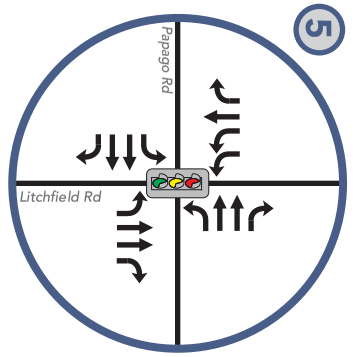
UCG
United Civil Group

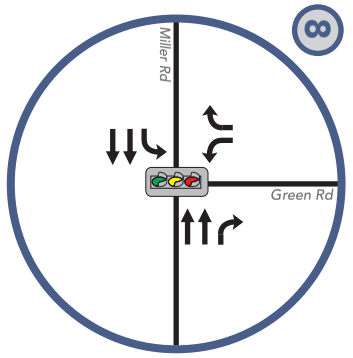
Figure 15a: Total Traffic - Year 2035

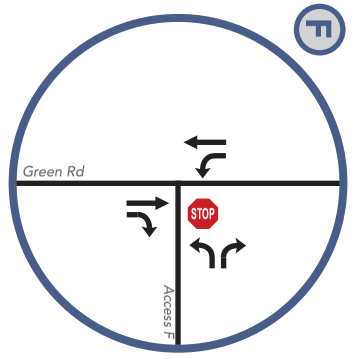


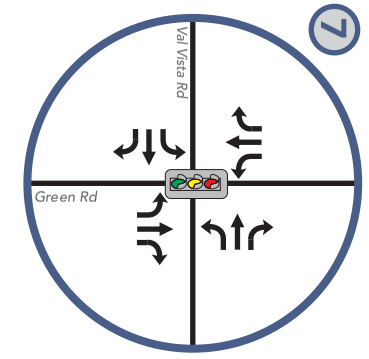


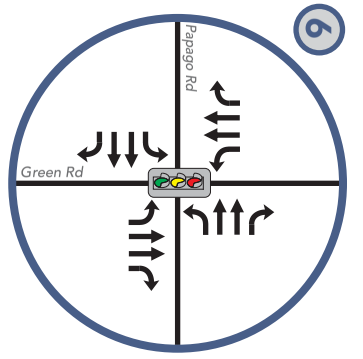


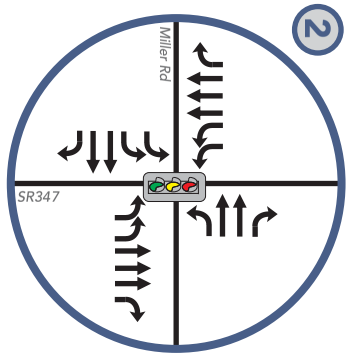


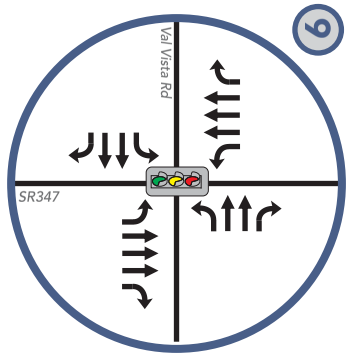


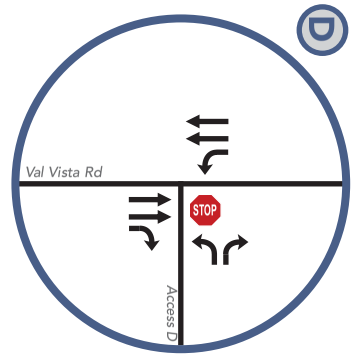




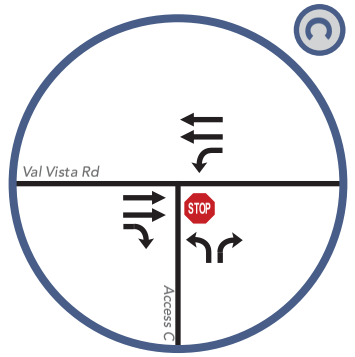


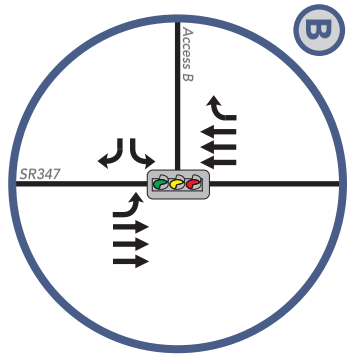


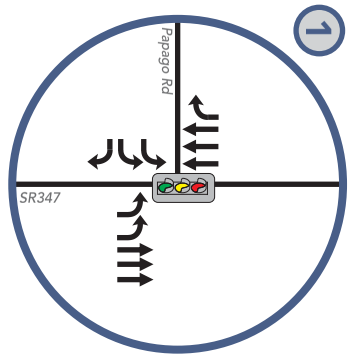








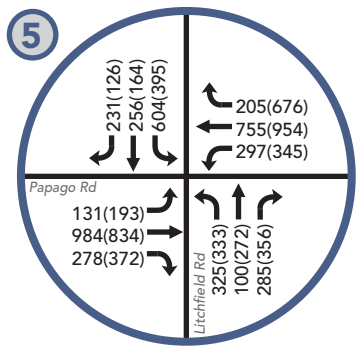


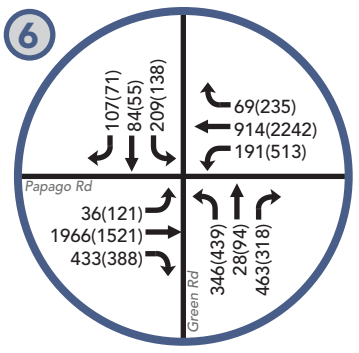


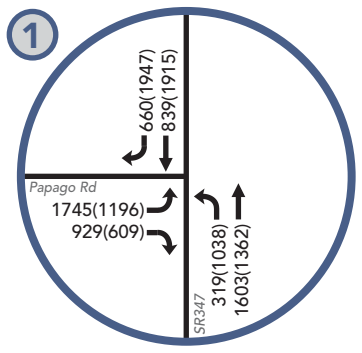
United Civil Group

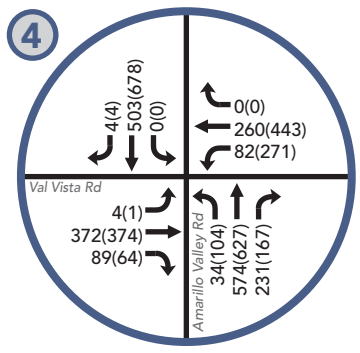
not to scale

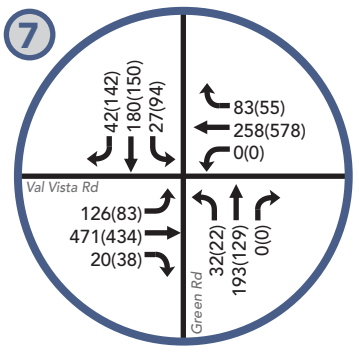
Figure 15b: Lane Configuration Background Traffic - Year 2035

