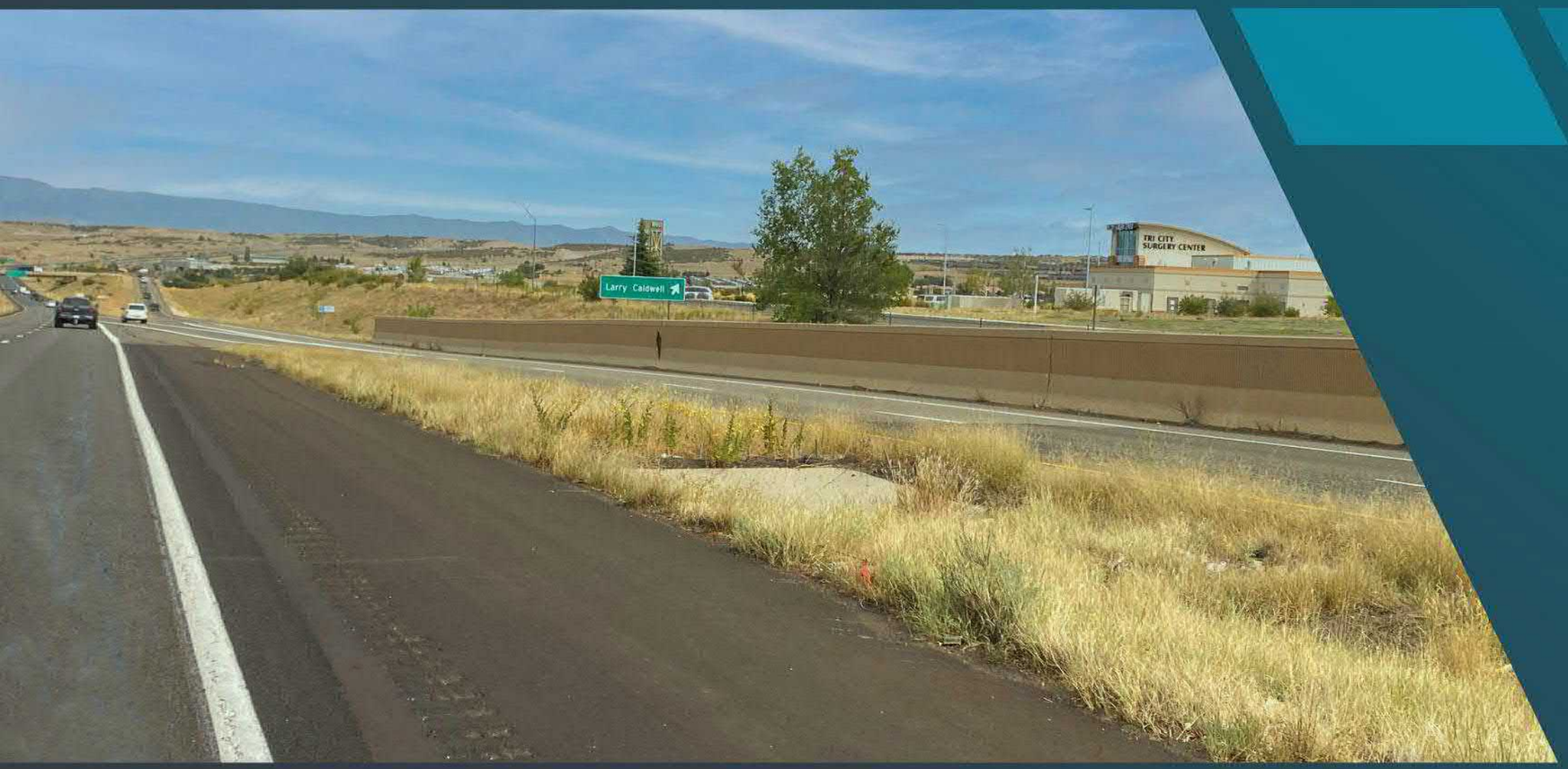
SR 89 to SR 89A

ON-RAMPS ALTERNATIVES SELECTION REPORT



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Prepared for:

Central Yavapai Metropolitan Planning Organization

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1 Introduction

The purpose of this project is to improve the SR 89 to SR 89A (Alternative) on-ramps. The project corridor limits extend between the SR 89 / SR 89A Traffic Interchange (TI) and Granite Creek Bridge primarily along the existing on-ramp and frontage road. This project is located within the northern portion of the City of Prescott, located in central Yavapai County, as depicted in **Figure 1**.

The existing SR 89A and SR 89 intersection provides southbound (SB) dual left-turn lanes for SR 89 traffic destined to SR 89A or Larry Caldwell Drive. An eastbound (EB) through movement to a frontage road is also provided with access to SR 89A and Larry Caldwell Drive. The current configuration contributes to several safety and operational concerns, including weaving and lane assignment issues. As development continues to grow north and south of SR 89A, these safety and operational concerns are expected to increase. A need for on-ramp improvements to address SR 89 to SR 89A safety and capacity issues has been recommended in the Central Yavapai Metropolitan Planning Organization (CYMPO) Regional Transportation Plan (RTP) and Arizona Department of Transportation (ADOT) SR 89A Transportation Study. This study will continue evaluating alternatives through preparation of an Alternatives Selection Report (ASR), which will identify a recommended alternative for lane configurations and additional minor improvements to the SR 89A entrance ramp and the frontage road, develop a cost estimate, and identify project requirements that need to be addressed as the project moves forward.

1.1 Project Purpose

The purpose of the project is to improve the SR 89 to 89A on-ramps, which was identified in the 2045 CYMPO RTP. SR 89A provides connection with the Town of Prescott, Town of Jerome, City of Cottonwood, and the CYMPO planning area. The SR 89A on-ramp serves as a major connection to Larry Caldwell Drive as well as access to SR 89A traveling EB. Safety and traffic issues have been identified including an underutilized left turn-lane at SR 89A to frontage road, limited sight distance entering SR 89A, unclear exit only signage for Larry Caldwell Dr, a short SR 89A EB on-ramp, and unsafe ramp weaving/absent gore separation. The purpose of this project is to improve existing and future traffic operations and safety. The proposed improvements include the following:

- Balance utilization of the SB dual left-turn lanes
- Improve safety and operations on the frontage road weave area
- Improve horizontal and vertical geometry of the ramp and frontage road
- Improve driver awareness of Larry Caldwell Drive access
- Improve safety near ramp gores.

1.2 Study Area

The study area for the SR 89 to 89A on-ramps ASR encompasses EB SR 89A from the SR 89 TI at milepost 317.3 to east of the Larry Caldwell Drive TI at approximate milepost 319. The study area is shown in **Figure 2**.

The corridor limits include one grade separated TI at SR 89 and the EB frontage road between SR 89 and Larry Caldwell Drive. The SR89A is an existing four-lane divided freeway facility.

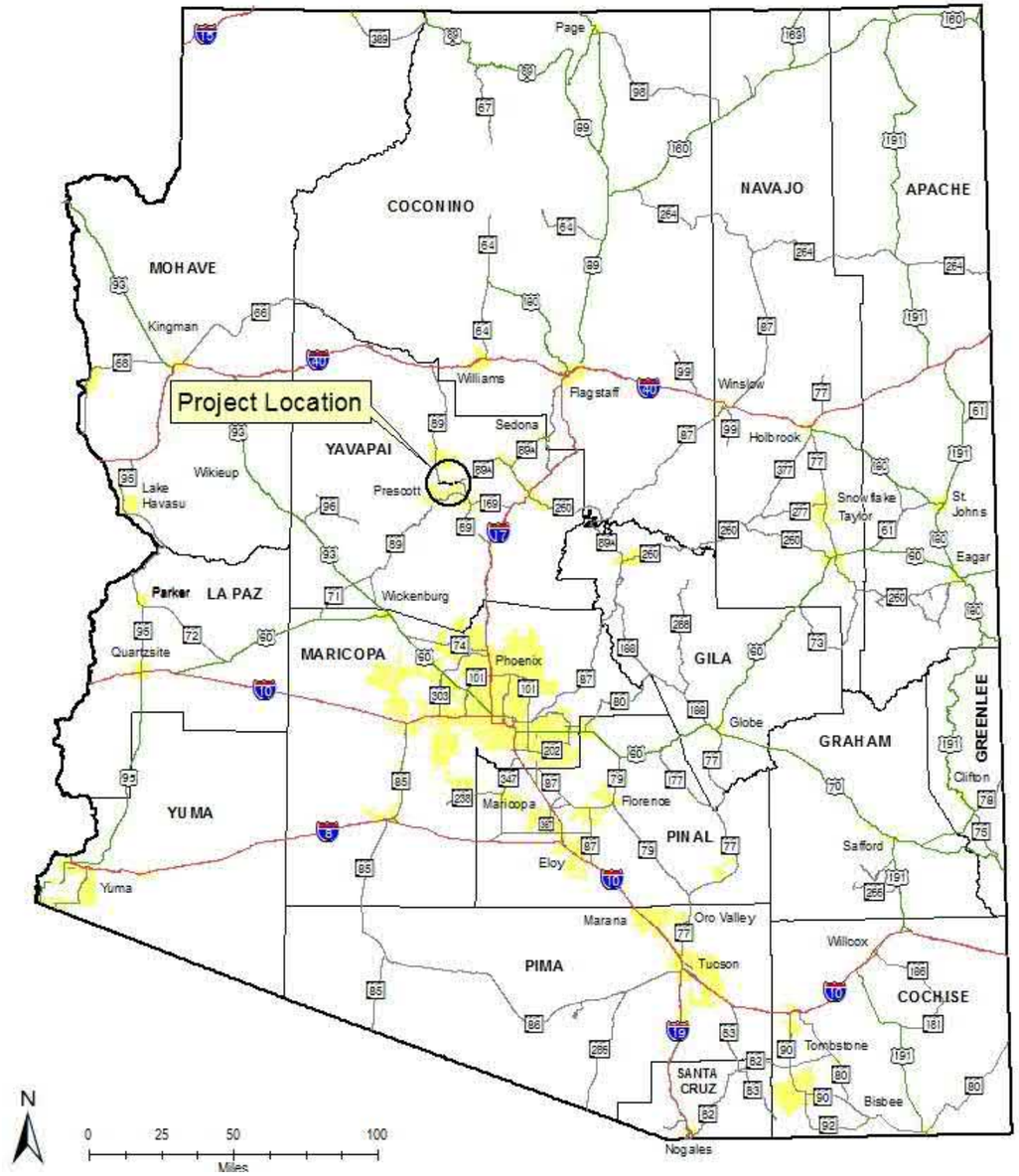


Figure 1: Project Location

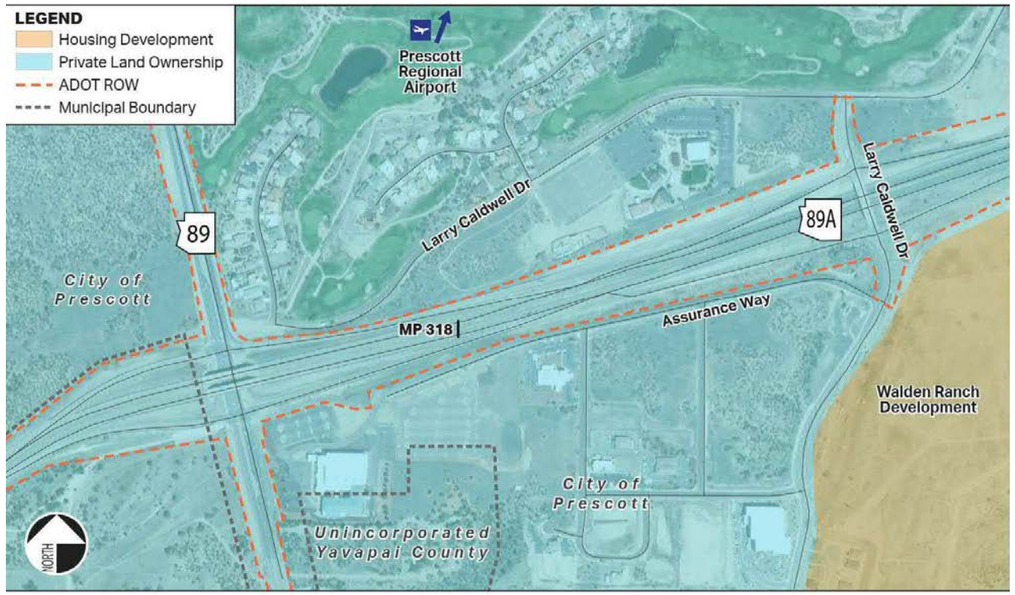


Figure 2: Study Area

1.3 Study Process

The team completed a five-step approach to the implementation of this project. The study process approach is shown in **Figure 3**.

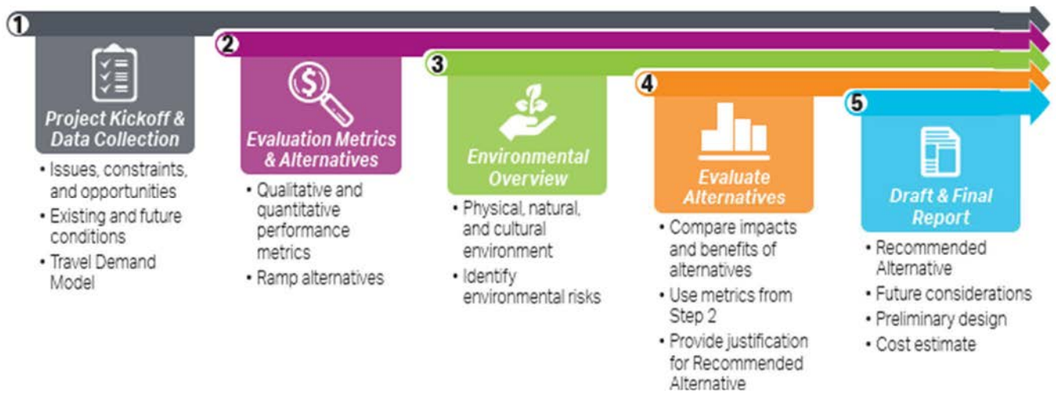


Figure 3: Study Process Five-Step Approach

2 Existing & Future Conditions

This section summarizes the existing and future conditions at the SR 89A and SR89 intersection.

2.1 Previous Studies

The *2040 CYMPO RTP Update (April 2015)* comprehensively assessed the regional transportation network to validate the previous 2011 CYMPO Update and reprioritize transportation investments for the metropolitan area. The plan focused on short-, medium- and long-term transportation investments. The SR 89/SR 89A TI was a short-term improvement recommendation project that included the adjustment of the dual EB SR 89A on-ramp.

In 2018, Northern Arizona Council of Governments (NACOG) lead the developments of the *Regional Strategic Transportation Safety Plan (RSTSP)* in partnership with CYMPO and Flagstaff Metropolitan Planning Organization (FMPO). The RSTSP featured a data driven assessment to fully identify regional safety performance and needs using January 1, 2012, to December 31, 2016 crash data. In addition to identifying a policy-level implementation plan, the study identified SR 89 Shoulder Widening from SR 89A to Rock Formations but had no additional direct recommendations in the project area.

The *SR 89A Transportation Study* (2018) assessed the SR 89A section between the SR 89 interchange and Robert Road intersection. The study's primary objectives were to identify the expansion needs of the corridor and prioritize and prepare 15% design plans for project recommendations addressing short-, medium-, and long-term needs. The following project recommendations were made for the SR 89A corridor:

Short-Term
: SR 89 TI EB Dual Lane Entrance Ramp: addition of a second lane on the EB on-ramp

Medium-Term
: SR 89A Widening, SR 89 to Glassford Hill Road: addition of one general purpose lane in each direction of travel

Long Term
: SR 89A Widening, Glassford Hill Road to Robert Road TI: addition of one general purpose lane in each direction

The SR 89 TI EB Dual Lane Entrance Ramp was the 2nd highest prioritized project along the corridor.

The 2045 CYMPO RTP, updated in 2020, comprehensively assess regional transportation performance and needs and reprioritize previously recommended and new transportation investments for the CYMPO region with a 2045 target buildout. The plan focuses on short-, medium-, and long-term transportation investments. The project recommendation of the CYMPO RTP focused primarily on safety and mobility related to addressing the identified needs. These projects were categorized into either Modernization or Expansion investment categories. The 2045 CYMPO RTP Update identified the SR 89 to 89A on-ramps project as a priority. The project is classified as a modernization project focused on safety/mobility needs and recommended EB dual-lane entrance ramp.

2.2 Historical and Future Population

The population of study area's surrounding regions is expected to continue to increase in the next two decades. The Arizona State Demographer's Office projects the most significant increase in population within Yavapai County to occur in the Town of Prescott Valley, with a projected 47% increase in population between the 2020 Census and 2050. The City of Prescott population is projected to increase 6% in this time span as well. **Table 1** summarizes the historical and projected population from the Arizona State Demographer.

Table 1: Historical and Future Population Estimates

Route	2010 Population	2015 Population	2020 Population	2040 Projected Population	2050 Projected Population	% Change 2020-2050
City of Prescott	39,843	40,989	42,627	43,039	45,109	6%
Town of Prescott Valley	38,822	41,415	45,854	57,410	67,208	47%

2.3 Roadway Characteristics

The SR 89A between SR 89 and Larry Caldwell Drive is categorized as an urban/fringe urban freeway system. The SR 89A within our study area is freeway access controlled. The junction of SR 89A and SR 89 is an existing signalized diamond TI. The intersection provides SB dual left-turn lanes for SR 89 traffic destined to SR 89A or Larry Caldwell Drive. The southern intersection provides an EB through movement to a frontage road with access to SR 89A and Larry Caldwell Drive.

The EB entrance ramp diverges from the frontage road approximately 1,500 feet east of the TI with a one-one lane split. The right lane continues on the frontage road to Larry Caldwell Drive and the left lane becomes a tapered entrance ramp onto SR 89A. An existing vertical curve along the frontage road crests approximately 600 feet west of the split limiting driver visibility for lane assignment. This split and limited effective weave distance causes both safety and operational issues. The SB dual left-turn lanes at the TI are underutilized and unbalanced because the primary destination is SR 89A, which causes the majority of traffic to use the inside left-turn lane.

The EB entrance ramp is approximately 350 feet long, which is significantly shorter than the 1,500 feet required by the ADOT Roadway Design Guidelines (RDG). The short ramp and the gore configuration allow for risky movements from the EB SR 89A mainline to the frontage road with no constraints. As development continues to increase north and south of SR 89A, these safety and operational concerns will be exacerbated, and EB entrance ramp capacity will become an additional area of concern. The roadway current project issues and concerns are displayed in **Figure 4**. **Table 2** summarizes the existing roadway characteristics.

Table 2: Roadway Characteristics

Roadway Segment	Number of Lanes	Speed Limit	Approx. Length of Segment (ft)
SR 89A EB Mainline SR89 to Granite Creek Bridge	2	65	4,900
SR 89A Frontage Road SR 89 to SR 89A Ramp	2	Not Posted	1,500
SR 89A On-Ramp	1	Not Posted	350
SR 89A Frontage Road SR 89A Ramp to Larry Caldwell Drive	1	Not Posted	2,200

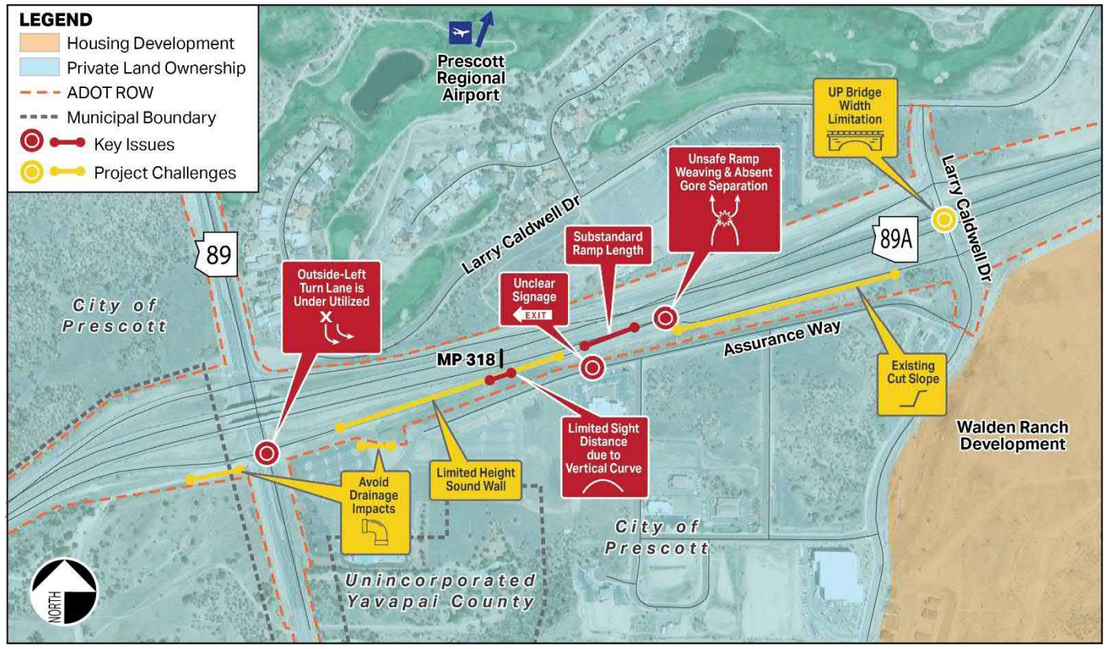


Figure 4: Study Issues and Challenges

2.4 Intersection Control

SR 89A and SR 89 is a signalized diamond TI. The intersection provides SB dual left-turn lanes for SR 89 traffic destined to SR 89A or Larry Caldwell Drive. The southern intersection provides an EB through movement to a frontage road with access to SR 89A and Larry Caldwell Drive.

The dual left-turns lanes for SR 89 to SR 89A or Larry Caldwell Drive, is currently underutilized. The far-right lane which only connects to Larry Caldwell Drive currently underutilized due to the single lane that accesses SR 89A EB.

2.5 Right-of-Way

SR 89A right-of-way within the project area varies between approximately 300 to 550 feet. The project improvements are expected to be accommodated within the existing ADOT right of way. In addition, the existing intersection configuration is also within ADOT right of way.

2.6 Utilities

A utility survey was not conducted for this ASR. There are multiple utility facilities located within the project limits as determined per coordination with CYMPO agencies and review of record drawings. The following have been identified as potential utilities located within the project limits:

- Gas
- Power
- Water
- Communications
- Sewer
- Storm Drain
- Arizona Department of Transportation (ADOT) Signals and Lighting
- Future Broadband Communication along the northside of SR89A

Potential utilities have been primarily identified at the SR89/SR89A TI. Utility coordination will be required during future phases of scoping and design to identify all utilities, conflicts, and mitigation needs. No major utility relocations are anticipated for this project at this time.

2.7 Land Ownership

A review of the Arizona State Land Department Parcel Viewer Mapping Tool, the project limits fall within the Black Hill Grazing Allotment. Within the general allotment the nearest Grazing Lease parcel is located east of Granite Dells Parkway on the Arizona Eco Development LLC property. This parcel straddles the SR 89A corridor, with approximately 75% of the parcel located on the north side of the corridor. There are no leasing arrangements located within the corridor limits.

The existing corridor alignment, including on-ramp, all four intersection legs, the frontage road, and the SR 89A mainline are contained fully within ADOT owned Right of Way (ROW).

2.8 Land Use

The majority of the land immediately adjacent to SR 89A is undeveloped with some residential and commercial uses which include churches and medical centers. Antelope Hills Golf Course is located north of the project area and includes the residential area along the project area. The property immediately north of SR 89A, west of Larry Caldwell Drive is owned by the Heights Church, which includes the church property and undeveloped vacant land and is a mix of Residential Office, Single-Family Residential, and Neighborhood Oriented Business.

