



February 23, 2023

Mr. Ross Rulney
OV 132, LLC
P.O. Box 43426
Tucson, Arizona 8533

SUBJECT: VISTOSO MULTI-FAMILY TRAFFIC IMPACT STATEMENT
(RICK ENGINEERING COMPANY JOB NUMBER 19548-P)

Dear Mr. Rulney:

The following Traffic Impact Statement (TIS) has been prepared to quantify the expected traffic generation and to evaluate the site access points for the proposed Vistoso multi-family development located within the Town of Oro Valley. It is anticipated to develop 132 multi-family dwelling units within 8.26 acres generally located south of Vistoso Highlands Drive (opposite the intersections of Steprock Canyon Place/Vistoso Highlands Drive and Bowcreek Springs Place/Vistoso Highlands Drive intersections). The project proposes to take access via two full access intersections along Vistoso Highlands Drive. This development also proposes to relocate the existing Vistoso Trails Nature Preserve Trailhead access and parking lot, just west of the Vistoso multi-family development. Opening year for this development is anticipated to be in mid-2024. **Attachment A** shows the site plan for the proposed project. With the proposed project estimated to generate less than 100 peak hour trips, a TIS was prepared based on initial comments received from Town staff on December 14, 2022.

Within the immediate project area, Vistoso Highlands Drive is currently constructed as a two-lane undivided east-west roadway that provides one vehicular travel lane and a bike lane in each direction. The posted speed limit is 30 mph and on-street parking is restricted. Based on recent 2023 traffic volume data collected by Field Data Services of Arizona, Vistoso Highlands Drive within the project vicinity currently carries about 1,830 ADT. **Attachment B** contains the Vistoso Highlands Drive ADT data as well as peak hour turning movement count data at its intersection with both Steprock Canton Place and Bowcreek Springs Place.

PROJECT TRAFFIC GENERATION

The traffic generation for the proposed multi-family development was estimated based on the trip generation rates listed in the 11th edition of the ITE (Institute of Transportation Engineer)'s *Trip Generation* publication for a multi-family housing-low rise land use (ITE Land Use Code 220). **Attachment C** contains a copy of these trip generation rates.

Based on these trip rates, the proposed 132 units are estimated to generate 992 ADT with 64 AM peak hour trips (15 inbound/49 outbound) and 78 PM peak hour trips (49 inbound/22 outbound) as summarized in **Table 1**.

Table 1
VISTOSO MULTI-FAMILY TRIP GENERATION

LAND USE	SIZE (UNITS)	RATE (TRIP/ UNIT)	ADT	AM PEAK			PM PEAK		
				RATE (TRIP/ UNIT)	VOLUME		RATE (TRIP/ UNIT)	VOLUME	
					IN	OUT		IN	OUT
Multi-family housing, low rise (ITE Code 220)	132	*	922	*	15	49	*	49	22

* Trip rates per ITE Trip Generation, 11th Edition publication were utilized for Multi Family Housing, Low Rise use (ITE Lane Use Code 220) per the below listed fitted curve equations (See Attachment B)
ADT: $T=6.41(x)+75.31$
AM peak: $T=0.31(x)+22.85$
PM peak: $T=0.43(x)+20.55$

PROJECT ACCESS OPERATIONS

The proposed two project access points along Vistoso Highlands Drive were analyzed for the anticipated mid-2024 opening year conditions. The western project access is located about 218 feet west of Steprock Canyon Place and the eastern project access is located about 263 feet east of Bowcreek Springs Place. The project trips were assigned to these locations based on local traffic patterns and review of the recent traffic count data collected along Vistoso Highlands Drive. In general, about 95% of the project trips are going to/coming from east of the project site and the remaining 5% going to/coming from the west.

The AM/PM peak hour intersection operational analysis results show that the conflicting movements at the two proposed project access points along Vistoso Highlands Drive were calculated to operate acceptably (LOS A) during the AM and PM peak hours at opening year. **Attachment D** contains the HCM intersection calculation sheets.

CONCLUSIONS/RECOMMENDATIONS

Based on the anticipated traffic generation for the Vistoso multi-family development (132 units), the following is recommended to help facilitate project access along Vistoso Highlands Drive.

VISTOSO HIGHLANDS DRIVE/WEST PROJECT ACCESS

This unsignalized intersection should allow for full access movements with stop sign control for the northbound approach. The intersection lane configuration should be as follows:

- Northbound: - One shared left-right lane
- Eastbound: - One shared through-right lane
- Westbound: - One shared left-through

Mr. Ross Rulney
February 23, 2023
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VISTOSO HIGHLANDS DRIVE/EAST PROJECT ACCESS

This unsignalized intersection should allow for full access movements with stop sign control for the northbound approach. The intersection lane configuration should be as follows:

Northbound: - One shared left-right lane

Eastbound: - One shared through-right lane

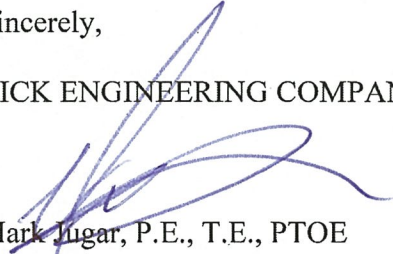
Westbound: - One shared left-through

Attachment E shows that separate turn lanes were not warranted at any of the project access locations based on evaluation methodologies described in Pima County's *2016 Subdivision and Development Street Standards*.

Should you have any questions, please contact me at (619) 291-0707 or mjugar@rickengineering.com.