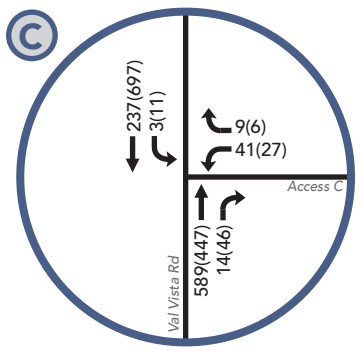


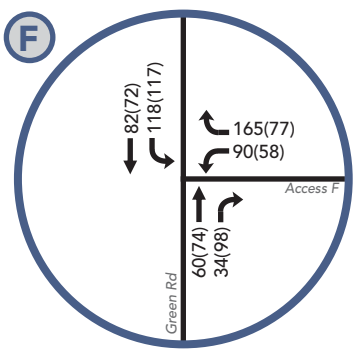


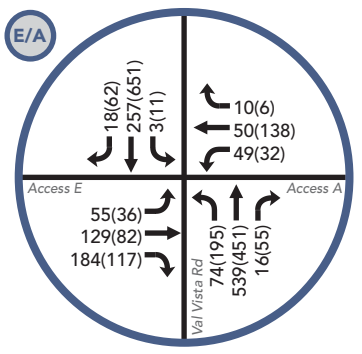


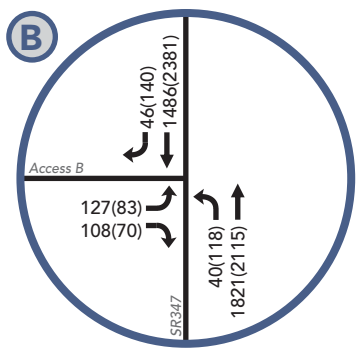


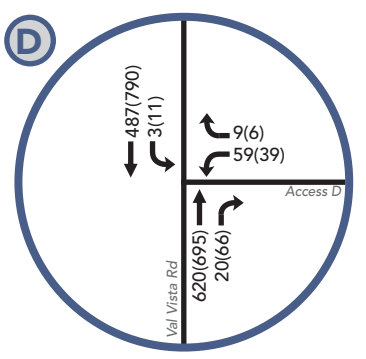


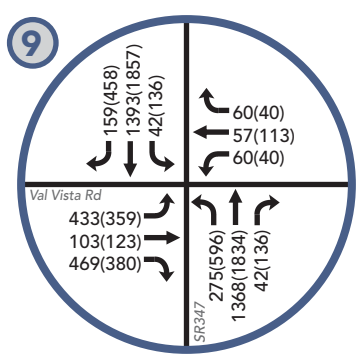


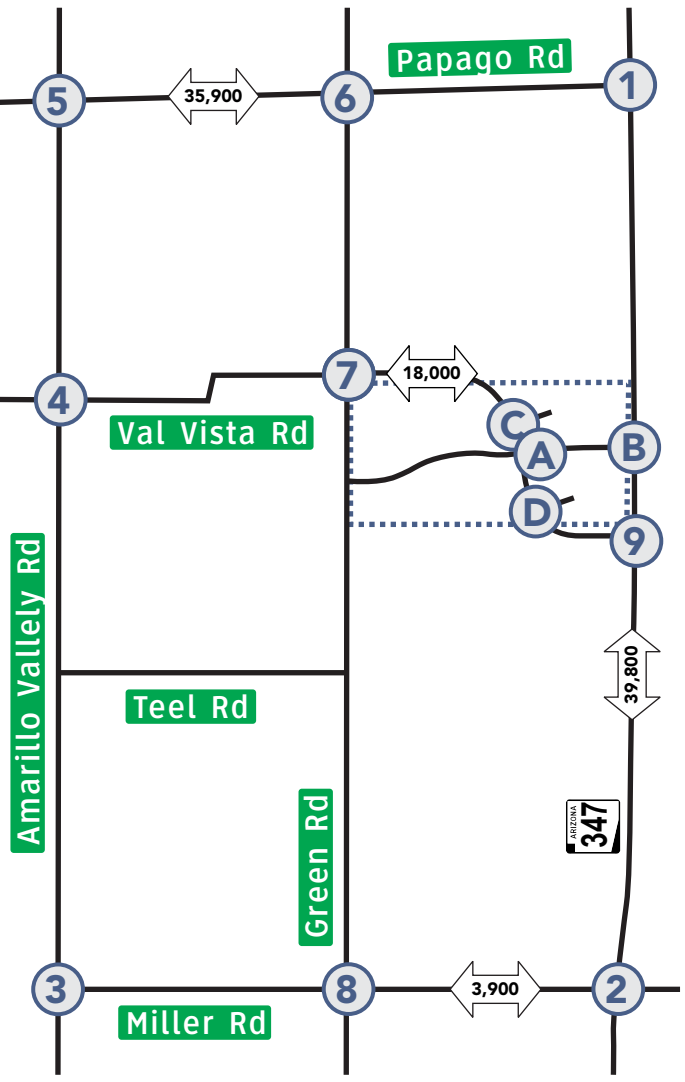


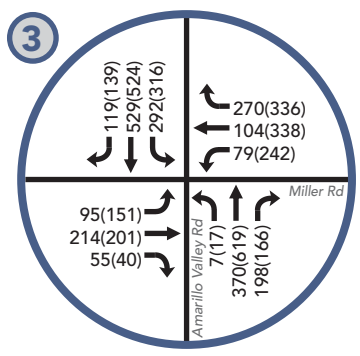


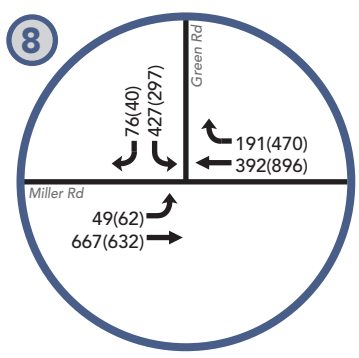


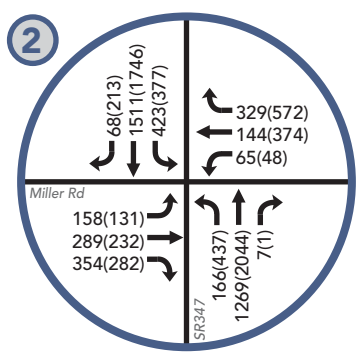












LEGEND

XX(XX) AM(PM) Peak Hour Traffic Volume

XXX Average Daily Traffic

not to scale

Figure 16a: Total Traffic - Year 2040

United Civil Group

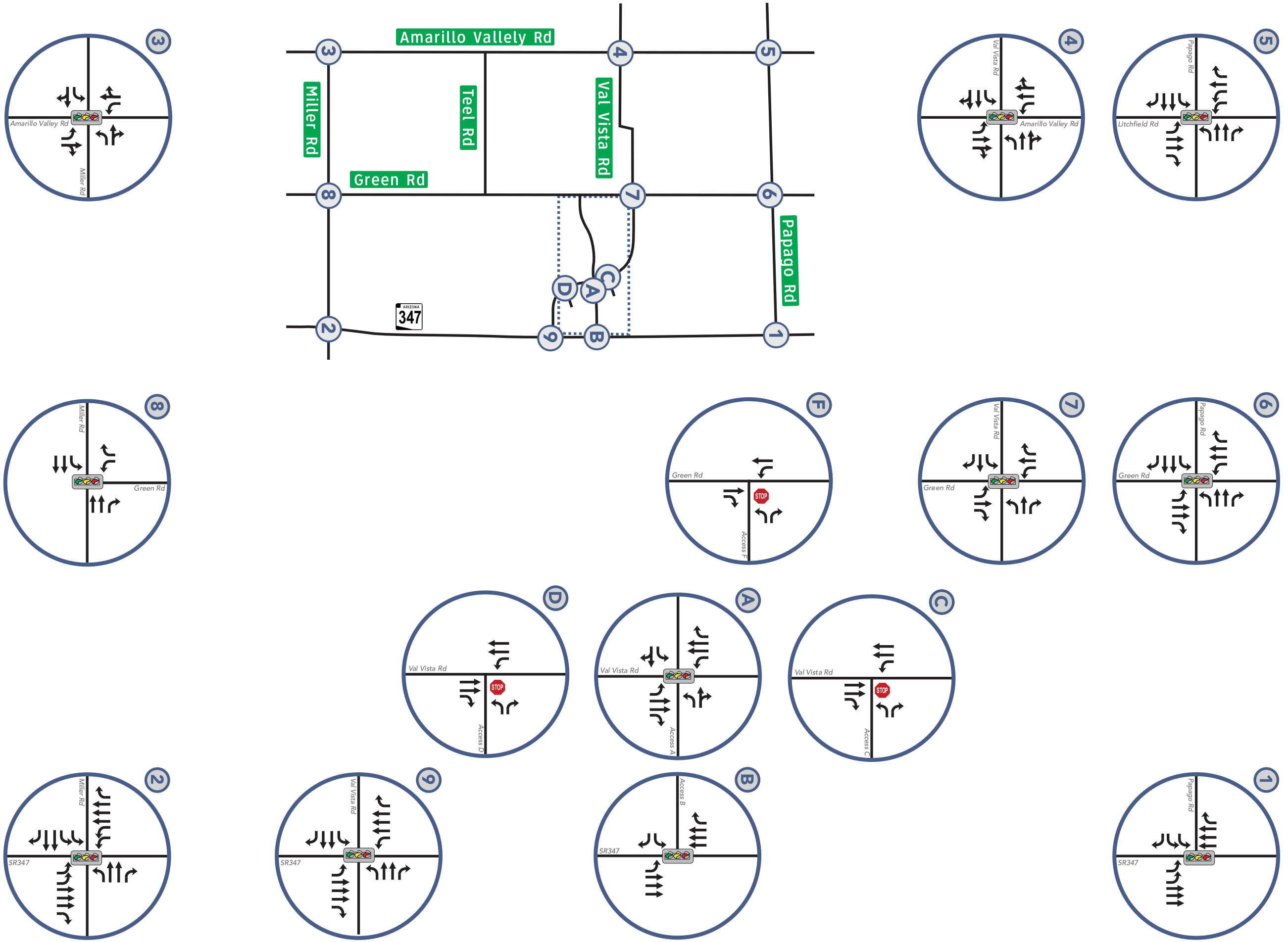
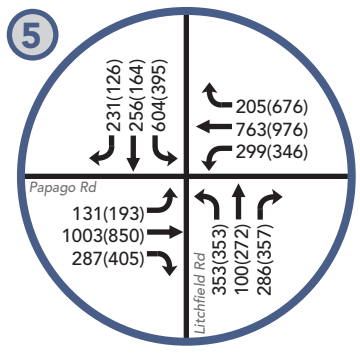
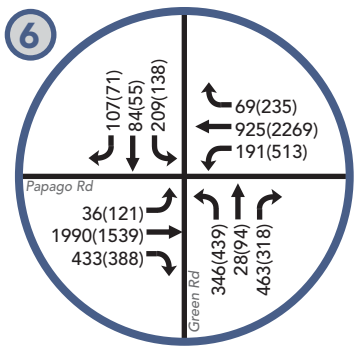
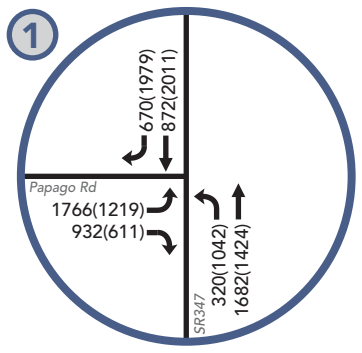
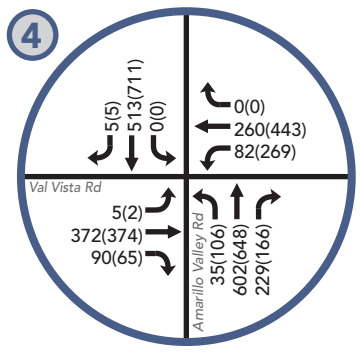


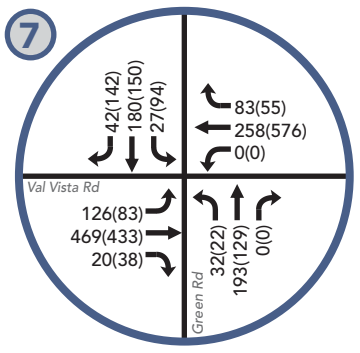
Figure 16b: Lane Configuration Background Traffic - Year 2040

