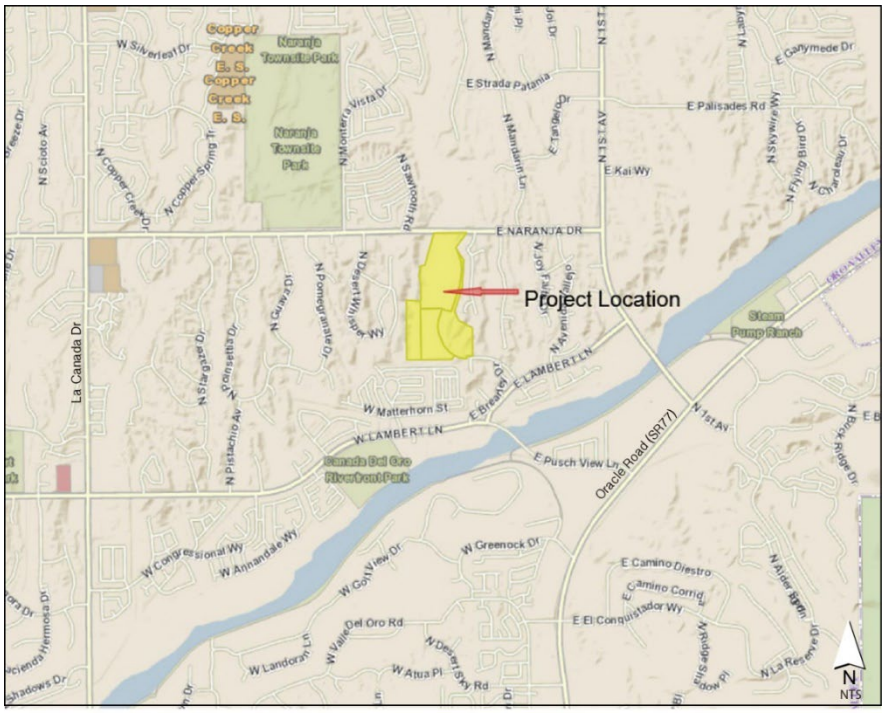
Naranja Trails

Traffic Study



Prepared for submittal to:

Town of Oro Valley, AZ

OV Case #2002761
Grading Permit #2202968

PLANS REVIEWED AND ACCEPTED FOR CODE COMPLIANCE

Engineering: dlaws 07/03/2024

The issuance of a permit shall not be construed to be a permit or approval of any violation of the codes or ordinances of the Town of Oro Valley

M Esparza Engineering, LLC
2934 W. Salvia Drive
Tucson, AZ 85745

October 28, 2020
Updated December 7, 2020
Updated March 21, 2022

Naranja Trails
Traffic Impact Study

Prepared for submittal to:

Town of Oro Valley, Arizona

Prepared by:
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Phone: (520) 207-3358
Project No. 2020.04
Marcos Esparza, P.E., Principal

October 28, 2020
Updated December 7, 2020
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Table of Contents

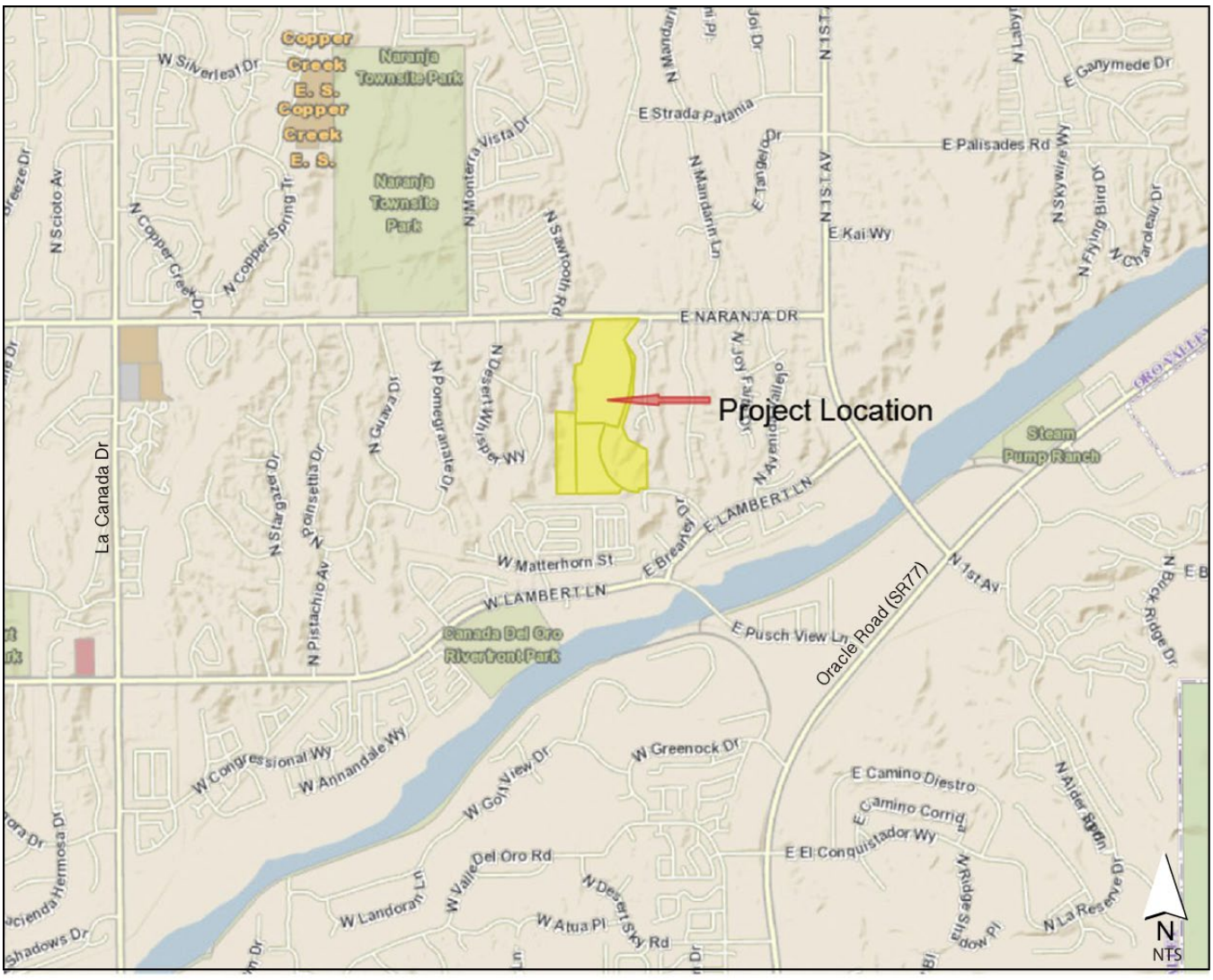
List of Exhibits

1. Introduction and Executive Summary

Purpose of Report and Study Objectives

This report addresses the potential traffic impacts associated with the proposed residential community between Lambert Lane and Naranja Drive, west of 1st Avenue in Oro Valley, Arizona. This report is provided with the Conceptual Site Plan. The parcel is currently vacant. The project location is shown in Exhibit 1.