There are additional vacant parcels south of SR 89A along Assurance Way. This vacant land is currently zoned by City of Prescott as Mixed Use, as part of the Centerpointe West Commerce Park west of Larry Caldwell Drive along Assurance Way. Further south of the corridor below the Mixed-Use zoned land includes additional Single-Family Residential zoned properties as part of the Walden Ranch Phases 1A, 1B, and 2 accessible from both Larry Caldwell Drive and Phippen Trail off of SR 89. The land immediately east of Larry Caldwell Drive and adjacent to these developing areas is zoned as Natural Open Space, includes the continuation of the Granite Creek floodplain, and contains no present development activity

3 Traffic Analysis

This section summarizes an analysis of current and future conditions at the SR 89A and SR89 intersection. A summary of current and future projected traffic data provided as well as it's conditions.

3.1 Current Traffic Volumes

Existing 2017 volumes were obtained from the *SR 89A Transportation Study*. This study collected volumes for the study area at the TI, frontage road, on-ramp and mainline locations. Discussions with the Technical Advisory Committee (TAC) indicated that volumes in the project area had increased in the post COVID-19 pandemic 2021 conditions. Therefore, the City of Prescott utilized Streetlight data and supplied 2017 and 2021 volumes along the SR 89 corridor both south and north of the SR 89A/SR 89 TI. **Table 3** summarizes Average Daily Traffic (ADT) from the collected traffic count data from the City of Prescott and the calculated growth rates.

Table 3: Existing Growth Trends

Route	2017 ADT	2021 ADT	2017-2021 Growth Percentage
State Route 89 (North of SR89A)	14,714	16,515	12.2%
State Route 89 (South of SR89A)	14,130	15,243	7.9%
		Average Growth Percentage	10.0%

The ADT along SR 89 indicated that traffic had grown approximately 10% on average according to the street light data. Therefore a 10% growth rate was applied to the 2017 historical counts to calculate existing 2021 traffic volumes. The existing 2021 AM and PM peak hour volumes are presented in **Figure 5**. These volumes indicate that a majority of the frontage road volume utilizes the SR 89A entrance ramp rather than continuing east to access Larry Caldwell in both peak hours. The Larry Caldwell destined volume is higher in the AM peak hour but still less than 500 vph. The volumes also indicate the distribution between the SR 89A mainline and the EB on-ramp are similar with the on-ramp having more traffic than the mainline in the AM peak hour. The SB left-turn volume is also greater than 650 vehicles in the AM peak hour.

3.2 Future Traffic Volumes

Projected 2045 traffic volumes for the project area were developed by utilizing the 2045 projections along SR 89A and the on-ramp that were included in the *2045 CYMPO RTP*. This document included travel demand projections for the 2045 conditions. The projections along the study area were compared to the existing 2021 volumes and the volumes indicate a 2.5% growth rate per year is to be expected. This growth rate is similar to the historical growth that was experienced according to the Streetlight data. Therefore, a 2.5% growth rate was applied to the existing 2021 volumes and 2045 AM and PM projections were development within the project area. The resultant 2045 AM and PM peak hour volumes projections are presented in **Figure 6**.

3.3 Level of Service (LOS) Analysis

3.3.1 Operational Analysis Methodology

An operational analysis was performed for the mainline including the general-purpose lanes, frontage road, ramp junction, and weave sections and for the existing conditions. Intersection analysis was also performed for the study including the TI. The VISSIM computer program was used to provide a simulation of the entire system within the study area. VISSIM is a microscopic traffic simulation program that uses roadway geometry and traffic volume inputs to simulate operations of an entire freeway or arterial network.

VISSIM has the ability to provide various measures of effectiveness for each link within the system. The vehicle density and speed outputs from VISSIM were used as the measure of effectiveness to relate to a level-of-service as established by the Highway Capacity Manual (HCM) for the freeway and ramp facilities. The vehicle delay output was used to relate to a level-of-service at the signalized intersection.

The concept of level-of-service (LOS) uses qualitative measures that characterize operational conditions within a stream of traffic. The descriptions of individual levels-of-service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. Six levels of service are defined for each type of facility for which the analytical procedures are available. They are given letter designations from 'A' to 'F', with each condition describing a gradually worsening level of congestion, as described below:

- **LOS A**: Best, free flow operations (on uninterrupted flow facilities) and very low delay (on interrupted flow facilities). Freedom to select desired speeds and to maneuver within traffic is extremely high.
- **LOS B**: Flow is stable, but presence of other users is noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within traffic.
- **LOS C**: Flow is stable, but the operation of users is becoming affected by the presence of other users. Maneuvering within traffic requires substantial vigilance on the part of the user.
- **LOS D**: High density but stable flow. Speed and freedom to maneuver are severely restricted. The driver is experiencing a generally poor level of comfort and convenience.
- **LOS E**: Flow is at or near capacity. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within traffic is extremely difficult. Comfort and convenience levels are extremely poor.
- **LOS F**: Worst, facility has failed, or a breakdown has occurred.

Table 4 describes levels-of-service and corresponding vehicle densities (vehicles per mile per lane) for freeway and ramp facilities or vehicle delays (seconds) for intersections as established in the HCM.

Table 4: Vehicle Levels-of-Service and Corresponding Measures of Effectiveness

Level-of-Service	Density Range (pc/mi/ln)	Signal Control Delay (sec)
A	0-11	0-10
B	>11-18	>10-20
C	>18-26	>20-35
D	>26-35	>35-55
E	>35-45	>55-80
F	>45	>80

Source: *Highway Capacity Manual* (2010)

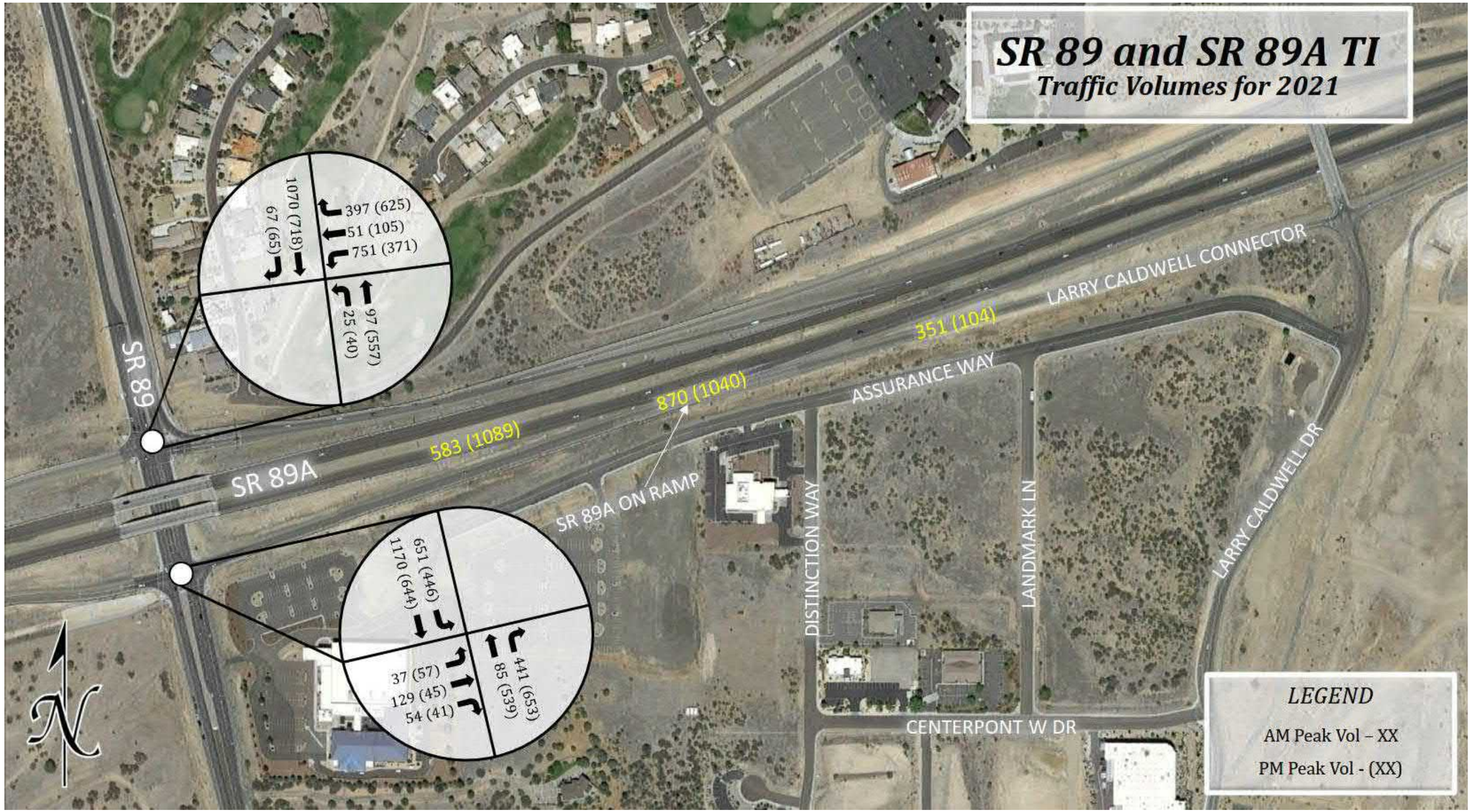


Figure 5: Existing 2021 Traffic Volumes

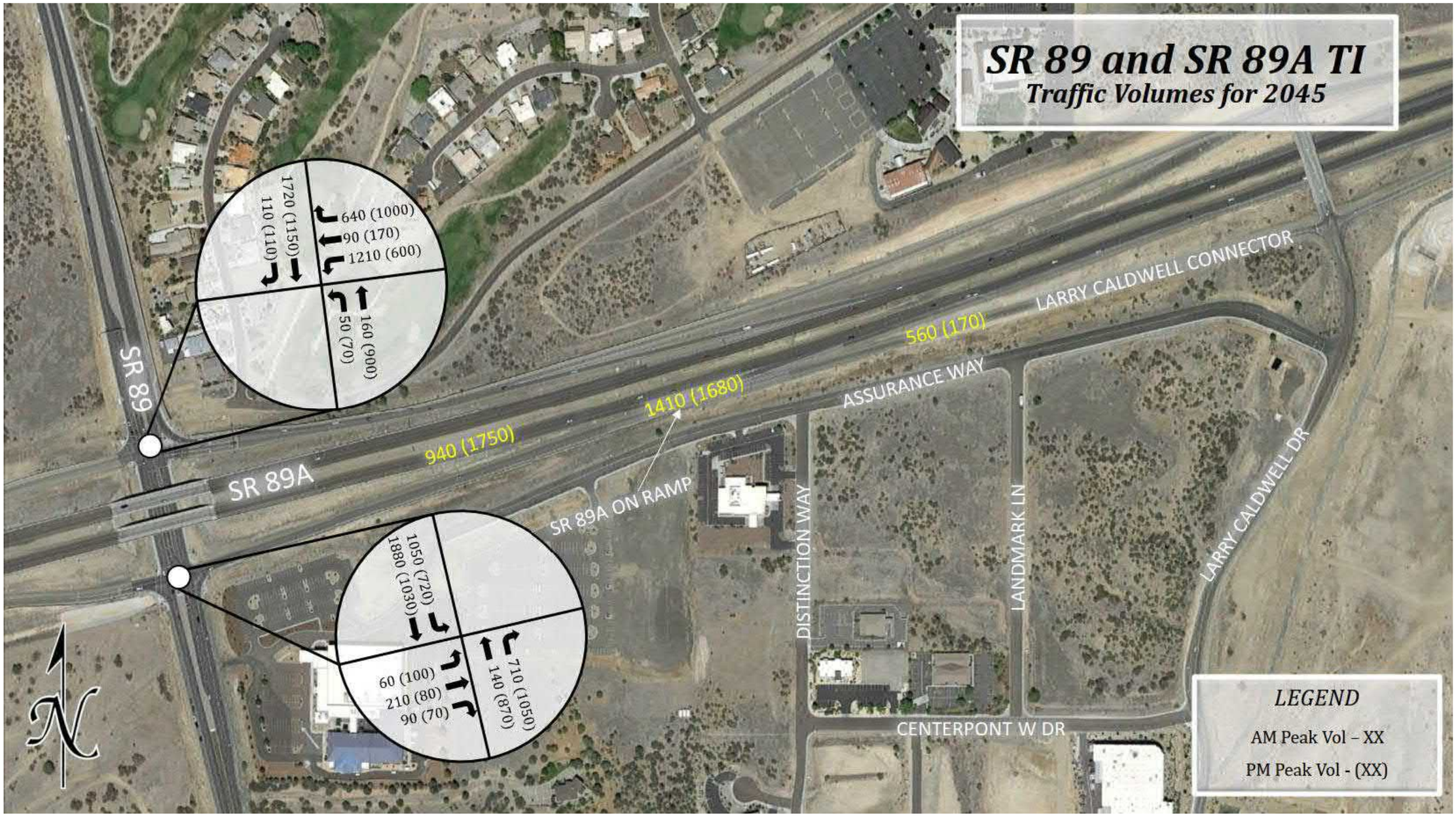


Figure 6: Projected 2045 Traffic Volumes

Existing signal timings from 2017 were utilized for the existing conditions at the TI, and these same signal timings were optimized for the 2045 No-Build conditions.

The following VISSIM model input assumptions were used for the operational analysis:

- Free flow speed of 65 mph for the mainline general-purpose lanes
- Free flow speed equal to the posted speed limit for all arterials
- Commercial vehicle percentage was applied independently at each input, based on observations from existing counts

In order to replicate the existing peak hour travel conditions, the AM and PM peak hour VISSIM models were calibrated based on measured field data. VISSIM models were calibrated based on travel time between the origin-destination pairs available. Following the calibration process, the VISSIM model output closely replicated the existing congestion conditions observed in the study area. The lane changing and driver behavior parameters from the calibration process were then used in the future condition VISSIM models. The models were run at least ten times with varying random number seeds and the model output was averaged to determine the density and delay.

3.3.2 Operational Analysis Results

The TI, frontage road, ramp, and mainline were all analyzed using VISSIM for Existing, No-Build 2045, and Build Alternative Conditions. The six “Build” alternatives are presented and described in Section 5.2 Alternative Development. **Table 5** and **Table 6** summarize the TI and Segment LOS for the AM peak hour, respectively. **Table 7** and **Table 8** summarize the TI and Segment LOS for the PM peak hour, respectively. The existing operational results indicate that the TI and all segments operate with a LOS D or better for all segments, approaches to the TI, and the overall TI during both the AM and PM peak hours. The No-Build conditions indicate the LOS will worsen by 2045 and during both the AM and PM peak hours multiple approaches to the TI will operate with a LOS E or F during both the AM and PM peak hours. However, the segment densities on the ramp, mainline and frontage roads will continue to operate with a LOS D or better.

The Build Alternatives analysis all provide similar benefits for each alternative. The TI has minimal benefits depending on the alternative especially in the PM peak hour. The SB approach improves which can be attributed to a higher utilization of the left-turn distribution. Similarly, the segment densities on the ramp, mainline and frontage roads include some benefit for each of the alternatives. The Alternatives 2, 2A, and 3C all so a better improvement due to the continues 2 lane on-ramp.

Table 5: AM Peak Period Intersection LOS

Int Name	Appr	Mvmt	Existing (2021)		No-Build (2045)		Alternative 1 (2045)		Alternative 2 & 2A (2045)		Alternative 3A (2045)		Alternative 3B (2045)		Alternative 3C (2045)	
			Delay (sec/veh)	Delay (sec/veh)	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 89A and SR 89	EB	LT	84	F	118	F	103	F	108	F	106	F	117	F	118	F
		TH	51	D	74	E	68	E	68	E	69	E	73	E	73	E
		RT	14	B	36	D	48	D	48	D	48	D	38	D	36	D
		Total	48	D	72	**E**	69	**E**	70	**E**	70	**E**	71	**E**	71	**E**
	WB	LT	46	D	99	F	95	F	96	F	95	F	95	F	96	F
		TH	50	D	76	E	18	B	19	B	19	B	19	B	19	B
		RT	1	A	1	A	1	A	1	A	1	A	1	A	1	A
		Total	31	C	65	**E**	60	**E**	61	**E**	60	**E**	60	**E**	61	**E**
	NB	LT	127	F	188	F	185	F	183	F	181	F	156	F	157	F
		TH	38	D	84	F	85	F	83	F	81	F	47	D	48	D
		RT	18	B	88	F	88	F	86	F	87	F	32	C	33	C
		Total	26	C	93	**F**	93	**F**	91	**F**	92	**F**	41	**D**	42	**D**
	SB	LT	42	D	72	E	69	E	69	E	69	E	69	E	69	E
		TH	22	C	46	D	45	D	45	D	46	D	46	D	45	D
		RT	8	A	29	C	30	C	30	C	30	C	31	C	30	C
		Total	33	C	59	**E**	58	**E**	58	**E**	58	**E**	58	**E**	58	**E**
	Int	**Total**	33	C	**70**	**E**	**67**	**E**	**67**	**E**	**67**	**E**	**57**	**E**	**57**	**E**

Table 6: AM Peak Period Segment LOS

Link Description	Existing (2021)			No-Build (2045)			Alternative 1 (2045)			Alternative 2&2A (2045)			Alternative 3A (2045)			Alternative 3B (2045)			Alternative 3C (2045)		
	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS
Eastbound/Southbound																					
Project Begin to SR 89 Off-Ramp	2	6	A	2	10	A	2	10	A	2	10	A	2	10	A	2	10	A	2	10	A
SR 89 Off-Ramp	1	5	A	1	8	A	1	8	A	1	8	A	1	8	A	1	8	A	1	8	A
SR 89 Off-Ramp to SR 89 On-Ramp	2	3	A	2	5	A	2	5	A	2	5	A	2	5	A	2	5	A	2	5	A
SR 89 On-Ramp Upstream of Frontage Rd	2	15	B	2	21	C	2	25	C	2	25	C	3	17	B	3	19	C	3	18	C
SR 89 On-Ramp Downstream of Frontage Rd (2-Lane)							2	14	B	2	14	B	2	14	B	2	15	B	2	14	B
SR 89 On-Ramp Downstream of Frontage Rd (1-Lane)	1	20	C	1	28	D	1	28	D				1	28	D	1	28	D			
Frontage Road	1	10	A	1	17	B	1	14	B	1	14	B	1	14	B	1	16	B	1	15	B
SR 89 On-Ramp to Larry Caldwell On-Ramp (4-Lane)										4	7	A							4	7	A
SR 89 On-Ramp to Larry Caldwell On-Ramp (3-Lane)							3	10	A	3	9	A	3	10	A	3	10	A	3	9	A
SR 89 On-Ramp to Larry Caldwell On-Ramp (2-Lane)	2	9	A	2	13	B	2	14	B	2	14	B	2	14	B	2	14	B	2	14	B

Table 7: PM Peak Period Intersection LOS

Int Name	Appr	Mvmt	Existing (2021)		No-Build (2045)		Alternative 1 (2045)		Alternative 2 & 2A (2045)		Alternative 3A (2045)		Alternative 3B (2045)		Alternative 3C (2045)	
			Delay (sec/veh)	Delay (sec/veh)	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SR 89A and SR 89	EB	LT	69	E	101	F	84	F	84	F	86	F	88	F	86	F
		TH	45	D	58	E	51	D	53	D	52	D	53	D	52	D
		RT	8	A	13	B	21	C	20	B	19	B	12	B	12	B
		Total	45	D	63	E	56	E	57	E	57	E	56	E	55	E
	WB	LT	38	D	53	D	51	D	53	D	52	D	59	E	57	E
		TH	39	D	57	E	39	D	39	D	40	D	47	D	45	D
		RT	1	A	5	A	8	A	10	A	11	B	28	C	24	C
		Total	17	B	26	C	26	C	27	C	27	C	40	D	37	D
	NB	LT	111	F	180	F	159	F	158	F	160	F	153	F	154	F
		TH	41	D	85	F	76	E	76	E	76	E	70	E	73	E
		RT	33	C	88	F	80	F	80	E	82	F	61	E	61	E
		Total	39	D	90	F	81	F	81	F	82	F	68	E	70	E
	SB	LT	35	C	54	D	44	D	44	D	45	D	45	D	44	D
		TH	17	B	27	C	21	C	21	C	21	C	22	C	22	C
		RT	4	A	13	B	8	A	8	A	9	A	9	A	10	A
		Total	26	C	41	D	33	C	33	C	33	C	34	C	34	C
	Int	Total	29	C	50	D	46	D	46	D	47	D	48	D	47	D

Table 8: PM Peak Period Segment LOS

Link Description	Existing (2021)			No-Build (2045)			Alternative 1 (2045)			Alternative 2&2A (2045)			Alternative 3A (2045)			Alternative 3B (2045)			Alternative 3C (2045)		
	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS	Lanes	Density	LOS
Eastbound/Southbound																					
Project Begin to SR 89 Off-Ramp	2	12	B	2	19	C	2	19	C	2	19	C	2	19	C	2	19	C	2	19	C
SR 89 Off-Ramp	1	3	A	1	5	A	1	5	A	1	5	A	1	5	A	1	5	A	1	5	A
SR 89 Off-Ramp to SR 89 On-Ramp	2	9	A	2	13	B	2	13	B	2	13	B	2	13	B	2	13	B	2	13	B
SR 89 On-Ramp Upstream of Frontage Rd	2	14	B	2	19	C	2	21	C	2	21	C	3	14	B	3	16	B	3	15	B
SR 89 On-Ramp Downstream of Frontage Rd (2-Lane)							2	17	B	2	16	B	2	17	B	2	18	C	2	16	B
SR 89 On-Ramp Downstream of Frontage Rd (1-Lane)	1	24	C	1	35	D	1	32	D				1	32	D	1	35	D			
Frontage Road	1	2	A	1	3	A	1	3	A	1	3	A	1	3	A	1	3	A	1	3	A
SR 89 On-Ramp to Larry Caldwell On-Ramp (4-Lane)										4	12	B							4	12	B
SR 89 On-Ramp to Larry Caldwell On-Ramp (3-Lane)							3	16	B	3	15	B	3	16	B	3	17	B	3	15	B
SR 89 On-Ramp to Larry Caldwell On-Ramp (2-Lane)	2	15	B	2	23	C	2	23	C	2	23	C	2	23	C	2	23	C	2	23	C

3.4 Safety Analysis

Crash data was obtained from Arizona Department of Transportation (ADOT) for the five-year period between 2017 and 2021 at the following locations:

- SR 89 and SR 89A Interchange
- Mainline SR 89A Mile Post 317-319
- SR 89A Frontage Road Mile Post 317-318.

The following crash analysis will be discussed according to location.

Location 1: SR 89 and SR 89A Interchange
Within the five-year period, a total of 120 crashes were reported at the interchange between SR 89 and SR 89A. The distribution of crashes during this time period is shown in **Figure 7**. There seemed to be a spike in crashes in Year 2019.