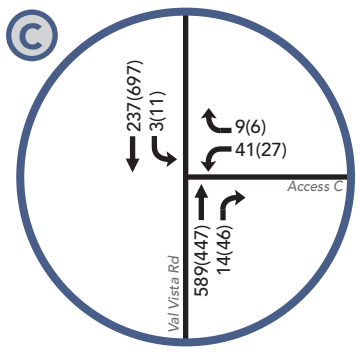


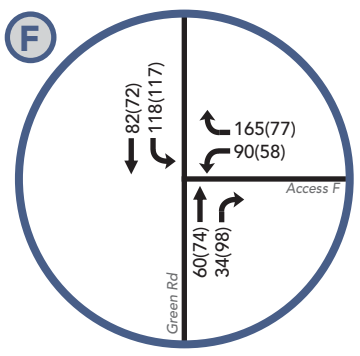


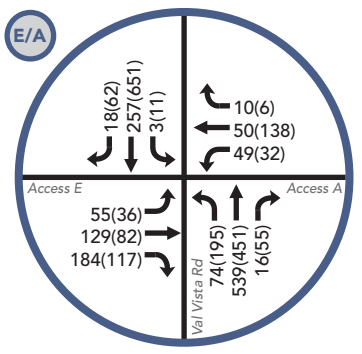


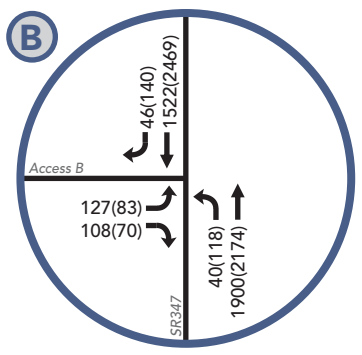


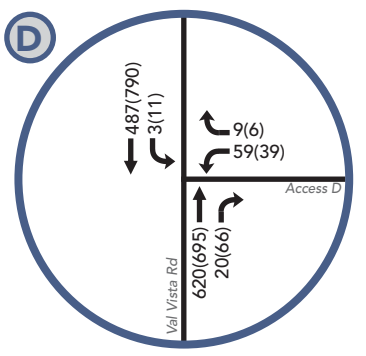


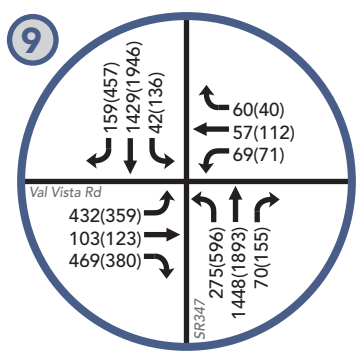


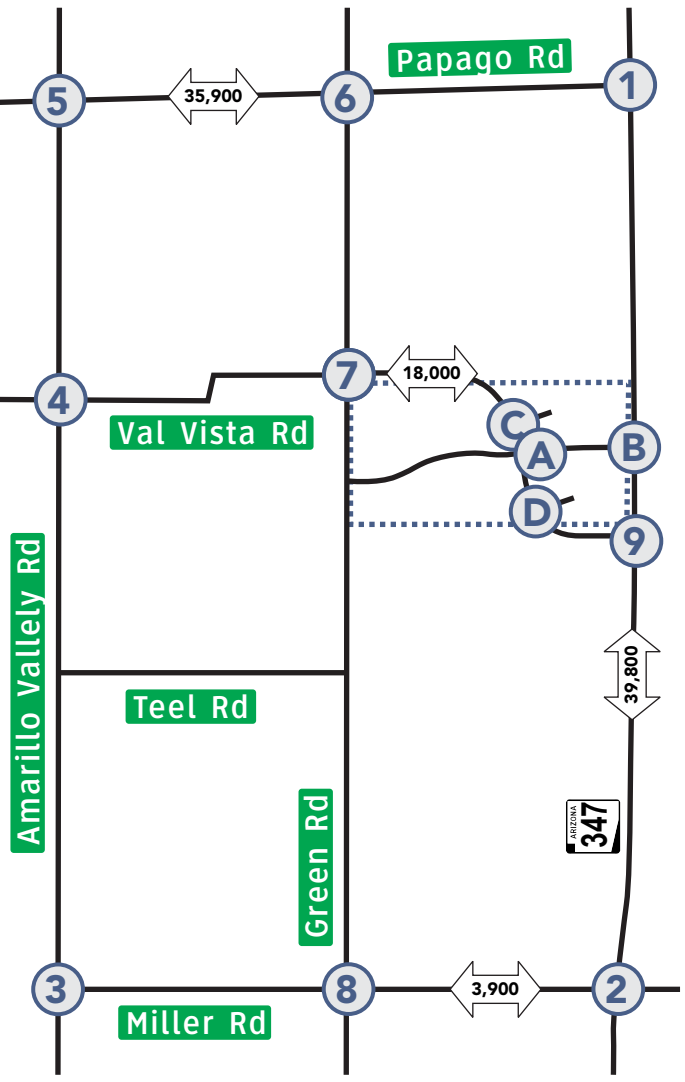


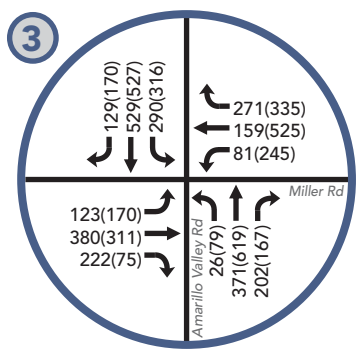


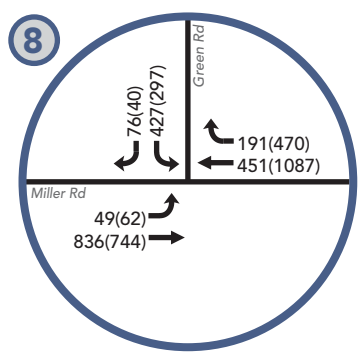


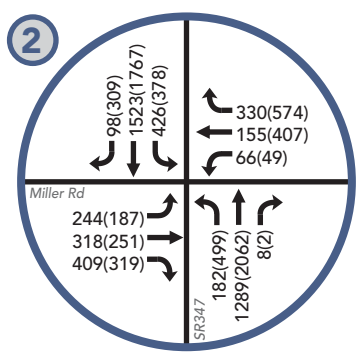












LEGEND

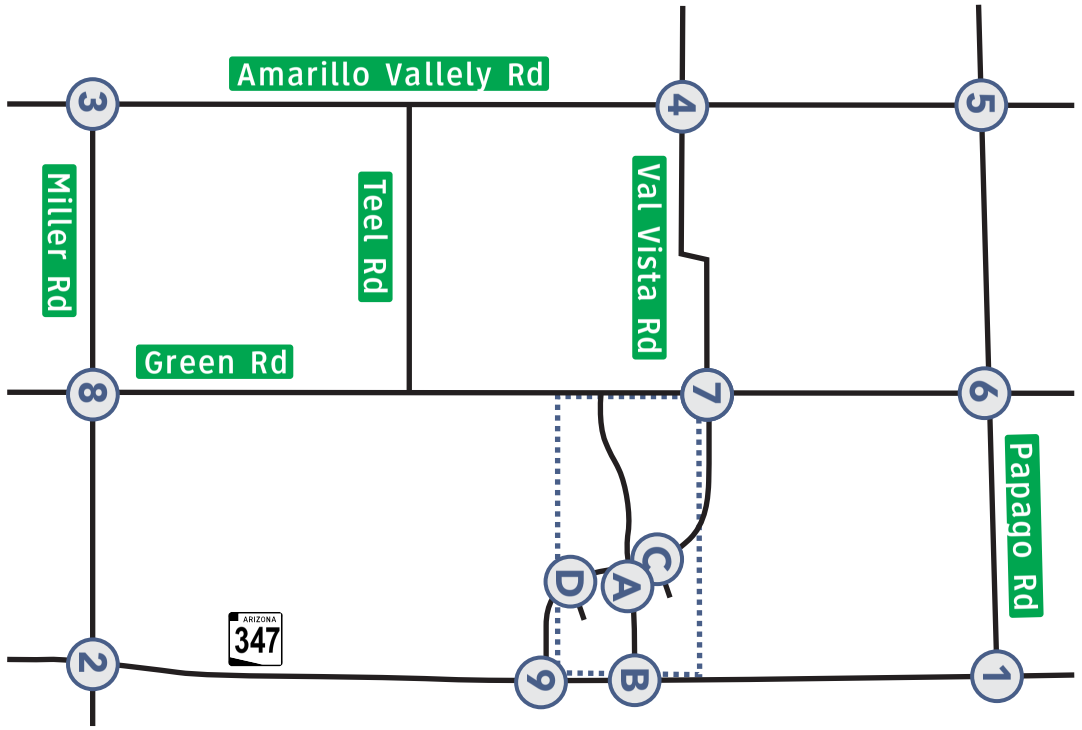
XX(XX) AM(PM) Peak Hour Traffic Volume

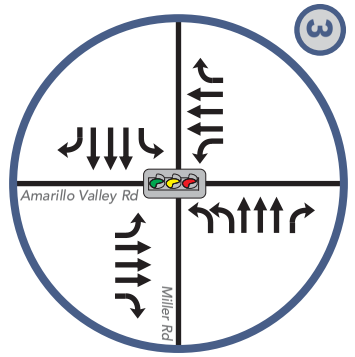
XXX Average Daily Traffic

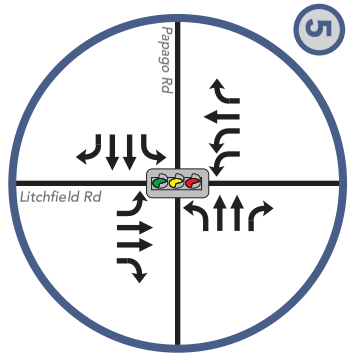
not to scale

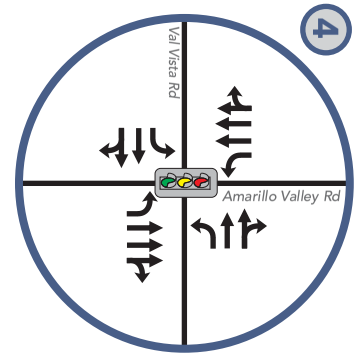
UCG
United Civil Group

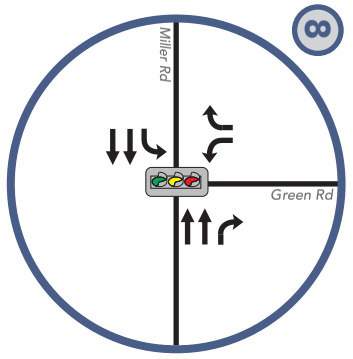
Figure 17a: Total Traffic - Year 2045

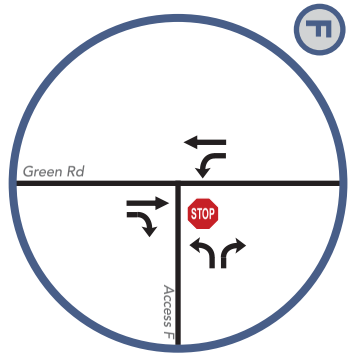


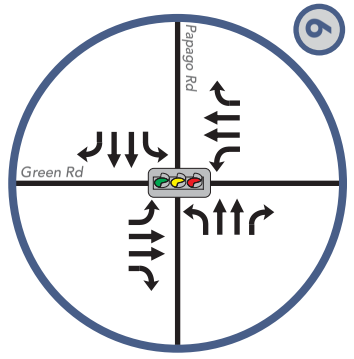


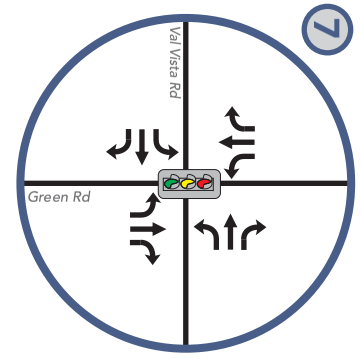


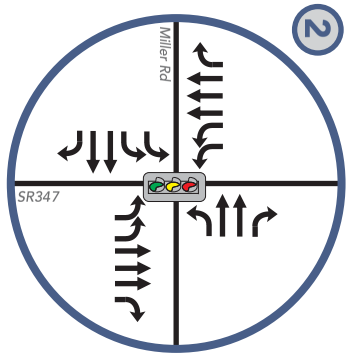


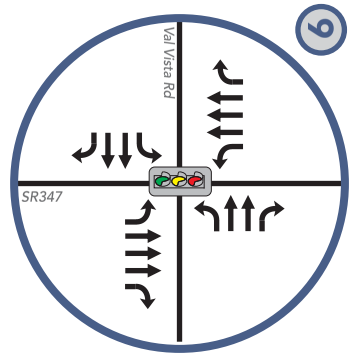


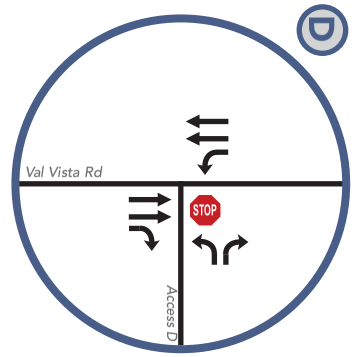




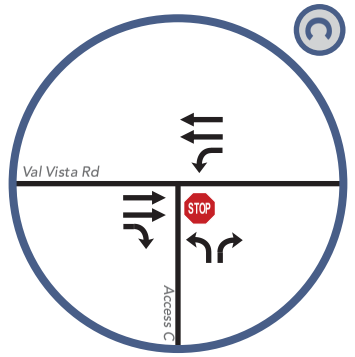


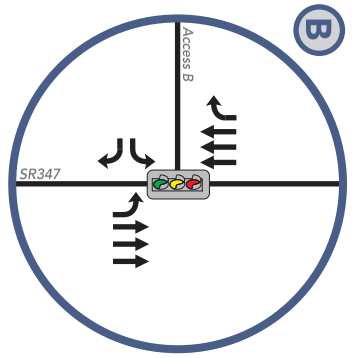


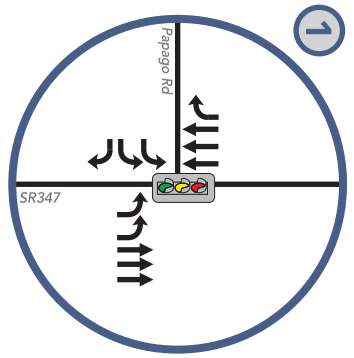












United Civil Group

not to scale

Figure 17b: Lane Configuration Background Traffic - Year 2045

Capacity analyses at the study area intersections and site access intersections were performed using the recommended geometric infrastructure and forecasted total traffic for each horizon year of the study.

Tables 16 through 21 on the following pages present the total levels of service utilizing the recommended improvements. Capacity analyses are in Appendix B.

By the first phase of development, it is assumed that the intersection of SR347/Val Vista Road is signalized.

Table 16: 2028 Total Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay/ LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	E	F	-	E	-	E	A	E	F	-	B	D	-	-	-	-	49.35 D
PM Peak Hour	F	B	-	E	-	F	A	F	F	-	C	F	-	-	-	-	92.11 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	C	B	C	D	B	B	C	D	D	D	D	D	D	D	D	27.64 C
PM Peak Hour	D	F	B	D	D	C	B	C	D	D	D	D	D	D	D	D	40.28 D
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	B	B	B	C	C	C	C	B	D	D	C	28.04 C
PM Peak Hour	B	D	D	D	C	C	C	C	B	C	C	C	B	C	C	C	30.74 C
Amarillo Valley Road/Val Visa Road – Two Way Stop Controlled																	
AM Peak Hour	A	A	A	A	-	A	A	A	C	D	C	D	E	C	-	D	29.76 D*
PM Peak Hour	A	A	A	A	-	A	A	A	E	D	C	D	F	E	-	E	47.23 E*
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	C	C	D	B	B	B	B	B	B	B	B	24.39 C
PM Peak Hour	C	D	D	C	D	C	C	D	A	B	B	B	B	B	B	B	20.48 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	-	F	E	-	-	-	-	-	C	A	C	C	A	-	A	21.88 C
PM Peak Hour	D	-	D	D	-	-	-	-	-	B	A	B	F	B	-	D	27.86 C
Green Road/Val Vista Road – Two Way Stop Controlled																	
AM Peak Hour	-	B	-	B	-	B	A	B	A	A	-	A	-	A	-	A	12.22 B*
PM Peak Hour	-	B	-	B	-	B	A	B	A	A	-	A	-	A	-	A	11.98 B*
Green Road/Miller Road – One Way Stop Controlled																	
AM Peak Hour	-	-	-	-	C	-	A	C	A	A	-	A	-	A	A	A	20.29 C*
PM Peak Hour	-	-	-	-	C	-	A	C	A	A	-	A	-	A	A	A	20.73 C*
SR347/Val Vista Road – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	8.76 A
PM Peak Hour	B	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	8.07 A
SR347/Access B – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	5.54 A
PM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	6.11 A
Val Vista Road/Access A – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	A	-	-	A	9.63 A*
PM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	A	-	-	A	10.00 A*
Val Vista Road/Access D – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	B	-	-	B	9.63 A*
PM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	B	-	-	B	10.84 B*

Val Vista Road/Access C – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	A	-	-	A	9.22 A*
PM Peak Hour	-	A	A	A	-	A	-	A	-	-	-	-	A	-	-	A	9.45 A*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

Using the projected total traffic volumes for 2028 and the improvements proposed, all the study intersections will operate at an acceptable LOS D or better after the first phase of the Sunset Canyon development is constructed and occupied ,except for the intersections of SR 347/Papago Road and Amarillo Valley Road/Val Vista Road which will operate with delay.

When the intersection of Amarillo Valley Road/Val Vista Road is signalized, then the delay will decrease to an acceptable LOS.

Delay will decrease at the intersection of SR 347/Papago Road when SR 347 is widened to three lanes in each direction through the intersection.

Table 17: 2032 Total Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay / LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	D	F	-	E	-	E	A	E	F	-	A	C	-	-	-	-	45.30 D
PM Peak Hour	F	B	-	D	-	F	A	E	F	-	C	E	-	-	-	-	62.47 E
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	D	B	B	B	D	B	B	B	D	C	D	D	E	C	D	D	24.11 C
PM Peak Hour	D	C	B	C	D	C	C	C	D	C	C	C	D	C	D	D	30.35 C
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	B	C	C	C	B	C	C	C	27.25 C
PM Peak Hour	B	D	D	D	C	C	C	C	B	C	C	C	B	D	D	C	31.58 C
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	B	C	C	C	A	C	C	C	B	C	C	C	B	C	C	B	22.15 C
PM Peak Hour	B	C	C	C	A	C	C	C	B	C	C	C	B	C	C	C	21.77 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	C	C	D	B	B	B	B	B	B	B	B	24.34 C
PM Peak Hour	C	D	D	C	D	C	C	D	A	B	B	B	B	B	B	B	19.90 B
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	-	F	F	-	-	-	-	-	C	A	C	D	A	-	A	28.75 C
PM Peak Hour	D	-	D	D	-	-	-	-	-	B	A	B	F	C	-	E	42.10 D
Green Road/Val Vista Road – All Way Stop Controlled																	
AM Peak Hour	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	11.92 B
PM Peak Hour	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	15.82 C
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	B	C	C	18.35 B
PM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	B	C	C	18.42 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	B	B	B	B	B	B	B	B	C	C	D	C	C	C	D	C	19.32 B
PM Peak Hour	C	B	A	B	B	C	C	C	C	C	D	D	C	D	D	C	22.21 C
SR347/Access B – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	5.47 A
PM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	5.21 A
Val Vista Road/Access A_Access E – Two Way Stop Controlled																	
AM Peak Hour	A	A	A	A	A	A	A	A	B	C	B	B	C	B	A	C	15.38 C*
PM Peak Hour	A	A	A	A	A	A	A	A	D	C	B	C	C	D	C	D	25.02 D*
Val Vista Road/Access D – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	13.09 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	A	C	15.08 C*

Val Vista Road/Access C – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	11.59 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	11.87 B*
Green Road/Access F – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	A	-	A	A	9.07 A*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	A	-	A	A	9.34 A*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

Using the projected total traffic volumes for 2032 and the improvements proposed, all the study intersections will operate at an acceptable LOS D or better after the second phase of the Sunset Canyon development is constructed and occupied. The exception to this is the signalized intersection of SR347/Papago Road that begins to deteriorate to a LOS E in the evening peak hour. This is due to the high volume of vehicles that are anticipated at the intersection with the proposed regional growth. As the regional transportation system is developed within the study area, the traffic will disperse to the new roadway systems and delay will likely decrease.

