SR 89A/Robert Road

Traffic Interchange Alternative Selection Report

February 2021

Prepared for

CYMPO
Central Yavapai Metropolitan Planning Organization

Prepared by

Kimley»Horn
Expect More. Experience Better.

STATE ROUTE 89A AT ROBERT ROAD ALTERNATIVES SELECTION REPORT

Task Order No. CYMPO FY20-02
ADOT Project # MPD 197313.200.2

February 11, 2021

Prepared for:

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1. INTRODUCTION

Central Yavapai Metropolitan Planning Organization (CYMPO) initiated this *SR 89A and Robert Road Alternatives Selection Report (ASR)* to confirm location, identify cost, and develop an implementation strategy for a new grade-separated diamond traffic interchange (TI) to be located east of and replace the existing at-grade signalized SR 89A and Robert Road intersection.

This ASR provides information for CYMPO and the Arizona Department of Transportation (ADOT) to evaluate project merit for final design and construction programming of SR 89A/Robert Road in the ADOT Five-Year Program.

Project Purpose

The *State Route 89A, State Route 89 to Robert Road Transportation Study, Final Report, March 2018* (*SR 89A Transportation Study, March 2018*) completed by AECOM documented that three fatal crashes occurred at the signalized intersection of SR 89A and Robert Road between 2011 and 2015. The *SR 89A Transportation Study, March 2018* identified several improvement alternatives at the SR 89A and Robert Road intersection. Alternatives included a roundabout and grade-separation (diamond traffic interchange).

The *SR 89A Transportation Study, March 2018* final report recommended a new diamond traffic interchange located approximately 2,800 feet east of the existing SR 89A and Robert Road intersection at the alignment with a new roadway, Santa Fe Loop, to be constructed by the Town of Prescott Valley.

This ASR builds upon this recommendation to further develop the concept. Specifically, this *ASR* includes the following:

- A conceptual layout for a grade-separated interchange at SR 89A and Santa Fe Loop.
- Recommended interim connections that facilitate a phased implementation of the interchange and the supporting local street network.
- Estimate of probable cost for the new traffic interchange.

Project Activities

SR 89A at Robert Road Alternatives Selection Report project activities included:

- Assess existing and projected traffic data
- Summarize crash data
- Develop conceptual layout for grade-separation alternative
- Identify engineering constraints
- Obtain stakeholder input
- Prepare a reliable cost estimate
- Identify options for phased implementation
- Summarize environmental, social, and economic considerations

- Prepare an Alternative Selection Report to document findings

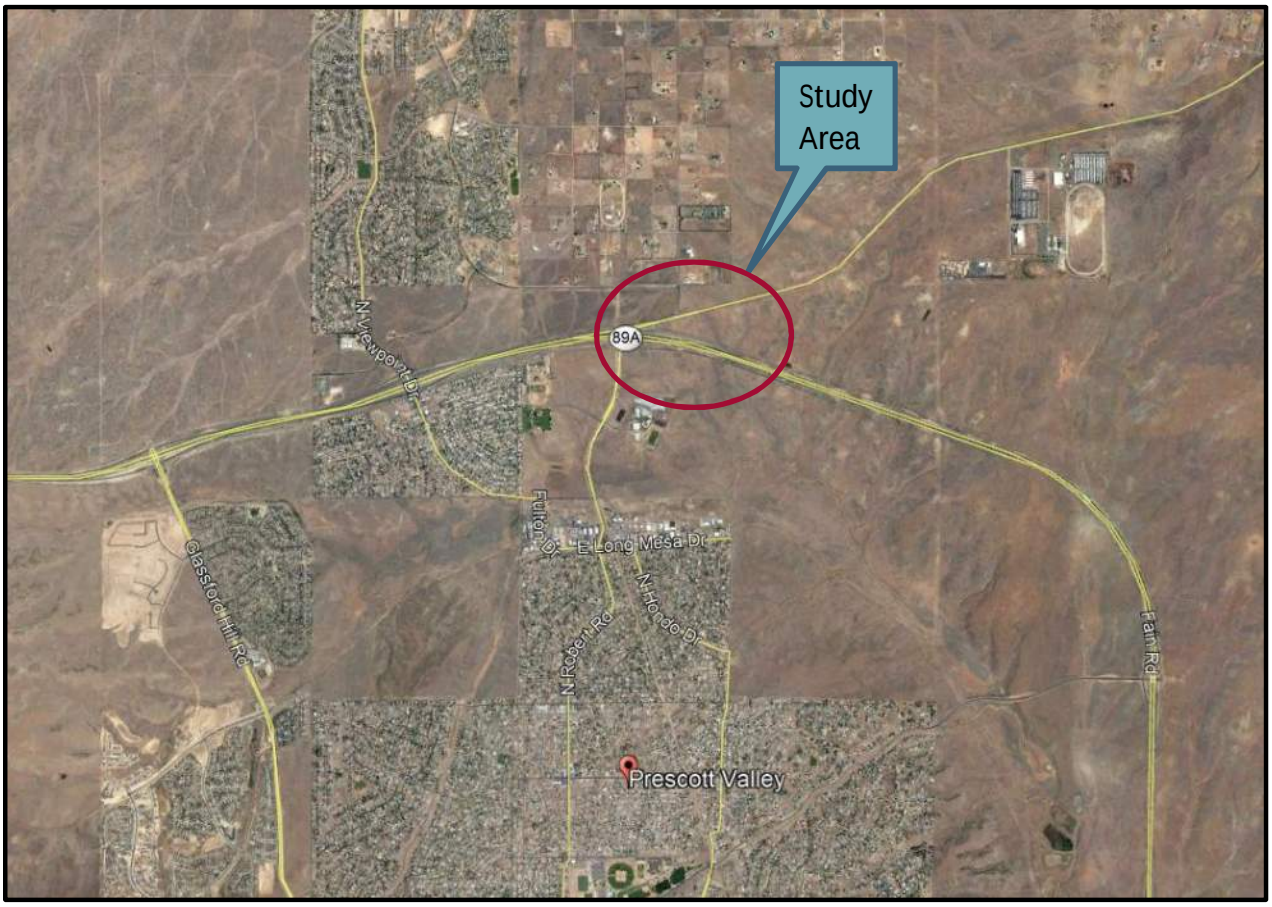
Study Area

The study area is illustrated Figure 1. The Robert Road at-grade signalized intersection is located where SR 89A intersects Robert Road. SR 89A continues to the northeast and connects to Fain Road (SR 89AS) to the east.

The SR 89A and Robert Road intersection is one of only four at-grade intersections on the 14-mile access-controlled section of Fain Road (SR 89AS) and SR 89A between SR 69 and SR 89.

There are five grade-separated interchanges along the 6.5-miles section of SR 89A between SR 89 and Robert Road. In addition, there is a grade-separated interchange east of Robert Road on SR 89AS at Lakeshore Drive.

FIGURE 1: STUDY INTERSECTION AND VICINITY MAP



Source: Google Earth

Alternatives Development

The *SR 89A Transportation Study, March 2018* recommended improvements to accommodate current and future traffic impacts on SR 89A, from SR 89 to east of Robert Road. The purpose

of the improvements is to address capacity, access, safety, and operational efficiency due to the increasing traffic volumes in the area.

The *SR 89A Transportation Study, March 2018* introduced and evaluated four improvements alternatives for the intersection of SR 89A and Robert Road:

- Signalized intersection improvements: consisted of upgrading signal heads and restriping to add lanes.
- Roundabout: the roundabout replaces the existing intersection with a two-lane roundabout and accommodates a third eastbound/westbound lane if needed.
- Traffic Interchange: the new traffic interchange includes a grade separated alternative, overpass over Fain Road mainline, east of the existing Robert Road intersection to connect to the new Santa Fe Loop Road.

The study recommended a new traffic interchange at SR 89A at Santa Fe Loop as the recommended improvement. The concept presented in the final study report is illustrated in Figure 2.

This ASR builds upon the recommended alternative: construct a new traffic interchange east of the existing Robert Road intersection at the future intersection with Santa Fe Loop.

FIGURE 2: NEW GRADE SEPARATED INTERCHANGE (AT SANTA FE LOOP)

Source: *State Route 89A, State Route 89 to Robert Road Transportation Study, March 2018*

2. EXISTING AND FUTURE CONDITIONS

This chapter summarizes existing and future conditions in the study area.

Previous Plans and Studies

Intersection improvements at SR89A and Robert Road have been considered in multiple studies and plans spanning nearly 15 years. These studies are listed in Table 1. Concepts developed in previous studies serve as the starting point for this ASR.

TABLE 1: PREVIOUS PLANNING STUDIES

Planning Document	Year	Description
CYMPO Regional Transportation Plan	2006	Recommended new connector between SR 169 and Fain Road, inclusive of the Robert Road/SR 89A intersection
SR 169 to Fain Road Planning Study	2009	Established a preferred corridor for the new access-controlled roadway between SR 169 and Fain Road.
Great Western Corridor Feasibility Study	2010	Define the future controlled access roadway needed to efficiently move regional traffic from SR 89A to SR 89.
CYMPO Regional Transportation Plan	2012	Identified need to prepare a DCR for a new TI east of Robert Road.
I-17 To Fain Road Connector Corridor Location Study	2013	Identified traffic interchange locations for new connector.
Roadway Safety Assessment	2015	Multidisciplinary team identified safety concerns and recommended mitigation (at-grade solutions)
State Route 89A, State Route 89 to Robert Road Transportation Study	2018	Identified interchange configuration alternatives for Robert Road/SR 89A, TI estimated cost of $30.4M
CYMPO Regional Transportation Plan	2020	SR 89A/Robert Road intersection is highest-ranked hot-spot with 3 fatal crashes; intersection listed as a lower-priority 2030 expansion project at estimated cost of $34.78M.

Previously Constructed Projects

Several improvements projects have been completed on or near the SR 89A and Robert Road intersection.

East of the intersection, Fain Road, was improved from a two-lane roadway to a four-lane divided highway in 2013 (ADOT Project #H8160). During the same year, the Viewpoint Drive Traffic Interchange was constructed which also included construction of a new southbound roadway (ADOT Project #7276).

A summary of improvements completed since 2000 are listed in Table 2.

TABLE 2: PREVIOUS PROJECTS CONSTRUCTED

Project Number	Begin MP	End MP	Project Plans Date	Record Drawings Year	Description
H6148	324.84	331.55	4/13/2006	03/08/2007	Construct 8' shoulders, 4" overlay and ½" AR-ACFC
H7276	322.15	326.26	4/16/2013	12/04/2013	Construction of Viewpoint Drive TI and southbound roadway
H8160	326.00	331.66	7/23/2013	9/18/2013	Fain Road Widening to four-lane divided highway, transferred to state highway system as SR 89AS
Glassford Hill Rd Right Turn Lane	-	-	-	2020 *(record drawings not yet available)*	Free-flow right turn lane on southbound SR 89A at Glassford Hill Road
SR 89 / SR 89A Traffic Interchange Eastbound Dual Left-Turn	-	-	-		Addition of second lane on the eastbound on ramp
Viewpoint Dr 2nd NB Lane	-	-	-		Restripe Viewpoint Dr through the SR 89A interchange and widen NB Viewpoint Dr north of SR 89A Limits: SR 89A – Pronghorn Ranch Parkway
Coyote Springs Rd SB Right-Turn Lane	-	-	-		Construct right-turn lane at SR 89A

Planned Corridor Improvements

Future improvements along the corridor consist of projects on SR 89A and roadways connected to SR 89A when in the vicinity of the corridor.

Projects that will have an impact on the SR 89A and Robert Road intersection are in Table 3, notably widening Robert Road from 2 lanes to 4 lanes to the south of the intersection.

TABLE 3: FUTURE PROJECTS

Project Name	Description	Document
Robert Rd Widening	Widen Robert Rd from 2 lanes to 4 lanes Limits: Tranquil Blvd – Long Mesa Dr	FY 2020-2024 CYMPO MTIP Local Jurisdiction

Historical and Future Population

The Town of Prescott Valley has experienced steady growth over the past decade. In 2010 Prescott Valley had a population of 38,822. As of July 2019, the estimated population was 46,515, representing a 20% increase. The population is projected to increase to over 60,000 people by 2040.

According to *the SR 89A, State Route 89 to Robert Road Transportation Study* the projected 2040 population is 60,196. Population in the area has increased by about 10,000 people in the last 10 years (2010-2020) and is expected to increase by 11,500 people over the next 20 years (2020-2040).

Table 4 summarizes population data for the Town of Prescott Valley by year.

TABLE 4: PRESCOTT VALLEY POPULATION GROWTH

Area	2010 Population	2015 Population	2019 Population	Estimated 2020 Population	2040 Population (State Route 89A Report)
Prescott Valley	38,822	41,415	46,515	48,729	60,196

Source: U.S. Census, Arizona Office of Economic Opportunity

Existing Roadway and Intersection Features

Table 5 describes features of the existing roadways.

TABLE 5: EXISTING ROADWAY FEATURES

Roadway	Functional Class	Number of Lanes	Lane Width	Speed Limit	Median
SR 89A (North)	Minor Arterial	Two lanes (one northbound and one southbound)	12’	55 MPH	none
Fain Road / SR 89A (East/West)	Freeway	Four (two eastbound and two westbound)	12’	65 MPH.	depressed median
Robert Road (South)	Major Collector	two (one northbound and one southbound)	12’	30 MPH	none
Intersection	• There are two thru lanes with dedicated left and right turn lanes on the east and west approaches • Both the north and south approaches have a dedicated left turn lane and shared thru-right turn lane. • Southbound SR 89A has a bypass lane to westbound SR 89A separate from the signalized intersection.				

Future Roadways

Santa Fe Loop is a planned 4-lane roadway that will connect to a new interchange at SR 89A. Upon construction, Santa Fe Loop will replace the at-grade SR 89A/Robert Road intersection. The alignment for Santa Fe Loop was developed in the *Agua Fria Floodplain Revision and Unit 16 Stormwater Mitigation Study* (June 2013), prepared by Lyon Engineering & Surveying, for the Town of Prescott Valley.

Santa Fe Loop will pass through the Arizona State Trust Land and private property. The roadway is planned to be an east-west connector from SR 89AS (Fain Road) to Glassford Hill Road. The roadway alignment is on the south side of the Agua Fria Channelization project. Additional right-of-way within ASLD and private parcels will be required.

TABLE 6: FUTURE ROADWAY FEATURES

Roadway	Functional Class	Number of Lanes	Lane Width	Speed Limit	Median
Santa Fe Loop	Urban Major Collector	Four lanes (two northbound and two southbound)	12'	35 MPH	depressed median

Adjacent Land Ownership and Use

Land adjacent to the intersection consists of both private ownership and public.

The land west of the study area consists of publicly owned land (Arizona State Trust Land), as depicted in Figure 3. Fain Land and Cattle Co owns approximately 459 acres of land east of the proposed interchange location. Fain Land and Cattle Co. owns parcels 401-01-009R (283.88 acres) and 401-01-009U (175.25 acres). Lawyers Title of Az Inc and C/O Glenarm Land Company own the other three smaller parcels of land, for a total of 7.97 acres, north of the proposed interchange. The parcels owned by the above parties consist of 401-01-010A (2.02 acres), 401-01-010B (2.02 acres), and 401-01-010C (3.93 acres).

Land adjacent to the existing intersection and to the proposed interchange is RCU zoning, which is defined as "Residential; Rural" in Yavapai County, and "Residential; Conditional Use Permits" in Town of Prescott Valley.

Parcels are summarized in Table 7. A map of adjacent parcels can be seen in Figure 4.

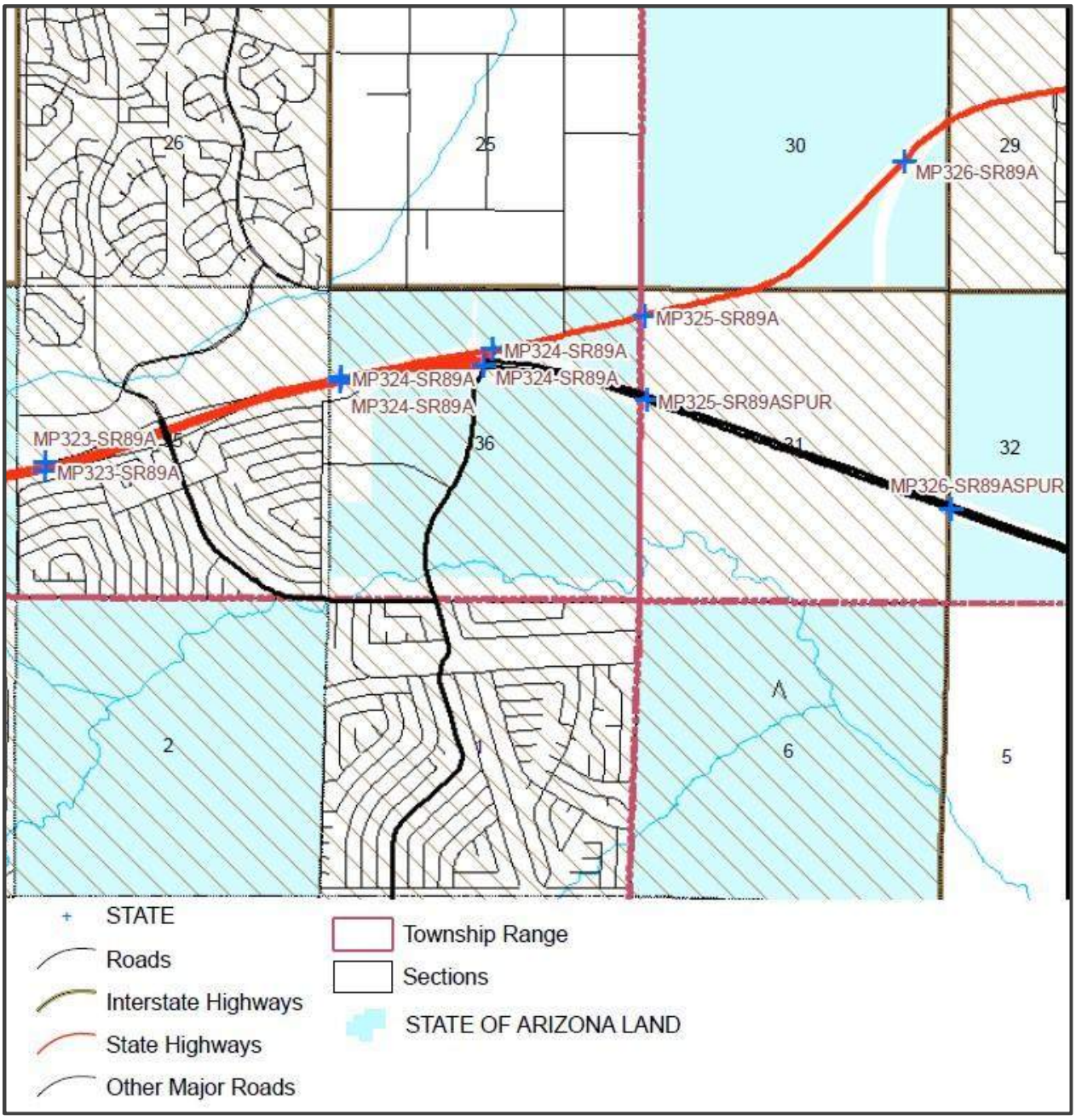


FIGURE 3: ADJACENT LAND OWNERSHIP

Source: Yavapai County

https://www.yavapai.us/Portals/31/GIS%20Products/YCLand_ArcMap36x48.pdf

TABLE 7: PROPERTY OWNERS AND LAND USE ADJACENT TO INTERSECTION

Parcel APN	Owner	Mailing Address	Land Use	Zoning
401-01-009R	Fain Land & Cattle Co	3001 N Main St Ste 2B Prescott Valley, AZ 86314-2293 283.88 Acres	Yavapai County Town of Prescott Valley	RCU
401-01-009U	Fain Land & Cattle Co	3001 N Main St Ste 2B Prescott Valley, AZ 86314-2293 175.25 Acres	Town of Prescott Valley	RCU
401-01-010A	Lawyers Title of Az Inc Tr 10 001 & C/O Glenarm Land Company	PO Box 870 Clarkdale, AZ 86324-0870 2.02 Acres	Town of Prescott Valley	RCU
401-01-010B	Lawyers Title of Az Inc Tr 10 001 & C/O Glenarm Land Company	PO Box 870 Clarkdale, AZ 86324-0870 2.02 Acres	Yavapai County Town of Prescott Valley	RCU
401-01-010C	Lawyers Title of Az Inc Tr 10 001 & C/O Glenarm Land Company	PO Box 870 Clarkdale, AZ 86324-0870 3.93 Acres	Yavapai County Town of Prescott Valley	RCU
800-10-020	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-10-024X	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-10-024Z	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Yavapai County	RCU
800-10-040A	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-12-018W	Town of Prescott Valley	7501 E Skoog Blvd Prescott Valley, AZ 86314	Town of Prescott Valley	RCU
800-12-021S	Town of Prescott Valley	7501 E Skoog Blvd Prescott Valley, AZ 86314	Town of Prescott Valley	RCU
800-20-033C	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Yavapai County	RCU
800-20-058L	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-20-058T	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-20-059C	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Yavapai County	RCU
800-20-059K	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-20-062W	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU
800-20-062X	Arizona State Land Department State Land Trust	1616 W Adams St, Phoenix, AZ 85007	Town of Prescott Valley	RCU

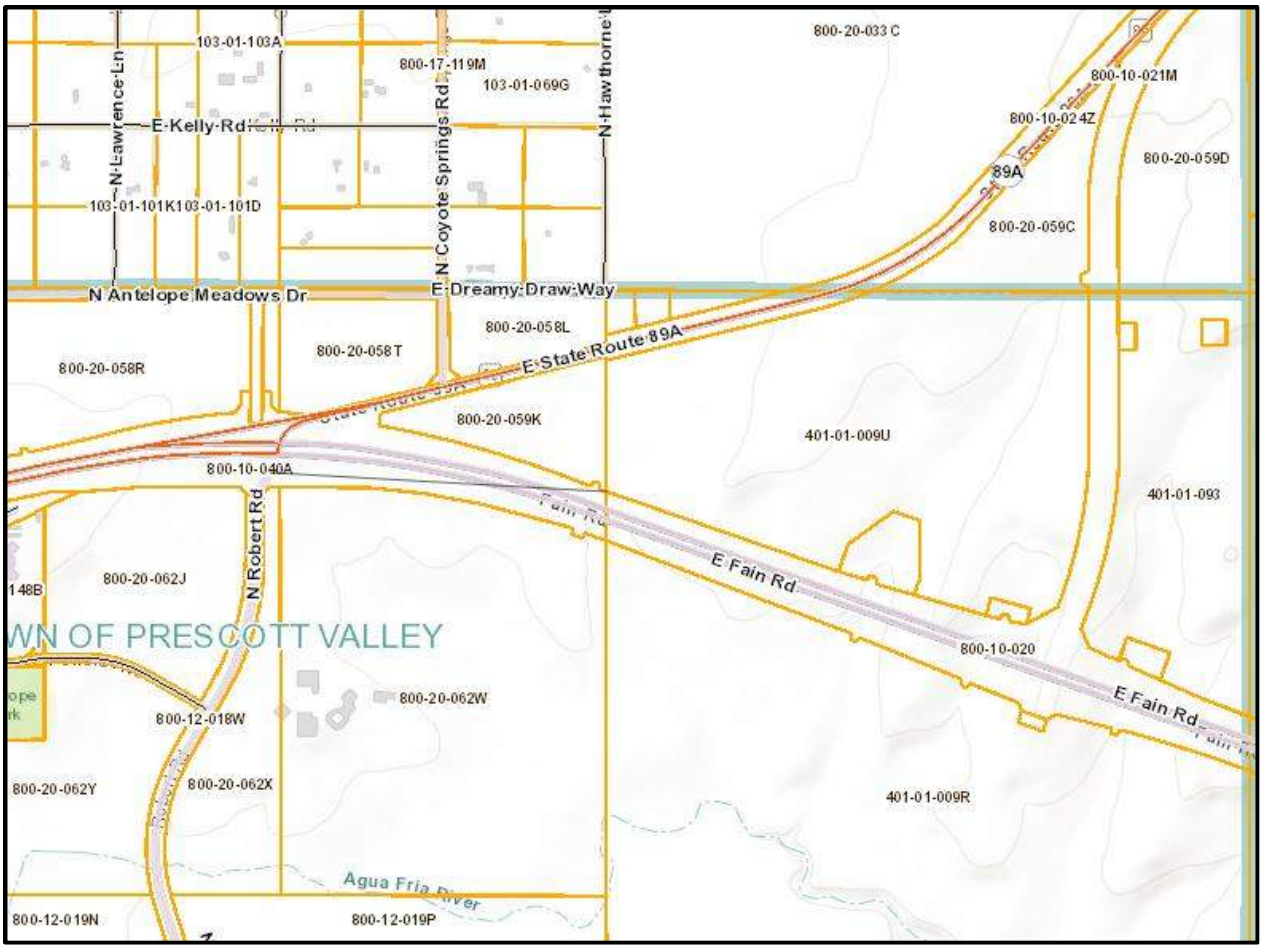


FIGURE 4: ADJACENT PARCELS

Source: Yavapai County, GIS, https://gis.yavapai.us/v4/

Utilities

Arizona Blue Stake was contacted to identify known utilities providers within the vicinity of the study area. Table 8 is a list of the utility service companies with facilities in the project area, their representative and contact information.

Utility resources in the study area include APS, Unisource, Midvale Telephone Exchange, and Century Link.

- APS overhead transmission lines run north-south along the section line; these lines would be impacted by the traffic interchange.
- Unisource Energy gas line runs north along the west side of Robert road and west along the north side of SR 89A.
- Midvale Telephone Exchange line runs north-south along the east side Coyote Springs Road and east along the northside of SR 89A.
- Century Link has facilities along SR 89A and Coyote Springs Road.

TABLE 8: EXISTING UTILITIES

Utility	Utility Type	Contact
AZ Public Services Prescott APSPRE03	Electric	APS Locate Dept 602-493-4225
Cable One CBNTVP03	CATV	USIC Dispatch Center 800-778-9140
Arizona Department of Transportation DTPREL03	Electric	Jared Kelly 928-642-2195
Arizona Department of Transportation DTPRUT03	Culverts, Storm Drains	Tiofilo Sots 928-277-2926
El Paso Natural Gas - Yavapai EPNGFL03	GAS	Russell Williams 520-509-3266
Midvale Telephone MVTEL03	Coaxial, Fiber Optics	Charles Bringe 480-258-1930
Town of Prescott Valley PRVLWT03	Reclaimed Water, Sewer, Water	Janes Kendall 928-759-9062
CenturyLink QLNAZ103	Coaxial, Fiber Optics	USIC Dispatch 800-778-9140
Unisource Energy Gas Prescott UNSGPR03	Gas	Aaron McCoy 928-771-7233

Right of Way

Existing ADOT right of way on SR 89A northeast of Robert Road is 100 feet until approximately ½ mile northeast of Robert Road. SR 89A has a typical right-of-way of 300 feet. Fain Road to the east of the intersection has a right-of-way between 300 feet and 375 feet. ADOT right of way is variable along existing SR 89A west of Robert Road and along Fain Road east of Robert Road.

Topography

The roadway characteristics can be classified as level terrain throughout the study area. Level terrain is any combination of geometric design elements that permits trucks to maintain speed that equal or approach speed of passenger cars.

3. TRAFFIC ANALYSIS

This section summarizes an analysis of current and future conditions at the SR 89A and Robert Road intersection. A crash data summary is provided, followed by a summary of current and future projected traffic data and conditions.

Safety Analysis

CYMPO's 2045 Regional Transportation Plan identified the SR 89A and Robert Road intersection as a regional safety hotspot, and SR 89A from Robert Road to east CYMPO Boundary as the 3rd on the prioritized list of segment safety improvements.

Crash data (Appendix B) from ADOT's Arizona Crash Information System (ACIS) for January 1, 2015 to December 31, 2019 show that 20 crashes were reported at the SR 89A/Robert Road intersection.

Crashes by Year

Figure 5 summarizes crashes by year and shows that annual number of crashes has ranged from no crashes in 2016, to 7 crashes in 2019.

