GREAT WESTERN CORRIDOR FEASIBILITY STUDY

WITH ENVIRONMENTAL OVERVIEW

(Bound Separately)

MARCH 2010

Prepared For:

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In Cooperation With:

Arizona Department of Transportation

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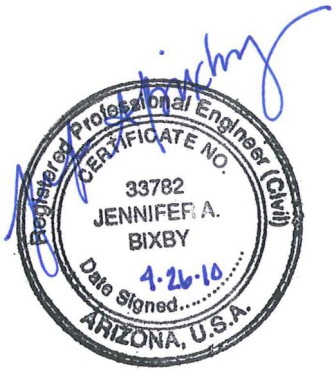

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Executive Summary

The *Central Yavapai County Transportation Study*, dated October 1995, identified Central Yavapai County as one of the fastest growing areas in the state. The study was conducted by Yavapai County in conjunction with Chino Valley, Prescott, Prescott Valley, Yavapai-Prescott Tribe, the Northern Arizona Council of Governments (NACOG), and ADOT. The 1995 transportation study was followed by the *Central Yavapai County Transportation Study Update*, dated December 1998. This study was prepared in conjunction with Yavapai County, Prescott, Prescott Valley, Chino Valley, and Yavapai-Prescott Tribe. In both studies, the Glassford Hill Road Extension was identified as a new regional four-lane "new or improved limited/controlled access road" that begins at the SR 89A/Glassford Hill Road intersection and continues north to the Road 5 South alignment, where it transitions to an east-west facility and terminates at SR 89. The study defined controlled access as high speed roadways with restricted access from properties and grade-separated interchanges.

The 2006 CYMPO study recommended a future roadway network comprised of local and regional roads to meet the 2030 travel demands, which included "Glassford Hill Road Extension from State Route 89A to Outer Loop Road or other alignment to be determined." Based on future traffic projections, an ultimate six-lane facility was recommended. In addition, the study states that "the Glassford Hill Road Extension from SR 89A to SR 89 to Williamson Valley Road provides the opportunity for a controlled access facility to offer some relief to SR 89 in the area" and therefore the plan reiterates that the roadway will be an access controlled facility.

The existing major highways in the study area include SR 69, SR 89, and SR 89A. Statewide and interstate travel to and from the area is served by I-17, which is roughly 32 miles east of the study area. These routes connect Central Yavapai County to the rest of Arizona, and the state highways serve as main thoroughfares for the local communities. The regional state routes are currently congested causing significant travel delays.

The City of Prescott recently completed the *Airport Area Transportation Plan*, which evaluated a large study area surrounding the Prescott Airport that includes the recommended Glassford Hill Extension roadway corridor. Updated traffic volume projections were developed based on potential build-out scenarios within the study area. That study identified the future "No-Build" conditions if a new controlled access freeway is not implemented in this area. The results of that analysis show that SR 89A and SR 89 will operate at level of service (LOS) E or F and the majority of the section line arterials within the study area will operate at LOS F.

These studies have all identified a need for a new access controlled facility based on projected future travel demands. In order to evaluate all potential locations on SR 89A for the beginning of the new access controlled facility, the study area for this Feasibility Study (refer to **Figure E-1**) has been broadened to also include what is referred to as the Great Western Road intersection with SR 89A (Old Hwy 89A). This study evaluates the Great Western Corridor and develops alternative alignments, traffic interchange locations and configurations, typical roadway cross sections, and ultimate right of way needs. The alternatives evaluation process includes an assessment of environmental, engineering, and property access criteria in order to develop a preferred corridor alignment.

Many agency and private stakeholders were involved with the alternatives development and evaluation of the Great Western Corridor, including Yavapai County, Arizona Department of Transportation (ADOT), Federal Highway Administration (FHWA), Town of Prescott Valley, Town of Chino Valley, City of Prescott, Central Yavapai Metropolitan Planning Organization (CYMPO), US Fish & Wildlife Services (USFWS), Arizona Game & Fish Department (AGFD), Granite Dells Ranch Holdings, LLC, Arizona State Land Department (ASLD), Deep Well Ranch, Cortez Enterprises, and Granite Dells Estates Properties, Inc.

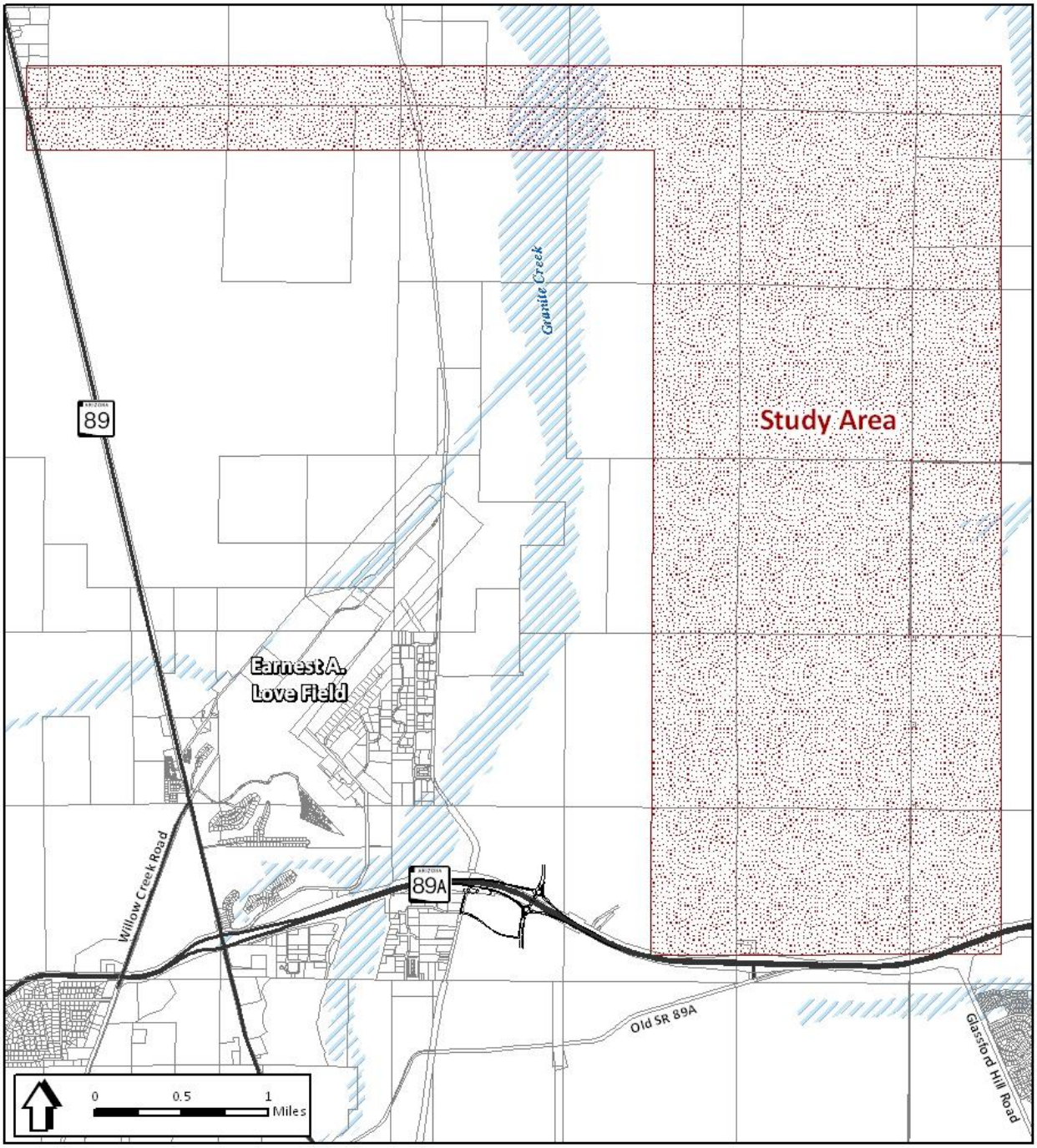


Figure E-1 Study Area

Monthly progress meetings were held with the project stakeholders in order to provide updates on technical data, develop alternative alignments, develop evaluation criteria, and select the preferred alternative for the corridor. The stakeholders, along with the project team, developed four alternative alignments for evaluation. Two of these alignments begin at SR 89A and Glassford Hill Road, and two of the alignments begin at SR 89A and Great Western Road. All alignment alternatives terminate at SR 89 and the future Road 5 South section line.

In order to evaluate each corridor alignment alternative, a set of evaluation criteria was developed based on input from the stakeholders and the agency and public scoping meetings held for this project. The evaluation categories included economic development, transportation systems, engineering considerations, environmental considerations, and construction and maintenance costs. Each of these categories was then broken down into specific evaluation criteria. The evaluation criteria represent specific issues that were of concern. In order to evaluate the criteria for the alternatives, it was necessary to also include performance measures. The performance measures are qualitative or quantitative measurements that can be made which apply to each criterion. The evaluation criteria and performance measures were presented to the project stakeholders for review and concurrence.

Based on the results of the evaluation criteria, consensus from the project stakeholders, and input received from the public at the alternatives presentation public meeting, a preferred corridor alignment was identified for further development. The recommended mainline corridor alignment, referred to as Alternative 1, begins at SR 89A at Great Western Road and follows the section line north, turning west at the Road 5 South section line and terminating at SR 89. This alignment is 9.2 miles in total length and essentially parallels Granite Creek in the north-south direction. The proximity to Granite Creek maintains large open spaces for pronghorn and other wildlife and maximizes the distance of the new roadway facility from the existing residential land uses near Viewpoint Drive. This is one of the shortest alignment alternatives, which results in comparatively less land disturbance, right of way requirements, and construction costs. The preferred corridor alignment is presented in **Figure E-2**.

The Great Western Corridor is proposed to transition to Great Western Road arterial south of SR 89A via ramps and frontage roads. This provides a physical exit and entrance from the high speed facility to the local roadway facility that requires drivers to consciously reduce their driving speed. Year 2030 traffic volumes show approximately 90,000 vpd within the first mile segment, which includes both local and regional traffic volumes. The frontage roads will extend approximately two miles north of SR 89A and will separate local traffic from regional traffic to provide the needed capacity for regional traffic on the mainline system.

The recommended cross section for the new Great Western access controlled roadway is an ultimate eight-lane highway section with a 76-foot open median. This median width provides adequate separation between opposing travel lanes and will not require a median barrier. It maintains the “rural character” preferred by the stakeholders and the public. The section provides four 12-foot travel lanes in each direction and 12-foot inside and outside shoulders, per current ADOT design standards. The minimum right of way width for this cross section is 400 feet. The preferred cross section is presented in **Figure E-3**.

Full access control is recommended along the Great Western corridor in accordance with ADOT and FHWA access control policy requirements. Limited access control is also recommended along the frontage roads adjacent to the corridor with intersection access to the frontage road limited to ½-mile spacing on the section lines.

Two local TI locations have been identified on the north-south segment of the corridor, and one local TI location has been identified on the east-west segment of the corridor. These are included in the recommended concept presented in **Figure E-2**. All local TI’s will be the responsibility of local developers to construct as traffic volumes warrant. At the local TI’s, the access control on the crossroad shall be per the current ADOT access control policy requirements. A minimum

spacing of ¼-mile is recommended from the crossroad and ramp intersection to the next adjacent intersection on the crossroad.

On Great Western Road, south of SR 89A, it is recommended no intersections be allowed north of the proposed Dells Ranch Road, which is approximately 1,000 feet south of the local TI ramp intersection.

Several configurations for system TI connections with Great Western at SR 89A, SR 89, and Chino Valley Extension were developed and evaluated. Operational analyses for each alternative were performed based on the travel demand model forecasts presented in the City of Prescott's *Airport Area Transportation Plan* (AATP). However, the AATP travel demand model does not include the proposed Chino Valley Extension. Therefore, the actual travel patterns along the regional roadway system may differ from the results of the model. Preliminary concepts based on the year 2030 AATP model were developed and evaluated, with feasible concepts taken to a 15% design level. No formal recommendations on the system TI configurations are recommended and further study will be required when an updated travel demand model is developed that includes all proposed regional roadways identified in CYMPO's long range transportation plan.

The recommended mainline corridor alignment will be implemented in phases as warranted by future development and traffic demands. The first phase includes construction of the local SR 89A/Great Western Road TI, which is recommended in the SR 89A DCR. As development occurs north of SR 89A and warrants local access, it is recommended the frontage roads be constructed up to the first local TI section line. The remaining phases include constructing the mainline in segments beginning and ending at adjacent TI's. Future phases will include construction of the system TI ramps at SR 89A and SR 89, for which final configurations will need to be developed with a future study. The system TI at Chino Valley Extension will be constructed with the future Chino Valley Extension mainline project and is not included in the phasing for this project. The recommended implementation phasing is presented in **Figure E-4**.