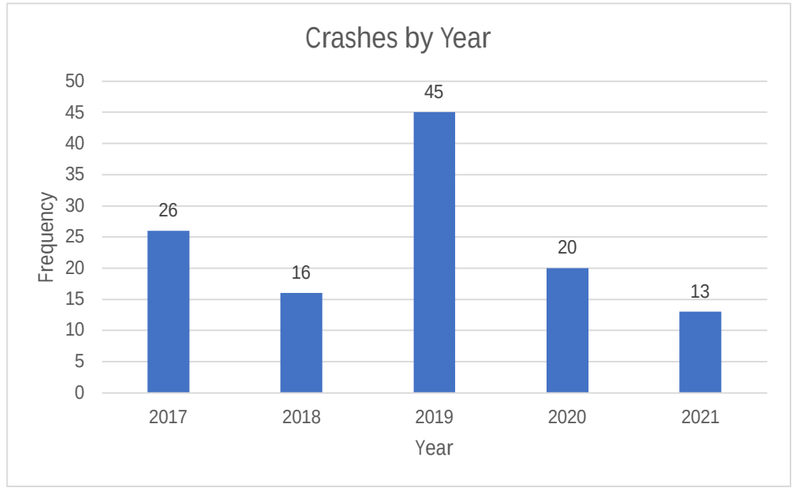


Figure 7: Crashes by Year at Interchange

Of the 120 crashes, 67% (80 crashes) resulted no injury, while 2% (2 crashes) were fatal. The remaining 38 crashes during the time period, 20% (24 crashes) resulted in possible injury, 10% (12 crashes) resulted in suspected minor injury, and 2% (2 crashes) resulted in suspected serious injury. **Figure 8** displays the observed number of crashes based on severity within this portion of the study area.

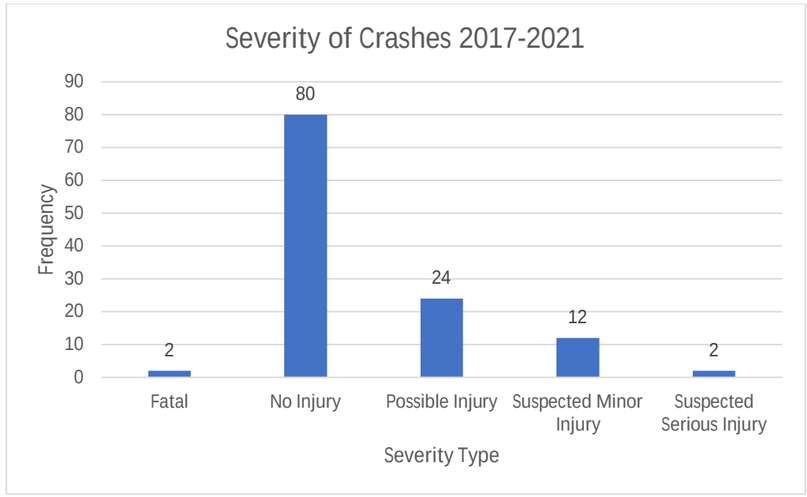


Figure 8: Severity of Crashes at Interchange

Similarly, 95% (114 crashes) were related to a motor vehicle in transport, or collision with another motor vehicle on the network also in motion. Few crashes reported in other categories such as cable traffic barriers, fences, other objects, or traffic signs as the first injury and/or damage producing event at the recorded crashes. The distribution of these crashes is depicted in **Figure 9**

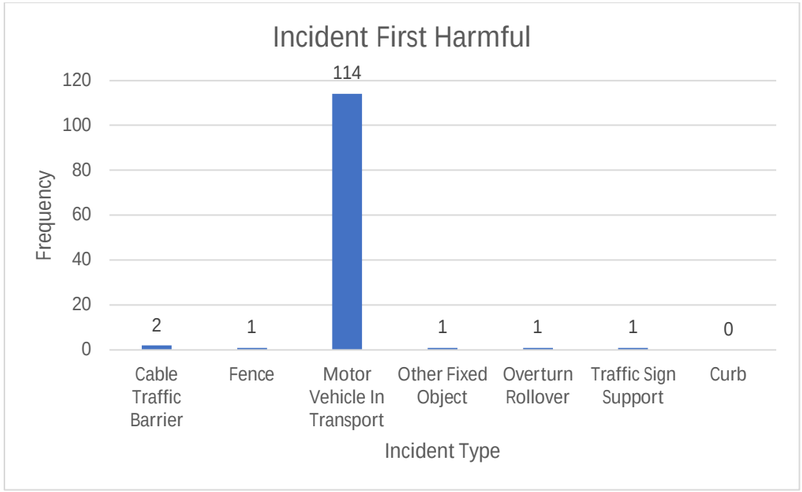


Figure 9: Incident First Harmful at Interchange

Since the majority of crashes reported involved contact with another vehicle, the distribution of collision manner supports this. The highest occurring collision manner during the five-year period were rear end crashes, totaling 46% of reported crashes. The second most reported collision manner were sideswipe crashes in the same direction, which is 26% (31 crashes) of the collected data. Angle crashes (front to side other than left turns) make up 17% (20 crashes) of the total, with the remaining 12% (14 crashes) scattered recorded due to left turn collisions, sideswipe in opposite directions, single vehicle, or other. These are typical intersection type crashes with congestion. The distribution of crashes based on collisions are described in **Figure 10**.

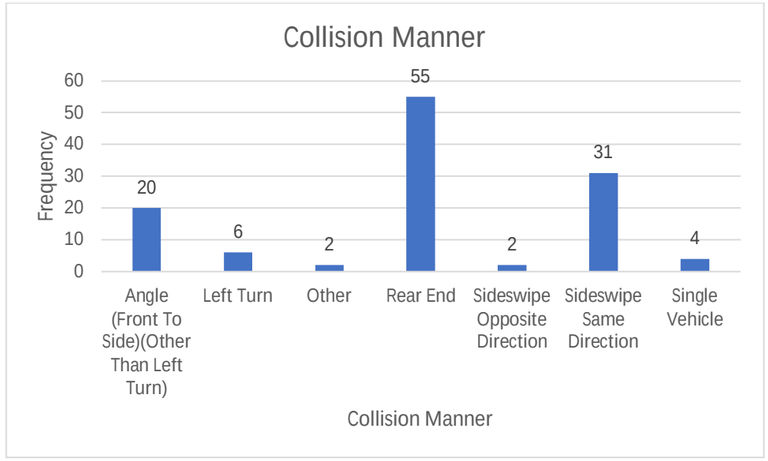


Figure 10: Collision Manner at Interchange

Most collisions occurred during daylight with clear conditions during the 5-year period. The observed crashes for lighting conditions and weather conditions are shown in **Figure 11** and **Figure 12** respectively.

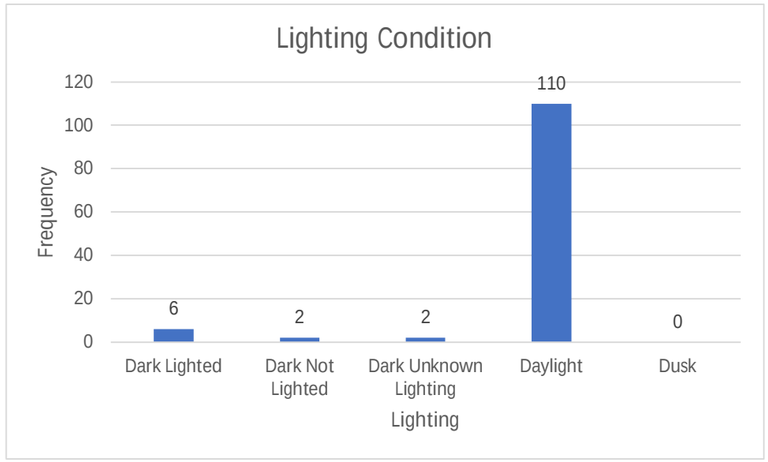


Figure 11: Lighting Condition at Interchange

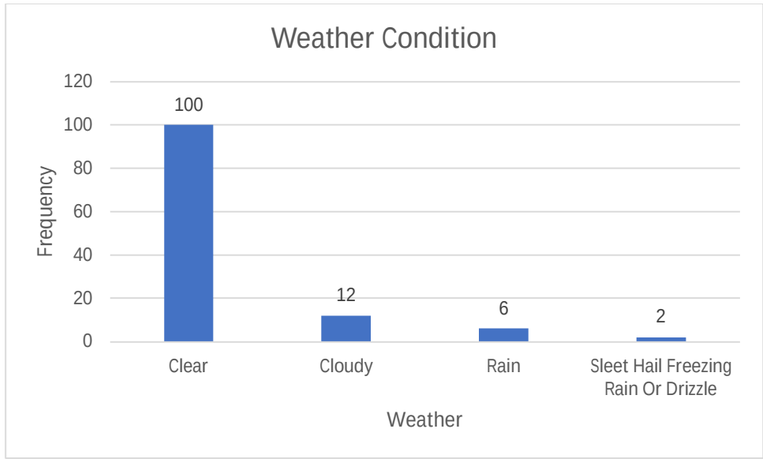


Figure 12: Weather Condition at Interchange

<u>Location 2: SR 89A Mainline Mile Post 317-319</u>
Within the five-year period, a total of 71 crashes were reported on SR 89A Mainline between Mile Post 317 and 319. The distribution of crashes during this time period is shown in **Figure 13.** Again, there seemed to be a spike in crashes in Year 2019.

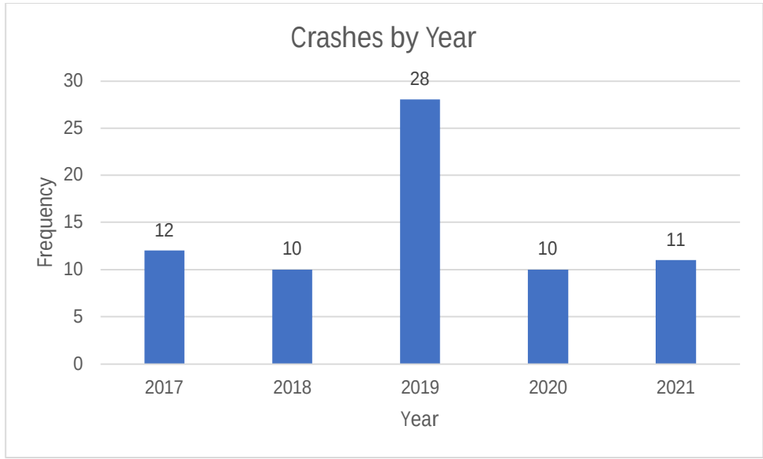


Figure 13: Crashes by Year On SR89 Mainline

Of the 71 crashes, 46% (33 crashes) resulted no injury, while 6% (4 crashes) were fatal. Further, 27% (19 crashes) of crashes were reported with suspected minor injury. **Figure 14** displays the observed number of crashes based on severity within this portion of the study area.

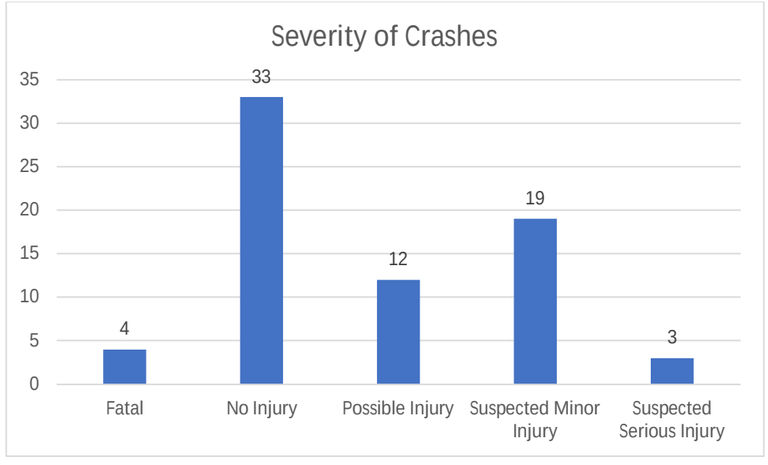


Figure 14: Severity of Crashes On SR89 Mainline

While not as high as at the interchange itself, 77% (55) crashes were related to a motor vehicle in transport. On the SR 89A mainline, crashes reported were due to various factors that did not contribute to crashes at the interchange. Few crashes reported in other categories such as animal impacts, cable and concrete traffic barriers, embankments, fences, other objects, or traffic signs as the first injury and/or damage producing event at the recorded crashes. The distribution of these crashes is depicted in **Figure 15.**

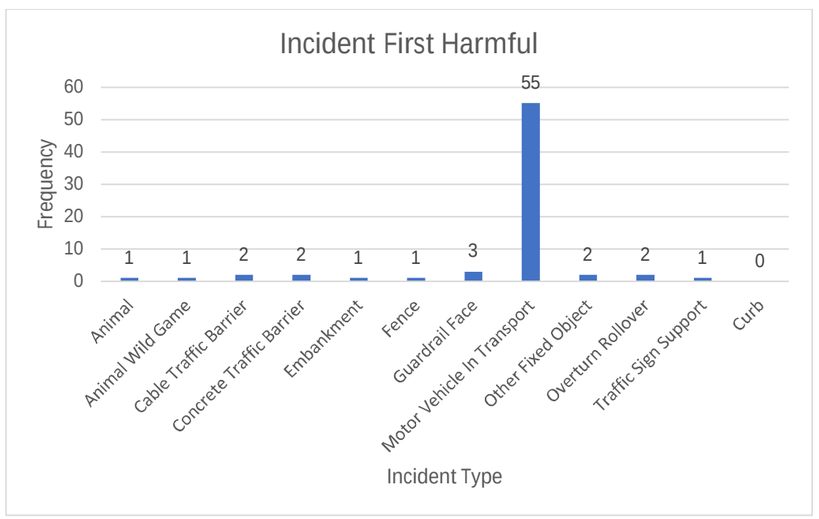


Figure 15: Incident First Harmful On SR89 Mainline

Since the majority of crashes reported involved contact with another vehicle, the distribution of collision manner supports this. Rear end crashes, 46% (32 crashes), followed by sideswipe same direction, 23% (16 crashes), then single vehicle crashes, 20% (14 crashes) represent the majority of the collision manner along SH89A mainline. The remaining crashes consisted of angle, head on, and other collision manners. The distribution of crashes based on collisions are described in **Figure 16.**

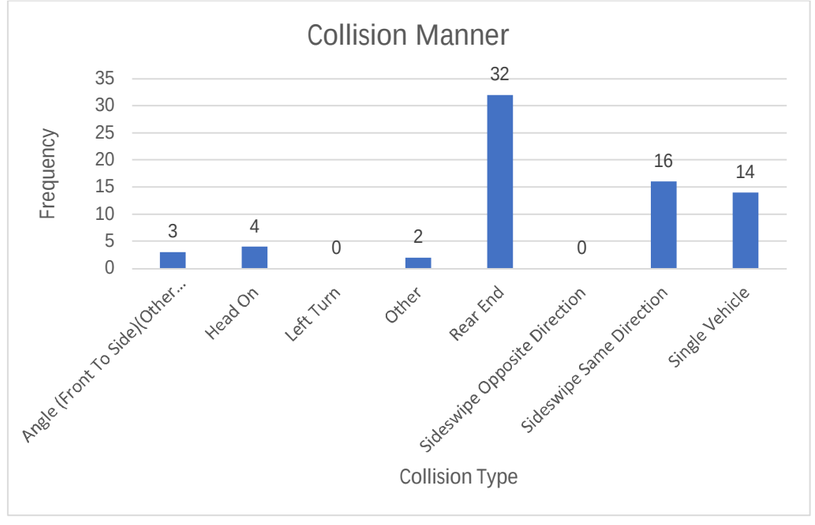


Figure 16: Collision Manner On SR89 Mainline

Additionally, most collisions occurred during daylight with clear conditions during the five-year period. The observed crashes for lighting conditions and weather conditions are shown in **Figure 17** and **Figure 18** respectively.

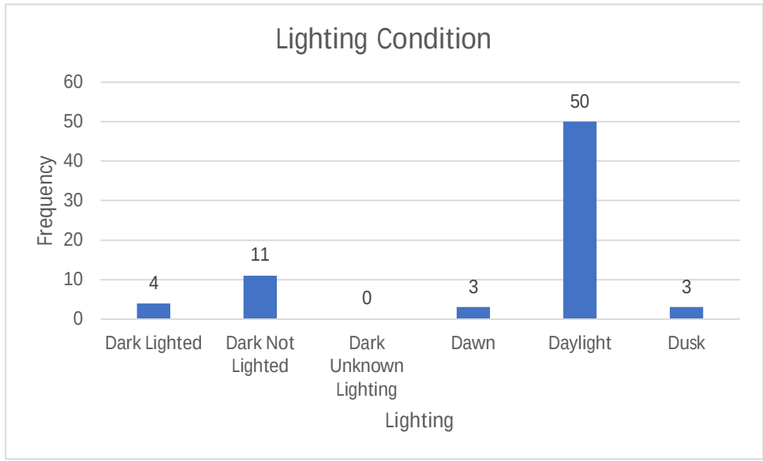


Figure 17: Lighting Condition On SR89 Mainline

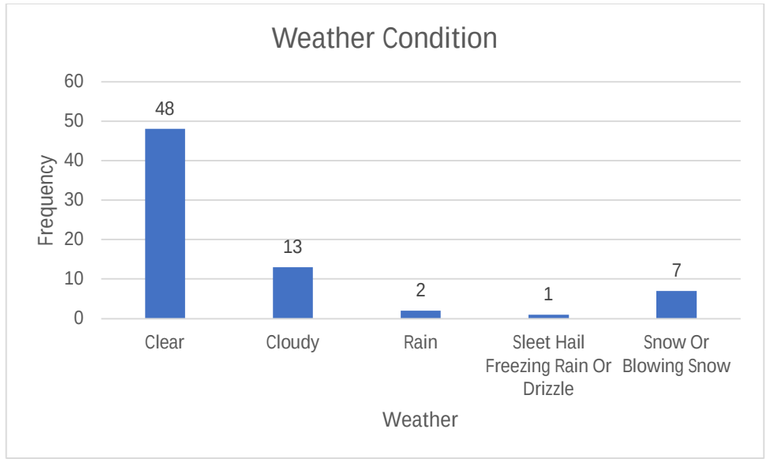


Figure 18: Weather Condition On SR89 Mainline

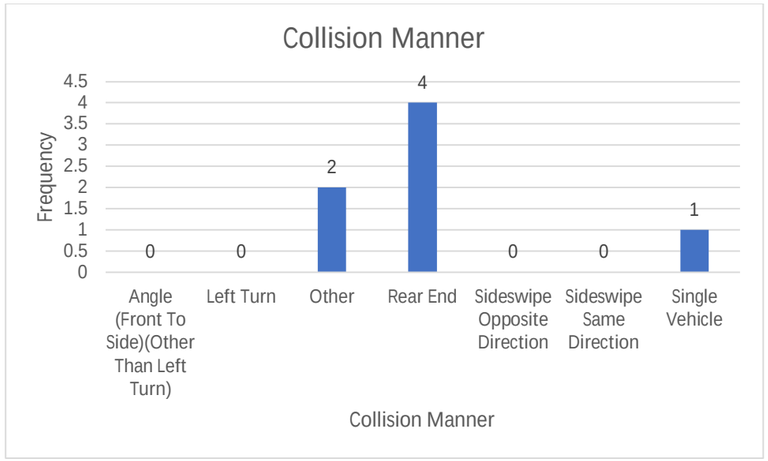


Figure 20: Collision Manner at Frontage Road

Location 3: SR 89A Frontage Road

Lastly, within the study area, the SR89A frontage road reported crashes were analyzed. Within the five-year period, a total of 7 crashes were reported in this area. Of the 7 crashes, 71% (5 crashes) resulted in no-injury, while the remaining 29% (2 crashes) resulted in possible injury. There were no fatal crashes during the time period. **Figure 19** displays the observed number of crashes per year. On trend with the other crash data locations within the study area, the collision type along the Frontage Road had 57% (4 crashes) reported as rear end crashes. The remaining 43% of crashes were divided between single vehicle (1 reported crash) and other (2 reported crashes). **Figure 20** indicates the collision manner at SR89A Frontage Road based on severity within this segment of the study area.

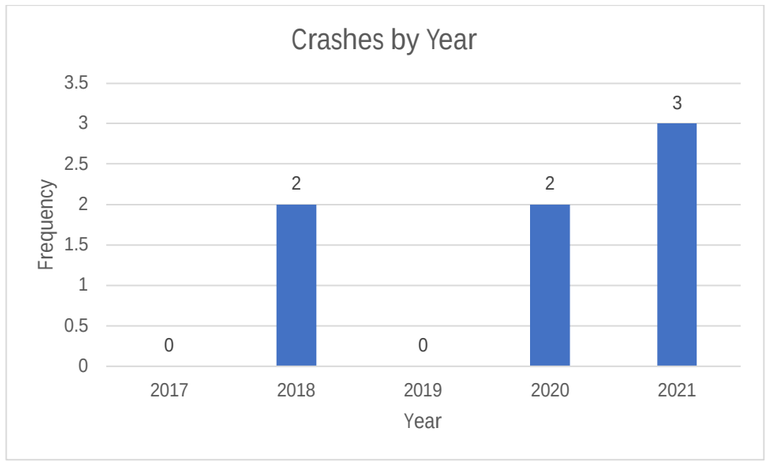


Figure 19: Crashes by Year at Frontage Road

In summary, the majority of crashes within the study area were non-injury related crashes occurring during daylight with clear weather conditions. There was a total of 6 reported fatal crashes during the five-year period considered at all three locations. Collision types were reported as mostly rear-end or sideswipe crashes. The improvements proposed in this ASR are anticipated to improve some of the rear-end and sideswipe crashes along the mainline and frontage road crashes.

4 Environmental Overview

The objective of an environmental overview is to describe the social, economic, cultural, and environmental character of the study area; to identify potential "fatal flaws", obstacles, issues associated with the study area; and to evaluate the study area alternatives. As shown in **Figure 21**, the study area for this environmental overview is defined as the existing SR 89A right-of-way, from approximately the SR 89 intersection to Granite Creek (but excludes Granite Creek). Any buffer areas extending out from study area are noted within those technical write ups.

4.1 Physical and Natural Environment

Topography/Physiology

The project site is located in the Lonesome Valley and crosses primarily undeveloped areas within Yavapai County. The project extends between the SR 89 / SR 89A intersection and Larry Caldwell Drive primarily along the existing on-ramp and frontage road.

The project is located within Sections 35 and 36, of Township (T) 15 North (N), Range (R) 2 West (W) Gila and Salt River Meridian, Arizona. The above legal descriptions are found on the Chino Valley and Prescott Valley South US Geological Survey (USGS) 7.5-minute Topographic Series maps.

Lonesome Valley is a relatively wide and flat-bottomed alluvial basin with some gentle to moderately steep slopes. The Bradshaw Mountains are located southwest of the project area, the Black Hills are on the northeast side of the valley, and the Granite Mountain Wilderness is located west of the project area. The soil information for Yavapai County was obtained from the Natural Resources Conservation Service (NRCS 2017). Soils within the project area are predominantly in the Abra, Lonti, Lynx, Springerville, and Wineg series.

Vegetation

The project is located within the Plains and Great Basin Grassland biotic community. This biotic community consists mainly of short-grass species and shrubs. Plants observed in the field included blue grama (*Bouteloua gracilis*) and other grama grasses, buffalo grass (*Bouteloua dactyloides*), Indian ricegrass (*Achnatherum hymenoides*), sand dropseed (*Sporobolus cryptandrus*) and alkali sacaton (*S. airoides*) and shrubs such as fourwing saltbush (*Atriplex canescens*), sagebrush (*Artemisia sp.*), and snakeweed (*Gutierrezia sarothrae*). (Brown 1994)

Biology

A query of the Arizona Game and Fish Department's (AGFD) Environmental Online Review Tool (AGFD 2017) and the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) database (USFWS 2021). The USFWS' Information for Planning and Consultation (IPaC) site listed four federally protected species potentially occurring within the project vicinity:

- Mexican Spotted Owel (*Strix occidentalis lucida*) - threatened
- Yellow-billed Cuckoo (*Coccyzus americanus*) – threatened
- Northern Mexican Gartersnake (*Thamnophis eques megalops*) – threatened
- Roundtail Chub (*Gila robusta*) – candidate
- Monarch Butterfly (*Danaus plexippus*) - candidate

The AGFD Environmental Online Review Tool identified three species that have been documented occurring within two miles of the project area These species are:

- American Peregrine Falcon (*Falco pereginus anatum*) - USFWS, SC; USPF, S; BLM, S
- Bald Eagle (*Haliaeetus leucocephalus*) - Winter & Sonoran Desert populations (Haliaeetus leucocephalus) – USFWS, SC & BGA; USFS, S; BLM, S
- Bald Eagle ((*Haliaeetus leucocephalus*) – USFWS, SC & BGA; USFS, S; BLM,

Based on a preliminary review or aerial imagery and site photos of the project area, it is not anticipated the project area would contain suitable habitat for the above-listed special status species. It is not anticipated any detailed species analysis would be required, nor would the project involve a lot of vegetation removal and disturbance.