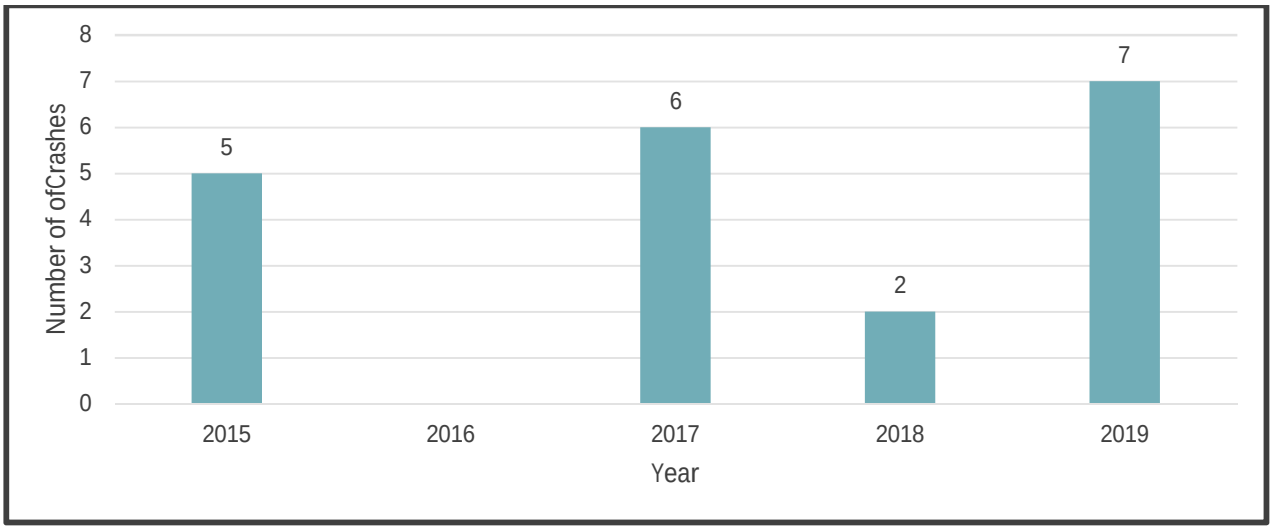


FIGURE 5: CRASHES PER YEAR, 2015-2019

Crash Severity

Figure 6 illustrates crashes by severity:

- one (1) fatal crash
- one (1) suspected serious injury
- three (3) minor injury
- four (4) possible injury
- 11 no injury crashes

Nine of the 20 crashes were rear-end crashes; speed too fast for conditions was identified as a contributing factor in eight of the 20 crashes.

Fatal Crashes

Only one fatal crash has occurred over the most recent five-year period (2015-2019), on Saturday, November 14, 2015 at 4:44 PM when a 54-year old male motorcyclist, traveling westbound, ran off the roadway and overturned while failing to maneuver a slight curve, killing the rider. The rider was found to have a blood-alcohol content of 0.086, in excess of the legal limit.

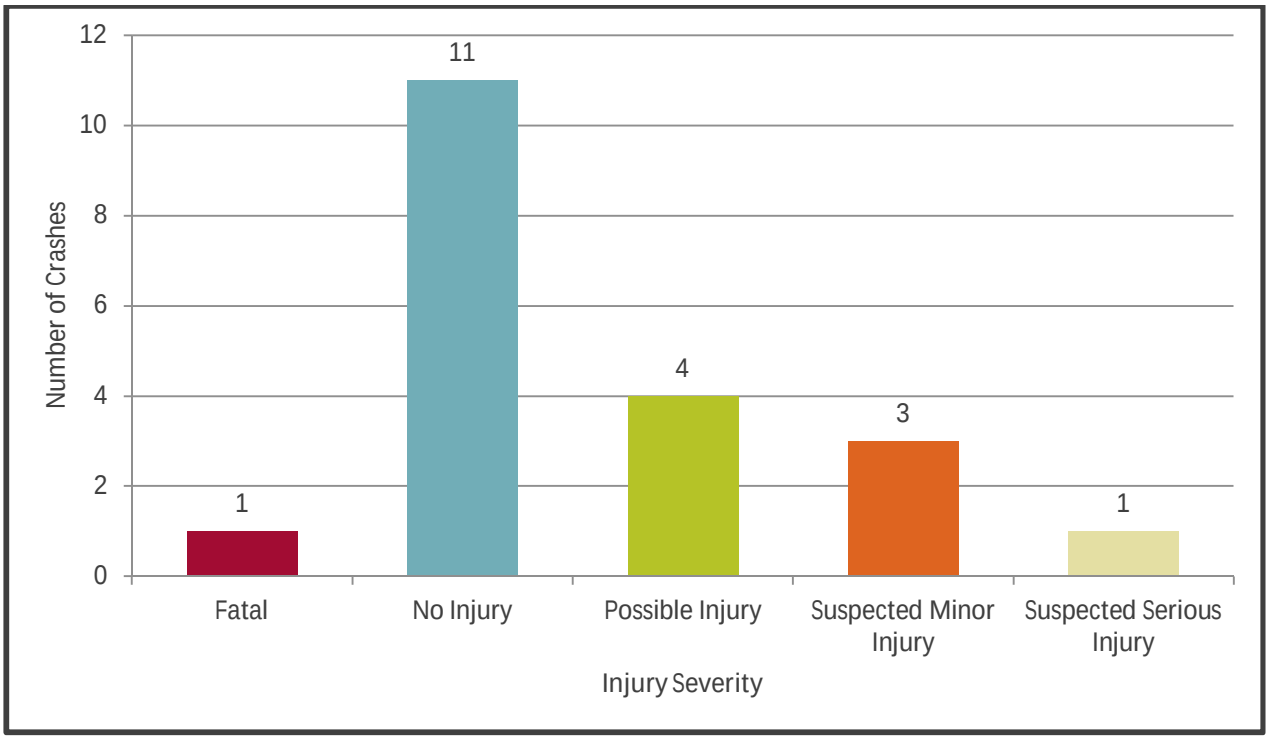


FIGURE 6: CRASHES BY INJURY SEVERITY, 2015-2019

Incident Collision Manner

Incident collision manner describes the type of crash. Crashes are summarized by collision manner in Figure 7.

Summary

- 9 (45%) of the total crashes are rear end.
- Single vehicle crashes account for the second most incidents with 4 (20%) crashes.
- The single fatal incident was a single vehicle that had overturn/rollover.
- The single serious injury incident occurred during an angle collision.
- 7 of the 9 rear end crashes occurred from vehicles traveling eastbound.

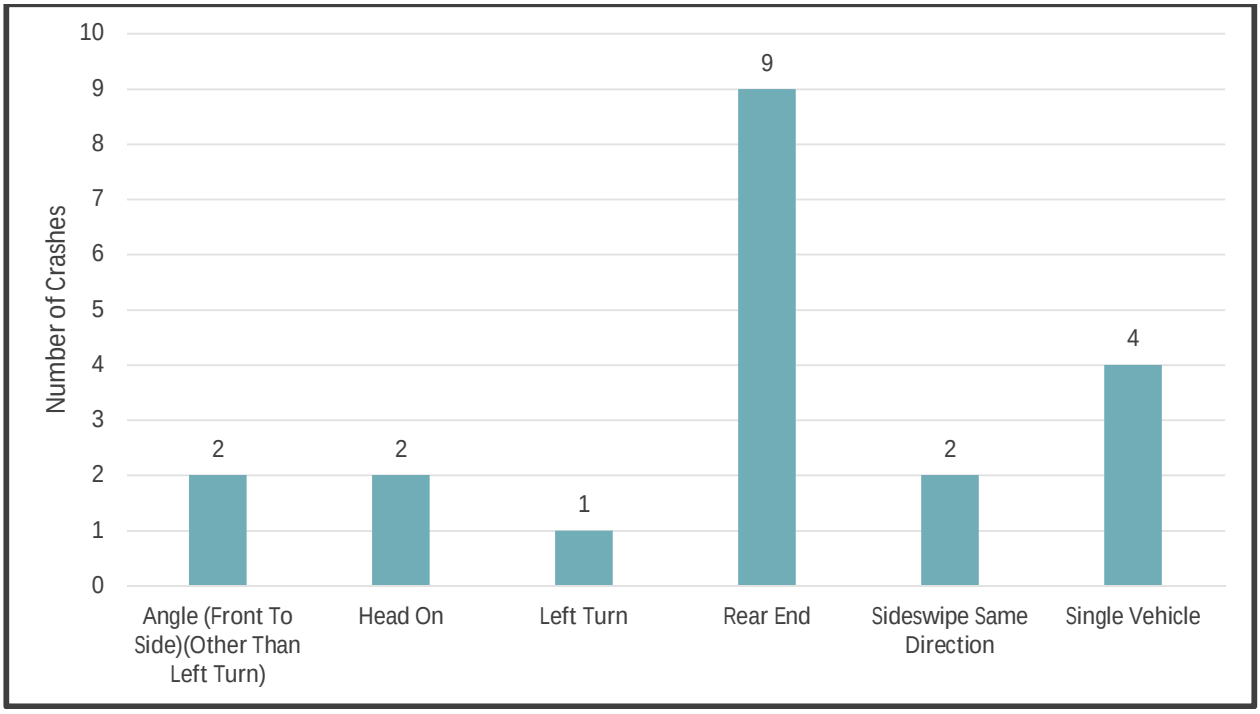


FIGURE 7: INCIDENT COLLISION MANNER (2015-2019)

Person Violation

The person violation crash description identifies the driver behavior, if applicable, that is responsible for the incident. These descriptors can provide insight to the driver and behavioral characteristics. Figure 8 summarizes the person violations by type.

Summary

- Speed too fast for conditions is the most common person violation with 8 (40%) of crashes.
- No improper action is the second leading with 4 (20%) crashes.
- The lone fatal collision was failure to keep in proper lane, which has a total of 2 (10%) crashes.
- The lone serious injury occurred due to violation of disregarded traffic signal, which has a total of 2 (10%) crashes.

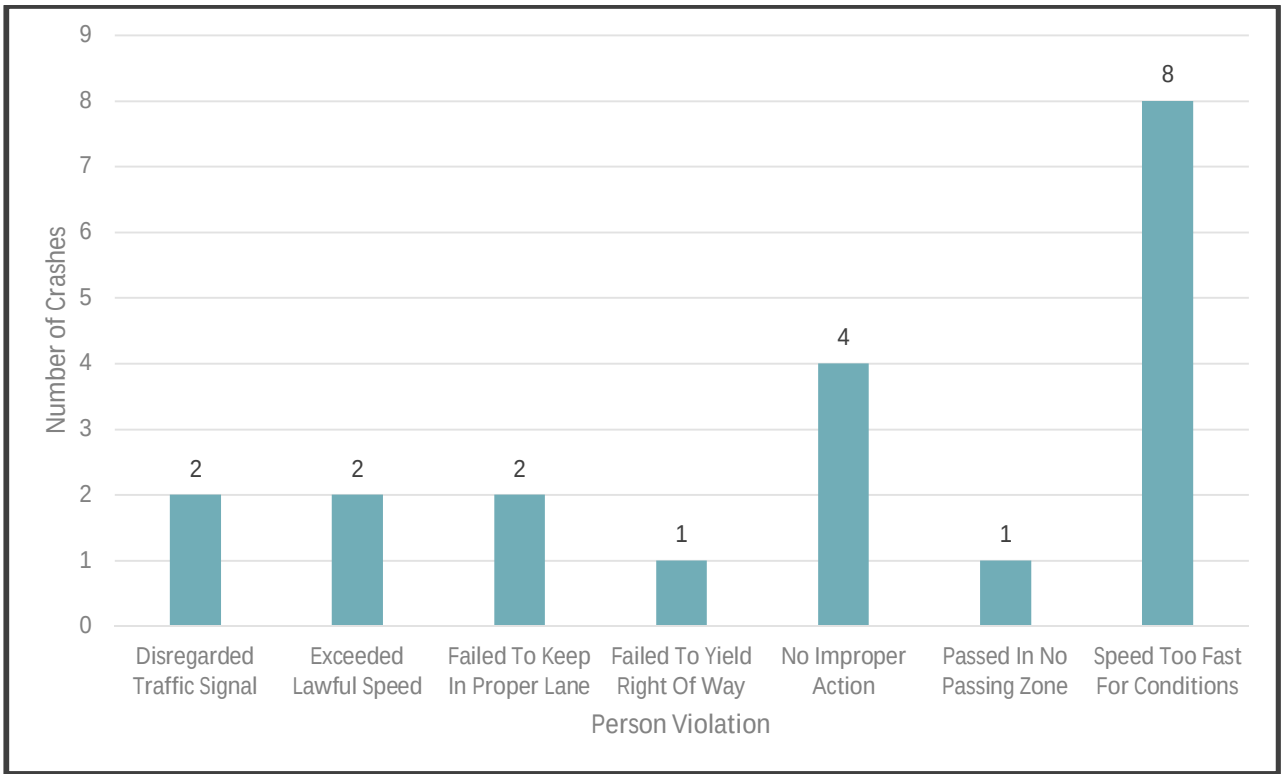


FIGURE 8: PERSON VIOLATION (2015-2019)

Light Condition

Light condition describes the type and level of light that existed at the time of the crash and are summarized in Figure 9.

Summary

- 17 of the 20 (85%) of the crashes occur in daylight, between sunrise and sunset
- 2 (10%) crashes occurred in a dark-lighted situation. Meaning no natural light but there is overhead “manmade” lighting on roadway.
- There was 1 incident in a dark-not lighted condition which describes a condition with no “natural” lighting and no overhead “manmade” light.
- Lighting is not a major factor in crashes at this intersection.

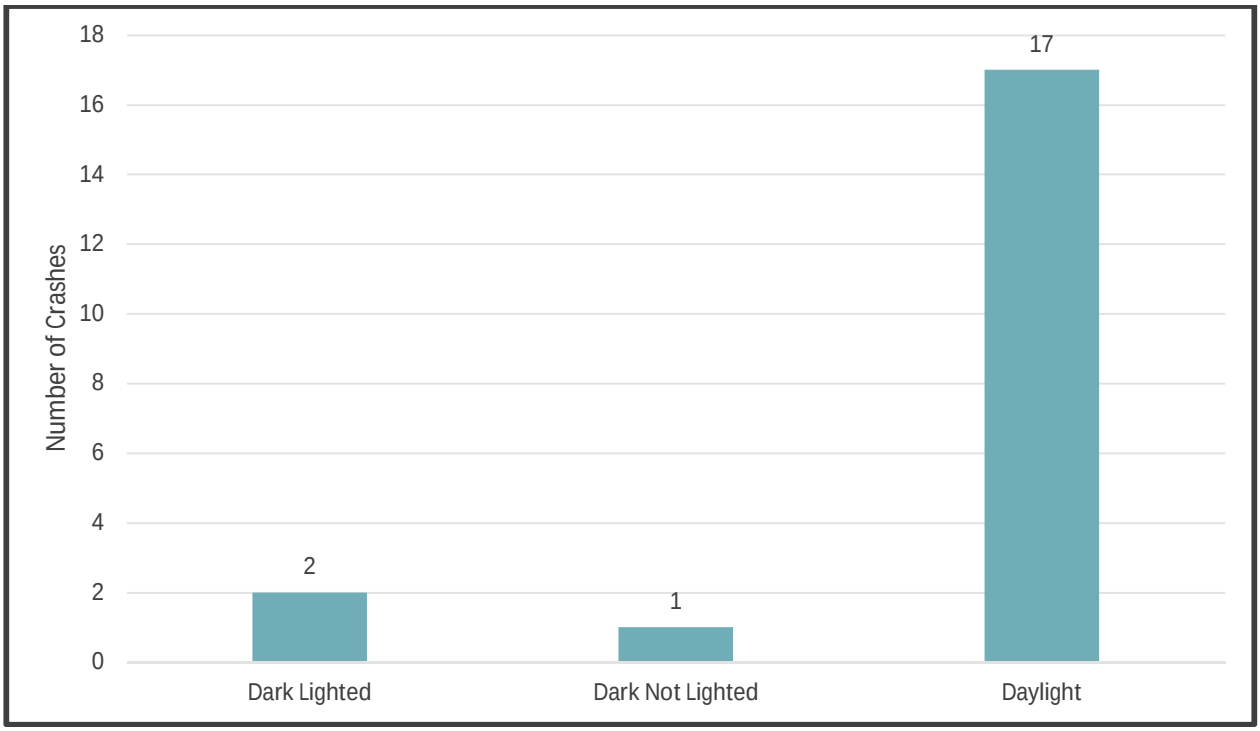


FIGURE 9: LIGHT CONDITION (2015-2019)

Weather Condition

Weather condition describes the prevailing (most significant) atmospheric condition that is present at the time of the crash and is summarized in Figure 10.

Summary

- 14 of the 20 (70%) of the crashes occurred during clear weather conditions.
- 4 (20%) occurred during cloudy weather.
- 2 occurred during precipitation, 1 during rain (5%) and 1 during snow (5%).
- Adverse weather is not a major factor in crashes at this intersection.

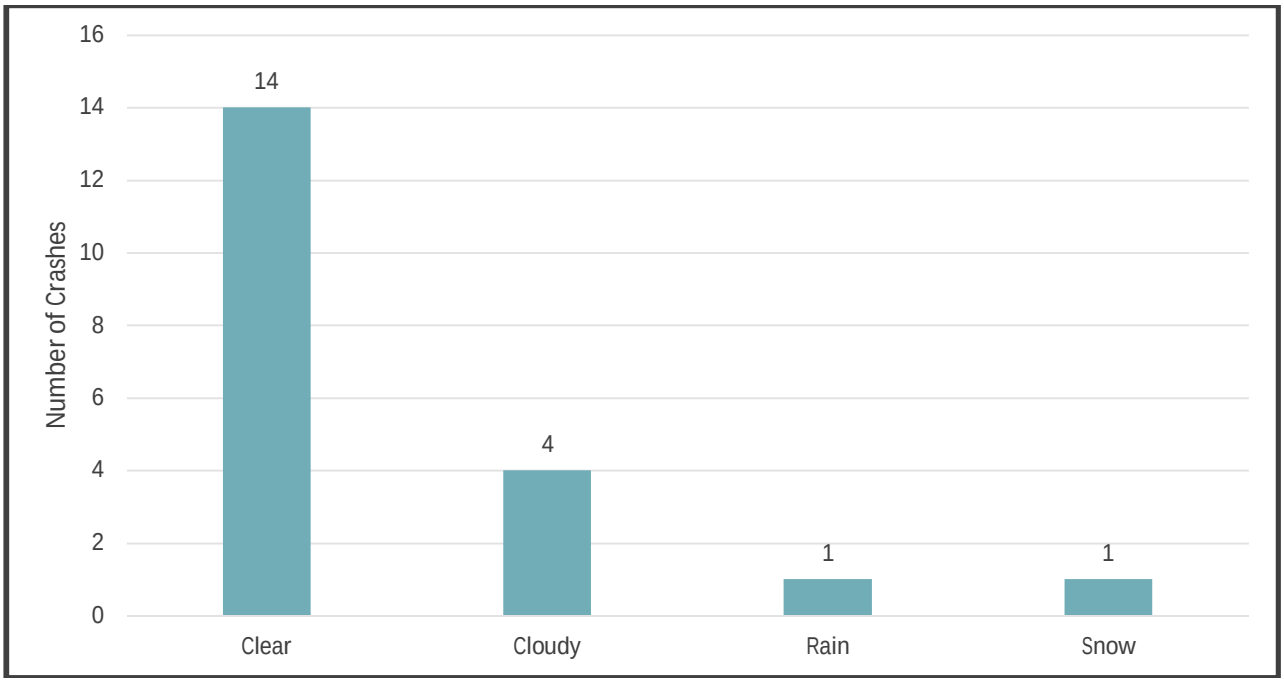


FIGURE 10: WEATHER CONDITION (2015-2019)

Current Daily Traffic Volumes

Daily Traffic Volumes

Average Daily Traffic (ADT) for all legs of the SR 89A and Robert Road intersection, including southbound to westbound SR 89A bypass lane were collected on Wednesday, July 1, 2020.

ADOT recorded a two-way count station on SR 89A west of the intersection (Location ID: 101662) in the Transportation Data Management System (TDMS). There is also a count station south of the intersection on Robert Road (Location ID: PRV-081).

The Average Annual Daily Traffic (AADT) within the corridor has grown from approximately 26,000 vehicles per day (2014) to 32,000 vpd (2020). The corridor experienced an 7% per year increase in traffic volumes from 2014 to 2018.

Table 9 summarizes collected traffic count data.

TABLE 9: TRAFFIC DATA

Route	2017 ADT*	ADOT TDMS AADT	July 2020 Daily Traffic	2040 AADT[1]	2020-2040 Growth Rate %	2020-2040 Growth Factor
SR 89A (north of intersection)	4,180	-	7,326	10,200	1.7%	1.39
Robert Road (south of intersection)	7,440	5,890 (2019)	7,970	15,400	3.3%	1.93
Fain Road (east of intersection)		12,121 (2018)	12,719	29,000	4.2%	2.28
SR 89A (west of intersection)[2]	19,300	19,502 (2020)	20,799	43,200	3.7%	2.08

1. *Data from 2017 SR 89A, SR 89 to Robert Road Transportation Study*
2. *Summation of traffic counts on SR 89A and on southbound bypass lane*

Intersection Turning Movement Counts

Turning movement counts for the SR 89A and Robert Road intersection were collected on Wednesday, July 1, 2020 from 12:00 AM to 12:00 PM and are documented in Appendix A. Data from July 2020 daily and peak hour traffic volumes are illustrated in Figure 11, 2020 Peak Hour).

Traffic Count Data Collection Summary

The July 2020 turning movement count data were compared to traffic data documented in the *SR89A Transportation Study, March 2018 (*Figure 11, 2017 Study Peak Hour). The comparison shows that the 2017 data documented in the *SR89A Transportation Study, March 2018* were higher than the 2020 data at half of the intersection movements.

Table 10 summarizes the 2017 traffic data and the 2020 data collected for this study. The green highlighted cells show where 2017 traffic data were higher than the 2020 traffic data.

The decreased 2020 data is attributed to seasonal (July) and a reduction in travel due to COVID-19. As such, to determine a conservative design volume that is representative of typical existing conditions, a composite design volume was developed from the higher of the 2017 counts (grown to 2020 based on growth rates) and is illustrated in Figure 11, 2020 Composite Peak Hour).

TABLE 10: PEAK TURNING MOVEMENTS, ROBERT ROAD/SR 89A INTERSECTION

Peak Turning Movement Counts		NB			SB			EB			WB		
		L	T	R	L	T	R	L	T	R	L	T	R
2017 Peak Hour (SR89A Transportation Study)	AM	322	55	33	59	161	230	145	363	92	47	528	40
	PM	139	116	35	54	104	173	234	462	214	52	408	40
2020 Peak Hour (Grown from 2017)	AM	355				169			405		53	597	
	PM		128		57	109			515		59	462	
2020 Peak Hour (Collected July 2020)	AM	235	67	42	65	114	252	152	312	115	37	422	48
	PM	150	113	48	51	77	258	277	435	217	41	362	67
2020 Composite Peak Hour	AM	355	67	42	65	169	252	152	405	115	53	597	48
	PM	150	128	48	57	109	258	277	515	217	59	462	67

= *Values from 2017 SR 89A Transportation Study used in composite design volume*

The K Factor and D Factor were calculated for 2020 using the daily counts at each leg of the SR 89A/Robert Road intersection. This data is summarized in Table 11 with the K Factor and D Factor for each intersection leg that is available on ADOT's Transportation Demand Management System.

TABLE 11: K FACTOR AND D FACTOR

Route	K Factor		D Factor	
	2020 Counts	TDMS	2020 Counts	TDMS
US 89A North of SR 89A/Robert Road Intersection	8.0%	-	58.7% North	-
Robert Road South of SR 89A/Robert Road Intersection	8.1%	-	57.3% North	-
Fain Road East of SR 89A/Robert Road Intersection	7.9%	10% (2018)	55.4% West	51% North
US 89A West of SR 89A/Robert Road Intersection	8.3%	10% (2018)	56.7% East	63% East
SR 89A Bypass	7.7%		100% West	

Future Traffic Volumes

SR 89A/Robert Road Intersection

Projected future 2040 traffic volumes for the existing Robert Road/SR89A intersection were developed by applying a 2% growth rate to 2020 composite turning movement volumes to each intersection approach. The volumes are shown in Figure 12.

SR 89A/Santa Fe Loop Interchange

Projected future 2040 traffic volumes for a new SR 89A/Santa Fe Loop Interchange were developed by shifting 2020 composite turning movement counts from the SR 89A/Robert Road intersection to the appropriate Santa Fe Loop interchange movement and applying a growth rate. The growth rates were calculated from July 2020 counts and the 2040 AADT from the *SR89A Transportation Study.* Growth rates (Table 9) range from 1.7% (north leg) to 4.2% (east leg). 2040 traffic volumes are presented in Figure 13.

Level of Service (LOS) Analysis

The 2040 LOS for the existing Robert Road/SR 89A intersection and the new Santa Fe Loop diamond traffic interchange was evaluated using *Synchro 10* methodology. The Synchro methodology was used instead of HCM methodology because the signal timing is grouped (clustered) for the two intersections within the diamond traffic interchange. HCM methods do not allow for evaluation of clustered intersections.

Signal timing for AM and PM, for both scenarios, was set at 120 second cycle length and the splits were optimized.

SR 89A/Robert Road 2040 LOS

The existing SR89A/Robert Road intersection will operate with several movements at LOS E or LOS F in 2040:

- AM eastbound left turns and northbound left turns.
- PM northbound left turns and southbound left turns.

Overall the intersection will operate at LOS E in the AM and LOS C in the PM. Synchro results can be found in Appendix C and the results are summarized in Table 12.

TABLE 12: SR89A/ ROBERT ROAD 2040 LEVEL OF SERVICE

2040		NB			SB			EB			WB			Intersection Overall
		L	T	R	L	T	R	L	T	R	L	T	R	
SR 89A / Robert Road	AM	F	A	C	C	C	A	F	C	B	C	C	-	E
	PM	F	A	D	E	D	A	D	A	A	B	A	-	C

SR 89A/Santa Fe Loop 2040 LOS

The SR 89A/Santa Fe Loop traffic interchange is projected to operate at LOS D or better on each movement. Table 13 summarizes the level of service (LOS) for the SR 89A/Santa Fe Loop interchange. The Synchro results are included in Appendix C. The lane configuration is consistent with that proposed in the *SR 89A Transportation Study*, and as included in the preliminary concept included in Appendix D.

Results show that in the AM the north intersection operates at LOS A and the south intersection operates at LOS B. All AM movements operate at LOS D or better. In the PM the north intersection operates at LOS A and the south intersection operates at LOS C. All PM movements operate at LOS D or better.

TABLE 13: SR89A/SANTA FE LOOP INTERCHANGE FUTURE LEVEL OF SERVICE

2040		NB			SB			EB			WB			Intersection Overall
		L	T	R	L	T	R	L	T	R	L	T	R	
1: North (WB) Ramps Intersection	AM	B	A	-	B			-	-	-	D	A	A	B
	PM	A	A	-	B			-	-	-	D	A	A	A
2: South (EB) Ramps Intersection	AM	D			A	A	-	D	B	A	-	-	-	C
	PM	D			A	A	-	D	C	A	-	-	-	C

Queue Lengths

Table 14 shows that northbound vehicles experience a 95th percentile queue of 237' at the south intersection. At the north intersection, southbound vehicles experience a 95th percentile queue of 145'.