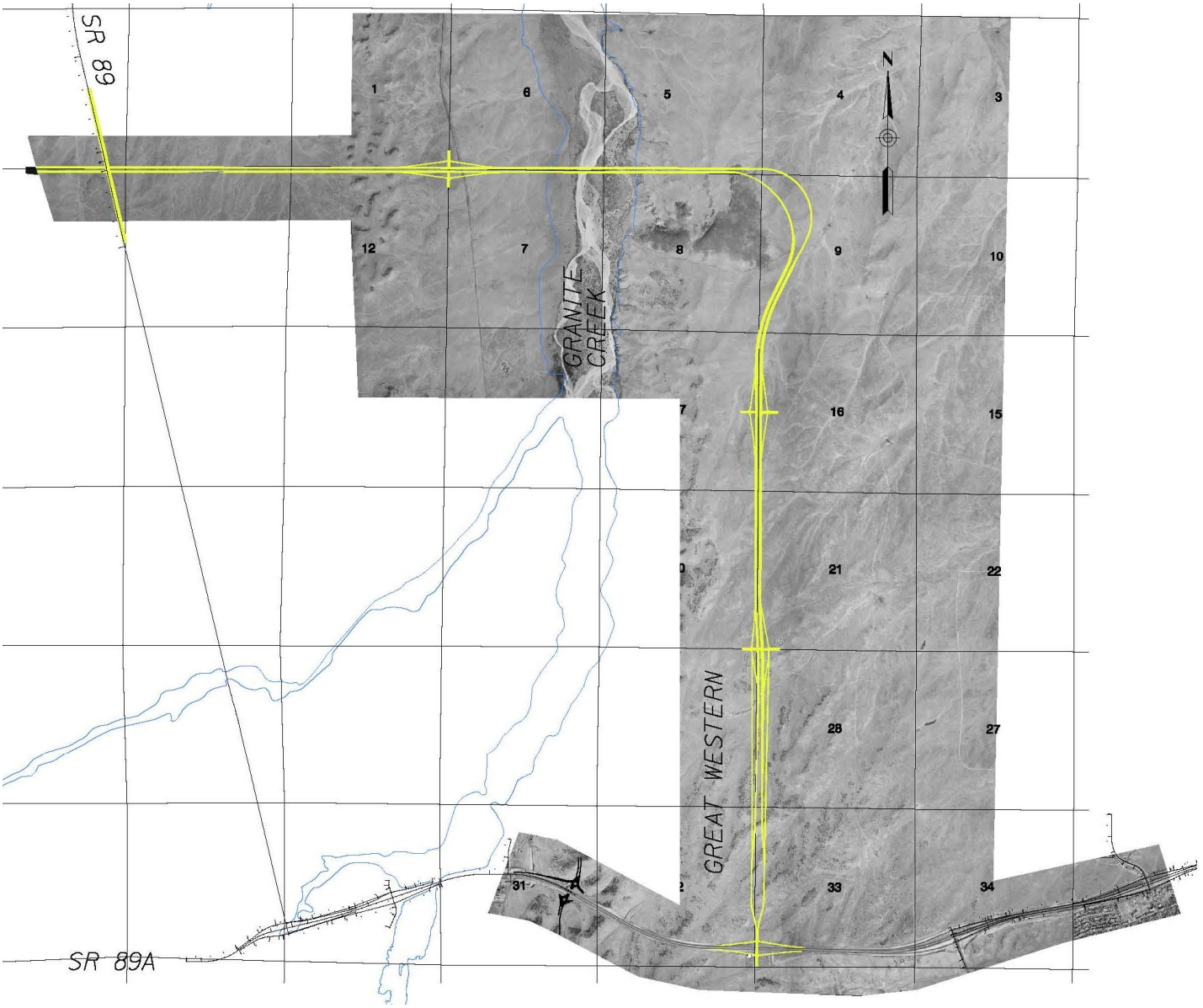


Figure E-2 Great Western Corridor Alignment

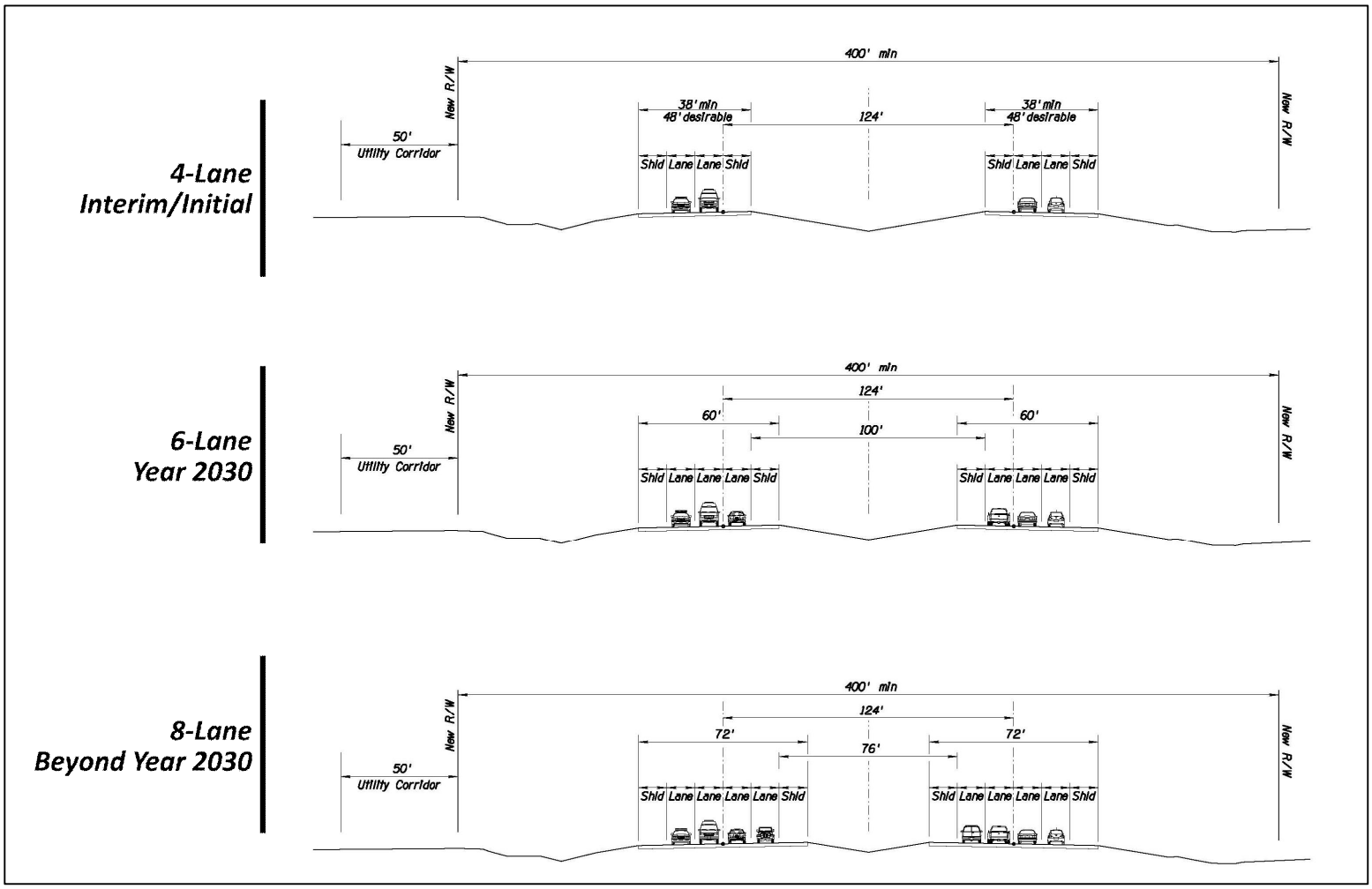


Figure E-3 Great Western Cross Section

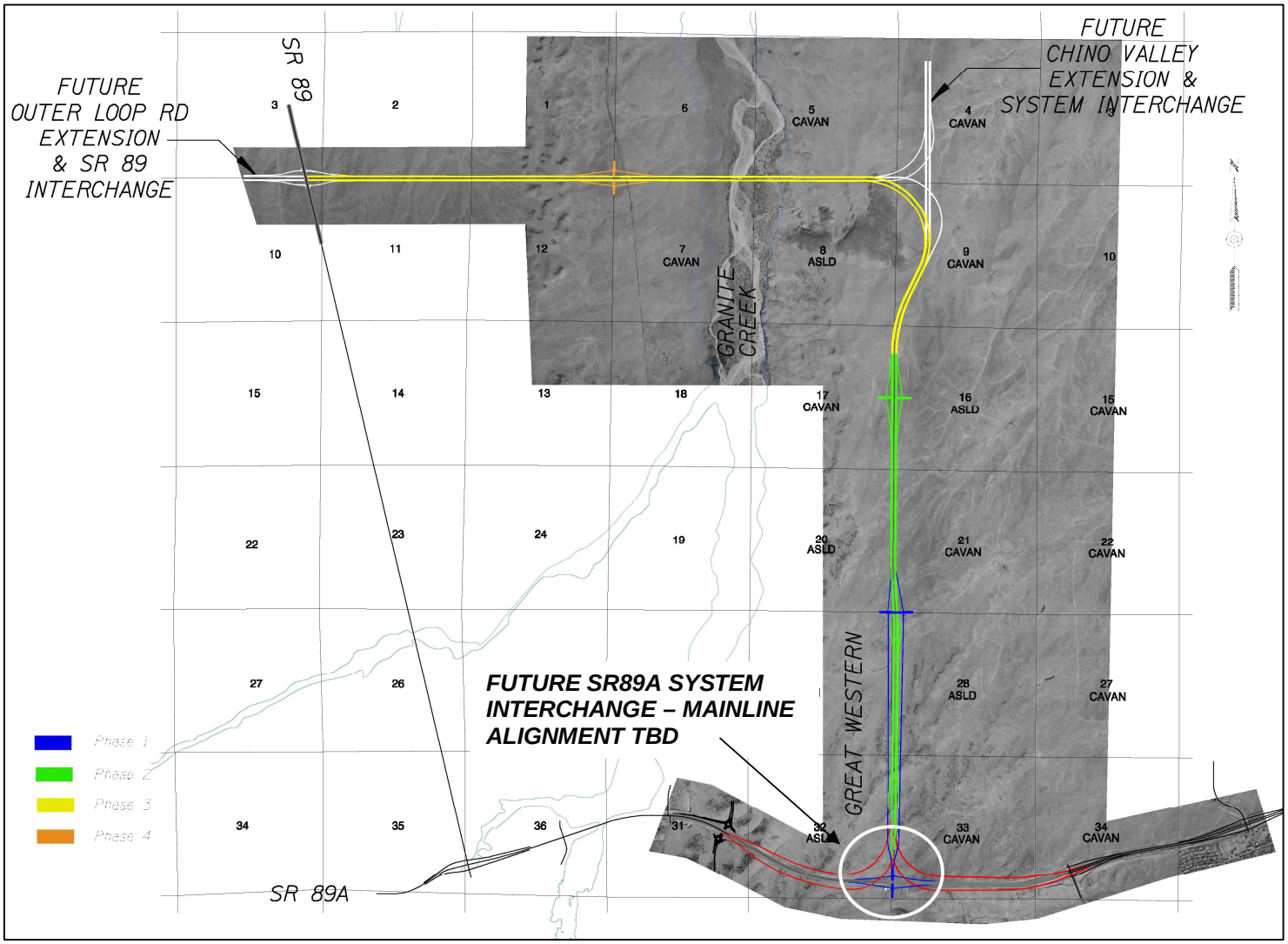


Figure E-4 Implementation Phasing

1.0 Introduction

1.1 Foreword

This Feasibility Study describes the development and evaluation of alignment alternatives, cross-sections, right of way, and access locations for the Great Western Corridor. The Great Western study corridor is located in Yavapai County, Arizona, within the Arizona Department of Transportation's (ADOT's) Prescott District. The study area encompasses the Town of Prescott Valley, the Town of Chino Valley, and the City of Prescott.

The study area includes a north-south segment approximately 4½ miles long and an east-west segment also approximately 4½ miles long. In total, the study area is roughly nine miles in length extending from SR 89A near the intersections of Glassford Hill Road and Great Western Road to SR 89 at the future intersection of Road 5 South, which is defined to be one mile south of the existing Road 4 South. Although Great Western Road does not actually intersect SR 89A, it is generally referred to as the intersection of Old Hwy 89A and SR 89A just east of the Town of Prescott Valley water tanks. The north-south segment of the study area is two miles wide while the east-west segment is one-half mile wide. A project vicinity map and study area map are provided in **Figures 1 and 2**, respectively.

The goal of this study is to identify the ultimate corridor alignment, right of way, and traffic interchange locations for a new high capacity roadway facility. This report describes the development and evaluation of alternative concepts for the Great Western Corridor. No construction funding has been programmed or identified for this corridor. An Environmental Overview (EO) will be developed in support of this study with planning level construction cost estimates to allow for future programming of design and construction. In addition, a separate traffic study, drainage report, and technical drainage memorandum have been prepared.

Many agency and private stakeholders were involved with the alternatives development and evaluation of the Great Western Corridor. In addition to Yavapai County, the agency stakeholders include ADOT, APS, Arizona Game & Fish Department (AGFD), Arizona State Land Department (ASLD), Central Yavapai Metropolitan Planning Organization (CYMPO), City of Prescott, Federal Highway Administration (FHWA), Town of Dewey-Humboldt, Town of Chino Valley, Town of Prescott Valley, and US Fish & Wildlife Services (USFWS). The private stakeholders include Cortez Enterprises, Deep Well Ranch, Granite Dells Estates Properties, Inc., Granite Dells Ranch Holdings, LLC., and The Nature Conservancy.

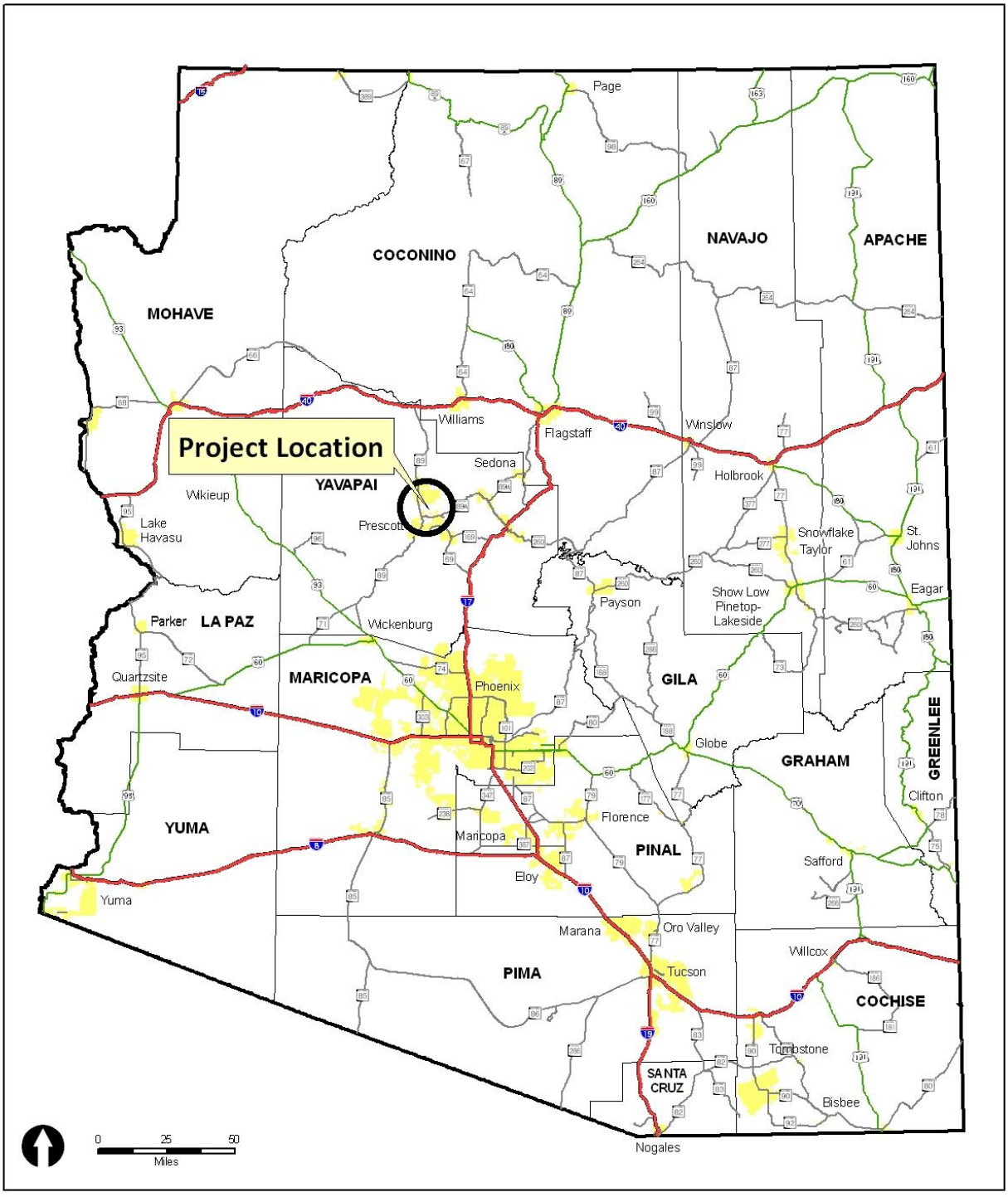


Figure 1. Vicinity Map

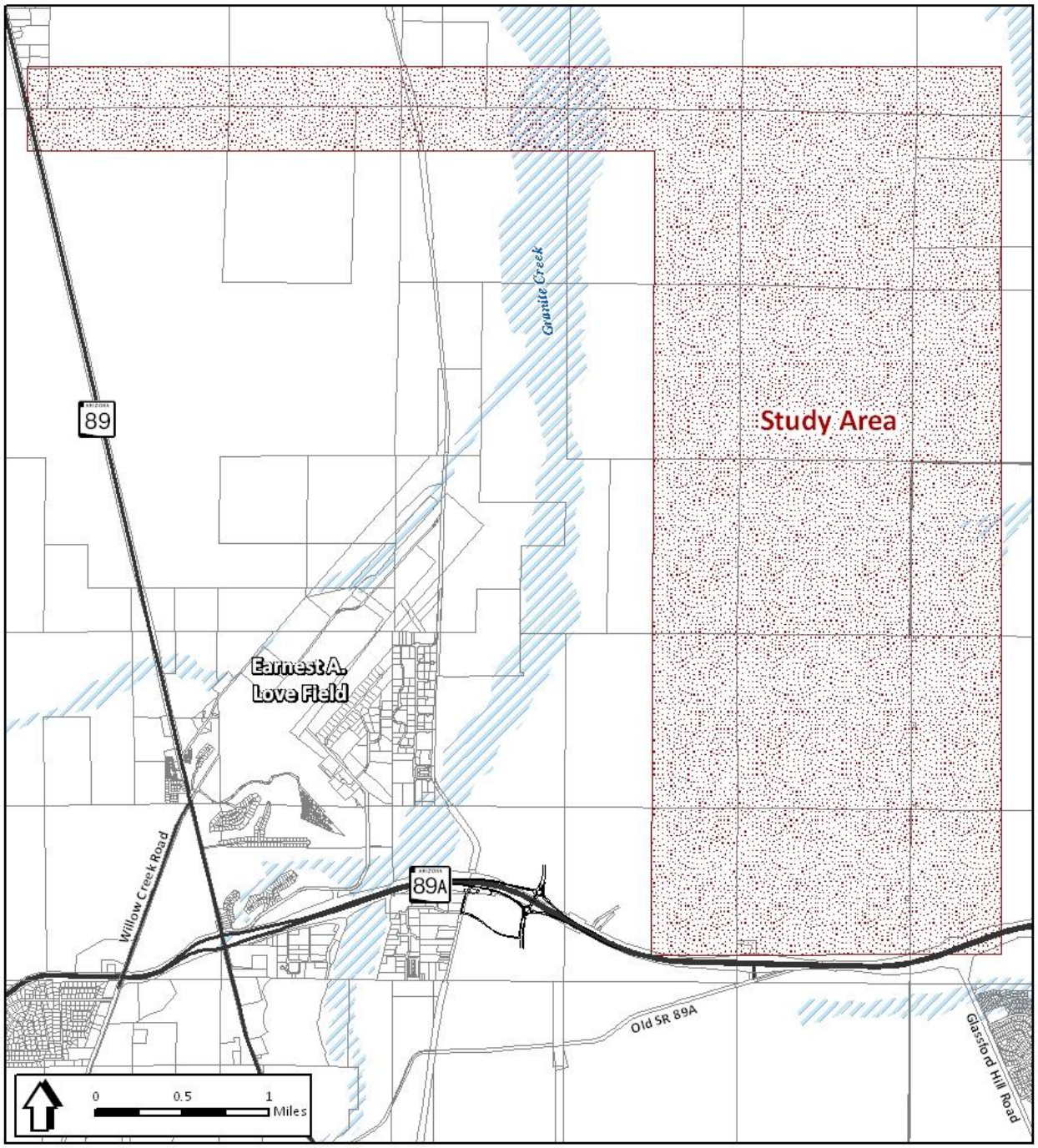


Figure 2. Project Study Area

1.2 Need for Project

Project Background

The *Central Yavapai County Transportation Study*, dated October 1995, documented Central Yavapai County as one of the fastest growing areas in the state. This study was conducted by Yavapai County in conjunction with Chino Valley, Prescott, Prescott Valley, Yavapai-Prescott Tribe, the Northern Arizona Council of Governments (NACOG), and ADOT. The purpose of the study was to evaluate the projected growth of Central Yavapai County for horizon year 2015 and recommend transportation improvements to sustain the growth.

The 1995 study projected an area population of 205,000 residents by year 2015. Based on this and other socio-economic data available, a travel demand model was developed for 2015 that was utilized to develop the 2015 recommended transportation network.

This 1995 study recommended the year 2015 Regional Plan. The study defined regional roads to be classified as arterial streets that carry a minimum of 4 lanes with a median and access control. The access control was defined as no direct driveway access to the roadway and minimum at-grade intersection spacing at one-half mile. The Glassford Hill Road Extension was identified as a new regional road included in the 2015 plan that begins at the SR 89A/Glassford Hill Road intersection and continues north to the Road 5 South alignment, where it transitions to an east-west facility and terminates at SR 89. The projected 2015 average daily traffic (ADT) volumes on the facility were 15,000 vehicles per day (vpd).

The 1995 transportation study was followed by the *Central Yavapai County Transportation Study Update*, dated December 1998. This study was prepared in conjunction with Yavapai County, Prescott, Prescott Valley, Chino Valley, and Yavapai-Prescott Tribe. The 1998 update evaluated horizon year 2018 projections and provided a future 2018 population estimate of 219,800 and a recommended supportive regional transportation system. The 1998 Update suggests that all new regional roads of significance should be designated as limited or controlled access highways. The limited access highways were defined as high speed roadways with at-grade intersections and limited access from properties. The controlled access highways were defined as high speed roadways with grade-separated interchanges and restricted access from properties.

The Glassford Hill Extension was included in the recommended 2018 regional roadway plan as a "new or improved limited/controlled access road." The plan indicated that the facility would be a four-lane roadway/highway. The alignment of the roadway remained in the same location as the 1995 study. The projected 2018 ADT's on the facility were 40,600 vpd north of SR 89A and 13,900 vpd east of SR 89.

The *Central Yavapai Metropolitan Planning Organization (CYMPO) Regional Transportation Study,* dated October 2006, was prepared in conjunction with Prescott, Chino Valley, Prescott Valley, Yavapai County, and ADOT. The study included the creation of a regional transportation plan for the 2015 and 2030 horizon years, and it included a recommended short range year 2010 project list. The study developed year 2030 traffic volume projections based on anticipated socioeconomic data for the area. The population of the Central Yavapai tri-cities area is projected to increase from roughly 118,000 in 2004 to nearly 440,000 in 2030. Employment within the region is anticipated to grow from approximately 35,850 employees in 2004 to 85,300 by the year 2030.