Wildlife

The project area is located East-West Prescott National potential linkage zone, for which the identified species include:

- American peregrine falcon (falco perengrinus antaum)
- American redstart (setophaga ruticilla)
- Arizona toad (bufo microscaphus)
- Desert sucker (Catostomus clarki)
- Elk (Cervus elaphus)
- Fringed Myotis (Myotis thysandoes)
- Gambel's Quail (cellipepla gambeli)

The project area is located within a linkage zone, this stretch of SR 89A is surrounded by developed land north and south of the highway. The nearest habitat blocks is located 9 miles W from the project area. It isn't anticipated the segment of SR 89A within the project limits would be a focal point for wildlife movement. Coordination with Arizona Game and Fish Department is recommended during the environmental review process.

The project area is located within AGFD's pronghorn management unit 19A (AGFD 2017a). The majority of pronghorn habitat in Unit 19A occurs on six ranches that comprise 172 square miles or 120,320 acres of land. The ranches are the Fletcher, Perkins, Wells, Deep Well, Granite Dells, and Fain (AGFD 2013). The project area crosses through the Granite Dells Ranch and generally borders Fain Ranch at the east end of the project. Granite Dells Ranch is located in approximately the center of Lonesome Valley and extends south across highway 89A to Glassford Hill. It consists of about 18,500 acres of private, and 4,500 acres of State Trust Land. This ranch contains extremely high-quality pronghorn habitat but is slated for development (residential housing). Fain Ranch is located south of Highway 89A and east of Prescott Valley. This ranch consists of approximately 16,600 acres of privately owned and 11,520 acres of State Trust Land. Approximately 750 post-hunt adult pronghorn inhabit Unit 19A in eight distinct sub-populations (AGFD 2013). Geographical features, urban developments, and Highways functionally isolate these subpopulations.

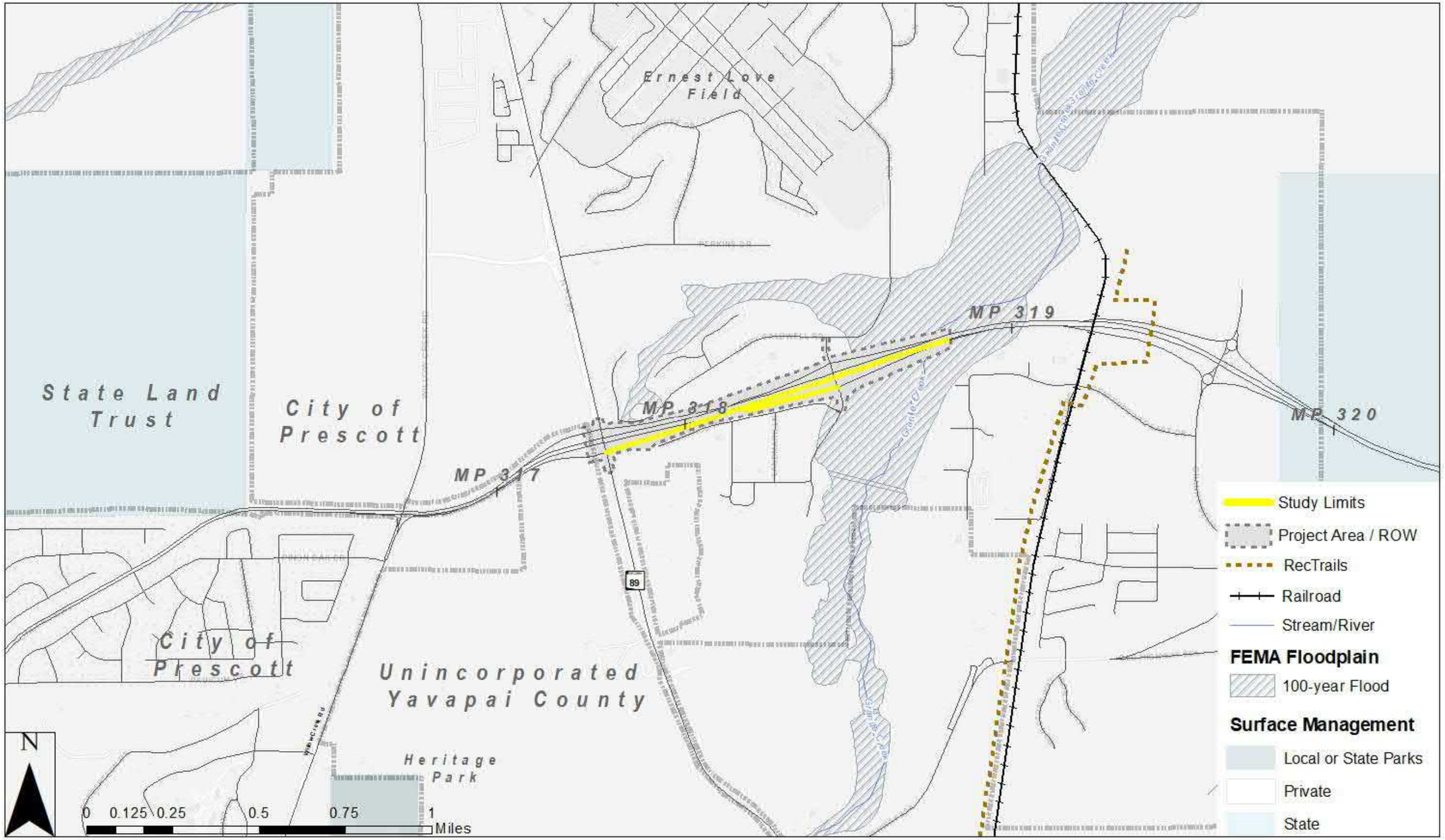


Figure 21: Environmental Project Footprint Map

Hydrology/Water Quality

State Route 89A crosses Granite Creek east of the project area. The designated floodplain and floodway for Granite Creek lie within the project area (Federal Emergency MA floodplain map 04025C1695G, effective date 09/03/2010). Granite Creek is a tributary of the Verde River. Granite Creek is a potential Water of the U.S.; any dredge or fill within its jurisdictional limits could be subject to regulations under Sections 401 and 404 of the Clean Water Act. Coordination with the U.S. Army Corps of Engineers to discuss Clean Water Act permitting requirements based on the current definition of a Water of the U.S. is recommended.

National Wetlands Inventory Mapper (USGS 2021) shows two watercourses classified as riverine cross SR 89A within the project area. Based on a review of aerial imagery and site photos, it is not anticipated Through the project area, at the intersection Pioneer Parkway and SR 89, is a riverine habitat, classified as R4SBC. Located west of Larry Caldwell Drive is a is a riverine habitat, classified as R4SBA. The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.

The ADEQ 303d impaired waters shows Willow Creek Reservoir, located southwest of the project area, as an impaired water resource.

Traffic Noise

The majority of the land adjacent to the project area is currently undeveloped or commercial. However, there are several noise sensitive developments along SR 89A. There is a residential development in the northeast quadrant of the intersection of SR 89 and SR 89A with the closest homes abutting SR 89.

It is assumed all alternatives under consideration would be considered a Type 1 project and require a noise analysis during the environmental review process, due to the additional capacity (i.e. the project will add a general-purpose, auxiliary, or ramp lane longer than 2,500 feet in length).

Hazardous Materials

A preliminary initial sight assessment (PISA) was not conducted for this environmental overview. A review for hazardous materials concerns is recommended during the environmental review process to determine if there are any contaminants that could potentially be encountered during construction. If construction requires removal of roadway striping, sampling to determine if the paint contains lead is recommended to determine risk of worker exposure during construction and determine waste disposal requirements. Similarly, if concrete structures will be disturbed, sampling to determine if they contain asbestos is recommended.

Section 4(f) and Section 6(f)

An inventory of potential 4f sites was completed for the study area. The inventory showed that there are no 4f sites located within the study area. Located west of the project, approximately 5 miles, is Heritage Park located along Willow Creek Road. Heritage Park provides multiple uses including Arizona National Guard recruiting center, Heritage Park Zoological Sanctuary, baseball fields, picnic areas, and other recreational facilities.

Land Ownership and Jurisdiction

A review of the Arizona State Land Department Parcel Viewer Mapping Tool, the project limits fall within the Black Hill Grazing Allotment. Within the general allotment the nearest Grazing Lease parcel is located east of Granite Dells Parkway on the Arizona Eco Development LLC property. This parcel straddles the SR 89A corridor, with approximately 75% of the parcel located on the north side of the corridor. There are no leasing arrangements located within the corridor limits.

The existing corridor alignment, including on-ramp, all four intersection legs, the frontage road, and the SR 89A mainline are contained fully within ADOT owned Right of Way (ROW). Furthermore, all proposed and evaluated Alternatives are fully contained within existing

Land Use

The majority of the land immediately adjacent to SR 89A is undeveloped with some residential and commercial uses which include churches and medical centers. Antelope Hills Golf Course is located north of the project area and includes the residential area along the project area. The property immediately north of SR 89A, west of Larry Caldwell Drive is owned by the Heights Church, which includes the church property and undeveloped vacant land and is a mix of Residential Office, Single-Family Residential, and Neighborhood Oriented Business.

There are additional vacant parcels south of SR 89A along Assurance Way. This vacant land is currently zoned by City of Prescott as Mixed Use, as part of the Centerpointe West Commerce Park west of Larry Caldwell Drive along Assurance Way. Further south of the corridor below the Mixed-Use zoned land includes additional Single-Family Residential zoned properties as part of the Walden Ranch Phases 1A, 1B, and 2 accessible from both Larry Caldwell Drive and Phippen Trail off of State Route 89. The land immediately east of Larry Caldwell Drive and adjacent to these developing areas is zoned as Natural Open Space and includes the continuation of the Granite Creek floodplain and contains no present development activity

Socioeconomics

A review of the socioeconomic data was done to evaluate the demographics of the study area. Demographic data collected included young (under the age of 18), elderly (over the age of 60), minority populations, and those living below the poverty line. **Table 9** presents the totals for the state, county and study area. The following demographic data is the total percentage of the population for each category:

Young: 9%
Elderly: 35.7%
Minority Populations
- Black or African American: 1.4%
- American Indian/Alaska Native: 1.7
- Asian: 2.1%
- Native Hawaiian: 3.3%
- Hispanic or Latino:6.4%
- Other Race: 0.4%

Poverty: 25%
Disabilities: 15.1%

Table 9: Socioeconomic Data

	State	Yavapai County	Study Area
Young	23.2%	16.5%	9%
Elderly	20.6%	36.6%	35.7%
Minorities			
Black or African American	5.7%	1.2%	1.4%
American Indian/Alaska Native	5.7%	2.9%	1.7%
Asian	4.4%	1.6%	2.1%
Native Hawaiian	0.5%	0.3%	3.3%
Hispanic or Latino	31.3%	14.5%	6.4%
Other Race	7.3%	3%	.4%
Poverty	29%	33%	25%
Disabilities	13%	18%	15.1%

Local businesses and other facilities located along the project area include two churches, four medical offices, VinylVision and a coffee shop. Located along the southern area of the project area are the four medical offices, Potter's House Christian Fellowship Church, and VinylVision. These businesses have been accessed using SR 89 to Assurance Way or using SR 89A to Larry Caldwell Drive. Located north of the project area is Heights Church and Grafted Coffee & Tea which is accessed using SR 89A to Larry Caldwell Drive.

The project would not require new ROW, relocations, or displacements. No closures of any access points. Project aims to improve lane changes and turning movements for traffic staying on SR 89 and exiting (spell out what the benefits are). Access road would remain accessible for businesses and other travel.

Cultural Resources

The Peavine Trail, west of Granite Dells Parkway, is located on an historic railroad corridor which crosses under SR 89A. The Town of Prescott Valley has a proposed recreational trail that would cross underneath SR 89A near the intersection with Robert Road. The tunnel for the trail has already been constructed. There are other existing and proposed trails that cross the project corridor which are located along existing roads. No other publicly owned recreational facilities or wildlife refuges were identified within one-quarter mile of the project area.

Archaeological sites N: 3:32(ASM), Santa Fe, Prescott & Phoenix Railway; AZ N:7:212(ASM), the Chino Valley Irrigation Ditch; and AZ N:218(ASM), and the Granite Dell Ranch Irrigation Ditch (old Chino Valley Irrigation Ditch) would qualify as cultural resources that would be protected under Section 4(f). There were no identified Section 6(f) resources identified within the project area. Roberts Rd scope: records review, 0.5-mile buffer around study area. Searched Portal & AZSITE.

5 Alternatives Criteria, Development & Evaluation

This section summarizes the development of the criteria, conceptual alternatives and the evaluation of those alternatives.

5.1 Alternatives Criteria

Evaluation criteria were developed to assess improvement alternatives for the 2045 build scenario. Below are the seven evaluation criteria that were used to analyze each alternative.

Safety

- Conflict points – quantitative measure of vehicular conflict points present

Mobility and Constructability

- Level-of-service – quantitative measurement of both AM and PM Peak Level of Service measurements
- Constructability – qualitative measure of the ease or complexity of traffic control and traffic impacts during construction periods

Regional Compatibility

- Future Compatibility with Ultimate 3rd lane on SR 89A – quantitative measure of how the alternatives configuration would be compatible with proposed third lane along SR 89A
- Compatibility with Current Plans South of SR 89A – qualitative measure of the alternatives to existing planning documents for improvements along SR 89A
- Agency Acceptance – qualitative assessment of CYMPO TAC member agencies support or ranking of each alternative

Design Criteria

- Geometric Improvements – qualitative assessment of ability of each alternative to meet project design criteria and identification of design elements requiring a potential design exception or variance
- Topographic/Earthwork Impacts – quantitative measurement of earthwork volumes (roadway excavation/waste)

Drainage

- Drainage Impacts – qualitative assessment of potential impacts to existing drainage features (catch basins and inlets) requiring reconstruction/relocation and potential proposed drainage improvements

Existing Environment

- Environmental Impacts – quantitative analysis of effects on the environment, including effects on species, vegetation, cultural resources, land use, and disadvantaged populations.
- Utility Impacts – quantitative measure on the number of traffic signals and other utilities
- Right-of-Way Impacts – quantitative measure on the existing right-of-way and amount of right-of-way needed for the project

Cost

- Total Project Cost – quantitative measurement of the total project cost, including contingency to implement suggested improvements (includes construction, design, etc). Planning level cost estimates were prepared for all proposed improvements

5.2 Alternatives Development

Potential corridor improvements were developed by investigating the corridor needs as described in Section 2 and 3 and brainstorming mitigation measures for these needs with the core project team. Additional corridor improvements were developed from direction provided by the TAC regarding corridor needs and safety needs from the detailed analysis. The following text describes each of the potential corridor improvements developed.

5.2.1 Design Criteria

Prior to development of the alternatives, design criteria were established for the mainline, ramp, and frontage road. This criterion was presented and agreed upon by the TAC. **Table 10**, **Table 11**, and **Table 12** present the design criteria for the mainline, ramp, and frontage road respectively.

5.2.2 Proposed Alternatives

Six Build and one No-Build design alternatives were considered for implementation. These design alternatives are presented and described below.

No Build

The no-build alternative will maintain existing conditions. The intersection will still provide SB dual left-turn lanes for SR 89 traffic destined to SR 89A or Larry Caldwell Drive. The southern intersection will provide an EB through movement to a frontage road with access to SR 89A and Larry Caldwell Drive.

The EB entrance ramp diverges from the frontage road approximately 1,500 feet east of the TI with a one-one lane split. The right lane continues on the frontage road to Larry Caldwell Drive and the left lane becomes a tapered entrance ramp onto SR 89A. An existing vertical curve along the frontage road crests approximately 600 feet west of the split. The EB entrance ramp is approximately 350 feet long. The No-build Alternative configuration and issues was previously presented in **Figure 4**.

Alternative 1

This design alternative would add a two-lane entrance to SR 89A, with the right lane having an option to continue east on the frontage road to Larry Caldwell Drive. The two-lane ramp would drop the right lane with a taper beginning near the entrance gore, in accordance with Figure 504.8B of the ADOT RDG. Concrete barriers and realignment of the mainline gore and the frontage road gore locations eliminate the ability to make the dangerous crossover maneuver from the mainline to the frontage road, reducing the safety concerns at this location. The realignment of the frontage road gore also slides the split lane to the west and makes it visible on the west of the crest curve. This alternative would terminate any improvements prior to the Larry Caldwell Drive bridge. The Alternative 1 configuration is presented in **Figure 22**.

Table 10: Design Criteria for SR 89A (Fringe-Urban Access Controlled Highway)

DESCRIPTION OF CRITERIA	VALUES FOR DESIGN	CRITERIA SOURCE
Design Year:	2045	
Design Speed (Existing):	65 mph	ADOT RDG Table 101.3 (Controlled-Access, Existing Posted 65 mph)
Design Vehicle:	WB-67	ADOT RDG Table 407.2
Superelevation:	Match Existing (0.06 ft./ft. max.)	ADOT RDG Table 202.1A (Controlled-Access, Match Existing)
Cross Slope:	Match Existing (2%)	
Lane Width:	12 ft	ADOT RDG Section 301.3
Maximum Horizontal Curve:	3 degrees, 27 minutes (1,660.75')	ADOT RDG Table 202.3B
Minimum Horizontal Curve with normal crown (2%)	0 degrees, 36 minutes (9,549.30')	ADOT RDG Table 202.3B
Maximum Gradient:	Match Existing	
Taper Rate:	Lane drop: 65:1 (D_s:1) Lane addition: 25:1	ADOT RDG Section 207
Slope Standards:		
Cut/Fill Slopes:	6:1 desirable (9' min hinge from EOP) ADOT Std C-02.20, 6:1 to 2:1 max (outside hinge)	ADOT RDG Section 306.3
Stopping Sight Distance:	612 ft (+3% effective longitudinal grade) 644 ft (level) 682 ft (-3% effective longitudinal grade)	ADOT RDG Section 201.2
Clear Zone Width:	30 ft from travelled way	ADOT RDG Section 303.2
Minimum Vertical Clearance:		
Highway Structure:	16.5 ft	ADOT Bridge Practice Guidelines, p. 2-7

Table 11: Design Criteria for SR 89 to EB SR 89A On-ramp (Service Entrance Ramp)

DESCRIPTION OF CRITERIA	VALUES FOR DESIGN	CRITERIA SOURCE
Design Year:	2045	
Design Speed:		
At gore (entrance ramps):	55 mph	ADOT RDG Section 503.3 (Mainline design speed = 65 mph)
Ramp body:	50 mph	ADOT RDG Section 503.3
Design Vehicle:	WB-67	ADOT RDG Table 407.2
Superelevation:	0.06 ft/ft max	ADOT RDG Section 504.3
Cross Slope:	2%	
Lane Width:	12 ft	ADOT RDG Section 504.5
Shoulder Width:		
Left:	2 ft	ADOT RDG Section 504.5/Table 302.4
Right:	8 ft	ADOT RDG Section 504.5/Table 302.4
Shoulder Width (with barrier):		
Left:	4 ft	Add 2’ shy for barrier
Right:	10 ft	Add 2’ shy for barrier
Maximum Horizontal Curve:	5 degrees, 24 minutes (1,061.03’)	ADOT RDG Table 202.3B (55 mph entrance gore)
Minimum Horizontal Curve with normal crown (2%)	0 degrees, 46 minutes (7,473.36’)	ADOT RDG Table 202.3B
Minimum Gradient:	0.40% with curb and gutter, otherwise 0.25%	ADOT RDG Section 504.1
Maximum Gradient:	4% upgrade, 5% downgrade	ADOT RDG Section 504.1
Ramp Taper at Entrance Taper:	50:1	ADOT RDG Figure 504.8A
Slope Standards:		
Cut/Fill Slopes:	6:1 to slope hinge (9’ min from EOP) 4:1 desirable, 3:1 max (outside hinge)	ADOT RDG Section 504.4/ADOT RDG Figure 303.1
Stopping Sight Distance (50 mph ramp body):	399 ft (+4% effective longitudinal grade) 424 ft (level) 464 ft (-5% effective longitudinal grade)	ADOT RDG Section 201.2
Clear Zone Width (55 mph gore):	30 ft from travelled way	ADOT RDG Section 303.2
Minimum Vertical Clearance:		
Highway Structure:	16.5 ft.	ADOT Bridge Practice Guidelines, p. 2-7

Table 12: Design Criteria for SR 89 to Larry Caldwell Drive (Frontage Road)

DESCRIPTION OF CRITERIA	VALUES FOR DESIGN	CRITERIA SOURCE
Design Year:	2045	
Design Speed:	45 mph	ADOT RDG Section 101.3
Design Vehicle:	WB-67	ADOT RDG Table 407.2
Superelevation:	0.06 ft/ft max	ADOT RDG Section 504.3
Cross Slope:	2%	
Lane Width:	12 ft	ADOT RDG Section 504.5
Shoulder Width:		
Left:	2 ft	ADOT RDG Figure 309A
Right:	4 ft	ADOT RDG Figure 309A
Shoulder Width (with barrier):		
Left:	4 ft	Add 2’ shy for barrier
Right:	6 ft	Add 2’ shy for barrier
Maximum Horizontal Curve:	8 degrees, 55 minutes (642.57’)	ADOT RDG Table 202.3B
Minimum Horizontal Curve with normal crown (2%)	1 degree, 6 minutes (5,208.71’)	ADOT RDG Table 202.3B
Minimum Gradient:	0.40% with curb and gutter, otherwise 0.25%	ADOT RDG Section 504.1
Maximum Gradient:	4% upgrade, 5% downgrade	ADOT RDG Section 504.1
Taper Rate:	Lane drop: 45:1 (D_s:1) Lane addition: 25:1	ADOT RDG Section 207
Slope Standards:		
Cut/Fill Slopes:	6:1 to slope hinge (9’ min from EOP) 4:1 desirable, 3:1 max (outside hinge)	ADOT RDG Section 504.4/ADOT RDG Figure 309A
Stopping Sight Distance:	340 ft (+4% effective longitudinal grade) 360 ft (level) 393 ft (-5% effective longitudinal grade)	ADOT RDG Section 201.2
Clear Zone Width:	28 ft from travelled way	ADOT RDG Section 303.2
Minimum Vertical Clearance:		
Highway Structure:	16.5 ft.	ADOT Bridge Practice Guidelines, p. 2-7

Figure 22: Alternative 1 Conceptual Design

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

Figure 22: Alternative 1 Conceptual Design (Sheet 2)

Figure 22: Alternative 1 Conceptual Design (Sheet 3)

Alternative 2

This design alternative would add a two-lane entrance to SR 89A, with the right lane having an option to continue east on the frontage road to Larry Caldwell Drive. East of the bridge over SR 89, the two lanes on the mainline would realign toward the median into the ultimate three-lane configuration, while the two ramp lanes would enter SR 89A together. The outside lane will drop with a taper west of the Larry Caldwell Drive overpass, with three lanes remaining in the EB direction. Concrete barriers and realignments of the mainline gore and the frontage road gore locations eliminate the ability to make the dangerous crossover maneuver from the mainline to the frontage road, reducing the safety concerns at this location. The realignment of the frontage road gore also slides the split lane to the west and makes it visible on the west of the crest curve. This alternative does carry one additional lane through the Larry Caldwell Drive bridge; this third lane under the Larry Caldwell Drive underpass will required some outside widening for the shoulder but should not impact the existing bridge concrete slope paving. The Alternative 2 configuration is presented in **Figure 23.**

Alternative 2A

This alternative presents the same lane configuration as Alternative 2, however, it modifies the geometry of the design. Alternative 2A does not push the mainline to the inside ultimate location, instead the two lanes are added all on the right edge of the mainline. This alternative also carries one additional lane under the Larry Caldwell Drive underpass but will require additional reconstruction or grading to widen on the right edge. Preliminary investigation assumes the existing bridge concrete slope paving should not be impacted per the widening, but additional evaluation would be required if this alternative moved forward to confirm no impacts. The Alternative 2A configuration is presented in **Figure 24.**

Alternative 3A

This alternative builds upon Alternative 1 by adding a two-lane entrance to SR 89A in a similar manner. However, Alternative 3A adds one additional lane departing EB from the SR 89A/SR 89 TI. This gives the ability for a two-one spilt at the ramp/frontage road gore. The third lane is added to the south side of the existing frontage road and requires the frontage road to be realigned further to the east. All other alternative alignments are the same as Alternative 1.