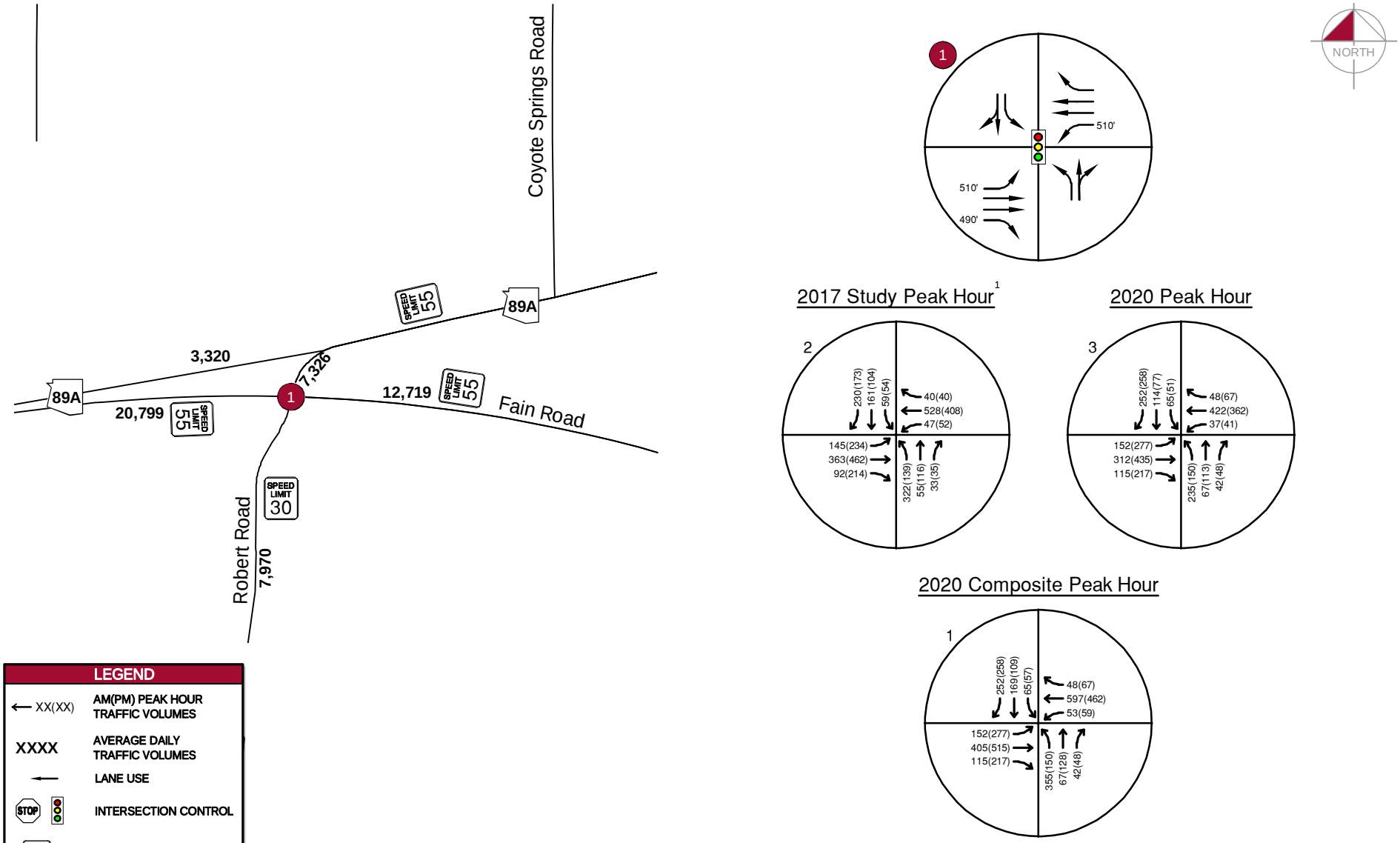
Two northbound left turn lanes are proposed at the north (westbound ramps) intersection for the northbound left movement from Santa Fe Loop to westbound SR 89A, and one left turn lane at the south intersection for southbound left turn movement to eastbound Fain Road.

Two left-turn lanes are necessary for the northbound left to contain the 95th percentile queueing between the intersections. With one left turn lane the 95th percentile queue is over 400 feet, the storage capacity between intersections is approximately 350 feet.

Other movements worth noting are the eastbound left/thru on the south intersection and the westbound left at the north intersection. The eastbound left is a heavy movement in the PM with 576 vehicles making the turn during the peak hour. The westbound left is not as heavy a movement but has a short green time of 12 seconds out of an 80 second cycle length, leading to extended queueing.

TABLE 14: 95TH PERCENTILE QUEUE LENGTH (FEET)

Queue Lengths (ft)	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
1: North Intersection	201’	8’	-	145’			-	-	-	137’	10’	6’
2: South Intersection	237’			32’	23’	-	441’	-	74’	-	-	-

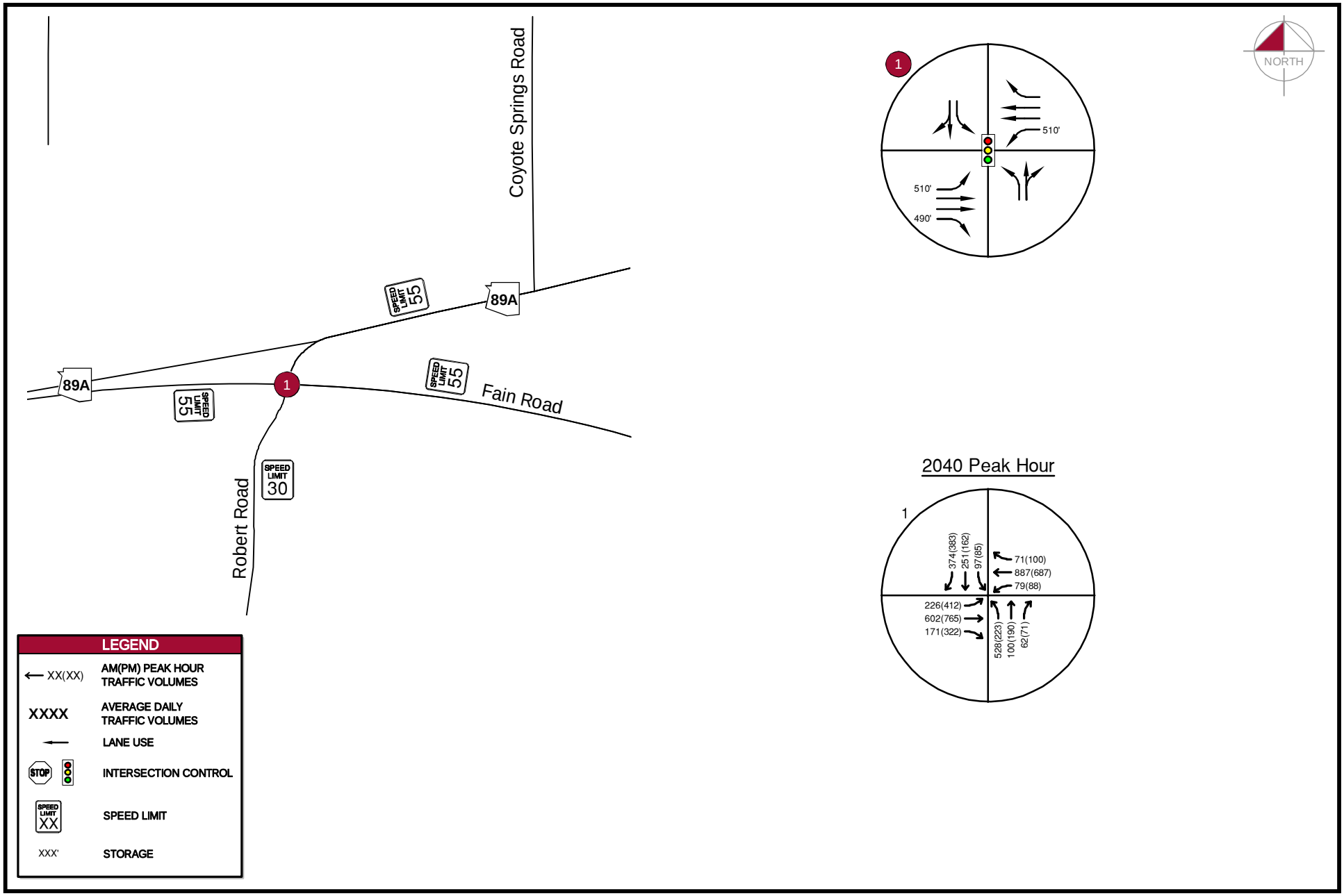


1. Volumes come from the 2018 SR 89A, SR 89 to Robert Road Transportation Study

Kimley»Horn

Figure 11

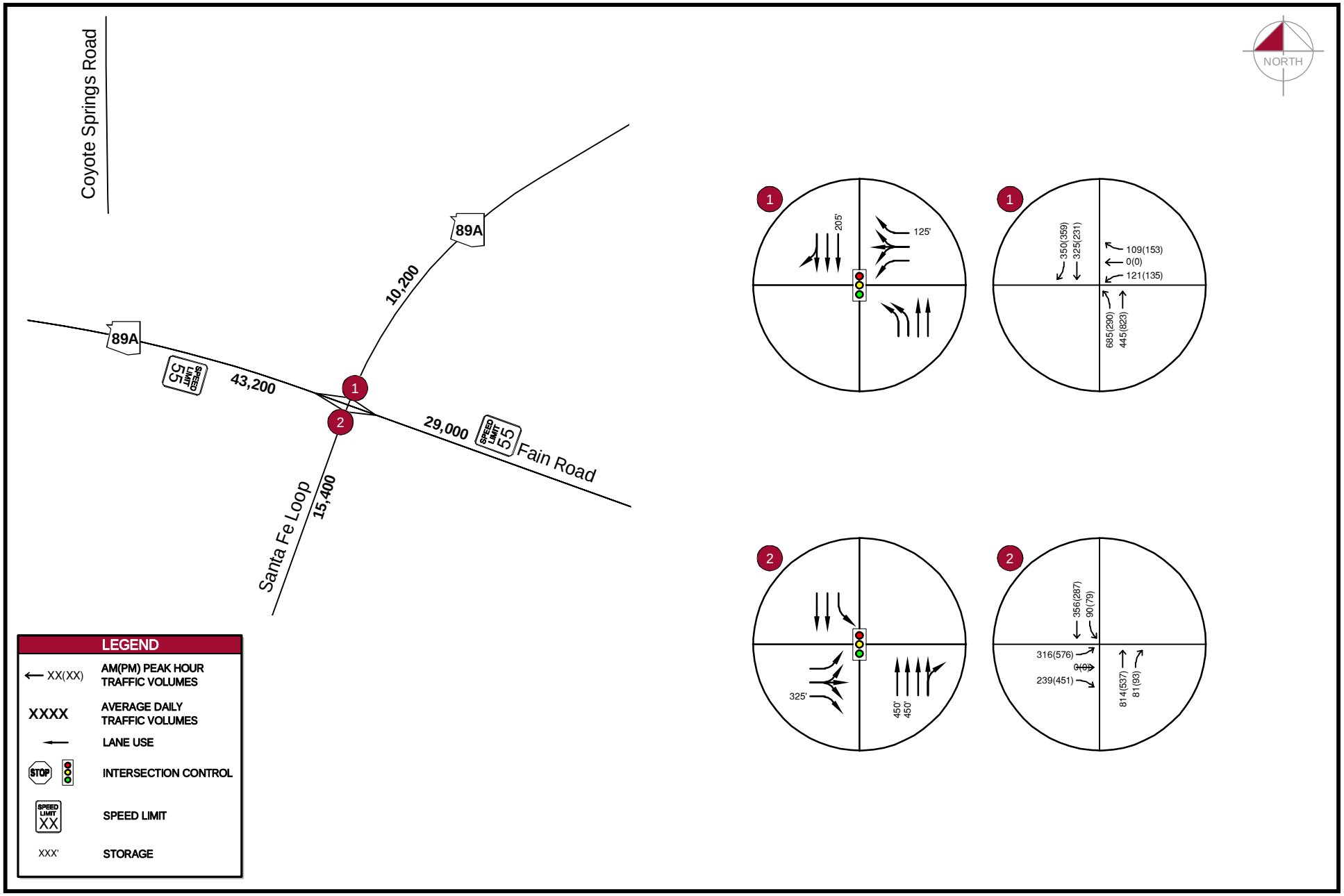
Existing Lane Configuration, Control and 2020 Turning Movement Counts



Kimley»Horn

Figure 12

Existing Lane Configuration, Control and 2040 Turning Movement Counts



Kimley»Horn

Figure 13

Design Lane Configuration, Control, and 2040 Weekday Peak Hour Volumes

4. MAJOR DESIGN FEATURES

This ASR develops a conceptual design, implementation phasing, and cost estimate for a new diamond traffic interchange at SR89A/Santa Fe Loop, as introduced in *State Route 89A to Robert Road Transportation Study*, March 2018. The new SR 89A/Santa Fe Loop interchange would replace the at-grade SR 89A/Robert Road intersection.

The traffic interchange would be located approximately 2,800 feet east of the existing Robert Road/SR 89A intersection, as recommended by ADOT in 2009 *SR 169 to Fain Road Planning Study,* to accommodate future system to system interchange for long term connectivity for a grade-separated interchange. The interchange is located east of Robert Road to provide improved interchange spacing between the new interchange and the Viewpoint Interchange located to the west.

The new interchange will connect to a new roadway, Santa Fe Loop. The Santa Fe Loop interchange will include an overpass over the Fain Road mainline. The overpass will consist of two through lanes and two left-turn lanes in the northbound direction and two through lanes and a single left-turn lane in the southbound direction.

The mainline exit ramps would be tapered, and entrance ramps would enter parallel to an acceleration lane.

A layout of the conceptual alternative is included in Appendix D.

ADOT Design Criteria

The ADOT Design Criteria are based on the Arizona Department of Transportation Roadway Design Guidelines (ADOT RDG). The most recent revision of the RDG is from April 2014, and can be found on ADOT's website below:

https://azdot.gov/sites/default/files/2019/06/2014-roadway-design-guidelines.pdf

Table 15 summarizes the design criteria used for freeways and ramps under ADOT jurisdiction. The reference column indicates if the ADOT RDG or AASHTO Criteria were implemented for the Santa Fe Loop interchange design concept.

TABLE 15: ADOT DESIGN CRITERIA

	Mainline		Ramps	
Feature	Criterion	Reference	Criterion	Reference
Level of Service	B	ADOT RDG Table 103.2	N/A	N/A
Typical Section	RA	ADOT RDG Sec. 306.2	N/A	N/A
Design Speed	70	ADOT RDG Table 101.3	45	ADOT RDG Sec. 503.3
Max Degree of Curve	3°10' *	ADOT RDG Table 202.3D	1202.009	ADOT RDG Table 202.3D
Vertical Alignment				
-Superelevation Rate	Max 10%	ADOT RDG Table 202.1A	6%	ADOT RDG Sec. 504.3
-Maximum Grade	3%	ADOT RDG Table 204.3	4%	ADOT RDG Sec. 504.1

	Mainline		Ramps	
Feature	Criterion	Reference	Criterion	Reference
-Minimum Vertical Curve	1000 FT	ADOT RDG Table 204.4	400 FT	ADOT RDG Sec. 504.1
-Stopping Sight Distance	See Table	ADOT RDG Table 201.2	See Table	ADOT RDG Table 201.2
-Minimum Clearance	16'-6"	ADOT RDG Sec. 206.4A	16'-6"	ADOT RDG Sec. 206.4A
Cross Section				
-Lane Width	12 FT	ADOT RDG Sec. 301.3	12 FT	ADOT RDG Sec. 301.3
-Left Shoulder	4 FT	ADOT RDG Table 302.4	2 FT	ADOT RDG Table 302.4
-Right Shoulder	10 FT	ADOT RDG Table 302.4	8 FT	ADOT RDG Table 302.4
-Curbs	Type B	ADOT RDG Sec. 302.2	N/A	ADOT RDG Sec. 302.2
-Side Slope	C-02.10	ADOT RDG Fig. 306.2	C-02.10	ADOT RDG Fig. 306.2
-Barrier	W-Beam	ADOT RDG Sec. 305.3	W-Beam	N/A
-Right of Way	N/A	N/A	N/A	N/A
Traffic Interchange				
-Entrance Angle	4º	ADOT RDG Fig. 504.7	N/A	N/A
-Departure Angle	1°08'45"	ADOT RDG Fig. 504.8A	N/A	N/A
-Max Degree of Curve	12°54' *	ADOT RDG Table 202.3D	N/A	N/A
-Tangent Length	16 FT	ADOT RDG Sec. 504.2	N/A	N/A
Intersection				
-Design Vehicle	WB-67	ADOT RDG Table 407.2	WB-67	ADOT RDG Table 407.2
-Min. Turning Radius	45 FT	AASHTO Exhibit 2-14	45 FT	AASHTO Exhibit 2-14
-Decision Sight Distance	780	AASHTO Exhibit 3-3	395	AASHTO Exhibit 3-3
Drainage				
-Storm Frequency	50	ADOT RDG Table 603.2A	10	ADOT RDG Table 603.2B
-Cross Drainage	50	ADOT RDG Table 603.2A	N/A	N/A
-Pavement Drainage	10	ADOT RDG Table 603.2B	10	ADOT RDG Table 603.2B

*Conversion to radius feet = 36000/(2*π*degree of curve)

Additional Design Controls

The design controls are identified in Table 16 used in addition to those controls listed above to design the diamond interchange alternative. All criteria are based on "Rural" specifications.

TABLE 16: OTHER DESIGN CRITERIA

Design Control	Design Value
Design Year	2040
Design Speed	
• SR 89A / Santa Fe Loop	70 MPH
• Ramps	
First Curve	60 MPH
Main Body	50 MPH
Terminus	35 MPH
Robert Road	45 MPH
Elevation	4,900 ft
Level of Service	B
Side Slope	ADOT C-02.10
Guardrail:	Provide per ADOT Criteria and/or AASHTO RDG.

Horizontal and Vertical Alignment

The purpose of the horizontal and vertical alignment is to meet the criteria below:

1. Meet the design and safety requirements for the final product.
2. Provide capacity to the growing traffic volumes and future expansion.
3. Minimize the difference in cut and fill volumes while matching the existing landscape.
4. Provide an experience that is pleasurable and natural to the driver by keeping the alignment as straight as practical, horizontal curves as flat as possible, and avoid spirals.
5. Crossroads are tangent through the interchange to at least 100 feet beyond ramp intersections.

Turn Lane Design

Table 17 shows the design queue lengths on each intersection approach, as determined from Synchro 95th percentile queue lengths and design speeds. Northbound Santa Fe Loop Road has two through lanes at the south intersection that feed into the northbound to westbound left turn lanes, with a design queue length of 250'. Southbound Santa Fe Loop Road has one through lane at the north intersection that feeds into the southbound to eastbound left turn, with a recommended design queue length of 150'.

The length of turn lanes determined using ADOT Traffic Engineering Guidelines and Processes (TPG), 430 Turn Lane Design. The design speed for the north and south approaches is 45 MPH and design speed for the ramps is 35 MPH.

Table 17 summarizes the recommended total turn lane length based on ADOT TGP 430.

TABLE 17: TURN LANE LENGTHS

		Santa Fe Loop South Intersection NBL (45 MPH)	Santa Fe Loop North Intersection SBL (45 MPH)	SR 89A EBR (35 MPH)	Fain Rd WBR (35 MPH)
Design Queue Length		250'	150'	210'	10'
Braking Distance	Desirable	200'	200'	115'	115'
	Minimum	85'	85'	40'	40'
Storage Range (Design Queue Length + Braking Distance)		335'-450'	235'-350'	250'-325'	50'-125'
Storage Length		450'	205'*	325'	125'
Gap Length		90'	90'	60'	60'
Taper Length = (Width*Speed)/2		420'	270'	210'	210'
Recommended Total Length		960'	565'	595'	395'

**Uses minimum braking distance Figure 430-C. from ADOT Traffic Engineering Guidelines and Processes*
(XX MPH) is design speed

The Storage Length from Table 17 is consistent with ADOT TPG 430:

- Storage Length = Design Queue Length + Braking Distance

Recommended Total Length follows ADOT TPG 430, equation blow.

- Recommended Total Length = Gap Length + Recommended Storage Length +Taper Length

The desirable breaking distance is recommended for the northbound left, eastbound right, and westbound right, resulting in a Recommended Total Length up to 960', 595' and 395' respectively. The minimum braking distance value for the southbound left turn at the north intersection was utilized due to geometric constraints. The Recommended Total Length for the southbound left is 565'.

Right-of-Way

The footprint of the study area is within land owned by either the state or Town of Prescott Valley, and Fain Land and Cattle Co. A third property owner, Lawyers Title of Az Inc and C/O Glenarm Land Company owns a small amount of land on the northern edge of the project.

Access Control

The interchange alternative for SR 89A and Robert Road will be fully access controlled. No driveway connections to SR 89A or to Santa Fe Loop Road will be permitted within ADOT access control limits.

Earthwork

An effort to balance the amount of cut and fill was considered with the design of the alternative. A total amount of cut and fill can be found in a Cut/Fill Report found in the Appendix H.

The future Agua Fria Channelization project has an approximate 200,000 cu yds of material that could potentially be used for fill material for the interchange, subject to a soil analysis. If the material is suitable, sufficient quantity may be available to reduce the cost of fill material for the interchange. Additional investigation is required.

Soils

The proposed alternative lies on two major soil types according to the United States Department of Agriculture's Web Soil Survey site. A majority of the projects alignment falls within the Wineg-Abra complex (Wn) and a portion to on the northside of the project lies in the Lonti-Abra gravelly sandy loams (LpB). A small portion of the western limits of the project footprint fall in Abra-Wineg association (AnC).

Figure 14 shows the location of the different soil types in the vicinity of the project site.

Wineg-Abra

This soil type is found in alluvial fan landforms and has a parent material of mixed alluvium. A typical profile of the Wineg soil type consists of 0-2 inches of sandy loam, 2-14 inches of gravelly sandy clay loam, and 14-60 inches of sandy loam. Abra typical profile consists of loam from 0-60 inches. The area is classified as well drained.

FIGURE 14: SOILS MAP

Source: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Lonti-Abra

This soil type is found in plains landforms and has a parent material of mixed alluvium. A typical profile for the Lonti soil type consists of a typical profile of 0 to 5 inches of gravelly sandy loam, 5-45 inches of gravelly clay, and 45-68 inches of very gravelly sandy clay loam. Abra typical profiles consist of 0-3 inches of gravelly sandy loam and 3-60 inches of loam. The area is classified as well drained.

Abra-Wineg

This soil type is found in ridge landforms and has a parent material of mixed alluvium. Abra soil type consist of a typical profile of 0-3 inches of gravelly sandy loam and 3-60 inches of loam. Wineg typical section consists of 0-2 inches of sandy loam, 2-14 inches of gravelly sandy clay loam, and 14-60 inches of sandy loam.

5. PROJECT PHASING AND ESTIMATE OF PROBABLE COST

The total construction cost of the Santa Fe Loop Interchange is estimated at $27.8 M. This represents a fully-functional traffic interchange as illustrated in Appendix D. The estimate of probable construction cost for the interchange is included in Appendix G. Note that this estimate does not include construction of Santa Fe Loop Road which will ultimately connect to the new interchange. Santa Fe Loop project development is the responsibility of local jurisdictions.

Recognizing that funding for large-scale infrastructure projects is limited, stakeholders recognize the need for a phased implementation of the Santa Fe Loop interchange. Phased implementation facilitates incremental and independent funding of the interchange and the Santa Fe Loop extension. Incremental phasing will allow a set of smaller projects to be completed, rather than a single large construction project.

Implementation Plan

The proposed implementation plan consists of five implementation phases as illustrated in Appendix E.

Implementation Phase 1

Phase 1 is a partial construction of the interchange to include the westbound off ramp, a portion of the eastbound off ramp, the eastbound on ramp, two lanes of the north approach and three lanes on the bridge.

The bridge would consist of northbound and southbound through lanes, a southbound left, and a wide shoulder adjacent to the southbound through lane.

A two-way frontage road would extend from Robert Road to the Santa Fe Loop following as much of the alignment of the future eastbound off-ramp as possible. The two-way frontage road would provide access to and from Robert Road, as Santa Fe Loop would not yet be in place. The intersection of the frontage road and Robert Road is located 660' south of the SR 89A/Robert Road curb returns, consistent with *ADOT Roadway Design Guidelines*, Section 506 - Access Control.

The interim frontage road connection of Robert Road to the Santa Fe Loop interchange is needed until Santa Fe Loop can be constructed by the Town of Prescott Valley.

Access at the existing SR 89A / Robert Road intersection will be limited to vehicles making an eastbound right from SR 89A onto southbound Robert Road. The southbound SR 89A bypass will still be operational for vehicles going westbound towards SR 89 during Phase 1.

Implementation Phase 2

Phase 2 is the demolition of the southbound SR 89A bypass, partial demolition of Coyote Springs Road south of Antelope Meadows Drive, construction of the westbound on-ramp, and construction of a new roadway connecting SR 89A to Antelope Meadows Drive.

The Phase 1 two-way frontage road connection to Robert Road would continue to operate as proposed in Phase 1.

Implementation Phase 3

Phase 3 is the construction of the south leg of the interchange and completion of the eastbound off ramp, and removal of the two-way frontage road connecting Robert Road and Santa Fe Loop.

During Phase 3, a Robert Road bridge over Fain Road could be considered. This bridge is not included in the cost estimate and is not shown on the phasing plan in Appendix E. A bridge concept layout is included in Appendix F. The bridge is estimated at approximately $6.3M. This bridge would connect neighborhoods north of Fain Road along Antelope Meadows Drive to the Robert Road corridor.

Implementation Phase 3A

Phase 3A is construction of Santa Fe Loop, by Town of Prescott Valley and local partners. Phase 3 and 3A should happen in parallel.

Implementation Phase 4

Phase 4 is the widening of the interchange to seven lanes with a median and widening of north and south roadway approaches to four lanes.

Implementation Phase 4A

Phase 4A is the widening, by Town of Prescott Valley and other local partners, of Santa Fe Loop to four lanes.

This is the ultimate design for the interchange and is fully functional, meeting LOS standards for 2040 traffic volumes.

Estimate of Probable Cost

An estimate of probable cost for the recommended alternative was prepared. The estimate includes costs for materials, construction, and design.

The cost is separated into four phases:

- Phase 1: $15,590,676
- Phase 2: $2,984,783
- Phase 3: $1,374,682
- Phase 4: $7,834,329

Total: $ 27,784,470

A detailed cost breakdown is shown in the Appendix G.

Phase 1 includes estimated cost for leased right of way from Arizona State Land Department. Arizona State Land Department provided preliminary cost estimates for land lease associated with the frontage road. Depending on the term for the temporary right of way the State Land Department will accept for Robert Road, estimates are provided for a 25-year term and for a 5-year term. Costs are estimates only, and are based on an appraised land value of $17,000/acre from a 2020 appraisal in Section 16, Township 14 North, Range 1 West with an effective date of the 01/09/2020:

- 25-year Term = $259,702.00
- 50-year Term = $283,672.00

Note that cost of Phase 3A and Phase 4A (Santa Fe Loop Road) is not included in the estimate as this is anticipated to be the responsibility of Town of Prescott Valley. Cost estimates for Santa Fe Loop are documented and evaluated in studies prepared by Town of Prescott Valley, *Agua Frida Design Report, Agua Fria Floodplain Revision & Unit 16 Stormwater Mitigation Study, Preliminary Design and Hydraulic Report*, June 2013.

An additional phase (Phase 5) may include construction of a Robert Road bridge over SR 89A at an estimated at $6.2M.

Interim Phase Traffic Analysis

During Phase 1, the intersection of Robert Road and the two-way frontage road will be constructed as a three-leg intersection that is all-way stop controlled.

A traffic analysis of this Phase 1 condition was conducted, for 2030 traffic conditions, focused on the intersection of Robert Road and the two-way frontage road. This intersection was analyzed using Synchro and following the HCM 6th edition methodology.

AM Peak Period

The analysis results show that all movements at this intersection, for the 2030 condition, will operate at a LOS B or better in the AM, and at overall intersection LOS B and intersection delay of 11.2 s/vehicle. The highest 95th percentile queue in the AM is on the westbound left turn and southbound approach with a queue of approximately 2 vehicles or 50 feet.

PM Peak Period

The analysis results show that all movements at this intersection, for the 2030 condition, will operate at LOS C or better in the PM, and at overall intersection LOS B and intersection delay of 14.5 s/vehicle. The highest 95th percentile queue in the PM is on the southbound approach with a queue of approximately 5 vehicles or 125 feet.

Synchro's HCM 6 results are included in Appendix C and seen below in Table 18 and Table 19.

TABLE 18: 2030 INTERIM FRONTAGE ROAD AT ROBERT ROAD LOS AND DELAY

	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Robert Road and Frontage Road												
AM LOS (Delay)	-	-	A (9)	B (12)	A (10)	-	-	-	-	B (12.5)	-	-
PM LOS (Delay)	-	-	B (10.5)	C (19.3)	B (13)	-	-	-	-	B (12.9)	-	

TABLE 19: 2030 INTERIM FRONTAGE ROAD AT ROBERT ROAD QUEUEING

	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Robert Road and Frontage Road												
AM Queue (ft)	-	-	25 ft	50 ft	25 ft	-	-	-	-	50 ft	-	-
PM Queue (ft)	-	-	50 ft	125 ft	75 ft	-	-	-	-	50 ft	-	

6. AGENCY COMMENTS

The project study team met with the Technical Advisory Committee (TAC) throughout the planning process to solicit input, comment, and direction. The TAC consisted of representatives from Arizona Department of Transportation, CYMPO, Dewey-Humboldt, Prescott, Prescott Valley, and Yavapai County.