The 2006 CYMPO study recommended a future roadway network comprised of local and regional roads to meet the 2030 travel demands, which included "Glassford Hill Road Extension from State Route 89A to Outer Loop Road or other alignment to be determined." The projected 2030 ADT volume on the facility was approximately 54,000 vpd. Based on these projections, an

ultimate six-lane facility was recommended. In addition, the study states that "the Glassford Hill Road Extension from SR 89A to SR 89 to Williamson Valley Road provides the opportunity for a controlled access facility to offer some relief to SR 89 in the area" and therefore the plan indicates that the roadway will be an access controlled facility.

These studies identified a need for this new access controlled facility based on projected future travel demands. Each of these regional studies recommended the new facility begin on SR 89A near the existing Glassford Hill Road traffic interchange (TI) and continue north. After review of these studies, ADOT and Yavapai County discussed the need to evaluate an interchange located near what is referred to as Great Western Road. In order to evaluate all potential locations on SR 89A for the beginning of the new access controlled facility, the study area has been broadened to include both the Glassford Hill Road and Great Western Road intersections with SR 89A.

Regional

The Great Western/Glassford Hill Extension access controlled roadway has been identified as a future transportation need. The corridor would connect Prescott and Prescott Valley in the south to Chino Valley in the north. The Great Western/Glassford Hill Extension would alleviate current and future travel delays and mitigate congestion within Central Yavapai County.

Level of service (LOS) is a qualitative measure of roadway and intersection operations as perceived by motorists and vehicle passengers. LOS is defined by letter grade on a scale from A to F with LOS A representing the best operational conditions and LOS F representing unacceptable congested traffic conditions. The LOS for the AM and PM peak hours in the study area were estimated for urban arterials, rural, and suburban multilane arterials, and controlled-access highways as part of the 2006 CYMPO study. Without an additional high-capacity facility in the region, many of the future collector and arterial roadways are expected to function at LOS F with the planned and programmed improvements from all participating jurisdictions within the next 25 years.

The Great Western/Glassford Hill Extension access controlled roadway corridor would help to improve the roadway level of service in the study area. Regional travel impacts, such as congestion and delay, would also be reduced by expanding the local and regional transportation system. However, if the proposed improvements are not implemented, the no-build alternative analysis indicates that the state routes in this area will become completely saturated and experience unacceptable travel time delays.

Community

The population growth and anticipated future employment centers will increase traffic volumes and pressures on the roadway systems within the study area. Current and future development in and near the study area includes residential, commercial, employment and mixed use land use. The study area is currently undeveloped open grasslands. Therefore, future development within the study area will need new roadway connections to SR 89 and 89A, as well as links to the local roadway network.

As growth continues in the region, access to high speed, high capacity facilities will become increasingly important. The metropolitan area encompassing the quad-cities of Chino Valley, Prescott, Prescott Valley and Dewey-Humboldt is the only major urban area in Arizona without direct interstate highway access.

Presently, access between Chino Valley and Prescott is primarily via SR 89. As a result, SR 89 experiences significant travel delays during peak hours. Drivers in Chino Valley destined to Prescott, Prescott Valley, or Interstate 17 (I-17) must use SR 89 to SR 69 or SR 89A. The previous transportation studies have shown that planned improvements to SR 89 will not provide sufficient capacity to accommodate future travel demands. The Great Western/Glassford Hill

Extension would provide the communities in this area with a high speed, high capacity facility that can provide new linkages and access to developing areas.

Existing Roadways

The existing major highways in the study area include SR 69, SR 89, and SR 89A. Statewide and interstate travel to and from the area is served by I-17, which is roughly 32 miles east of the study area. These routes connect Central Yavapai County to the rest of Arizona, and the state highways serve as main thoroughfares for the local communities. The regional state routes are currently congested causing significant travel delays.

SR 89A runs east-west through the study area, but it is primarily a north-south route with connections to Cottonwood, Sedona, and the Flagstaff area. The ADT volume on SR 89A currently averages 21,000 vpd in the study area.

SR 89 begins near Wickenburg at US 93 and continues north through Prescott and Chino Valley where it ultimately connects to I-40. Currently, the ADT on SR 89 averages 14,000 vpd near the junction with SR 89A to over 24,000 vpd north of Ernest A. Love Field Airport.

SR 69 runs east-west and connects I-17 to the quad-cities area. It serves Dewey-Humboldt, Prescott Valley, and Prescott as their principal roadway with substantial commercial development located along the roadway. Development adjacent to SR 69 severely limits the ability to upgrade this highway to a controlled-access roadway. As development continues to increase along the SR 69 corridor, more local traffic will be added to the roadway, reducing the level of service on SR 69.

The Great Western/Glassford Hill Extension would provide an alternate high capacity travel route through Yavapai County that would link the regional roadways and reduce travel delays. Subsequently, the purpose of this study is to: 1) expand the local and regional transportation system to meet the projected population and transportation needs of the area by providing connectivity and increased roadway capacity; 2) provide improved access from Chino Valley to the City of Prescott and Prescott Valley and other destinations to the south and east; 3) offer transportation linkages in the study area to meet future growing population, employment, and commercial center needs; and, 4) reduce projected traffic volumes and maintain acceptable level of service (LOS) on SR 89 and SR 89A.

2.0 Existing Conditions

The Great Western/Glassford Hill Extension study corridor is referred to herein as "Great Western" and generally begins at SR 89A in the vicinity of the existing Glassford Hill Road TI. The study corridor extends north and west ending at SR 89 in the vicinity of Road 5 South. The study corridor is approximately nine miles in length. The north-south segment of the study area is approximately two miles wide while the east-west segment is approximately one-half mile wide. The north-south and east-west segments are approximately equal in length at about 4½ miles each. The study area was presented in **Figure 2**.

2.1 Topography

The Great Western study area consists largely of minor hills and valleys. The terrain within the study corridor is classified as rolling per ADOT design guidelines. ADOT defines rolling terrain as any combination of geometric design elements that causes trucks to reduce speeds substantially below that of passenger cars on some sections of the highway but does not involve sustained crawl speeds by trucks for any substantial distance. Existing terrain elevations within the study area range from approximately 4,840 feet within the Granite Creek floodplain to 5,160 feet around the Great Western Rd/SR 89A intersection area.

Significant topographic features to note within the study area include the basaltic Black Hill located in the northern section of the study area, Granite Creek, and a range of hills running north-south in the western section of the study area.

2.2 Roadway Characteristics

The major existing roadways surrounding the study area include SR 89 and SR 89A. These state highways provide direct access between the Towns of Chino Valley and Prescott Valley, and the City of Prescott.

State Route 89 (SR 89)

The majority of SR 89 in this study area is a two lane undivided urban highway that runs north-south with a posted speed limit of 50 miles per hour (mph) near Prescott and a speed limit of 65 mph near Chino Valley. SR 89 is the main connector roadway between Prescott and communities to the north. The segment of SR 89 near the intersection with the future Road 5 South carries a total of three travel lanes with eight-foot outside shoulders. The southbound direction of travel has one 12-foot travel lane and one 12-foot passing lane. The northbound direction of travel has one 12-travel lane. SR 89 has no curb or gutter within the study area boundary.

State Route 89A (SR 89A)

SR 89A is a four-lane divided urban freeway that runs east-west near the study area with a posted speed limit of 65 mph. SR 89A is the main connector roadway between Prescott and Prescott Valley. The typical cross-section of SR 89A consists of two 12-foot travel lanes with a four-foot inside shoulder and a ten-foot outside shoulder in each direction, separated by a 46-foot-wide center median (measured from the inside edge of each travel lane). There is no curb and gutter on SR 89A through the study area.

SR 89A is currently in the implementation process to become a fully access controlled facility. Due to funding limitations, the access controlled traffic interchanges along the route are being implemented in phases.

SR 89A intersects with SR 89 at a full diamond TI with signal-controlled intersections on SR 89. A bridge structure carries the SR 89A through movement over SR 89. West of this TI, SR 89A transitions from an urban freeway into a four-lane divided limited access urban parkway called Pioneer Parkway.

Approximately 3,700 feet east of the SR 89 TI, SR 89A intersects with Larry Caldwell Drive at a diamond TI with one-way stop-controlled intersections at the SR 89A off-ramps. Larry Caldwell Drive is a two lane local roadway that extends north and south of SR 89A. Due to the close proximity of this crossroad to SR 89, access to the west is provided via frontage roads that connect to the SR 89 TI.

Approximately 4,000 feet east of the Larry Caldwell Drive TI, SR 89A intersects with Side Road at a stop controlled T-intersection with the stop control on Side Road. Side Road is a two lane local roadway that extends south of SR 89A and transitions to an unpaved roadway that intersects with Old Highway 89A. An eastbound right turn lane and a westbound left turn lane are provided on SR 89A to access Side Road to the south.

Approximately 9,200 feet east of Side Road, SR 89A intersects with a minor roadway referred to as Great Western Road at a stop controlled T-intersection with the stop control on Great Western Road. Great Western Road is a gated roadway to the south of SR 89A that provides access to the Town of Prescott Valley water storage tanks and other private lands. An eastbound right turn lane and a westbound left turn lane are provided on SR 89A to access Great Western Road to the south. The T-intersection with Great Western Road is located within the study area boundary.

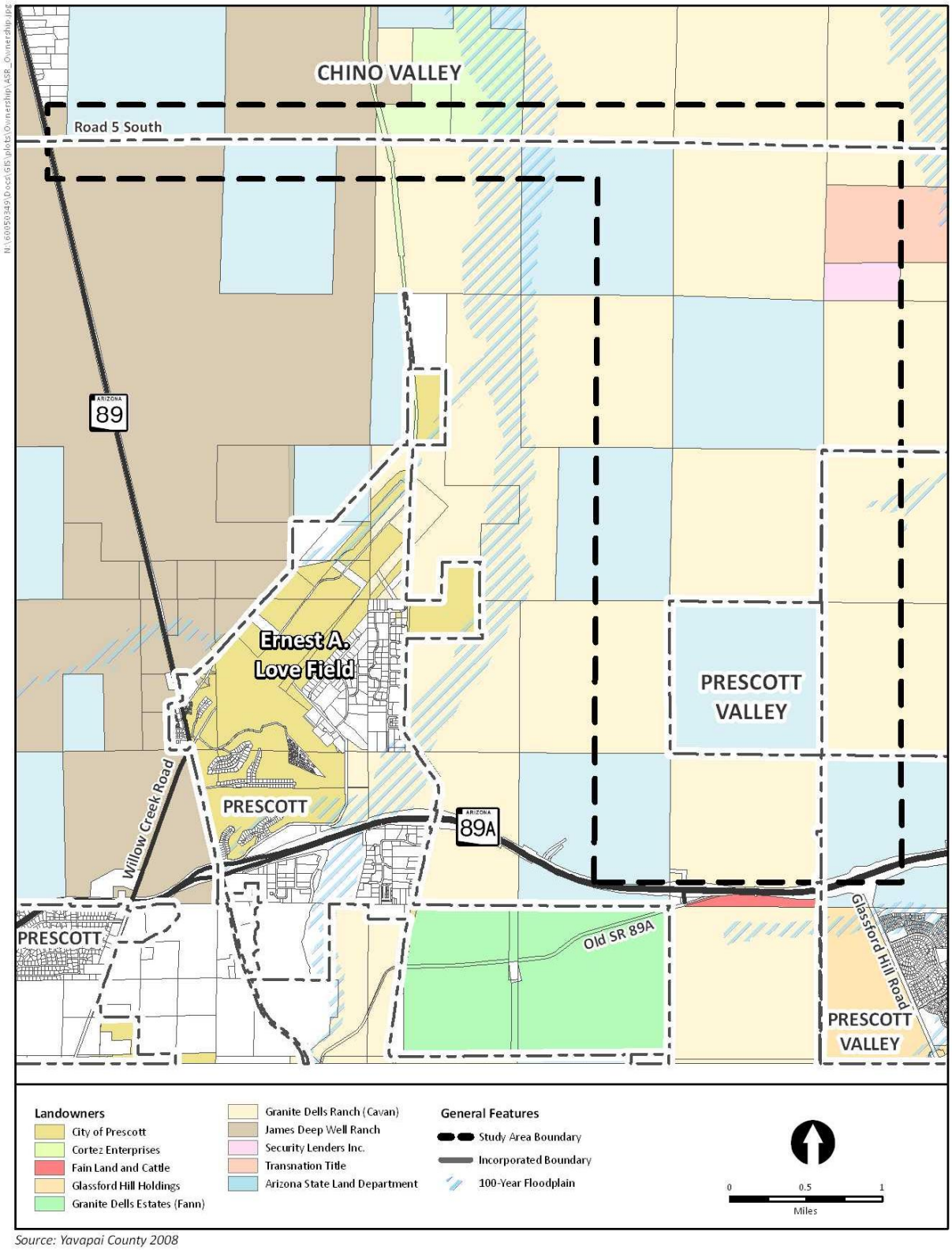
The Glassford Hill Road TI is approximately 6,200 feet east of the SR 89A/Great Western Road intersection. SR 89A intersects with Glassford Hill Road at a full diamond TI with signal-controlled intersections on Glassford Hill Road. Glassford Hill Road is a four lane arterial roadway that extends south of SR 89A and ultimately intersects with SR 69.

Approximately 6,700 feet east of the Glassford Hill Road TI, SR 89A intersects with Viewpoint Drive at a diamond TI with signal-control on Viewpoint Drive. The ramps for the ultimate TI have been constructed and are open to traffic, but the bridge structure on SR 89A has not yet been constructed. Therefore, the current configuration requires SR 89A through traffic to travel on the ramps and pass through the signalized intersections on Viewpoint Drive. Viewpoint Drive is a two-lane arterial roadway that extends both north and south of SR 89A. It provides the primary access to the residential developments north of SR 89A.

2.3 Land Use

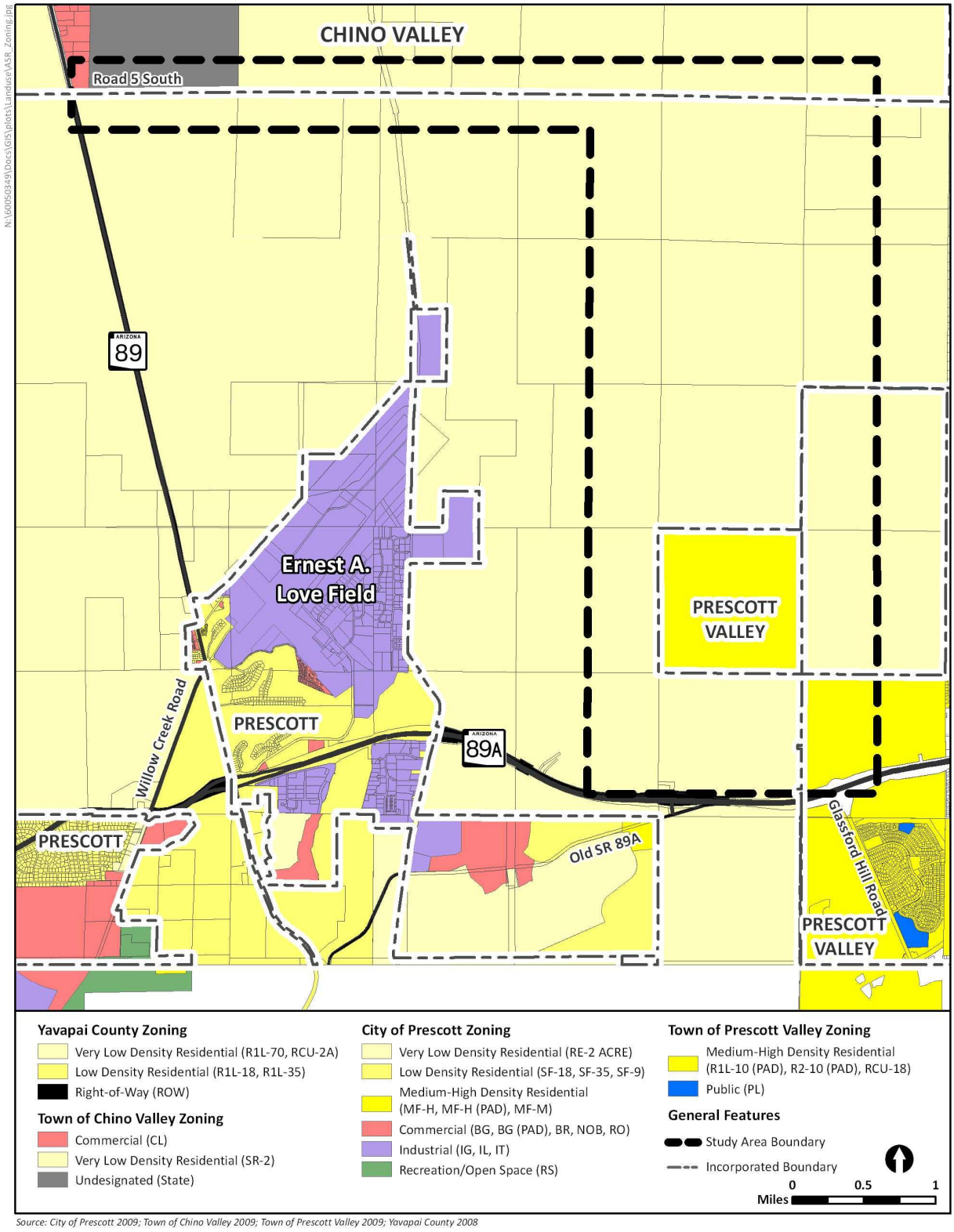
The land within the project study area is predominantly undeveloped grasslands and the principal land use is agriculture or grazing. Property ownership is a checkerboard pattern of alternating sections of private and State Trust Land. **Figure 3** presents the existing land owners within the study area and surrounding vicinity. The major land owners within and near the study area include Arizona State Land Department (ASLD), Granite Dells Ranch, Granite Dells Estates, Cortez Enterprises, Deep Well Ranch, and the City of Prescott which owns Ernest A. Love Field.