Sincerely,

RICK ENGINEERING COMPANY


Mark Jugar, P.E., T.E., PTOE

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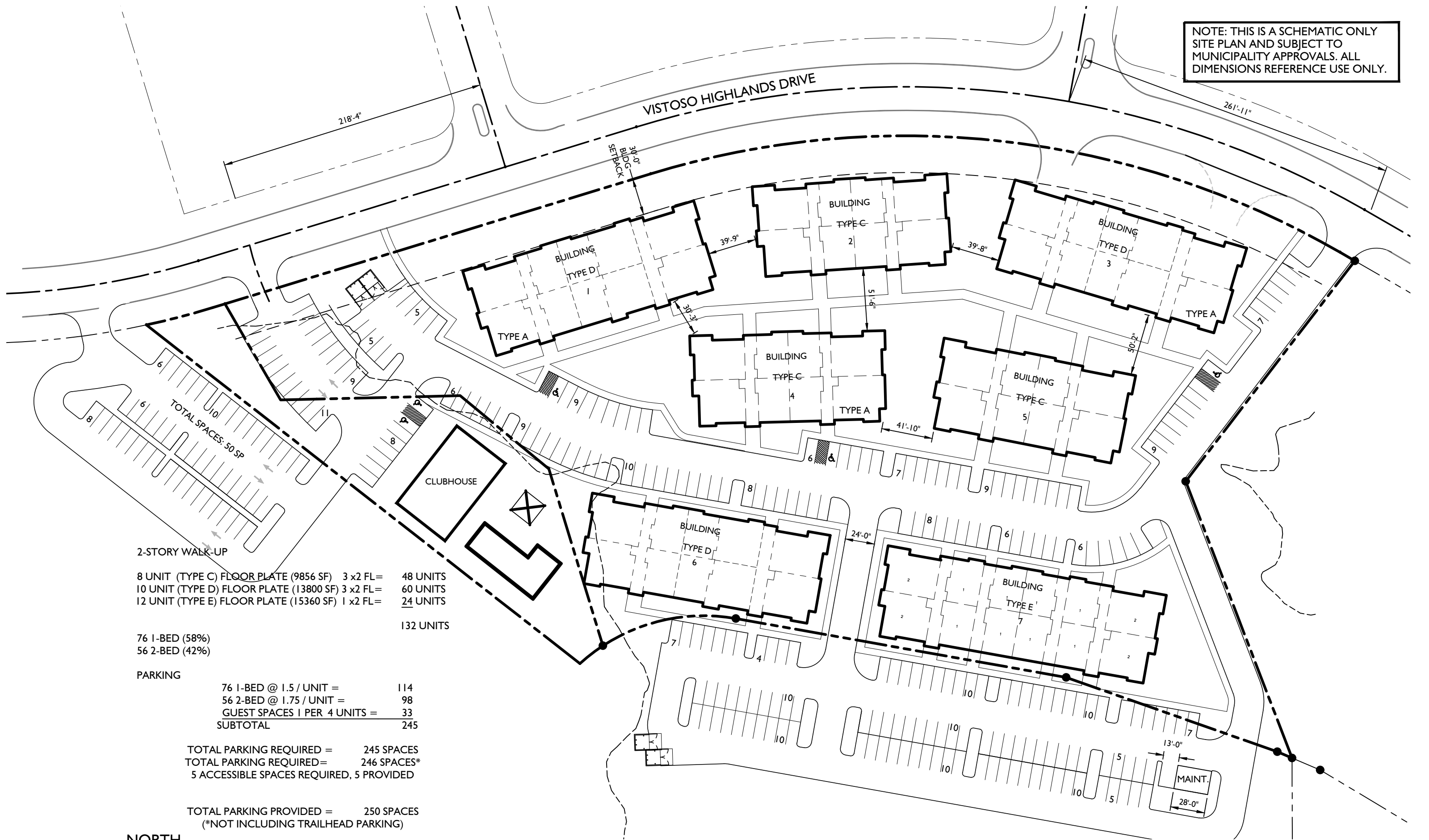
Attachments



ATTACHMENT A

PROPOSED SITE PLAN

NOTE: THIS IS A SCHEMATIC ONLY
SITE PLAN AND SUBJECT TO
MUNICIPALITY APPROVALS. ALL
DIMENSIONS REFERENCE USE ONLY.



2-STORY WALK-UP

8 UNIT (TYPE C) FLOOR PLATE (9856 SF) 3 x2 FL= 48 UNITS
10 UNIT (TYPE D) FLOOR PLATE (13800 SF) 3 x2 FL= 60 UNITS
12 UNIT (TYPE E) FLOOR PLATE (15360 SF) 1 x2 FL= 24 UNITS

76 1-BED (58%)
56 2-BED (42%)
132 UNITS

PARKING

76 1-BED @ 1.5 / UNIT =	114
56 2-BED @ 1.75 / UNIT =	98
GUEST SPACES 1 PER 4 UNITS =	33
SUBTOTAL	245

TOTAL PARKING REQUIRED = 245 SPACES
TOTAL PARKING REQUIRED= 246 SPACES*
5 ACCESSIBLE SPACES REQUIRED, 5 PROVIDED

TOTAL PARKING PROVIDED = 250 SPACES
(*NOT INCLUDING TRAILHEAD PARKING)



SITE PLAN EXHIBIT - VISTOSO

NOT TO SCALE DATE: 01.26.23 A23#22039

a.23studios

711 E. 9th Street
Tucson, AZ 85719
520.245.4010 phone



ATTACHMENT B

VISTOSO HIGHLANDS DRIVE TRAFFIC COUNT SHEETS

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, January 25, 2023

City: Oro Valley

Project# 23-1059-004

Location : Vistoso Highlands Dr east of Vistoso Trails Eastern Dwy

DAY 1

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	0	12:00			19	19
00:15			0	0	12:15			20	21
00:30			1	0	12:30			16	28
00:45			1	2 0 0 2	12:45			14 69 21 89 158	
01:00			0	0	13:00			20	12
01:15			0	0	13:15			25	8
01:30			0	0	13:30			16	20
01:45			0	0 0 0 0	13:45			21 82 21 61 143	
02:00			0	1	14:00			17	25
02:15			0	0	14:15			32	17
02:30			0	0	14:30			28	17
02:45			0	0 1 1	14:45			18 95 18 77 172	
03:00			0	0	15:00			32	21
03:15			0	0	15:15			23	18
03:30			0	0	15:30			27	15
03:45			0	0 0 0 0	15:45			22 104 17 71 175	
04:00			0	0	16:00			15	18
04:15			0	0	16:15			29	8
04:30			1	0	16:30			10	16
04:45			0	1 0 0 1	16:45			14 68 25 67 135	
05:00			2	0	17:00			15	13
05:15			1	0	17:15			14	10
05:30			0	0	17:30			14	7
05:45			3	6 0 0 6	17:45			13 56 10 40 96	
06:00			1	0	18:00			12	5
06:15			2	2	18:15			10	13
06:30			6	4	18:30			12	8
06:45			4	13 11 17 30	18:45			5 39 5 31 70	
07:00			10	15	19:00			3	4
07:15			8	9	19:15			6	6
07:30			20	19	19:30			3	8
07:45			8	46 12 55 101	19:45			0 12 7 25 37	
08:00			21	22	20:00			2	7
08:15			14	12	20:15			3	6
08:30			18	20	20:30			1	2
08:45			13	66 24 78 144	20:45			1 7 4 19 26	
09:00			14	21	21:00			0	2
09:15			17	22	21:15			2	6
09:30			21	15	21:30			4	2
09:45			12	64 23 81 145	21:45			5 11 0 10 21	
10:00			19	13	22:00			3	0
10:15			18	14	22:15			2	0
10:30			17	21	22:30			0	2
10:45			22	76 35 83 159	22:45			0 5 0 2 7	
11:00			19	17	23:00			2	0
11:15			25	21	23:15			0	1
11:30			28	12	23:30			0	0
11:45			29	101 16 66 167	23:45			0 2 0 1 3	

Total Vol.	375	381	756	550	493	1043
GPS Coordinates:	32.456875, -110.982177					
	Daily Totals					
	NB	SB	EB	WB	Combined	
			925	874	1799	
	AM					
Split %	49.6%	50.4%	42.0%	52.7%	47.3%	58.0%
Peak Hour	11:00	10:30	10:45	14:15	12:00	14:15
Volume	101	94	179	110	89	183
P.H.F.	0.87	0.67	0.79	0.86	0.79	0.86