Input and comments received during discussion from the TAC are outlined below.

Technical Advisory Committee Meeting No. 1

TAC Meeting No. 1 was held on June 22, 2020. Topics discussed during included traffic data, location of interchange, baseline alternative (diamond), and safety.

Engineering Considerations:

- Location of the interchange has been studied, there is no need to review other locations.
- Baseline alternative is a diamond Traffic Interchange. There is no need to review other configurations.
- The critical movements are southbound Fain Road to northbound SR 89A and northbound Robert Road to westbound SR 89A.

Social and Economic Considerations:

- The Coyote Springs community will require access, rerouting will impact access to community.
- Robert Road will need to be considered in the reconfiguration; Prescott Valley has envisioned that Robert Road would be constructed over SR 89A.
- Two landowners are Arizona State Land Department (east of section line) and Fain Land and Cattle (west of section line).

Technical Advisory Committee Meeting No. 2

The second TAC meeting occurred on August 13, 2020. Topics discussed include project objectives, land ownership, current and future conditions, traffic data, crash data, and alternatives development. Key discussion items included:

Engineering Considerations:

- Project recommendations should incorporate phased implementation.
- Interim improvements to facilitate a phased implementation include a bridge on Robert Road alignment over SR 89A or a 2-way frontage road connecting Robert Road to Santa Fe Loop.

Social and Economic Considerations:

- Robert Road access to SR 89A cannot be eliminated without substantially equal access restoration.

Technical Advisory Committee Meeting No. 3

The third TAC meeting occurred on October 13, 2020 via teleconference call. The draft ASR report was presented, along with the proposed phasing plan. Key discussion items included:

Phasing Plan:

- Timing of construction of both Santa Fe Loop and the new interchange are undetermined. As such, interim connections from Robert Road to the new interchange are required, so that the interchange could be constructed independent of Santa Fe Loop.
- ADOT would be concerned about the potential duration of the interim connections.
- Town of Prescott Valley stated that the phasing plan needs to be separated into smaller projects so that the interchange can be constructed incrementally. Separating the interchange into smaller projects that is the only way that a project of this magnitude is feasible within a rural area.

Phasing Plan Alternatives

- Construct a 2-lane bridge, which can then be expanded in a subsequent phase to 4 lanes. The ability of large trucks to navigate turning movements on a narrower 2-lane bridge will need to be considered.
- Provide interim connections (e.g. temporary roads and ramp connections) to connect to Robert Road so that the full interchange does not require construction within a single project.

Arizona State Land Department

The Arizona State Land Department (ASLD) reviewed the Alternatives Selection Report. In addition, a teleconference call was held with ASLD representatives to discuss the interchange location and the temporary frontage road connecting Robert Road to the Santa Fe Loop interchange. The frontage road will require temporary access across State Trust Land. ASLD provided the following comments and input to the alternatives:

1. Depending on the term for the temporary Right of Way (ROW) the State Land Department will accept for Robert Road, two estimates are provided for costs to lease land for the temporary frontage road. Costs are estimates only, and are based on an appraised land value of $17,000/acre from a 2020 appraisal in Section16, Township 14 North, Range 1 West with an effective date of the 01/09/2020:
    a. 25-year Term = $259,702.00
    b. 50-year Term = $283,672.00
2. Additional ROW considerations related to Robert Rd / SR89A roadway project and specific to Robert Rd. Bypass Road with two-way traffic, (2) 12' lanes are:
    a. It is understood that the Robert Rd frontage road is temporary short-term interim onramp/offramp to and from SR89A Santa Fe Loop Traffic Interchange (TI)

b. Application for short-term right of way for temporary Bypass Rd to be filed by jurisdiction ultimately responsible for construction, maintenance and operation of bypass road.
c. Frontage road should allow for interior collector spur roads to serve adjacent Trust lands.
d. At the discretion of the State Land Department and at the time Santa Fe Loop is constructed, bypass road to be terminated
e. Construction and operation of Santa Fe Loop Road will initiate the obliteration and reclamation of temporary Bypass Rd

3. Engineering considerations include:
    a. With the ROW application, the submittal needs to include a constraints map (with GIS/CAD files) to establish any severance parcels. Refer to Attachments 1 and 2 (Appendix I).
    b. ASLD will require coordination with the ROW applicant for Santa Fe Loop Road, the interim frontage road and the TI at all design levels, not limited to:
        i. Culvert crossings – A drainage report is needed to determine if drainage easements are needed.
        ii. Utility sleeve crossings. i.e., Gravity Sewer goes to the east southeast.
4. Regarding the interim frontage road connection to Robert Road, please provide reference for the 640-foot restriction that there be no intersection along an at-grade bisecting road (Robert Road) with a major freeway (SR89) within 640-feet of the Robert Road/SR 89 intersection.
5. Planning considerations include:
    a. The interim frontage road alignment could be a potential problem for future developers. Please evaluate if there would be opportunities for ingress and egress access to the adjacent State Trust Land.
    b. The final alignment of the road should be coordinated with ASLD to maximize opportunity to facilitate development of the adjacent State Trust Land.
    c. The ultimate frontage road condition should allow ability for ingress and egress access to the adjacent State Trust Land.
    d. The final location of the interchange should be coordinated with ASLD to reduce severance requirements associated with ROW acquisition, optimize safety and development opportunity of the adjacent State Trust Land, which in turn maximizes economic development opportunity for the Town of Prescott Valley and Yavapai County. One option may include shifting the final interchange location up to 500' either east or west to better facilitate future land uses.
    e. Given the impact of this traffic interchange and the proposed Santa Fe Loop to State Trust land, ASLD should be consulted before final location of the traffic interchange and Santa Fe Loop Drive alignments are determined, since slight modifications may result in significant impact to the Trust and reduce the

potential need for inclusion of severance parcels as part of the ROW acquisition. Some considerations the larger traffic interchange/Santa Fe Loop project should address are:

i. Santa Fe Loop Road is planned as a major truck route. Consider if the Town will allow some commercial development on adjacent land in addition to residential development.
ii. Determine any setback requirements between future State Trust land development and school.
iii. Determine any setback requirements between Santa Fe Loop Road and the school.
iv. Determine any setback requirements between the future State Trust land development and Santa Fe Loop Drive.
v. Determine whether Santa Fe Loop Road will be access controlled along this portion of Santa Fe Loop Drive and if so, the access requirements.
vi. Determine if there is flexibility in realigning or moving the Santa Fe Loop Road crossing at the Agua Fria River proposed channelization.
vii. Determine if there is flexibility in moving the Agua Fria River channel curve at this crossing to the east to accommodate a new crossing location.
viii. Determine if there is flexibility to slightly realign the Santa Fe Loop Road overpass at the SR 89/Fain Road traffic interchange to other than 90 degrees to accommodate land use plan of State Trust.
ix. Appendix I contains several ASLD graphics (Attachments 3-5) that demonstrate how slight realignments create different benefits for adjacent development opportunities that will ultimately benefit the Trust, the Town and the County.

7. SOCIAL, ENVIRONMENTAL, ECONOMIC CONCERNS

Based on the selected alternative (diamond traffic interchange), the following section discusses concerns related to social, economic, and environmental factors. Social concerns are those that effect the population of the area and roadway, economic concerns are related to the cost of the project and monetary effects on the area, and environmental concerns are those related to the biophysical environment.

It is anticipated that a Categorical Exclusion (CE) Checklist will be appropriate National Environmental Policy Act (NEPA) documentation for the project; however, this should be evaluated as design continues.

Biological Resources

Based on the review of the Arizona Game and Fish Department (AGFD) Online Environmental Review Tool (OERT), no federally listed species have been documented within two miles of the project limits. A Biological Evaluation Short Form (BESF) will be prepared by a qualified biologist to evaluate impacts to biological resources during the environmental clearance process. A Biological Evaluation may be required; subject to direction from ADOT.

Wetland and Riparian Areas

According to the National Wetlands Inventory Wetlands Mapper and review of aerial photography, there are no wetlands or riparian areas in or adjacent to the project limits.[1] Therefore, no impacts are anticipated. This should be reevaluated during the environmental clearance process.

Section 401/404 of the Clean Water Act

Based on the review of aerial photography and USGS topographic mapping, there are no potential Waters of the U.S. (WOTUS) within or adjacent to the project limits. The Agua Fria River is located approximately 0.6 miles south of the project limits.[2] Therefore, Section 404/401 permitting is not anticipated. This should be reevaluated during the environmental clearance process.

Floodplain Encroachment

Based on the review of Federal Emergency Management Agency (FEMA) data, the project is not located within a floodplain. The nearest floodplain is approximately 0.5 mile south of the project along the Agua Fria River.[3] Therefore, no impacts are anticipated during the construction of the new traffic interchange. The Santa Fe Loop will cross the floodplain and has been evaluated in

[1] https://www.fws.gov/wetlands/data/Mapper.html
[2] https://www.fws.gov/wetlands/data/Mapper.html
[3] https://msc.fema.gov/portal/search?AddressQuery=prescott%20valley%20az#searchresultsanchor

the *Agua Fria Floodplain Revision & Unit 16 Stormwater Mitigation Study* completed by Lyon Engineering for Prescott Valley in June 2013. This should be reevaluated during the environmental clearance process.

Sole Source Aquifer

The project is not located within the limits of a Sole Source Aquifer.[4] Therefore, no impacts are anticipated. This should be reevaluated during the environmental clearance process.

Cultural Resources

The project limits include portions of SR89A, portions of Fain Road, and the proposed Santa Fe Loop. Portions of the project limits along SR89A, Fain Road, and the proposed Santa Fe Loop have been previously surveyed for various projects related to the realignment and widening of SR89A and Fain Road and the construction of a radio tower. The proposed Santa Fe Loop has not been surveyed in its entirety. The historic alignment of SR89A was recorded as a historic site, however this portion of the in-use road is not considered a historic or scenic road. Abandoned segments of SR89A within the project limits should be evaluated as potential contributing elements. Because portions of the project limits have not been surveyed and the surveyed areas were investigated over 10 years ago, the project limits should be subjected to a Class III pedestrian survey in their entirety in compliance with 36 CFR 800, the regulations implementing the National Historic Preservation Act, the Arizona Antiquities Act, ARS 41-841 et seq., and the Arizona Historic Preservation Act, ARS 41-861 through 41-864. These requirements should be reevaluated during the environmental clearance process based on the project scope of work and environmental clearance limits.

Section 4(f) Resources

The project is subject to Section 4(f) of the United States Department of Transportation (USDOT) Act of 1966 (49 U.S.C. 303). Based on preliminary review, there are no potential protected Section 4(f) properties within or adjacent to the project limits; therefore, Section 4(f) analysis/consultation is not anticipated. The nearest potential Section 4(f) property is Humboldt Unified School District located approximately 0.3 miles south of the project limits. This should be reevaluated during the environmental clearance process.

Section 6(f) Resources

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965 (16 U.S.C. 4601-4 et seq.) applies to all transportation projects, regardless of funding source or approval authority, which propose to use land from a Section 6(f) property. Based on preliminary review, there are no potential protected Section 6(f) properties in the project area; therefore, Section 6(f)

4 https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b

analysis/consultation is not required.[5] This should be reevaluated during the environmental clearance process.

Visual

The addition of a traffic interchange would change the visual contrast of the project area. The project area is also surrounded by State Trust lands managed by the Arizona State Land Department (ASLD). Coordination with ASLD during scoping, could outline any specific visual analysis requirements ASLD would require. This should be reevaluated if there are changes to the project limits or project scope of work. This should be evaluated during the environmental clearance process.

Scenic and Historic Route

This portion of SR89A is not considered a Historic or Scenic Road.[6] This should be reevaluated during the environmental clearance process.

Socioeconomic Impacts

The proposed location for the new interchange is east of the current SR 89A and Robert Road intersection. Obtaining this land would require use of public land and private land owned by Fain Land and Cattle Co. All land is currently undeveloped and would not require the moving or relocating of any buildings or facilities.

This is the last at grade intersection along the main corridor of SR 89A through Prescott Valley. The final design to create a grade-separated diamond interchange with Santa Fe Loop fits into the current surrounding infrastructure to create a full access-controlled corridor.

Current growth in the area also favors the development of an interchange alternative. Growth in commercial and residential developments to the north and south of the study area favor the increased capacity added to the roadways by the grade-separated alternative.

Construction cost is a major concern for the final design of this alternative. The project has been broken up into two phase, Phase 1 completion of the diamond interchange and Phase 2 completion of the Santa Fe Loop. Interim Alternatives 1 and 2 connect Robert Road to the new interchange between phases via a frontage road south of SR 89A or a bridge over SR 89A, both at the existing Robert Road.

Regional economic effects are increase connectivity between the north/south and east/west sides of Prescott Valley.

No residential or commercial displacements will occur as a result of this project. Detours will not be required for this project and at least one lane will always be maintained during construction.

[5] http://projects.invw.org/data/lwcf/grants-az.html
[6] https://azdot.gov/about/historic-and-scenic-roads

Disproportionate impacts to protected populations are not anticipated. This should be reevaluated during the environmental clearance process.

Hazardous Materials

Based on the review of the Arizona Department of Environmental Quality (ADEQ) eMaps website, there are no documented hazardous materials cased in the project area.[7] A Preliminary Initial Site Assessment (PISA) will be prepared during the environmental clearance process to further investigate the potential for facilities with hazardous materials concerns. Testing for asbestos and lead based paint will also be conducted during the environmental clearance process.

Noise

Sensitive noise receptors are located in the project area. The proposed project would result in a substantial vertical alteration and is considered a Type I project. Therefore, noise impacts would need to be evaluated for sensitive receptors within 650 feet of the TI. Noise impacts should be evaluated during the environmental clearance process.

AZPDES Stormwater Permit

Construction is anticipated to disturb more than one acre of land; therefore, a Section 402 [Arizona Pollutant Discharge Elimination System (AZPDES)] permit and a Stormwater Prevention Pollution Plan (SWPPP) will be required from the Arizona Department of Environmental Quality (ADEQ). This should be reevaluated during the environmental clearance process.

Air Quality

The project is not located within non-attainment or maintenance areas for carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO2); ozone (O3); or particulate matter (PM) for both PM10 and PM2.5; and sulfur dioxide (SO2). This project and has not been linked with any special mobile source air toxic (MSAT) concerns and will not have a negative effect on air quality in the area. Air quality analysis is not required. This should be reevaluated during the environmental clearance process.

Agency Scoping

Public/agency scoping will be completed during the environmental clearance process in the form of scoping letters, public meetings and/or other means as seen fit and will be documented in the CE.

[7] http://gisweb.azdeq.gov/arcgis/emaps/?topic=places

8. SUMMARY

SR 89A is a major corridor that runs east-west between Prescott Valley and Prescott. SR 89A extends from SR 89 on the west, passes through Prescott Valley, and continues northeast to Sedona and Flagstaff, and to SR 69 and I-17 via the access-controlled Fain Road.

The intersection of SR 89A and Robert Road is the last at grade intersection on SR 89A between Prescott Valley and Prescott. Crash analysis in *CYMPO's 2045 Regional Transportation Plan* shows that this intersection is a regional safety hotspot.

The Town of Prescott Valley has experienced tremendous growth in population over the past 10 years, increasing from 38,822 people in 2010 to an estimated 48,729 in 2020. The area is expected to grow to 60,196 in 2040. Consistent with regional growth, traffic volumes on SR 89A near the Robert Road and SR 89A intersection increased 8% per year increase in traffic volumes in recent years and 2.5% per year from 2014-2020.

To accommodate the increased traffic volumes, and to improve safety at the intersection, intersection improvement projects are recommended in the *CYMPO 2040 Regional Transportation Plan (RTP) Update*, in ADOT's 2013 *Corridor Location Study and Environmental Overview: I-17 to Fain Road Connector*, and *Yavapai County's Great Western Feasibility Study*, among other studies.

The Alternative Selection Report recommends improving the intersection to a diamond traffic interchange located east of the existing Robert Road. The interchange, upon buildout, will provide four lanes in the northbound direction (two throughs and two lefts) and three lanes in the southbound (two throughs and a left).

This configuration will provide LOS D or better in 2040, on all movements.

Major design features are based on the *ADOT Roadway Design Guide* and *AASHTO A Policy for the Geometric Design of Streets and Highways*.

No major socioeconomic or environmental concerns have been identified.

The ASR presents a possible four-phase implementation, as summarized in Table 20.

The four-phased implementation is intended to accommodate incremental implementation as funding becomes available.

TABLE 20: IMPLEMENTATION PHASING SUMMARY

Phase	Description	Estimate of Probable Cost
1	• Partial completion of the traffic interchange • Two-way Frontage road	$15,590,676
2	• Westbound on ramp • Removal of the southbound to westbound SR 89A bypass lanes • Roadway connection from SR 89A to Antelope Meadows Drive	$2,984,783
3	• Eastbound off ramp • South leg of the interchange. • Expected to be completed in parallel with Phase 3A	$1,374,682
3A	• Santa Fe Loop (2-lanes)	By Town of Prescott Valley
4	• Widening the north and south leg, and bridge	$7,834,329
	Total	$27,784,470
Other Phase Costs		
4A	• Santa Fe Loop (4-Lanes)	By Town of Prescott Valley
5	• Robert Road Bridge over SR 89A *The need for a bridge over SR 89A along Robert Road alignment will be determined during future planning efforts.*	$6,291,879

APPENDIX A – TURNING MOVEMENT COUNTS

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

Volumes for: Wednesday, July 1, 2020 City: Prescott Valley Project #: 20-1253-001

Location: Bypass cars only from Robert Rd to SR 89A

AM Period	NB	SB	EB	WB			PM Period	NB	SB	EB	WB		
00:00				1			12:00				72		
00:15				2			12:15				58		
00:30				0			12:30				64		
00:45				2	5	5	12:45				59	253	253
01:00				1			13:00				84		
01:15				0			13:15				73		
01:30				1			13:30				58		
01:45				2	4	4	13:45				68	283	283
02:00				1			14:00				73		
02:15				1			14:15				72		
02:30				1			14:30				72		
02:45				0	3	3	14:45				52	269	269
03:00				0			15:00				56		
03:15				2			15:15				54		
03:30				2			15:30				65		
03:45				3	7	7	15:45				54	229	229
04:00				2			16:00				71		
04:15				4			16:15				67		
04:30				7			16:30				58		
04:45				10	23	23	16:45				59	255	255
05:00				15			17:00				51		
05:15				18			17:15				51		
05:30				19			17:30				56		
05:45				27	79	79	17:45				34	192	192
06:00				48			18:00				47		
06:15				36			18:15				36		
06:30				32			18:30				39		
06:45				50	166	166	18:45				17	139	139
07:00				55			19:00				21		
07:15				66			19:15				16		
07:30				79			19:30				18		
07:45				59	259	259	19:45				13	68	68
08:00				48			20:00				24		
08:15				60			20:15				24		
08:30				51			20:30				14		
08:45				58	217	217	20:45				10	72	72
09:00				57			21:00				3		
09:15				63			21:15				11		
09:30				66			21:30				5		
09:45				62	248	248	21:45				3	22	22
10:00				53			22:00				2		
10:15				63			22:15				5		
10:30				76			22:30				6		
10:45				66	258	258	22:45				3	16	16
11:00				67			23:00				3		
11:15				58			23:15				7		
11:30				53			23:30				4		
11:45				59	237	237	23:45				2	16	16
Total Vol.					1506	**1506**						1814	**1814**

GPS Coordinates: 34.640434, -112.315797

Daily Totals

NB	SB	EB	WB	Combined
			3320	**3320**

	AM		PM	
Split %	100.0%	**45.4%**	100.0%	**54.6%**
Peak Hour	10:15	**10:15**	13:45	**13:45**
Volume	272	**272**	285	**285**
P.H.F.	0.89	**0.89**	0.98	**0.98**

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET:	Robert Rd.	DATE:	07/01/20	LOCATION:	Prescott Valley
E-W STREET:	SR 89A / Fain Rd.	DAY:	WEDNESDAY	PROJECT#	20-1253-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	0.5	0.5	1	0.5	0.5	1	2	1	1	2	1	
12:00 AM	2	2	1	1	0	0	1	4	2	2	7	0	22
12:15 AM	2	0	0	0	1	0	2	6	0	0	4	0	15
12:30 AM	2	0	0	0	0	0	3	8	0	1	3	1	18
12:45 AM	1	0	1	0	0	0	0	1	2	0	4	1	10
1:00 AM	1	0	2	0	0	0	2	7	1	0	5	0	18
1:15 AM	2	0	1	1	1	0	1	5	1	0	4	0	16
1:30 AM	2	1	0	2	1	0	1	6	3	0	5	0	21
1:45 AM	0	0	1	1	1	0	1	3	2	0	4	0	13
2:00 AM	3	0	1	0	0	0	1	2	1	0	10	0	18
2:15 AM	3	1	0	0	0	0	1	3	1	0	10	3	22
2:30 AM	2	0	1	0	2	0	3	4	0	1	9	1	23
2:45 AM	2	2	1	1	1	0	0	2	1	0	4	2	16
3:00 AM	2	1	0	0	0	0	0	6	0	0	4	0	13
3:15 AM	2	0	1	2	1	0	3	6	0	0	8	1	24
3:30 AM	2	0	0	1	0	0	2	5	0	0	11	0	21
3:45 AM	3	1	5	2	2	0	4	5	4	0	6	2	34
4:00 AM	7	2	0	0	1	0	5	11	1	2	14	1	44
4:15 AM	6	2	1	1	2	0	1	15	2	0	10	3	43
4:30 AM	20	2	0	1	3	0	5	17	5	2	18	5	78
4:45 AM	13	5	1	6	0	0	10	18	8	1	23	5	90
5:00 AM	12	2	3	7	5	0	12	43	2	2	28	2	118
5:15 AM	23	7	4	11	3	0	13	37	10	2	42	3	155
5:30 AM	37	5	11	10	10	0	17	57	12	3	52	5	219
5:45 AM	30	8	10	14	7	0	16	44	10	5	43	11	198
6:00 AM	32	7	5	12	7	0	26	60	10	9	70	11	249
6:15 AM	61	9	7	8	20	0	24	63	12	5	78	11	298
6:30 AM	68	14	9	8	15	0	50	62	26	13	122	15	402
6:45 AM	71	15	14	15	21	0	50	58	33	14	88	10	389
7:00 AM	56	18	3	8	21	0	36	66	18	5	99	5	335
7:15 AM	71	13	11	13	29	0	35	73	31	4	115	14	409
7:30 AM	79	11	15	14	41	0	36	82	23	10	127	10	448
7:45 AM	33	22	7	20	23	0	50	69	37	18	108	10	397
8:00 AM	52	21	9	18	21	0	31	88	24	5	72	14	355
8:15 AM	46	18	11	24	29	0	44	92	22	7	89	9	391
8:30 AM	51	21	14	14	30	0	40	92	28	5	81	13	389
8:45 AM	38	20	4	15	29	0	38	67	17	5	71	19	323
9:00 AM	26	27	4	11	14	0	49	72	22	3	83	17	328
9:15 AM	34	6	6	13	23	0	50	73	14	5	87	20	331
9:30 AM	46	22	7	11	26	0	47	79	22	8	68	11	347
9:45 AM	27	27	11	14	19	0	50	69	19	13	89	10	348
10:00 AM	28	26	8	13	19	0	49	74	25	4	73	4	323
10:15 AM	42	16	7	11	38	0	59	78	19	9	80	5	364

Intersection Turning Movement

Prepared by:

10:30 AM	29	18	13	9	40	1	66	78	38	6	99	18	415
10:45 AM	41	24	7	12	13	0	51	76	22	12	93	14	365
11:00 AM	27	19	11	22	19	0	65	84	24	4	74	16	365
11:15 AM	25	24	7	11	16	0	54	58	28	5	70	14	312
11:30 AM	32	19	7	8	33	0	64	72	17	11	92	8	363
11:45 AM	36	25	6	12	22	1	51	74	27	7	69	11	341
12:00 PM	29	34	5	10	16	0	54	64	42	8	97	10	369
12:15 PM	39	27	7	13	27	0	57	84	27	5	86	8	380
12:30 PM	30	28	7	14	33	0	69	97	34	2	75	15	404
12:45 PM	29	22	11	12	24	1	67	88	29	8	74	16	381
1:00 PM	38	24	5	12	24	2	47	99	40	6	100	19	416
1:15 PM	32	28	5	10	18	1	62	78	31	8	78	18	369
1:30 PM	34	34	2	18	29	0	57	77	31	6	91	10	389
1:45 PM	27	18	6	12	17	0	53	86	23	9	106	8	365
2:00 PM	35	23	8	14	18	1	49	80	29	8	80	11	356
2:15 PM	37	24	11	22	18	0	64	68	40	8	94	20	406
2:30 PM	37	32	6	12	25	0	59	101	37	6	76	15	406
2:45 PM	37	29	10	17	30	0	49	91	39	10	72	10	394
3:00 PM	42	26	7	14	22	0	66	104	49	8	98	17	453
3:15 PM	26	19	10	24	18	0	52	97	50	8	84	13	401
3:30 PM	41	21	9	9	29	0	67	117	56	12	88	14	463
3:45 PM	28	23	15	21	20	1	63	92	46	9	97	14	429
4:00 PM	40	45	9	7	13	0	76	122	52	11	88	23	486
4:15 PM	41	24	15	14	15	0	71	104	63	9	89	16	461
4:30 PM	43	20	14	23	24	1	49	90	36	14	99	19	432
4:45 PM	33	32	9	8	21	0	54	90	45	6	92	17	407
5:00 PM	45	37	3	9	17	0	54	126	67	9	83	10	460
5:15 PM	36	36	8	13	29	0	62	92	61	9	91	9	446
5:30 PM	35	30	14	7	21	0	54	81	50	10	79	7	388
5:45 PM	25	28	6	15	13	0	42	73	29	7	61	12	311
6:00 PM	27	10	3	8	24	1	41	57	41	6	61	15	294
6:15 PM	36	33	3	9	19	0	41	59	26	10	81	6	323
6:30 PM	22	20	8	9	16	0	34	39	23	11	64	11	257
6:45 PM	12	17	4	2	15	0	28	42	25	6	44	3	198
7:00 PM	8	16	4	6	6	1	31	42	16	5	48	12	195
7:15 PM	20	13	3	4	12	1	27	29	14	4	40	10	177
7:30 PM	16	11	4	4	13	0	16	20	14	6	51	9	164
7:45 PM	16	14	2	5	6	0	25	38	11	2	33	4	156
8:00 PM	20	6	2	9	14	1	23	41	13	5	38	4	176
8:15 PM	14	5	8	7	11	0	24	30	17	8	31	3	158
8:30 PM	6	9	0	6	7	0	20	24	17	2	29	4	124
8:45 PM	12	10	5	0	5	0	13	21	11	1	26	3	107
9:00 PM	11	10	1	3	1	0	19	26	10	4	22	8	115
9:15 PM	9	8	2	4	5	2	17	15	14	3	27	4	110
9:30 PM	4	4	2	3	5	0	15	30	14	2	17	5	101
9:45 PM	6	3	2	0	6	2	11	11	10	3	14	2	70
10:00 PM	9	8	6	1	2	0	8	22	7	3	18	4	88
10:15 PM	5	7	4	1	3	0	16	13	9	5	13	1	77
10:30 PM	4	2	3	1	3	0	9	17	14	2	10	1	66
10:45 PM	2	2	1	1	0	0	4	11	4	3	8	6	42
11:00 PM	1	1	0	2	1	0	1	10	2	1	8	1	28
11:15 PM	2	0	0	2	2	1	9	14	3	0	15	1	49
11:30 PM	3	2	0	1	0	0	4	10	4	2	7	2	35
11:45 PM	2	0	1	2	1	0	5	5	1	1	7	4	29

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	2336	1358	518	797	1307	18	3057	4901	1952	499	5215	789	22747

Intersection Turning Movement

Prepared by:

Approach %	55.46	32.24	12.30	37.56	61.59	0.85	30.85	49.46	19.70	7.67	80.19	12.13	
App/Depart	4212	/	5204	2122	/	3758	9910	/	6216	6503	/	7569	