The majority of the project study area falls within the unincorporated areas of Yavapai County with some parcels in the town limits of Prescott Valley and/or Chino Valley. The existing zoning for the study area is shown in **Figure 4**. Figure 4 is a consolidated illustration of the zoning in and around the project study area. The consolidation was done to make interpretation of zoning among the various jurisdictions easier. The zoning codes are described in **Table 1**. The Yavapai County areas are zoned Residential Rural (RCU-2A). Approximately 1,000 acres of the study area are located within Prescott Valley town limits and are zoned Residential Single-Family Rural



Source: Yavapai County 2008

Figure 3. Existing Land Ownership



Source: City of Prescott 2009; Town of Chino Valley 2009; Town of Prescott Valley 2009; Yavapai County 2008

Figure 4. Existing Zoning

Table 1. Description of Zoning Codes

Symbol	Name	Description
Yavapai County		
RCU-2A	Residential Rural	Residential, single-family, rural; minimum two-acre lots.
Prescott Valley		
RCU-18	Residential Single-Family Rural	Residential, single-family, rural; minimum lot size 18,000 ft^2. Maximum lot coverage 25%.
R1L-10 PAD	Residential Single-Family Limited; Planned Area Development	Residential, single-family. Lot sizes and size of the dwelling units can vary. Dwelling space cannot be less than 10 percent of lot size. Planned Area Developments establish procedures that encourage innovated site planning and minimize inequities that may result from strict application of zoning regulations
Chino Valley		
SR-2	Single Family	Residential, single-family; minimum two-acre lots.
CL	Light Commercial	Retail, service businesses, offices, and apartments.
City of Prescott		
SF-18	Single Family	Residential, single-family, rural; minimum lot size 18,000 ft^2. Maximum lot coverage 35%.
BR	Business Regional	High intensity business district. Typical uses include large-scale office buildings, retail box stores, restaurants, automobile service facilities, and entertainment and commercial recreation.

Sources: Yavapai County Planning and Zoning Ordinance (http://www.co.yavapai.az.us/uploadedFiles/Ordinances/zoningordinance.pdf, accessed 3/13/09); Town of Prescott Valley Town Code (http://www.pvaz.net/Index.aspx?page=274, chapter 13, accessed 3/13/09); Town of Chino Valley Unified Development Ordinance (http://www.chinoaz.net/dev_services/udo.shtml, accessed 3/13/09); City of Prescott Land Development Code, amended November 28, 2008 (http://www.cityofprescott.net/_d/ldc.pdf, accessed 3/13/09);

(RCU-18). The east-west segment of the project area is split between unincorporated Yavapai County and the Town of Chino Valley jurisdiction. Approximately 720 acres of the area within Chino Valley is zoned Single Family, two-acre minimum lots (SR-2). Approximately 160 acres at the western end of the project study area is State Trust Land and is not zoned by Chino Valley. At the extreme western end of the project study area, adjacent to SR 89, is a parcel zoned Light Commercial (CL).

The general zoning patterns that exist within the project study area extend for some distance beyond study area boundaries, with an exception south of SR 89A. In Prescott Valley, beginning just south of SR 89A, the zoning changes from RCU-18 to a higher density residential zoning of Planned Area Development, single family limited (R1L-10 PAD). Within the city limits of Prescott, beginning just south of SR 89A the residential zoning changes from Yavapai County RCU-2A to a higher density zoning of Single Family (SF-18). In addition, the City of Prescott has zoned an area southwest of the intersection of SR 89A and Old Highway 89A as Business Regional (BR).

Ernest A. Love Field Airport is located approximately one mile west of the project study area, and it is owned by the City of Prescott. The area between the airport and the project study area is unincorporated and zoned RCU-2A. Areas along SR 89A are continuing to develop, including plans to develop a parcel immediately east of Granite Creek and north of SR 89A, just west of the project study area.

In Chino Valley, there is some minor development north of the east-west segment of the study area within the area zoned CL adjacent to SR 89. No other development exists within the study area.

2.4 Drainage / Hydrology

Eleven existing drainage ways have been identified and located within the Great Western study area. The north-south study corridor includes seven minor drainage ways. The areas of these seven watersheds range between 85 acres to 895 acres.

The east-west study corridor includes four drainage ways, including the 110-square mile Granite Creek Area Basin. The two major drainage ways, Granite Creek and Willow Creek, flow northeast from the mountains located southwest of Prescott into two reservoirs previously owned by the Chino Valley Irrigation District (CVID), which are now under the City of Prescott's jurisdiction. Willow Creek discharges into Willow Lake, and Granite Creek discharges into Watson Lake. The two creeks join downstream of the lakes and continue on as Granite Creek, crossing SR 89A about a mile north of the convergence. Granite Creek continues north through the east-west study corridor and ultimately discharges to the Verde River.

The Granite Creek watershed also includes three additional watersheds that join Granite Creek north of the SR 89A bridge. These include an unnamed tributary that drains the Pioneer Park area, Bottleneck Wash which flows north of the regional airport, and an unnamed tributary that drains the rangeland area of the Deep Well Ranch.

2.5 Initial Geotechnical Assessment

2.5.1 Existing Subsurface Conditions

The generalized subsurface conditions for the approximate nine mile-long Great Western Corridor were determined based on review of available geotechnical investigation reports completed in the project vicinity, geologic reports and maps of the area and AECOM's general knowledge of the existing geologic conditions. The following is a listing of the information reviewed for this preliminary assessment:

- Billingsly, G.H., Conway, C.M., and Beard, L.S., 1998, *Geologic Map of the Prescott 30-x 60-minute Quadrangle, Arizona*, Open-File Report 88-372.
- Engineering & Testing Consultants, Inc., 1998, *Geotechnical Report for the Airport Connector/SR 89A Realignment, Prescott, Arizona*, Prepared for Dava & Associates, ETC File No. 1728, September 30.
- Engineering & Testing Consultants, Inc., 2008, *Soil Survey and Pavement Thickness Design for Granite Trails Ranch, Prescott Valley, Arizona*, Prepared for Cavan Real Estate Investment, ETC File No. 6796, January 15.
- Nations, D., and Stump, E., *Geology of Arizona*, Kendall/Hunt Publishing Company, 1981.

The project site is located within the Central Highlands (or Transition Zone) Geologic/Physiographic Province of Arizona. The Central Highlands Province comprises a

narrow transitional region between the Basin and Range Province to the south and southwest, and the Colorado Plateau Province to the north and northeast. The region is characterized by rugged mountain ranges cored by Precambrian-aged crystalline basement rocks and intensely deformed volcaniclastic and metasedimentary units, interspersed with often discontinuous fault-bounded and eroded basins and infilled valleys.

The generalized geology of the project site consists of late Tertiary to Quaternary alluvium overlying Precambrian granitic bedrock. Granitic basement rock, though not known to be exposed within the project limits, is known to underlie the site in its entirety, but at variable and unknown depths. The overlying poorly- to well-cemented fine grained to granular sediments were deposited on an irregular surface eroded into the granitic basement, and were later covered by basaltic lava flows and pyroclastic deposits within much, or all, of the immediate area. Recent erosion within the general project site area has created the current landscape typified by frequently basalt-capped hills and ridges (such as Black Hill located within or adjacent to the northeast portion of the alignment), and highlands of sandstone-conglomerate or granitic rocks interspersed with eroded valleys and drainages. Further recent (Quaternary) erosion and deposition including ephemeral washes and Granite Creek has mantled much of the landscape with lesser consolidated materials.

Soils encountered within test borings completed to the north, east and south of the proposed project alignment typically consist of moderately firm to hard medium to high plasticity clayey sands, sandy clays and clayey gravels with lesser dense, non-plastic to low plasticity relatively clean to silty gravelly sands and sand and gravels with cobbles. The coarser materials are typically present at depths of more than 10 feet.

2.5.2 Embankments, Excavations, and Pavement Support

With respect to roadway embankment construction, the existing near surface soils will be usable in their current condition. The higher plasticity clays may, however, be unsuitable for direct pavement support without either some form of modification or overexcation and removal where present within three feet of finished pavement subgrade elevation. Higher plasticity clay soils are known to be present at shallow depths throughout the project and within the general area. These moisture-sensitive soils should either be avoided or accommodated for in the pavement design. Modification of the soils, if left in place could include the use of geogrid (and separation fabric) or possibly mixing with lime.

In general, earth moving operations can be made with normal excavating equipment. The only known exception would be in the direct vicinity of Black Hill. Should the alignment pass through or adjacent to this exposed ridge, blasting, chemical expansion, hoe-ram or other specialized methods may be required to excavate the basalt bedrock.

Relatively flat slopes (greater than 2.5H:1V) should be used for cuts and fills given the soils general propensity for erosion. Steeper cut slopes (likely 0.75 to 1H:1V) could be anticipated should cuts be required within the Black Hill basalt unit.

It is estimated that the near surface (upper 5 feet) soils excavated on the project and reused for embankment will shrink 5 to 10 percent when placed at 95 percent of standard Proctor density. Soils excavated from depths below 5 feet will likely shrink from 0 to 5 percent. The basalt bedrock, if excavated, should swell 15 to 20 percent if re-used and compacted to 95 percent of standard Proctor density.

2.6 Utilities

Existing utilities within the study area include APS overhead power transmission lines, APS underground power distribution lines, Qwest underground telephone lines, Cable One

underground fiber optic lines, Unisource underground gas lines, and Prescott Valley water lines. **Figure 5** presents the existing utilities within and adjacent to the study area. Each utility company was contacted to determine existing utility locations by providing plans or as-builts as needed and/or reviewing documents for accuracy.

Within the study area along SR 89A, there are several utility crossings perpendicular to the highway mainline including an APS underground power distribution line, a Cable One fiber optic line, and a Qwest telephone line. These utilities cross under the Glassford Hill Road overpass and run along the east side of Glassford Hill Road.

The majority of the remaining existing utilities within the study area are located inside a 20-foot utility corridor in the existing right of way along the north side of SR 89A. The 20-foot utility corridor begins approximately 2,000 feet east of Great Western Road and continues to the east of Viewpoint Drive. Existing utilities include APS underground power distribution lines, Qwest underground telephone lines, Cable One underground fiber optic lines, Unisource underground gas lines, and Prescott Valley water lines.

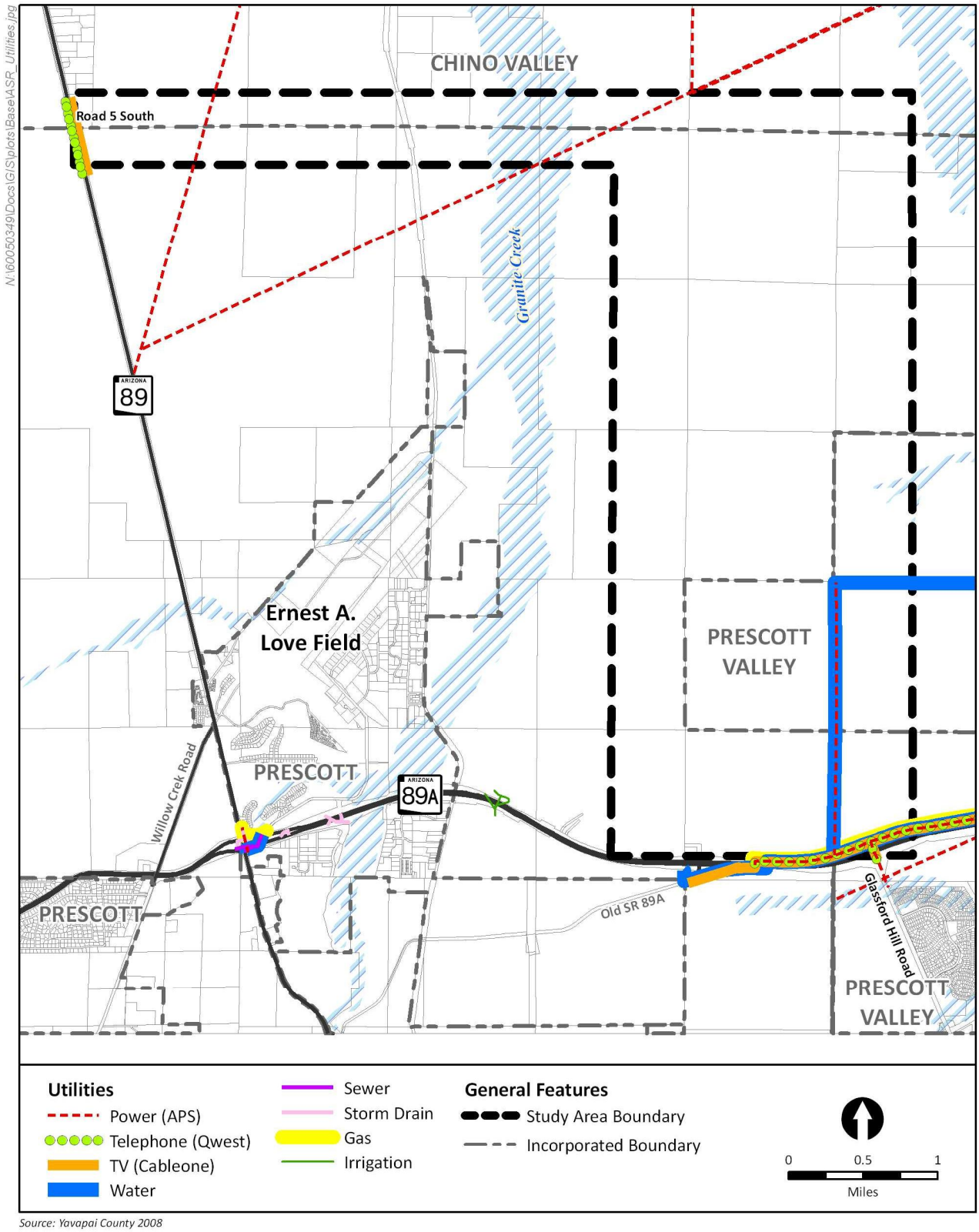


Figure 5. Existing Utilities

An APS underground power distribution line and a Prescott Valley water line are located approximately 1,300 feet west of Glassford Hill Road and run north to south along the well sites located just north of SR 89A. The APS underground power distribution lines connect to the temporary Glassford Hill power substation and end at the Township 15 North, Range 1 West, Section 22/27 common line. The Prescott Valley water line angles perpendicular to the Section 22/27 common line and runs east towards an existing residential area.

Qwest and Cable One underground lines run along SR 89 within the study area. There is one Qwest underground telephone line and one Qwest fiber optic line on the west side of SR 89 and one Cable One underground fiber optic television line on the east side of SR 89, both running parallel to the roadway and within the existing right of way.

Three APS overhead power lines lie within the study area. The 230kv Willow Lake overhead power transmission line runs northeast in the northern part of the study area and crosses SR 89 at approximately milepost 322.5. One 69kv overhead power transmission line extends off of the Willow Lake power line just east of SR 89 and travels due north. The other 69kv line is located just south of the Glassford Hill Road TI and runs east-west.

2.7 Traffic

Existing Traffic Volumes

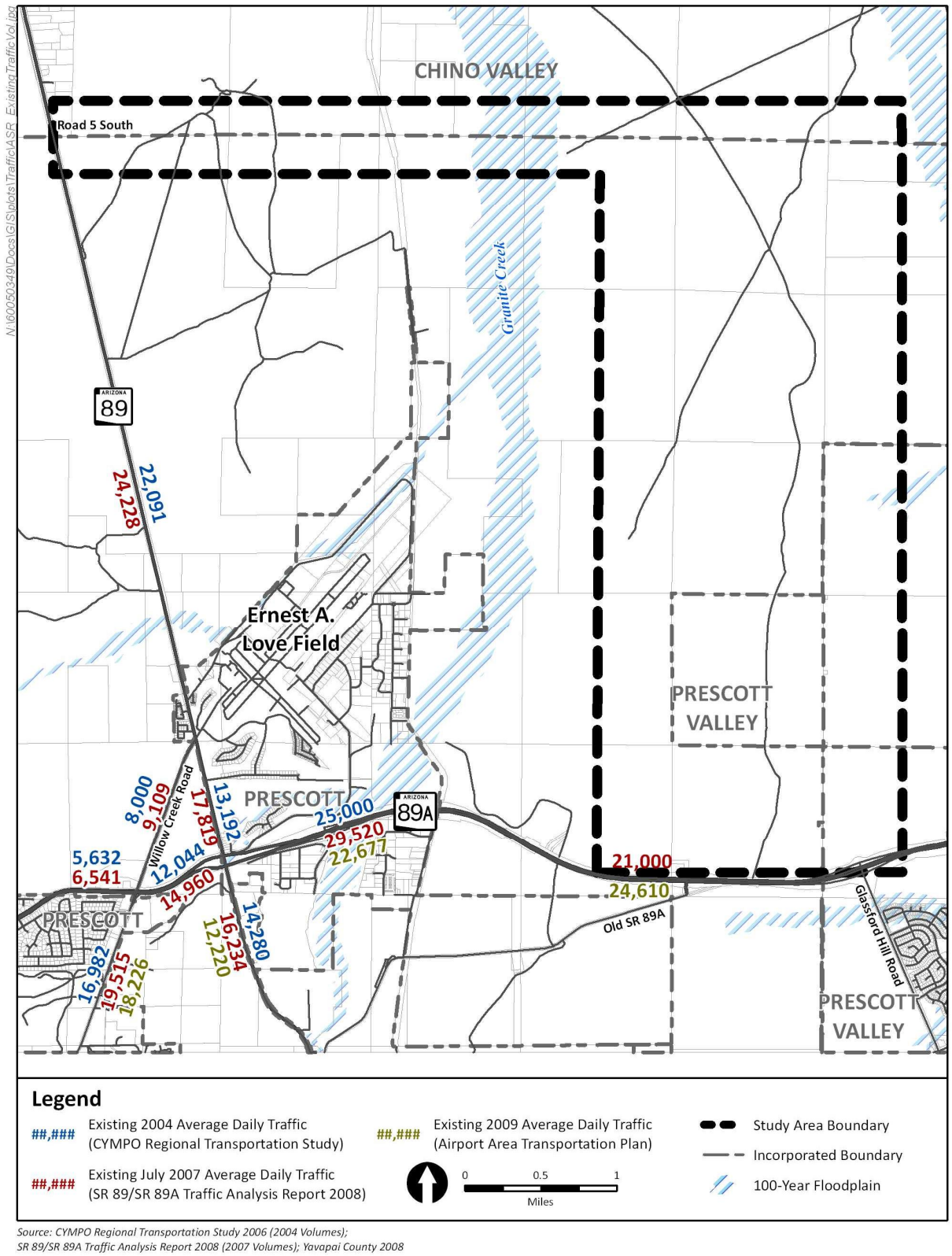
Three recent studies have collected existing traffic volumes in and near the project study area, which range from year 2004 to year 2009. These studies include the *CYMPO Regional Transportation Study* dated 2006, the *"Triangle Area" Traffic Analysis Report* dated August 2008, and the *City of Prescott Airport Area Transportation Plan* dated June 2009. The existing volumes from each of these reports were obtained in 2004, 2007, and 2008/2009 and are presented in **Figure 6**.