The Alternative 3A configuration is presented in **Figure 25.**

Alternative 3B

This alternative presents the same lane configuration as Alternative 3A, however, it adds the third lane to the north side of the frontage road. The existing traffic signal and sidewalk ramp on the northeast corner of the southern intersection of the TI would require relocation and reconstruction with this alternative. All other alternative alignments are the same as Alternative 1 and 3A.

The Alternative 3B configuration is presented in **Figure 26**.

Alternative 3C

This alternative presents the same lane configuration as Alternative 3B for the frontage road. This alternative for the mainline and ramp however follows Alternative 2 by adding a two-lane entrance to SR 89A in a similar manner.

The Alternative 3C configuration is presented in **Figure 27.**

5.3 Alternatives Evaluation

The alternatives analysis includes evaluation of each of the alternatives using the evaluation criteria as described in Section 5.1. The evaluation criteria were utilized for each alternative. The alternative receiving the highest score would be identified as the preferred 2045 alternative. The alternative analysis matrix for the project is shown in **Figure 28.** Detailed cost estimates for each alternative are provided in **Appendix B**.

Based upon the analysis, the preferred 2045 Alternative would be either Alternative 1 or Alternative 2 as they both score a total net effect of 43. As indicated in the evaluation, Alternative 2 provides the largest benefit to the project area but has a larger cost than Alternative 1. The TAC agencies (which include ADOT who is the facility owner) are most supportive of Alternative 2 to move forward with as the funding seems to be reasonable and achievable and includes the greatest benefits. Alternative 2 also is also most compatible with a future 3rd general purpose lane implementation on SR 89A. Therefore, the Recommended Alternative to move forward is Alternative 2.

Figure 23: Alternative 2 Conceptual Design

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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

ALT 2

SR89 TO SR89A ON-RAMP

EXHIBIT
ALTERNATIVE 2
2 OF 4

Figure 23: Alternative 2 Conceptual Design (Sheet 2)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

Figure 23: Alternative 2 Conceptual Design (Sheet 3)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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

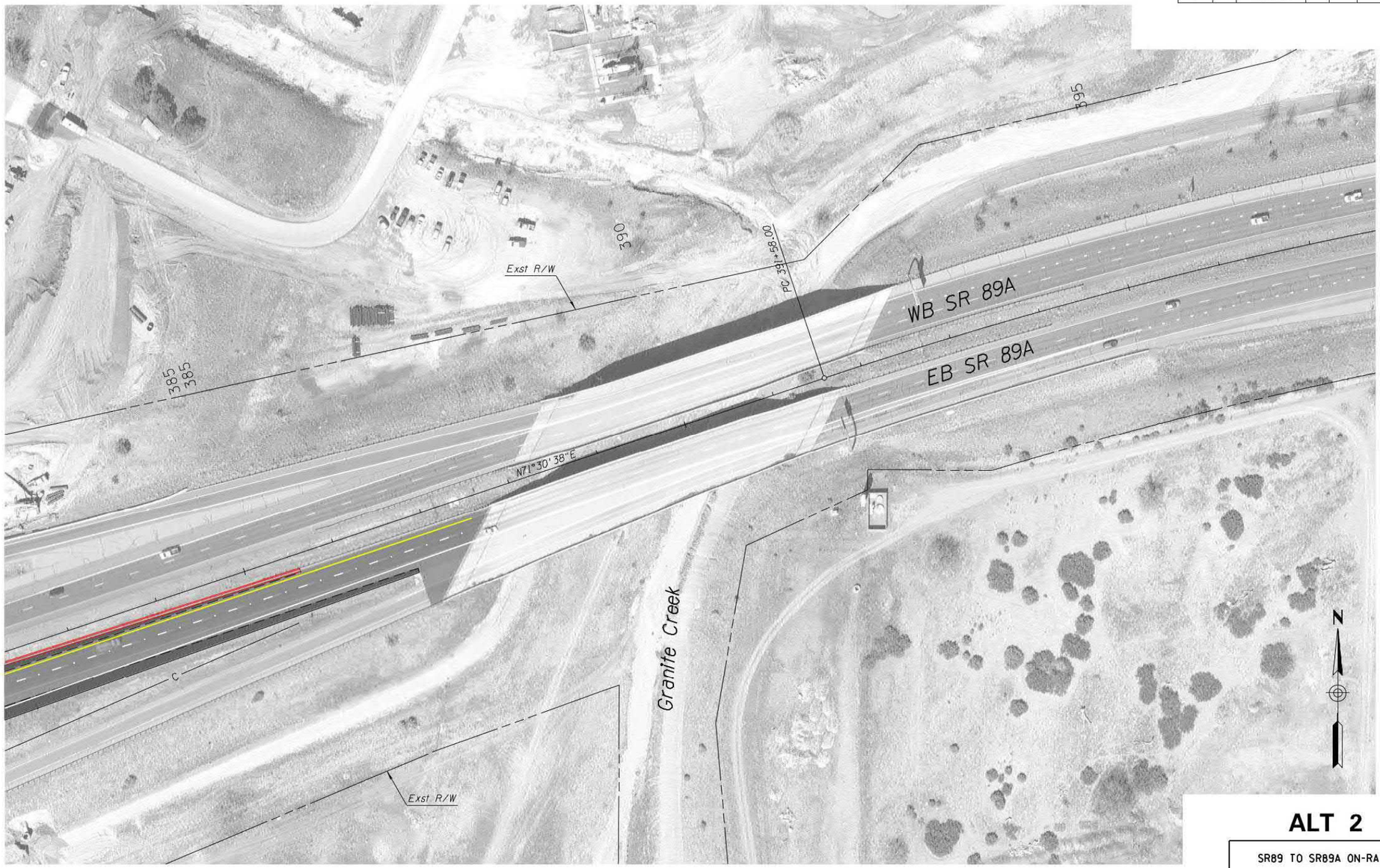


Figure 23: Alternative 2 Conceptual Design (Sheet 4)

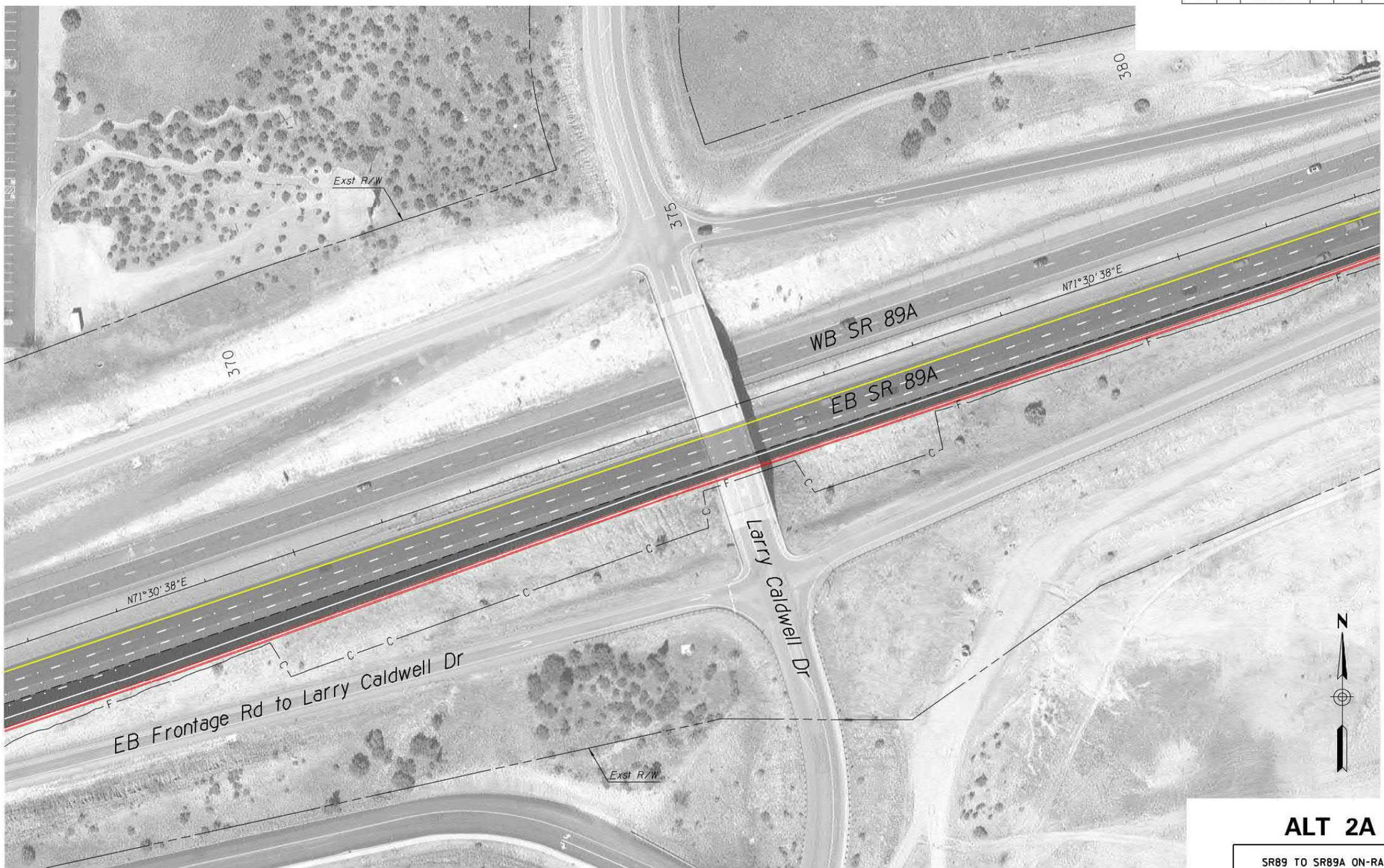
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

Figure 24: Alternative 2A Conceptual Design

Figure 24: Alternative 2A Conceptual Design (Sheet 2)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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



ALT 2A

SR89 TO SR89A ON-RAMP

EXHIBIT
ALTERNATIVE 2A
3 OF 4

Figure 24: Alternative 2A Conceptual Design (Sheet 3)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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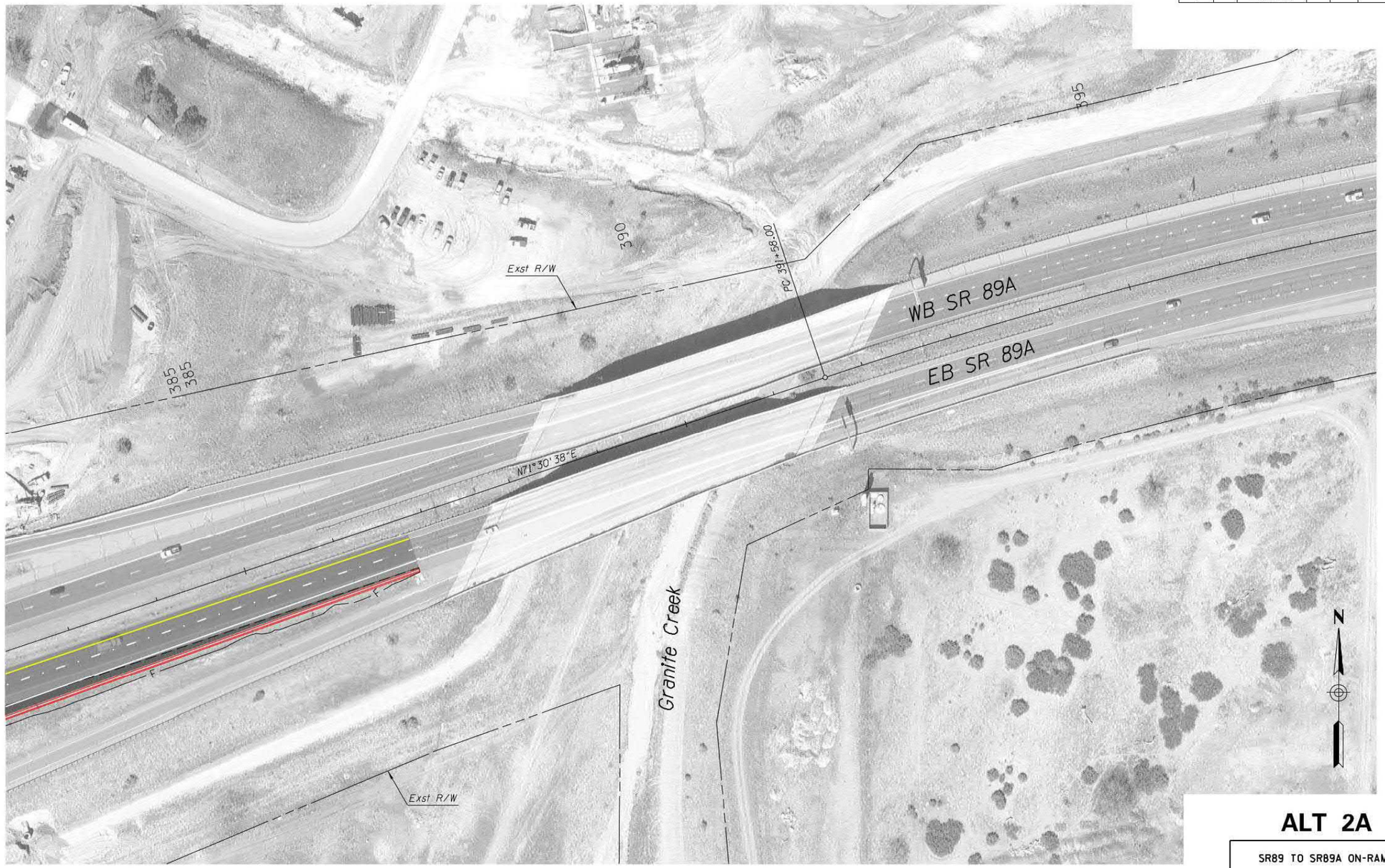
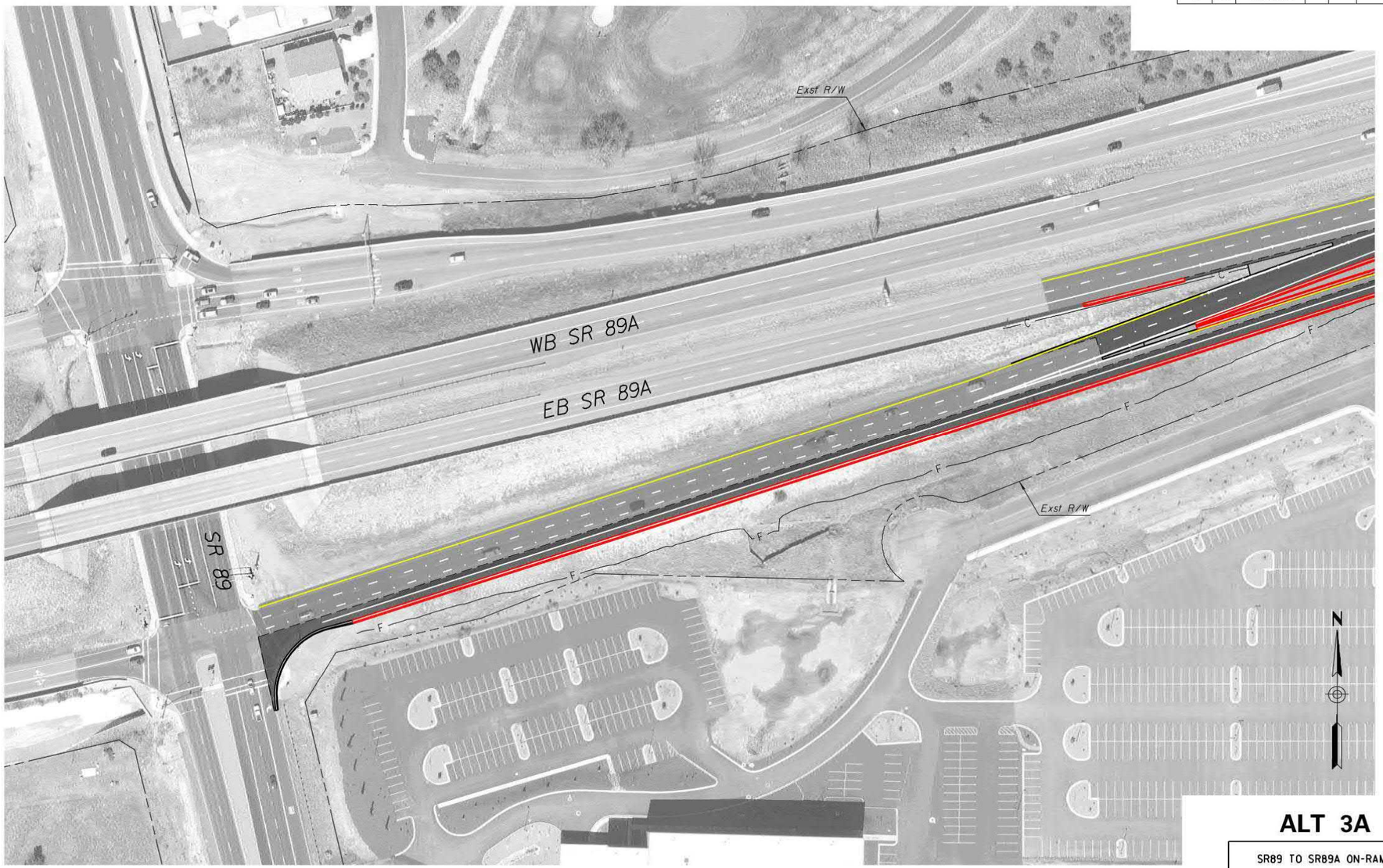


Figure 24: Alternative 2A Conceptual Design (Sheet 4)

F.A.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			



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

Figure 25 Alternaive 3A Conceptual Design

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

ALT 3A

SR89 TO SR89A ON-RAMP

EXHIBIT
ALTERNATIVE 3A
2 OF 3

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

Figure 25: Alternative 3A Conceptual Design (Sheet 2)

Figure 25: Alternative 3A Conceptual Design (Sheet 3)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

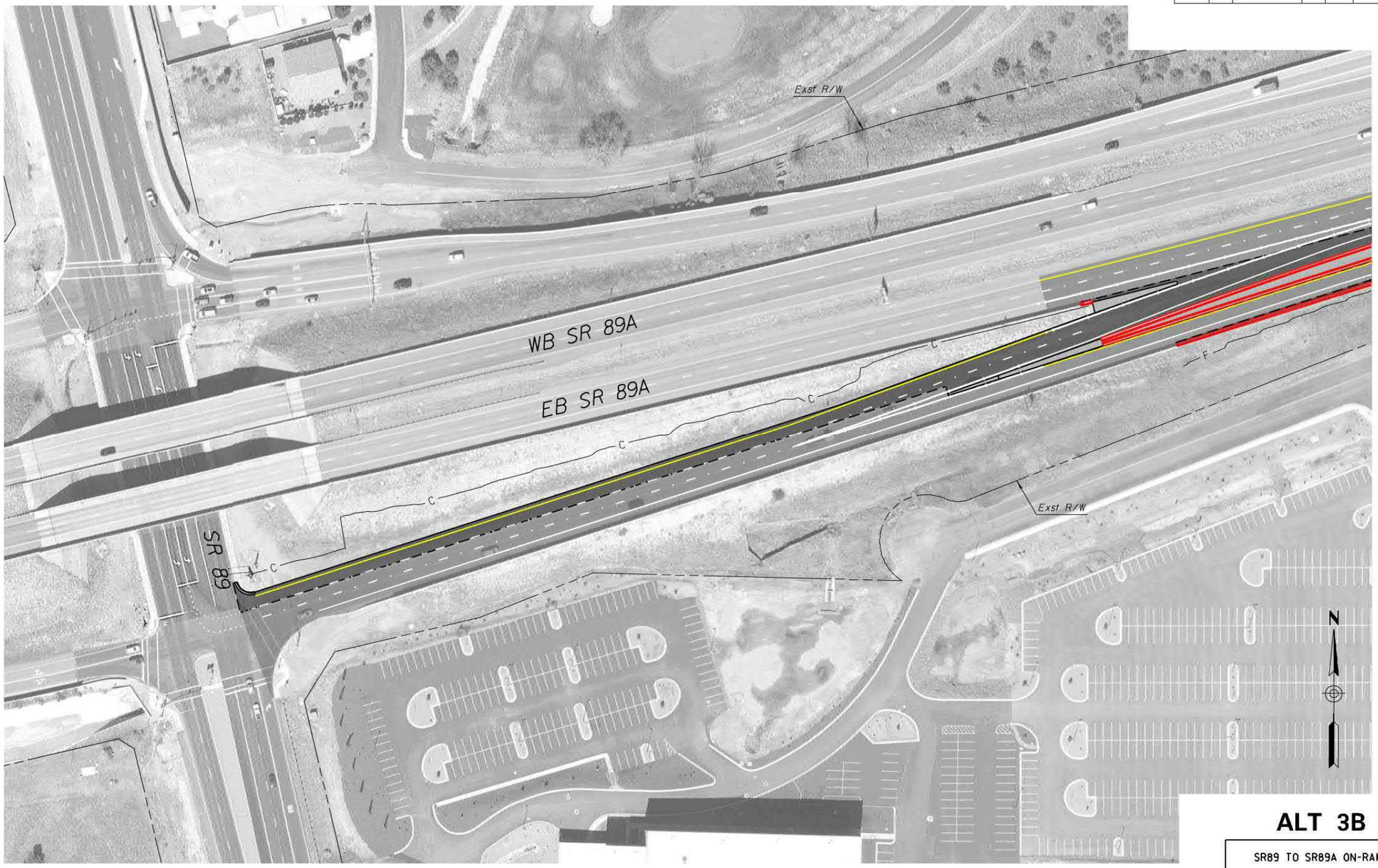


Figure 26: Alternative 3B Conceptual Design

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPDJ97313			

ALT 3B

SR89 TO SR89A ON-RAMP

EXHIBIT
ALTERNATIVE 3B
2 OF 3

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

Figure 26: Alternative 3B Conceptual Design (Sheet 2)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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