Table 18: 2035 Total Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay / LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	E	D	-	E	-	E	A	E	C	-	B	C	-	-	-	-	42.89 D
PM Peak Hour	F	B	-	E	-	F	A	F	F	-	D	F	-	-	-	-	124.79 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	E	C	B	C	D	B	A	C	E	D	D	D	F	D	E	E	31.05 C
PM Peak Hour	E	F	A	D	E	D	B	D	E	D	D	D	E	D	E	E	47.51 D
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	C	C	C	C	C	D	D	D	26.10 C
PM Peak Hour	B	F	F	F	F	D	D	E	C	C	C	C	C	F	F	F	70.05 E
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	A	A	A	A	A	A	A	C	D	D	D	C	C	C	C	21.20 C
PM Peak Hour	A	A	A	A	A	B	B	B	C	D	D	D	C	C	C	C	21.47 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	D	D	C	D	D	C	D	B	C	B	C	D	C	B	C	29.46 C
PM Peak Hour	B	C	C	C	C	C	C	C	B	C	C	C	C	C	C	C	25.30 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	C	F	E	C	D	D	C	A	F	B	E	D	B	A	B	45.19 D
PM Peak Hour	F	D	F	F	C	D	D	C	C	F	B	D	F	F	A	F	70.14 E
Green Road/Val Vista Road – Signalized																	
AM Peak Hour	B	C	A	C	B	C	C	C	B	C	B	C	A	C	C	C	23.20 C
PM Peak Hour	C	D	A	D	C	C	C	C	B	B	B	B	A	C	B	C	23.41 C
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	C	C	C	19.25 B
PM Peak Hour	-	-	-	-	C	-	C	C	A	A	-	A	-	B	B	B	16.21 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	D	B	A	B	A	C	B	C	D	C	D	D	C	D	D	C	23.61 C
PM Peak Hour	F	B	A	C	C	F	B	D	D	C	D	D	C	D	D	C	37.08 D
SR347/Access B – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.07 A
PM Peak Hour	C	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.24 A
Val Vista Road/Access A_Access E – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	B	C	C	C	B	B	B	B	22.25 C
PM Peak Hour	B	C	B	C	B	C	B	C	B	C	C	C	B	C	C	B	21.88 C
Val Vista Road/Access D – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	C	18.66 C*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	D	-	B	C	23.92 C*

Val Vista Road/Access C – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	B	14.45 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	A	C	15.51 C*
Green Road/Access F – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.67 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.52 B*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

With the addition of Phase III of Sunset Canyon, the intersections will continue to perform at LOS D or better in the morning and evening peak hours. The exception to this is the intersections of SR347/Papago Road and Amarillo Valley Road/Miller Road that operates with delay in the evening peak hour.

It should be noted that by 2035, it is assumed in the background condition that SR347 may need to be widened to 3 lanes in each direction to accommodate the projected traffic volumes. This roadway improvement was carried forward to the total traffic analysis. However, as traffic increases the delay is noted.

Table 19: 2040 Total Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay / LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	D	D	-	D	-	D	A	D	F	-	C	E	-	-	-	-	52.75 D
PM Peak Hour	F	B	-	F	-	F	A	F	F	-	D	F	-	-	-	-	131.82 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	E	C	B	C	D	B	B	C	E	D	E	D	E	D	E	E	31.70 C
PM Peak Hour	E	F	A	E	E	D	C	D	E	D	D	D	E	D	E	E	50.43 D
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	B	D	D	D	C	C	C	C	C	C	C	C	B	D	D	C	32.79 C
PM Peak Hour	B	F	F	F	F	D	D	F	C	C	C	C	B	F	F	F	110.77 F
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	B	B	B	A	B	B	B	C	D	D	D	C	C	C	C	20.66 C
PM Peak Hour	B	B	B	B	A	B	B	B	B	D	D	D	C	C	C	C	21.98 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	C	F	D	D	C	C	D	B	D	C	C	E	C	C	C	35.52 D
PM Peak Hour	C	D	D	C	D	D	C	D	C	C	B	C	D	C	C	C	27.66 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	C	F	D	C	D	D	C	A	F	B	E	D	B	A	B	45.23 D
PM Peak Hour	F	D	E	F	C	D	D	C	C	D	B	D	F	F	A	F	72.46 E
Green Road/Val Vista Road – Signalized																	
AM Peak Hour	B	C	A	C	B	C	C	C	B	C	B	C	A	C	C	C	23.94 C
PM Peak Hour	B	C	A	C	B	C	C	C	B	C	B	C	A	C	B	C	24.87 C
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	B	-	B	B	B	C	-	C	-	C	C	C	21.92 C
PM Peak Hour	-	-	-	-	C	-	C	C	A	A	-	A	-	B	B	B	16.31 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	D	B	B	C	B	C	B	C	D	C	D	D	C	D	D	C	24.90 C
PM Peak Hour	F	B	A	C	C	F	C	D	F	C	D	E	C	D	D	C	41.17 D
SR347/Access B – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.08 A
PM Peak Hour	C	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.60 A
Val Vista Road/Access A_Access E – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	B	C	C	C	B	B	B	B	23.92 C
PM Peak Hour	C	C	B	C	B	C	B	C	B	C	C	C	B	C	C	C	22.25 C
Val Vista Road/Access D – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	C	21.62 C*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	D	-	B	D	29.32 D*

Val Vista Road/Access C – One Way Stop Controlled																
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	B	16.19 C*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	A	C	17.51 C*
Green Road/Access F – One Way Stop Controlled																
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.67 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.52 B*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

Table 20: 2045 Total Conditions Intersection Levels of Service

Intersection Location	NB LOS				SB LOS				EB LOS				WB LOS				Overall Intersection
	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	L	T	R	Tot	AvgDelay / LOS*
SR347/Papago Road – Signalized																	
AM Peak Hour	E	F	-	E	-	D	A	D	F	-	B	D	-	-	-	-	51.40 D
PM Peak Hour	F	B	-	F	-	F	A	F	F	-	D	F	-	-	-	-	142.29 F
SR347/Miller Road/**Louis Johnson Drive** – Signalized																	
AM Peak Hour	E	C	B	C	D	B	B	C	E	D	D	D	E	D	E	E	33.90 C
PM Peak Hour	E	F	B	E	E	D	C	D	E	D	D	D	E	D	E	E	56.44 E
Amarillo Valley Road/Miller Road – Signalized																	
AM Peak Hour	A	B	B	B	B	B	B	B	C	C	C	C	D	C	D	D	21.72 C
PM Peak Hour	B	B	B	B	C	B	B	C	C	C	C	C	D	C	D	C	24.52 C
Amarillo Valley Road/Val Visa Road – Signalized																	
AM Peak Hour	A	A	A	A	A	A	A	A	C	D	D	D	C	C	C	C	19.29 B
PM Peak Hour	B	B	B	B	A	B	B	B	B	C	C	C	C	C	C	C	20.04 C
Amarillo Valley Road/Papago Road – Signalized																	
AM Peak Hour	C	C	D	C	D	D	C	D	B	C	B	C	E	C	B	C	32.59 C
PM Peak Hour	C	C	D	C	D	C	C	D	C	C	B	C	D	C	C	C	28.82 C
Green Road/Papago Road – Signalized																	
AM Peak Hour	D	C	F	D	C	D	D	C	A	F	B	E	D	B	A	B	47.60 D
PM Peak Hour	F	D	E	F	C	D	D	C	C	F	B	D	F	F	A	F	75.42 E
Green Road/Val Vista Road – Signalized																	
AM Peak Hour	B	C	A	C	B	C	C	C	B	C	B	C	A	C	C	C	23.91 C
PM Peak Hour	B	C	A	C	B	C	C	C	B	C	B	C	A	C	B	C	24.81 C
Green Road/Miller Road – Signalized																	
AM Peak Hour	-	-	-	-	C	-	B	C	B	B	-	B	-	C	C	C	20.08 C
PM Peak Hour	-	-	-	-	C	-	C	C	B	A	-	A	-	B	B	B	16.81 B
SR347/Val Vista Road – Signalized																	
AM Peak Hour	D	B	B	C	B	C	B	C	D	C	D	D	C	D	D	C	24.91 C
PM Peak Hour	F	B	B	C	C	F	C	E	F	C	D	E	C	D	D	C	47.60 D
SR347/Access B – Signalized																	
AM Peak Hour	A	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.11 A
PM Peak Hour	C	A	-	A	-	A	A	A	D	-	D	D	-	-	-	-	7.93 A
Val Vista Road/Access A_Access E – Signalized																	
AM Peak Hour	B	C	C	C	B	C	C	C	B	C	C	C	B	B	B	B	23.92 C
PM Peak Hour	C	C	B	C	B	C	B	C	B	C	C	C	B	C	C	C	22.25 C
Val Vista Road/Access D – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	C	21.62 C*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	D	-	B	D	29.32 D*

Val Vista Road/Access C – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	B	B	16.19 C*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	C	-	A	C	17.51 C*
Green Road/Access F – One Way Stop Controlled																	
AM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.67 B*
PM Peak Hour	-	A	A	A	A	A	-	A	-	-	-	-	B	-	A	B	10.52 B*

*The overall LOS letter grade for two-way stop-controlled intersections is shown as the worst approach.

Ten years after full buildout of the development, the study area intersections continue to operate at acceptable levels of service, LOS D or better in the morning and evening peak hours. The exceptions are the signalized intersections of SR347/Papago Road, SR347/Miller Road/Louis Johnson Drive and Green Road/Papago Road operating with delay in the evening peak hour.

When additional infrastructure is constructed throughout the study area, including Interstate 11 approximately 2.5 miles south of the site, traffic will redistribute on the roadway network, likely improving the LOS at the intersections with SR347.

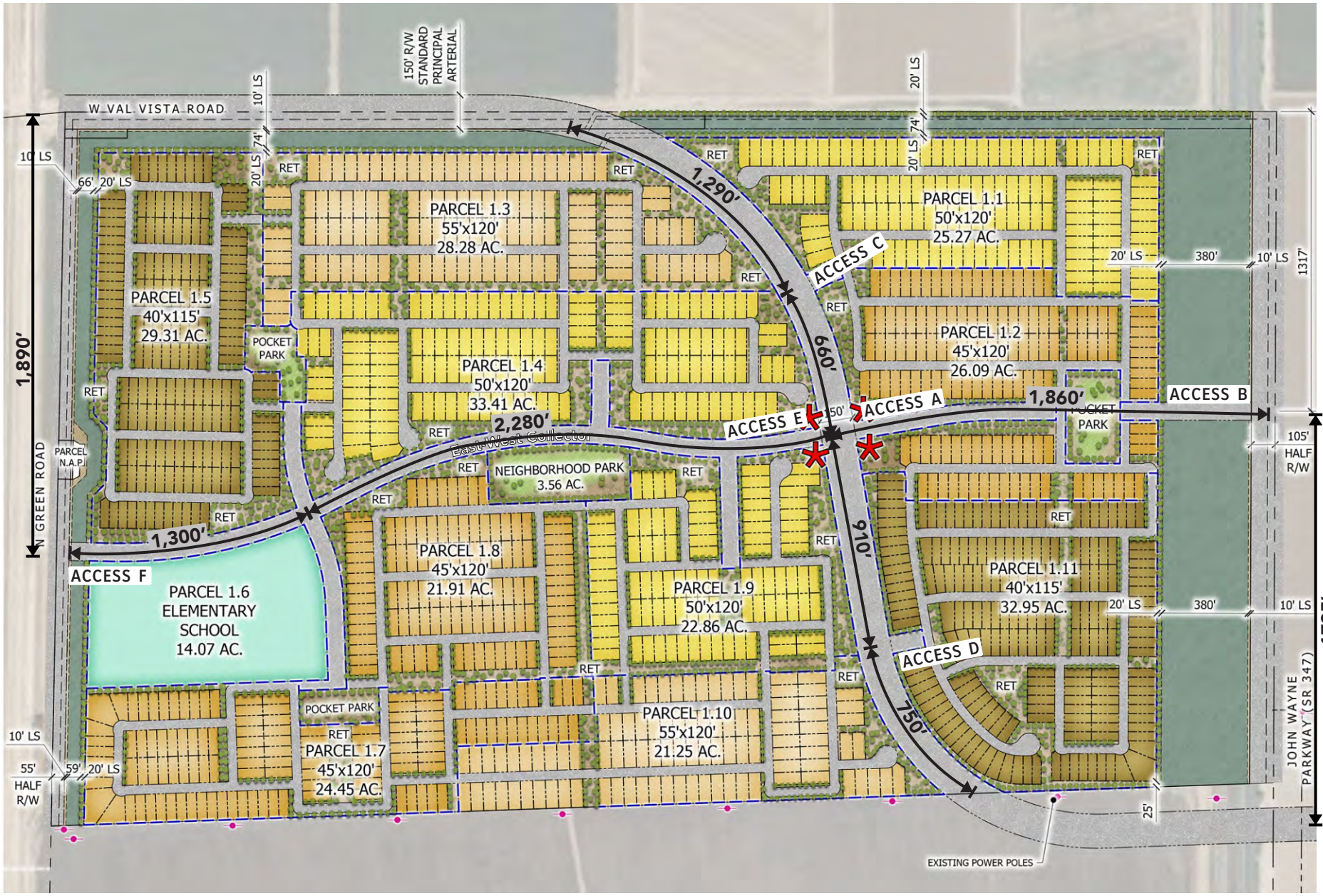
F. Roadway and Intersection Geometric Improvements