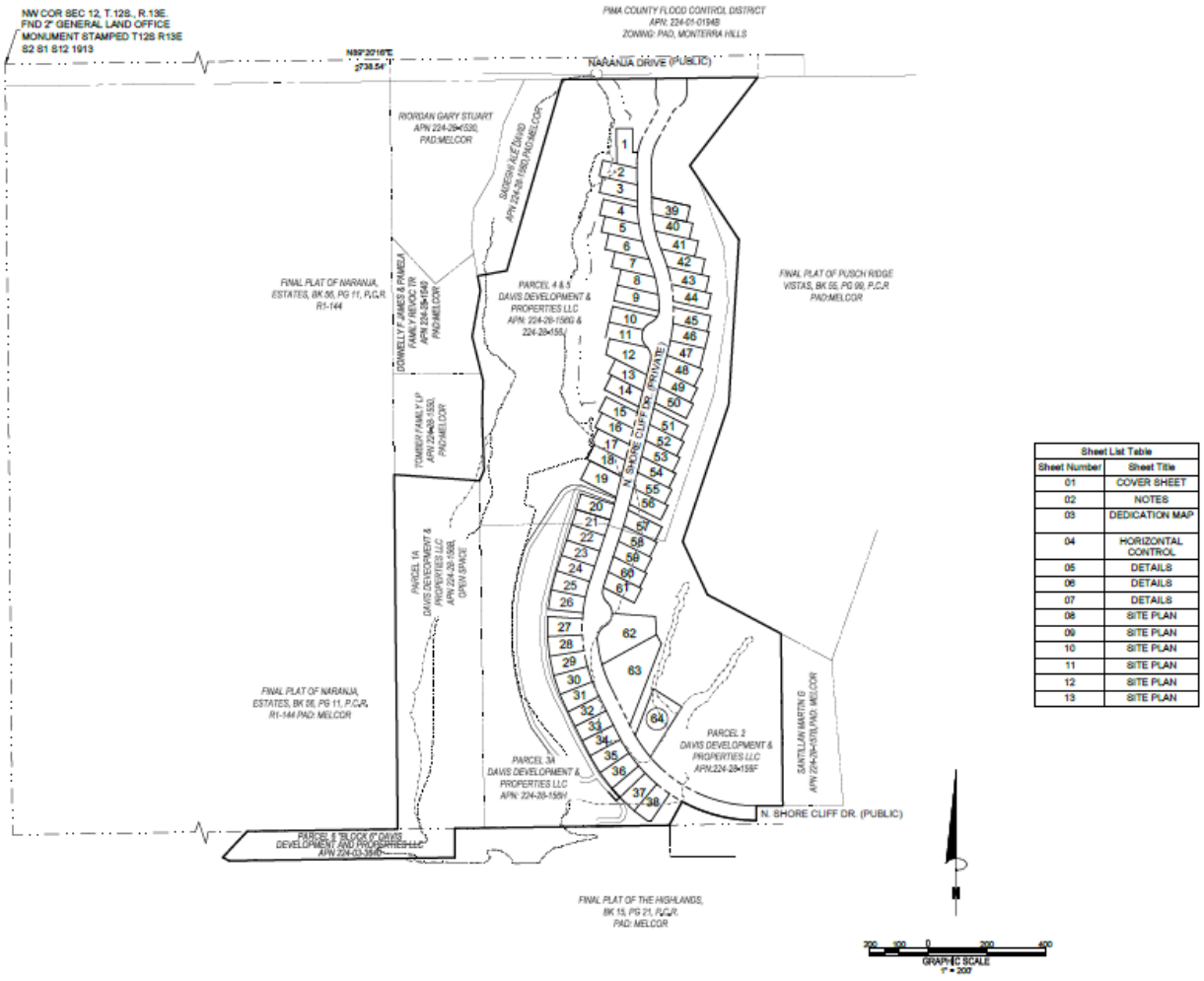
Exhibit 1 Project Location



As shown on the conceptual site plan, the project includes sixty-four single family residential lots. There are two access locations shown in the preliminary site plan, one from Lambert Lane on the south which will be for egress only, via Shore Cliff Drive, and a future intersection with Naranja Drive to the north which will be for both ingress and egress. Both access locations will be gated, and all new roads within the site will be private roads. The conceptual site plan is shown in Exhibit 2.

Exhibit 2 Site Plan

CONCEPTUAL SITE PLAN
FOR
NARANJA TRAILS
2002761
A PORTION OF THE NORTHWEST QUARTER OF SECTION 12,
TOWNSHIP 12 SOUTH, RANGE 13 EAST, OF THE GILA AND
SALT RIVER BASE AND MERIDIAN, PIMA COUNTY, ARIZONA



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The objectives of this traffic study are to determine the traffic impacts of the project on the local transportation system and to recommend improvements to maintain efficient and safe traffic operations for motor vehicle uses, pedestrians, and bicyclists. This report focuses on access management, trip generation, the potential for turn lanes on Naranja Drive and site distances from the new Naranja Drive/Project Access Road.

The analysis also evaluates the operations of the new intersection created at Naranja Drive with the project northern access.

Summary of Findings

Study Area

The project is located on the west side of 1st Avenue between Lambert Lane and Naranja Drive in the Town of Oro Valley, as shown in Exhibit 1. The study area includes the existing and proposed site access driveways on Lambert Lane (via Shore Cliff Drive) and Naranja Drive. Existing (2022) and future (2023) conditions are analyzed. These analysis years have been updated from the previous reports as the original traffic statement was prepared in 2020.

The project area is surrounded mostly by residential uses to the north and west and with commercial areas to the south.

Development Description

The project includes sixty-four (64) single-family residential lots.

Principal Findings

1. All study area roadways and intersections will operate at LOS D or better based on projected 2023 daily traffic volumes, and FDOT level of service standards.
2. Based on a 1.74% background growth rate, the projected daily traffic volumes for 2023 without the project will not exceed the LOS D capacities of the project roadways.
3. A left turn lane is numerically warranted for the westbound left turn at the project driveway on Naranja Drive. A right turns lane is not numerically warranted for the eastbound right turn into the Naranja Drive project access driveway.
4. All new roadways within the site will be private roads.
5. The driveway spacing and corner clearances for the driveways and nearby intersections meet Pima County and Oro Valley standards.
6. The provision of gated entrances should conform to Oro Valley Subdivision Street Standards and Policies Manual requirements.
7. Roadway and subdivision design should conform to current jurisdictional standards. This includes ensuring that sight distance requirements are met.
8. All new traffic signs and markings, on-site and off-site, must comply fully with the *Manual on Uniform Traffic Control Devices* and Town requirements.

2. Proposed Development

Site Location

The project location is shown in Exhibit 1. It will have access from Lambert Lane on the south (egress only) via Shore Cliff Drive and future access via a new roadway connection to Naranja Drive to the north (both ingress and egress).

Land Use and Intensity

The project is a sixty-four (64) lot single family residential development. The site plan is shown in Exhibit 2.

Proposed Access

There are two proposed access locations. Both access locations will be gated, and all new roads in the project site will be private. The project will have access from Lambert Lane on the south (egress only), via Shore Cliff Drive and future access via a new roadway connection to Naranja Drive to the north (both ingress and egress). The access locations meet corner clearance and driveway spacing criteria based on Pima County and Town of Oro Valley typical standards.

Development Phasing and Timing

Based on information from the developer, buildout is not anticipated to be for several years, and a phasing plan has not been developed. For the purposes of this report, the buildout year is assumed to be 2023.

3. Study Area Conditions

Area Characteristics

Land Use

The project is surrounded by single family residential lots. The Canada del Oro wash is south of the site and commercial and retail uses exist along Oracle Road (SR 77). The current site is vacant. It has been zoned and platted for residential use.

Anticipated Future Development

There are no major proposed development projects in the project study area, or in the vicinity of the project. There is a small development near the project:

- Sanctuary at Silverhawk (East of 1st Avenue and north of Naranja Drive) – 44 Residential Units

Program for Completion of Roadway and Intersection Improvements

There are no projects in the vicinity of the project listed in the 2020-2024 Pima Association of Governments Transportation Improvement Program.

Existing Roads

Three arterial routes - Lambert Lane, Naranja Drive and 1st Avenue – are within the study area of the project. Shore Cliff Drive is a local street that provides direct access to the site. Exhibit 3 provides a physical inventory of the roadways within or near the study area.