AM Peak Hr Begins at: 330 PM

PEAK													
Volumes	150	113	48	51	77	1	277	435	217	41	362	67	1839
Approach %	48.23	36.33	15.43	39.53	59.69	0.78	29.82	46.82	23.36	8.72	77.02	14.26	
PEAK HR. FACTOR:		0.827			0.768			0.929			0.963		0.946

CONTROL: Signal
COMMENT 1:
GPS: 34.639902, -112.315636

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

Volumes for: Wednesday, July 1, 2020 City: Prescott Valley Project #: 20-1253-002

Location: Robert Rd. north of SR 89A (no bypass cars included)

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	3		1					12:00	98		26				
00:15	2		1					12:15	92		40				
00:30	4		0					12:30	112		47				
00:45	1	10	0	2			12	12:45	105	407	37	150			557
01:00	2		0					13:00	90		38				
01:15	1		2					13:15	108		29				
01:30	2		3					13:30	101		47				
01:45	1	6	2	7			13	13:45	79	378	29	143			521
02:00	1		0					14:00	83		33				
02:15	5		0					14:15	108		40				
02:30	4		2					14:30	106		37				
02:45	4	14	2	4			18	14:45	88	385	47	157			542
03:00	1		0					15:00	109		36				
03:15	4		3					15:15	84		42				
03:30	2		1					15:30	102		38				
03:45	7	14	4	8			22	15:45	100	395	42	158			553
04:00	8		1					16:00	144		20				
04:15	6		3					16:15	111		29				
04:30	12		4					16:30	88		48				
04:45	20	46	6	14			60	16:45	103	446	29	126			572
05:00	16		12					17:00	101		26				
05:15	23		14					17:15	107		42				
05:30	27		20					17:30	91		28				
05:45	35	101	21	67			168	17:45	82	381	28	124			505
06:00	44		19					18:00	66		33				
06:15	44		28					18:15	80		28				
06:30	79		23					18:30	65		25				
06:45	75	242	36	106			348	18:45	48	259	17	103			362
07:00	59		29					19:00	59		13				
07:15	62		42					19:15	50		17				
07:30	57		55					19:30	36		17				
07:45	82	260	43	169			429	19:45	43	188	11	58			246
08:00	66		39					20:00	33		24				
08:15	71		53					20:15	32		18				
08:30	74		44					20:30	33		13				
08:45	77	288	44	180			468	20:45	26	124	5	60			184
09:00	93		25					21:00	37		4				
09:15	76		36					21:15	29		11				
09:30	80		37					21:30	24		8				
09:45	87	336	33	131			467	21:45	16	106	8	31			137
10:00	79		32					22:00	20		3				
10:15	80		49					22:15	24		4				
10:30	102		50					22:30	12		4				
10:45	89	350	25	156			506	22:45	12	68	1	12			80
11:00	100		41					23:00	3		3				
11:15	92		27					23:15	10		5				
11:30	91		41					23:30	8		1				
11:45	87	370	35	144			514	23:45	9	30	3	12			42
Total Vol.		2037		988			**3025**			3167		1134			**4301**

GPS Coordinates: 34.640193, -112.315462

Daily Totals

NB	SB	EB	WB	Combined
5204	2122			**7326**

	AM			PM		
Split %	67.3%	32.7%	**41.3%**	73.6%	26.4%	**58.7%**
Peak Hour	11:45	07:30	**11:45**	15:30	14:45	**15:30**
Volume	389	190	**537**	457	163	**586**
P.H.F.	0.87	0.86	**0.84**	0.79	0.87	**0.89**

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

Volumes for: Wednesday, July 1, 2020 City: Prescott Valley Project #: 20-1253-002

Location: Robert Rd. south of SR 89A

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	5		4					12:00	68		66				
00:15	2		1					12:15	73		59				
00:30	2		1					12:30	65		69				
00:45	2	11	2	8			19	12:45	62	268	61	255			523
01:00	3		1					13:00	67		70				
01:15	3		2					13:15	65		57				
01:30	3		4					13:30	70		66				
01:45	1	10	3	10			20	13:45	51	253	49	242			495
02:00	4		1					14:00	66		55				
02:15	4		1					14:15	72		66				
02:30	3		3					14:30	75		68				
02:45	5	16	2	7			23	14:45	76	289	79	268			557
03:00	3		0					15:00	75		79				
03:15	3		1					15:15	55		76				
03:30	2		0					15:30	71		97				
03:45	9	17	6	7			24	15:45	66	267	75	327			594
04:00	9		4					16:00	94		76				
04:15	9		4					16:15	80		87				
04:30	22		10					16:30	77		74				
04:45	19	59	9	27			86	16:45	74	325	72	309			634
05:00	17		9					17:00	85		93				
05:15	34		15					17:15	80		99				
05:30	53		25					17:30	79		81				
05:45	48	152	22	71			223	17:45	59	303	49	322			625
06:00	44		26					18:00	40		71				
06:15	77		37					18:15	72		55				
06:30	91		54					18:30	50		50				
06:45	100	312	68	185			497	18:45	33	195	46	222			417
07:00	77		44					19:00	28		27				
07:15	95		64					19:15	36		30				
07:30	105		74					19:30	31		33				
07:45	62	339	78	260			599	19:45	32	127	19	109			236
08:00	82		50					20:00	28		32				
08:15	75		58					20:15	27		36				
08:30	86		63					20:30	15		26				
08:45	62	305	51	222			527	20:45	27	97	17	111			208
09:00	57		39					21:00	22		15				
09:15	46		42					21:15	19		22				
09:30	75		56					21:30	10		21				
09:45	65	243	51	188			431	21:45	11	62	19	77			139
10:00	62		48					22:00	23		12				
10:15	65		66					22:15	16		17				
10:30	60		84					22:30	9		19				
10:45	72	259	47	245			504	22:45	5	53	7	55			108
11:00	57		47					23:00	2		4				
11:15	56		49					23:15	2		5				
11:30	58		61					23:30	5		6				
11:45	67	238	56	213			451	23:45	3	12	3	18			30
Total Vol.		1961		1443			**3404**			2251		2315			**4566**

GPS Coordinates: 34.639359, -112.315864

Daily Totals

NB	SB	EB	WB	Combined
4212	3758			**7970**

	AM			PM		
Split %	57.6%	42.4%	**42.7%**	49.3%	50.7%	**57.3%**
Peak Hour	06:45	07:15	**06:45**	16:00	16:45	**16:45**
Volume	377	266	**627**	325	345	**663**
P.H.F.	0.90	0.85	**0.88**	0.86	0.87	**0.93**

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

Volumes for: Wednesday, July 1, 2020 City: Prescott Valley Project #: 20-1253-002

Location: SR 89A east of Robert Rd.

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			6		9			12:00			79		115		
00:15			6		4			12:15			104		99		
00:30			8		5			12:30			118		92		
00:45			2	22	5	23	45	12:45			111	412	98	404	816
01:00			9		5			13:00			116		125		
01:15			7		4			13:15			93		104		
01:30			8		5			13:30			97		107		
01:45			5	29	4	18	47	13:45			104	410	123	459	869
02:00			3		10			14:00			102		99		
02:15			3		13			14:15			101		122		
02:30			5		11			14:30			119		97		
02:45			4	15	6	40	55	14:45			118	440	92	410	850
03:00			6		4			15:00			125		123		
03:15			9		9			15:15			131		105		
03:30			6		11			15:30			135		114		
03:45			12	33	8	32	65	15:45			128	519	120	462	981
04:00			11		17			16:00			138		122		
04:15			17		13			16:15			133		114		
04:30			18		25			16:30			127		132		
04:45			25	71	29	84	155	16:45			107	505	115	483	988
05:00			53		32			17:00			138		102		
05:15			52		47			17:15			113		109		
05:30			78		60			17:30			102		96		
05:45			68	251	59	198	449	17:45			94	447	80	387	834
06:00			77		90			18:00			68		82		
06:15			78		94			18:15			71		97		
06:30			79		150			18:30			56		86		
06:45			87	321	112	446	767	18:45			48	243	53	318	561
07:00			77		109			19:00			52		65		
07:15			97		133			19:15			36		54		
07:30			111		147			19:30			28		66		
07:45			96	381	136	525	906	19:45			45	161	39	224	385
08:00			115		91			20:00			52		47		
08:15			127		105			20:15			45		42		
08:30			120		99			20:30			30		35		
08:45			86	448	95	390	838	20:45			26	153	30	154	307
09:00			87		103			21:00			30		34		
09:15			92		112			21:15			21		34		
09:30			97		87			21:30			35		24		
09:45			94	370	112	414	784	21:45			13	99	19	111	210
10:00			95		81			22:00			29		25		
10:15			96		94			22:15			18		19		
10:30			100		123			22:30			21		13		
10:45			95	386	119	417	803	22:45			13	81	17	74	155
11:00			117		94			23:00			12		10		
11:15			76		89			23:15			16		16		
11:30			87		111			23:30			11		11		
11:45			92	372	87	381	753	23:45			8	47	12	49	96
Total Vol.				2699		2968	**5667**					3517		3535	**7052**

GPS Coordinates: 34.639884, -112.314432

Daily Totals

NB	SB	EB	WB	Combined
		6216	6503	**12719**

	AM			PM		
Split %	47.6%	52.4%	**44.6%**	49.9%	50.1%	**55.4%**
Peak Hour	07:45	07:00	**07:30**	15:30	15:45	**15:45**
Volume	458	525	**928**	534	488	**1014**
P.H.F.	0.90	0.89	**0.90**	0.97	0.92	**0.98**

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

Volumes for: Wednesday, July 1, 2020 City: Prescott Valley Project #: 20-1253-002

Location: SR 89A west of Roberty Rd. (no bypass cars included)

AM Period	NB	SB	EB		WB			PM Period	NB	SB	EB		WB		
00:00			7		9			12:00			160		126		
00:15			8		6			12:15			168		125		
00:30			11		5			12:30			200		105		
00:45			3	29	5	25	54	12:45			184	712	104	460	1172
01:00			10		6			13:00			186		140		
01:15			7		6			13:15			171		111		
01:30			10		7			13:30			165		125		
01:45			6	33	4	23	56	13:45			162	684	133	509	1193
02:00			4		13			14:00			158		116		
02:15			5		13			14:15			172		131		
02:30			7		11			14:30			197		113		
02:45			3	19	6	43	62	14:45			179	706	109	469	1175
03:00			6		6			15:00			219		140		
03:15			9		10			15:15			199		110		
03:30			7		13			15:30			240		129		
03:45			13	35	9	38	73	15:45			201	859	126	505	1364
04:00			17		21			16:00			250		128		
04:15			18		16			16:15			238		130		
04:30			27		38			16:30			175		143		
04:45			36	98	36	111	209	16:45			189	852	125	526	1378
05:00			57		40			17:00			247		128		
05:15			60		65			17:15			215		127		
05:30			86		89			17:30			185		114		
05:45			70	273	73	267	540	17:45			144	791	86	455	1246
06:00			96		102			18:00			139		89		
06:15			99		139			18:15			126		117		
06:30			138		190			18:30			96		86		
06:45			141	474	159	590	1064	18:45			95	456	56	348	804
07:00			120		155			19:00			89		57		
07:15			139		186			19:15			70		61		
07:30			141		206			19:30			50		67		
07:45			156	556	141	688	1244	19:45			74	283	49	234	517
08:00			143		124			20:00			77		59		
08:15			158		135			20:15			71		45		
08:30			160		132			20:30			61		35		
08:45			122	583	109	500	1083	20:45			45	254	38	177	431
09:00			143		109			21:00			55		33		
09:15			137		121			21:15			46		38		
09:30			148		114			21:30			59		21		
09:45			138	566	116	460	1026	21:45			32	192	22	114	306
10:00			148		101			22:00			37		27		
10:15			156		122			22:15			38		18		
10:30			182		129			22:30			40		14		
10:45			149	635	134	486	1121	22:45			19	134	10	69	203
11:00			173		101			23:00			13		9		
11:15			140		95			23:15			26		18		
11:30			153		124			23:30			18		10		
11:45			152	618	106	426	1044	23:45			11	68	9	46	114
Total Vol.				3919		3657	**7576**					5991		3912	**9903**

GPS Coordinates: 34.639873, -112.316790

Daily Totals

NB	SB	EB	WB	Combined
		9910	7569	**17479**

	AM			PM		
Split %	51.7%	48.3%	**43.3%**	60.5%	39.5%	**56.7%**
Peak Hour	11:45	06:45	**06:45**	15:30	15:45	**15:30**
Volume	680	706	**1247**	929	527	**1442**
P.H.F.	0.85	0.86	**0.90**	0.93	0.92	**0.95**

APPENDIX B – CRASH DATA

Crash Data

SR 89A at Robert Road

Source: ADOT ACIS
Accessed: July 2020

Incident ID	Incident Date & Time	Incident On Road	Incident Crossing	Incident Offset	Incident Injury Severity Description	Incident First Harmful Description	Incident Collision Manner Desc	Incident Light Condition Desc	Incident Weather Desc	Incident Intersection Type Desc	Incident Junction Relation Desc	Incident Traffic Way Type Desc	Unit Body Style Desc	Unit Travel Direction Desc	Unit Action Desc	Unit Road Condition Desc1	Unit Surface Condition Desc1	Unit Env Condition Desc1	Unit Defect Desc1	Unit Number	Unit Event Sequence Desc1	Unit Event Sequence Desc2	Person Type Desc	Person Safety Device Desc	Person Violation Desc1	Latitude	Longitude
2940818	3/9/2015 6:51:00 PM	SA089	Robert Rd	0	Possible Injury	Motor Vehicle In Transport	Head On	Dark Not Lighted	Clear	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	Passenger 4Dsd Sedan 4 Dr	4 - West	Slowing In Traffic way	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63978452	-112.3157146
2959720	3/31/2015 6:56:00 AM	SA089	Robert Rd	0	Suspected Minor Injury	Motor Vehicle In Transport	Left Turn	Daylight	Clear	Four Way Intersection	Intersection Interchange	Two Way Not Divided	Passenger 12Pu Pickup 1 2 Ton	99 - Unknown	Making Left Turn	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Failed To Yield Right Of Way	34.63978452	-112.3157146
2973585	6/13/2015 10:59:00 AM	SA089	Fain Rd	0	Possible Injury	Curb	Single Vehicle	Daylight	Cloudy	Four Way Intersection	Intersection Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	Motorcycle Mc Motorcycle	6 - Northeast	Making Left Turn	Road Surface Condition	Dry			1	Fell Jumped From Vehicle	Curb	Driver	Not Applicable	No Improper Action	34.63978452	-112.3157146
2980122	7/23/2015 11:20:00 PM	SA089	Robert Rd	20	No Injury	Motor Vehicle In Transport	Sideswipe Same Direction	Dark Lighted	Clear	Four Way Intersection	Intersection Related Non Interchange	Two Way Not Divided	Passenger Pu Pickup	7 - Southwest	Overtaking Passing	Unknown	Dry	Unknown	Unknown	1	Motor Vehicle In Transport		Driver	Unknown	Passed In No Passing Zone	34.63983704	-112.3156999
3019891	11/14/2015 4:44:00 PM	SA089	Robert Rd	100	Fatal	Overturn Rollover	Single Vehicle	Daylight	Clear	T Intesection	Intersection Related Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	Motorcycle Mc Motorcycle	4 - West	Negotiating A Curve	Unknown	Dry	Unknown	Unknown	1	Ran Off Road Right	Overturn Rollover	Driver	Unknown	Failed To Keep In Proper Lane	34.64004546	-112.3156177
3210449	3/23/2017 3:51:00 PM	SA089	N Robert Rd	120	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Rain	Four Way Intersection	Intersection Related Non Interchange	Two Way Not Divided	Passenger 4Dsd Sedan 4 Dr	3 - East	Going Straight Ahead	Road Surface Condition	Wet			1	Motor Vehicle In Transport		Driver	Lap Belt	Speed Too Fast For Conditions	34.64009517	-112.3155863
3216710	4/7/2017 4:49:00 PM	SA089	N Robert Rd	100	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Clear	Four Way Intersection	Intersection Related Non Interchange	Two Way Not Divided	Passenger 4Dsw Station Wagon 4 Dr	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.6400464	-112.3156171
3256344	7/16/2017 7:18:00 AM	SA089	N Robert Rd	40	Suspected Minor Injury	Overturn Rollover	Single Vehicle	Daylight	Clear	Four Way Intersection	Intersection Related Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	Motorcycle Mc Motorcycle	7 - Southwest	Slowing In Traffic way	Other	Dry	Other	Other	1	Overturn Rollover	Ran Off Road Right	Driver	Helmet Used	No Improper Action	34.63989171	-112.3156851
3267336	8/7/2017 6:23:00 PM	13N ROBERT RD	SR-89A	-15	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Clear	Four Way Intersection	Not Reported	Two Way Not Divided	Passenger 4Dsd Sedan 4 Dr	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63974377	-112.3157211
3267339	8/24/2017 6:40:00 AM	SA089	N Robert Rd	60	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Cloudy	Four Way Intersection	Intersection Related Non Interchange	Two Way Not Divided With Continuous Left Turn Lane	Passenger 2Dsw Station Wagon 2 Dr	3 - East	Going Straight Ahead	No Contributing Circumstances	Wet	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63994453	-112.3156665
3289520	9/24/2017 1:42:00 PM	SR-89A	Robert Rd	15	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Clear	Four Way Intersection	Intersection Related Interchange	Two Way Not Divided	Passenger 4Dsd Sedan 4 Dr	3 - East	Slowing In Traffic way	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Air Bag Deployed/Shoulder-Lap Belt	No Improper Action	34.63978584	-112.3157738
3329281	1/17/2018 4:34:00 PM	13N ROBERT RD	SR-89A	0	No Injury	Motor Vehicle In Transport	Sideswipe Same Direction	Daylight	Clear	Four Way Intersection	Intersection Related Non Interchange	Two Way Not Divided	Passenger 4Dsd Sedan 4 Dr	2 - South	Changing Lanes	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Failed To Keep In Proper Lane	34.63978449	-112.3157133
3350408	2/23/2018 2:19:00 PM	SA089	N Robert Rd	67	Suspected Minor Injury	Motor Vehicle In Transport	Rear End	Daylight	Snow	Four Way Intersection	Intersection Related Non Interchange	Two Way Divided Unprotected Painted 4 Feet Median	Passenger 12Pu Pickup 1 2 Ton	3 - East	Slowing In Traffic way	No Contributing Circumstances	Wet	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63996277	-112.3156591
3484974	2/11/2019 10:21:00 AM	SA089	N Fain Rd Non-Cardinal	50	No Injury	Motor Vehicle In Transport	Angle (Front To Side)(Other Than Left Turn)	Daylight	Clear	Not Reported	Intersection Related Interchange	Two Way Not Divided	Passenger 4Dsw Station Wagon 4 Dr	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Exceeded Lawful Speed	34.63991832	-112.3156764
3484985	2/9/2019 7:52:00 PM	SA089	N Robert Rd	0	Possible Injury	Motor Vehicle In Transport	Head On	Dark Lighted	Clear	Not Reported	Intersection 4 Way	Two Way Not Divided	Passenger 4Dsw Station Wagon 4 Dr	2 - South	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Lap Belt	No Improper Action	34.63978449	-112.3157133
3485118	2/3/2019 1:31:00 PM	13N ROBERT [illegible]	SR-89A	0	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Clear	Not Reported	Intersection Related	Two Way Not Divided	Truck Bs Bus	1 - North	Going Straight Ahead	Unknown	Dry	Unknown	Unknown	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Exceeded Lawful Speed	34.63978449	-112.3157133
3502424	3/9/2019 7:38:00 AM	SA089	N Robert Rd	75	No Injury	Tree Bush Stump Standing	Single Vehicle	Daylight	Clear	Not Reported	Intersection Related	Two Way Divided Unprotected Painted 4 Feet Median	Passenger 4Dsd Sedan 4 Dr	4 - West	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Ran Off Road Right	Tree Bush Stump Standing	Driver	Shoulder And Lap Belt	Disregarded Traffic Signal	34.63998334	-112.3156498
3557321	8/8/2019 12:45:00 PM	SA089	N Robert Rd	60	No Injury	Motor Vehicle In Transport	Rear End	Daylight	Cloudy	Not Reported	Intersection Related	Two Way Divided Unprotected Painted 4 Feet Median	Passenger 34Pu Pickup 3 4 Ton	3 - East	Slowing In Traffic way	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63994453	-112.3156665
3586354	11/11/2019 11:55:00 AM	SA089	M324	0.46	Suspected Serious Injury	Motor Vehicle In Transport	Angle (Front To Side)(Other Than Left Turn)	Daylight	Cloudy	Not Reported	Intersection	Two Way Divided Unprotected Painted 4 Feet Median	Truck Tk Truck	3 - East	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Disregarded Traffic Signal	34.63978725	-112.3158723
3601267	12/17/2019 2:42:00 PM	SA089	N Robert Rd	47	Possible Injury	Motor Vehicle In Transport	Rear End	Daylight	Clear	Not Reported	Intersection Related	Two Way Not Divided With Continuous Left Turn Lane	Passenger 12Pu Pickup 1 2 Ton	4 - West	Going Straight Ahead	No Contributing Circumstances	Dry	No Contributing Circumstances	No Contributing Circumstances	1	Motor Vehicle In Transport		Driver	Shoulder And Lap Belt	Speed Too Fast For Conditions	34.63991032	-112.3156791

APPENDIX C – SYNCHRO REPORTS

AM 2040 Robert Road/SR89A Synchro Report

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	226	602	171	79	887	71	528	100	62	97	251	0
Future Volume (veh/h)	226	602	171	79	887	71	528	100	62	97	251	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	246	654	186	86	964	0	574	109	67	105	273	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	1703	760	297	1703		448	483	297	524	834	0
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.00	0.45	0.45	0.45	0.45	0.45	0.00
Sat Flow, veh/h	583	3554	1585	655	3554	1585	1106	1084	666	1209	1870	0
Grp Volume(v), veh/h	246	654	186	86	964	0	574	0	176	105	273	0
Grp Sat Flow(s),veh/h/ln	583	1777	1585	655	1777	1585	1106	0	1750	1209	1870	0
Q Serve(g_s), s	34.2	14.1	8.3	11.6	23.3	0.0	42.1	0.0	7.4	7.0	11.4	0.0
Cycle Q Clear(g_c), s	57.5	14.1	8.3	25.7	23.3	0.0	53.5	0.0	7.4	14.5	11.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.38	1.00		0.00
Lane Grp Cap(c), veh/h	226	1703	760	297	1703		448	0	780	524	834	0
V/C Ratio(X)	1.09	0.38	0.24	0.29	0.57		1.28	0.00	0.23	0.20	0.33	0.00
Avail Cap(c_a), veh/h	226	1703	760	297	1703		448	0	780	524	834	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.4	19.9	18.4	28.1	22.3	0.0	41.8	0.0	20.5	24.9	21.6	0.0
Incr Delay (d2), s/veh	85.0	0.7	0.8	2.5	1.4	0.0	142.3	0.0	0.7	0.9	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.0	5.5	3.0	1.9	9.1	0.0	31.4	0.0	3.2	2.0	4.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	132.5	20.6	19.2	30.6	23.7	0.0	184.0	0.0	21.2	25.8	22.6	0.0
LnGrp LOS	F	C	B	C	C		F	A	C	C	C	A
Approach Vol, veh/h		1086			1050	A		750			378	
Approach Delay, s/veh		45.7			24.3			145.8			23.5	
Approach LOS		D			C			F			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		58.0		62.0		58.0		62.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		53.5		57.5		53.5		57.5				
Max Q Clear Time (g_c+I1), s		55.5		59.5		16.5		27.7				
Green Ext Time (p_c), s		0.0		0.0		1.7		7.6				

Intersection Summary												
HCM 6th Ctrl Delay			59.2									
HCM 6th LOS			E									

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

PM 2040 Robert Road/SR89A Synchro Report

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	412	765	322	88	687	100	223	190	71	85	162	0
Future Volume (veh/h)	412	765	322	88	687	100	223	190	71	85	162	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	448	832	350	96	747	0	242	207	77	92	176	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	486	2419	1079	337	2419		260	317	118	171	457	0
Arrive On Green	0.68	0.68	0.68	0.68	0.68	0.00	0.24	0.24	0.24	0.24	0.24	0.00
Sat Flow, veh/h	714	3554	1585	474	3554	1585	1209	1300	484	1095	1870	0
Grp Volume(v), veh/h	448	832	350	96	747	0	242	0	284	92	176	0
Grp Sat Flow(s),veh/h/ln	714	1777	1585	474	1777	1585	1209	0	1783	1095	1870	0
Q Serve(g_s), s	71.5	11.7	10.9	12.7	10.2	0.0	19.9	0.0	17.2	9.9	9.4	0.0
Cycle Q Clear(g_c), s	81.7	11.7	10.9	24.4	10.2	0.0	29.3	0.0	17.2	27.1	9.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.27	1.00		0.00
Lane Grp Cap(c), veh/h	486	2419	1079	337	2419		260	0	435	171	457	0
V/C Ratio(X)	0.92	0.34	0.32	0.29	0.31		0.93	0.00	0.65	0.54	0.39	0.00
Avail Cap(c_a), veh/h	486	2419	1079	337	2419		260	0	435	171	457	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.0	8.0	7.8	13.1	7.7	0.0	51.8	0.0	40.8	52.9	37.8	0.0
Incr Delay (d2), s/veh	25.5	0.4	0.8	2.1	0.3	0.0	40.3	0.0	7.4	11.7	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.8	3.7	3.2	1.4	3.3	0.0	10.3	0.0	8.4	3.2	4.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.6	8.4	8.6	15.2	8.1	0.0	92.1	0.0	48.2	64.6	40.3	0.0
LnGrp LOS	D	A	A	B	A		F	A	D	E	D	A
Approach Vol, veh/h		1630			843	A		526			268	
Approach Delay, s/veh		20.3			8.9			68.4			48.6	
Approach LOS		C			A			E			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.8		86.2		33.8		86.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		29.3		81.7		29.3		81.7				
Max Q Clear Time (g_c+I1), s		31.3		83.7		29.1		26.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		6.8				

Intersection Summary		
HCM 6th Ctrl Delay		27.4
HCM 6th LOS		C

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

AM 2040 SR89A/Santa Fe Loop Synchro Report

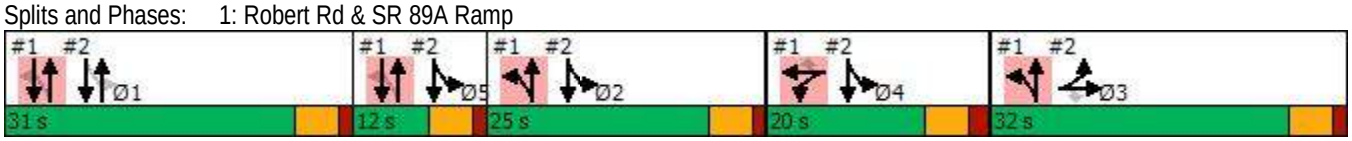
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	121	0	109	685	445	0	0	325	350
Future Volume (vph)	0	0	0	121	0	109	685	445	0	0	325	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	350		350	0		0	200		0
Storage Lanes	0		0	1		1	2		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.91	0.95	0.97	0.95	1.00	1.00	0.91	0.91
Frt					0.930	0.850					0.922	
Flt Protected				0.950	0.974		0.950					
Satd. Flow (prot)	0	0	0	1681	1535	1504	3433	3539	0	0	4689	0
Flt Permitted				0.950	0.974		0.282					
Satd. Flow (perm)	0	0	0	1681	1535	1504	1019	3539	0	0	4689	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					161	161					241	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		835			628			397			749	
Travel Time (s)		19.0			14.3			4.9			9.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	132	0	118	745	484	0	0	353	380
Shared Lane Traffic (%)				34%		33%						
Lane Group Flow (vph)	0	0	0	87	84	79	745	484	0	0	733	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1	1	1	1	1			1	
Detector Template				Left	Thru	Right	Left	Thru			Thru	
Leading Detector (ft)				20	100	20	20	100			100	
Trailing Detector (ft)				0	0	0	0	0			0	
Detector 1 Position(ft)				0	0	0	0	0			0	
Detector 1 Size(ft)				20	100	20	20	100			100	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Turn Type				Split	NA	Perm	D.P+P	NA			NA	
Protected Phases				4	4		2 3	1 5 2 3			1 5	
Permitted Phases						4	1 5					
Detector Phase				4	4	4	2 3	1 5 2 3			1 5	
Switch Phase												
Minimum Initial (s)				6.0	6.0	6.0						
Minimum Split (s)				12.0	12.0	12.0						
Total Split (s)				20.0	20.0	20.0						