ALT 3B

SR89 TO SR89A ON-RAMP

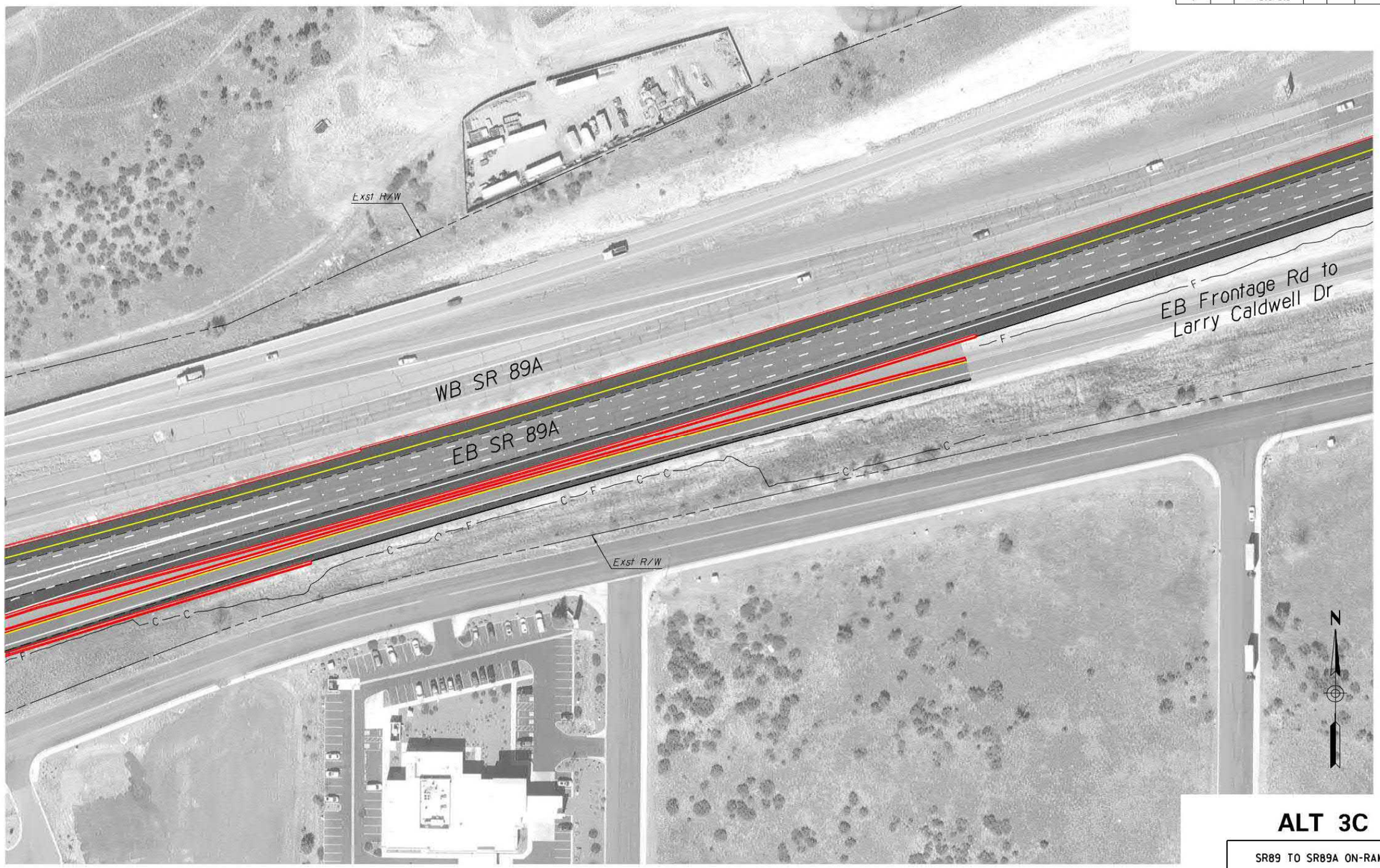
EXHIBIT
ALTERNATIVE 3B
3 OF 3

Figure 26: Alternative 3B Conceptual Design (Sheet 3)

Figure 27: Alternative 3C Conceptual Design

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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



ALT 3C

SR89 TO SR89A ON-RAMP

EXHIBIT
ALTERNATIVE 3C
2 OF 4

Figure 27: Alternative 3C Conceptual Design (Sheet 2)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

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

Figure 27: Alternative 3C Conceptual Design (Sheet 3)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313			

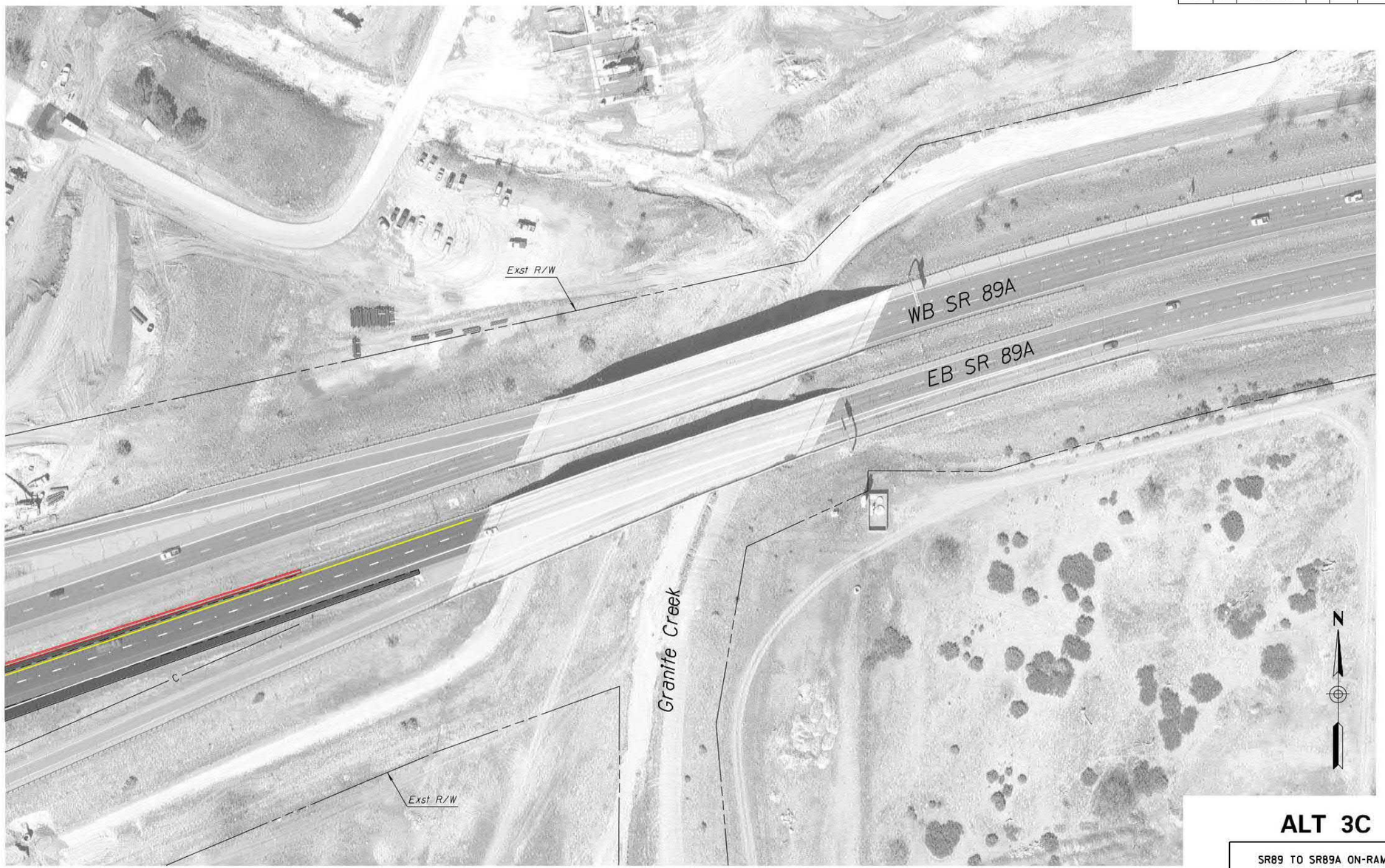


Figure 27: Alternative 3C Conceptual Design (Sheet 4)

EVALUATION CRITERIA		NO-BUILD	Alternative 1 – 1 lane enters Mainline	Alternative 2 – 2 lanes enters Mainline	Alternative 2A – Alt 2 w/ adjusted geometry	Alternative 3A – Alt 1 w/ 3 lane frontage outside widening	Alternative 3B – Alt 1 w/ 3 lane frontage inside widening	Alternative 3C – Alt 2 w/ 3 lane frontage inside widening
Safety	**Conflict Points**	• Frontage & ramp crossing conflicts *Net Effect: 1*	• Frontage and Ramp Conflicts min. *Net Effect: 4*	• Frontage and Ramp Conflicts min. • *Net Effect: 4*	• Frontage and Ramp Conflicts min. *Net Effect: 4*	• Ramp Conflicts min. • New Frontage *Net Effect: 3*	• Ramp Conflicts min. • New Frontage *Net Effect: 3*	• Ramp Conflicts min. • New Frontage *Net Effect: 3*
Mobility/Constructability	**Traffic Operations/ Level of Service**	• Inter– E/D • Frontage- C/C • Ramp-D • Mainline-B/C *Net Effect: 1*	• Inter– E/C • Frontage- C/C • Ramp-D • Mainline-B/B *Net Effect: 3*	• Inter– E/C • Frontage- C/C • Ramp-B • Mainline-B/B *Net Effect: 4*	• Inter– E/C • Frontage- C/C • Ramp-B • Mainline-A/B *Net Effect: 4*	• Inter– E/C • Frontage- B/B • Ramp-D • Mainline-B/B *Net Effect: 3*	• Inter– E/C • Frontage- B/B • Ramp-D • Mainline-B/B *Net Effect: 3*	• Inter– E/C • Frontage- B/B • Ramp-B • Mainline-A/B *Net Effect: 4*
	Constructability/ Maintenance of Traffic	• No Issues *Net Effect: 5*	• Minimal Impacts to Traffic *Net Effect: 4*	• Traffic Control Complex • *Net Effect: 3*	• Traffic Control Complex *Net Effect: 3*	• Traffic Control complex *Net Effect: 3*	• Traffic Control Complex *Net Effect: 3*	• Traffic Control Complex *Net Effect: 3*
Regional Compatibility	**Future Compatibility with Ultimate 3rd Lane on SR 89A**	• N/A *Net Effect: 3*	• No impacts from existing config. *Net Effect: 3*	• Works best for compatibility with future 3rd lane • *Net Effect: 5*	• All widening is outside so 3rd lane would not be set up *Net Effect: 2*	• No impacts from existing config. *Net Effect: 3*	• No impacts from existing config. *Net Effect: 3*	• Works best for compatibility with future 3rd lane *Net Effect: 5*
	Compatibility with Current Plans South of SR 89A	• No known plans, all within R/W *Net Effect: 3*	• No known plans, all within R/W *Net Effect: 3*	• No known plans, all within R/W • *Net Effect: 3*	• No known plans, all within R/W *Net Effect: 3*	• No known plans, all within R/W *Net Effect: 3*	• No known plans, all within R/W *Net Effect: 3*	• No known plans, all within R/W *Net Effect: 3*
	Agency Acceptance	• Least Agency Acceptance *Net Effect: 1*	• Positive Agency Acceptance *Net Effect: 3*	• Most Agency Acceptance *Net Effect: 5*	• Positive Agency Acceptance *Net Effect: 3*	• Least Agency Acceptance *Net Effect: 1*	• Least Agency Acceptance *Net Effect: 1*	• Least Agency Acceptance *Net Effect: 1*
Design Criteria	**Geometric Improvements (Vertical/Horizontal)**	• None *Net Effect: 3*	• Meets criteria • Inside Mainline Shoulder (6-8') *Net Effect: 3*	• Meets criteria • *Net Effect: 4*	• Meets criteria • Inside Mainline Shoulder (6-8') • Need special mitigation at LC bridge *Net Effect: 2*	• Meets criteria • Inside Mainline Shoulder (6-8') *Net Effect: 3*	• Meets criteria • Inside Mainline Shoulder (6-8') *Net Effect: 3*	• Meets criteria *Net Effect: 4*
	Topographic/earthwork Impacts	• None *Net Effect: 3*	• 2,000 CY Waste *Net Effect: 4*	• 6,000 CY Waste *Net Effect: 2*	• 340 CY Waste *Net Effect: 5*	• 2,100 CY Waste Net Effect: 4	• 2,100 CY Waste *Net Effect: 4*	• 6,600 CY Waste *Net Effect: 2*
Drainage	**Drainage Impacts**	• None *Net Effect: 3*	• Minimal Impacts *Net Effect: 3*	• Longer roadway so impacts increase *Net Effect: 2*	• Longer roadway so impacts increase *Net Effect: 2*	• Longer roadway so impacts increase *Net Effect: 2*	• Minimal Impacts *Net Effect: 3*	• Longer roadway so impacts increase *Net Effect: 2*
Existing Environments	**Environmental Impacts**	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*
	Utility Impacts	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• Traffic Signal *Net Effect: 2*	• Traffic Signal *Net Effect: 2*	• Traffic Signal *Net Effect: 2*
	Right-of-Way Impacts	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*	• None *Net Effect: 3*
Costs	**Project Costs**	• None *Net Effect: 5*	• $2.5M *Net Effect: 4*	• $5.4M *Net Effect: 2*	• $3.7M *Net Effect: 3*	• $3.3M *Net Effect: 3*	• $2.7M *Net Effect: 4*	• $5.6M *Net Effect: 2*
Criteria Rating **2 – Some Disadvantage** **4 – Some Advantage**	**1 – Strong Disadvantage** **3 – Neutral** **5 – Strong Advantage**	***Total Net Effect: 37***	***Total Net Effect: 43***	***Total Net Effect: 43***	***Total Net Effect: 40***	***Total Net Effect: 36***	***Total Net Effect: 38***	***Total Net Effect: 37***

Figure 28: Evaluation of Alternative Matrix

6 Proposed Improvements

The recommended alternative based on the evaluation described in Section 5 and per coordination with the TAC is Alternative 2. 15% Design Plans have been provided in **Appendix A**. Proposed improvements of the recommended alternative are further described within the sections below.

6.1 Roadway Feature Improvements

The recommended alternative consists of construction of a new two-lane entrance to SR 89A, with the right lane having an option to continue east on the frontage road to Larry Caldwell Drive. East of the bridge over SR 89, the two lanes on the mainline would realign toward the median into the ultimate three-lane configuration (mainline sawcut and widen), while the two new ramp lanes would enter SR 89A together. The outside lane will drop with a taper west of the Larry Caldwell Drive overpass, with three lanes remaining in the EB direction. Concrete barriers and realignments of the mainline gore and the frontage road gore locations eliminate the ability to make the existing dangerous crossover maneuver from the mainline to the frontage road, reducing the current safety concerns at this location. The realignment of the frontage road gore also slides the split lane to the west and makes it visible on the west of the crest curve (frontage road sawcut and widen). This alternative does carry one additional lane through the Larry Caldwell Drive bridge; this third lane under the Larry Caldwell Drive underpass will required some outside widening for the shoulder but should not impact the existing bridge concrete slope paving (additional investigation is required for determination of impacts and potential mitigation needs during scoping phase). Existing remaining pavement within the project limits of the sawcut and widening along the mainline and frontage road will required a mill and overlay in order to facilitate the existing pavement marking removal and restriping.

6.2 Earthwork

15% earthwork calculations result in approximately 9,843 CY of excavation and 3,722 CY of embankment. Overall, the project yields 6,121 CY waste. Higher excavation quantities are a result of required excavation for widening of SR 89A to the Granite Creek Bridge. Road excavation costs are estimated at $196,900 ($20/CY).

6.3 Traffic Control

The project will need to be constructed in phases in order to minimize adverse impacts to the traveling public. A preliminary look at phasing indicates that there could be approximately three phases to construct the project. The first phase would include widening of the frontage road on the south side. This stage would include reduced lane width of the current frontage road and shoulder closures. The second phase would include inside median widening on the SR 89A mainline with inside shoulder width reductions. After these two phases are completed ramp construction can be expedited by closing the existing SR 89A on-ramp and traffic re-routed via the newly widened frontage road to the Larry Caldwell Drive entrance ramp. This may require a temporary signal at Larry Caldwell Drive TI. The mainline outside widening would occur this same phase while the existing lanes are pushed to the north on the newly completed median widening.

Traffic Control requirements will be in accordance with the 2009 MUTCD, the 2012 Arizona Supplement to the MUTCD, the ADOT Traffic Control Design Guidelines, latest approved edition, and/or by special provisions.

6.4 Access Condition and Traffic Operations

Existing property access are not anticipated to be impacted by implementation of this project. Implementation of the Recommended Alternative will improve overall traffic operations as summarized in Section 3.3.2.

6.5 Intersection Improvements

There are no anticipated intersection improvements at this time.

6.6 Impacts

No new right-of-way or major utility relocations are anticipated with the recommended alternative. Additional investigation of potential impacts at the Larry Caldwell Drive bridge outside existing slope paving is required during the scoping phase.

6.7 Intelligent Transportation System

No Intelligent Transportation Systems are anticipated for the project at this time.

6.8 Signing and Pavement Marking

Existing signing and pavement marking within the project limits will be replaced due to the roadway widening. Signing and pavement marking will follow current ADOT guidelines. Signing and pavement marking will meet ADOT requirements.

A new tapered tube sign structure is recommended to be implemented along the frontage roads as included in the 15% design plans and below in **Figure 29**. These signs will help give advanced warning and clarify decision making for the public.

Figure 29: Recommended Frontage Road Signage

6.9 Typical Section

The proposed typical sections for the EB SR 89A On-Ramp, Mainline, and Frontage Road are described below.

The proposed EB SR 89A On-Ramp follows ADOT criteria for a Two-Lane Service Entrance On-Ramp, which includes a minimum 2-12’ travel lanes, 2’ inside shoulder (4’ with barrier), and 8’ outside shoulder (10’ with barrier).

The proposed EB SR 89A Mainline follows ADOT criteria for a Fringe-Urban Access Controlled Highway, which includes a minimum 12’ travel lanes (4 travel lanes once EB SR 89A On-Ramp enters the mainline which then transitions back to 2 travel lanes prior to Granite Creek Bridge), 12’ inside and outside shoulders, and barrier.

The proposed EB Frontage Road follows ADOT criteria for a One Lane Frontage Road, which includes a minimum 12’ travel lane, 2’ inside shoulder (4’ with barrier), and 8’ outside shoulder (10’ with barrier).

Assumed pavement sections were used to for cost estimating purposes. Pavement section design will be required during future phases of scoping and design. Assumed pavement sections used for the recommended alternative include the following:

- Roadway Widening and New Pavement (SR 89A Mainline) – 1” AR-ACFC, 7” AC Pavement, AB, and Subgrade (Lime Treatment/Geotextile/etc. requirements to be determined during future phases of scoping and design)
- Roadway Widening and New Pavement (Ramp and Frontage Road) – 1” AR-ACFC, 5” AC Pavement, AB, and Subgrade (Lime Treatment/Geotextile/etc. requirements to be determined during future phases of scoping and design)
- Mill and Overlay – 1” Mill Existing AC Pavement, and 1” AR-ACFC

See **Appendix A** for typical sections included as part of the 15% plans.

6.10 Horizontal and Vertical Alignments

The existing and proposed horizontal alignments for the EB SR 89A mainline, entrance ramp, and frontage road meet the design criteria as described in Section 5.2.1. The EB SR 89A mainline and frontage road consist of sawcut and widening of the existing pavement. The new entrance ramp consists of construction of a new two-lane entrance to SR 89A. Ramp and mainline horizontal geometry, lane shifts, and lane drop tapers follow requirements per the ADOT RDG and the approved design criteria.

The EB SR 89A mainline and frontage consist of sawcut and widening of the existing pavement and thus match the existing vertical alignments. The proposed vertical alignment for the new two-lane entrance to SR 89A meets the design criteria as described in Section 5.2.1 and the requirements per the ADOT RDG. It should be noted that the new two-lane entrance ramp allows for realignment of the frontage road gore (sliding the split lane to the west of its existing location) providing improved and required sight distance for lane assignment decisions approaching the entrance ramp and frontage road.

6.11 Right-of-Way

No new ROW is anticipated with the recommended alternative.

6.12 Utility

A utility survey was not conducted for this ASR. No major utility relocations are anticipated for this project at this time. Utility coordination will be required during future phases of scoping and design to identify all utilities, conflicts, and mitigation needs.

6.13 Drainage

The recommended alternative will maintain existing drainage patterns. Proposed widening will require reconstruction/relocation of existing drainage structures including catch basins and other impacted drainage structures.

7 Scoping Phase Requirements

It is recommended that the SR 89 to SR 89A On-Ramp project be moved forward to the scoping phase to develop more detailed engineering design and further refine the Recommended Alternative. Project scoping could include development of a Project Assessment or Design Concept Report along with 30% Design Plans, Technical Reports, and documentation. The following requirement and other key considerations should be examined as part of the scoping design phase:

- Detailed topographic survey
- Alternative refinement
- Drainage Report
- Traffic Report
- Geotechnical and Pavement Design Report
- ADA Report
- Detailed Environmental Documentation/NEPA and determination of potential mitigation measures warranted before commencement of project construction
- Public Involvement
- TAC/Agency input and acceptance
- Total project cost and available funding sources
- Scoping Phase is estimated to take approximately 9 months

8 Estimated Cost

Figure 30 presents the preliminary total project cost estimate for the Recommended Alternative. The preliminary total project cost estimate for the Recommended Alternative is $5,330,000. The preliminary total project cost estimate includes planning level construction, design, and contingency costs for implementation of the Recommended Alternative. See **Appendix B** for additional cost estimate information.

Preliminary Design, Final Design, and Construction are currently not programmed for this project in either the CYMPO MTIP or ADOT Five-Year Construction Program. This project is anticipated to be programmed in future fiscal year programs, using CYMPO and ADOT statewide funds pending funding availability.

In addition to traditional project programming processes, CYMPO has also requested funding for this project as part of CYMPO's request for one-time state legislative funding support. This state legislative funding support is a funding request formally proposed in Arizona's fifty-fifth Legislature – Second Regular Session as supported by Rural Transportation Advisory Council (RTAC) and Greater Arizona COG and MPO agencies. This statewide proposal is comprised of various transportation infrastructure project funding requests distributed proportionally across COG/MPOs equivalent to population. At the time of the publication of this report, the funding proposal is still pending revision and has not been approved by the State House or Senate.