Exhibit 3 Roadway Inventory

`	*Segment*	*Travel Lanes*	*Speed Limit*	*Oro Valley Bike Map Designation*	*Sun Tran Bus Route*
Shore Cliff Drive	North of Lambert Lane	2	25 MPH	N/A	
Lambert Lane	La Canada to 1st	2	45 MPH	Multipurpose Lane and Paved Shared Use Path	102X, 203X
Naranja Drive	La Canada to 1st	2	45 MPH	Multipurpose Lane	
First Avenue	Tangerine to Naranja	4	45 MPH	Signed Bike Route with Multipurpose Lane	203X
	Naranja to Oracle	4	45 MPH		

Bus Routes:
102X = Northwest/UA Express
203X = Oro Valley-Aero Park Express

Access

There are two proposed access locations for this project: one on Shore Cliff Drive (egress only) and a new one on Naranja Drive (ingress and egress).

Study Area

Based on discussions with Town staff, the study area includes Lambert Lane, Naranja Drive and the project intersections at Lambert Lane and Naranja Drive.

Physical Characteristics

Roadway Characteristics

Lambert Lane and Naranja Drive are major roads with existing or proposed access to the project. All roads are in good condition. Shore Cliff Drive is a local residential road that provides access to residential uses north and south of Lambert Lane.

Naranja Drive and Lambert Lane are major east-west roads that terminate at 1st Avenue to the east. The speed limit on each road is 45 mph. The posted speed limit on Shore Cliff Drive is 25 mph.

Existing Intersections

The closest signalized intersections are 1st Avenue/Lambert Lane and 1st Avenue/Naranja Drive. The intersection of Lambert Lane/Shore Cliff Drive is unsignalized (see Exhibit 4).

Ground Photos

Ground photos of the project and the roadways surrounding it are provided in Exhibit 5.

Exhibit 4 Lambert Lane/Shore Cliff Drive

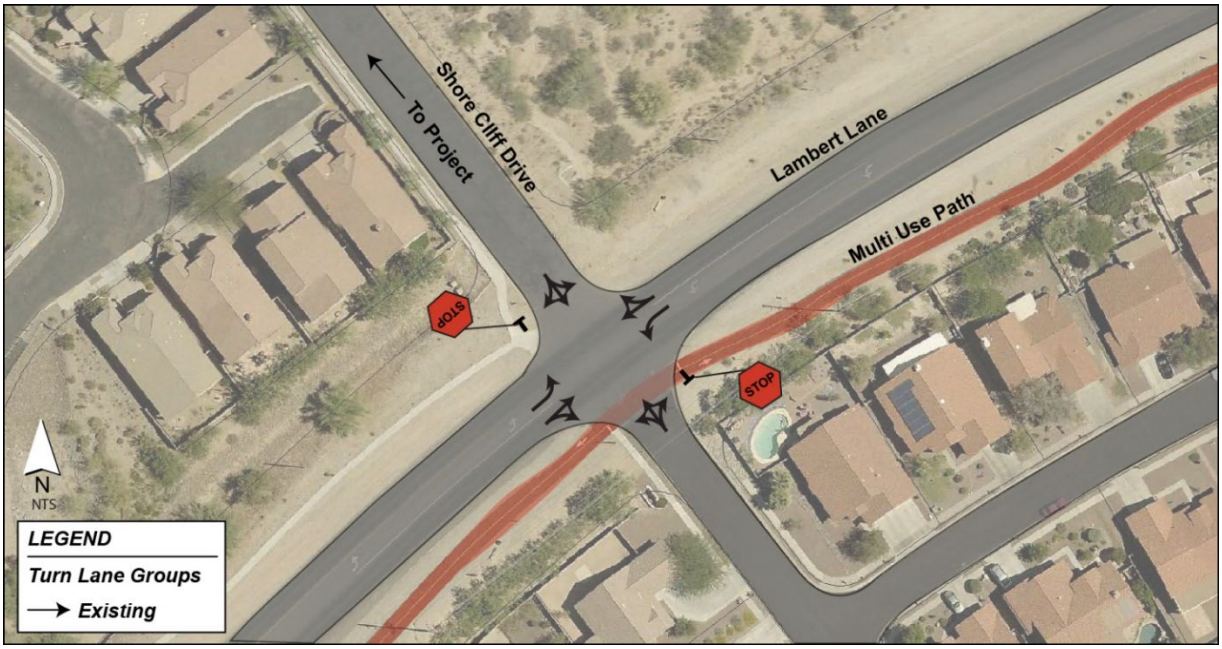


Exhibit 5 Ground Photographs

Looking South on Shore Cliff Drive toward Lambert Lane.

Looking East on Naranja Drive at Proposed North Access Location.

Traffic Control Devices

The intersection of Shore Cliff Drive/Lambert Lane is a four-leg intersection with stop control on Shore Cliff Drive.

Transit Service

Two Sun Tran express bus routes operate on 1st Avenue and Lambert Lane; 102X, and 203X.

Pedestrian/Bicycle Facilities

Oro Valley Bike Map designations for the project roadways are provided in Exhibit 3. There is good bicycle route connectivity adjacent to and in the vicinity of the project.

Traffic Volumes

Daily Traffic Volumes

Daily traffic volumes for most study area roadways are available on PAG's website.

Level of service (LOS) is a qualitative description of how well a roadway or intersection operates under prevailing traffic conditions. A grading system of A through F, similar to academic grades, is utilized. LOS A is free-flowing traffic, whereas LOS F is forced flow and extreme congestion.

Exhibit 6 shows the estimate current traffic volumes, capacity, and LOS for the average weekday on the nearby roadway segments.

Exhibit 6 Roadway Volumes and Level of Service – Existing Conditions

`	*Segment*	*ADT*	*ADT Year*	*Source*	*2022 ADT*	*LOS D Capacity*
Shore Cliff Drive	North of Lambert Lane	<1000	2021	Estimated	<1000	15,930
Lambert Lane	La Canada to 1st	13,000	2021	Estimated	13,226	15,930
Naranja Drive	La Canada to 1st	8,646	2021	PAG	8,796	15,930
First Avenue	Tangerine to Naranja	16,844	2021	PAG	17,137	35,820
	Naranja to Oracle	19,317	2021	PAG	19,653	35,820

Notes: All ADTs from PAG, except for Shore Cliff Drive (estimated). ADT on Lambert estimated from Lambert ADT west of project area.
Notes: 2022 ADTs estimated by applying 1.74%/year growth based on 2017 and 2021 PAG volumes. LOS D Capacity from FDOT 2020 LOS Tables.

Safety Related Deficiencies

ADOT collects crash data for all roadways within the state. We reviewed the data for the 0.75-mile segment of Naranja Drive from Sawtooth Road which is just west of the proposed project driveway to 1st Avenue for the most recently available three-year period (2016-2018).

Roadway Segment Crashes

There was one crash designated as "non-junction" or roadway segment crashes on Naranja Drive during the three-year period. It was a rear-end type crash with no injuries. Based on the segment length of 0.75 miles and daily volume of 8,557 vpd, the three-year crash rate is 0.14 crashes per million-vehicle-miles (MVM).

Intersection Crashes

There were ten "junction-related" crashes at Naranja/1st and two at Naranja/Sawtooth during the three-year period. At Naranja/1st, there were eight rear-end crashes and two left-turn crashes. Of the ten total crashes, eight were non-injury crashes and two were injury-crashes. There was one left-turn crash and one angle crash at Naranja/Sawtooth with one injury crash and one non-injury crash. The three-year crash rates at the intersections were 0.41 crashes per million-entering vehicles at Naranja/1st and 0.20 crashes per MEV at Naranja/Sawtooth.[1]

[1] Daily volumes used to calculate crash rates are from PAG daily volumes on Naranja and 1st Avenue. Daily volumes on Sawtooth were estimated. Entering volumes at Naranja/1st were 22,377 vpd and 9,000 vpd at Naranja/Sawtooth.