Existing Operational Characteristics

Operational traffic conditions are defined based on level of service (LOS) per the Highway Capacity Manual (HCM). The concept of LOS uses qualitative measures that characterize operational conditions within a stream of traffic. The descriptions of individual LOS 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 analytical procedures are available. They are given letter designations from 'A' to 'F', with LOS 'A' representing the best operational conditions and LOS 'F' representing an over-capacity condition (congestion). Each LOS represents a range of operating conditions.

The *"Triangle Area" Traffic Analysis Report* established existing operational conditions at the SR 89/SR 89A intersection. However, the existing analysis was completed prior to the last phase of the TI construction. Therefore, the study completed two existing analyses: one with the east-west SR 89A through volume passing through the signalized intersections and one without the SR 89A through volume and the SR 89A traffic reassigned to the new bridge structure.

Utilizing the HCM methodologies, the report established that during the peak hours without the bridge in place, the existing 2007 SR 89A/SR 89 TI ramp intersections operated at an acceptable LOS D or better with the exception of the PM peak hour, which operated at LOS F at the eastbound ramp intersection. With the opening of the new bridge in year 2008 and removal of the SR 89A through traffic, SR 89A/SR 89 TI ramp intersections were anticipated to operate at an acceptable LOS B or better.



Source: CYMPO Regional Transportation Study 2006 (2004 Volumes);
SR 89/SR 89A Traffic Analysis Report 2008 (2007 Volumes); Yavapai County 2008

Figure 6. Existing Traffic Volumes

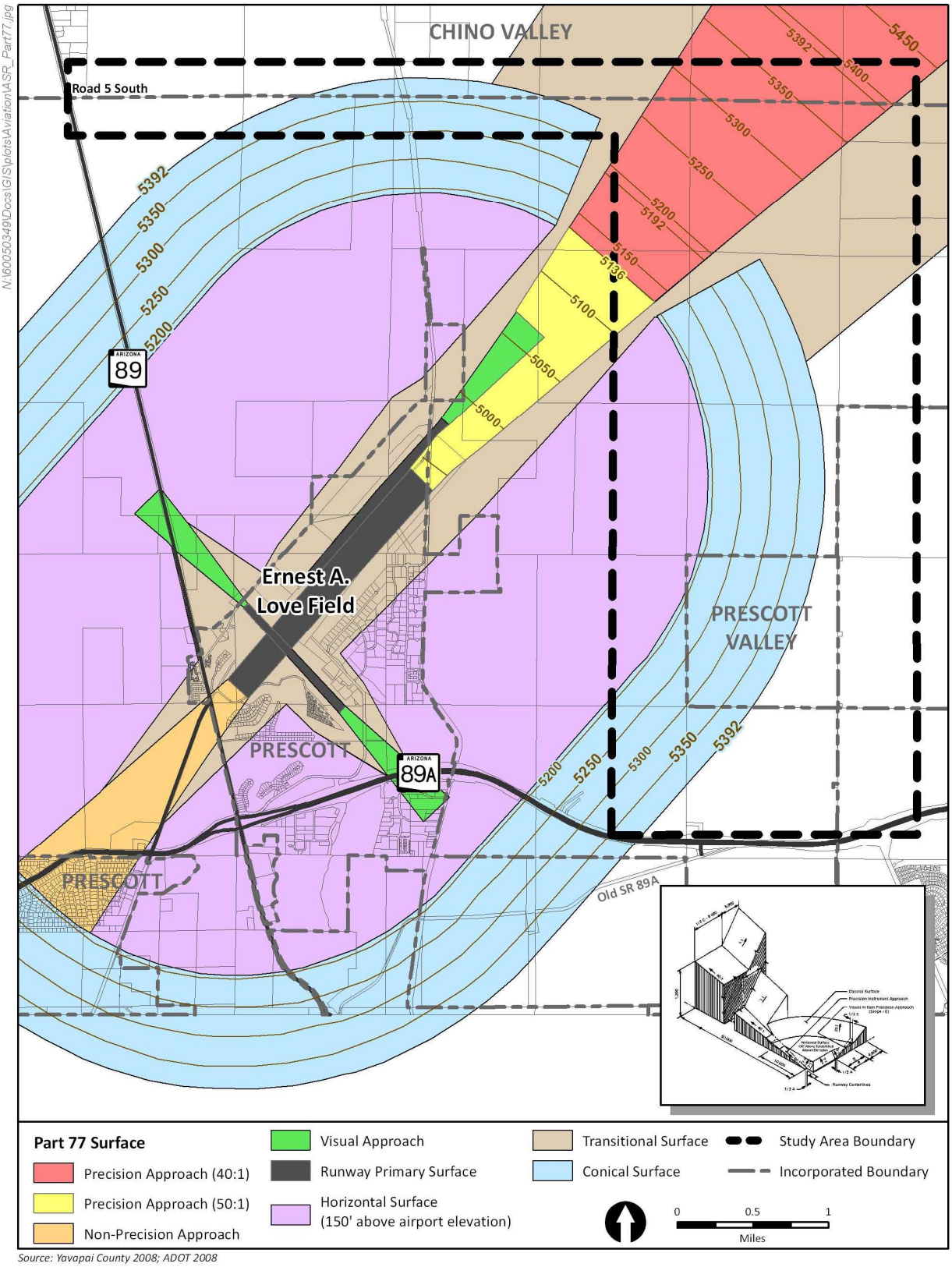
2.8 Ernest A. Love Field Airport

As stated in the existing land use section, the Ernest A. Love Field Airport is located approximately one mile west of the project study area. The airport serves both the commercial and general aviation needs for the surrounding area, which includes Prescott, Prescott Valley, Chino Valley, Yavapai County, and the local Yavapai Reservation. The airport also serves as the flight training base for Embry-Riddle Aeronautical University.

The airport is owned by the City of Prescott, and it is classified by the FAA as a Class II Commercial Service public use airport. The existing Ernest A. Love Field Part 77 Surface map is presented in **Figure 7**.

2.9 Trails and Pathways

There are no existing established pathways or trails within the extents of the study area. There is an existing railroad corridor right of way owned by Cortez Enterprises that crosses the east-west segment of the study area. The corridor no longer has rail, and it appears to be used as an unofficial pathway/trail that extends from the Prescott airport north to Chino Valley.



Source: Yavapai County 2008; ADOT 2008

Figure 7. Existing Ernest A. Love Field Part 77 Surface

3.0 Future Conditions

3.1 Land Development

Future land uses are a projection of allowable uses and densities as designated in the general or comprehensive plans of the governing jurisdictions. As previously mentioned, the Great Western study area is within the jurisdiction and planning areas of Yavapai County, the City of Prescott, the Town of Prescott Valley, and the Town of Chino Valley. Each of these municipalities has their own General Plan for the planned areas within and surrounding their jurisdictions.

The goal within the City of Prescott's General Plan is to achieve a balanced mix of land uses by continuing to provide areas for commercial and industrial uses as the community and region continue to grow but without sacrificing the City's historic and cultural resources and open spaces. The City of Prescott General Plan has adopted three specific area plans prior to 2003: the Prescott East Area Plan (PEAP), the Willow Lake South Area Plan (WLSAP), and the Airport Specific Area Plan (ASAP). The City believes these plans represent the best opportunity to achieve the goals of balancing land uses, promoting a diversity of residential choices and preserving significant open space. A Major General Plan Amendment (GPA) to the Prescott 2003 General Plan was released in July 2008 centering on land west of the Ernest A. Love Field Airport. This GPA included recommendations for future land uses and future roadways in this area.

The Town of Prescott Valley General Plan 2020 discusses the Town's vision for the future in year 2020. The Land Use Plan consists of two growth tiers: Growth Tier I consists of direct growth within the Town boundaries, and Growth Tier II is based off the development that cannot be reasonably accommodated within Tier I due to physical, environmental or other circumstances. The Town's vision also consists of designated commercial and industrial lands to create opportunities for more highly-skilled, higher wage jobs. It is desired to broaden the type and range of local-serving amenities and become a center for regional employment. The Land Use Plan mentions focusing special attention on selected areas of the community or Focus Revitalization Areas. The General Plan 2020 Land Use Map shows a large amount of designated Planned Area Development (PAD) Land Use, Low-Density Residential and Medium Density Residential with pockets of Public/Quassi-Public and Open Space Land Uses. Within the Great Western study area, SR 89A is zoned as PAD 3-1 to both the north and south, with a small section to the south near Viewpoint Drive zoned as a combination of Low-Density Residential, Medium-High Density Residential, and Community Commercial.

The Town of Chino Valley General Plan identifies a future land use goal of between 50 to 70 percent of the land developed as residential with an anticipated future population of 50 percent retirees and 50 percent working families. The Town has two classifications for residential, low-density residential and medium-density residential, and one classification for commercial land use. Commercial zoning areas are planned to comprise between 15 to 25 percent of the total land area and industrial use is planned to be five percent. The Town has a goal to enhance and promote the SR 89 corridor as a retail and employment area by encouraging a diversity of commercial development, providing a balance in traffic circulation needs, and continuing to improve the corridor for vehicular, pedestrian and bicycle safety.

The Yavapai County General Plan: Land Use Plan, adopted April 2003, is based on four categories of Land Uses: Open Space Areas, Rural Residential Areas, "Community" Areas and Municipal Influence Areas. The goals of the County are intended to support the desired characteristics of community and rural living in accordance with the natural environment. The County's goals include maintaining compatible land use patterns, sustaining the County's rural character, preserving open lands and the County's attractive image, and establishing public participation criteria for land use decisions.

The General Plan Land Use map is presented in **Figure 8**. It was created using information provided by Yavapai County, the City of Prescott, Town of Prescott Valley and Town of Chino Valley.

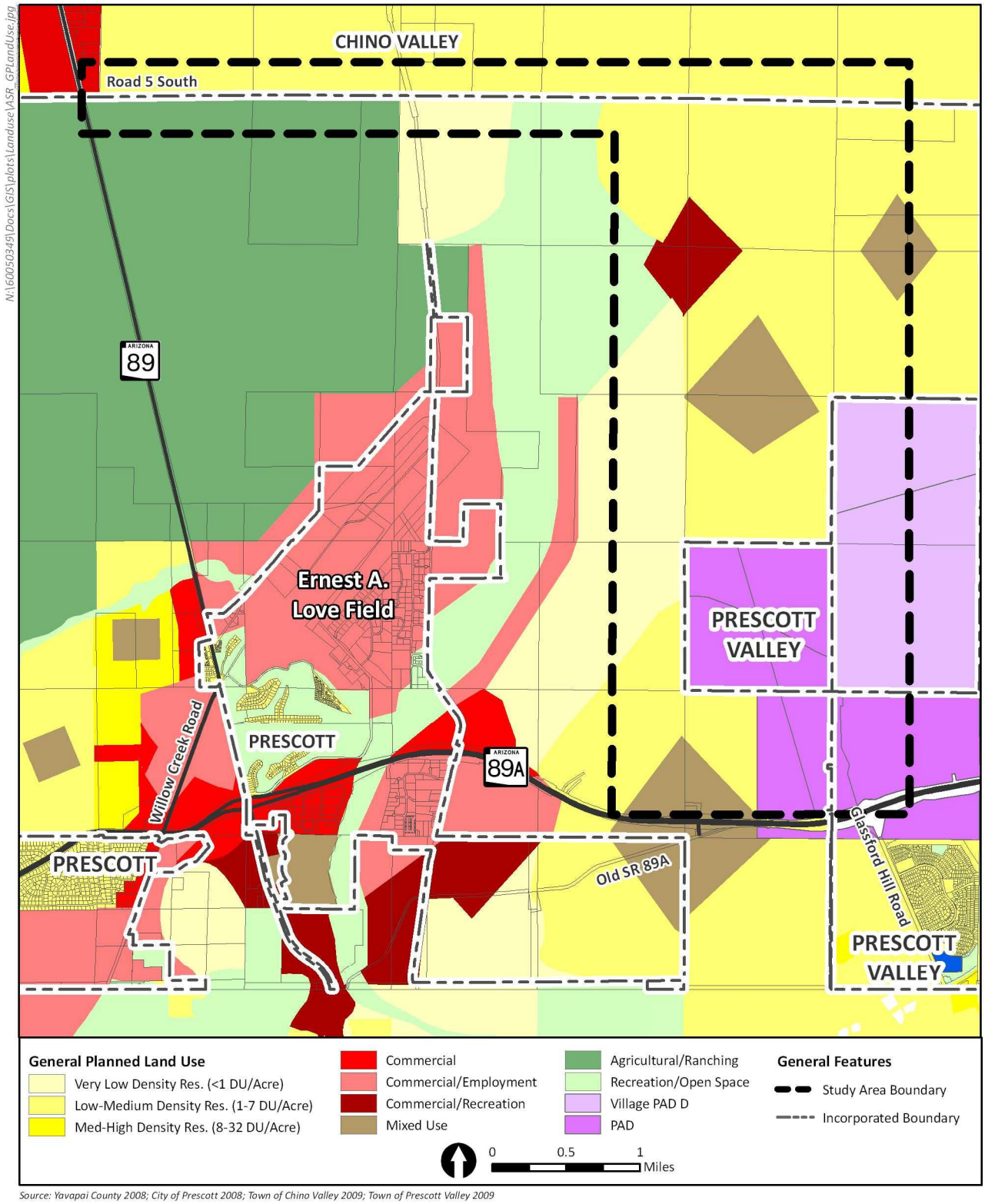
Within the project study area, the majority of the land is zoned for development. Land within the Town of Prescott Valley has been designated for Planned Area Development (PAD). PAD's provide for various types and combinations of land uses such as commercial centers, single and multi-family housing, industrial complexes and public spaces. The majority of the unincorporated area within the project study area has been designated for low- to medium- density residential, with some areas identified as very low-density residential. The jurisdictions have also identified areas of future mixed use and commercial use.

The existing commercial area around the airport is anticipated to expand to the north and west. As shown in **Figure 8**, there are large areas along the west side of the project study area that have been identified for recreation/open space and very low-density residential use. The far western portion of the project study area, south of Chino Valley, has been identified as Agricultural/Ranching.

3.2 Other Studies and Proposed Future Roadways

There are several studies and projects that have recently been completed or are currently in progress within and surrounding the study area. The proposed roadway networks from these studies and the jurisdictional General Plans have been collected for consideration and cohesiveness with the Great Western study alignment development. The following are the documents and studies included:

- Yavapai County/ADOT, SR 89/SR89A/Willow Creek Road "Triangle Area" Traffic Analysis Report, August 2008
- Yavapai County General Plan, April 2003
- City of Prescott, General Plan, May 2004
- City of Prescott, West Airport General Plan Amendment (GPA), July 2008
- CYMPO, Chino Valley Extension Planning Study, February 2009
- Town of Chino Valley, General Plan, November 2003
- Town of Chino Valley, Small Area Transportation Study (SATS), January 2007
- ADOT, Project Assessment for SR 89 from SR 89A to South Chino Limits, July 2007
- Town of Prescott Valley, General Plan, Adopted January 2002
- City of Prescott/ADOT, SR 89A/Granite Dells Pkwy (Side Road) Interchange DCR, October 2008
- City of Prescott, Airport Area Transportation Plan, June 2009



Source: Yavapai County 2008; City of Prescott 2008; Town of Chino Valley 2009; Town of Prescott Valley 2009

Figure 8. General Planned Land Use

In addition to these studies, specific roadway and land use information has been provided by the following developments:

- Granite Dells Estates Properties, Inc
- Granite Dells Ranch Holdings, LLC

Yavapai County/ADOT, SR 89/SR 89A/Willow Creek Road "Triangle Area" Traffic Analysis Report, August 2008

The *"Triangle Area" Traffic Analysis Report* dated August 2008, identified the future travel patterns and roadway needs within the SR 89/SR 89A/Willow Creek Road "triangle" study area. The study assessed existing and future traffic volumes within the study area and identified future roadway capacity needs.

The study recommended the following improvements to accommodate year 2030 traffic volumes (based on the 2005 CYMPO projected travel demand model):

- Construct four lanes on SR 89 as currently identified in the ADOT 5-year construction program.
- Realign Willow Creek Road to intersect existing SR 89 north of Ruger Road with an overpass at Ruger Road and free flow ramps connecting Willow Creek Road and SR 89.
- Provide access to the lands adjacent to Willow Creek Road at a controlled intersection approximately midway between Pioneer Parkway and MacCurdy Drive. An additional potential future access point was also identified on MacCurdy Drive.
- Provide access to the lands west of Willow Creek Road and SR 89 at the north end of the corridor via a grade-separated extension of Ruger Road.

City of Prescott, General Plan, May 2004

The *City of Prescott General Plan*, adopted in 2003, identifies goals and strategies for the City's arterials, collectors, and local streets in a general manner. It also addressed the 1995 CYMPO Regional Transportation Study recommendation of a phased approach to regional transportation planning and improvements. The majority of the first phase of regional improvements have already been completed with the later phases including the extension of Fain Road, improvements to the SR 69/SR89 intersection, connecting Rosser between Prescott Heights and Cliff Rose, and widening Copper Basin Road. The 1998 update recommended additional regional transportation corridors including a Prescott East Loop connecting SR 69 and SR 89 north of Yavapai Hills, a third SR 69/SR 89 connector across the Yavapai-Prescott Indian Reservation, and a proposed tri-city parkway.

City of Prescott, West Airport General Plan Amendment (GPA), July 2008

The *West Airport General Plan Amendment*, dated July 2008, identified potential development and zoning west of SR 89 and Ernest A. Love Field for future city planning. The GPA has been adopted by the City of Prescott and incorporated into the City's future land use database and GIS mapping. The proposed roadway network includes the realignment of Willow Creek Road per the recommendations of the Yavapai County "Triangle Study." A realigned Ruger Road is planned to continue west through the intersection of SR 89 and loop through the planned development and connect perpendicular to Pioneer Parkway at a location west of Willow Creek Road. An additional collector roadway is planned to extend west from the existing intersection of SR 89 and MacCurdy Road. The collector roadway is anticipated to travel in a southwestern direction through the development and head south out of the planned area.

CYMPO, Chino Valley Extension Planning Study, February 2009

The *Chino Valley Extension Planning Study*, dated February 2009, defined a future corridor for a new access controlled roadway to relieve traffic congestion and provide an alternate travel route to SR 89 for local and regional traffic. The project corridor begins near the southern border of Chino Valley at the future Road 5 South alignment and within the Great Western/Glassford Hill Extension corridor and continues northward to intersect SR 89 near the northern Chino Valley limits. Corridor "CV8" was selected as the recommended alternative for the future roadway alignment. The corridor provides the best route for local and regional trips and avoids the parcel owned by The Nature Conservancy. The recommended alignment parallels SR 89, connecting at the north end of Chino Valley. The southern portion of the preferred corridor may need to be adjusted to accommodate the ultimate Great Western Extension alignment recommendation.