Lane Group	Ø1	Ø2	Ø3	Ø5
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Taper Length (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Turn Type				
Protected Phases	1	2	3	5
Permitted Phases				
Detector Phase				
Switch Phase				
Minimum Initial (s)	15.0	5.0	6.0	6.0
Minimum Split (s)	21.0	11.0	12.0	12.0
Total Split (s)	31.0	25.0	32.0	12.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)				16.7%	16.7%	16.7%						
Maximum Green (s)				14.1	14.1	14.1						
Yellow Time (s)				3.9	3.9	3.9						
All-Red Time (s)				2.0	2.0	2.0						
Lost Time Adjust (s)				-1.9	-1.9	-1.9						
Total Lost Time (s)				4.0	4.0	4.0						
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.5	2.5	2.5						
Recall Mode				None	None	None						
Act Effct Green (s)				13.0	13.0	13.0	81.0	89.0			38.6	
Actuated g/C Ratio				0.12	0.12	0.12	0.74	0.81			0.35	
v/c Ratio				0.44	0.26	0.25	0.44	0.17			0.41	
Control Delay				53.3	1.9	1.8	14.6	0.3			19.0	
Queue Delay				0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay				53.3	1.9	1.8	14.6	0.3			19.0	
LOS				D	A	A	B	A			B	
Approach Delay					19.8			9.0			19.0	
Approach LOS					B			A			B	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 110.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 13.5	Intersection LOS: B
Intersection Capacity Utilization 48.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Robert Rd & SR 89A Ramp



Lane Group	Ø1	Ø2	Ø3	Ø5
Total Split (%)	26%	21%	27%	10%
Maximum Green (s)	25.9	19.9	26.6	6.9
Yellow Time (s)	3.9	3.9	3.9	3.9
All-Red Time (s)	1.2	1.2	1.5	1.2
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead			Lag
Lead-Lag Optimize?				
Vehicle Extension (s)	2.5	2.5	2.5	3.0
Recall Mode	Min	Min	Max	Max
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	87	84	79	745	484	733
v/c Ratio	0.44	0.26	0.25	0.44	0.17	0.41
Control Delay	53.3	1.9	1.8	14.6	0.3	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	1.9	1.8	14.6	0.3	19.0
Queue Length 50th (ft)	61	0	0	148	3	92
Queue Length 95th (ft)	121	0	0	201	2	145
Internal Link Dist (ft)		548			317	669
Turn Bay Length (ft)	350		350			
Base Capacity (vph)	245	361	357	1891	3071	1787
Starvation Cap Reductn	0	0	0	48	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.23	0.22	0.40	0.16	0.41

Intersection Summary

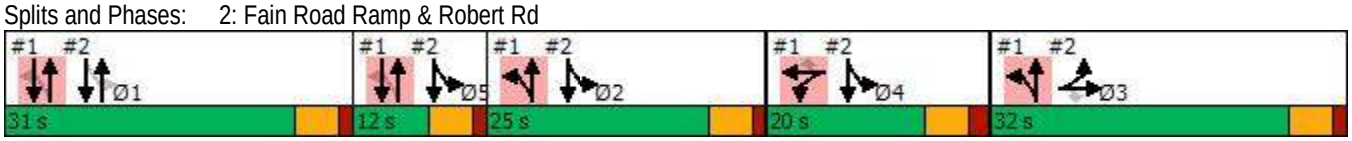
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	316	0	239	0	0	0	0	814	81	90	356	0
Future Volume (vph)	316	0	239	0	0	0	0	814	81	90	356	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	0		0	250		200	0		0
Storage Lanes	1		1	0		0	2		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.91	0.95	1.00	1.00	1.00	1.00	0.86	0.86	1.00	0.95	1.00
Frt		0.949	0.850					0.986				
Flt Protected	0.950	0.968								0.950		
Satd. Flow (prot)	1681	1557	1504	0	0	0	0	6318	0	1770	3539	0
Flt Permitted	0.950	0.968								0.151		
Satd. Flow (perm)	1681	1557	1504	0	0	0	0	6318	0	281	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		165	190					17				
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		650			835			502			397	
Travel Time (s)		14.8			19.0			6.2			4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	343	0	260	0	0	0	0	885	88	98	387	0
Shared Lane Traffic (%)	39%		27%									
Lane Group Flow (vph)	209	204	190	0	0	0	0	973	0	98	387	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1					1		1	1	
Detector Template	Left	Thru	Right					Thru		Left	Thru	
Leading Detector (ft)	20	100	20					100		20	100	
Trailing Detector (ft)	0	0	0					0		0	0	
Detector 1 Position(ft)	0	0	0					0		0	0	
Detector 1 Size(ft)	20	100	20					100		20	100	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Turn Type	Split	NA	Perm					NA		D.P+P	NA	
Protected Phases	3	3						1		5 2 4	1 5 2 4	
Permitted Phases			3							1		
Detector Phase	3	3	3					1		5 2 4	1 5 2 4	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0					15.0				
Minimum Split (s)	12.0	12.0	12.0					21.0				
Total Split (s)	32.0	32.0	32.0					31.0				

Lane Group	Ø2	Ø4	Ø5
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(ft)			
Link Offset(ft)			
Crosswalk Width(ft)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (mph)			
Number of Detectors			
Detector Template			
Leading Detector (ft)			
Trailing Detector (ft)			
Detector 1 Position(ft)			
Detector 1 Size(ft)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Turn Type			
Protected Phases	2	4	5
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	6.0
Minimum Split (s)	11.0	12.0	12.0
Total Split (s)	25.0	20.0	12.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	26.7%	26.7%	26.7%					25.8%				
Maximum Green (s)	26.6	26.6	26.6					25.9				
Yellow Time (s)	3.9	3.9	3.9					3.9				
All-Red Time (s)	1.5	1.5	1.5					1.2				
Lost Time Adjust (s)	-1.4	-1.4	-1.4					-1.1				
Total Lost Time (s)	4.0	4.0	4.0					4.0				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5	2.5					2.5				
Recall Mode	Max	Max	Max					Min				
Act Effct Green (s)	28.1	28.1	28.1					26.5		69.9	73.9	
Actuated g/C Ratio	0.26	0.26	0.26					0.24		0.63	0.67	
v/c Ratio	0.49	0.39	0.36					0.63		0.13	0.16	
Control Delay	41.1	11.7	7.3					39.6		6.1	2.4	
Queue Delay	0.0	0.0	0.0					0.0		0.0	0.0	
Total Delay	41.1	11.7	7.3					39.6		6.1	2.4	
LOS	D	B	A					D		A	A	
Approach Delay		20.5						39.6			3.2	
Approach LOS		C						D			A	

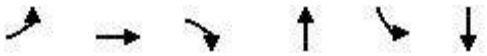
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 110.1			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 25.5		Intersection LOS: C	
Intersection Capacity Utilization 48.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Fain Road Ramp & Robert Rd



Lane Group	Ø2	Ø4	Ø5
Total Split (%)	21%	17%	10%
Maximum Green (s)	19.9	14.1	6.9
Yellow Time (s)	3.9	3.9	3.9
All-Red Time (s)	1.2	2.0	1.2
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag			Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	2.5	2.5	3.0
Recall Mode	Min	None	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			

Intersection Summary



Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	209	204	190	973	98	387
v/c Ratio	0.49	0.39	0.36	0.63	0.13	0.16
Control Delay	41.1	11.7	7.3	39.6	6.1	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.1	11.7	7.3	39.6	6.1	2.4
Queue Length 50th (ft)	133	23	0	176	8	15
Queue Length 95th (ft)	234	100	62	237	32	18
Internal Link Dist (ft)		570		422		317
Turn Bay Length (ft)	250		250			
Base Capacity (vph)	429	520	525	1569	813	2464
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.39	0.36	0.62	0.12	0.16

Intersection Summary

PM 2040 SR89A/Santa Fe Loop Synchro Report

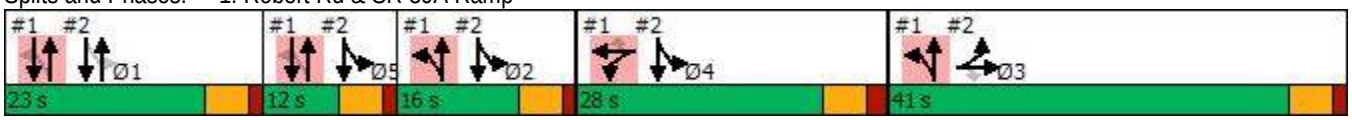
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	135	0	153	290	823	0	0	231	359
Future Volume (vph)	0	0	0	135	0	153	290	823	0	0	231	359
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	350		350	0		0	200		0
Storage Lanes	0		0	1		1	2		0	1		0
Taper Length (ft)	25			200			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.91	0.95	0.97	0.95	1.00	1.00	0.91	0.91
Frt					0.905	0.850					0.909	
Flt Protected				0.950	0.982		0.950					
Satd. Flow (prot)	0	0	0	1681	1506	1504	3433	3539	0	0	4623	0
Flt Permitted				0.950	0.982		0.303					
Satd. Flow (perm)	0	0	0	1681	1506	1504	1095	3539	0	0	4623	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					161	161					312	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		835			628			397			749	
Travel Time (s)		19.0			14.3			4.9			9.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	147	0	166	315	895	0	0	251	390
Shared Lane Traffic (%)				26%		40%						
Lane Group Flow (vph)	0	0	0	109	104	100	315	895	0	0	641	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1	2	1	1	2			2	
Detector Template				Left	Thru	Right	Left	Thru			Thru	
Leading Detector (ft)				20	100	20	20	100			100	
Trailing Detector (ft)				0	0	0	0	0			0	
Detector 1 Position(ft)				0	0	0	0	0			0	
Detector 1 Size(ft)				20	6	20	20	6			6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Detector 2 Position(ft)					94			94			94	
Detector 2 Size(ft)					6			6			6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Split	NA	Perm	D.P+P	NA			NA	
Protected Phases				4	4		2 3	1 5 2 3			1 5	
Permitted Phases						4	1 5					

Lane Group	Ø1	Ø2	Ø3	Ø5
Lane Configurations				
Traffic Volume (vph)				
Future Volume (vph)				
Ideal Flow (vphpl)				
Storage Length (ft)				
Storage Lanes				
Taper Length (ft)				
Lane Util. Factor				
Frt				
Flt Protected				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Right Turn on Red				
Satd. Flow (RTOR)				
Link Speed (mph)				
Link Distance (ft)				
Travel Time (s)				
Peak Hour Factor				
Adj. Flow (vph)				
Shared Lane Traffic (%)				
Lane Group Flow (vph)				
Enter Blocked Intersection				
Lane Alignment				
Median Width(ft)				
Link Offset(ft)				
Crosswalk Width(ft)				
Two way Left Turn Lane				
Headway Factor				
Turning Speed (mph)				
Number of Detectors				
Detector Template				
Leading Detector (ft)				
Trailing Detector (ft)				
Detector 1 Position(ft)				
Detector 1 Size(ft)				
Detector 1 Type				
Detector 1 Channel				
Detector 1 Extend (s)				
Detector 1 Queue (s)				
Detector 1 Delay (s)				
Detector 2 Position(ft)				
Detector 2 Size(ft)				
Detector 2 Type				
Detector 2 Channel				
Detector 2 Extend (s)				
Turn Type				
Protected Phases	1	2	3	5
Permitted Phases				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase				4	4	4	2 3	1 5 2 3			1 5	
Switch Phase												
Minimum Initial (s)				6.0	6.0	6.0						
Minimum Split (s)				12.0	12.0	12.0						
Total Split (s)				28.0	28.0	28.0						
Total Split (%)				23.3%	23.3%	23.3%						
Maximum Green (s)				22.1	22.1	22.1						
Yellow Time (s)				3.9	3.9	3.9						
All-Red Time (s)				2.0	2.0	2.0						
Lost Time Adjust (s)				0.0	0.0	0.0						
Total Lost Time (s)				5.9	5.9	5.9						
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.5	2.5	2.5						
Recall Mode				None	None	None						
Act Effct Green (s)				14.0	14.0	14.0	76.3	86.5			30.0	
Actuated g/C Ratio				0.13	0.13	0.13	0.68	0.78			0.27	
v/c Ratio				0.52	0.32	0.30	0.18	0.33			0.44	
Control Delay				54.2	3.7	3.1	1.6	0.9			18.3	
Queue Delay				0.0	0.0	0.0	0.0	0.3			0.0	
Total Delay				54.2	3.7	3.1	1.6	1.2			18.3	
LOS				D	A	A	A	A			B	
Approach Delay					21.1			1.3			18.3	
Approach LOS					C			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 111.5			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 9.2		Intersection LOS: A	
Intersection Capacity Utilization 51.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Robert Rd & SR 89A Ramp



Lane Group	Ø1	Ø2	Ø3	Ø5
Detector Phase				
Switch Phase				
Minimum Initial (s)	15.0	5.0	6.0	6.0
Minimum Split (s)	21.0	11.0	12.0	12.0
Total Split (s)	23.0	16.0	41.0	12.0
Total Split (%)	19%	13%	34%	10%
Maximum Green (s)	17.9	10.9	35.6	6.9
Yellow Time (s)	3.9	3.9	3.9	3.9
All-Red Time (s)	1.2	1.2	1.5	1.2
Lost Time Adjust (s)				
Total Lost Time (s)				
Lead/Lag	Lead			Lag
Lead-Lag Optimize?				
Vehicle Extension (s)	2.5	2.5	2.5	3.0
Recall Mode	Min	Min	Max	Max
Act Effct Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	109	104	100	315	895	641
v/c Ratio	0.52	0.32	0.30	0.18	0.33	0.44
Control Delay	54.2	3.7	3.1	1.6	0.9	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.0
Total Delay	54.2	3.7	3.1	1.6	1.2	18.3
Queue Length 50th (ft)	77	0	0	6	10	68
Queue Length 95th (ft)	137	10	6	17	8	115
Internal Link Dist (ft)		548			317	669
Turn Bay Length (ft)	350		350			
Base Capacity (vph)	334	428	428	1739	2766	1471
Starvation Cap Reductn	0	0	0	0	1083	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.24	0.23	0.18	0.53	0.44

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	576	0	451	0	0	0	0	537	93	79	287	0
Future Volume (vph)	576	0	451	0	0	0	0	537	93	79	287	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		250	0		0	250		200	0		0
Storage Lanes	1		1	0		0	2		0	1		0
Taper Length (ft)	200			25			200			25		
Lane Util. Factor	0.95	0.91	0.95	1.00	1.00	1.00	1.00	0.86	0.86	1.00	0.95	1.00
Frt		0.945	0.850					0.978				
Flt Protected	0.950	0.969								0.950		
Satd. Flow (prot)	1681	1552	1504	0	0	0	0	6267	0	1770	3539	0
Flt Permitted	0.950	0.969								0.232		
Satd. Flow (perm)	1681	1552	1504	0	0	0	0	6267	0	432	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		165	353					31				
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		650			835			502			397	
Travel Time (s)		14.8			19.0			6.2			4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	626	0	490	0	0	0	0	584	101	86	312	0
Shared Lane Traffic (%)	38%		28%									
Lane Group Flow (vph)	388	375	353	0	0	0	0	685	0	86	312	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1					2		1	2	
Detector Template	Left	Thru	Right					Thru		Left	Thru	
Leading Detector (ft)	20	100	20					100		20	100	
Trailing Detector (ft)	0	0	0					0		0	0	
Detector 1 Position(ft)	0	0	0					0		0	0	
Detector 1 Size(ft)	20	6	20					6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0					0.0		0.0	0.0	
Detector 2 Position(ft)		94						94			94	
Detector 2 Size(ft)		6						6			6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Split	NA	Perm					NA		D.P+P	NA	
Protected Phases	3	3						1		5 2 4	1 5 2 4	
Permitted Phases			3							1		

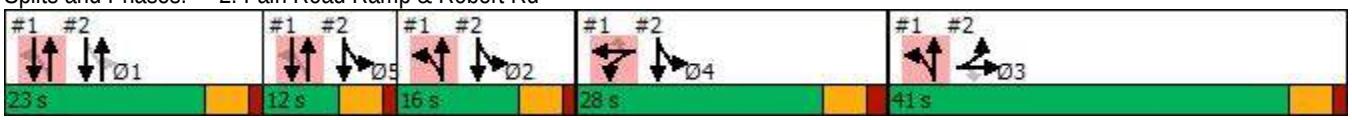
Lane Group	Ø2	Ø4	Ø5
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(ft)			
Link Offset(ft)			
Crosswalk Width(ft)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (mph)			
Number of Detectors			
Detector Template			
Leading Detector (ft)			
Trailing Detector (ft)			
Detector 1 Position(ft)			
Detector 1 Size(ft)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(ft)			
Detector 2 Size(ft)			
Detector 2 Type			
Detector 2 Channel			
Detector 2 Extend (s)			
Turn Type			
Protected Phases	2	4	5
Permitted Phases			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3	3					1		5 2 4	1 5 2 4	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0					15.0				
Minimum Split (s)	12.0	12.0	12.0					21.0				
Total Split (s)	41.0	41.0	41.0					23.0				
Total Split (%)	34.2%	34.2%	34.2%					19.2%				
Maximum Green (s)	35.6	35.6	35.6					17.9				
Yellow Time (s)	3.9	3.9	3.9					3.9				
All-Red Time (s)	1.5	1.5	1.5					1.2				
Lost Time Adjust (s)	0.0	0.0	0.0					0.0				
Total Lost Time (s)	5.4	5.4	5.4					5.1				
Lead/Lag								Lead				
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5	2.5					2.5				
Recall Mode	Max	Max	Max					Min				
Act Effct Green (s)	35.7	35.7	35.7					18.0		60.1	65.3	
Actuated g/C Ratio	0.32	0.32	0.32					0.16		0.54	0.59	
v/c Ratio	0.72	0.62	0.49					0.66		0.12	0.15	
Control Delay	43.6	23.3	5.8					46.1		5.4	4.5	
Queue Delay	0.0	0.0	0.0					0.0		0.0	0.0	
Total Delay	43.6	23.3	5.8					46.1		5.4	4.5	
LOS	D	C	A					D		A	A	
Approach Delay		24.8						46.1			4.7	
Approach LOS		C						D			A	

Intersection Summary

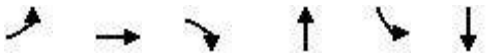
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 111.5
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 51.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fain Road Ramp & Robert Rd



Lane Group	Ø2	Ø4	Ø5
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	6.0	6.0
Minimum Split (s)	11.0	12.0	12.0
Total Split (s)	16.0	28.0	12.0
Total Split (%)	13%	23%	10%
Maximum Green (s)	10.9	22.1	6.9
Yellow Time (s)	3.9	3.9	3.9
All-Red Time (s)	1.2	2.0	1.2
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag			Lag
Lead-Lag Optimize?			
Vehicle Extension (s)	2.5	2.5	3.0
Recall Mode	Min	None	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			

Intersection Summary



Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	388	375	353	685	86	312
v/c Ratio	0.72	0.62	0.49	0.66	0.12	0.15
Control Delay	43.6	23.3	5.8	46.1	5.4	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	23.3	5.8	46.1	5.4	4.5
Queue Length 50th (ft)	258	138	0	129	11	20
Queue Length 95th (ft)	#441	278	74	177	16	23
Internal Link Dist (ft)		570		422		317
Turn Bay Length (ft)	250		250			
Base Capacity (vph)	538	609	721	1035	846	2284
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.62	0.49	0.66	0.10	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

AM 2030 Frontage Road at Robert Road Synchro Results

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	268	0	0	140	195	147
Future Vol, veh/h	268	0	0	140	195	147
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	291	0	0	152	212	160
Number of Lanes	1	0	0	1	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	12.5	9	11.1
HCM LOS	B	A	B

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	100%	100%	0%
Vol Thru, %	0%	0%	0%	100%
Vol Right, %	100%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	268	195	147
LT Vol	0	268	195	0
Through Vol	0	0	0	147
RT Vol	140	0	0	0
Lane Flow Rate	152	291	212	160
Geometry Grp	5	2	7	7
Degree of Util (X)	0.199	0.434	0.352	0.243
Departure Headway (Hd)	4.708	5.362	5.983	5.478
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	752	667	596	649
Service Time	2.805	3.438	3.77	3.265
HCM Lane V/C Ratio	0.202	0.436	0.356	0.247
HCM Control Delay	9	12.5	12	10
HCM Lane LOS	A	B	B	A
HCM 95th-tile Q	0.7	2.2	1.6	0.9

PM 2030 Frontage Road at Robert Road Synchro Results

Intersection	
Intersection Delay, s/veh	14.5
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	205	0	0	225	355	278
Future Vol, veh/h	205	0	0	225	355	278
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	223	0	0	245	386	302
Number of Lanes	1	0	0	1	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	12.9	10.5	16.5
HCM LOS	B	B	C

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	100%	100%	0%
Vol Thru, %	0%	0%	0%	100%
Vol Right, %	100%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	225	205	355	278
LT Vol	0	205	355	0
Through Vol	0	0	0	278
RT Vol	225	0	0	0
Lane Flow Rate	245	223	386	302
Geometry Grp	5	2	7	7
Degree of Util (X)	0.337	0.381	0.648	0.465
Departure Headway (Hd)	4.961	6.153	6.048	5.543
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	726	586	598	653
Service Time	2.986	4.18	3.77	3.265
HCM Lane V/C Ratio	0.337	0.381	0.645	0.462
HCM Control Delay	10.5	12.9	19.3	13
HCM Lane LOS	B	B	C	B
HCM 95th-tile Q	1.5	1.8	4.7	2.5

APPENDIX D – DIAMOND TRAFFIC INTERCHANGE ALTERNATIVE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	1	6	

LEGEND

- Reconstruction Limits - Highway, Ramps, and Crossroad
- New Bridge
- Santa Fe Loop
- Existing Fain Rd
- Roadway Demolition

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

SR 89A AT ROBERT RD
TRAFFIC INTERCHANGE

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

ROUTE	LOCATION	DWG NO.
SR 89A	SR 89A AT ROBERT RD	___ OF ___

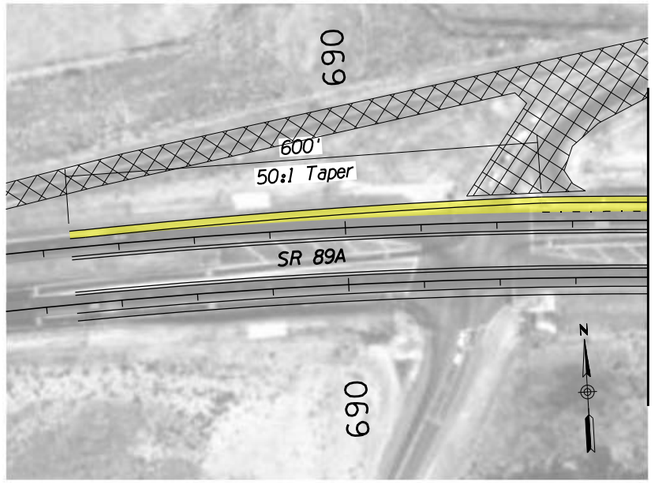
TRACS NO. - | - |

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

8:30:43 AM 9/23/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_1.DGN

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	2	6	

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-



SEE BELOW LEFT

MATCHLINE - SEE SHEET 4

Section Line

New R/W

Santa Fe Loop
TI - Ramp A

Exist R/W

Rd Cst ℄

Westbound On Ramp
Parallel Type

SR 89A

Santa Fe Loop
TI - Ramp C

SR 89A

Eastbound Off Ramp
Taper Type
(Due to Curve)

Exist R/W

Santa Fe Loop
TI - Ramp B

New R/W

660' Access Control (Typ)

Santa Fe Loop

Santa Fe Loop

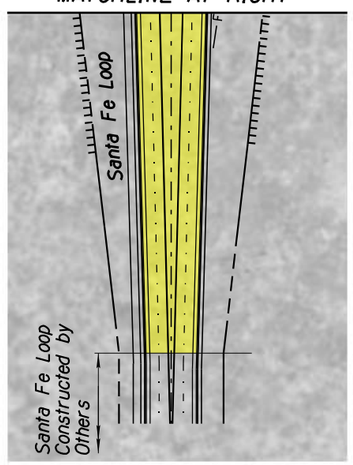
Santa Fe Loop
TI - Ramp D

SEE ABOVE

695 700 705 710 715 720

MATCHLINE - SEE SHEET 3

MATCHLINE AT RIGHT



MATCHLINE AT LEFT

LEGEND

- Reconstruction Limits - Highway, Ramps, and Crossroad
- New Bridge
- Santa Fe Loop
- Existing Fain Rd
- Roadway Demolition

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

SR 89A AT ROBERT RD
TRAFFIC INTERCHANGE

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

ROUTE: SR 89A
LOCATION: SR 89A AT ROBERT RD
DWG NO.
TRACS NO. - - -
___ OF ___

8:39:08 AM 9/23/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_2.DGN

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	3	6	

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

MATCHLINE - SEE SHEET 2

Santa Fe Loop
TI - Ramp C

New R/W

Exist R/W

Westbound Off Ramp
Parallel Type

Rd Cst ℄

300'
25:1 Taper

Fain Rd

600'
50:1 Taper

Eastbound On Ramp
Parallel Type

Exist R/W

New R/W

Santa Fe Loop
TI - Ramp D

725 730 735 740 745 750

F

N

LEGEND

Reconstruction Limits - Highway, Ramps, and Crossroad

Existing Fain Rd

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

SR 89A AT ROBERT RD
TRAFFIC INTERCHANGE

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

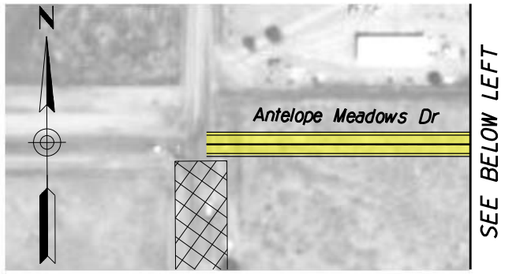
ROUTE: SR 89A
LOCATION: SR 89A AT ROBERT RD
DWG NO.

TRACS NO. -

- OF ___

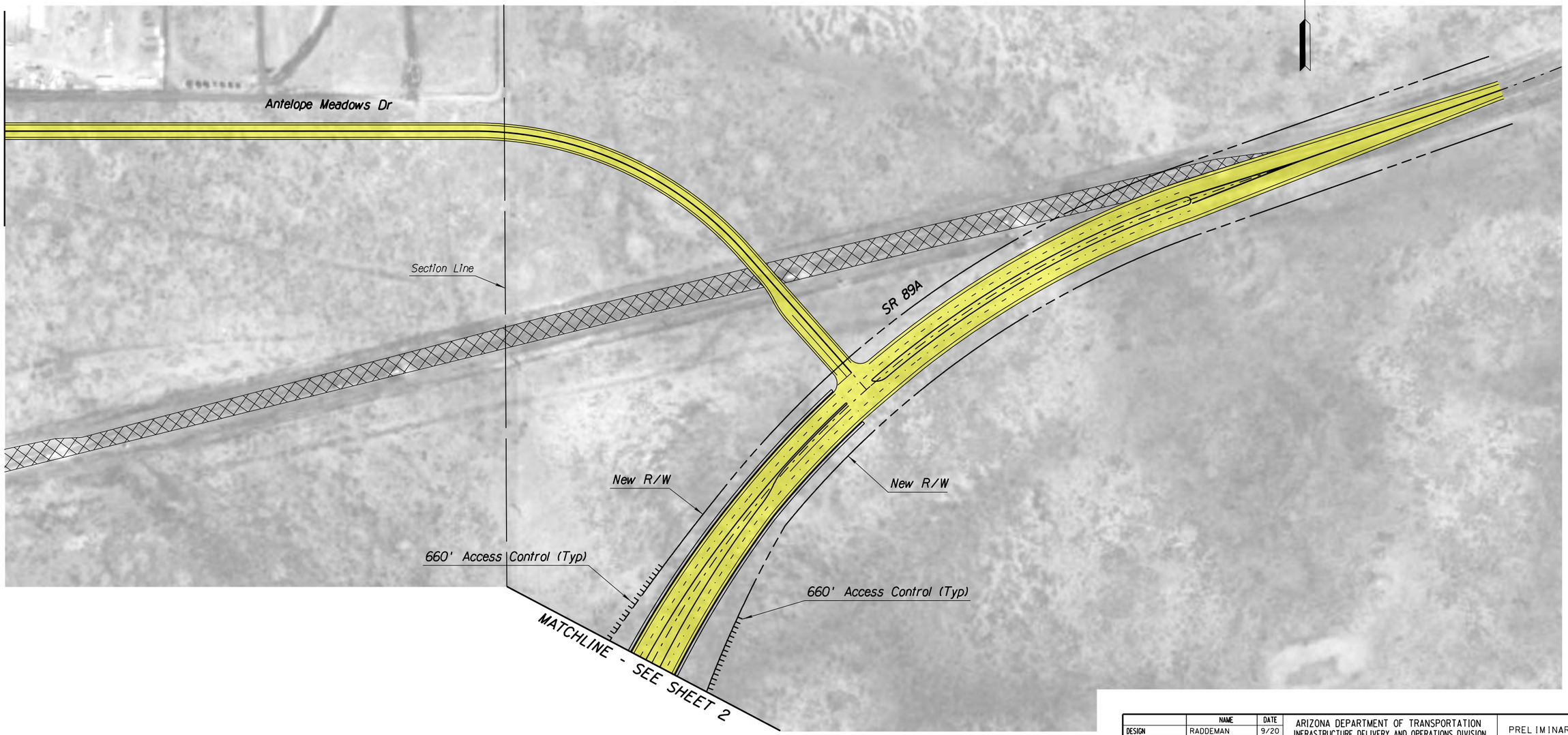
8:33:01 AM 9/23/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_3.DGN

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	4	6	



SEE BELOW LEFT

SEE ABOVE RIGHT



LEGEND

Reconstruction Limits - Highway, Ramps, and Crossroad

Demolition Roadway

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

SR 89A AT ROBERT RD TRAFFIC INTERCHANGE

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 89A

LOCATION: SR 89A AT ROBERT RD

DWG NO.