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, January 26, 2023

City: Oro Valley

Project# 23-1059-004

Location : Vistoso Highlands Dr east of Vistoso Trails Eastern Dwy

DAY 2

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	0	12:00			16	22
00:15			0	0	12:15			19	15
00:30			0	0	12:30			19	28
00:45			0	0	12:45			15	69
01:00			0	0	13:00			21	26
01:15			0	0	13:15			23	20
01:30			0	0	13:30			17	20
01:45			0	0	13:45			27	88
02:00			0	0	14:00			36	27
02:15			0	0	14:15			25	20
02:30			0	0	14:30			25	19
02:45			0	0	14:45			22	108
03:00			0	0	15:00			40	9
03:15			0	0	15:15			23	18
03:30			0	0	15:30			30	15
03:45			0	0	15:45			15	108
04:00			0	0	16:00			21	18
04:15			0	0	16:15			13	16
04:30			0	0	16:30			16	22
04:45			1	1	16:45			12	62
05:00			1	0	17:00			12	12
05:15			6	2	17:15			8	8
05:30			0	0	17:30			18	12
05:45			3	10	17:45			16	54
06:00			5	0	18:00			9	11
06:15			1	3	18:15			4	9
06:30			1	6	18:30			8	14
06:45			9	16	18:45			6	27
07:00			12	10	19:00			10	4
07:15			5	12	19:15			3	5
07:30			14	12	19:30			5	3
07:45			8	39	19:45			5	23
08:00			21	17	20:00			4	9
08:15			15	13	20:15			7	5
08:30			19	32	20:30			1	7
08:45			12	67	20:45			0	12
09:00			17	17	21:00			3	2
09:15			18	16	21:15			0	6
09:30			17	17	21:30			1	4
09:45			15	67	21:45			0	4
10:00			18	13	22:00			0	0
10:15			24	15	22:15			0	0
10:30			20	13	22:30			0	0
10:45			20	82	22:45			0	0
11:00			25	16	23:00			0	0
11:15			22	17	23:15			0	0
11:30			34	24	23:30			0	1
11:45			30	111	23:45			0	0

Total Vol.	393	378	771	555	534	1089
GPS Coordinates:	32.456875, -110.982177					
			Daily Totals			
	NB	SB	EB	WB	Combined	
			948	912	1860	
	AM		PM			
Split %	51.0%	49.0%	51.0%	49.0%	58.5%	
Peak Hour	11:00	11:45	11:00	14:45	12:30	13:45
Volume	111	92	195	115	98	199
P.H.F.	0.82	0.82	0.84	0.72	0.88	0.79

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, January 25, 2023 &
Thursday, January 26, 2023

City: Oro Valley

Project# 23-1059-004

Location : Vistoso Highlands Dr east of Vistoso Trails Eastern Dwy

2-DAY AVERAGE

AM Period	NB		SB		EB		WB		PM Period	NB		SB		EB		WB			
00:00	0		0		0		0		12:00	0		0		18		21			
00:15	0		0		0		0		12:15	0		0		20		18			
00:30	0		0		1		0		12:30	0		0		18		28			
00:45	0	0	0	0	1	1	0	0	1	12:45	0	0	0	0	15	69	23	89	158
01:00	0		0		0		0		13:00	0		0		21		19			
01:15	0		0		0		0		13:15	0		0		24		14			
01:30	0		0		0		0		13:30	0		0		17		20			
01:45	0	0	0	0	0	0	0	0	13:45	0	0	0	0	24	85	21	74	159	
02:00	0		0		0		1		14:00	0		0		27		26			
02:15	0		0		0		0		14:15	0		0		29		19			
02:30	0		0		0		0		14:30	0		0		27		18			
02:45	0	0	0	0	0	0	0	1	1	14:45	0	0	0	0	20	102	21	84	185
03:00	0		0		0		0		15:00	0		0		36		15			
03:15	0		0		0		0		15:15	0		0		23		18			
03:30	0		0		0		0		15:30	0		0		29		15			
03:45	0	0	0	0	0	0	0	0	15:45	0	0	0	0	19	106	18	66	172	
04:00	0		0		0		0		16:00	0		0		18		18			
04:15	0		0		0		0		16:15	0		0		21		12			
04:30	0		0		1		0		16:30	0		0		13		19			
04:45	0	0	0	0	1	1	0	0	1	16:45	0	0	0	0	13	65	16	65	130
05:00	0		0		2		0		17:00	0		0		14		13			
05:15	0		0		4		1		17:15	0		0		11		9			
05:30	0		0		0		0		17:30	0		0		16		10			
05:45	0	0	0	0	3	8	0	1	9	17:45	0	0	0	0	15	55	10	41	96
06:00	0		0		3		0		18:00	0		0		11		8			
06:15	0		0		2		3		18:15	0		0		7		11			
06:30	0		0		4		5		18:30	0		0		10		11			
06:45	0	0	0	0	7	15	13	20	35	18:45	0	0	0	0	6	33	8	38	71
07:00	0		0		11		13		19:00	0		0		7		4			
07:15	0		0		7		11		19:15	0		0		5		6			
07:30	0		0		17		16		19:30	0		0		4		6			
07:45	0	0	0	0	8	43	15	54	96	19:45	0	0	0	0	3	18	8	23	41
08:00	0		0		21		20		20:00	0		0		3		8			
08:15	0		0		15		13		20:15	0		0		5		6			
08:30	0		0		19		26		20:30	0		0		1		5			
08:45	0	0	0	0	13	67	21	79	145	20:45	0	0	0	0	1	10	4	22	31
09:00	0		0		16		19		21:00	0		0		2		2			
09:15	0		0		18		19		21:15	0		0		1		6			
09:30	0		0		19		16		21:30	0		0		3		3			
09:45	0	0	0	0	14	66	23	77	142	21:45	0	0	0	0	3	8	1	12	19
10:00	0		0		19		13		22:00	0		0		2		0			
10:15	0		0		21		15		22:15	0		0		1		0			
10:30	0		0		19		17		22:30	0		0		0		1			
10:45	0	0	0	0	21	79	30	75	154	22:45	0	0	0	0	0	3	0	1	4
11:00	0		0		22		17		23:00	0		0		1		0			
11:15	0		0		24		19		23:15	0		0		0		1			
11:30	0		0		31		18		23:30	0		0		0		1			
11:45	0	0	0	0	30	106	22	75	181	23:45	0	0	0	0	0	1	1	2	3
Total Vol.					384				380	764				553				514	1066

GPS Coordinates: 32.456875, -110.982177

										Daily Totals			Combined		
										NB	SB				
										937			893		
										51.8%			48.2%		
										58.3%					
										14:15			12:00		
										111			89		
										0.77			0.79		

AM			
Split %	50.3%	49.7%	41.7 %
Peak Hour	11:00	11:45	10:45
Volume	106	88	181
P.H.F.	0.85	0.79	0.89

PM		
Split %	51.8%	48.2%
Peak Hour	14:15	12:00
Volume	111	89
P.H.F.	0.77	0.79

Intersection Turning Movement

Prepared by:



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: **Steprock Canyon Pl**

DATE: **01/26/23**

LOCATION: **Oro Valley**

E-W STREET: **Visoto Highlands Dr**

DAY: **THURSDAY**

PROJECT# **23-1059-001**

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	0	0	0	0	0	0	11	0	0	10	0	21
7:15 AM	0	0	0	1	0	0	0	4	0	0	12	0	17
7:30 AM	0	0	0	1	0	0	0	12	0	0	9	2	24
7:45 AM	0	0	0	1	0	0	0	6	0	0	17	0	24
8:00 AM	0	0	0	0	0	0	0	18	0	0	16	0	34
8:15 AM	0	0	0	0	0	0	0	12	0	0	12	0	24
8:30 AM	0	0	0	1	0	0	0	17	0	0	30	0	48
8:45 AM	0	0	0	0	0	0	0	12	0	0	16	0	28
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	0	4	0	0	0	92	0	0	122	2	220
Approach %	####	####	####	100.00	0.00	0.00	0.00	100.00	0.00	0.00	98.39	1.61	
App/Depart	0	/	2	4	/	0	92	/	96	124	/	122	

AM Peak Hr Begins at: 800 AM

PEAK

Volumes	0	0	0	1	0	0	0	59	0	0	74	0	134
Approach %	####	####	####	100.00	0.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	

PEAK HR.

FACTOR:	0.000	0.250	0.819	0.617	0.698
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CONTROL: **1-Way Stop (SB)**

COMMENT 1:

GPS: **32.457046, -110.984537**

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: **Steprock Canyon Pl**
0
E-W STREET: **Visoto Highlands Dr**

DATE: **01/26/23**
DAY: **THURSDAY**

LOCATION: **Oro Valley**
PROJECT# **23-1059-001**

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	0	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	0	0	1	0	0	0	19	0	0	18	0	38
4:15 PM	0	0	0	3	0	0	0	7	0	0	15	0	25
4:30 PM	0	0	0	0	0	0	0	13	0	0	14	3	30
4:45 PM	0	0	0	0	0	1	0	11	0	0	7	0	19
5:00 PM	0	0	0	1	0	0	0	11	0	0	11	1	24
5:15 PM	0	0	0	0	0	0	0	8	0	0	7	1	16
5:30 PM	0	0	0	0	0	0	0	17	0	0	8	1	26
5:45 PM	0	0	0	1	0	0	0	15	0	0	8	0	24
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	0	6	0	1	0	101	0	0	88	6	202
Approach %	####	####	####	85.71	0.00	14.29	0.00	100.00	0.00	0.00	93.62	6.38	
App/Depart	0	/	6	7	/	0	101	/	107	94	/	89	

PM Peak Hr Begins at: 400 PM

PEAK

Volumes	0	0	0	4	0	1	0	50	0	0	54	3	112
Approach %	####	####	####	80.00	0.00	20.00	0.00	100.00	0.00	0.00	94.74	5.26	

PEAK HR.

FACTOR:	0.000	0.417	0.658	0.792	0.737
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CONTROL: **1-Way Stop (SB)**
COMMENT 1: **0**
GPS: **32.457046, -110.984537**



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

Pedestrian & Bicycle Study

N-S STREET: Steprock Canyon Pl
E-W STREET: Visoto Highlands Dr

Date: 01/26/23
Day: THURSDAY

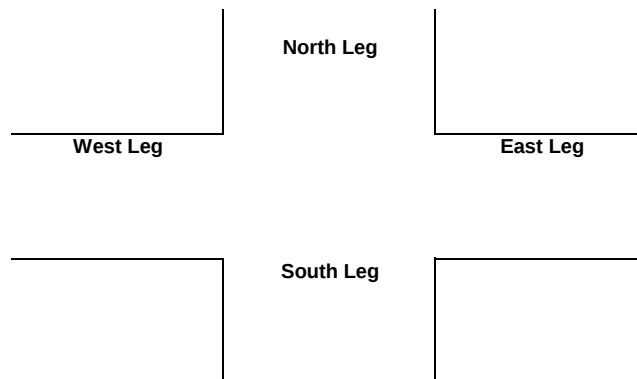
City: Oro Valley
Project #: 23-1059-001

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	0
7:15 AM	1	0	0	0
7:30 AM	2	0	0	0
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
8:45 AM	1	0	0	0
TOTAL	4	0	0	0

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	0
7:15 AM	0	0	0	0
7:30 AM	0	0	0	0
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
8:45 AM	0	0	0	0
TOTAL	0	0	0	0

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	0	0	0	0
4:15 PM	2	0	0	0
4:30 PM	4	0	0	0
4:45 PM	4	0	0	0
5:00 PM	2	0	0	0
5:15 PM	1	0	0	0
5:30 PM	0	0	0	0
5:45 PM	0	0	0	0
TOTAL	13	0	0	0

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	0	0	0	0
4:15 PM	0	0	0	0
4:30 PM	0	0	0	0
4:45 PM	0	0	0	0
5:00 PM	0	0	0	0
5:15 PM	0	0	0	0
5:30 PM	0	0	0	0
5:45 PM	0	0	0	0
TOTAL	0	0	0	0



Intersection Turning Movement

Prepared by:



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Bowcreek Springs Pl

DATE: 01/26/23

LOCATION: Oro Valley

E-W STREET: Visoto Highlands Dr

DAY: THURSDAY

PROJECT# 23-1059-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	0	0	1	0	0	0	11	0	0	10	0	22
7:15 AM	0	0	0	0	0	0	0	5	0	0	12	0	17
7:30 AM	0	0	0	1	0	0	1	12	0	0	11	1	26
7:45 AM	0	0	0	1	0	0	0	7	0	1	17	0	26
8:00 AM	0	0	0	2	0	0	0	18	0	1	16	0	37
8:15 AM	0	0	0	3	0	0	0	12	0	0	12	1	28
8:30 AM	0	0	0	1	0	1	0	18	0	0	29	3	52
8:45 AM	0	0	0	1	0	0	0	11	1	0	16	1	30
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	0	10	0	1	1	94	1	2	123	6	238
Approach %	####	####	####	90.91	0.00	9.09	1.04	97.92	1.04	1.53	93.89	4.58	
App/Depart	0	/	7	11	/	3	96	/	104	131	/	124	

AM Peak Hr Begins at: 800 AM

PEAK

Volumes	0	0	0	7	0	1	0	59	1	1	73	5	147
Approach %	####	####	####	87.50	0.00	12.50	0.00	98.33	1.67	1.27	92.41	6.33	

PEAK HR.