Recommended Alternative
Stage I (15%)
SR 89A to SR89A On Ramps ASR

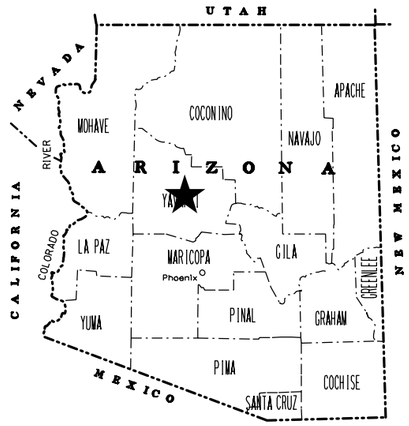
ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	7,001	7.00	49,100
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	24,643	1.50	37,000
2020201	SAWCUTTING	L.FT.	11,736	1.50	17,700
20200XX	REMOVE BARRIER	L.FT.	1,202	20.00	24,100
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	9,843	20.00	196,900
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	24,643	9.00	221,800
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime	SQ.YD.	3,653	50.00	182,700
40900XX	ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	12,505	60.00	750,300
50000XX	DRAINAGE (3%)	L.SUM	1	67,000.00	67,000
60600XX	SIGNING (1%)	L.SUM	1	22,000.00	22,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	25,785	0.35	9,100
70600XX	PAVEMENT MARKERS	EACH	387	3.00	1,200
91000XX	CONCRETE BARRIER	L.FT.	7,904	80.00	632,400
			ITEM TOTAL		**2,246,300**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		180,000.00	180,000
	Dust and Water Palliative (0.75%)	COST		17,000.00	17,000
	Quality Control (0.75%)	COST		17,000.00	17,000
	Construction Surveying (1.5%)	COST		34,000.00	34,000
	Erosion Control (0.3%)	COST		7,000.00	7,000
	Mobilization (8% of all construction items)	COST		264,000.00	264,000
			PROJECT WIDE SUBTOTAL		**519,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		554,000.00	554,000
			PROJECT WIDE TOTAL		**1,073,000**
OTHER COST					
	Construction Engineering (9%)	COST		299,000.00	299,000
	Construction Contingencies (5%)	COST		166,000.00	166,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		266,000.00	266,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		67,000.00	67,000
			OTHER COST TOTAL		**798,000**

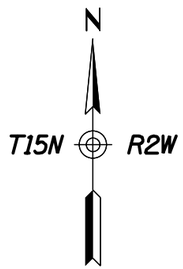
SUMMARY

ITEM TOTAL	**2,246,300**
PROJECT WIDE	**1,073,000**
OTHER COST TOTAL	**798,000**
SUBTOTAL PROJECT COST	**4,117,300**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**453,000**
TOTAL PROJECT COST	**4,570,300**
TOTAL PROJECT COST (ROUNDUP $100K)	**4,600,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**5,330,000**

Figure 30: Recommended Alternative 15% Cost Estimate

Appendix A – 15% Recommended Alternative Design Plans



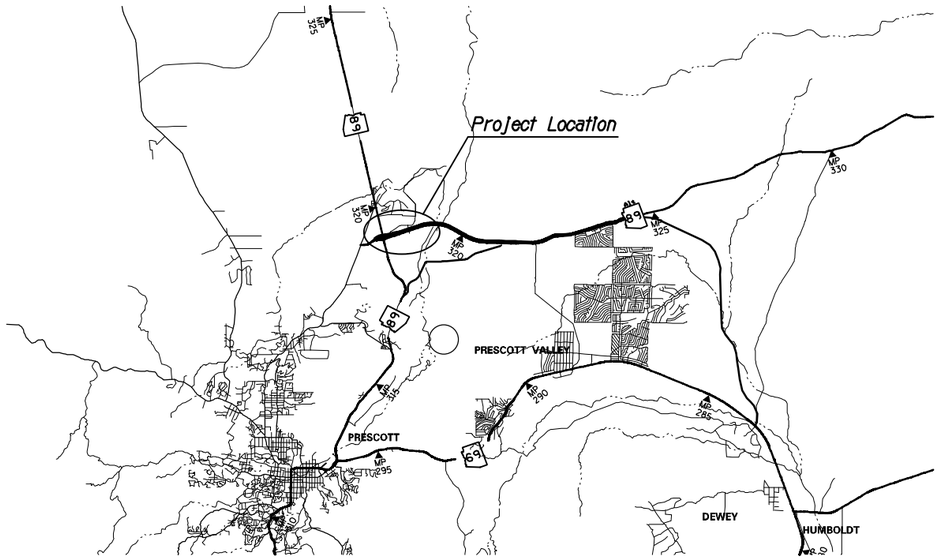


STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION

ADOT

PROJECT PLANS

STATE HIGHWAY
PRESCOTT–FLAGSTAFF HIGHWAY
STATE ROUTE 89A



STAGE I DESIGN SUBMITTAL
15% COMPLETE
APRIL, 2022

SR 89 TO SR 89A ON–RAMPS
ALTERNATIVES SELECTION REPORT

ADOT PROJECT NO.: MPD197313.21–200.3

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
GREG BYRES, P.E., STATE ENGINEER

REC. DWGS. DATA	REC. DWG. DATE	_____ OF _____

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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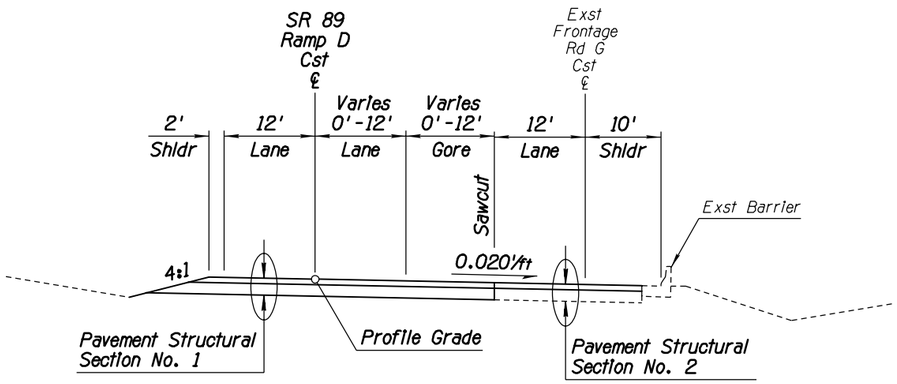
		89A YV 317			



TYPICAL SECTION - SR 89 Ramp D & Frontage Rd G

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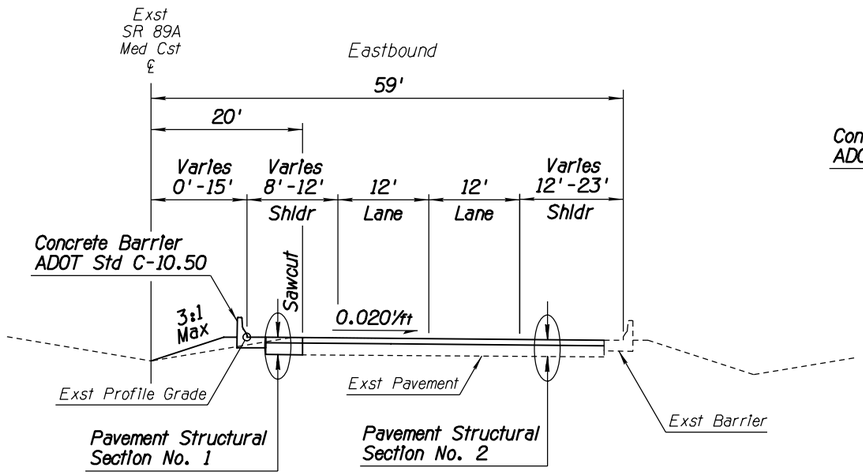
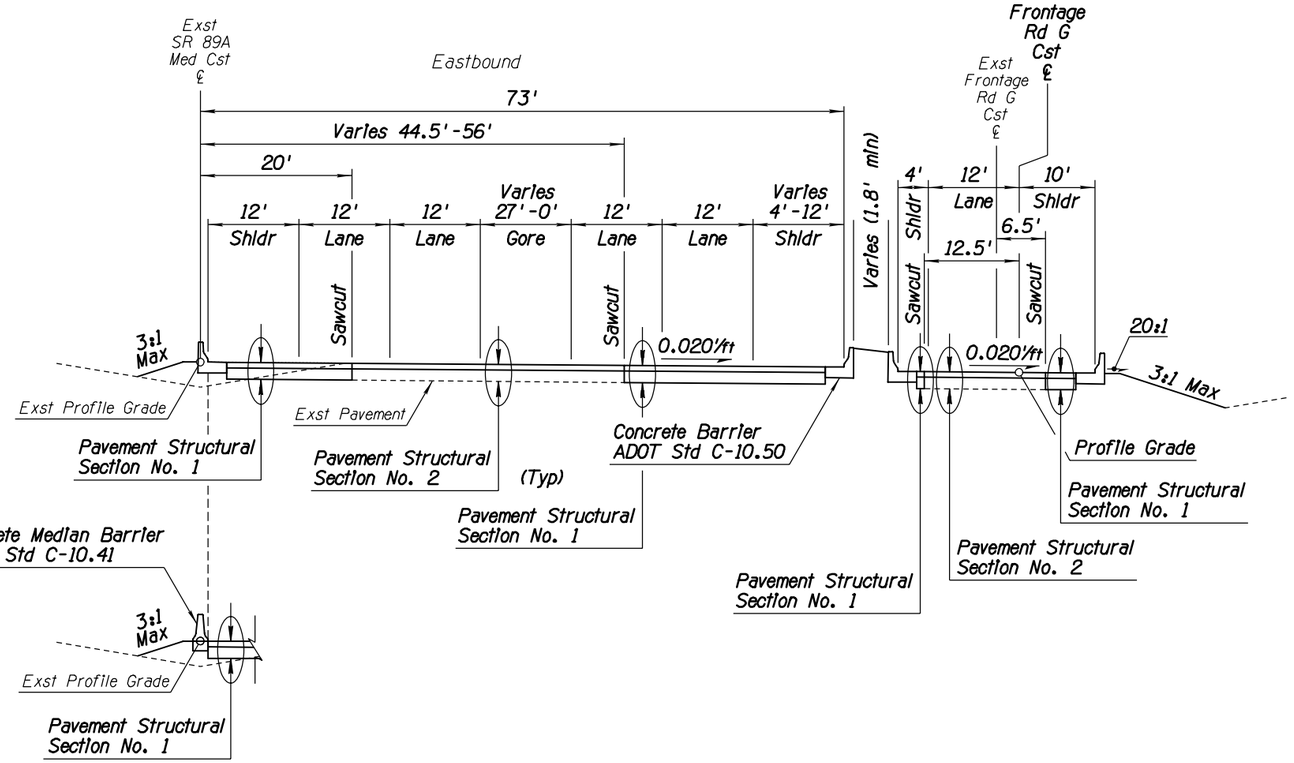


TYPICAL SECTION - SR 89A

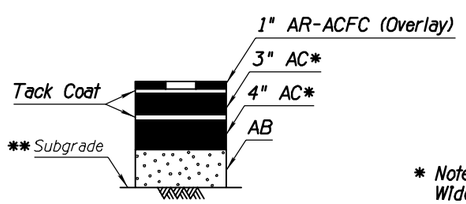
Sta 339+53.15 to Sta 348+00.00 (SR 89A)



Sta 355+30.00 to Sta 362+00.00

TYPICAL SECTION - SR 89A & Frontage Rd G

Sta 348+00.00 to Sta 362+00.00 (SR 89A)

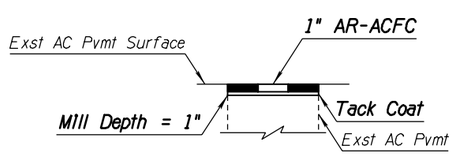


* *Note Ramp and Frontage Road Widening Assume 5" Total AC Depth.*

** *Lime Treated Subgrade or Geotextile To Be Determined If Required During Final Design*

ASSUMED PAVEMENT STRUCTURAL SECTION NO. 1

Roadway Widening & New Pavement



ASSUMED PAVEMENT STRUCTURAL SECTION NO. 2

Mill & Overlay

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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ROADWAY DESIGN SERVICES

TYPICAL SECTIONS

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR
DWG NO. C-01.01

TRACS NO. MPD197313.21-200.3
___ OF ___

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

HALF_GRAY. PLTCFG
WYSIWYG. W_NAME. TBL

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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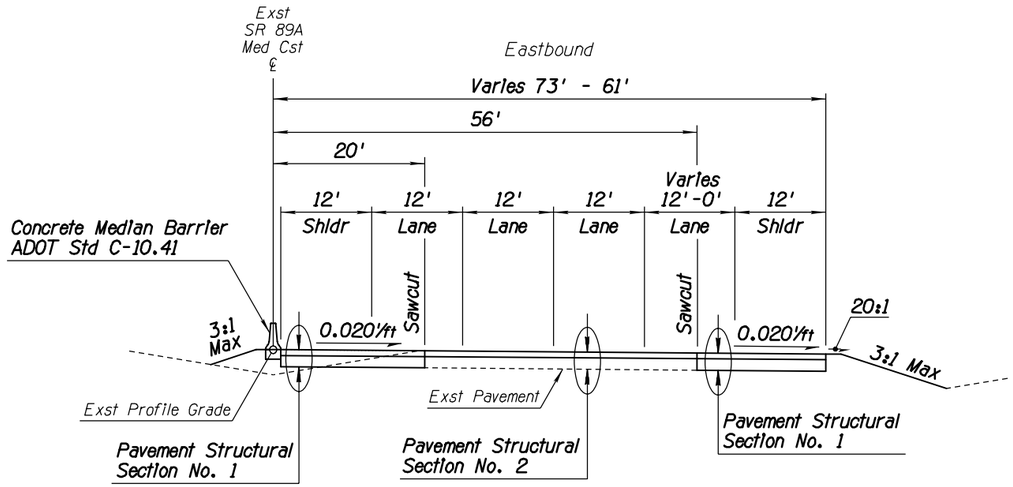
		89A YV 317			



TYPICAL SECTION - SR 89A & Frontage Rd G

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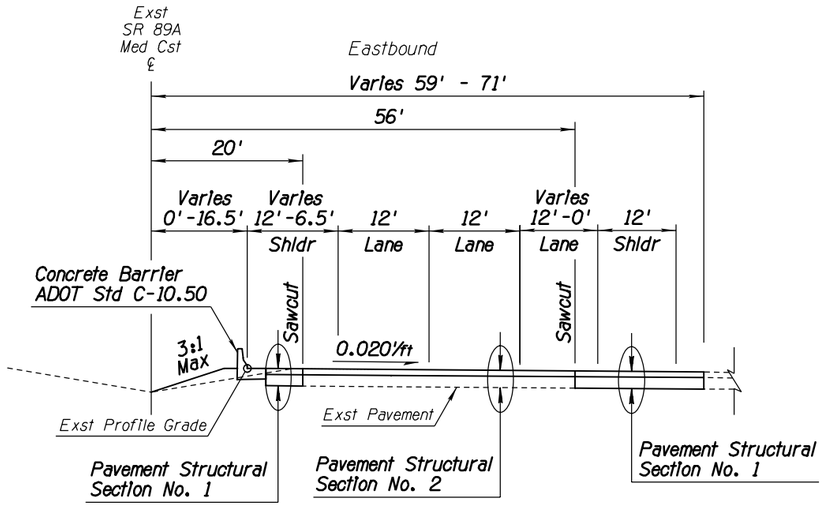

TYPICAL SECTION - SR 89A

Sta 375+00.00 to Sta 387+70.00 (SR 89A)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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TYPICAL SECTIONS

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR

DWG NO. C-01.02

TRACS NO. | MPD197313.21-200.3 | ___ OF ___

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

HALF_GRAY.PLTCFG
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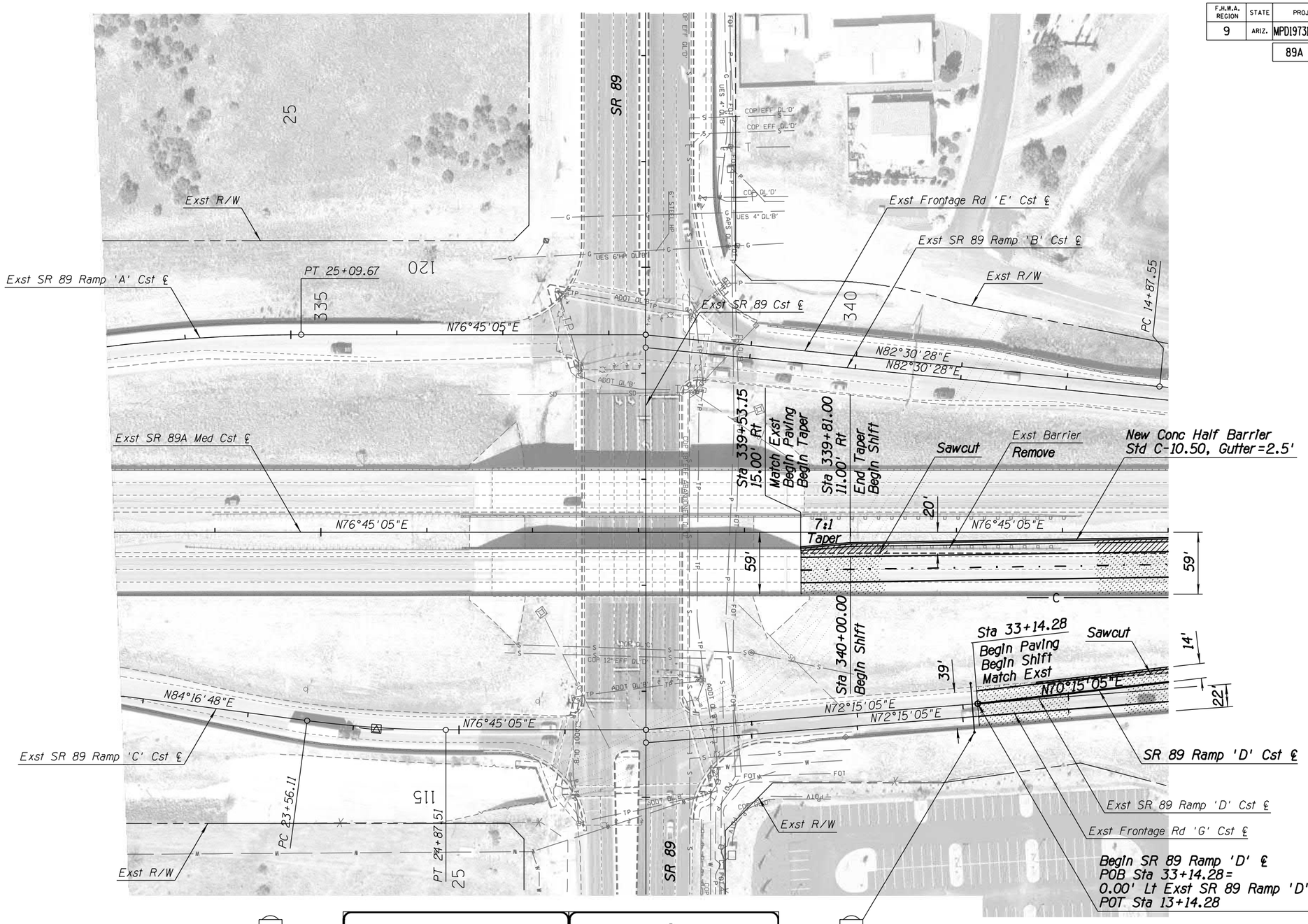
		89A YV 317			



LEGEND

- Pavement Structural Section No. 1 (Roadway Widening & New Pavement)
- Pavement Structural Section No. 2 (Mill & Overlay)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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ROADWAY DESIGN SERVICES

ROADWAY PLANS
SR 89A
STA 329+00 TO STA 343+00

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

ROUTE	LOCATION	DWG NO.
SR 89A	SR 89 TO SR 89A ON RAMPS ASR	C-03.01
TRACS NO.	MPD197313.21-200.3	___ OF ___

HALF_GRAY. PLTCFG
WYSIWYG_W_NAME. TBL

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

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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		89A YV 317			

(100) CURVE DATA
PI Sta 43+75.18
Main Curve
Δ=4°12'05" Rt
D=0°45'00"
R=7639.44'
L=560.20'
T=280.22'
Ext=5.14'
Super=NC

(110) CURVE DATA
PI Sta 37+34.02
Main Curve
Δ=3°15'33" Rt
D=0°15'00"
R=22918.31'
L=1303.67'
T=652.01'
Ext=9.27'
Super=NC

PC 15+08.40
PT 19+21.47
PT 20+59.95
PC 27+64.39
Exst Frontage Rd 'E' Cst ℄
Exst SR 89 Ramp 'B' Cst ℄
Exst R/W
New Conc Half Barrier
Std C-10.50, Gutter=2.5'
N74°18'32"E
N76°35'28"E
N76°45'05"E
N71°34'11"E
Exst SR 89A Med Cst ℄
Sta 347+80.00,
1.00' Rt
End Shift
PC 345+29.92
Exst SR 89A Med Cst ℄
Sta 355+30.00
End Conc Half Barrier
Begin Conc Median Barrier
Exst SR 89A Ramp 'D' Cst ℄
Sta 42+06.33
End Gore
Sawcut
New Conc Median Barrier
Std C-10.41
End SR 89 Ramp 'D' Cst ℄
PT Sta 46+55.15=
49.00' Rt Exst SR 89A Med Cst ℄
POC Sta 354+52.61
Frontage Rd 'G' Cst ℄
SR 89 Ramp 'D' Cst ℄
SR 89A Ramp 'D' Cst ℄
Sta 38+32.29
Begin Gore
SR 89 Ramp 'D' Cst ℄
Sta 40+04.97, 16.00' Rt
Exst Frontage Rd 'G' Cst ℄
Sta 20+06.00, 16.00' Lt
Frontage Rd 'G' Cst ℄
Sta 30+82.01, 10.00' Rt
PC 40+94.96
Exst SR 89A Med Cst ℄
Sta 351+50.82, 73.00' Rt
PC 25+06.42
Frontage Rd 'G' Cst ℄
Sta 36+50.00, 10.00' Rt
Exst Frontage Rd 'G' Cst ℄
Exst SR 89 Ramp 'D' Cst ℄
Begin Frontage Rd 'G' Cst ℄
PC Sta 30+82.01=
0.00' Rt Exst Frontage Rd 'G' Cst ℄
POT Sta 20+82.01
New Conc Half Barrier
Std C-10.50, Gutter=2.5'
Frontage Rd 'G' Cst ℄

LEGEND

- Pavement Structural Section No. 1 (Roadway Widening & New Pavement)
- Pavement Structural Section No. 2 (Mill & Overlay)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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ROADWAY DESIGN SERVICES

ROADWAY PLANS
SR 89A
STA 343+00 TO STA 357+00

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR

TRACS NO. | MPD197313.21-200.3

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-03.02
___ OF ___

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE
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WYSIWYG_W_NAME.TBL

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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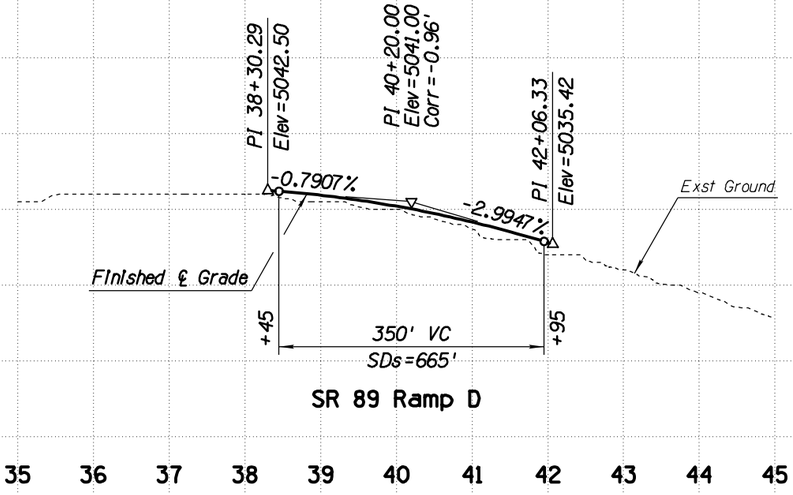
89A YV 317



	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

PROFILE SHEET
SR 89 RAMP D

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR

DWG NO. C-03.03

TRACS NO. MPD197313.21-200.3

___ OF ___

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

HALF_GRAY. PLTCFG
WYSIWYG_W_NAME. TBL

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313.21-200.3			
		89A YV 317			

(110) CURVE DATA

PI Sta 37+34.02

Main Curve
Δ=3°15'33" Rt
D=0°15'00"
R=22918.31'
L=1303.67'
T=652.01'
Ext=9.27'
Super=NC