4. Projected Traffic

Site Traffic Forecasting

Trip Generation

The future traffic from the project is estimated using the trip rates contained in the Institute of Traffic Engineers' *Trip Generation Manual,* 11th Edition. The number of trips generated is the mathematical product of land use intensity (building square footage, number of dwelling units, etc.) and the trip generation rate, based on an average rate or from a fitted curve equation. The result is the total number of one-way trips (not round trips) expected to be generated by the project. These trips represent the number of vehicles estimated to enter and leave the project.

Trip Generation

We applied the fitted curve equations for weekday, AM and PM peak hour trip generation from *Trip Generation Manual* to estimate trip generation for the land use, Single Family Detached Housing (ITE Land Use Code 210). Applying the equations results in a higher, or more conservative, estimate of site trips than applying the average rates.

Exhibit 7 shows the trip rates and estimated trip generation. Based on the trip rates for the project land uses, the project generates about 669 daily one-way trips with 50 during the AM peak hour and 65 during the PM peak hours.

Exhibit 7 Trip Generation

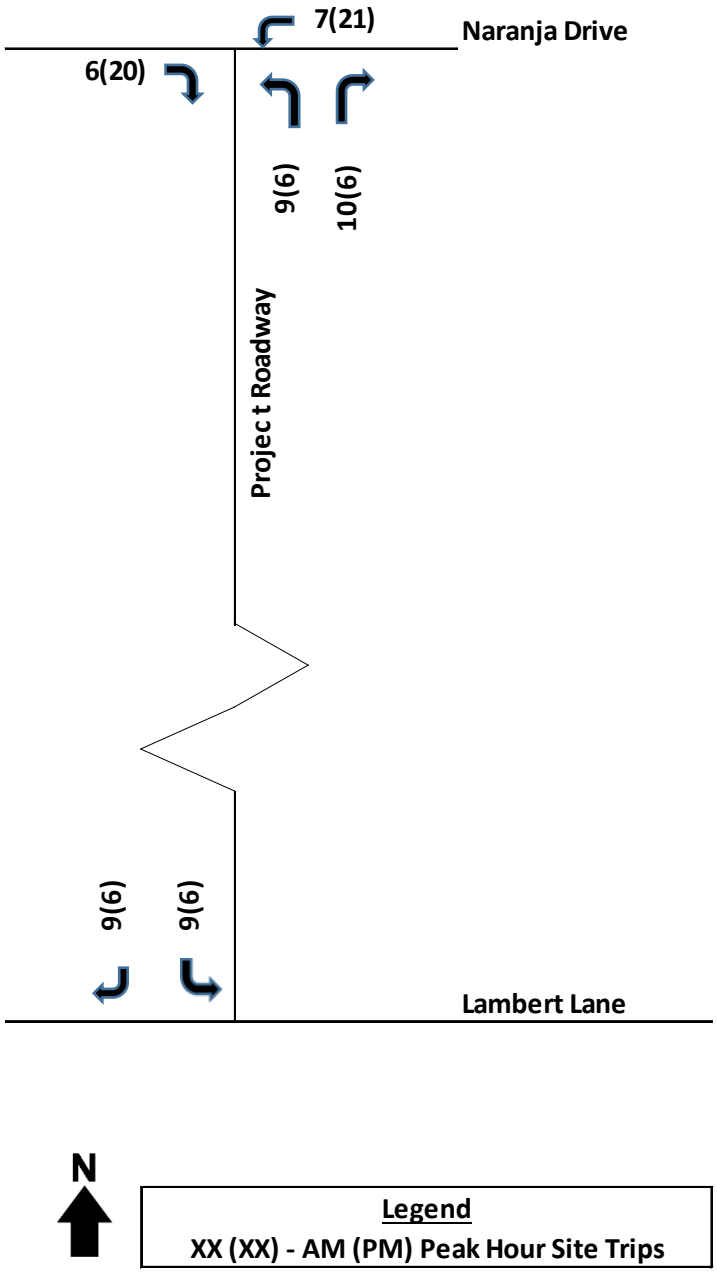
				Trip Rates (Using Fitted Curve Equation)					
				Weekday AM		Weekday PM		Avg Weekday	
Proposed Use	*Unit*	*No.Units*	*ITE Categ.*	*In*	*Out*	*In*	*Out*	*In*	*Out*
Single-Family Detached Housing	DU	64	210	Ln(T)=0.91Ln(X)+0.12 26%	 74%	Ln(T)=0.94Ln(X)+0.27 63%	 37%	Ln(T)=0.92Ln(X)+2.68 50%	 50%

			Trip Generation					
			Weekday AM		Weekday PM		Avg Weekday	
Proposed Use	*Unit*	*No. Units*	*In*	*Out*	*In*	*Out*	*In*	*Out*
Single-Family Detached Housing	Dwelling Units	64	50 13	 37	65 41	 24	669 335	 335

Trip Distribution and Assignment

The majority of the site traffic will be via Naranja Drive since the southern driveway will be an egress only driveway. All of the entering trips will be via Naranja, and the outbound trips were split equally to each driveway. We assumed that at both driveways, 50% of the site trips will be to the east and 50% will be to the west. The site trips at the project driveways are shown in Exhibit 8.

Exhibit 8 Site Traffic Assignment

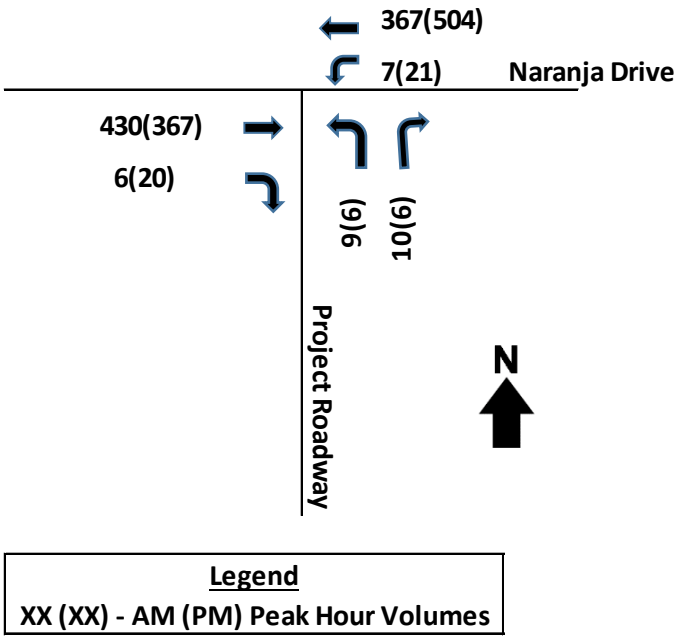


Total Traffic

For this update, we reviewed PAG volumes on Naranja Drive near the project intersection. The AADT volumes for 2017 and 2021 were 8,070 AADT (2017) and 8,646 AADT (2021) representing a 1.74% per year growth rate between those years. We applied this rate to estimate 2023 volumes. There were 2017 recorded hourly volumes on Naranja Drive near the northern driveway location and we applied the 1.74% per year growth rate to estimate the hourly volumes on this road for the purpose of analyzing the year 2023 conditions.

The site traffic assignment was added to the estimated background traffic in 2023 to estimate the total peak hour traffic volumes at the Naranja Drive/Project intersection. The intersection turning movements for the "with project" scenarios are shown in Exhibit 9. We did not show volumes at Shore Cliff Drive/Lambert Lane because the addition of the egress-only site traffic is minimal and would not impact operations at the intersection.

Exhibit 9 Future Traffic Volumes at Naranja Dr/Project Driveway – 2023 (With Project)



Roadway Volumes

Daily site trips were added to the projected background daily volumes for the study year 2023. Recorded or estimated volumes were grown by 1.74%/year based on PAG AADTs and the projected site trips were added to this. Exhibit 10 shows the projected daily volumes on the study area roads.

Based on FDOT criteria, all roadway segments will operate at or below LOS D capacity conditions through 2023, with the project.