FACTOR:	0.000	0.667	0.833	0.617	0.707
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CONTROL: 2-Way Stop (NB & SB)

COMMENT 1:

GPS: 32.457184, -110.983014

Intersection Turning Movement



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

N-S STREET: Bowcreek Springs Pl
0

DATE: 01/26/23

LOCATION: Oro Valley

E-W STREET: Visoto Highlands Dr

DAY: THURSDAY

PROJECT# 23-1059-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	0	0	1	0	0	0	20	0	0	18	0	39
4:15 PM	0	0	1	1	0	0	0	10	0	1	15	0	28
4:30 PM	0	0	0	1	0	0	0	11	2	2	17	2	35
4:45 PM	0	0	0	1	0	0	0	11	0	0	7	0	19
5:00 PM	0	0	0	0	0	0	0	12	0	0	12	0	24
5:15 PM	0	0	0	0	0	0	0	8	0	0	8	0	16
5:30 PM	0	0	1	0	0	0	0	16	1	1	9	2	30
5:45 PM	0	0	0	0	0	0	0	16	0	0	8	1	25
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	0	2	4	0	0	0	104	3	4	94	5	216
Approach %	0.00	0.00	100.00	100.00	0.00	0.00	0.00	97.20	2.80	3.88	91.26	4.85	
App/Depart	2	/	5	4	/	7	107	/	110	103	/	94	

PM Peak Hr Begins at: 400 PM

PEAK

Volumes	0	0	1	4	0	0	0	52	2	3	57	2	121
Approach %	0.00	0.00	100.00	100.00	0.00	0.00	0.00	96.30	3.70	4.84	91.94	3.23	

PEAK HR.

FACTOR:	0.250	1.000	0.675	0.738	0.776
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CONTROL: 2-Way Stop (NB & SB)

COMMENT 1: 0

GPS: 32.457184, -110.983014



FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745



veracitytrafficgroup

Pedestrian & Bicycle Study

N-S STREET: Bowcreek Springs Pl
E-W STREET: Visoto Highlands Dr

Date: 01/26/23
Day: THURSDAY

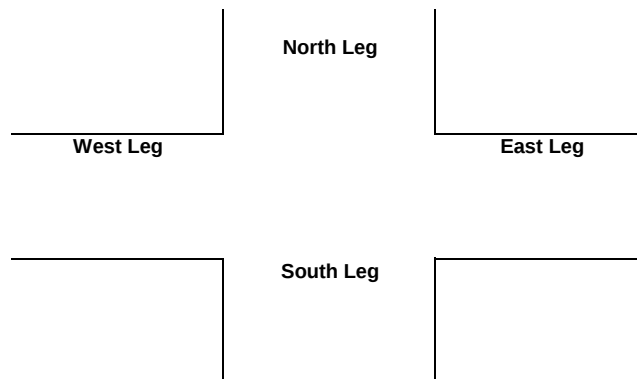
City: Oro Valley
Project #: 23-1059-002

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	0
7:15 AM	2	0	0	0
7:30 AM	2	0	0	0
7:45 AM	0	0	0	0
8:00 AM	1	0	0	0
8:15 AM	3	0	0	0
8:30 AM	1	0	0	0
8:45 AM	0	2	0	0
TOTAL	9	2	0	0

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
7:00 AM	0	0	0	0
7:15 AM	0	0	0	0
7:30 AM	0	0	0	0
7:45 AM	0	0	0	0
8:00 AM	0	0	0	0
8:15 AM	0	0	0	0
8:30 AM	0	0	0	0
8:45 AM	0	0	0	0
TOTAL	0	0	0	0

	PEDESTRIANS			
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	4	0	0	0
4:15 PM	5	2	0	1
4:30 PM	5	1	0	0
4:45 PM	0	0	0	0
5:00 PM	0	1	0	0
5:15 PM	0	3	1	0
5:30 PM	0	0	0	0
5:45 PM	0	0	0	0
TOTAL	14	7	1	1

	BICYCLES			
	N-LEG	S-LEG	E-LEG	W-LEG
4:00 PM	0	0	0	0
4:15 PM	0	0	0	0
4:30 PM	0	0	0	0
4:45 PM	0	0	0	0
5:00 PM	0	0	0	0
5:15 PM	0	0	0	0
5:30 PM	0	0	0	0
5:45 PM	0	0	0	0
TOTAL	0	0	0	0