30
30
35
40
Exst R/W
360
PT 34+34.34
Exst Frontage Rd 'E' Cst ℄
365
370
Exst SR 89 Ramp 'B' Cst ℄
N69°30'38"E
PT 366+33.73
New Conc Median Barrier
Std C-10.41
Exst SR 89A Med Cst ℄
20'
N71°30'38"E
73'
17'
73'
Varies
24'
F
C
110
8'
16'
Sawcut
Sawcut
24'
17'
50:1 Taper
N75°30'38"E
PT 29+61.49
Exst SR 89 Ramp 'D' Cst ℄
Exst R/W
Exst Frontage Rd 'G' Cst ℄
30
40
New Conc Half Barrier
Std C-10.50, Gutter=2.5'
End Frontage Rd 'G' Cst ℄
PT Sta 43+85.68=
Exst Frontage Rd 'G' Cst ℄
POT Sta 33+85.90
Frontage Rd 'G' Cst ℄
Sta 43+85.68=
End Paving
Match Exst
Exst SR 89A Med Cst ℄
Sta 362+00.00, 73.00' Rt=
End Paving
Match Exst
35
40
Exst SR 89A Med Cst ℄
Sta 368+00.00, 73.00' Rt
Begin Taper

LEGEND

- Pavement Structural Section No. 1 (Roadway Widening & New Pavement)
- Pavement Structural Section No. 2 (Mill & Overlay)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

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

ROADWAY PLANS
SR 89A
STA 357+00 TO STA 371+00

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR

TRACS NO. MPD197313.21-200.3

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-03.04

___ OF ___

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

HALF_GRAY. PLTCFG
WYSIWYG_W_NAME. TBL

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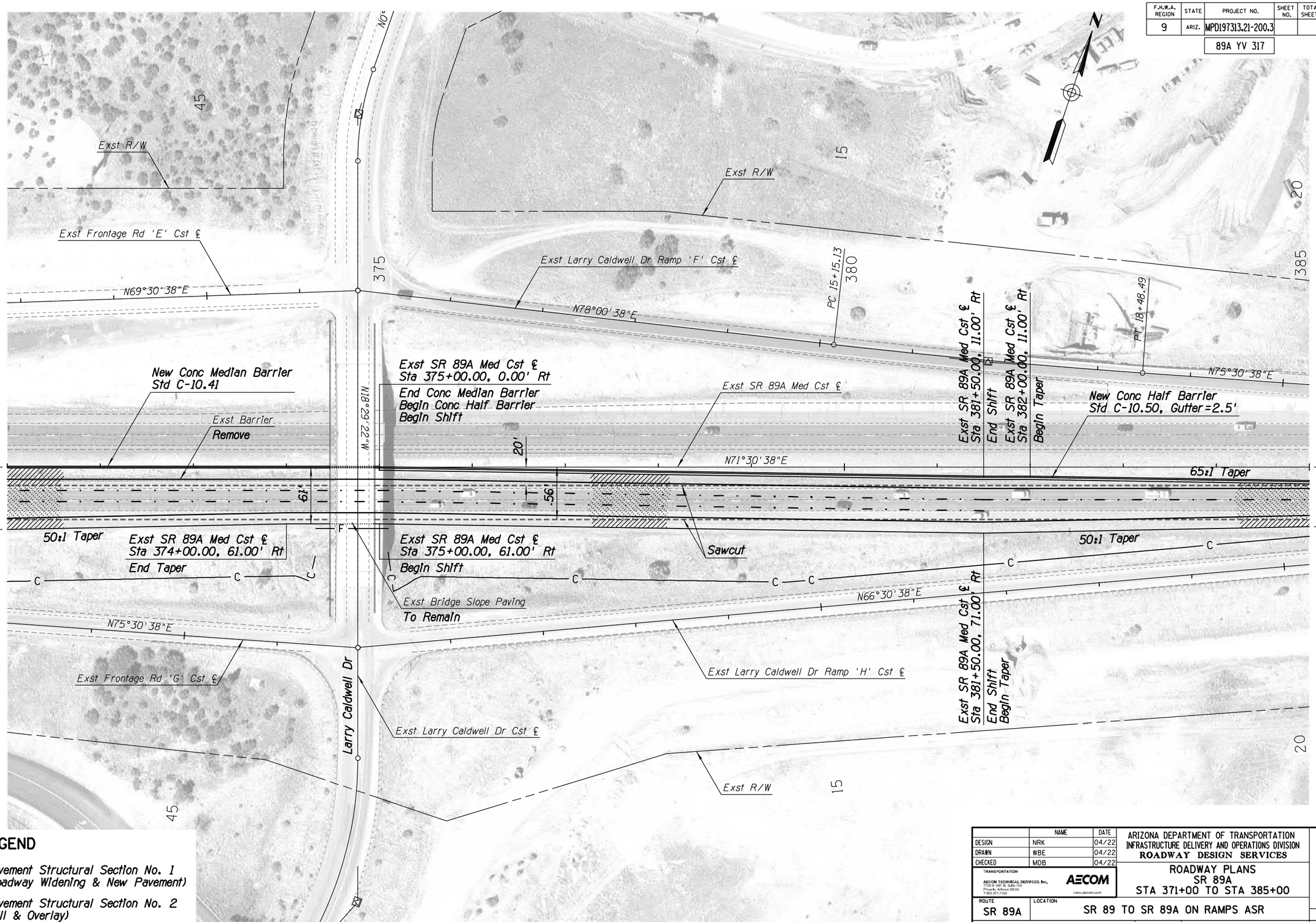
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313.21-200.3			
		89A YV 317			



LEGEND

- Pavement Structural Section No. 1 (Roadway Widening & New Pavement)
- Pavement Structural Section No. 2 (Mill & Overlay)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

TRANSPORTATION
AECOM TECHNICAL SERVICES, Inc.
7720 N 16th St, Suite 150
Phoenix, Arizona 85020
T 602.371.1100
AECOM
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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

ROADWAY PLANS
SR 89A
STA 371+00 TO STA 385+00

ROUTE: SR 89A
LOCATION: SR 89 TO SR 89A ON RAMPS ASR

TRACS NO. MPD197313.21-200.3

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. C-03.05

___ OF ___

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

HALF_GRAY.PLTCFG
WYSIWYG_W_NAME.TBL

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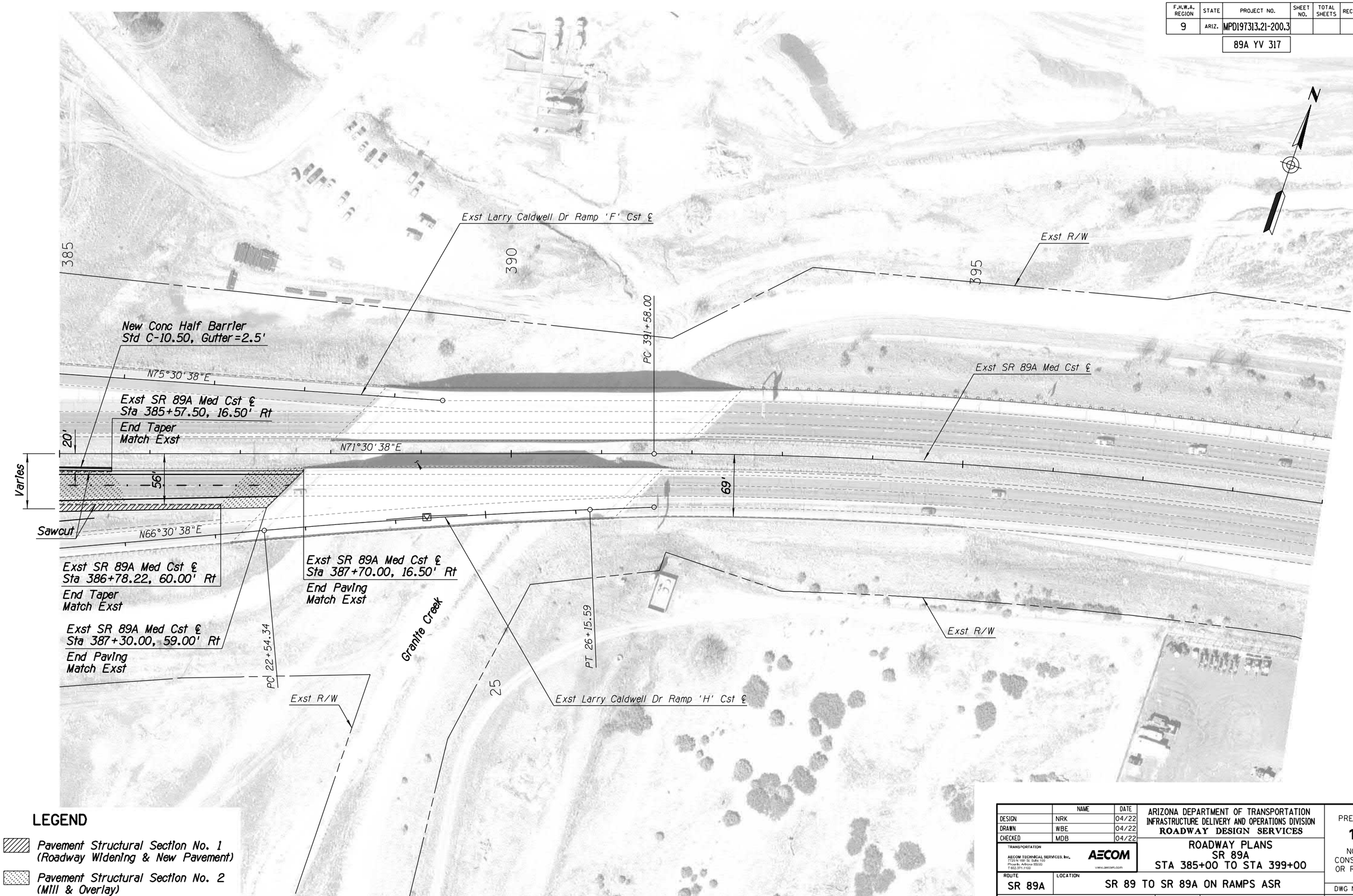
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.	MPD197313.21-200.3			

89A YV 317



LEGEND

- Pavement Structural Section No. 1 (Roadway Widening & New Pavement)
- Pavement Structural Section No. 2 (Mill & Overlay)

	NAME	DATE
DESIGN	NRK	04/22
DRAWN	WBE	04/22
CHECKED	MDB	04/22

TRANSPORTATION

AECOM TECHNICAL SERVICES, Inc.
7720 N 16th St, Suite 100
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ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
ROADWAY DESIGN SERVICES

ROADWAY PLANS
SR 89A
STA 385+00 TO STA 399+00

PRELIMINARY
15%
NOT FOR CONSTRUCTION OR RECORDING

ROUTE	LOCATION
SR 89A	SR 89 TO SR 89A ON RAMPS ASR

DWG NO. C-03.06

TRACS NO. MPD197313.21-200.3

___ OF ___

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

HALF_GRAY.PLTCFG
WYSIWYG_W_NAME.TBL

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Appendix B – Alternative Cost Estimates

Alt 1
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	3,862	7.00	27,100
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	7,932	1.50	11,900
2020201	SAWCUTTING	L.FT.	5,956	1.50	9,000
20200XX	REMOVE BARRIER	L.FT.	569	20.00	11,400
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	4,586	25.00	114,700
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	7,932	9.00	71,400
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS	SQ.YD.	3,437	50.00	171,900
40900XX	STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	3,801	60.00	228,100
50000XX	DRAINAGE (3%)	L.SUM	1	30,000.00	30,000
60600XX	SIGNING (1%)	L.SUM	1	10,000.00	10,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	10,539	0.35	3,700
70600XX	PAVEMENT MARKERS	EACH	158	3.00	500
91000XX	CONCRETE BARRIER	L.FT.	3,357	80.00	268,600
			ITEM TOTAL		**993,300**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		80,000.00	80,000
	Dust and Water Palliative (0.75%)	COST		8,000.00	8,000
	Quality Control (0.75%)	COST		8,000.00	8,000
	Construction Surveying (1.5%)	COST		15,000.00	15,000
	Erosion Control (0.3%)	COST		3,000.00	3,000
	Mobilization (8% of all construction items)	COST		117,000.00	117,000
			PROJECT WIDE SUBTOTAL		**231,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		245,000.00	245,000
			PROJECT WIDE TOTAL		**476,000**
OTHER COST					
	Construction Engineering (9%)	COST		133,000.00	133,000
	Construction Contingencies (5%)	COST		74,000.00	74,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		118,000.00	118,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		30,000.00	30,000
			OTHER COST TOTAL		**355,000**

SUMMARY	
ITEM TOTAL	**993,300**
PROJECT WIDE	**476,000**
OTHER COST TOTAL	**355,000**
SUBTOTAL PROJECT COST	**1,824,300**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**201,000**
TOTAL PROJECT COST	**2,025,300**
TOTAL PROJECT COST (ROUNDUP $100K)	**2,100,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**2,440,000**

Alt 2
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	7,001	7.00	49,100
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	24,643	1.50	37,000
2020201	SAWCUTTING	L.FT.	11,736	1.50	17,700
20200XX	REMOVE BARRIER	L.FT.	1,202	20.00	24,100
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	9,843	20.00	196,900
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	24,643	9.00	221,800
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime Treated or Geotext) ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS	SQ.YD.	3,653	50.00	182,700
40900XX	STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	12,505	60.00	750,300
50000XX	DRAINAGE (3%)	L.SUM	1	67,000.00	67,000
60600XX	SIGNING (1%)	L.SUM	1	22,000.00	22,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	25,785	0.35	9,100
70600XX	PAVEMENT MARKERS	EACH	387	3.00	1,200
91000XX	CONCRETE BARRIER	L.FT.	7,904	80.00	632,400
			ITEM TOTAL		**2,246,300**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		180,000.00	180,000
	Dust and Water Palliative (0.75%)	COST		17,000.00	17,000
	Quality Control (0.75%)	COST		17,000.00	17,000
	Construction Surveying (1.5%)	COST		34,000.00	34,000
	Erosion Control (0.3%)	COST		7,000.00	7,000
	Mobilization (8% of all construction items)	COST		264,000.00	264,000
			PROJECT WIDE SUBTOTAL		**519,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		554,000.00	554,000
			PROJECT WIDE TOTAL		**1,073,000**
OTHER COST					
	Construction Engineering (9%)	COST		299,000.00	299,000
	Construction Contingencies (5%)	COST		166,000.00	166,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		266,000.00	266,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		67,000.00	67,000
			OTHER COST TOTAL		**798,000**

SUMMARY	
ITEM TOTAL	**2,246,300**
PROJECT WIDE	**1,073,000**
OTHER COST TOTAL	**798,000**
SUBTOTAL PROJECT COST	**4,117,300**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**453,000**
TOTAL PROJECT COST	**4,570,300**
TOTAL PROJECT COST (ROUNDUP $100K)	**4,600,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**5,330,000**

Alt 2A
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	5,721	7.00	40,100
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	8,679	1.50	13,100
2020201	SAWCUTTING	L.FT.	7,505	1.50	11,300
20200XX	REMOVE BARRIER	L.FT.	604	20.00	12,100
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	3,446	25.00	86,200
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	8,679	9.00	78,200
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime Treated or Geotext)	SQ.YD.	4,423	50.00	221,200
40900XX	ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	6,938	60.00	416,300
50000XX	DRAINAGE (3%)	L.SUM	1	46,000.00	46,000
60600XX	SIGNING (1%)	L.SUM	1	15,000.00	15,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	19,441	0.35	6,900
70600XX	PAVEMENT MARKERS	EACH	292	3.00	900
91000XX	CONCRETE BARRIER	L.FT.	6,853	80.00	548,300
			ITEM TOTAL		**1,530,600**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		123,000.00	123,000
	Dust and Water Palliative (0.75%)	COST		12,000.00	12,000
	Quality Control (0.75%)	COST		12,000.00	12,000
	Construction Surveying (1.5%)	COST		23,000.00	23,000
	Erosion Control (0.3%)	COST		5,000.00	5,000
	Mobilization (8% of all construction items)	COST		180,000.00	180,000
			PROJECT WIDE SUBTOTAL		**355,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		378,000.00	378,000
			PROJECT WIDE TOTAL		**733,000**
OTHER COST					
	Construction Engineering (9%)	COST		204,000.00	204,000
	Construction Contingencies (5%)	COST		114,000.00	114,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		182,000.00	182,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		46,000.00	46,000
			OTHER COST TOTAL		**546,000**

SUMMARY	
ITEM TOTAL	**1,530,600**
PROJECT WIDE	**733,000**
OTHER COST TOTAL	**546,000**
SUBTOTAL PROJECT COST	**2,809,600**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**310,000**
TOTAL PROJECT COST	**3,119,600**
TOTAL PROJECT COST (ROUNDUP $100K)	**3,200,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**3,710,000**

Alt 3A
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	6,190	7.00	43,400
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	7,979	1.50	12,000
2020201	SAWCUTTING	L.FT.	6,986	1.50	10,500
20200XX	REMOVE BARRIER	L.FT.	1,538	20.00	30,800
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	4,953	25.00	123,900
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	7,979	9.00	71,900
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime Treated or Geotext)	SQ.YD.	6,113	50.00	305,700
40900XX	ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	3,809	60.00	228,600
50000XX	DRAINAGE (3%)	L.SUM	1	40,000.00	40,000
60600XX	SIGNING (1%)	L.SUM	1	13,000.00	13,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	12,468	0.35	4,400
70600XX	PAVEMENT MARKERS	EACH	187	3.00	600
91000XX	CONCRETE BARRIER	L.FT.	5,356	80.00	428,500
			ITEM TOTAL		**1,348,300**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		108,000.00	108,000
	Dust and Water Palliative (0.75%)	COST		11,000.00	11,000
	Quality Control (0.75%)	COST		11,000.00	11,000
	Construction Surveying (1.5%)	COST		21,000.00	21,000
	Erosion Control (0.3%)	COST		5,000.00	5,000
	Mobilization (8% of all construction items)	COST		159,000.00	159,000
			PROJECT WIDE SUBTOTAL		**315,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		333,000.00	333,000
			PROJECT WIDE TOTAL		**648,000**
OTHER COST					
	Construction Engineering (9%)	COST		180,000.00	180,000
	Construction Contingencies (5%)	COST		100,000.00	100,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		160,000.00	160,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		40,000.00	40,000
			OTHER COST TOTAL		**480,000**

SUMMARY	
ITEM TOTAL	**1,348,300**
PROJECT WIDE	**648,000**
OTHER COST TOTAL	**480,000**
SUBTOTAL PROJECT COST	**2,476,300**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**273,000**
TOTAL PROJECT COST	**2,749,300**
TOTAL PROJECT COST (ROUNDUP $100K)	**2,800,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**3,250,000**

Alt 3B
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	4,459	7.00	31,300
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	9,066	1.50	13,600
2020201	SAWCUTTING	L.FT.	6,331	1.50	9,500
20200XX	REMOVE BARRIER	L.FT.	569	20.00	11,400
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	4,953	25.00	123,900
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	9,066	9.00	81,600
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime Treated or Geotext)	SQ.YD.	4,613	50.00	230,700
40900XX	ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	3,801	60.00	228,100
50000XX	DRAINAGE (3%)	L.SUM	1	32,000.00	32,000
60600XX	SIGNING (1%)	L.SUM	1	11,000.00	11,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	12,720	0.35	4,500
70600XX	PAVEMENT MARKERS	EACH	191	3.00	600
91000XX	CONCRETE BARRIER	L.FT.	3,360	80.00	268,800
			ITEM TOTAL		**1,082,000**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		87,000.00	87,000
	Dust and Water Palliative (0.75%)	COST		9,000.00	9,000
	Quality Control (0.75%)	COST		9,000.00	9,000
	Construction Surveying (1.5%)	COST		17,000.00	17,000
	Erosion Control (0.3%)	COST		4,000.00	4,000
	Mobilization (8% of all construction items)	COST		128,000.00	128,000
			PROJECT WIDE SUBTOTAL		**254,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		268,000.00	268,000
			PROJECT WIDE TOTAL		**522,000**
OTHER COST					
	Construction Engineering (9%)	COST		145,000.00	145,000
	Construction Contingencies (5%)	COST		81,000.00	81,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		129,000.00	129,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		33,000.00	33,000
			OTHER COST TOTAL		**388,000**

SUMMARY	
ITEM TOTAL	**1,082,000**
PROJECT WIDE	**522,000**
OTHER COST TOTAL	**388,000**
SUBTOTAL PROJECT COST	**1,992,000**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**220,000**
TOTAL PROJECT COST	**2,212,000**
TOTAL PROJECT COST (ROUNDUP $100K)	**2,300,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**2,670,000**

Alt 3C
Stage I (15%)
SR 89A to SR89A On Ramps ASR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	7,255	7.00	50,800
2020081	REMOVE BITUMINOUS PAVEMENT (MILLING) (1")	SQ.YD.	25,631	1.50	38,500
2020201	SAWCUTTING	L.FT.	12,100	1.50	18,200
20200XX	REMOVE BARRIER	L.FT.	1,202	20.00	24,100
20300XX	EARTHWORK (ROADWAY EX)	CU.YD.	10,630	20.00	212,700
40900XX	ASPHALTIC CONCRETE (MILLED AREAS) (MISCELLANEOUS STRUCTURAL) (1" AC)	SQ.YD.	25,631	9.00	230,700
40900XX	ASPHALTIC CONCRETE (RAMPS & FRONTAGE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 5" AC, AB or Lime Treated or Geotext)	SQ.YD.	4,874	50.00	243,700
40900XX	ASPHALTIC CONCRETE (MAINLINE) (MISCELLANEOUS STRUCTURAL) (1" AR-ACFC, 7" AC, AB or Lime Treated or Geotext)	SQ.YD.	12,522	60.00	751,400
50000XX	DRAINAGE (3%)	L.SUM	1	70,000.00	70,000
60600XX	SIGNING (1%)	L.SUM	1	23,000.00	23,000
606XXXX	BRIDGE SIGN STRUCTURE	L.SUM	1	35,000.00	35,000
70400XX	PAVEMENT MARKINGS (STRIPE)	L.FT.	28,021	0.35	9,900
70600XX	PAVEMENT MARKERS	EACH	420	3.00	1,300
91000XX	CONCRETE BARRIER	L.FT.	7,949	80.00	636,000
			ITEM TOTAL		**2,345,300**
PROJECT WIDE					
	Maintenance and Protection of Traffic (8%)	COST		188,000.00	188,000
	Dust and Water Palliative (0.75%)	COST		18,000.00	18,000
	Quality Control (0.75%)	COST		18,000.00	18,000
	Construction Surveying (1.5%)	COST		36,000.00	36,000
	Erosion Control (0.3%)	COST		8,000.00	8,000
	Mobilization (8% of all construction items)	COST		276,000.00	276,000
			PROJECT WIDE SUBTOTAL		**544,000**
	Unidentified Items (20% of Item Total and Project Wide Subtotal)	COST		578,000.00	578,000
			PROJECT WIDE TOTAL		**1,122,000**
OTHER COST					
	Construction Engineering (9%)	COST		313,000.00	313,000
	Construction Contingencies (5%)	COST		174,000.00	174,000
	Environmental Mitigation (Unknown at this time)	COST		-	-
	PCCP Quality Incentive	SQ.YD.	0	1.50	-
	AR-ACFC Smoothness Incentive	L.MILE	0	11,000.00	-
	Engineering Design (Includes Surveying and Geotechnical) (8% of all items)	COST		278,000.00	278,000
	Right-of-Way	COST		-	-
	Utilities (Miscellaneous Relocation) (2%)	COST		70,000.00	70,000
			OTHER COST TOTAL		**835,000**

SUMMARY	
ITEM TOTAL	**2,345,300**
PROJECT WIDE	**1,122,000**
OTHER COST TOTAL	**835,000**
SUBTOTAL PROJECT COST	**4,302,300**
INDIRECT COST ALLOCATION (ICAP) (10.1%)	**474,000**
TOTAL PROJECT COST	**4,776,300**
TOTAL PROJECT COST (ROUNDUP $100K)	**4,800,000**
COST ADJUSTMENT FROM INCREASED RECENT BIDS (15%) (ROUNDUP $10K)	**5,560,000**

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