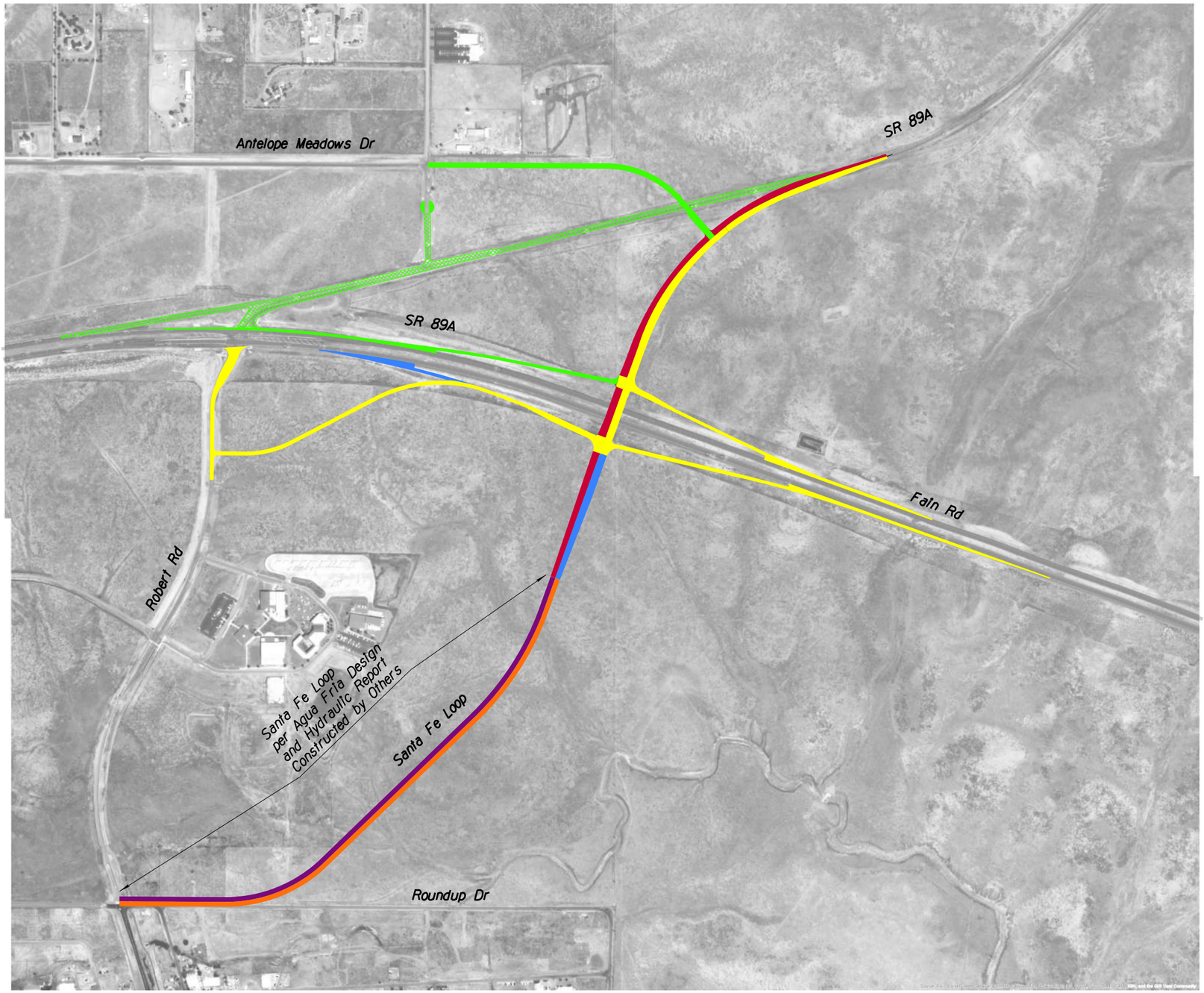
TRACS NO. -

- OF -

DATE- | SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

8:34:09 AM 9/23/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_4.DGN

APPENDIX E – IMPLEMENTATION PHASING



N

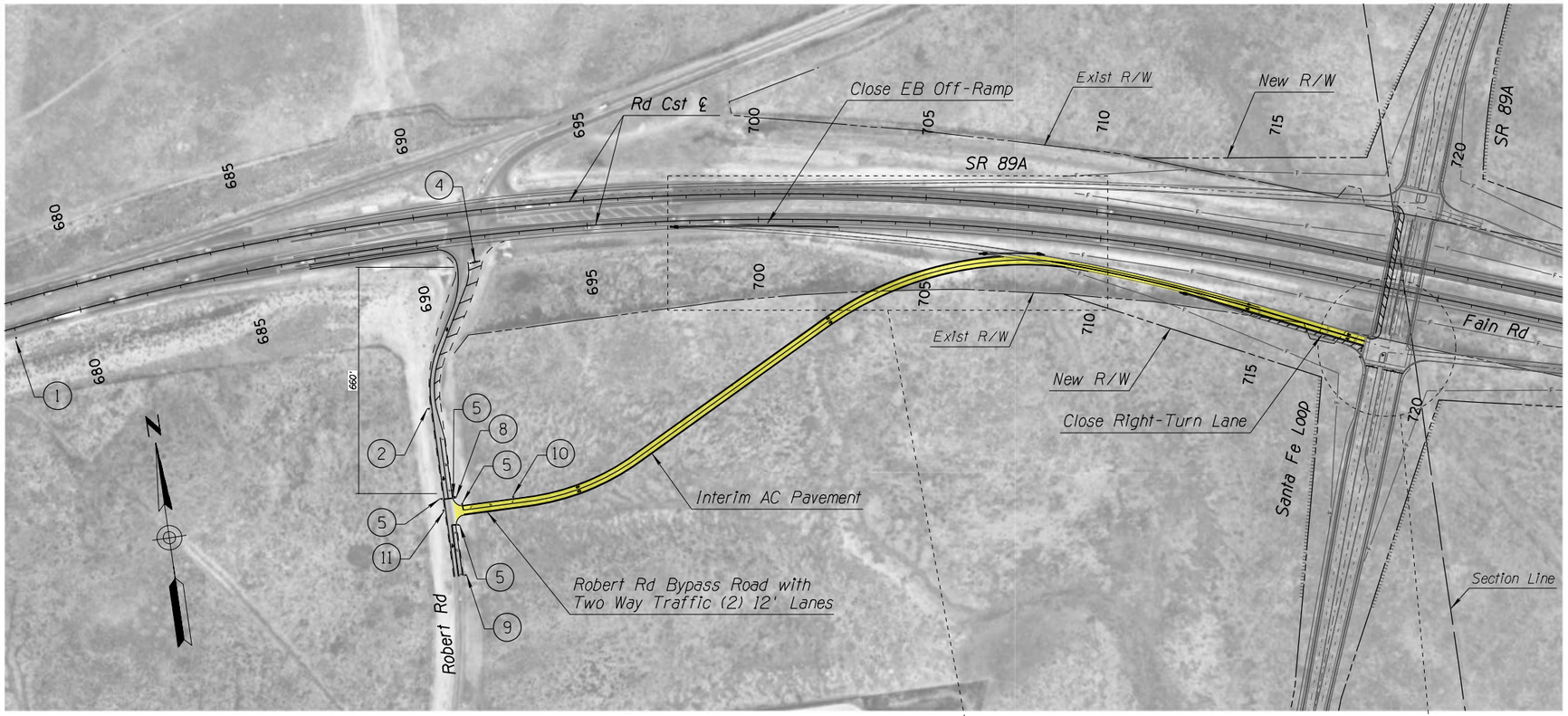
Phasing Breakdown

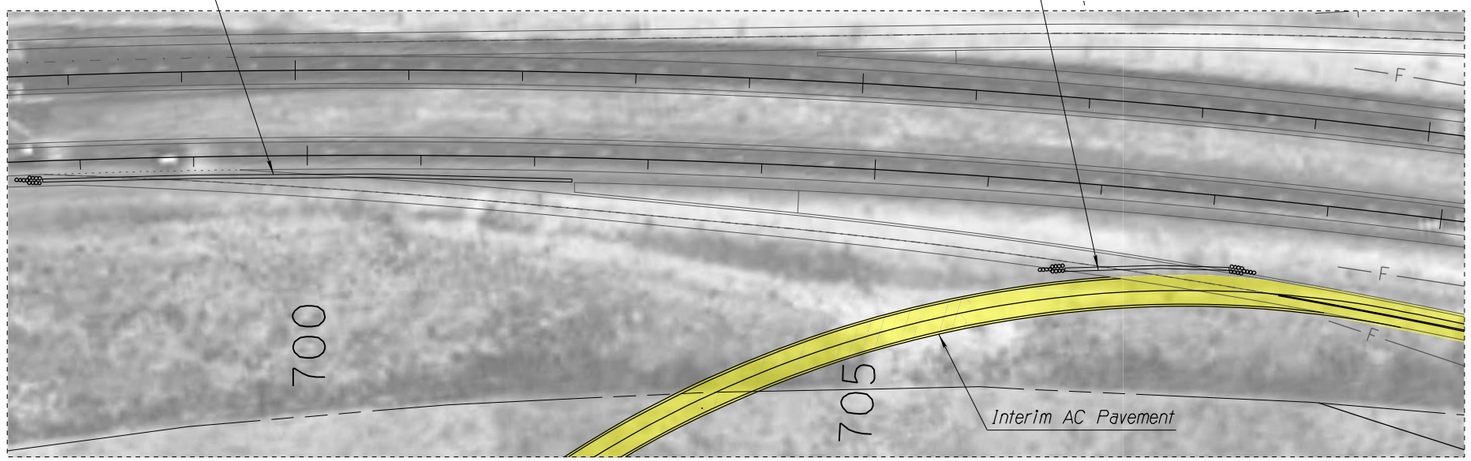
- Phase 1
- Phase 2
- Phase 2 Removal
- Phase 3
- Phase 3A (cost by others)
- Phase 4
- Phase 4A (cost by others)

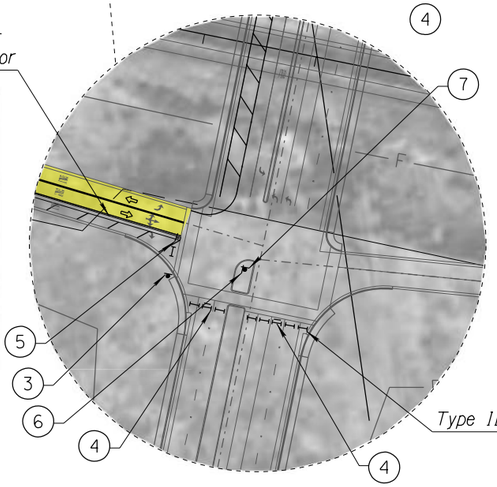
SR89A AT SANTA FE LOOP INTERCHANGE
PHASED IMPLEMENTATION CONCEPT

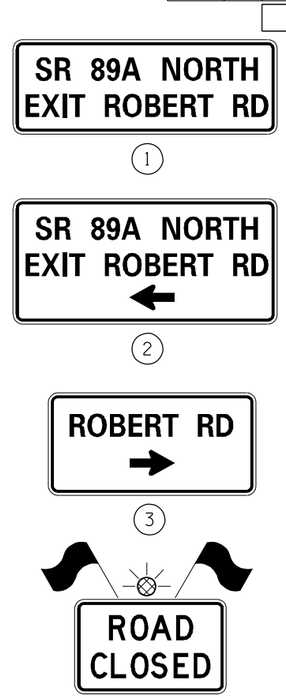
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	5	6	

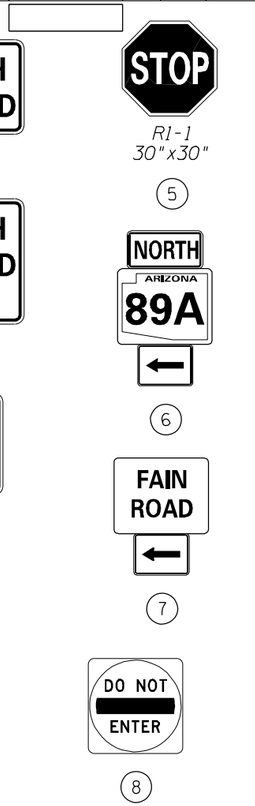
SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-











SYMBOL LEGEND:

⊩	SIGN ON EMBEDDED POST(S)	⇨	DIRECTION OF TRAVEL
⊢	SIGN ON CONCRETE BARRIER	▭	TEMPORARY CONCRETE BARRIER SEE STD DWG C-3 FOR DETAILS.
I	TYPE III BARRICADE	ooooo	TEMPORARY SAND BARREL ARRAY SEE STD DWG C-1.C-2 FOR DETAILS.
I⊩	SIGN ON TYPE III BARRICADE		

LEGEND

Robert Road Interim Connection Alternative 1

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

ROBERT ROAD
INTERIM CONNECTION
ALTERNATIVE 1

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

ROUTE	LOCATION	DWG NO.
SR 89A	SR 89A AT ROBERT RD	
TRACS NO. -	-	___ OF ___

1:15:07 PM 12/4/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_5.DGN

APPENDIX F – BRIDGE OVER FAIN ROAD

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	-	6	6	

LEGEND

- Robert Road Interim Connection Alternative 2
- New Bridge

	NAME	DATE
DESIGN	RADDEMAN	9/20
DRAWN	RADDEMAN	9/20
CHECKED	HATHCOCK	9/20

Kimley»Horn

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

ROBERT ROAD
INTERIM CONNECTION
ALTERNATIVE 2

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

ROUTE: SR 89A
LOCATION: SR 89A AT ROBERT RD
DWG NO.: ___ OF ___
TRACS NO. -

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO. | DATE-

8:37:47 AM 9/23/2020 TERRY.RADDEMAN K:\TUC_TPTO\098356000-ROBERT_RD_SR89_ ASR\CADD\SHEET_6.DGN

APPENDIX G – ESTIMATE OF PROBABLE COST

Arizona Department of Transportation
Estimated Engineering Construction Cost

Project Number: MPD 197313.200.2

Location: SR 89A and Robert Road

Version: Final Report
Phase 1 (Within Interim Frontage Road)

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001	CLEARING AND GRUBBING	L.SUM	1	$25,000.00	$25,000
2030301	ROADWAY EXCAVATION	CU.YD.	10,668	$20.00	$213,350
2030900	BORROW (IN PLACE)	CU.YD.	106,244	$15.00	$1,593,661
2050001	GRADING ROADWAY FOR PAVEMENT	SQ.YD.	5,828	$11.00	$64,104
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	10,668	$45.00	$480,060
4040111	BITUMINOUS TACK COAT	TON	25	$550.00	$13,750
4040116	APPLY BITUMINOUS TACK COAT	HOUR	31	$200.00	$6,200
4160002	ASPHALTIC CONCRETE (3/4" MIX) (END PRODUCT)	TON	13,322	$50.00	$666,100
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$22,000.00	$22,000
6080102	MISCELLANEOUS WORK (SIGNS)(CANTILEVER SIGNS)	L.SUM	1	$180,000.00	$180,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	58,590	$0.50	$29,295
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	12,430	$0.50	$6,215
7040007	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC)(0.120")	L.FT.	1,150	$1.00	$1,150
7060013	PAVEMENT MARKER, RAISED, TYPE C	EACH	130	$4.00	$520
7040073	PAVEMENT LEGEND (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	8	$150.00	$1,200
7040074	PAVEMENT SYMBOL (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	16	$150.00	$2,400
7310820	REMOVE EXISTING FOUNDATIONS	L.SUM	1	$10,000.00	$10,000
7330550	REMOVE AND SALVAGE TRAFFIC SIGNALS AND LOAD CENTER CABINETS	L.SUM	1	$60,000.00	$60,000
7360300	ROADWAY LIGHTING	L.SUM	1	$160,000.00	$160,000
9050006	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	2,363	$5.00	$11,815
9050025	GUARD RAIL TERMINAL (MASH)	EACH	4	$6,000.00	$24,000
9080001	CONCRETE CURB (C-05.10) (TYPE A)	L.FT.	1,850	$22.00	$40,700
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	8,925	$7.25	$64,706
9080286	CONCRETE SIDEWALK RAMP (	EACH	8	$3,000.00	$24,000
9100002	CONCRETE BARRIER (SINGLE FACE)	L.FT.	800	$150.00	$120,000
9240038	MISCELLANEOUS WORK (BRIDGE)	SQ.FT.	14,236	$175.00	$2,491,277
9240050	MISCELLANEOUS WORK (DRAINAGE IMPROVEMENTS)	L.SUM	1	$100,000.00	$100,000
9240051	MISCELLANEOUS WORK (EROSION CONTROL)	L.SUM	1	$40,000.00	$40,000
				ITEM TOTAL	**$6,451,503**
	PROJECT WIDE				
	Mobilization (10%)				$645,151
	Dust and Water Palliative (1%)				$64,516
	Quality Control (2%)				$129,031
	Construction Surveying (2%)				$129,031
	Maintenance And Protection Of Traffic (3%)				$193,546
				PROJECT WIDE SUBTOTAL	**$1,161,275**
	Unidentified Item Allowance (20%)				$1,522,556
				PROJECT WIDE TOTAL	**$2,683,831**
	OTHER COSTS				
	Construction Engineering (9%)				$775,729
	Construction Contingencies (5%)				$430,961
	Consultant Services (1%)				$86,193
	Contingency (20%)				$1,723,842
	Right-of-Way ($1.5 per sqft)				$260,000
	Utilities (Relocate Transmission Line)				$1,000,000
	Consultant Design (12% of construction cost)				$774,180
				OTHER COSTS TOTAL	**$5,050,905**
	ITEM TOTAL				**$6,451,503**
	PROJECT WIDE				**$2,683,831**
	OTHER COST TOTAL				**$5,050,905**
	SUBTOTAL PROJECT COST				**$14,186,239**
	INDIRECT COST ALLOCATION (9.90%)				**$1,404,438**
				TOTAL PROJECT COST	**$15,590,676**

Arizona Department of Transportation
Estimated Engineering Construction Cost

Project Number: MPD 197313.200.2

Location: SR 89A and Robert Road

Version: Final Report
Phase 1 (Within Interim Frontage Road)

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001	CLEARING AND GRUBBING	L.SUM	1	$5,000.00	$5,000
2020020	REMOVAL OF CONCRETE CURB	L.FT.	110	$4.50	$495
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	365	$5.50	$2,008
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	30,020	$3.50	$105,070
2020153	REMOVE (SIGNS, STRUCTURES, FOUNDATIONS, AND POSTS)	L.SUM	1	$35,000.00	$35,000
2030301	ROADWAY EXCAVATION	CU.YD.	4,981	$20.00	$99,628
2030900	BORROW (IN PLACE)	CU.YD.	33,534	$15.00	$503,008
2050001	GRADING ROADWAY FOR PAVEMENT	SQ.YD.	8,006	$11.00	$88,063
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	3,574	$45.00	$160,830
4040111	BITUMINOUS TACK COAT	TON	9	$550.00	$4,950
4040116	APPLY BITUMINOUS TACK COAT	HOUR	12	$200.00	$2,400
4160002	ASPHALTIC CONCRETE (3/4" MIX) (END PRODUCT)	TON	4,463	$50.00	$223,150
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	14,910	$0.50	$7,455
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	3,700	$0.50	$1,850
7040007	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC)(0.120")	L.FT.	36	$1.00	$36
7040074	PAVEMENT SYMBOL (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	2	$150.00	$300
7310810	REMOVE AND SALVAGE EXISTING LIGHTING POLE	L.SUM	1	$4,800.00	$4,800
9050006	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	900	$5.00	$4,500
9050025	GUARD RAIL TERMINAL (	EACH	1	$6,000.00	$6,000
9240050	MISCELLANEOUS WORK (DRAINAGE IMPROVEMENTS)	L.SUM	1	$50,000.00	$50,000
9240051	MISCELLANEOUS WORK (EROSION CONTROL)	L.SUM	1	$24,000.00	$24,000
				$1.00	
				ITEM TOTAL	**$1,338,542**

PROJECT WIDE

Mobilization (10%)	$133,855
Dust and Water Palliative (1%)	$13,386
Quality Control (2%)	$26,771
Construction Surveying (2%)	$26,771
Maintenance And Protection Of Traffic (5%)	$66,928
PROJECT WIDE SUBTOTAL	**$267,711**
Unidentified Item Allowance (20%)	$321,251
PROJECT WIDE TOTAL	**$588,962**

OTHER COSTS

Construction Engineering (9%)	$161,429
Construction Contingencies (5%)	$89,683
Consultant Services (1%)	$17,937
Contingency (20%)	$358,730
Consultant Design (12% of construction cost)	$160,625
OTHER COSTS TOTAL	**$788,404**

SUMMARY

ITEM TOTAL	**$1,338,542**
PROJECT WIDE	**$588,962**
OTHER COST TOTAL	**$788,404**
SUBTOTAL PROJECT COST	**$2,715,908**
INDIRECT COST ALLOCATION (9.90%)	**$268,875**
TOTAL PROJECT COST	**$2,984,783**

Arizona Department of Transportation
Estimated Engineering Construction Cost

Project Number: MPD 197313.200.2

Location: SR 89A and Robert Road

Version: Final Report
Phase 1 (Within Interim Frontage Road)

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001	CLEARING AND GRUBBING	L.SUM	1	$5,000.00	$5,000
2030301	ROADWAY EXCAVATION	CU.YD.	540	$20.00	$10,800
2030900	BORROW (IN PLACE)	CU.YD.	18,913	$15.00	$283,701
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	1,072	$45.00	$48,240
4040111	BITUMINOUS TACK COAT	TON	3	$550.00	$1,650
4040116	APPLY BITUMINOUS TACK COAT	HOUR	5	$200.00	$1,000
4160002	ASPHALTIC CONCRETE (3/4" MIX) (END PRODUCT)	TON	1,338	$50.00	$66,900
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$5,000.00	$5,000
6080102	MISCELLANEOUS WORK (SIGNS)(CANTILEVER SIGNS)	L.SUM	1	$60,000.00	$60,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	4,000	$0.50	$2,000
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	2,600	$0.50	$1,300
7360300	ROADWAY LIGHTING	L.SUM	1	$20,000.00	$20,000
9050025	GUARD RAIL TERMINAL (MASH)	EACH	1	$6,000.00	$6,000
9080001	CONCRETE CURB (C-05.10) (TYPE A)	L.FT.	1,031	$22.00	$22,689
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	5,309	$7.25	$38,494
9240050	MISCELLANEOUS WORK (DRAINAGE IMPROVEMENTS)	L.SUM	1	$20,000.00	$20,000
9240051	MISCELLANEOUS WORK (EROSION CONTROL)	L.SUM	1	$5,000.00	$5,000
				ITEM TOTAL	**$597,774**
	PROJECT WIDE				
	Mobilization (10%)				$59,778
	Dust and Water Palliative (1%)				$5,978
	Quality Control (2%)				$11,956
	Construction Surveying (2%)				$11,956
	Maintenance And Protection Of Traffic (10%)				$59,778
				PROJECT WIDE SUBTOTAL	**$149,446**
	Unidentified Item Allowance (20%)				$149,445
				PROJECT WIDE TOTAL	**$298,891**
	OTHER COSTS				
	Construction Engineering (9%)				$72,630
	Construction Contingencies (5%)				$40,350
	Consultant Services (1%)				$8,070
	Contingency (20%)				$161,400
	Consultant Design (12% of construction cost)				$71,733
				OTHER COSTS TOTAL	**$354,183**

SUMMARY

ITEM TOTAL	**$597,774**
PROJECT WIDE	**$298,891**
OTHER COST TOTAL	**$354,183**
SUBTOTAL PROJECT COST	**$1,250,848**
INDIRECT COST ALLOCATION (9.90%)	**$123,834**
TOTAL PROJECT COST	**$1,374,682**

Arizona Department of Transportation
Estimated Engineering Construction Cost

Project Number: MPD 197313.200.2

Location: SR 89A and Robert Road

Version: Final Report
Phase 1 (Within Interim Frontage Road)

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2030301	ROADWAY EXCAVATION	CU.YD.	3,188	$20.00	$63,760
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	3,188	$45.00	$143,460
4040111	BITUMINOUS TACK COAT	TON	8	$550.00	$4,400
4040116	APPLY BITUMINOUS TACK COAT	HOUR	10	$200.00	$2,000
4160002	ASPHALTIC CONCRETE (3/4" MIX) (END PRODUCT)	TON	3,981	$50.00	$199,050
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$5,000.00	$5,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	26,710	$0.50	$13,355
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	11,790	$0.50	$5,895
7040007	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC)(0.120")	L.FT.	3,640	$1.00	$3,640
7060013	PAVEMENT MARKER, RAISED, TYPE C	EACH	186	$4.00	$744
7040073	PAVEMENT LEGEND (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	7	$150.00	$1,050
7040074	PAVEMENT SYMBOL (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	14	$150.00	$2,100
9050025	GUARD RAIL TERMINAL (MASH)	EACH	1	$6,000.00	$6,000
9080001	CONCRETE CURB (C-05.10) (TYPE A)	L.FT.	9,270	$22.00	$203,940
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	18,454	$7.25	$133,792
9080286	CONCRETE SIDEWALK RAMP (	EACH	2	$3,000.00	$6,000
9210012	MEDIAN PAVING (CONCRETE)	SQ.YD.	6,243	$75.00	$468,240
9240038	MISCELLANEOUS WORK (BRIDGE)	SQ.FT.	11,596	$175.00	$2,029,319
9240050	MISCELLANEOUS WORK (DRAINAGE IMPROVEMENTS)	L.SUM	1	$75,000.00	$75,000
9240051	MISCELLANEOUS WORK (EROSION CONTROL)	L.SUM	1	$30,000.00	$30,000
9240052	MISCELLANEOUS WORK (PARTIAL BRIDGE REMOVAL)	L.SUM	1	$9,990.00	$9,990
				ITEM TOTAL	**$3,406,735**
	PROJECT WIDE				
	Mobilization (10%)				$340,674
	Dust and Water Palliative (1%)				$34,068
	Quality Control (2%)				$68,135
	Construction Surveying (2%)				$68,135
	Maintenance And Protection Of Traffic (10%)				$340,674
				PROJECT WIDE SUBTOTAL	**$851,686**
	Unidentified Item Allowance (20%)				$851,685
				PROJECT WIDE TOTAL	**$1,703,371**
	OTHER COSTS				
	Construction Engineering (9%)				$413,919
	Construction Contingencies (5%)				$229,955
	Consultant Services (1%)				$45,991
	Contingency (20%)				$919,819
	Consultant Design (12% of construction cost)				$408,808
				OTHER COSTS TOTAL	**$2,018,492**