Town of Chino Valley, General Plan, November 2003

The *Town of Chino Valley General Plan*, adopted 2003, lists the following future expectations for highways and roads:

- SR 89 will be widened to four traffic lanes with a continuous left turn lane, curb, gutter and sidewalks.
- The future Glassford Hill connector (referred to herein as Great Western) will be the major north-south connector from Prescott Valley to Chino Valley as it joins SR 89A to Road 4 South.
- Fain Road will be a new major county highway connecting SR 69 to SR 89A.
- Williamson Valley/Outer Loop Road will be improved from Williamson Valley Road to West Road 4 South.
- Outer Loop Road will be a major connector between SR 89 and Williamson Valley.
- Road 4 South will become an improved major street as an extension of Williamson Valley loop connector and Prescott Valley Glassford Hill connector.
- Roads 2, 3, 4, and 5 North, Road 2 South, Center Street, Road 1 West, Road 1 East and Red Cinder will all be improved major streets.
- All section and mid-section streets will be improved to collector or major street standards.

Town of Chino Valley, Small Area Transportation Study (SATS), January 2007

The *Town of Chino Valley Small Area Transportation Study* (SATS), dated January 2007, addresses transportation issues and identifies transportation improvements needed to accommodate future growth. The SATS program objective is to develop a transportation plan that will guide multi-modal planning and programming on local roads and can be used to revise the existing Town of Chino Valley General Plan. The major goals of the SATS, in relation to the roadway network, are:

- Plan for and implement improvements to SR 89.
- Work with CYMPO to develop timely connections between Chino Valley and regional routes.
- Develop and adopt street standards for all street classifications throughout the Town.
- Develop an updated Circulation Element.

The Chino Valley Roadway Framework is based on roadway improvement assumptions which include the Great Western/Glassford Hill Extension, widening of SR 89, the extension of Center Street west to provide additional connectivity with the Williamson Valley area, the Chino Valley Extension, and widening of Outer Loop Road.

ADOT, Project Assessment for SR 89 from SR 89A to South Chino Limits, July 2007

The *Project Assessment for SR 89 from SR 89A to South Chino Limits*, dated July 2007, recommends ultimately providing six lanes, three lanes in each direction of travel, along SR 89 between SR 89A and Chino Valley to increase capacity and improve safety. The study recommends the following improvements to meet the projected travel demand in the year 2030:

- SR 89 to a point 1,000 feet north of Ruger Road: Provide a 12-foot median with either a paved two-way left turn lane or a 3-foot raised median with 4-foot inside shoulders; provide a 5-foot shoulder from edge of outside travel lanes to face of curb.
- SR 89 at a point 1,000 feet north of Ruger Road to Chino Valley: Provide a 46-foot median 38-foot wide earth median and a 4-foot inside shoulders; provide a 10-foot outside shoulder.
- Provide a second eastbound to northbound left turn lane on Willow Creek Road at the SR 89 intersection.
- Lengthen the southbound to westbound right turn lane on SR 89 at Willow Creek Road.
- Provide a northbound to eastbound right turn lane on SR 89 at Ruger Road.
- Provide a northbound to eastbound right turn lane on SR 89 at Perkins Drive.

Town of Prescott Valley, General Plan 2020, Adopted January 2002

The Town of Prescott Valley General Plan 2020 lists the following planned arterial improvements:

- Viewpoint Drive will be designated as a minor collector and will extend north from Spouse Drive to Robert Road.
- Fain Road will be designated a principal arterial and will extend from Highway 89 to Highway 89A. Fain Road will be a four-lane road with grade-separated interchanges at Lakeshore Drive, Superstition Drive and Santa Fe Loop.
- Glassford Hill Road will be designated a six-lane arterial with the extension north of Highway 89A and a grade-separated interchange.
- Great Western Extension will be a six-lane minor arterial west of Glassford Hill Road and will extend north of Old Black Canyon Highway north of Highway 89A where it will connect with Glassford Hill Road.
- Lakeshore Drive will serve as a two-lane minor collector and will extend from Badger Road and connect with Fain Road.
- Robert Road will serve as a two- to four-lane major collector and will be realigned north of Long Mesa Drive and extend to the Pronghorn Ranch community.
- Santa Fe Loop will serve as a four-lane major collector but is forecast as a future arterial that will extend around the existing perimeter of the Town.
- Superstition Drive will serve as a two-lane minor collector and will extend from La Jolla Drive and ultimately connect with Fain Road.

City of Prescott/ADOT, SR 89A/Granite Dells Pkwy (Side Road) Interchange DCR, October 2008

The *SR 89A/Granite Dells Parkway (Side Road) Interchange DCR* studied three alternative locations for the future interchange and selected a recommended location approximately 1,800 feet east of the existing SR 89A/Side Road intersection. The recommended location for the proposed Granite Dells Parkway interchange was presented to and approved by the City of Prescott City Council.

The proposed improvements are as follows:

- The design will include the initial build-out of a four-lane bridge over the existing SR 89A freeway and construction of two-lane roundabouts on both the north and south side of the interchange. The interchange ramps along SR 89A will also be constructed with the initial project.
- Granite Dells Parkway will initially be constructed as a four-lane arterial between the interchange and the proposed intersection with the Centerpoint East Drive connector roadway. Granite Dells Parkway will then continue as three paved lanes south of this intersection to connect to the Granite Dells Estates project. Granite Dells Parkway may be expanded to six lanes in the future.
- Centerpoint East Drive will be initially constructed as three lanes from Granite Dells Parkway to the existing Side Road with plans for expansion to five lanes in the future.
- Both Granite Dells Parkway and Centerpoint East Drive will be graded out to the ultimate future roadway widths, but will only be paved with the interim sections.
- The Peavine Trail path along the east side of the existing Side Road will be routed east along the south side of SR 89A using the existing double 22'x12' box concrete culvert cattle crossing. This trail will then exit the box culvert crossing on the north side of the freeway and turn west along the SR 89A right of way and connect to the existing Peavine Trail/abandoned railroad right of way.

The final design of the interchange has been completed and construction began in late 2009.

City of Prescott, Airport Area Transportation Plan, June 2009

The *City of Prescott Airport Area Transportation Plan* evaluated the projected land uses and potential roadways recommended by various projects currently underway within the Prescott Airport area. The Airport Area Transportation Plan developed a recommended roadway network to meet the future travel demands on the area. The following are key roadway improvements included within the recommended network:

- A high capacity roadway facility that runs near the Great Western section line and Road 5 South alignment with a high capacity/free-flow connection to SR 89A.
- A new east-west arterial roadway approximately one mile north of SR 89A from Larry Caldwell Drive to Viewpoint Drive with a bridge crossing over Granite Creek.
- A new north-south roadway connecting the airport to Great Western Extension/Road 5 South.
- Willow Creek Road is realigned as a four-lane minor arterial per the recommendations of the Yavapai County "Triangle Area" traffic study.
- Larry Caldwell Drive and Melville Road (Airport Loop Road) will be widened to four-lane collector roadways.

Granite Dells Estates

Granite Dells Estates is located south of SR 89A between Larry Caldwell Drive and the Great Western Road section line, also referred to as Santa Fe Loop Extension (south of SR 89A) by the Town of Prescott Valley. The property owner, Mike Fann, provided AECOM the preliminary site plan details for the development. The plan indicated a roadway connection to Granite Dells Parkway and a connection to the future Great Western Road/Santa Fe Loop extension approximately 1,000 feet south of the existing SR 89A.

Granite Dells Ranch

Granite Dells Ranch, LLC is managed by Cavan Real Estate Investments. The majority of the development is located within the project study area north of SR 89A. The master planning of this development is currently underway and roadway connections are preliminary. Cavan has provided confidential preliminary land use scenarios and roadway networks to the consultant team for consideration in this study. The major north-south roadways proposed to serve Granite Dells Ranch include Glassford Hill Road, Great Western Road, and Granite Dells Parkway.

3.3 Drainage

As stated previously, eleven existing drainage ways have been identified and located within the Great Western study area. There are no known drainage or watershed modifications within or contributing to the study area.

3.4 Utilities

APS plans to replace the existing temporary Glassford Hill power substation north of SR 89A with a new permanent power substation. The new substation is planned to be located approximately at the northwest corner of Section 27, Township 15 North, Range 1 West. APS has future plans to construct a new 69kv overhead transmission line corridor which would run north-south from the new substation. The future 69kv corridor would begin at the existing 69kv lines located south of SR 89A and run north, through the new substation, and end at the existing 69kv lines located in Township 16 North, Range 1 West.

The Town of Prescott Valley has indicated that they plan to construct a new 24 to 30-inch water pipeline between the Town's existing tank farm located south of SR 89A near Great Western Road and the Prescott production facility located in Chino Valley. The exact location of the new pipeline is yet to be determined with possible alternative alignments along the north-south section lines at Great Western Road or Glassford Hill Road.

There are no other known utilities planned in the near future within the study area.

3.5 Traffic

2030 Travel Demand Volumes

The *CYMPO Regional Transportation Study,* dated 2006, and the *City of Prescott Airport Area Transportation Plan,* dated June 2009, both included year 2030 model runs that incorporate the project study area.

The *CYMPO Regional Transportation Study* was prepared by Lima and Associates in October 2006. This study identified future land uses and development areas based on approved General Plans for the tri-city area. The CYMPO model is a regional traffic forecasting model that develops future traffic volume projections based on projected socio-economic, population, employment, origin-destination, and other regional data. The output from the model includes daily traffic volumes for the proposed freeways and arterials within the regional system.

The *City of Prescott Airport Area Transportation Plan* (AATP) was prepared by AECOM and Jacobs in June 2009. This study took the 2006 CYMPO travel demand model for year 2030 and included proposed roadway networks and land uses based on the recent studies and developments discussed in previous sections of this report. The year 2030 model was further refined for the area and multiple alternative models were evaluated to develop a roadway network that would meet the 2030 travel needs of the tri-city area.

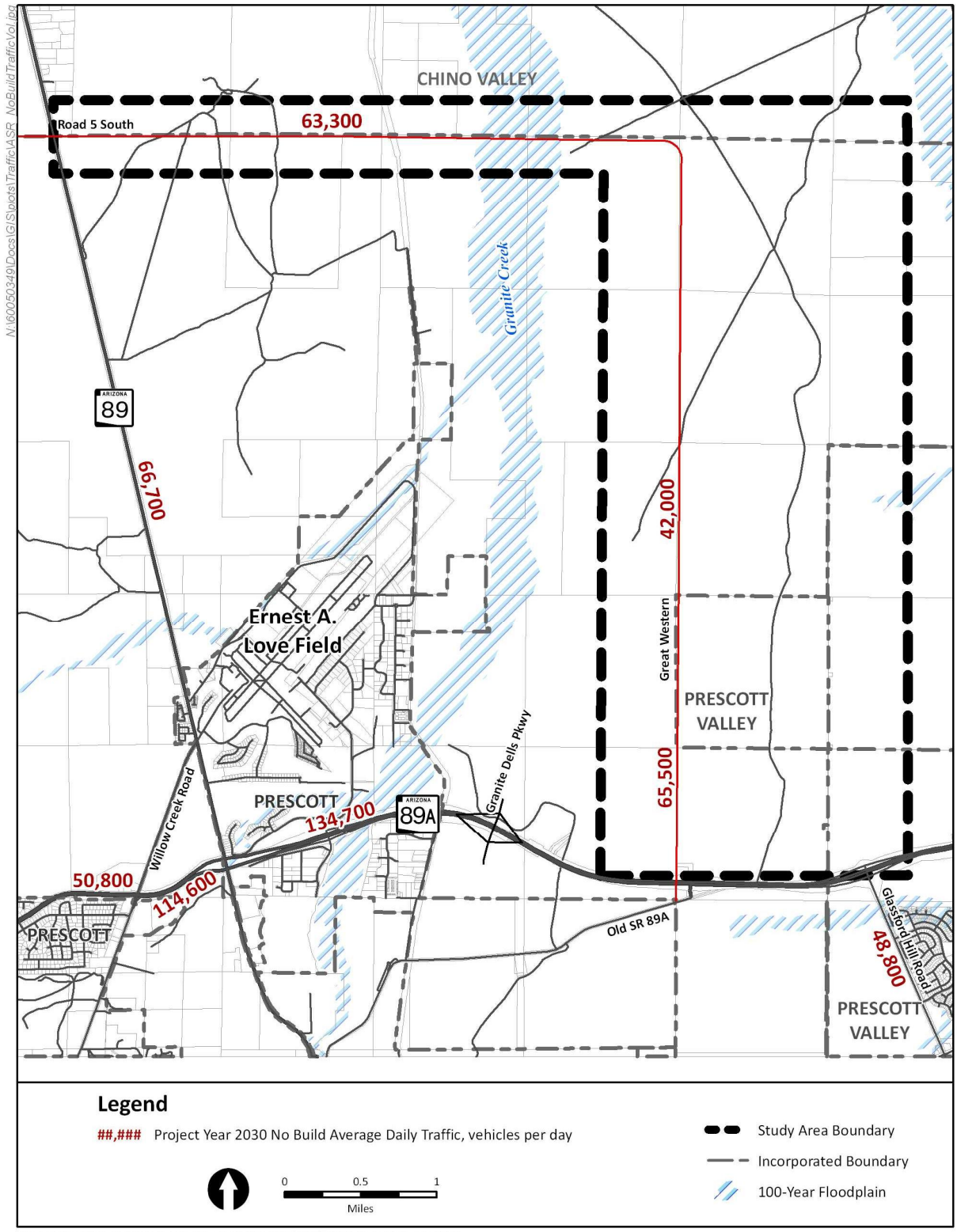
The alternative roadway networks evaluated generally included future section line roadways within the study area. Included in the multiple alternatives was a “no freeway” model run, referred to as Alternative 2 in the AATP report. This model modified the base roadway network to reflect Great Western/Road 5 South, Glassford Hill Road, and Granite Dells Parkway as all 4-lane arterial roadways, and therefore no new access controlled facility was included. For the purposes of this study, the AATP Alternative 2 model will be considered the “No-Build” Great Western study model. **Figure 9** represents the year 2030 daily traffic volumes within the study area from the AATP Alternative 2 roadway network model.

SR 89 south of Road 5 South is projected to carry approximately 67,000 vpd in 2030 No-Build conditions compared to the 24,200 vpd in the existing 2007 conditions, reflecting a growth of approximately 180 percent. Similarly, SR 89A east of Larry Caldwell Drive is projected to carry 135,000 vpd compared to 29,500 vpd in existing 2007 conditions, reflecting a growth of approximately 360 percent.

The AATP included a recommended roadway network that would meet the year 2030 needs of the area. **Figure 10** represents the year 2030 daily traffic volumes from the recommended AATP roadway network model within the study area. The AATP model includes Great Western Road as a high capacity/high speed corridor. SR 89 south of Road 5 South is projected to carry approximately 57,000 vpd in 2030 with the high speed facility in place. Similarly, SR 89A is projected to carry 106,000 vpd in 2030. The Great Western alignment north of SR 89A is anticipated to carry 90,000 vpd, and Road 5 South east of SR 89 is anticipated to carry 80,000 vpd.

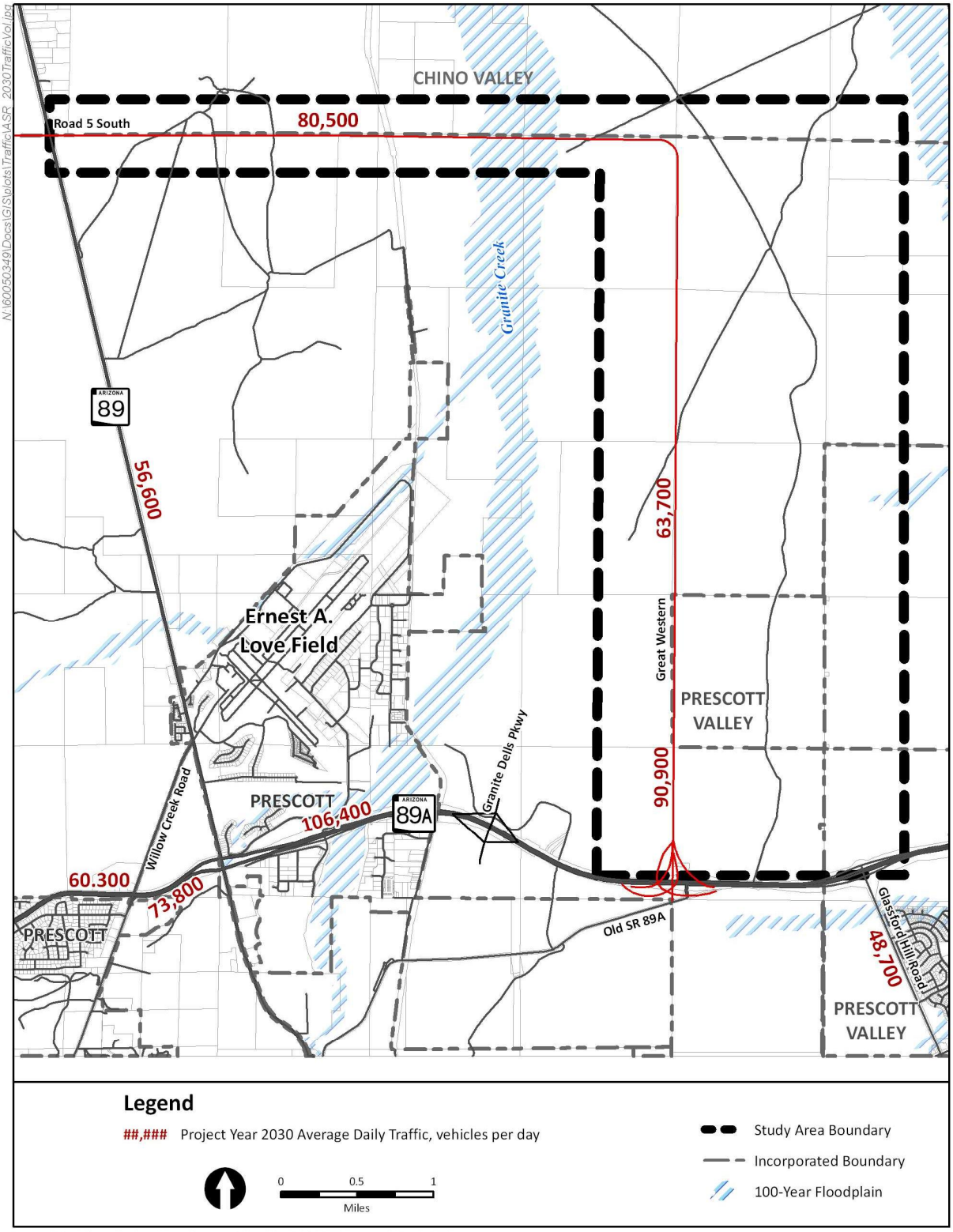
Neither the AATP year 2030 model nor the CYMPO model includes the future Chino Valley Extension north of the Great Western Corridor. The regional trips utilizing the Great Western Corridor in the north-south direction are anticipated to increase from the current projections with the completion of the Chino Valley Extension beyond year 2030. Since the year 2030 travel demand models do not include the Chino Valley Extension, it is very difficult to predict the year 2030 traffic volumes along the Great Western with the full future roadway system in place. Therefore, this study will establish the need for an access controlled facility by evaluating the anticipated Build year 2030 volumes currently available and providing recommendations for the

preferred corridor alignment. Due to the limitations with the 2030 Build travel demand model, only preliminary evaluation with current traffic projections of the system interchange options will be performed. No final recommendations will be made. It will be necessary to reevaluate these system connections with a new updated model which includes a more extended network and up to date land use. An updated model is expected to be developed with the next CYMPO long-range transportation study that is anticipated to be completed in year 2012.