ATTACHMENT C

ITE TRIP GENERATION RATE SHEETS

Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 22

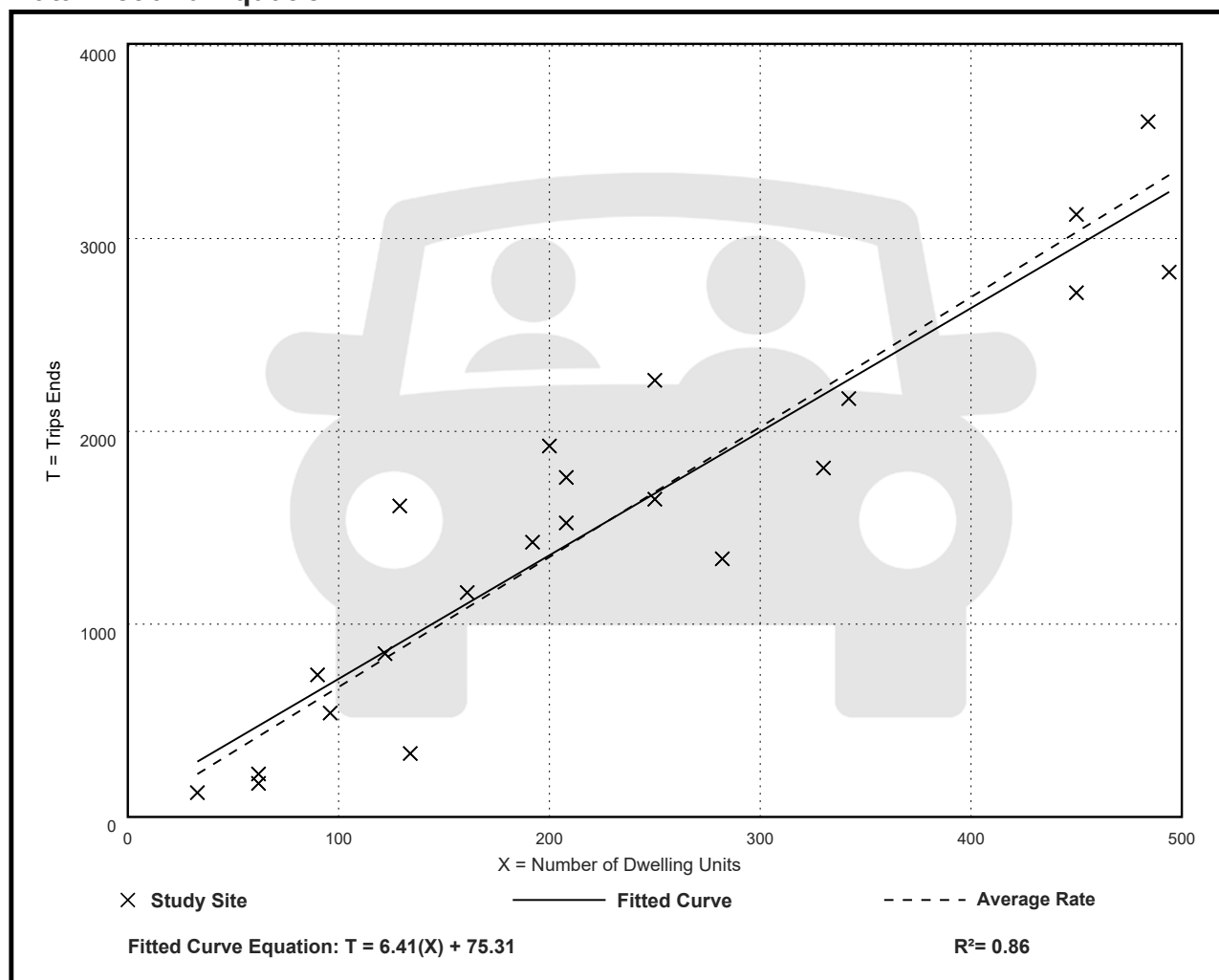
Avg. Num. of Dwelling Units: 229

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
6.74	2.46 - 12.50	1.79

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 49

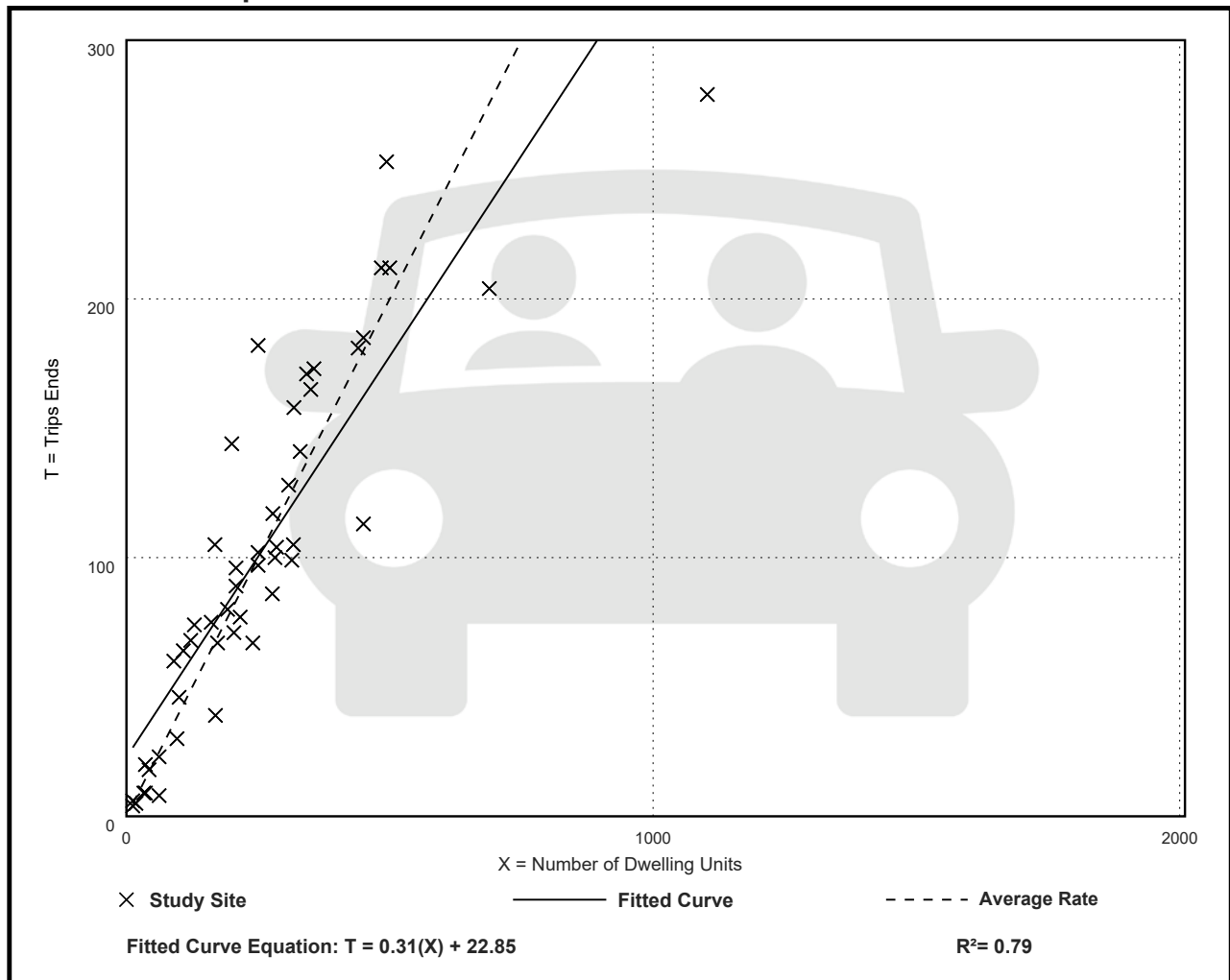
Avg. Num. of Dwelling Units: 249

Directional Distribution: 24% entering, 76% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 59