Val Vista Road is noted in the "Regionally Significant Routes for Safety and Mobility, Final Report" dated December 2008 and also shown on the "Regionally Significant Routes for Safety and Mobility-2017 Update" for Pinal County as a principal arterial roadway within the vicinity of the site. Val Vista Road is currently located on the northern boundary of the Sunset Canyon property. However, when Sunset Canyon is developed, Val Vista Road will traverse through the site and continue east of SR 347. Because of the Val Vista Road proposed classification, roadway improvements should be constructed. 75 feet of right of way should be provided, measured centerline to right of way line. In its ultimate configuration, Val Vista Road should be constructed as a four-lane roadway with two lanes in each direction separated by a raised median. The right of way should be reserved for a future third lane and necessary auxiliary lanes in each direction, if necessary, in the future. The developer should be responsible for the construction of Val Vista Road within the study area.

Half-street roadway improvements along Green Road adjacent to the Sunset Canyon property will be constructed as part of the development. Green Road is noted as a minor arterial per the Pinal County GIS Community Development website. Therefore, Green Road should provide 55 feet of right-of-way, measured centerline to right of way line.

The internal E-W collector roadway within the Sunset Canyon development should be designed per the Pinal County major collector roadway section with a total of 80 feet of right of way.

With the construction of all new accesses, sight triangles shall be provided and maintained at all site accesses per the most current edition of the American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, ADOT's Traffic Guidelines and Processes and the Pinal County TIA Guidelines. The sight triangles shall be provided on the developer's landscape and design plans.



not to scale

Figure 18: Driveway Spacing

United Civil Group

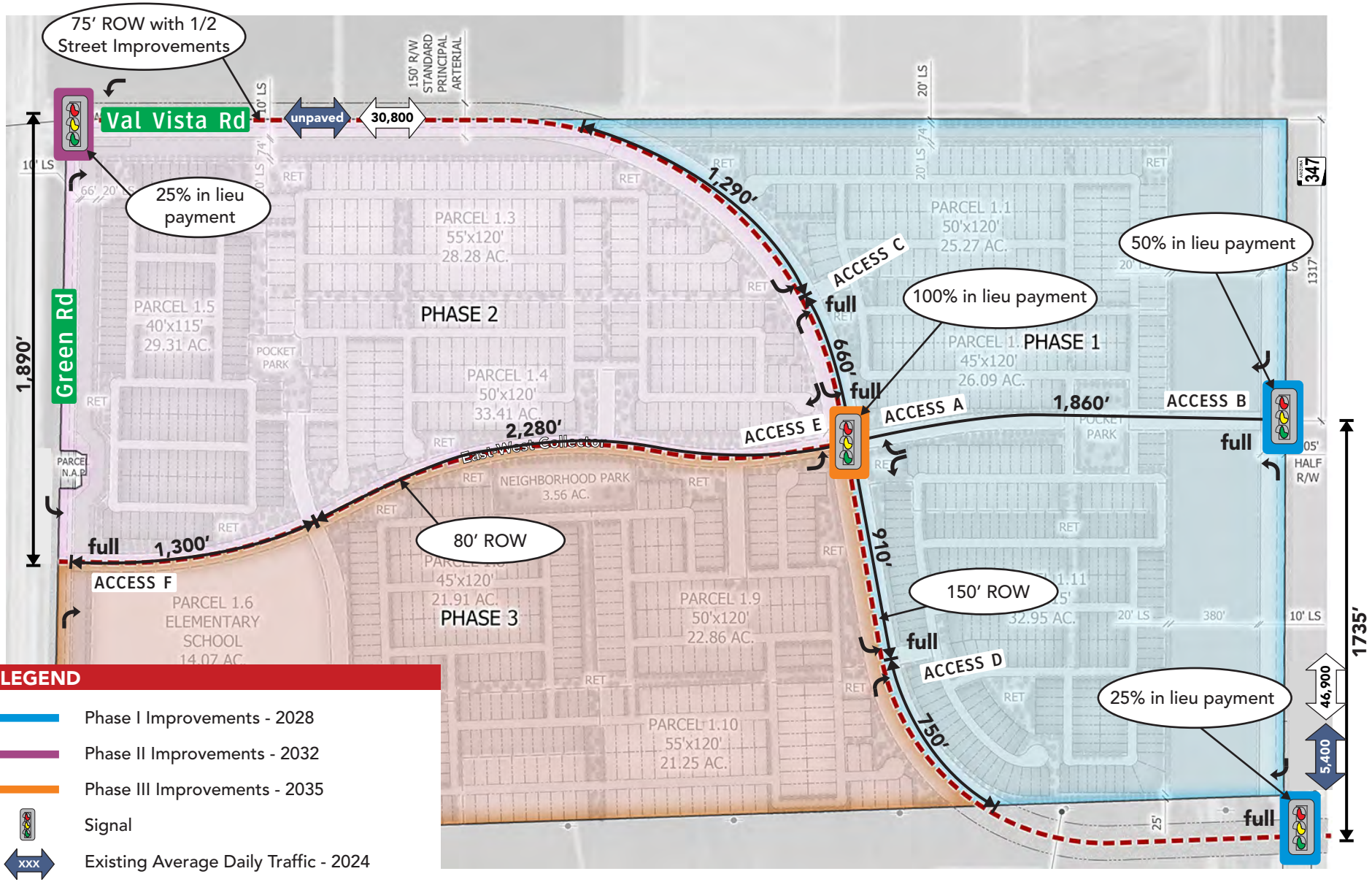


Figure 19: Overall Traffic Circulation Map Full Site Buildout

not to scale

United Civil Group

VII. CONCLUSIONS AND RECOMMENDATIONS

United Civil Group prepared this traffic impact analysis for the proposed Sunset Canyon Development in Pinal County, Arizona. The report conforms to the Pinal County *Traffic Impact Assessment Guidelines & Procedures* dated January 2007, Arizona Department of Transportation (ADOT) Traffic Engineering Guidelines and Processes Section 240 Traffic Impact Analyses, locally accepted standards, and industry practice.

The approximate 375-acre development is planned to include a total of 1,532 single family dwelling units and an elementary school. The development will be constructed in three phases with full buildout by 2035.

- Phase I consists of (parcels 1.1, 1.2 and 1.11) 539 single family homes - occupied by 2028.

- Phase II consists of (parcels 1.3, 1.4, and 1.5) 481 single family homes occupied by 2032.

- Phase III consists of (parcels 1.6, 1.7, 1.8, 1.9 and 1.10) 512 single family homes plus the elementary school with 600 students by 2035.

- Two additional horizon years, 5 years after full buildout (2040) and 10 years after full buildout (2045) were analyzed based on the County and State TIA guidelines to identify any foreseen traffic impacts 5 and 10 years after the development is fully built out and occupied.

The Sunset Canyon Development will have six accesses. Accesses A, C, D and E are located on Val Vista Road, Access B is located on SR347 and Access F is located on Green Road. Because Arizona Department of Transportation (ADOT) owns and maintains SR347, Access B was analyzed in accordance with ADOT's Traffic Policies and Guidelines. Val Vista Road and Green Road are owned and maintained by Pinal County. Therefore, Accesses A, C, D, E and F were analyzed using Pinal County Traffic Engineering Guidelines.

On a typical weekday, after full build-out, the Sunset Canyon development is forecasted to generate 15,128 total daily trips, with 1,294 trips in the morning peak hour and 1,488 trips in the evening peak hour, according to the 11th Edition of the Trip Generation Manual.

Traffic signals are warranted based on traffic generated by the surrounding developments including the Sunset Canyon Residential Development. Signals may be required at the intersections of SR347/Access B, SR347/Val Vista Road, Val Vista Road Accesses A & E, Green Road/Access F and Val Vista Road/Green Road. The

developer should contribute their proportionate share of the signal costs for the design and construction of the signals. Signal warrants should be conducted to confirm signals are warranted prior to their installation.

Ten years after full buildout of the development, the study area intersections operate at acceptable levels of service, LOS D or better in the morning and evening peak hours. The exceptions are the signalized intersections of SR347/Papago Road, SR347/Miller Road/Louis Johnson Drive and Green Road/Papago Road operating with delay in the evening peak hour. When additional infrastructure is constructed throughout the study area, including Interstate 11 approximately 2.5 miles south of the site, traffic will redistribute on the roadway network, likely improving the LOS at the intersections with SR347.

Proper intersection sight distance and sight triangles shall be provided and maintained at all site access driveways of the proposed development to give drivers exiting the site a clear view of oncoming traffic. The landscape and hardscape (monument signs) within the sight triangles must not obstruct the driver's view of the adjacent travel lanes. The sight triangles shall be provided on the developer's landscape and design plans.

Any work performed in ADOT's right of way will require an Encroachment Permit. The Development Agreement between Pinal County and the Developer will need to be coordinated with ADOT to ensure recommendations and mitigations are achieved.

Based on this TIA, the following roadway and intersection improvements are proposed to be constructed.

PHASE I of the Sunset Canyon Residential Development– 2028

- Provide 75 feet of right of way and construct Val Vista Road as a three-lane roadway in the interim condition through the site tying into the proposed development to the south of Sunset Canyon that will connect Val Vista Road to SR 347. Tie Val Vista Road into the existing alignment on the northern boundary of the site. In the future, if required, Val Vista Road can be widened to accommodate traffic growth projections.
- Contribute an in-lieu fee of 50% for the construction of the signal at the intersection of Access B/SR 347
- Provide 80 feet of right of way and construct the proposed internal E-W major collector roadway as necessary to accommodate local traffic from SR347 to Val Vista Road. This E-W major collector roadway ties Access A to Access B.

PHASE II of the Sunset Canyon Development – 2032

- Construct the north half of the internal E-W collector road as necessary to accommodate site traffic. 40 feet of right of way will be required for this major collector roadway, measured centerline to right of way line.
- Provide 75 feet of right of way and construct the half street improvements for Val Vista Road principal arterial cross section from the northern boundary to the Phase III boundary. For Phase II, it is assumed that the full section of Val Vista Road will be constructed as two lanes in each direction with a raised median.
- Construct half street improvements along Green Road along the site's western boundary. This improvement should provide 55 feet of right of way for the future minor arterial cross section, measured centerline to right of way line. Construct the intersection of Access F/Green Road. Access F should be designed with right and left turn deceleration lanes exiting the development. Right and left turn lanes will be required on Green Road at Access F.
- Contribute an in-lieu fee of 25% for the construction of the signal at the intersection of Val Vista Road/SR347.

PHASE III of the Sunset Canyon Development – 2035

- Provide 75 feet of right of way and construct the half street improvements for Val Vista Road principal arterial cross section from the phase II boundary to the southern boundary of the site. For Phase III, it is assumed that the full section of Val Vista Road will be constructed as two lanes in each direction with a raised median.
- Construct the south half of the internal E-W collector road as necessary to accommodate site traffic. 40 feet of right of way will be required for this major collector roadway. By Phase III, the E-W collector roadway should tie to Green Road, Access F to Val Vista Road Access E.
- Construct half street improvements along Green Road along the site's western boundary. This improvement should provide 55 feet of right of way for the future minor arterial cross section, measured centerline to right of way line.
- Contribute an in-lieu fee of 100% of the construction cost for signalization at the intersection of Val Vista Road/Access A and Access E, when warranted.
- Contribute an in-lieu fee of 25% for the construction cost for signalization at the intersection of Green Road/Val Vista Road, when warranted.

This report concludes that when constructed, the offsite improvements recommended above will assist in maintaining an acceptable LOS. However, as this area grows and roadways are constructed or widened to their full capacity, traffic may redistribute to the new roadways from what was originally proposed.

VIII. LIMITATIONS

Our professional services have been performed using the degree of skill ordinarily exercised, under similar circumstances, by reputable transportation engineering firms practicing in this locality. No other warranty, expressed or implied, is made.