Source: City of Prescott Airport Area Transportation Plan (AATP) 2009; Yavapai County 2008

Figure 9. Year 2030 No-Build Traffic Volumes



Source: City of Prescott Airport Area Transportation Plan (AATP) 2009; Yavapai County 2008

Figure 10. Year 2030 Traffic Volumes

2030 No-Build Operational Characteristics

As previously mentioned, operational traffic conditions are defined based on LOS per the HCM with letter designations from 'A' to 'F' with LOS 'A' representing the best operational conditions and LOS 'F' representing an over-capacity condition (congestion). Traffic operational analyses for SR 89A and SR 89 were conducted using CORSIM. The anticipated operations for year 2030 No-Build conditions include the following:

- In the AM Peak hour, SR 89 will operate at LOS 'F' in the southbound direction north of Road 5 South to south of Willow Creek Road, then transitions to a LOS 'E' to the SR 89A traffic interchange.

- Northbound SR 89 from the SR 89A TI to north of Road 5 South will operate at LOS 'F' in the PM peak hour.

- SR 89A mainline will experience LOS 'F' in the westbound direction in the AM peak hour and LOS 'F' in the eastbound direction in the PM peak hour. Some of the anticipated congestion will be caused by weaving maneuvers between closely spaced service interchanges and the high volumes anticipated on SR 89A.

All intersections that were included in the analyses are anticipated to operate at LOS 'E' or 'F' in both peak hours with the exception of the SR89/SR89A TI southern intersection in the AM peak hour, which operates at LOS 'D'.

3.6 Ernest A. Love Field Airport

The City of Prescott's *Airport Master Plan Update*, which is currently in progress, will assess the future growth in the region and forecast the future needs of the Ernest A. Love Field (PRC) airport. The Master Plan Update will provide recommendations regarding future airport services to stimulate new traffic and economic growth for the airport. A new terminal location and proposed circulation plan will be developed.

The consultant team preparing the Master Plan Update provided preliminary information for use in this study. An update for the Airport Part 77 surface is not yet available; however, conservative estimations for approach elevations can be made utilizing the most conservative proposed runway extension plans. The current runway alternatives vary the roadway extension length, with the longest extension approximately 4,000 feet. Utilizing the approach surface elevation rates in the current Part 77 surface and an assumed runway extension of 4,000 feet will provide conservative approach elevations for alternatives analysis purposes.

3.7 Trails and Pathways

There are no future trails or pathways planned within the extents of the study area. However, there is an existing railroad right-of-way corridor owned by Cortez Enterprises which crosses the east-west segment of the study area. The corridor no longer has rail, but has the potential to become integrated into the City of Prescott's Rails to Trails program. South of the Prescott Airport, the railroad corridor is an established trail called the Peavine Trail which could extend north in the future.

4.0 Environmental Setting and Context

4.1 Land Use

Existing Land Use

The project study area is located within an unincorporated portion of Yavapai County between the City of Prescott and the Towns of Prescott Valley and Chino Valley. Approximately 640 acres of the project study area is located within the town limits of Prescott Valley. The project study area is undeveloped and used principally for livestock grazing. (See Section 2.3 *Existing Land Use*)

Future Land Use

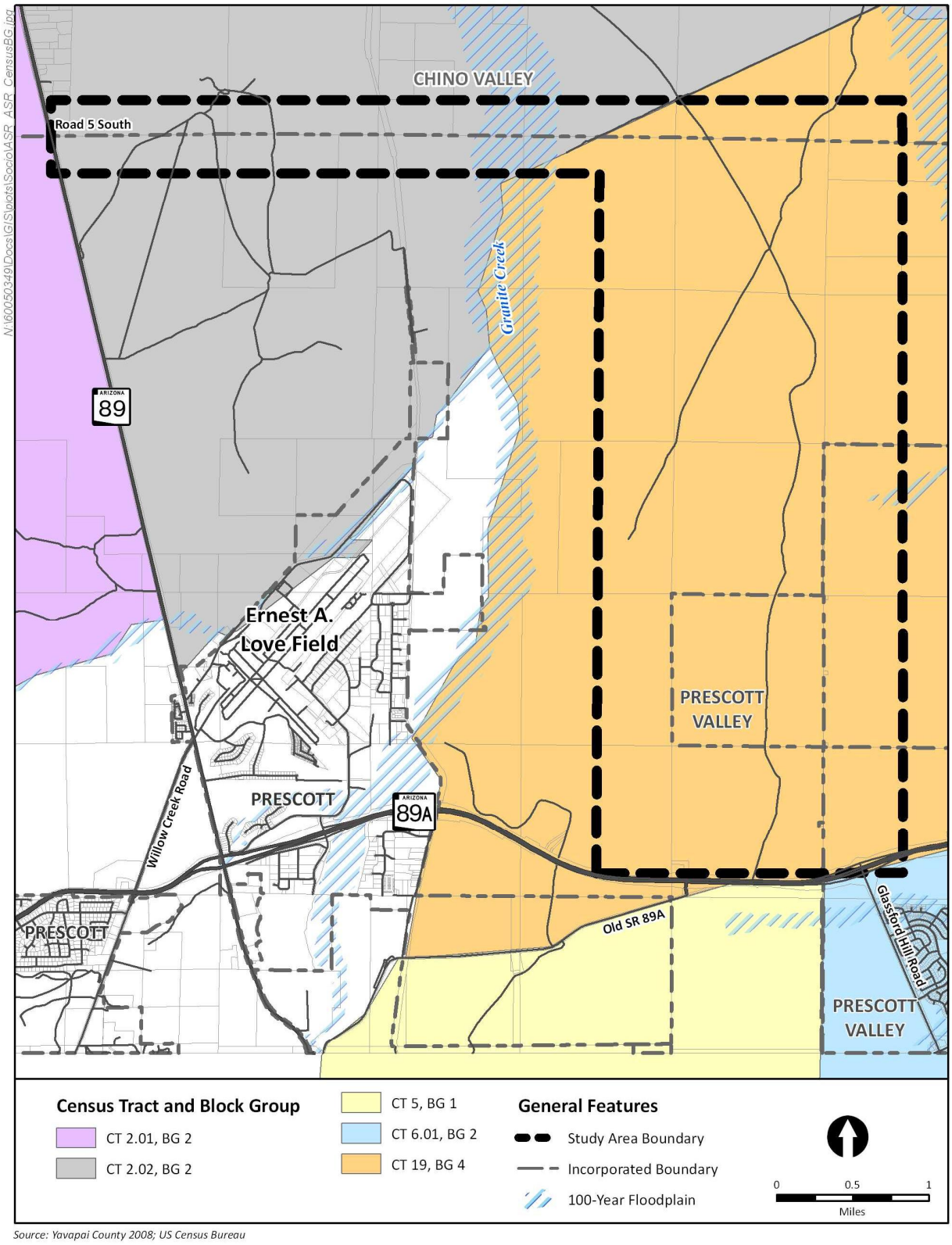
Future land uses, as designated in the general or comprehensive plans of the governing jurisdictions were described in Section 3 *Future Conditions*.

4.2 Title VI/Environmental Justice

Title VI of the Civil Rights Act of 1964 and related statutes ensure those individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, national origin, age, sex, and disability. Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994) directs that programs, policies, and activities not have a disproportionately high and adverse human health and environmental effects on minority and low-income populations. The rights of women, the elderly, and the disabled are protected under related statutes.

Demographic data obtained from the 2000 U.S. Census were used to compare the demographic profile of the study area with that of Yavapai County and the State of Arizona. Census block group level data were used to identify disabled, gender, income, age, and minority populations. The study area is made up of two block groups, with three more immediately adjacent to the study area that may also be affected by the project (refer to **Figure 11** *Census Block Groups*). The population distribution is summarized in **Table 2**.

The evaluation of the study area block groups indicates that census tract 5, block group 1, just south of the study area, has a high percentage of elderly persons; however aerial imagery reveals that the portion of that block group closest to the study area is undeveloped. No other protected populations were identified. While disproportionate impacts to protected populations are not anticipated, the alignment corridor could impact isolated populations within a census block group.



Source: Yavapai County 2008; US Census Bureau

Figure 11. Census Block Groups

Table 2. Population Distribution

Area		CT 2.01, BG 2	CT 2.02, BG 2	CT 5, BG 1	CT 6.01, BG 2	CT 19, BG 4	Total Tracts	Yavapai County	Arizona
Total Population	#	2,497	4,313	3,310	2,507	1,116	**13,743**	**167,517**	**5,130,632**
Total Minority	#	215	498	228	296	99	**1,336**	**22,533**	**1,858,567**
	%	8.60%	11.50%	6.90%	11.80%	8.90%	**9.70%**	**13.50%**	**36.20%**
Age 60 years and over	#	555	498	1,300	385	99	**2,837**	**22,533**	**870,065**
	%	22.20%	11.50%	39.30%	15.40%	8.90%	**20.60%**	**13.50%**	**17.00%**
Total Population for whom disabled is determined	#	2,333	3,981	3,091	2,240	1,079	**12,724**	**156,572**	**4,667,187**
Disabled	#	445	765	561	357	199	**2,327**	**34,220**	**902,252**
	%	19.10%	19.20%	18.10%	15.90%	18.40%	**18.30%**	**21.90%**	**19.30%**
Total Population for whom poverty is determined	#	2,464	4,301	3,204	2,492	1,111	**13,572**	**163,663**	**5,130,632**
Below Poverty Level	#	288	197	149	321	66	**1,021**	**14,092**	**263,514**
	%	11.70%	4.60%	4.70%	12.90%	5.90%	**7.50%**	**8.60%**	**5.10%**
Households	#	962	1,689	1,483	925	446	**5,505**	**70,069**	**1,901,625**
Female Head of Household	#	160	451	356	175	45	**1,187**	**18,218**	**515,611**
	%	16.60%	26.70%	24.00%	18.90%	10.10%	**21.60%**	**26.00%**	**27.10%**

4.3 Cultural Resources

As part of the Great Western Feasibility Study, a Class I cultural resources overview of the study area was undertaken to determine if a Class III field survey would be indicated. The report is entitled, *A Class I Cultural Resources Literature Review and Assessment Report for the Great Western/Glassford Hill Extension Study, Yavapai County, Arizona* (Ripley 2008) and the results of this research are summarized below.

The Class I overview identified 15 surveys in conjunction with previous investigations that were either within or partially within the study corridor (Madsen 1981, 1983; Howard 1987; Bayman 1987; Scott 1992; Euler 1993; Spalding et al. 1994; Indermill 1995; Weaver 1996; Ziem and Motsinger 1998; Ziem 1998, 1999; Fox 1999; Webb 2001; North and Foster 2003). The surveys cumulatively cover approximately five percent of the study area, therefore, a Class III field survey would be required before construction for the remaining unsurveyed portions of the Preferred Alternative. Five cultural resource sites were identified within the study area. Four of the five sites are linear features and one is a multi-component site.

AZ N:3:32 (ASM) is the Santa Fe, Prescott, & Phoenix Railway Line (SFP&P). The SFP&P traversed west central Arizona, from Ash Fork to Phoenix, via Prescott, Congress, and Wickenburg and is considered Eligible for inclusion in the National Register of Historic Places (NRHP). A portion, Sections 6 and 7, Township 15 North, Range 1 West, is located within the study corridor but this segment has not been evaluated.

AZ I:3:10 (ASM), the Historic Alignment of old SR 89 (Pipeline Road), and AZ N:7:61, the Historic Alignment of SR 89A are considered Eligible for the NRHP under Criteria A, C, D (Ziem and

Motsinger 1998). According to the Interim Procedures for Treatment of Historic Roads (November 15, 2002), US 89 and US 89A are recognized as part of the Historic State Highway System, and are thus recommended as Eligible for inclusion in the Arizona Register of Historic Places (ARHP). The proposed project may alter the historic fabric of the US 89 and US 89A roadways. However, such alteration is normal and on-going aspect of road maintenance, and one that is consistent with the Secretary of Interior's standards for the treatment of historic properties (36 CFR §68).

AZ N:7:342 (ASM) is a multi-component site containing a dispersed prehistoric artifact scatter and a discrete historic occupation of one rock ring, two depressions, and a few artifacts. This site is considered Eligible for the NRHP (North and Foster 2003) and avoidance is recommended.

AZ N:7:212 (ASM)/ AZ N:7:217 (ASM) is the Chino Valley irrigation ditch and is considered Eligible for the NRHP under Criterion A and D (Brodbeck 2004; Ziem and Motsinger 1998). This site consists of in-use and abandoned segments and features of the Chino Valley Irrigation District (CVID). The portion of this site that falls within the study area is restricted to a small area of the southeast corner of Section 3, Township 1 North, Range 2 West and could potentially be easily avoided by construction activity.

Three sites have been recorded within a half-mile radius of the study corridor; AZ N:7:218 (ASM), an irrigation ditch, AZ N:7:219 (ASM), a lithic scatter, and AZ N:7:341 (ASM), a NRHP Listed historic site. If work is anticipated to be done in these areas, the presence of these sites must be taken into account.

4.4 Biological Resources

The study area is located in the Lonesome Valley on primarily undeveloped land within Yavapai County. Lonesome Valley is a relatively wide and flat-bottomed alluvial basin with some gentle to moderately steep slopes. It is located within the Plains and Great Basin Grassland biotic community (Brown 1994). This biotic community consists mainly of short-grass species and shrubs.

Vegetation

Vegetation within the project area is primarily grasslands dominated by grama grasses (*Bouteloua* sp.) and wheat grass (*Agropyron* sp). The area is interspersed by chapparal, which is characterized by short-grass prairie, with scattered woody perennial shrubs. According to a report including local field conditions (SWCA 1999), shrub vegetation includes: scrub oak (*Quercus turbinella*), Mexican cliffrose (*Purshia mexicana*), prickly pear cactus (*Opuntia* spp.), beargrass (*Nolina microcarpa*), mountain mahogany (*Cercocarpus montanus*), Utah juniper (*Juniperus osteosperma*), one-seed juniper (*J. monosperma*), and pinyon pine (*Pinus edulis*). Vegetation found in the smaller washes ranges from mainly annual weeds to native grasses (*Agropyron* and *Bouteloua* spp.), some shrubs (*Q. turbinella, P. mexicana, C. montanus*), and sometimes a few trees (*Juniperus* and *Pinus* spp.).

Native Plants: A search of the AGFD On-Line Environmental Review Tool (Search ID No. 20081203007614) revealed that Arizona phlox (*Phlox amabilis*), a US Forest Service sensitive species, has been reported to occur within three miles of the study area. The AGFD distribution map shows that the plant has been observed in three different locations along SR 89 and SR 89A near Prescott and Prescott Valley (AGFD 2005). This plant may be present within the study area. No other native plants with special status have been reported. A plant survey was conducted for the preferred corridor (refer to EO section 3.2 Biological Resources).

***Invasive Species**:* Invasive species are likely present in the area, but no records have been located to date. Invasive species may be present near SR 89 and SR 89A, but no records have been located to date. No invasive species were observed during a driving survey of the preferred corridor in December 2009.

Special Status Species

The AGFD On-Line Environmental Review Tool was queried on December 3, 2008 (Search ID No. 20081203007614). The query indicated that four special status species have been documented as occurring within three miles of the study area. One of the species, Arizona phlox, is discussed in the Native Plants section above. The other special status species are discussed below; all are protected under the Migratory Bird Treaty Act. No proposed or designated critical habitat is present within three miles of the study area.

Threatened and Endangered Species: The AGFD On-Line Environmental Review indicated that wintering bald eagles (*Haliaeetus leucocephalus*) have been reported within three miles of the study area. The "wintering population" of bald eagles in Arizona is listed as a "Species of Concern" under the Endangered Species Act and is not given formal protection; they are a distinct group from the "desert-nesting sub-population" of bald eagles that has been relisted as Threatened. A review of the AGFD distribution map for bald eagles shows that a wintering bald eagle was reported near Lynx Lake (AGFD 2004). There is no appropriate habitat for bald eagle nesting or foraging within the study area; they are not expected to occur there.

In addition to the AGFD On-Line Environmental Review, a qualified biologist reviewed the list of Threatened and Endangered Species for Yavapai County from the US Fish and Wildlife Service. The results are presented in **Table 3**.

Table 3. Federally-listed Species Known to Occur in Yavapai County, Arizona

Common Name	Scientific Name	Status	Suitable Habitat Present?	Occupied Habitat Present?	Critical Habitat Present?	Species Affected?	Critical/ Suitable Habitat Affected?
Arizona cliffrose	*Purshia subintegra*	E	No	No	N/A	No	No
Bald eagle (Desert nesting sub-population)	*Haliaeetus leucocephalus*	T	No	No	N/A	No	No
Black-footed ferret	*Mustela nigripes*	E	No	No	No	No	No
California condor	*Gymnogyps californianus*	E (NEP)	No	No	N/A	No	No
Chiricahua leopard frog	*Lithobates (Rana) chiricahuensis*	T	No	No	N/A	No	No
Colorado pikeminnow	*Ptychocheilus lucius*	E (NEP)	No	No	No	No	No
Desert pupfish	*Cyprinodon macularius*	E	No	No	N/A	No	No
Gila chub	*Gila intermedia*	E (CH)	No	No	No	No	No
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E	No	No	N/A	No	No
Mexican spotted owl	*Strix occidentalis lucida*	T (CH)	No	No	No	No	No
Razorback sucker	*Xyrauchen texanus*	E	No	No	N/A	No	No
Southwestern willow flycatcher	*Empidonax traillii extimus*	E (CH)	No	No	No	No	No
Spikedace	*Meda fulgida*	T (CH)	No	No	No	No	No
Headwater chub	*Gila nigra*	C	No	No	N/A	No	No
Northern Mexican Gartersnake	*Thamnophis eques megalops*	C	No	No	N/A	No	No
Page springsnail	*Pyrgulopsis morrisoni*	C	No	No	N/A	No	No
Roundtail chub	*Gila robusta*	C	No	No	N/A	No	No
Yellow-billed cuckoo	*Coccyzus americanus*	C	No	No	N/A	No	No

Notes: **E** = Endangered; **T** = Threatened; **C** = Candidate; **CH**= Designated Critical Habitat within Yavapai County; **PDL** = Proposed Delisted; **NEP** = Nonessential Experimental Population.