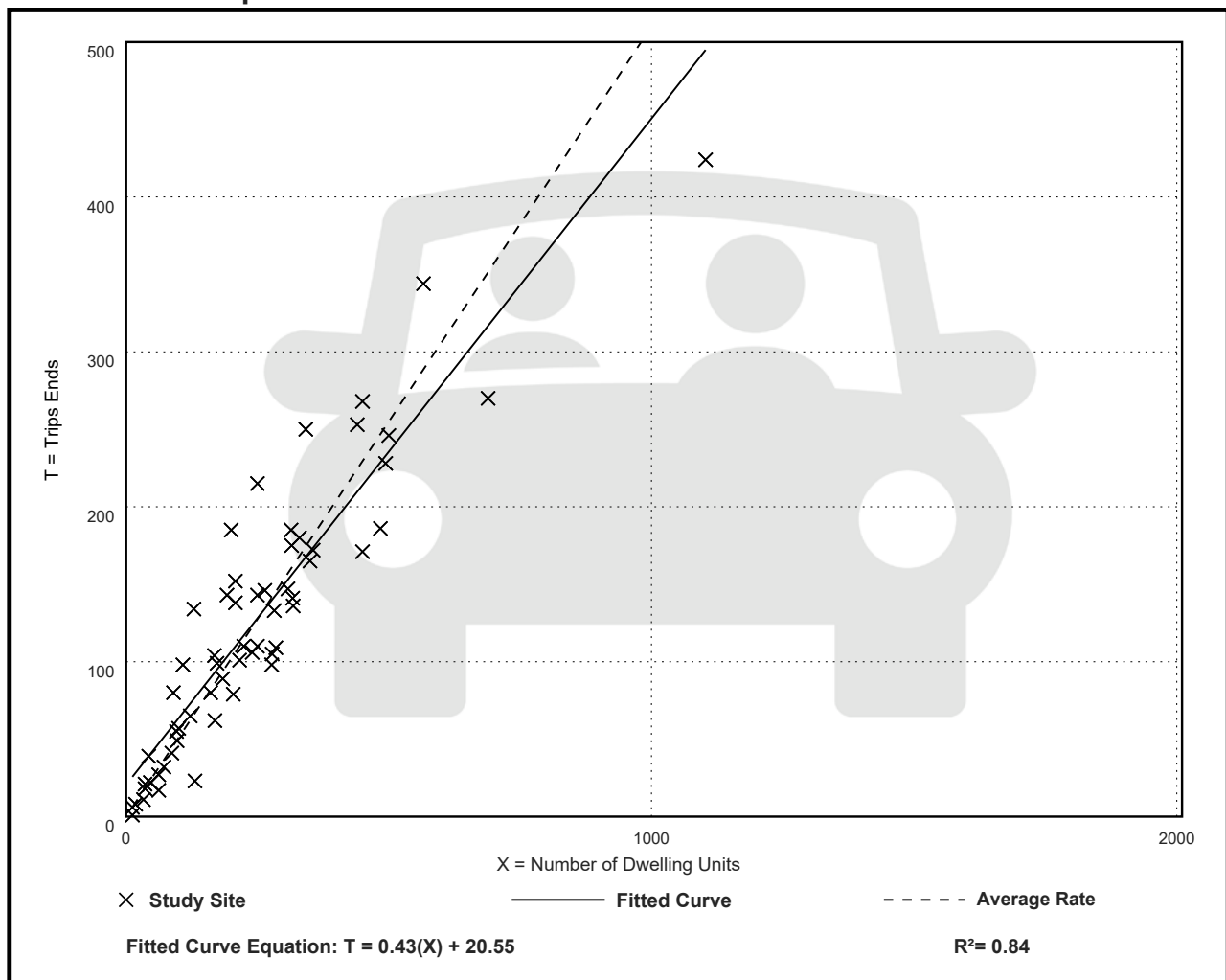
Avg. Num. of Dwelling Units: 241

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

Data Plot and Equation



ATTACHMENT D

PROJECT ACCESS HCM INTERSECTION OPERATION CALCULATION SHEETS

Intersection						
Int Delay, s/veh	1.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	60	1	7	76	1	23
Future Vol, veh/h	60	1	7	76	1	23
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	65	1	8	83	1	25
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	66	0	165	66
Stage 1	-	-	-	-	66	-
Stage 2	-	-	-	-	99	-
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	-	-	1536	-	826	998
Stage 1	-	-	-	-	957	-
Stage 2	-	-	-	-	925	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1536	-	822	998
Mov Cap-2 Maneuver	-	-	-	-	822	-
Stage 1	-	-	-	-	957	-
Stage 2	-	-	-	-	920	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		8.7	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	989	-	-	1536	-	
HCM Lane V/C Ratio	0.026	-	-	0.005	-	
HCM Control Delay (s)	8.7	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	1.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	68	0	7	82	1	24
Future Vol, veh/h	68	0	7	82	1	24
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	74	0	8	89	1	26
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	74	0	179	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	105	-
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	-	-	1526	-	811	988
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	919	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1526	-	806	988
Mov Cap-2 Maneuver	-	-	-	-	806	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	913	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		8.8	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	979	-	-	1526	-	
HCM Lane V/C Ratio	0.028	-	-	0.005	-	
HCM Control Delay (s)	8.8	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	51	1	23	56	1	14
Future Vol, veh/h	51	1	23	56	1	14
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	55	1	25	61	1	15
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	56	0	167	56
Stage 1	-	-	-	-	56	-
Stage 2	-	-	-	-	111	-
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	-	-	1549	-	823	1011
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	914	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1549	-	809	1011
Mov Cap-2 Maneuver	-	-	-	-	809	-
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	898	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.1		8.7	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1		EBT	EBR	WBL	WBT
Capacity (veh/h)	994		-	-	1549	-
HCM Lane V/C Ratio	0.016		-	-	0.016	-
HCM Control Delay (s)	8.7		-	-	7.4	0
HCM Lane LOS	A		-	-	A	A
HCM 95th %tile Q(veh)	0.1		-	-	0	-

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	58	1	24	64	0	14
Future Vol, veh/h	58	1	24	64	0	14
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	63	1	26	70	0	15
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	64	0	186	64
Stage 1	-	-	-	-	64	-
Stage 2	-	-	-	-	122	-
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	-	-	1538	-	803	1000
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1538	-	789	1000
Mov Cap-2 Maneuver	-	-	-	-	789	-
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	887	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2		8.7	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	1000	-	-	1538	-	
HCM Lane V/C Ratio	0.015	-	-	0.017	-	
HCM Control Delay (s)	8.7	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0	-	-	0.1	-	