Exhibit 10 Future Daily Traffic Volumes and Capacities

`	***Segment***	**2023 Background ADT**	**Site Trips**	**2023 Total ADT**	***LOS D Capacity***
Shore Cliff Drive	North of Lambert Lane	<1000	174	1,500	15,930
Lambert Lane	La Canada to 1st	13,456	87	13,543	15,930
Naranja Drive	La Canada to 1st	8,949	248	9,197	15,930
First Avenue	Tangerine to Naranja	17,435	43	17,479	35,820
	Naranja to Oracle	19,995	43	20,039	35,820

Notes: All ADTs from PAG, except for Shore Cliff Drive (estimated). ADT on Lambert estimated from Lambert ADT west of project area.

Notes: 2023 ADTs estimated by applying 1.74%/year growth based on 2017 and 2021 PAG volumes. LOS D Capacity from FDOT 2020 LOS Tables.

5. Traffic and Improvement Analysis

Level of Service Analysis

With Project

We conducted intersection capacity analyses for the new intersection on Naranja Drive for the build out year 2023. The results of the intersection analysis are shown in Exhibit 11. All movements operate at LOS C or better.

Based on turn lane warrant findings, a westbound left turn lane may be warranted on Naranja Drive. Intersection capacity analyses was conducted with this left turn lane also, and the results with the projected 95th percentile queue for this left turn lane is also shown in the exhibit. The addition of the left turn has a very minor impact on the delay estimates at the intersection.

Because the impact of the project will be very minor at the southern driveway near Shore Cliff Drive (see Exhibit 8), a capacity analysis was not conducted at the southern project intersection with Shore Cliff Drive or at Shore Cliff Drive/Lambert.

Exhibit 11 Intersection Level of Service – Future Conditions

Naranja/Project Driveway	2022 With Project			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Westbound Left	8.3	A	8.2	A
Northbound Left/Right	14.1	B	15.1	C

Naranja/Project Driveway (W/WB Left Turn Lane)	2022 With Project					
	AM		PM		95th% Queue	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	AM	PM
Westbound Left	8.3	A	8.2	A	< 25 feet	< 25 feet
Northbound Left/Right	14.1	B	15	C		

Off Site Improvements

A new driveway will be constructed on Naranja Drive for the northern access. This access will be gated and will be designed to Oro Valley Subdivision Street Standards and Policies Manual for a gated entrance[2]. The southern egress-only driveway will also be gated and will be constructed to Oro Valley standards.

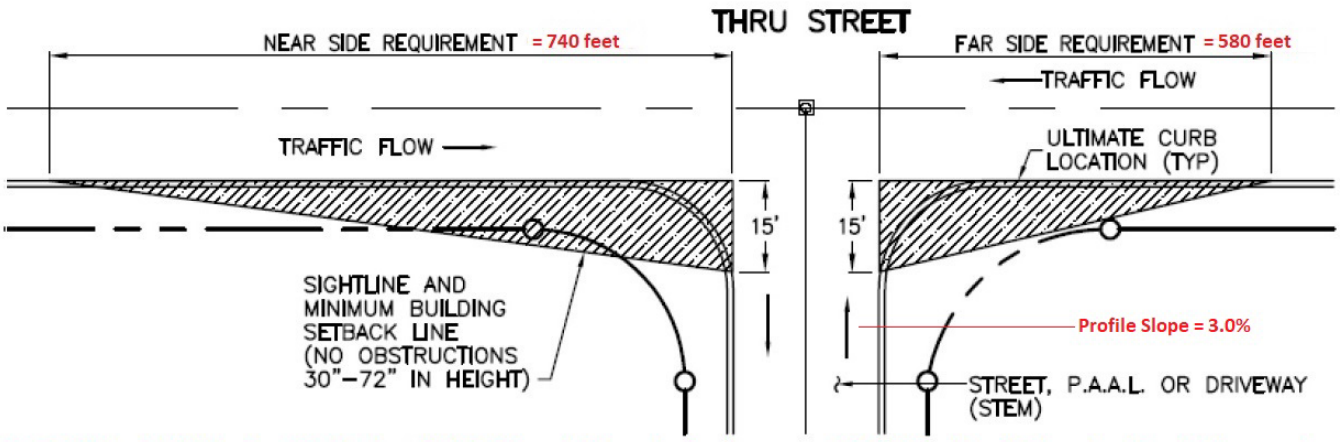
[2] Oro Valley Subdivision Street Standards and Policies Manual, Town of Oro Valley, May 2004, Chapter Sections 4.1 and 4.2.

Traffic Safety

Sight Distance

Sight distances at the project driveways should meet the criteria in Oro Valley's Subdivision Street Standards and Policies Manual. Based on the design speed of 50 mph (5 mph over the speed limit of 45 mph) on Naranja Drive (see Exhibit 12), the near side distance should be 740 feet. The far side distance should be 580 feet. The profile slope of the new street at its intersection with Naranja Drive is 3.0%.

Exhibit 12 Sight Distance Requirements (Naranja Dr/Project Driveway)



Per Oro Valley Subdivision Street Standards and Policies Manual, SVT must be 5 mph over speed limit (45 mph), so SVT based on 50 mph design speed.

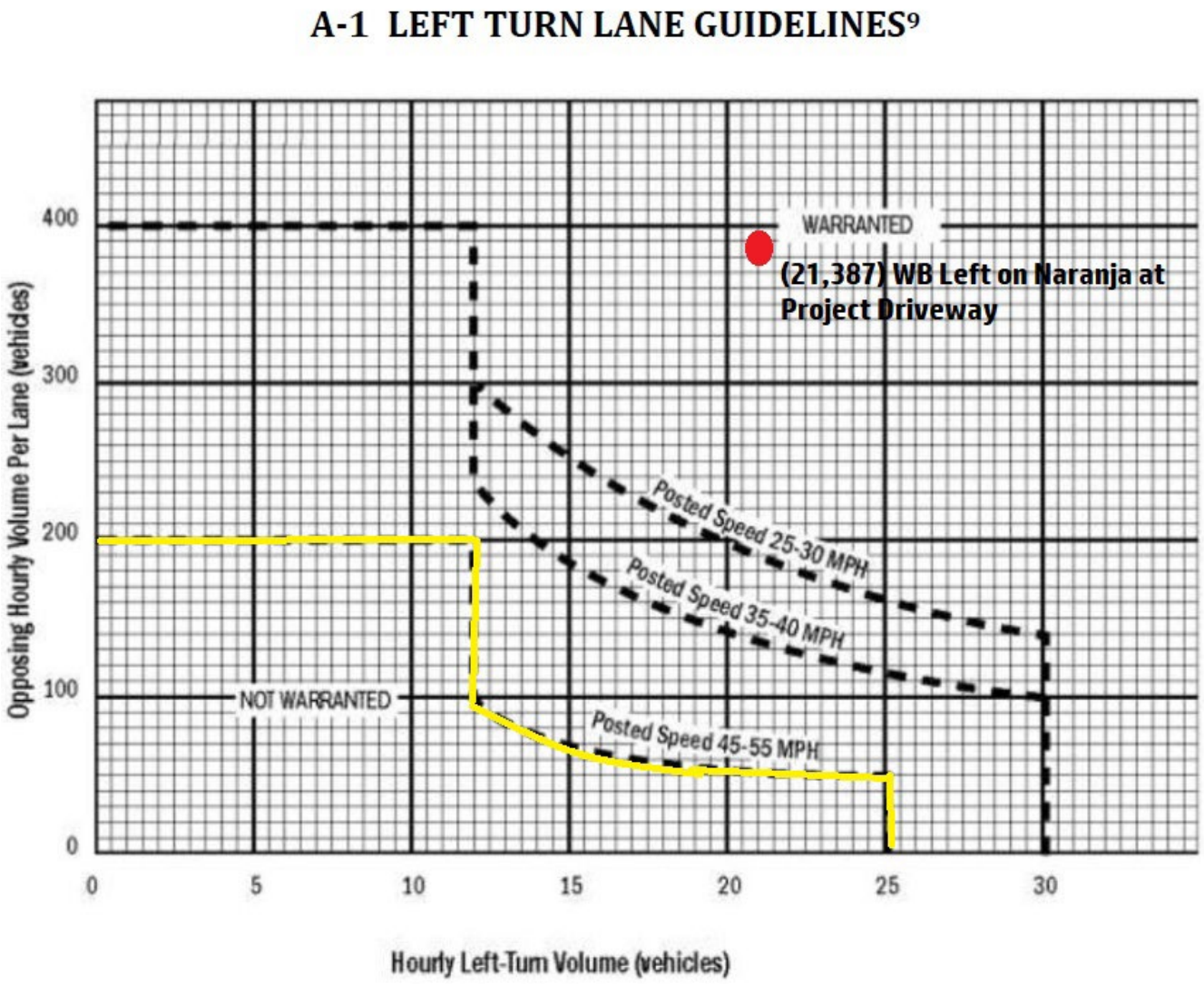
There is existing guardrail on Naranja Drive that will need to be removed at the project entrance. The new locations of the guardrail east and west of the project intersection on Naranja Drive and the end treatments should be where the required sight distances will be attained.