The contents of this report are intended for the sole use of the addressee and his/her designees. In completing this report, data was obtained from a variety of sources (i.e., City, County, State and Federal sources); United Civil Group has assumed these sources to be reliable and accurate. Should deviations from this report be noted, this firm shall be contacted for review of the area of concern.

A reasonable attempt was made to acquire recent traffic impact studies, traffic projections and/or data that may be helpful in more accurately projecting traffic volumes. United Civil Group is not responsible for incorporating data made available after this document has been finalized.

This report is issued with the understanding that it is the responsibility of the owner to see that its provisions are carried out or brought to the attention of those concerned. If any changes to the proposed project are planned, the conclusions and recommendations contained in this report shall be reviewed and the report shall be modified or supplemented as necessary.

IX. SOURCES

Arizona Department of Transportation Traffic Engineering Guidelines and Processes, June 2015.

A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2018.

Highway Capacity Manual, HCM, Transportation Research Board, 6th Edition.

Manual on Uniform Traffic Control Devices, Federal Highway Administration, MUTCD 2009.

Pinal County Access Management Manual, February 24, 2017.

Pinal County Regionally Significant Routes for Safety and Mobility Final Report. December 2008.

Pinal County Small Area Transportation Study Final Report, August 2006.

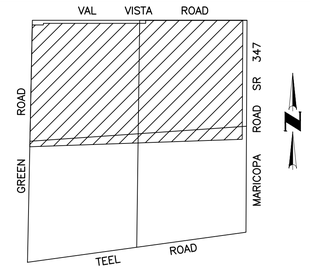
Pinal County Subdivision & Infrastructure Design Manual.

Pinal County Traffic Assessment Guidelines & Procedures, January 2007.

Trip Generation, 11th Edition, Institute of Transportation Engineers.

SUNSET CANYON
A.L.T.A./N.S.P.S. LAND TITLE SURVEY

A PORTION OF LAND LOCATED IN THE NORTH HALF OF SECTION 28,
TOWNSHIP 5 SOUTH, RANGE 3 EAST, OF THE GILA AND SALT RIVER MERIDIAN,
PINAL COUNTY, ARIZONA



VICINITY MAP
(NOT-TO-SCALE)

NOTES

THIS SURVEY IS BASED ON A COMMITMENT FOR TITLE INSURANCE BY FIRST AMERICAN TITLE INSURANCE COMPANY.

ORDER NO. NCS-1133754-PHX1, REVISION NO. 1 DATED 08/03/2022

THE PROPERTY IS SUBJECT TO THE FOLLOWING, ACCORDING TO SCHEDULE B OF SAID COMMITMENT:

1. TAXES FOR THE FULL YEAR OF 2022. (THE FIRST HALF IS DUE OCTOBER 1, 2022 AND IS DELINQUENT NOVEMBER 1, 2022. THE SECOND HALF IS DUE MARCH 1, 2023 AND IS DELINQUENT MAY 1, 2023 .) (NOT MAPPABLE)

2. ANY CHARGE UPON SAID LAND BY REASON OF ITS INCLUSION IN SOUTH MARICOPA FIRE ASSOCIATION. (ALL ASSESSMENTS DUE AND PAYABLE ARE PAID.) (NOT MAPPABLE)

3. ANY CHARGE UPON SAID LAND BY REASON OF ITS INCLUSION IN MARICOPA STANFIELD IRRIGATION AND DRAINAGE DISTRICT. (ALL ASSESSMENTS DUE AND PAYABLE ARE PAID.) (NOT MAPPABLE)

4. RESERVATIONS OR EXCEPTIONS IN PATENTS, OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF. (NOT MAPPABLE)

5. THE RIGHT TO ENTER UPON SAID LAND, PROSPECT FOR, MINE AND REMOVE ALL COAL, OIL, GAS AND OTHER MINERAL DEPOSITS AS RESERVED IN DEED RECORDED AS 2007-036589 OF OFFICIAL RECORDS. (AFFECTS PARCEL NO. 1) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

6. DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED AS 2005-149010, RECORDED AS 2007-079521, FIRST AMENDMENT RECORDED AS 2006-030998 ACKNOWLEDGMENT AND CONSENT RECORDED AS 2007-079522 ASSIGNMENT OF DECLARANT'S RIGHTS RECORDED AS 2008-087614, RE-RECORDED AS 2008-088922 SECOND AMENDMENT RECORDED AS 2021-141252 (AFFECTS PARCEL NO. 1) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

7. DECLARATION OF ROAD BY THE PINAL COUNTY BOARD OF SUPERVISOR RECORDED AS DOCKET 375, PAGE 572. (AFFECTS PARCEL NO. 2) (MAPPED HEREON)

8. ALL MATTERS AS SET FORTH IN QUIT CLAIM DEEDS, RECORDED JANUARY 16, 1991 AS DOCKET 1720, PAGE 78 AND AS DOCKET 1793, PAGE 747 OF OFFICIAL RECORDS. (AFFECTS PARCEL NO. 2) (MAPPED HEREON)

9. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "JOINT USE TURNOUT AGREEMENT" RECORDED MAY 26, 1988 AS DOCKET 1530, PAGE 799 OF OFFICIAL RECORDS. ASSIGNMENT RECORDED AS DOCKET 1539, PAGE 617 (AFFECTS PARCEL NO. 1 AND 2) (MAPPED HEREON)

10. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "AGREEMENT FOR PROTECT WATER" RECORDED JUNE 29, 1989 AS DOCKET 1615, PAGE 554 OF OFFICIAL RECORDS. MODIFICATION RECORDED AS DOCKET 1983, PAGE 970 (AFFECTS PARCEL NO. 1 AND 2) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

11. ALL MATTERS AS SET FORTH IN ZONE CHANGE RESOLUTION, RECORDED NOVEMBER 17, 2003 AS 2003-080679 AND AS 2003-080680 OF OFFICIAL RECORDS. (AFFECTS PARCEL NO. 1 AND 2) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

12. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "DEVELOPMENT AGREEMENT" RECORDED MARCH 7, 2005 AS 2005-023476 OF OFFICIAL RECORDS. ASSIGNMENT AND ASSUMPTION RECORDED AS 2008-087613, RE-RECORDED AS 2008-088921 (AFFECTS PARCEL NO. 1 AND 2) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

13. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "INFRASTRUCTURE COORDINATION AND FINANCE AGREEMENT" RECORDED MAY 24, 2005 AS 2005-060411 OF OFFICIAL RECORDS. (AFFECTS PARCEL NO. 1 AND 2) (ITEM IS BLANKET IN NATURE-NOT MAPPABLE)

14. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "SPECIAL WARRANTY DEED AND RESERVATIONS OF SURFACE RIGHTS (MINERALS)" RECORDED MARCH 27, 2007 AS 2007-036589 OF OFFICIAL RECORDS. (AFFECTS PARCEL NO. 1) (ITEM IS BLANKET IN NATURE - NOT MAPPABLE)

15. ANY FACTS, RIGHTS, INTERESTS OR CLAIMS WHICH WOULD BE DISCLOSED BY A CORRECT ALTA/NSPS SURVEY. (NOT MAPPABLE)

16. THE RIGHTS OF PARTIES IN POSSESSION BY REASON OF ANY UNRECORDED LEASE OR LEASES OR MONTH TO MONTH TENANCIES AFFECTING ANY PORTION OF THE WITHIN DESCRIBED PROPERTY. (NOT MAPPABLE)

17. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT SHOWN BY THE PUBLIC RECORDS. (NOT MAPPABLE)

18. AN EASEMENT FOR ELECTRIC LINES AND APPURTENANT FACILITIES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED AS 2007-043624 OF OFFICIAL RECORDS. (MAPPED HEREON)

PURSUANT TO TABLE "A", ITEM 1, MONUMENTS HAVE BEEN PLACED (OR A REFERENCE MONUMENT OR WITNESS TO THE CORNER) AT ALL MAJOR CORNERS OF THE BOUNDARY OF THE PROPERTY, UNLESS ALREADY MARKED OR REFERENCED BY EXISTING MONUMENTS OR WITNESSES IN CLOSE PROXIMITY TO THE CORNER.

PURSUANT TO TABLE "A", ITEM 2, THE PROPERTY ADDRESS IS NOT AVAILABLE PER THE PINAL COUNTY ASSESSOR

NOTES (CONTINUED)

PURSUANT TO TABLE "A", ITEM 3, FLOOD ZONE INFORMATION IS SHOWN IN THE FLOOD ZONE CERTIFICATION.

PURSUANT TO TABLE "A", ITEM 4, PARCEL AREAS ARE SHOWN AT THE END OF THE LEGAL DESCRIPTION.

PURSUANT TO TABLE "A", ITEM 8, SUBSTANTIAL FEATURES OBSERVED IN THE FIELD ARE SHOWN ON THE PLAT OF SURVEY.

PURSUANT TO TABLE "A", ITEM 13, NAMES OF ADJOINING OWNERS OF SUBDIVIDED LANDS ACCORDING TO CURRENT TAX RECORDS ARE SHOWN ON THE PLAT OF SURVEY.

PURSUANT TO TABLE "A", ITEM 16, THERE IS NO OBSERVABLE EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS WITHIN RECENT MONTHS.

PURSUANT TO TABLE "A", ITEM 17, THERE IS NO INFORMATION AVAILABLE CONCERNING ANY CHANGES IN STREET RIGHT OF WAY LINES, EITHER COMPLETED OR PROPOSED. THERE IS NO OBSERVABLE EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS.

ADJOINING RIGHTS-OF-WAY ARE MAPPED PER INFORMATION FROM THE PINAL COUNTY ASSESSOR UNLESS NOTED OTHERWISE.

BEARINGS, DISTANCES AND CURVE DATA NOT SPECIFIED AS RECORD OR MEASURED REPRESENT CVL FIELD MEASURED DATA.

THIS SURVEY REFLECTS BLUESTAKE MARKINGS AS FOUND IN THE FIELD. THESE MARKINGS WERE NOT ORDERED BY CVL NOR THE CLIENT AND WERE SET BY UNKNOWN PARTIES FOR UNKNOWN PURPOSES.

SOURCES USED IN THE PREPARATION OF THIS SURVEY INCLUDE:
ALTA SURVEY CREATED BY COE & VAN LOO ON 4/26/2002
JOB NO. 020035-01
FRED KLEIN LS#38582

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF PINAL, STATE OF ARIZONA, AND IS DESCRIBED AS FOLLOWS:

A PARCEL OF LAND LYING IN AND BEING A PART OF SECTION 28, TOWNSHIP 5 SOUTH, RANGE 3 EAST, GILA AND SALT RIVER BASE AND MERIDIAN, PINAL COUNTY, ARIZONA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 28, THE TRUE POINT OF BEGINNING;

THENCE NORTH 89 DEGREES 58 MINUTES 45 SECONDS EAST, A DISTANCE OF 5329.05 FEET TO THE NORTHEAST CORNER OF SECTION 28;

THENCE SOUTH 0 DEGREES 16 MINUTES 00 SECONDS WEST, A DISTANCE OF 2951.34 FEET;

THENCE SOUTH 87 DEGREES 58 MINUTES 24 SECONDS WEST, A DISTANCE OF 5380.90 FEET;

THENCE NORTH 01 DEGREES 08 MINUTES 33 SECONDS EAST, A DISTANCE OF 135.00 FEET TO THE WEST QUARTER CORNER OF SECTION 28;

THENCE NORTH 01 DEGREES 08 MINUTES 06 SECONDS EAST, A DISTANCE OF 3005.30 FEET TO THE TRUE POINT OF BEGINNING;

EXCEPT THAT PORTION OF THE EAST HALF OF THE EAST HALF OF SAID SECTION 28, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID SECTION 28;

THENCE SOUTH 00 DEGREES 17 MINUTES 57 SECONDS WEST ALONG THE EAST LINE OF SECTION 28, A DISTANCE OF 2631.35 FEET TO THE EAST QUARTER CORNER OF SECTION 28;

THENCE SOUTH 00 DEGREES 18 MINUTES 28 SECONDS WEST ALONG THE EAST LINE OF SECTION 28, A DISTANCE OF 320.00 FEET;

THENCE SOUTH 88 DEGREES 00 MINUTES 20 SECONDS WEST, A DISTANCE OF 105.25 FEET;

THENCE NORTH 00 DEGREES 18 MINUTES 12 SECONDS EAST, A DISTANCE OF 2955.04 FEET TO A POINT ON THE NORTH LINE OF SECTION 28;

THENCE SOUTH 89 DEGREES 59 MINUTES 03 SECONDS EAST, A DISTANCE OF 105.00 FEET TO THE POINT OF BEGINNING; AND

ALSO EXCEPT THE NORTH 75 FEET OF THE WEST HALF OF SAID SECTION 28; AND

ALSO EXCEPT THE SOUTH 40 FEET OF THE NORTH 115 FEET OF THE WEST 275 FEET OF THE WEST HALF OF SAID SECTION 28;

ALSO EXCEPT THE NORTH 75 FEET OF THE WEST 150 FEET OF THE EAST HALF OF SAID SECTION 28;