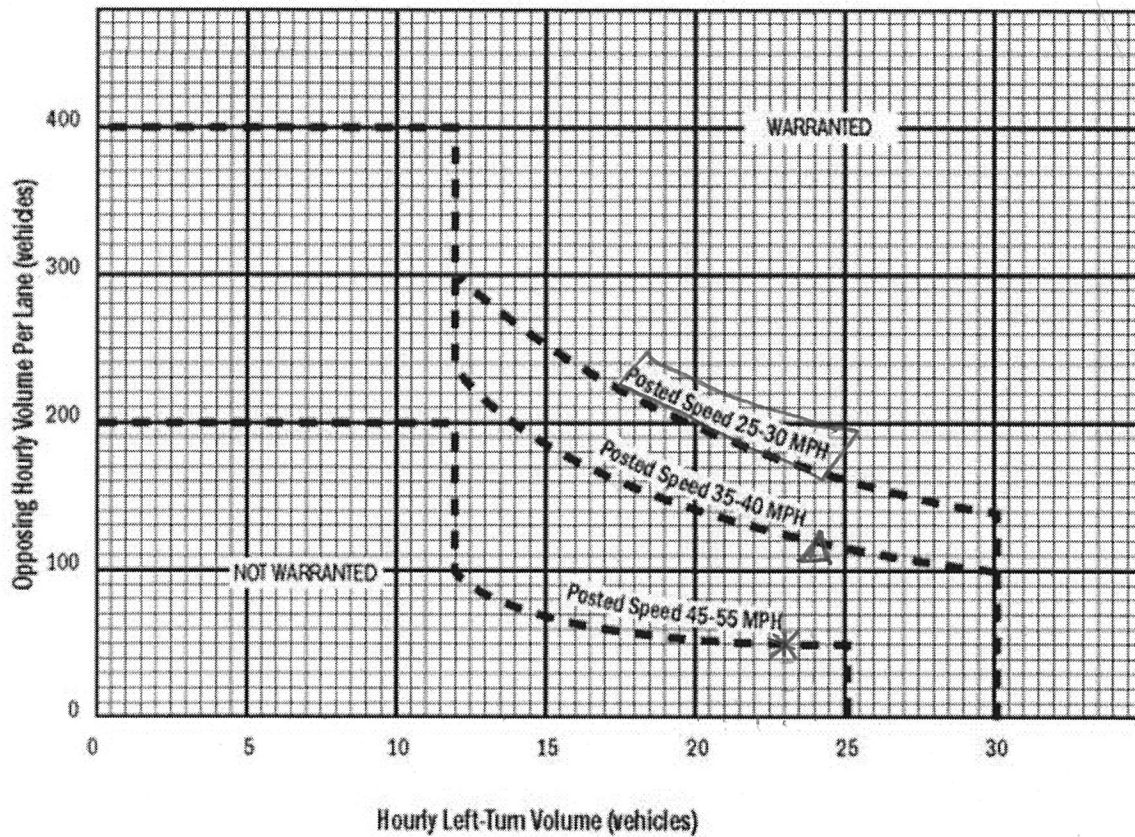
ATTACHMENT E

PROJECT ACCESS TURN LANE WARRANT EVALUATIONS

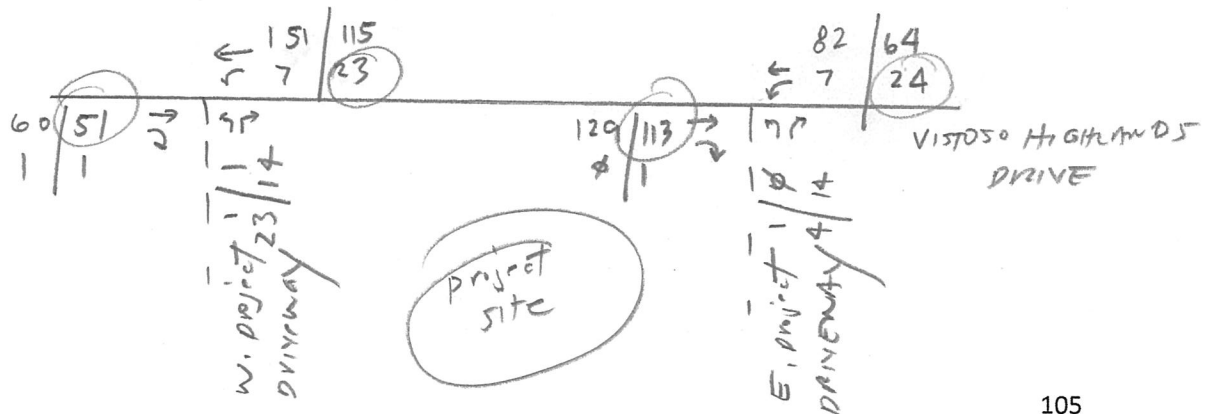
JN 19598-P
 VISTOSO MULTI-FAMILY
 TRAFFIC STATEMENT
 2/9/23
 mf

8. APPENDIX

A-1 LEFT TURN LANE GUIDELINES⁹

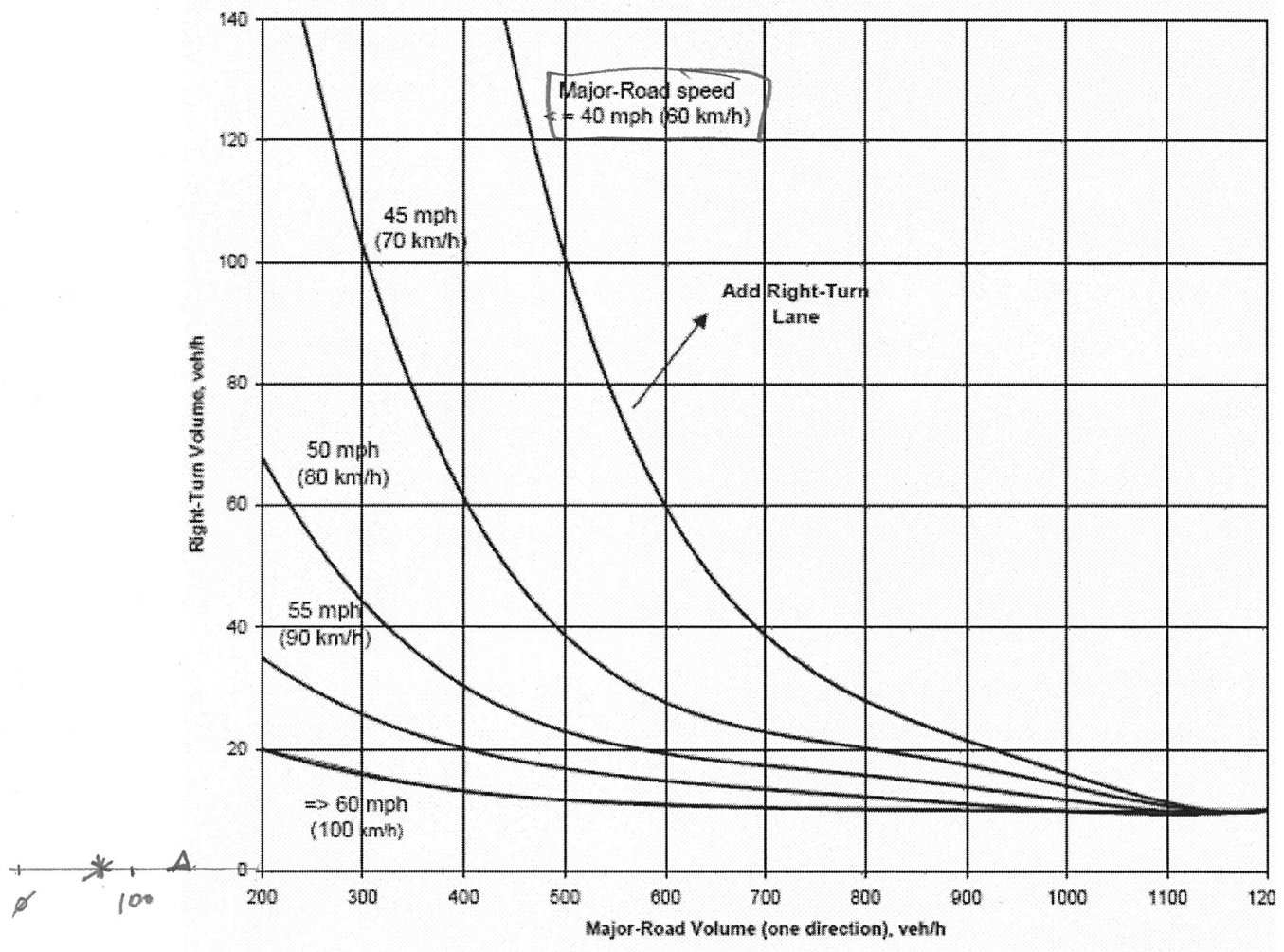


* = West project driveway - (23, 51) ⇒ LT Lane NOT warranted
 Δ = East project driveway - (24, 113) ⇒ LT Lane NOT warranted



JN 19548-P
 VISTOSO MULTI-FAMILY
 TRAFFIC STATEMENT
 2/9/23
 ny

A-2 RIGHT TURN LANE GUIDELINES FOR TWO-LANE ROADS⁹



* = West project driveway - (51, 1) ⇒ RT Lane not warranted
 Δ = East project driveway - (113, 1) ⇒ RT Lane not warranted