Sight distance is measured from an eye height of 3.5 feet at/near the centerline of a driveway to a point along the crossing roadway that is six feet from the face of curb or edge of the traveled way and 2.75 feet above the roadway. It will be necessary for a survey crew to measure the required sight distance to determine how much guard rail will need to be removed. With the widening for the new left turn lane, the roadway edge is getting closer to the wash and guardrail protection or adequate safety clearance is needed.

Acceleration/Deceleration Lanes, Auxiliary Lanes

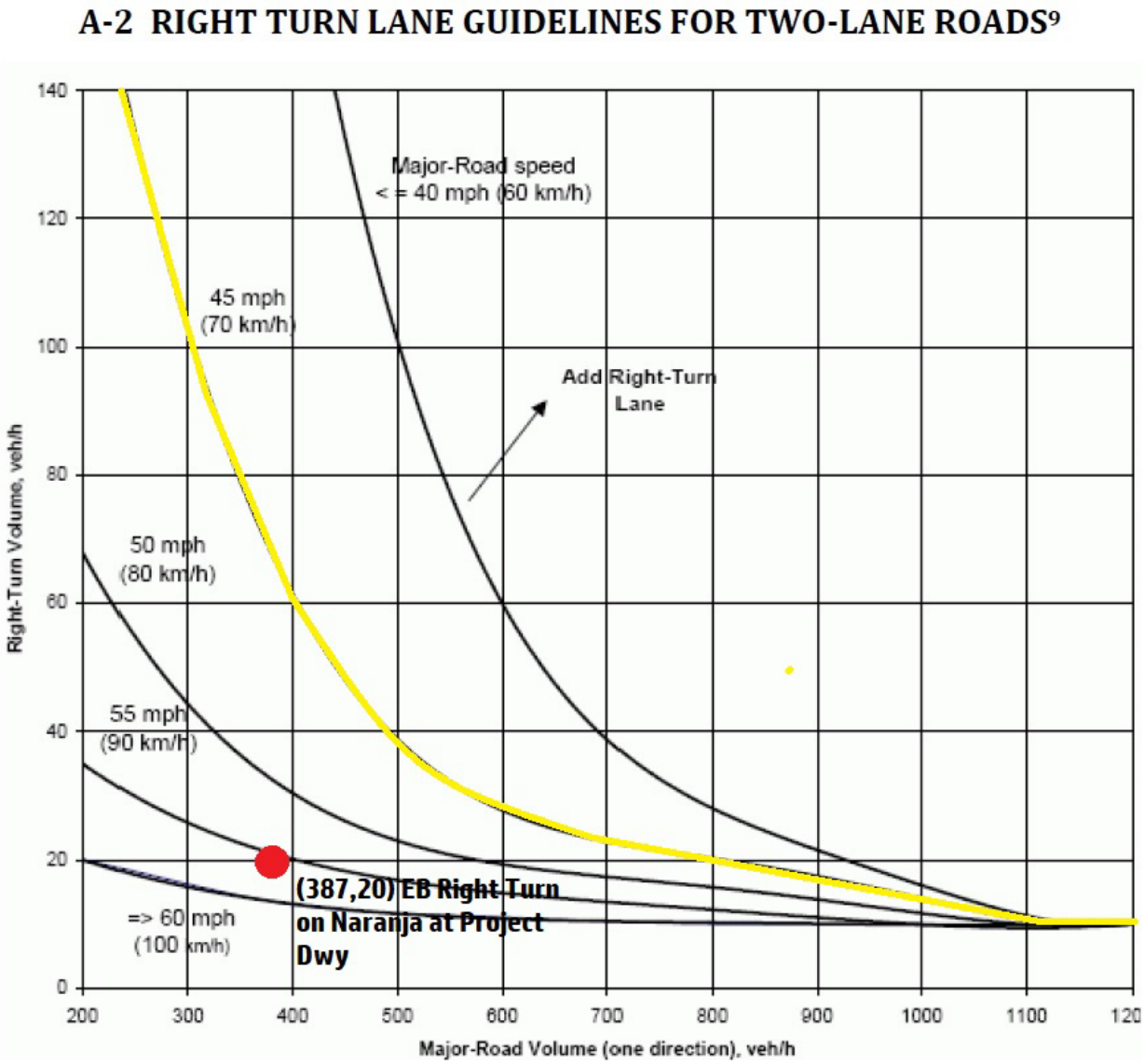
Turn lane warrant criteria from the *Pima County Subdivision and Development Street Standards* were applied to determine whether turn lanes are warranted at the project intersection on Naranja Drive, a 45-mph roadway. Exhibit 13 shows the left turn lane warrant criteria and where the westbound left turn lane volumes fall on the chart. Exhibit 14 shows the right turn lane warrant criteria for a two-lane roadway.

Exhibit 13 Left Turn Lane Warrant Chart



Note: First number within parentheses is the projected left turn lane volume; second number is the opposing peak hour volume.
Source: Pima County Subdivision and Development Street Standards, 2016

Exhibit 14 Right Turn Lane Warrant Chart



Note: First number within parentheses is the major road peak hour volume; second number is the projected peak hour right turn volume.
Source: Pima County Subdivision and Development Street Standards, 2016

Based on the location of the volumes on the chart (Exhibit 13), a left turn lane is warranted for the westbound left turn on Naranja Drive into the project based on volumes at the intersection during the PM peak hour. The two-way left turn lane east of the project driveway can be continued to the west to provide this left turn lane. As shown in Exhibit 14, a right turn lane is not warranted on Naranja Drive based on the peak hour volumes.

Driveway Spacing

As shown in the site plan, the location of the driveway is over 230 feet from the next driveway on Naranja Drive to the east. This distance meets Pima County standards for driveway spacing on a 45-mph road. Oro Valley defers to Pima County standards for driveway spacing.

Alternative Modes Considerations

1st Avenue and Lambert Lane are on bus routes and sidewalks and multi-use paths exist in the vicinity of the project. The area is well served for alternate modes.

6. Conclusions and Recommendations

Conclusions

1. All study area roadways and intersections will operate at LOS D or better based on projected 2023 daily traffic volumes, and FDOT level of service standards.
2. Based on a 1.74% background growth rate, the projected daily traffic volumes for 2023 without the project will not exceed the LOS D capacities of the project roadways.
3. A left turn lane is numerically warranted for the westbound left turn at the project driveway on Naranja Drive. A right turns lane is not numerically warranted for the eastbound right turn into the Naranja Drive project access driveway.
4. All new roadways within the site will be private roads.
5. The driveway spacing and corner clearances for the driveways and nearby intersections meet Pima County and Oro Valley standards.
6. The provision of gated entrances should conform to Oro Valley Subdivision Street Standards and Policies Manual requirements.
7. Roadway and subdivision design should conform to current jurisdictional standards. This includes ensuring that sight distance requirements are met.
8. All new traffic signs and markings, on-site and off-site, must comply fully with the *Manual on Uniform Traffic Control Devices* and Town requirements.