ALSO EXCEPT THAT PART OF THE NORTHWEST QUARTER OF SECTION 28, TOWNSHIP 5 SOUTH, RANGE 3 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, PINAL COUNTY, ARIZONA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE 1/2" IRON BAR MARKING THE NORTHWEST CORNER OF SAID SECTION 28, FROM WHICH THE 1/2" IRON BAR WITH PINAL COUNTY CAP MARKING THE WEST QUARTER CORNER OF SAID SECTION 28 BEARS SOUTH 01 DEGREES 07 MINUTES 51 SECONDS WEST, A DISTANCE OF 3004.65 FEET;

THENCE SOUTH 01 DEGREES 07 MINUTES 51 SECONDS WEST ALONG THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 28, A DISTANCE OF 1443.62 FEET;

THENCE SOUTH 88 DEGREES 52 MINUTES 09 SECONDS EAST DEPARTING SAID WEST LINE, A DISTANCE OF 63.00 FEET TO THE TRUE POINT OF BEGINNING;

THENCE CONTINUING SOUTH 88 DEGREES 52 MINUTES 09 SECONDS EAST, A DISTANCE OF 5.00 FEET;

THENCE SOUTH 59 DEGREES 15 MINUTES 37 SECONDS EAST, A DISTANCE OF 30.90 FEET;

THENCE SOUTH 88 DEGREES 52 MINUTES 09 SECONDS EAST, A DISTANCE OF 20.17 FEET TO A POINT ON A LINE WHICH IS PARALLEL WITH AND 115.03 FEET EASTERLY, AS MEASURED AT RIGHT ANGLES, FROM THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 28;

THENCE SOUTH 01 DEGREES 07 MINUTES 51 SECONDS WEST ALONG SAID PARALLEL LINE, A DISTANCE OF 95.00 FEET;

THENCE NORTH 88 DEGREES 52 MINUTES 09 SECONDS WEST DEPARTING SAID PARALLEL LINE, A DISTANCE OF 20.17 FEET TO A POINT ON A LINE WHICH IS PARALLEL WITH AND 94.86 FEET EASTERLY, AS MEASURED AT RIGHT ANGLES, FROM THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 28;

THENCE SOUTH 01 DEGREES 07 MINUTES 51 SECONDS WEST ALONG SAID PARALLEL LINE, A DISTANCE OF 45.00 FEET;

THENCE SOUTH 61 DEGREES 07 MINUTES 51 SECONDS WEST DEPARTING SAID PARALLEL LINE, A DISTANCE OF 31.00 FEET;

LEGAL DESCRIPTION (CONTINUED)

THENCE NORTH 88 DEGREES 52 MINUTES 09 SECONDS WEST, A DISTANCE OF 5.02 FEET TO A POINT ON A LINE WHICH IS PARALLEL WITH AND 63.00 FEET EASTERLY, AS MEASURED AT RIGHT ANGLES, FROM THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 28;

THENCE NORTH 01 DEGREES 07 MINUTES 51 SECONDS EAST ALONG SAID PARALLEL LINE, A DISTANCE OF 170.77 FEET TO THE TRUE POINT OF BEGINNING;

TOGETHER WITH ALL RIGHTS, INCLUDING WATER RIGHTS, AND APPURTENANCES THERETO.

EXCEPTING THEREFROM ALL COAL, OIL, GAS, AND MINERAL DEPOSITS AS CONVEYED TO DRH ENERGY, INC., A COLORADO CORPORATION, RECORDED MARCH 27, 2007 IN FEE NO. 2007-036589, OFFICIAL RECORDS.

CONTAINING: 361.792 ACRES, MORE OR LESS

FLOOD ZONE CERTIFICATION

THIS IS TO CERTIFY THAT THIS PROPERTY IS LOCATED WITHIN THE ZONE "X" FLOOD HAZARD AREA PER FIRM MAP PANEL NUMBER 04021-C1125 E DATED 12/04/2007, AS PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).

ZONE "X" AS DEFINED BY FEMA IS:
AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

BASIS OF BEARING

BASIS OF BEARING: ARIZONA STATE PLANE CENTRAL ZONE, GRID NORTH, BASED ON GPS OBSERVATION.

CERTIFICATION

TO:
HAM SUNSET, L.L.C., AN ARIZONA LIMITED LIABILITY COMPANY;
FIRST AMERICAN TITLE INSURANCE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 8, 13, 16 AND 17 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON 06/20/2022.

DATE OF PLAT OR MAP: 11/04/2022

RICHARD G. ALCOCER
REGISTRATION NUMBER 33851
4550 N. 12TH STREET
PHOENIX, ARIZONA 85014
(602)-264-6831
CVLSURVEY@CVLCI.COM

Registered Land Surveyor
CERTIFICATE NO.
33851
RICHARD G.
ALCOCER
Date Signed 11-04-22
Initials RGA

CVL CONSULTANTS
CELEBRATING 60 YEARS
4550 North 12th Street
Phoenix, Arizona 85014
(602) 264-6831
www.cvlci.com

NO.	REVISION	DATE

Coe & Van Loo Consultants, Inc.

A.L.T.A. / N.S.P.S. LAND TITLE SURVEY

SUNSET CANYON
MARICOPA, ARIZONA

SHEET 01 OF 02

CVL Contact: JERRY DODD
CVL Project #: 1-01-03764-01

© 2021 Coe & Van Loo Consultants, Inc.
All rights reserved to
reproduction in any format

Printed By: **BradH** Print Date: **November 4, 2022** Filename: N:\01\03764\01\CADD\ALTA\ALTA 2022\VS ALTA_2022.dwg

NORTHWEST CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. 1/2" REBAR NO ID
P.O.B.
P.O.C. EXCEPTION

33' COUNTY ROADWAY (7)
DKT. 375, PG. 572

24.3' DIRT ROAD

VAL VISTA ROAD (UNIMPROVED PUBLIC ROAD)

NORTH 1/4 CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. 1/2" REBAR WITH CAP
LS#38582

15.3' DIRT ROAD

NORTHEAST CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 8 EAST
FND. ADOT ALUM.
CAP IN H.H.
P.O.B. EXCEPTION

24" PIPE

CONC. SPLASH PAD

115.02'

30" PIPE

12' CLD

12' DIRT TRAIL

18.9' DIRT DITCH

40' EXCEPTION

33' COUNTY ROADWAY (7)
DKT. 375, PG. 572

33' COUNTY ROADWAY (7)
DKT. 375, PG. 572

24' DIRT ROAD

4.3' CLD

10' CLD

20.5' DIRT ROAD

33' COUNTY ROADWAY (7)
DKT. 375, PG. 572

N89°58'45"E 2664.52'

N89°58'45"E 2390.97'

75' EXCEPTION

JOINT USE TURNAROUND AGREEMENT
DKT. 1530, PG. 799 (9)
DKT. 1539, PG. 617

10' CLD

75.01'

N89°58'45"E 5329.04'

75' EXCEPTION

38.9' DIRT CHANNEL

13.6' DIRT ROAD

33' COUNTY ROADWAY (7)
DKT. 375, PG. 572

N89°58'45"E 2664.52'

N89°58'45"E 2409.51'

12' DIRT ROAD

105.00'

53.4' DIRT CHANNEL

12.6' DIRT ROAD

24" PIPE

CONC. STRUCTURE

7.1' DIRT DITCH

(8) 105' R/W
DKT. 1720, PG. 078
DKT. 1793, PG. 747

BWF LIES 0.3'
EAST OF PL

12' DIRT ROAD

55.4' DIRT CHANNEL

43.7' PAVED ROAD

ER LIES 79.9'
EAST OF PL

(7) 33' COUNTY ROADWAY
DKT. 375, PG. 572

(7) 33' COUNTY ROADWAY
DKT. 375, PG. 572

S00°15'51"W 2631.34'(L)
MARICOPA ROAD (PAVED PUBLIC ROAD)

S00°15'50"W 2631.31'
S00°17'57"W 2631.35'(L)
S00°16'00"W(L) 2951.31' 2951.34'(L)

S00°16'03"W 2954.99'

2538.61'

2-18" PIPES

105' EXCEPTION

11.3' DIRT DITCH

12' DIRT ROAD

BWF LIES 0.6'
EAST OF PL

77.1' DIRT CHANNEL

43.4' PAVED ROAD

ER LIES 80.4'
EAST OF PL

(8) 105' R/W
DKT. 1720, PG. 078
DKT. 1793, PG. 747

WESTERLY R/W LINE
OF MARICOPA ROAD

105.45'

CONC. SPLASH PAD
AND 24" PIPE

316.38'

320.00'

2631.39'

2311.33'

S00°15'57"W

(18) SRP ELECTRIC LINE ESMT.
FEE NO. 2007-043624

SOUTHEAST CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. ADOT ALUM.
CAP IN H.H.

GREEN ROAD (UNIMPROVED PUBLIC ROAD)

N01°07'51"E 3005.13'
N01°08'06"E 3005.30'(L)

1328.60'

N01°07'53"E 3025.10'

SEE DETAIL "A"
EXCEPTION

WELL & PUMP

5.2' CLD

15' DIRT ROAD

2743.15'
N00°43'50"E 2818.16'

5.1' CLD

15' DIRT ROAD

FARMLAND

FARMLAND

FARMLAND

FARMLAND

P.O.B. EXCEPTION

L15 L6 L7 L8 L14 L9 L10 L11 L13 L12

DETAIL "A"
EXCEPTION
N.T.S.

1561.51'

15' DIRT ROAD

4.4' CLD

12' CLD

12' DIRT TRAIL

10.8' DIRT DITCH

23.2' DIRT ROAD

CONC. PAD

WEST 1/4 CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. 1/2" REBAR WITH
PINAL COUNTY CAP

WELL & PUMP

30" PIPE

30" PIPE

15.2'

N01°08'31"E 3005.64'

SOUTHWEST CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. 1/2" REBAR NO ID

S86°00'28"W 2694.44'

4.6' CLD

14' DIRT ROAD

N87°58'28"E 2689.37'

APN: 510-48-020E
TRES POINTS LLC
FEE NO. 2021-014128

CENTER OF SECTION
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
CALCULATED POSITION
NOTHING FND. OR SET

2589.42'
S86°00'28"W 2694.87'

4.7' CLD

14' DIRT ROAD

227.52'

N87°58'28"E 2586.17'

S87°58'28"W 5380.79'
S87°58'24"W 5380.90'(L)

APN: 510-48-020E
TRES POINTS LLC
FEE NO. 2021-014128

N00°43'50"E 2818.35'
2590.83'

SOUTH 1/4 CORNER
SECTION 28
TOWNSHIP 5 SOUTH
RANGE 3 EAST
FND. 1/2" REBAR NO ID

LEGEND

ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION	DKT.	DOCKET	PL	PROPERTY LINE
ALUM.	ALUMINUM	ESMT	EASEMENT	P.O.B.	POINT OF BEGINNING
APN	ASSESSOR PARCEL NUMBER	ER	EDGE OF ROAD	P.O.C.	POINT OF COMMENCEMENT
B.C.H.H.	BRASS CAP IN HAND HOLE	FND.	FOUND	R/W	RIGHT-OF-WAY
BWF	BARBED WIRE FENCE	H.H.	HAND HOLE		
CLD	CONCRETE LINED DITCH	HW	HEADWALL		
CONC.	CONCRETE	(L)	RECORD INFORMATION PER LEGAL DESCRIPTION		

	SET 1/2" REBAR WITH CAP LS#33851		STANDPIPE
	DOWNGUY		PROPERTY LINE
	POWER POLE	X	BARBED WIRE FENCE
E	JUNCTION BOX		PIPE
TP	TELEPHONE PEDESTAL	OHE	OVERHEAD ELECTRIC LINE
IV	IRRIGATION CONTROL VALVE	(1)	SCHEDULE B ITEM NUMBER
WELL	WELL		
AC	FOUND ADOT ALUMINUM CAP		
R	FOUND REBAR		
	FOUND BRASS CAP IN HAND HOLE		

LINE TABLE		
NO.	BEARING	LENGTH
L1	N89°58'45"E	275.06'
L2	N01°07'51"E	40.01'
L3	N89°58'45"E	149.03'
L4	N00°43'50"E	75.01'
L5	N01°08'31"E	135.00'
L6	S88°52'09"E	5.00'
L7	S59°15'37"E	30.90'
L8	S88°52'09"E	20.17'

LINE TABLE		
NO.	BEARING	LENGTH
L9	S01°07'51"W	95.00'
L10	N88°52'09"W	20.17'
L11	S01°07'51"W	45.00'
L12	S61°07'51"W	31.00'
L13	N88°52'09"W	5.02'
L14	N01°07'51"E	170.77'
L15	S88°52'09"E	63.00'
L16	S88°00'20"W	105.25'

200' 100' 0 200'
SCALE: 1" = 200'

CVL CONSULTANTS
CELEBRATING 60 YEARS
4550 North 12th Street
Phoenix, Arizona 85014
602.264.6831
www.cvlci.com

DATE
REVISION
NO.

Coe & Van Loo Consultants, Inc.