SUMMARY

ITEM TOTAL	**$3,406,735**
PROJECT WIDE	**$1,703,371**
OTHER COST TOTAL	**$2,018,492**
SUBTOTAL PROJECT COST	**$7,128,598**
INDIRECT COST ALLOCATION (9.90%)	**$705,731**
TOTAL PROJECT COST	**$7,834,329**

Arizona Department of Transportation
Estimated Engineering Construction Cost

Project Number: MPD 197313.200.2

Location: SR 89A and Robert Road

Version: Draft ASR
Phase 1 (Within Interim Frontage Road)

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001	CLEARING AND GRUBBING	L.SUM	1	$5,000.00	$5,000
2020153	REMOVE (SIGNS, STRUCTURES, FOUNDATIONS, AND POSTS)	L.SUM	1	$5,000.00	$5,000
2030301	ROADWAY EXCAVATION	CU.YD.	1,410	$20.00	$28,200
2030900	BORROW (IN PLACE)	CU.YD.	41,795	$15.00	$626,925
2050001	GRADING ROADWAY FOR PAVEMENT	SQ.YD.	1,410	$11.00	$15,510
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	1,409	$45.00	$63,405
4040111	BITUMINOUS TACK COAT	TON	4	$550.00	$2,200
4040116	APPLY BITUMINOUS TACK COAT	HOUR	6	$200.00	$1,200
4160002	ASPHALTIC CONCRETE (3/4" MIX) (END PRODUCT)	TON	1,760	$50.00	$88,000
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$5,000.00	$5,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	5,670	$0.50	$2,835
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	3,820	$0.50	$1,910
7360300	ROADWAY LIGHTING	L.SUM	1	$40,000.00	$40,000
9050006	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	2,200	$5.00	$11,000
9050025	GUARD RAIL TERMINAL (MASH)	EACH	4	$6,000.00	$24,000
9100002	CONCRETE BARRIER (SINGLE FACE)	L.FT.	700	$150.00	$105,000
9240038	MISCELLANEOUS WORK (BRIDGE)	SQ.FT.	9,633	$175.00	$1,685,817
9240050	MISCELLANEOUS WORK (DRAINAGE IMPROVEMENTS)	L.SUM	1	$20,000.00	$20,000
9240051	MISCELLANEOUS WORK (EROSION CONTROL)	L.SUM	1	$5,000.00	$5,000
				ITEM TOTAL	**$2,736,002**

PROJECT WIDE

Mobilization (10%)	$273,601
Dust and Water Palliative (1%)	$27,361
Quality Control (2%)	$54,721
Construction Surveying (2%)	$54,721
Maintenance And Protection Of Traffic (10%)	$273,601
PROJECT WIDE SUBTOTAL	**$684,005**
Unidentified Item Allowance (20%)	$684,002
PROJECT WIDE TOTAL	**$1,368,007**

OTHER COSTS

Construction Engineering (9%)	$332,425
Construction Contingencies (5%)	$184,681
Consultant Services (1%)	$36,937
Contingency (20%)	$738,722
Consultant Design (12% of construction cost)	$328,320
OTHER COSTS TOTAL	**$1,621,085**

SUMMARY

ITEM TOTAL	**$2,736,002**
PROJECT WIDE	**$1,368,007**
OTHER COST TOTAL	**$1,621,085**
SUBTOTAL PROJECT COST	**$5,725,095**
INDIRECT COST ALLOCATION (9.90%)	**$566,784**
TOTAL PROJECT COST	**$6,291,879**

APPENDIX H – CUT/FILL REPORT

Cut/Fill Report

Generated: 2020-10-06 14:30:51

By user: Terry.Raddeman

Drawing: C:_Terry\K_DRIVE\TUC_TPTO\098356000-Robert_Rd_SR89_ASR\CADD\C:_Terry\K_DRIVE\TUC_TPTO\098356000-Robert_Rd_SR89_ASR\CADD\Surface_Comp.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (acres)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Surface_Comp_TI	full	1.000	1.000	45.13	26035.11	192038.71	166003.61<Fill>
Surface_Comp_Analop	full	1.000	1.000	3.02	5618.89	145.08	5473.81<Cut>
Surface_Comp_frontage	full	1.000	1.000	0.97	1844.08	6.54	1837.55<Cut>
RobertRdSouth	full	1.000	1.000	1.82	924.72	26275.58	25350.86<Fill>
RobertRdNorth	full	1.000	1.000	1.90	1291.15	17735.00	16443.85<Fill>

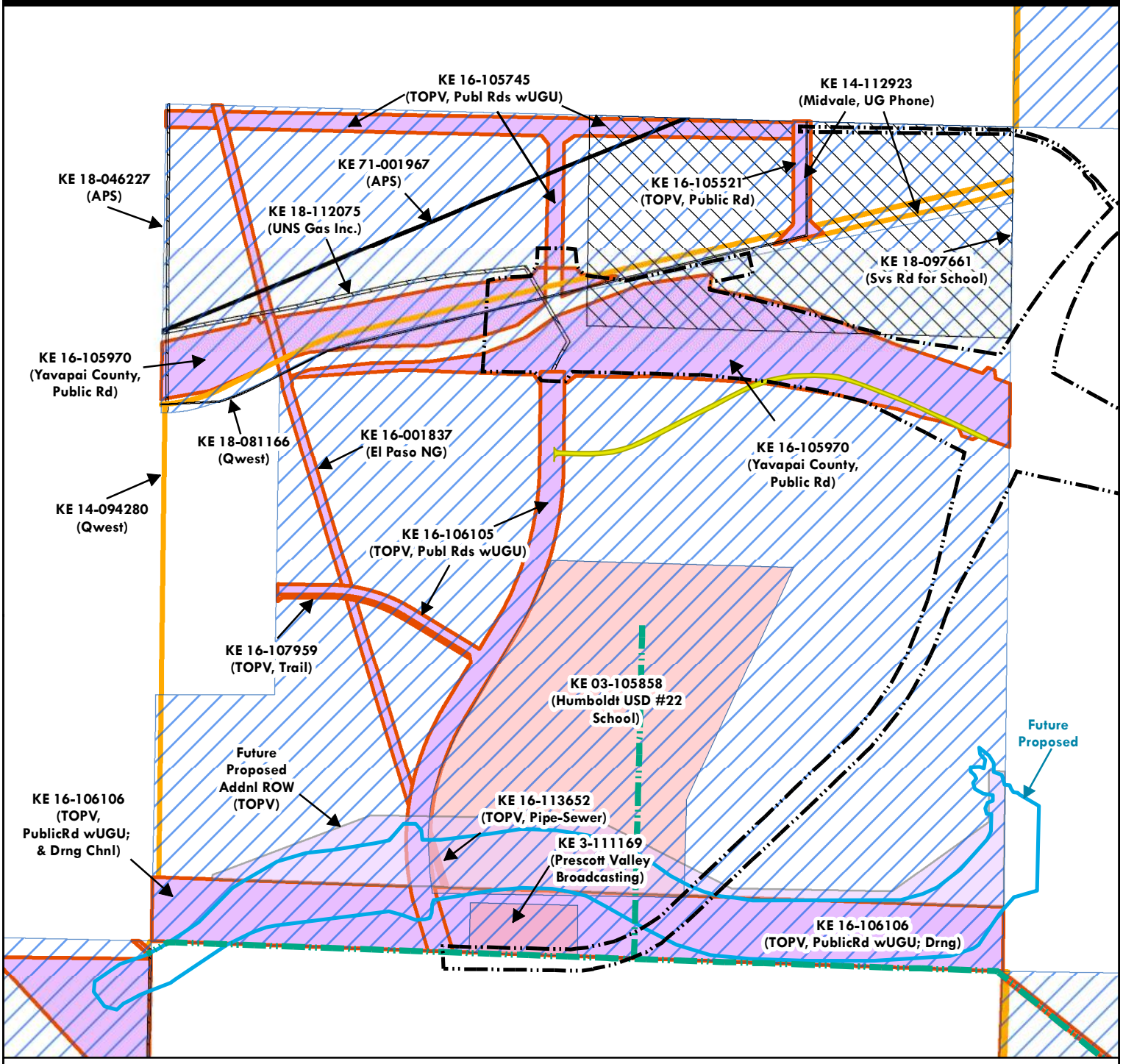
Totals

	2d Area (acres)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	52.83	35713.95	236200.91	200486.96<Fill>

* Value adjusted by cut or fill factor other than 1.0

APPENDIX I – ARIZONA STATE LAND DEPARTMENT MAPPING

Proposed Santa Fe Loop Dr (Robert Rd-to-SR89A North) w T.I. over Fain Rd/SR 89
T15N, R01W, Sec. 36, Town of Prescott Valley, Yavapai County, AZ
Existing ROWs & Leases on State Trust Land



Legend:

- 200925_KHA_ASR_Recomm_Alt_Sht1
- 201203_KHA_Proposed Interim_Frontage_Rd
- 130626_LYON_Existing_WW_Sewer
- 130626_LYON_Prelim_D&H_Rpt_Proposed_100yr_FP
- State Trust land (Surface Parcels)
- 130626_LYON_Prelim_D&H_Rpt_Proposed_Addnl_ROW
- 3 - Commercial Lease on Trust land

Rights of Way

- In Process
- 14 - Long Term
- 16 - Perpetual
- 18 - 10 Yr Definite
- Other

N

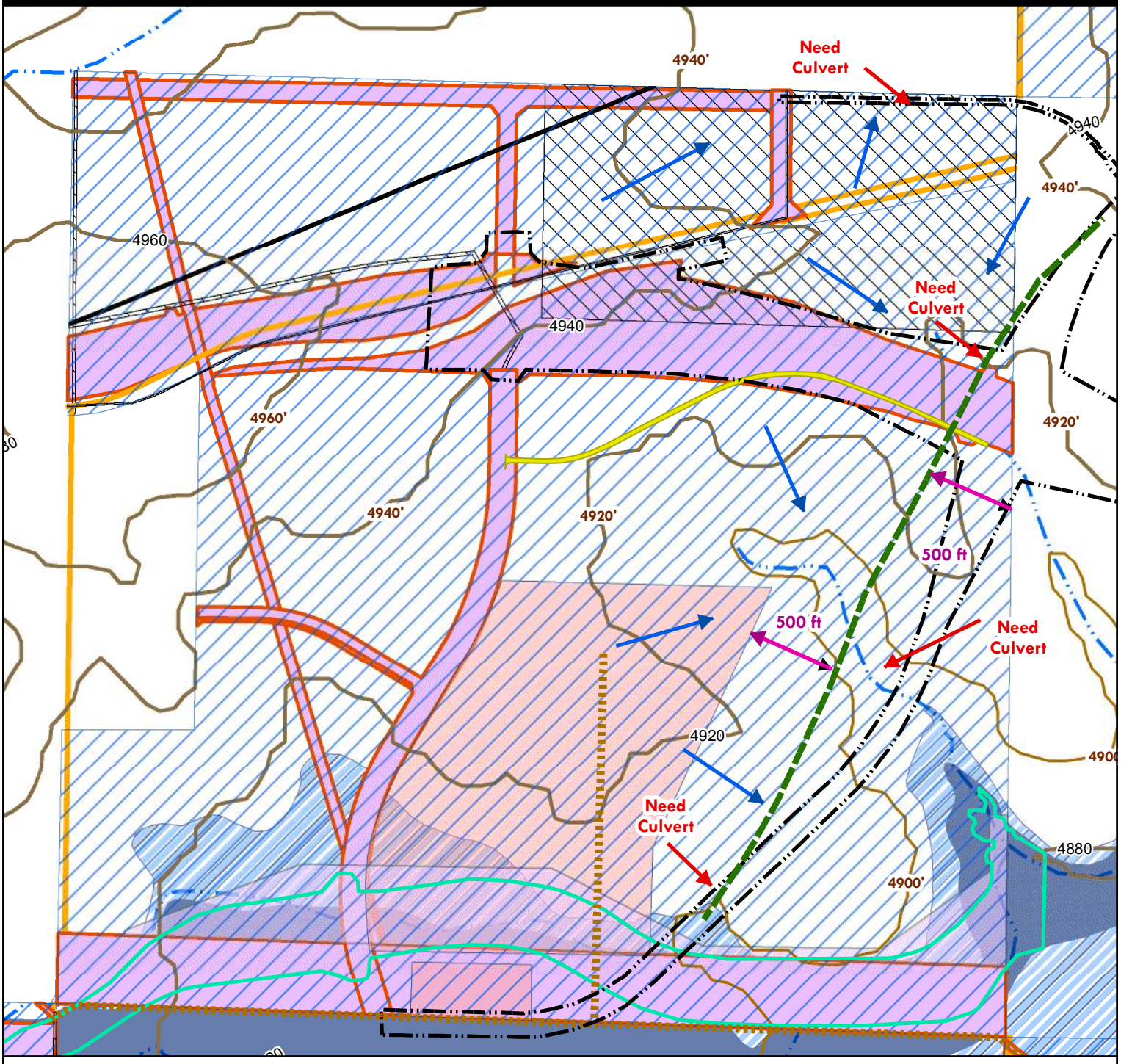
0 350 700 1,400 Feet

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

The Arizona State Land Department makes no warranties, expressed or implied with respect to the information shown on this map.

| M. Naber | January 26, 2021 |

Proposed Santa Fe Loop Dr (Robert Rd-to-SR89A North) w T.I. over Fain Rd/SR 89
T15N, R01W, Sec. 36, Town of Prescott Valley, Yavapai County, AZ
Constraints & Infrastructure Recommendations



Legend:

- ASLD Proposed Sante Fe Loop Dr & T.I. Location
- 200925_KHA_ASR_Recomm_Alt_Sht1
- 201203_KHA_Proposed Interim_Frontage_Rd
- 130626_LYON_Existing_WW_Sewer
- 130626_LYON_Prelim_D&H_Rpt_Proposed_100yr_FP
- State Trust land (Surface Parcels)
- 130626_LYON_Prelim_D&H_Rpt_Proposed_Addnl_ROW
- 3 - Commercial Lease on Trust land

Rights of Way

- In Process
- 14 - Long Term
- 16 - Perpetual
- 18 - 10 Yr Definite
- Other

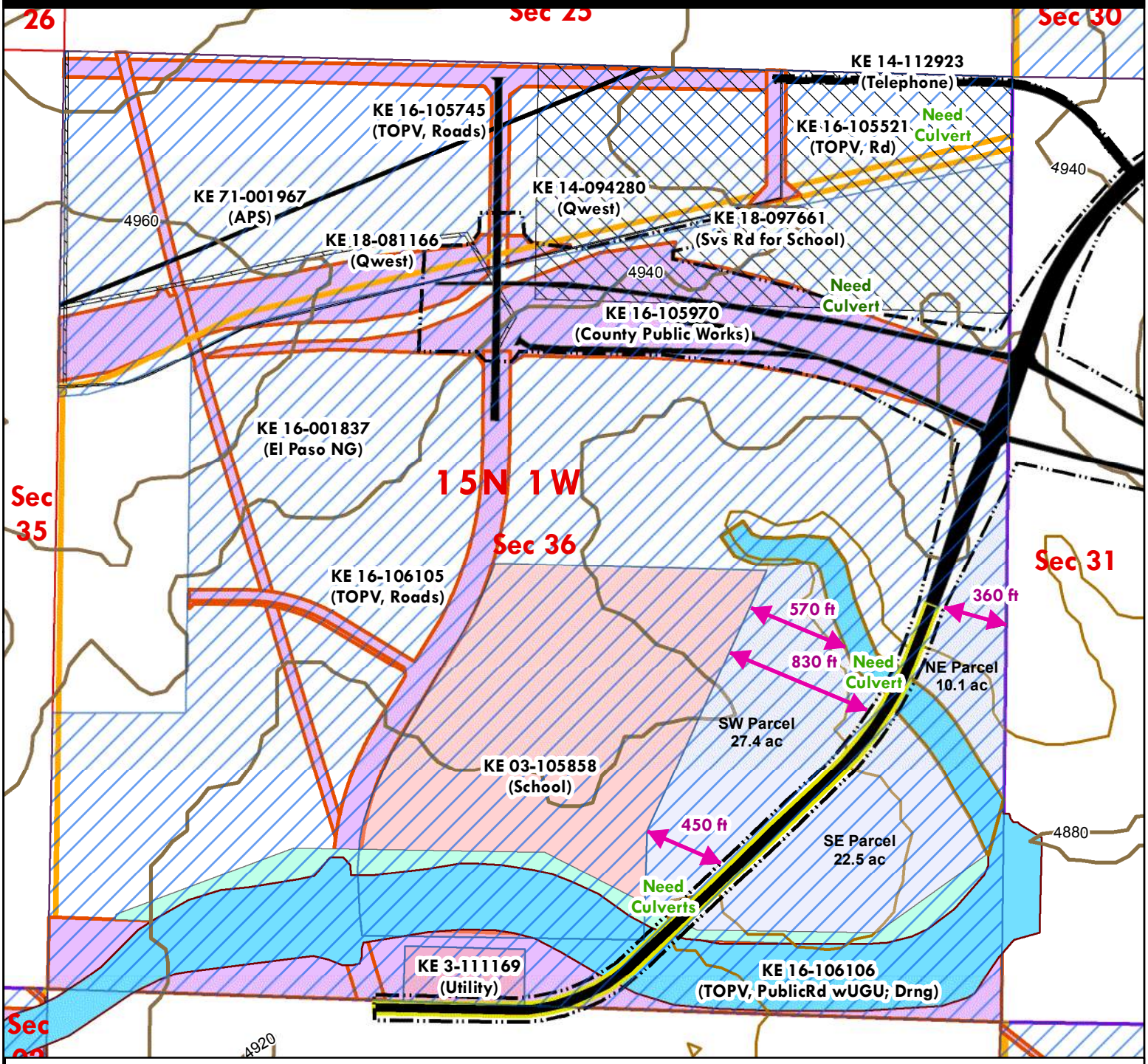
N

0 250 500 1,000 Feet

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

| M. Naber | January 26, 2021 |

Proposed Santa Fe Loop Dr/US 89 (Fain Road) Traffic Interchange
Alternative #1 - T.I. at Original KHA Proposed Location
Town of Prescott Valley, AZ



Legend:

- Surface Parcels
- 200925_KHA_ASR_Recomm_Alt_Sht1
- 210209 MN Scenario1_E&W Develop Area
- 210209_MN_Scenarios_East_Wash_Corridor
- 130626_LYON_Prelim_D&H_Rpt_Proposed_100yr_FP
- 130626_LYON_Prelim_D&H_Rpt_Proposed_Addnl_ROW
- 3 - Commercial
- In Process
- 9 - Gov ROW
- 14 - Long Term
- 16 - Perpetual
- 17 - Annual Rental
- 18 - 10 Yr Definite
- 72 - Original Fed Lease
- Other

N

0 250 500 1,000 1,500 Feet

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

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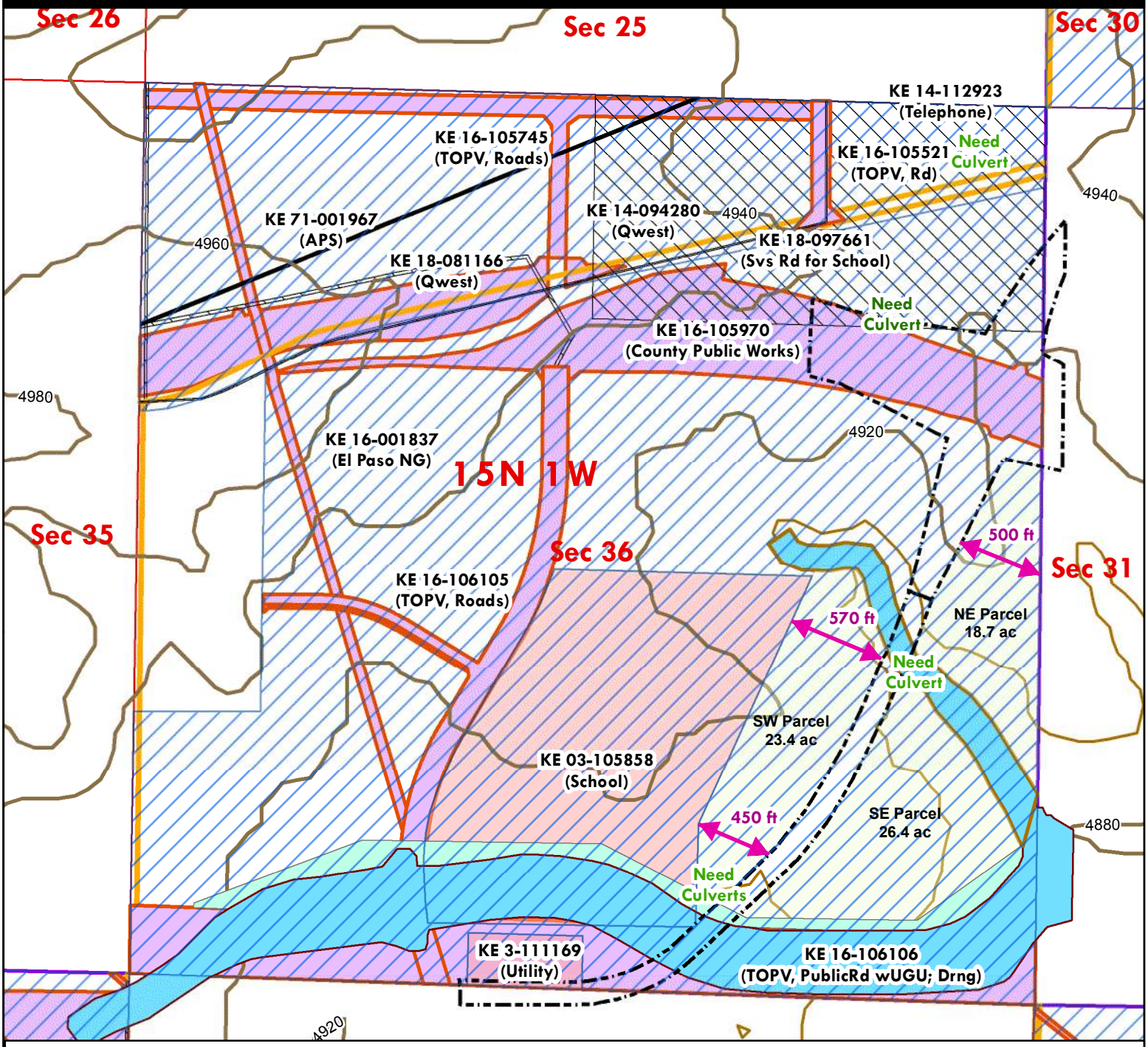
| M. Naber | Feb. 9, 2021 |

ARIZONA STATE LAND DEPARTMENT

Proposed Santa Fe Loop Dr/US 89 (Fain Road) Traffic Interchange
Alternative #2 - T.I. moved West about 400 ft
Town of Prescott Valley, AZ



Legend:

- Surface Parcels
- 210209_MN_SFL_Dr_(SR89A-RobertRd)_Scenario2
- 210209 MN Scenario2_E&W Develop Area
- 210209_MN_Scenarios_East_Wash_Corridor
- 130626_LYON_Prelim_D&H_Rpt_Proposed_100yr_FP
- 130626_LYON_Prelim_D&H_Rpt_Proposed_Addnl_ROW
- 3 - Commercial
- In Process
- 9 - Gov ROW
- 14 - Long Term
- 16 - Perpetual
- 17 - Annual Rental
- 18 - 10 Yr Definite
- 72 - Original Fed Lease
- Other

N

0 250 500 1,000 1,500 Feet

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

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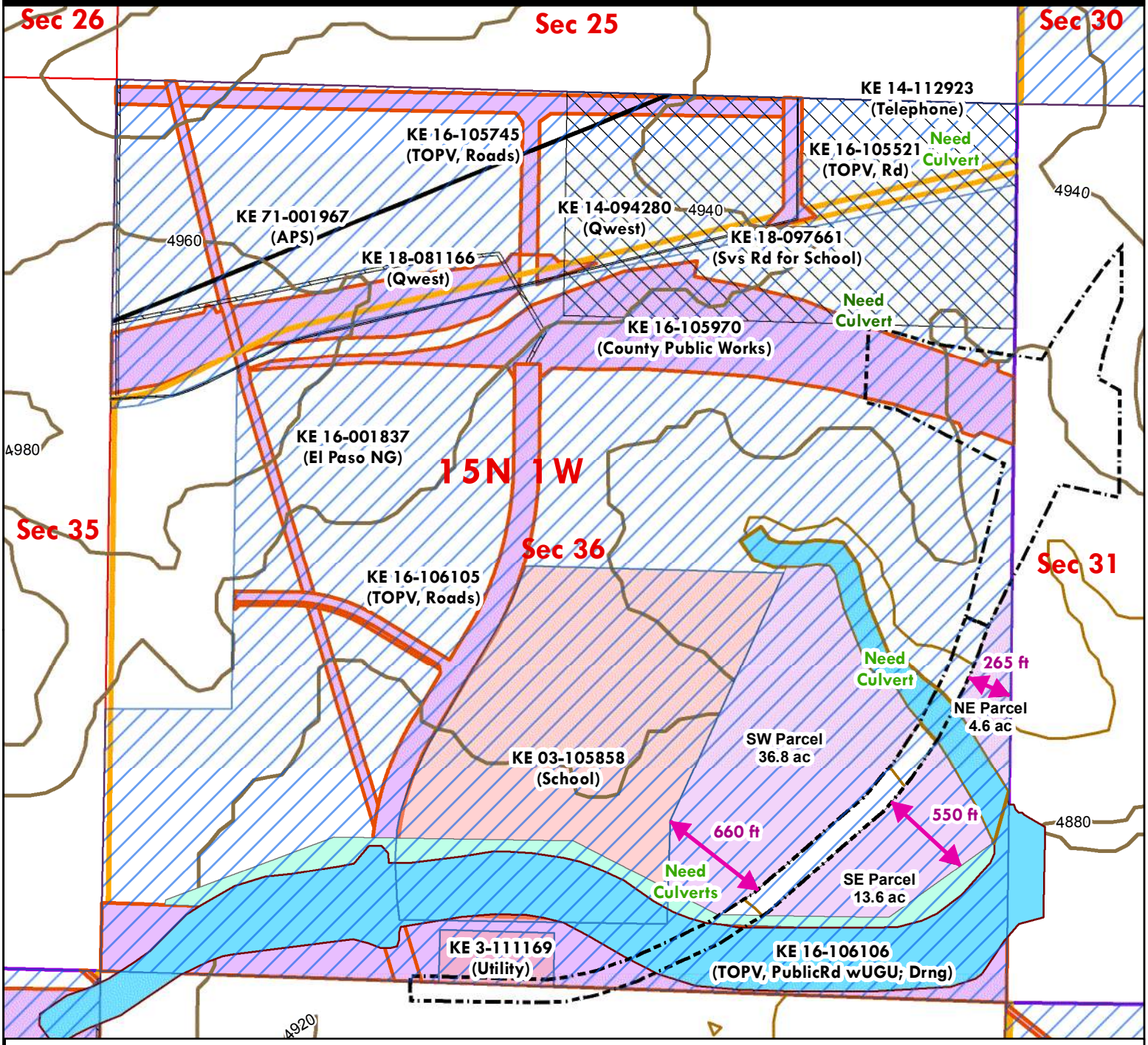
| M. Naber | Feb. 9, 2021 |

ARIZONA STATE LAND DEPARTMENT

Proposed Santa Fe Loop Dr/US 89 (Fain Road) Traffic Interchange
Alternative #3 - T.I. moved East about 400 ft
Town of Prescott Valley, AZ



Legend:

- 210209_MN_SFL_Dr_(SR89A-RobertRd)_Scenario3
- 210209 MN Scenario3_E&W Develop Area
- Surface Parcels
- 210209_MN_Scenarios_East_Wash_Corridor
- 130626_LYON_Prelim_D&H_Rpt_Proposed_100yr_FP
- 130626_LYON_Prelim_D&H_Rpt_Proposed_Addnl_ROW
- 3 - Commercial
- In Process
- 9 - Gov ROW
- 14 - Long Term
- 16 - Perpetual
- 17 - Annual Rental
- 18 - 10 Yr Definite
- 72 - Original Fed Lease
- Other

N

0 250 500 1,000 1,500 Feet

Arizona State Land Department
1616 W Adams Street Phoenix, AZ 85007

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| M. Naber | Feb. 9, 2021 |

ARIZONA STATE LAND DEPARTMENT