Appendix

- Site Plan
- Traffic Data
- Synchro Analysis

LEGEND

EXISTING	PROPOSED	
◀	◀	SEWER FLOW LINE
○	◉	SEWER MANHOLE
⊗	⊗	WATER VALVE
5	5	LOT NUMBER
6	6	FINAL LOT NUMBER
	✱	SUGGESTED DRIVEWAY LOCATION
FF=18.17 PAD=17.5	FF=18.17 PAD=17.5	PAD & FINISHED FLOOR ELEVATION
	PRV	PRESSURE REDUCING VALVE
4:1	4:1	SIDE SLOPE
		RIP RAP
		STREET SIGN
1350	1350	MAJOR CONTOUR
1350	1350	MINOR CONTOUR

LINE TYPES

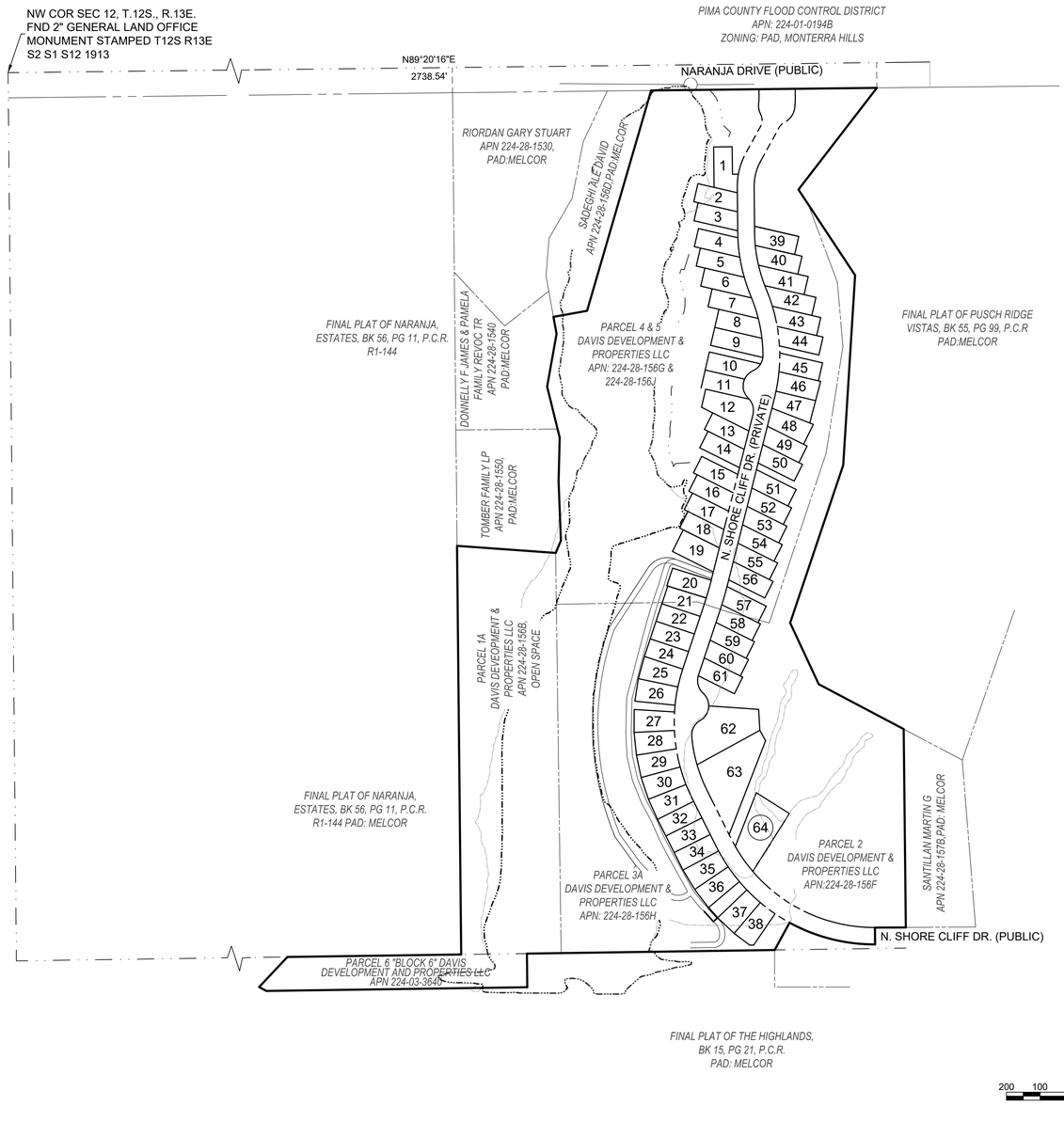
- BOUNDARY
- CENTERLINE
- EASEMENT
- TEMPORARY DRAINAGE EASEMENT
- PROPOSED LOT
- PROPOSED BUILDING ENVELOPE
- PUBLIC UTILITY EASEMENT
- RIGHT OF WAY
- 8"S — SEWER LINE
- 8"W — WATER LINE
- EXISTING SECTION LINE
- SIGHT VISIBILITY TRIANGLE : 25MPH
- EXISTING EASEMENT
- X — EXISTING FENCE
- EXISTING LOT
- EXISTING PUBLIC UTILITY EASEMENT
- EXISTING RIGHT OF WAY
- EX 8"S — EXISTING SEWER LINE
- EXISTING Q_{100} FLOODPLAIN
- PROPOSED Q_{100} FLOODPLAIN
- CRITICAL RESOURCE AREA CATAGORY
- EXISTING 15% SLOPE

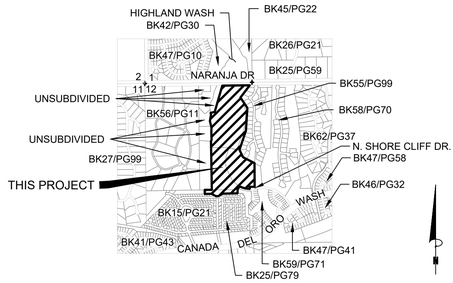
ABBREVIATIONS

(AB)	AS-BUILT
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
BC OR B/C	BACK OF CURB
CA	COMMON AREA
CL	CENTERLINE
EL	ELEVATION
EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EX	EXISTING
FC	FACE OF CURB
FF	FINISH FLOOR
MH	MANHOLE
PL	PROPERTY LINE
P.A.G.	PIMA COUNTY ASSOCIATION OF GOVERNMENTS
PROP	PROPOSED
PUE	PUBLIC UTILITY EASEMENT
R/W	RIGHT OF WAY
S or SWR	SEWER
S/W	SIDEWALK
STD	STANDARD
SVT	SITE VISIBILITY TRIANGLE
TC	TOP OF CURB
W	WATER

CONCEPTUAL SITE PLAN
FOR
NARANJA TRAILS
2002761

A PORTION OF THE NORTHWEST QUARTER OF SECTION 12, TOWNSHIP 12 SOUTH, RANGE 13 EAST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, PIMA COUNTY, ARIZONA





SECTION 12 TOWNSHIP 12 SOUTH
RANGE 13 EAST
VICINITY MAP
NTS

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OWNER
PREMIER BUILDING GROUP
3191 E. 44th STREET
TUCSON, AZ 85713
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PHONE: 520.293.0300

DEVELOPER:
MERITAGE HOMES
5326 N. LA CHOLLA BLVD.
TUCSON, AZ 85741
CONTACT: LISA HOSKIN
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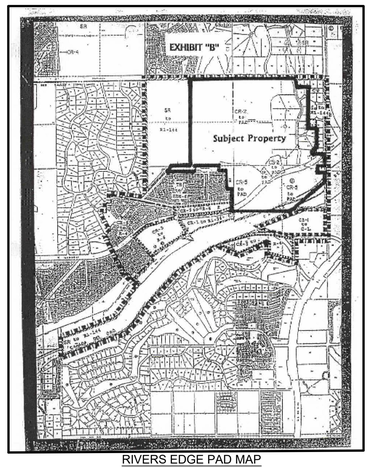
CIVIL ENGINEER
ATWELL
4700 E. SOUTHERN AVENUE
MESA, ARIZONA 85206
PHONE: (520-268-6322)
CONTACT: FRANCIS HEMMAH
FHEMMAH@ATWELL-GROUP.COM
REGISTRATION #52508



RIVERS EDGE PAD MAP
NTS

ATWELL
866.850.4200 www.atwell-group.com
4700 E. SOUTHERN AVENUE
MESA, AZ 85206
520.268.6322

Registered Professional Engineer (Civil)
CERTIFICATE NO.
52508
FRANCIS ALLEN HEMMAH
Date Signed 10/20/2021
ARIZONA U.S.A.