A.L.T.A. / N.S.P.S. LAND TITLE SURVEY

SUNSET CANYON
MARICOPA, ARIZONA

Registered Land Surveyor
CERTIFICATE NO.
33851
RICHARD G.
ALCOCER
Date: 11-04-21
ARIZONA U.S.A.

SHEET 02 OF 02

CVL Contact: JERRY DODD
CVL Project #: 1-01-03764-01

© 2021 Coe & Van Loo Consultants, Inc.
All rights reserved to
reproduction in any format

Printed By: **BradH** Print Date: **November 4, 2022** Filename: N:\01\03764\01\CADD\ALTA\ALTA 2022\VS ALTA_2022.dwg

PRELIMINARY WATER DESIGN REPORT

April 5, 2023

Sunset Canyon

Maricopa, Arizona

Preliminary Water Design Report

Prepared for:

Zeitlin Capital, LLC

5050 North 40th Street, Suite 330

Phoenix, AZ 85018

Contact: Harry Zeitlin

Prepared by:

Coe & Van Loo Consultants, Inc.

4550 N. 12th Street

Phoenix, AZ 85014

Contact: Cassandra Alejandro, PE

602.285.4763



Job # 1.01.0376401

CVL CONSULTANTS

Table of Contents

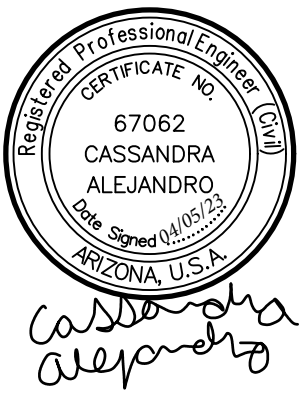
1.0 INTRODUCTION 1
1.1 PROJECT DESCRIPTION 1
1.2 PROJECT LOCATION 1
1.3 LAND USE 1
1.4 TOPOGRAPHIC CONDITIONS 2
2.0 WATER SYSTEM DESIGN CRITERIA 4
2.1 DESIGN CRITERIA 4
3.0 EXISTING INFRASTRUCTURE 5
3.1 EXISTING WATERLINES 5
4.0 PROPOSED INFRASTRUCTURE 6
4.1 WATER DEMANDS 6
4.2 PROPOSED INFRASTRUCTURE 6
5.0 SUMMARY 7

Figures

Figure 1 – Vicinity Map 3

Tables

Table 1 – Land Use 1
Table 2 – Water Demand 6



1.0 INTRODUCTION

1.1 Project Description

Sunset Canyon is an approximately 325 acre master planned community located in the City of Maricopa, Arizona (see Figure 1). Sunset Canyon will have a total of 1,678 proposed single family residential units. The following preliminary water design report will present the proposed water distribution system needed to serve Sunset Canyon. The water system analysis will follow the Global Water Resources (GWR) *Design and Construction Standards for Potable Water, Raw Water, Recycled Water and Wastewater Infrastructure,* dated January, 2023. A hydraulic analysis is out of scope for this preliminary wastewater design report.

1.2 Project Location

Sunset Canyon is bounded to the north by Val Vista Road, to the east by Maricopa Road, to the west by Green Road and to the south by undeveloped agricultural land (See Figure 1). Sunset Canyon is located in a portion of Section 28, Township 5 South, Range 3 East of the Gila and Salt River Base and Meridian; Pinal County, Arizona.

1.3 Land Use

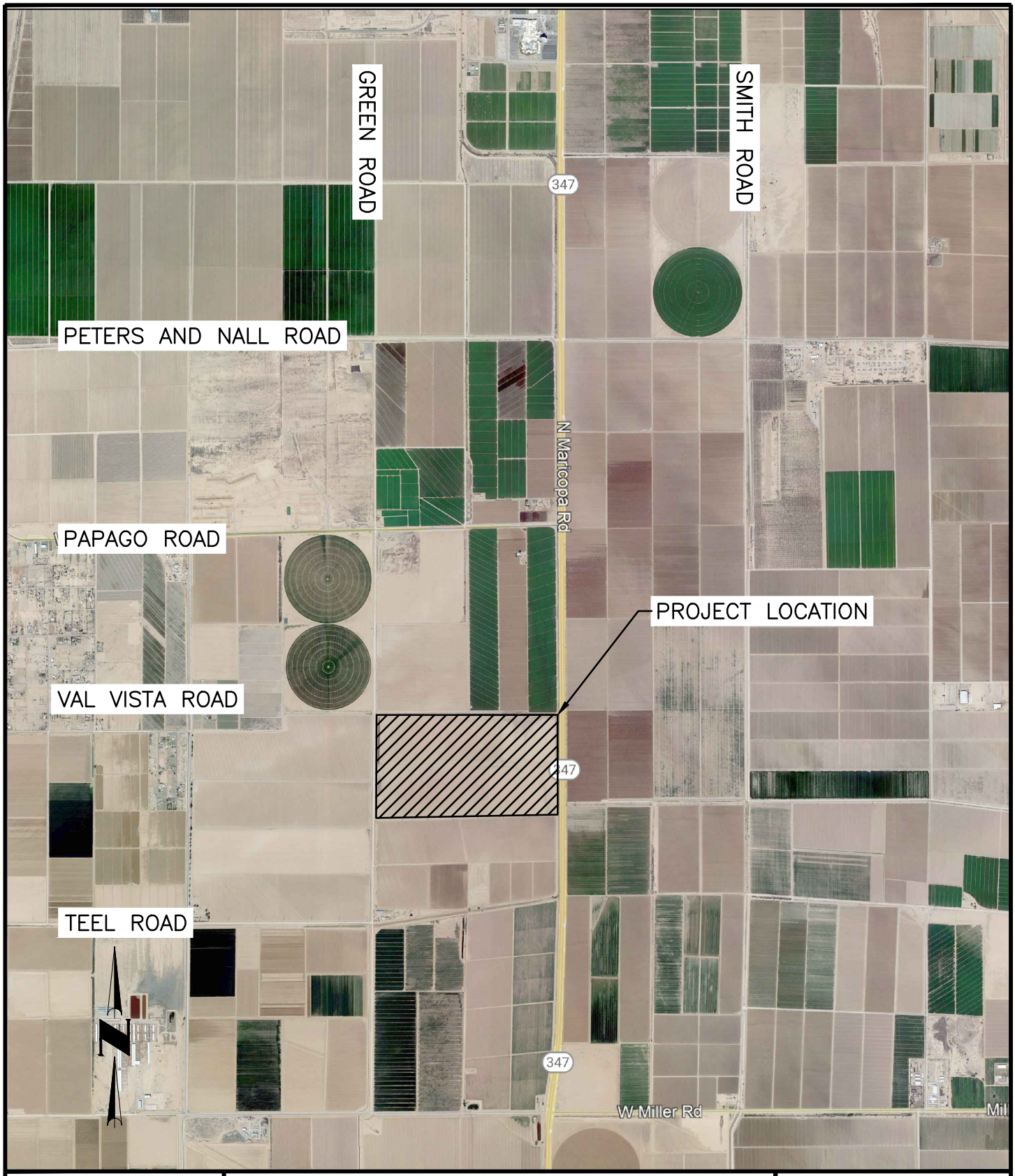
A summary of the land use, dwelling units, acres, and density within Sunset Canyon are presented in Table 1. Water demands for Sunset Canyon are based on gallons per dwelling units for residential land use gallons per day per student for the school, and gallons per day per acre for the parks and commercial land use. Units within Sunset Canyon have been classified as single-family residential (SFR), multi-family residential (MFR), and build to rent (BTR).

Table 1 – Land Use

Parcels	Dwelling Units	Acres	Density
1.1	Commercial	26.54	---
1.2	159	28.89	5.50
1.3	137	29.14	4.70
1.4	108	25.63	4.21
1.5	97	23.18	4.18
1.6	159	28.86	5.51
1.7	128	27.28	4.69
1.8	83	21.93	3.78
1.9	88	20.39	4.32
1.10	School	13.60	---
1.11	112	26.61	4.21
1.12	382	15.93	23.98
1.13	225	18.76	11.99
	Parks	18.35	
Total	**1,678**	**306.74**	**5.47**

1.4 Topographic Conditions

The site encompasses approximately 325 acres of undeveloped agricultural land. The slope of the land decreases in elevation from the southwest to the northeast of the site. The total elevation change is approximately 15 feet, dropping from 1,234 feet above mean sea level (MSL) near the southwest corner of the development to about 1,219 feet MSL at the northeast corner of the development.



NOT TO SCALE

FIGURE 1

4550 North 12th Street
Phoenix, Arizona 85014
Phone 602-264-6831
http://www.cvlci.com

SUNSET CANYON

VICINITY MAP

CVL CONSULTANTS

1.01.0376401

N:\01\0376401\Enviro\Parcel\Figures\Sunset Canyon Figures.dwg **HunterS** **March 28, 2023**

2.0 WATER SYSTEM DESIGN CRITERIA

The following criteria will be used in developing the water design report.

2.1 Design Criteria

This water design report is based on criteria from the Global Water Resources (GWR) *Design and Construction Standards for Potable Water, Raw Water, Recycled Water and Wastewater Infrastructure,* dated January 2023. Demand calculations were conducted using Microsoft Excel. The following criteria were used in developing this plan:

- Demand factors
  - SFR Average Day demand = 250 gpd/DU
  - MFR Average Day demand = 240 gpd/DU
  - Commercial Average Day demand = 2,800 gpad
  - School Average Day demand = 50 gpd / student (assuming 1,000 students)
  - Parks and Landscaped Open Space Average Day demand = 4,374 gpad
  - Maximum day factor = 2.0 x Average Day Demand
  - Peak hour factor = 1.7 x Maximum Day Demand

- Pressure requirements
  - Minimum = 40 psi
  - Maximum = 80 psi
    - Individual PRV's on the service line are required when static pressures exceed 80 psi at the property boundary.
- Velocity
  - Maximum
    - 5 fps for maximum day demand
    - 6 fps for peak hour demand
    - 8 fps for maximum day demand plus fire flow

- Unit friction head loss
  - Maximum
    - 6ft/1,000 ft of pipe for maximum day demand
    - 8ft/1,000 ft of pipe for peak hour demand

- Hazen-Williams Coefficient = 130, Ductile Iron

- Fire Flows = 1,500 gpm for 2 hours

Minimum pressure of 20 psi for maximum day demand plus Fire Flow

3.0 EXISTING INFRASTRUCTURE

3.1 Existing Waterlines

There are no existing onsite waterlines within the proposed development. The closest existing offsite infrastructure include a 12-inch reclaimed waterline stub at the intersection of Val Vista Road and Green Road at the northwest corner of the project site.

4.0 PROPOSED INFRASTRUCTURE

4.1 Water Demands

Sunset Canyon average day demand, maximum day demand, and peak hour demands have been calculated in accordance with the information presented in Section 2.0. Table 2 presents a summary of average day demand, maximum day demand and peak hour demand for Sunset Canyon.

Table 2 – Water Demand

Parcels	Dwelling Units	Acres	Average Day Demand Factor	Unit	Average Day Demand (gpd)	Average Day Demand (gpm)	Maximum Day Demand (gpd)	Maximum Day Demand (gpm)	Peak Hour Demand (gpd)	Peak Hour Demand (gpm)
1.1	Commercial	26.54	2,800	gpad	74,312	51.61	148,624	103.21	252,661	175.46
1.2	159	28.89	250	gpd/DU	39,750	27.60	79,500	55.21	135,150	93.85
1.3	137	29.14	250	gpd/DU	34,250	23.78	68,500	47.57	116,450	80.87
1.4	108	25.63	250	gpd/DU	27,000	18.75	54,000	37.50	91,800	63.75
1.5	97	23.18	250	gpd/DU	24,250	16.84	48,500	33.68	82,450	57.26
1.6	159	28.86	250	gpd/DU	39,750	27.60	79,500	55.21	135,150	93.85
1.7	128	27.28	250	gpd/DU	32,000	22.22	64,000	44.44	108,800	75.56
1.8	83	21.93	250	gpd/DU	20,750	14.41	41,500	28.82	70,550	48.99
1.9	88	20.39	250	gpd/DU	22,000	15.28	44,000	30.56	74,800	51.94
1.1	School	13.60	50	gpd/student	50,000	34.72	100,000	69.44	170,000	118.06
1.11	112	26.61	250	gpd/DU	28,000	19.44	56,000	38.89	95,200	66.11
1.12	382	15.93	240	gpd/DU	91,680	63.67	183,360	127.33	311,712	216.47
1.13	225	18.76	240	gpd/DU	54,000	37.50	108,000	75.00	183,600	127.50
	Parks	18.35	4,374	gpad	80,263	55.74	160,526	111.48	272,894	189.51
Total	**1,678**	**325.09**	**---**	**---**	**618,005**	**429.17**	**1,236,010**	**858.34**	**2,101,217**	**1,459.18**

4.2 Proposed Infrastructure

A proposed onsite system of 8-inch waterlines to the GWR water system. Details for the proposed offsite water system are being discussed with Global to determine the appropriate line size to serve this development and other proposed adjacent developments. Final offsite waterline sizes will be outlined during final design.