811 Know what's below. Call before you dig.

LOCATION DESCRIPTION
A PORTION OF THE EAST HALF OF THE NORTHWEST QUARTER OF SECTION 12, TOWNSHIP 12 SOUTH, RANGE 13 EAST,OF THE GILA AND SALT RIVER BASE AND MERIDIAN TOWN OF ORO VALLEY, PIMA COUNTY, ARIZONA

CONCEPTUAL SITE PLAN
NARANJA TRAILS
LOTS 1 THROUGH 64 & COMMON AREAS A THROUGH B
TOWN OF ORO VALLEY, PIMA COUNTY, ARIZONA

PM.	F. HEMMAH
DR.	F. HEMMAH
JOB NO.	20000103
DATE.	09.23.2021

ORO VALLEY CASE No: 2000939

COVER SHEET

SHEET NO.
01 OF 13

Location Info	
Location ID	B-125_EB
Type	LINK
Functional Class	5
Located On	NARANJA DR
Between	LA CANADA DR AND 1ST AV
Direction	EB
Community	-
MPO_ID	
HPMS ID	
Agency	Pima Association of Governments

Count Data Info	
Start Date	9/7/2017
End Date	9/8/2017
Start Time	12:00 AM
End Time	12:00 AM
Direction	
Notes	
Count Source	
File Name	B-125_2-WAY_cc_count.xlsx
Weather	
Study	
Owner	pag

Interval: 15 mins

Time	15 Min				Hourly Count	2022 Vol	2023 Vol
	1st	2nd	3rd	4th			
00:00 - 01:00	1	2	1	1	5	5	6
01:00 - 02:00	1	0	0	0	1	1	1
02:00 - 03:00	0	1	3	2	6	7	7
03:00 - 04:00	0	0	2	0	2	2	2
04:00 - 05:00	2	5	8	10	25	27	28
05:00 - 06:00	9	15	15	23	62	68	69
06:00 - 07:00	18	48	53	82	201	219	223
07:00 - 08:00	81	93	93	121	388	423	430
08:00 - 09:00	106	97	90	82	375	409	416
09:00 - 10:00	64	42	63	47	216	235	240
10:00 - 11:00	64	63	66	56	249	271	276
11:00 - 12:00	65	73	50	72	260	283	288
12:00 - 13:00	72	65	59	79	275	300	305
13:00 - 14:00	76	76	66	51	269	293	298
14:00 - 15:00	39	63	96	80	278	303	308
15:00 - 16:00	60	97	113	87	357	389	396
16:00 - 17:00	74	79	76	76	305	332	338
17:00 - 18:00	90	78	80	83	331	361	367
18:00 - 19:00	67	76	65	72	280	305	311
19:00 - 20:00	82	54	58	40	234	255	260
20:00 - 21:00	23	22	23	28	96	105	106
21:00 - 22:00	20	33	21	16	90	98	100
22:00 - 23:00	13	4	5	2	24	26	27
23:00 - 24:00	3	3	4	3	13	14	14
TOTAL					4342	4733	4815

Location Info	
Location ID	B-125_WB
Type	LINK
Functional Class	5
Located On	NARANJA DR
Between	LA CANADA DR AND 1ST AV
Direction	WB
Community	-
MPO_ID	
HPMS ID	
Agency	Pima Association of Governments

Count Data Info	
Start Date	9/7/2017
End Date	9/8/2017
Start Time	12:00 AM
End Time	12:00 AM
Direction	
Notes	
Count Source	
File Name	B-125_2-WAY_cc_count.xlsx
Weather	
Study	
Owner	pag

Interval: 15 mins

Time	15 Min				Hourly Count	2022 Vol	2023 Vol
	1st	2nd	3rd	4th			
00:00 - 01:00	3	3	2	0	8	9	9
01:00 - 02:00	1	2	0	2	5	5	6
02:00 - 03:00	1	0	0	2	3	3	3
03:00 - 04:00	0	0	2	0	2	2	2
04:00 - 05:00	1	1	3	4	9	10	10
05:00 - 06:00	6	7	13	13	39	43	43
06:00 - 07:00	17	30	37	46	130	142	144
07:00 - 08:00	50	69	113	99	331	361	367
08:00 - 09:00	64	69	75	67	275	300	305
09:00 - 10:00	61	53	54	47	215	234	238
10:00 - 11:00	53	50	50	55	208	227	231
11:00 - 12:00	58	66	65	53	242	264	268
12:00 - 13:00	61	79	70	73	283	308	314
13:00 - 14:00	61	74	63	74	272	297	302
14:00 - 15:00	84	85	63	96	328	358	364
15:00 - 16:00	95	87	84	109	375	409	416
16:00 - 17:00	110	97	99	98	404	440	448
17:00 - 18:00	102	130	122	100	454	495	504
18:00 - 19:00	86	103	65	88	342	373	379
19:00 - 20:00	74	61	40	36	211	230	234
20:00 - 21:00	34	39	30	30	133	145	148
21:00 - 22:00	30	27	24	16	97	106	108
22:00 - 23:00	11	6	6	6	29	32	32
23:00 - 24:00	7	7	5	2	21	23	23
TOTAL					4416	4814	4898

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	430	6	7	367	9	10
Future Vol, veh/h	430	6	7	367	9	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	467	7	8	399	10	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	474	0	886	471
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	415	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1088	-	315	593
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1088	-	312	593
Mov Cap-2 Maneuver	-	-	-	-	312	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	-	-	1088	-
HCM Lane V/C Ratio	0.05	-	-	0.007	-
HCM Control Delay (s)	14.1	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	367	20	21	504	6	6
Future Vol, veh/h	367	20	21	504	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	399	22	23	548	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	421	0	1004	410
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	594	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1138	-	268	642
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	552	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1138	-	260	642
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	552	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	370	-	-	1138	-
HCM Lane V/C Ratio	0.035	-	-	0.02	-
HCM Control Delay (s)	15.1	-	-	8.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	430	6	7	367	9	10
Future Vol, veh/h	430	6	7	367	9	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	467	7	8	399	10	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	474	0	886	471
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	415	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1088	-	315	593
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1088	-	313	593
Mov Cap-2 Maneuver	-	-	-	-	313	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	1088	-
HCM Lane V/C Ratio	0.05	-	-	0.007	-
HCM Control Delay (s)	14.1	-	-	8.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	367	20	21	504	6	6
Future Vol, veh/h	367	20	21	504	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	399	22	23	548	7	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	421	0	1004	410
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	594	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1138	-	268	642
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	552	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1138	-	263	642
Mov Cap-2 Maneuver	-	-	-	-	263	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	552	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	373	-	-	1138	-
HCM Lane V/C Ratio	0.035	-	-	0.02	-
HCM Control Delay (s)	15	-	-	8.2	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-