Source: *Federally listed species for Yavapai County (July 16, 2009)*. Obtained from USFWS on Aug. 11, 2009.

Last Updated: 08/13/2009

Migratory Bird Treaty Act: The MBTA is a federal act that protects birds that migrate within the United States or between the United States and other countries, as they may not otherwise be afforded protection when they are not full-time residents in a single state. The act protects most raptors (*e.g.* eagles, owls) and many other migratory species.

The AGFD On-Line Environmental Review indicated that three species protected under the MBTA have been observed within three miles of the study area. These species, plus an additional species that has not been reported to the AGFD but likely occurs in the study area, are presented in **Table 4** below.

Table 4. Species Protected Under the Migratory Bird Treaty Act

Species	Scientific Name	Sighting/ habitat	Likely to occur in study area?	Mitigation
Bald eagle (wintering population)	*Haliaeetus leucocephalus*	Reported near Lynx Lake. Nest and feed near open water.	No	None
Golden eagle	*Aquila chrysaetos*	Reported near Prescott/Hwy 89. Found in open country, prairies, barren areas, especially in hilly or mountainous area. Nest on rock ledges, cliffs or large trees.	No	None
Belted kingfisher	*Megaceryle alcyon*	Reported near headwaters of Agua Fria (Prescott/Hwy 89). Live along smaller perennial streams and rivers.	No	None
Burrowing owl	*Athene cunicularia hypugaea*	No reported sightings. Found in open, well-drained grasslands, steppes, deserts, pariries, and agricultural lands; sometimes in open areas near human habitation, golf courses or airports.	Yes	Pre-construction survey; ADOT standard measures for relocation

Wildlife Movement

The area is located between the eastern and western portions of the Prescott National Forest, which provides habitat that is used by several species of wildlife that require large open spaces, including pronghorn, mule deer, javelina, and mountain lions (refer to **Figure 12**). The study area is located in an area of open grasslands within Potential Linkage Zone 35, East – West Prescott National Forest, as identified by The Arizona Wildlife Linkage Working Group (AWLW 2006). Within this zone functional linkage(s) should be designated and conserved to allow for wildlife movement between the two protected forest areas. Construction of a new road through this area would fragment the habitat, reducing or eliminating the ability of wildlife to move from one side to the other and increasing the chances of wildlife – vehicle collisions. Wildlife crossings are recommended in these situations to reduce the conflict between natural movements and human development. One solution is to modify box culverts and bridges that are placed at washes to encourage wildlife crossing at these natural pathways. Specialized fencing can also be used along the roadway to discourage wildlife from crossing across the asphalt and encouraging movement toward wildlife crossing locations.

The land in the study area is currently owned by private parties and the Arizona State Land Department (refer to **Figure 3** *Existing Land Ownership*). The future plans for the area include a large amount of residential and commercial development, which will also fragment the habitat (refer to **Figure 8** *General Planned Land Use*). As planning continues, an important topic will be determining the best way to accommodate wildlife movement while allowing future development.

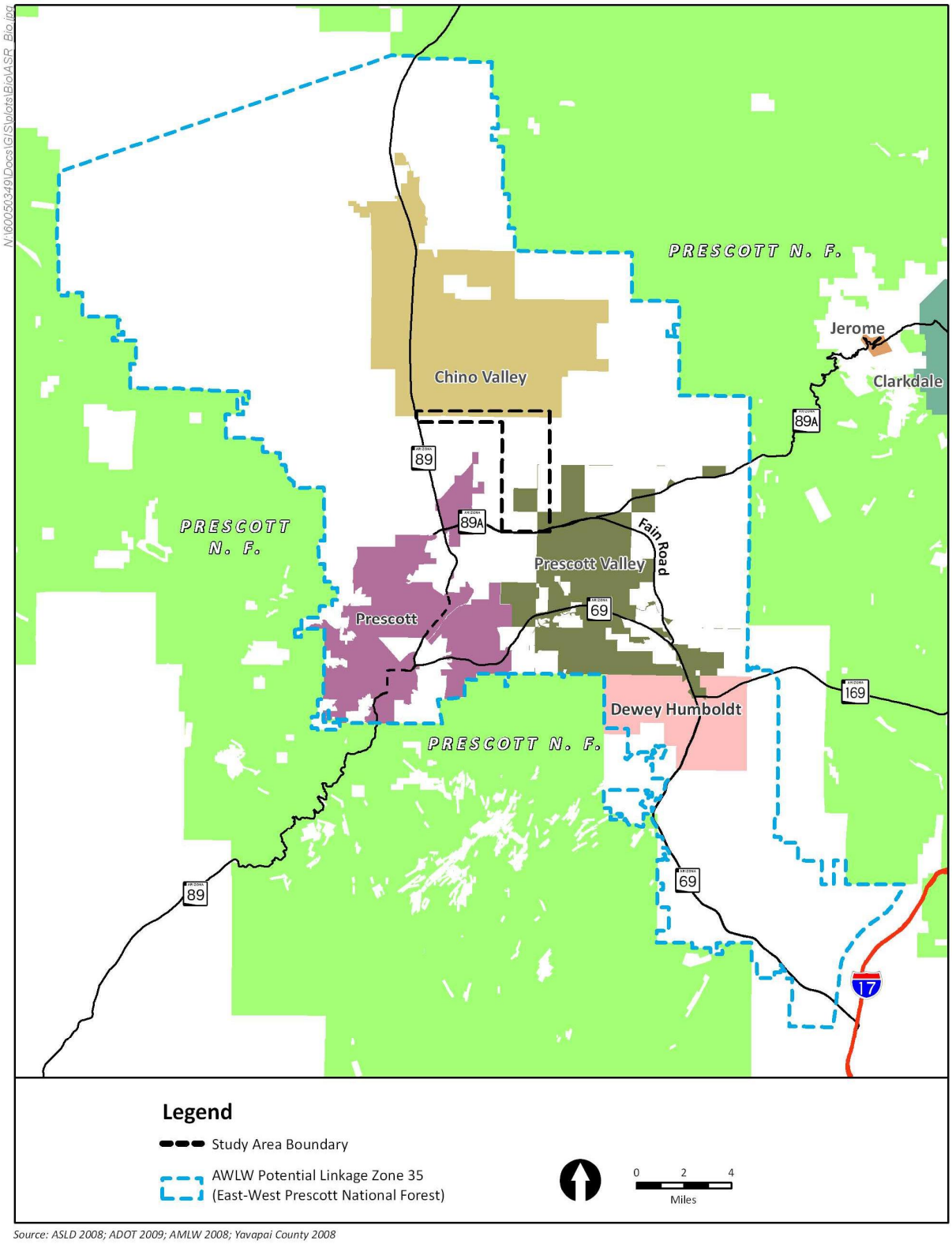


Figure 12. Wildlife Map

4.5 Water Resources

This section covers surface and ground water resources within the project area, including water quality, floodplains, and wells. Drainages were also discussed in the existing conditions section of this report.

Surface Water

The study area is located within the Upper Verde River subwatershed, which is part of the larger Verde River Watershed. Surface water generally flows south to north and west to east within the study area. Granite Creek, the largest drainage feature in the study area, flows through the northern portion of the study area. There are ten other drainages located throughout the study area. All of the drainages are ephemeral washes; that is, water runs in them only when it rains and they are dry most of the year. The closest perennial waterbodies are Willow Creek Reservoir and Watson Lake, located south of the Prescott Airport, and the Verde River, which becomes perennial as a result of groundwater flow at the confluence with Granite Creek just north of the study area (USGS 2002).

***Jurisdictional Waters of the United States**:* According to Section 404 of the Clean Water Act, the Army Corps of Engineers (Corps) has the authority to regulate discharges, including construction of bridges, etc., in Waters of the United States (WOUS). The active channel of Granite Creek is likely jurisdictional. Construction within the active channel of Granite Creek would necessitate consultation with the Corps.

***Floodplains**:* The majority of the study area is outside the 100-year floodplain (Zone X) as shown in **Figure 2** *Project Study Area*. There are two areas that fall within the 100-year floodplain: the area along Granite Creek in the north part of the study area and a small area along an unnamed wash just northeast of the Town of Prescott Valley section that is within the study area. Any construction within the 100-year floodplain that could cause an increase in the flood depth must be coordinated with the Yavapai County Floodplain Manager.

***Surface Water Quality**:* Surface water quality within the study area meets state standards. Based on the Arizona Department of Environmental Quality (ADEQ 2008) List of Impaired Waters, there is one river reach upstream (south) of the study area that is not attaining state water quality standards: Granite Creek from the headwaters to Willow Creek. This stretch of Granite Creek has levels of mercury, *E. coli* bacteria, and turbidity that exceed the maximum allowed, and levels of dissolved oxygen that are below the minimum required. The measured parameters are back within acceptable ranges where Granite Creek crosses the study area.

***Irrigation District**:* The City of Prescott purchased the Chino Valley Irrigation District's rights to surface water impounded at Watson Lake and Willow Creek Reservoir. The City maintains the lakes for recreational uses and releases approximately 1,500 acre-feet per year for groundwater recharge at their recharge facility (ADWR 2008).

Groundwater

Groundwater is a precious resource in Arizona, especially in areas with limited freshwater supplies. In some places, groundwater is being pumped for use faster than the groundwater supply can be recharged (groundwater overdraft). The Arizona Department of Water Resources has designated Active Management Areas (AMA) for groundwater in three areas of the state where groundwater overdraft is occurring. The AMAs are managed with the long-term goal of achieving safe-yield by 2025. The study area is located within the Prescott AMA. The Prescott AMA boundary is defined by the Bradshaw Mountains to the south, Granite Mountain and Sullivan Buttes to the west, and by the Black Hills to the northeast.

The Prescott AMA consists of two sub-basins, the Little Chino and the Upper Agua Fria, which are bisected by a surface drainage divide. Granite Creek, Big Draw, and Little Chino Creek drain the Little Chino sub-basin into the Verde River. Lynx Creek and other smaller ephemeral streams drain the Upper Agua Fria sub-basin into the Agua Fria River (ADWR 2008). Most of the Verde River watershed is within the boundary of the Verde River groundwater basin. Groundwater flow is a major factor in maintaining perennial flow in the Verde River.

Groundwater Quality*:* In general, water quality throughout the AMA is excellent. Radon levels that exceed standards have been detected in granitic formations around Prescott (ADWR 2008). Groundwater aquifers may potentially be impacted by nitrate and bacterial contamination due to septic tanks. Although most portions of the AMA are not subject to this threat, areas where the depth to water is shallow could be at some risk, particularly where municipal growth rates are high. A large portion of the exempt wells and dry-lot subdivisions in the Prescott AMA use septic systems for wastewater disposal, rather than utilizing a central wastewater collection and treatment system (ADWR 2008).

Wells*:* The Arizona Department of Water Resources (ADWR) Wells55 database was reviewed to determine whether wells were present in the general vicinity of the study area. The ADWR-Wells55 database contains information on all wells registered with the state. The accuracy of the well locations in this database is limited because the locations are reported to ADWR at the level of the quarter-quarter-quarter-section (10 acre areas). As-builts and aerials were used to more precisely determine well locations. There are several wells located within the study area; three are located within potential construction areas of the alternatives under consideration as shown in **Figure 13**. The three wells identified are municipal water production wells owned by the Prescott Valley Water District.

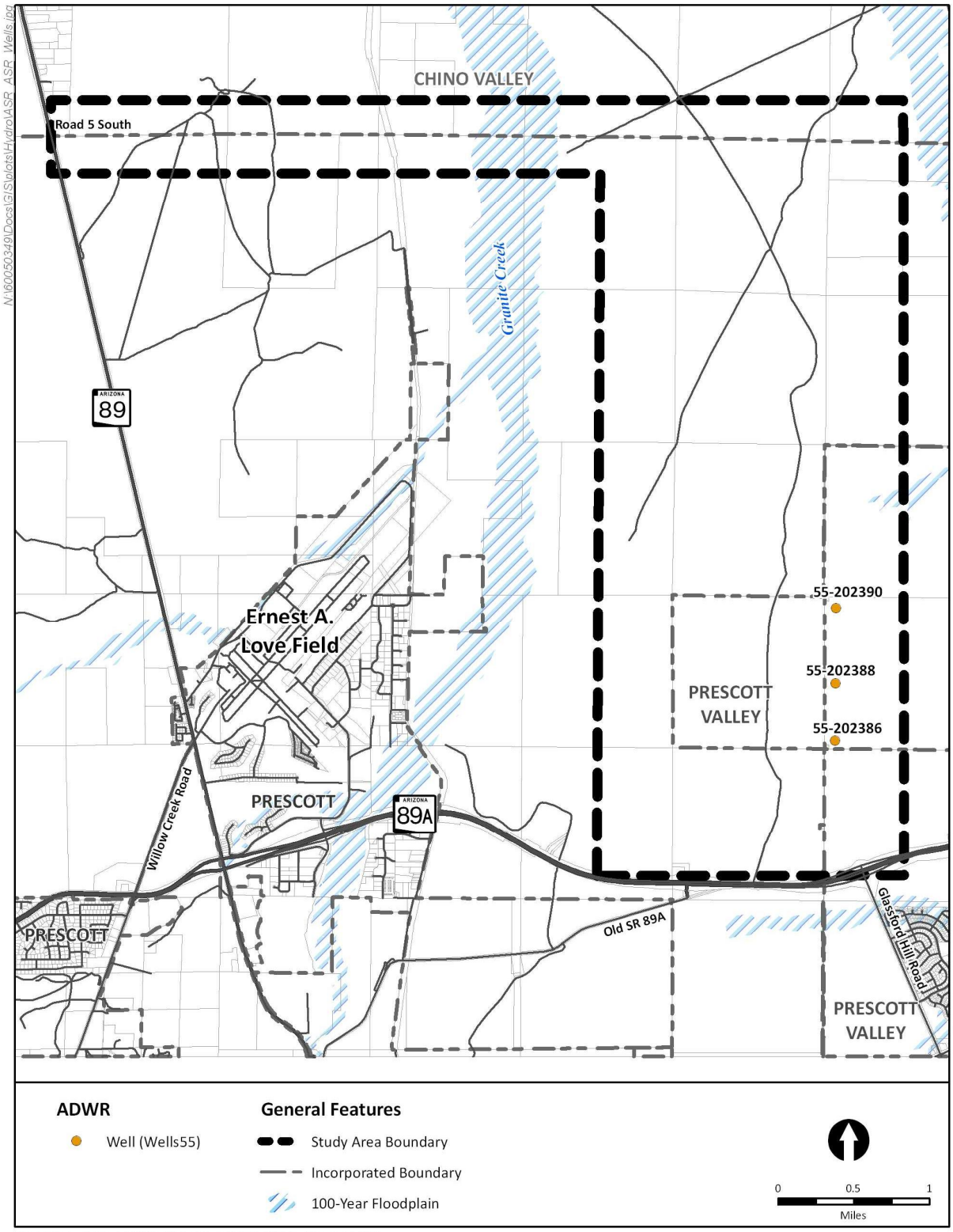
4.6 Hazardous Materials

A review of the ADEQ online interactive map was completed on May 14, 2009 to identify sites within the study area that have the potential to adversely impact the project site through release of hazardous substances to the surface, the subsurface, or groundwater. No sites were identified.

4.7 Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981 (FPPA) was passed in 1981 with the intent to minimize the impact of federal programs that involve converting farmland to non-agricultural uses. As a result, any important farmland that would be affected by a project needs to be identified. The USDA Natural Resources Conservation Service (NRCS), in cooperation with other federal, state, and local government organizations, has inventoried land that can be considered important farmlands. Important farmland classifications include prime farmland, unique farmland, and farmland of statewide or local importance.

Along the western bank of Granite Creek there is a strip of land, approximately 500 feet wide, that is considered farmland of unique importance. Within Granite Creek there are also islands of soil types that could be considered prime farmland if irrigated. As there is no irrigation in this area it is not considered prime farmland. All other land within the project area is not considered important farmland.



Source: Yavapai County 2008; Arizona Department of Water Resources 2009

Figure 13. Wells

4.8 Visual Resources

The study area is situated in both Lonesome Valley and Little Chino Valley, on undeveloped land primarily used for grazing. The landscape is characterized by low rolling hills and open grasslands. Views of the landscape are generally unobstructed. Existing terrain elevations within the study area range from approximately 4,840 feet to 5,160 feet. The terrain rises gently east to west out of Lonesome Valley to crest the basaltic Black Hill (5,030 feet) before descending to Granite Creek and continuing to traverse Little Chino Valley.

A privately owned portion of the Peavine Trail crosses the east-west portion of the study area. Segments of the Peavine Trail are open to the public in both the Prescott and Chino Valley areas, but there is currently a gap between these two trails segments. Recreational users of the trail would be sensitive to changes in the visual changes in the landscape. Also, residents who live on nearby parcels may be sensitive to visual changes. Homes situated approximately a quarter mile southeast of the Glassford Hill Road TI and approximately one half mile east of the study area could potentially have foreground (0-.25 mile), middle ground (0.25-3 miles) and background views (beyond 3 miles) of the transportation facilities, especially if those facilities are elevated.

4.9 Noise

Traffic noise tends to be a dominant noise source in urban as well as rural environments. The proposed project is surrounded by vacant, currently undeveloped land. As such, there are no existing residences or businesses within or near the project area that are close enough to the proposed road to be affected by its noise.

There is a proposed residential development located south of SR 89A at the Granite Dells Parkway TI. Current site plans indicate the houses could be located approximately 300 feet from the SR 89A/Great Western Road on and off ramps. According to ADOT's Noise Abatement Policy (ADOT 2005), a new development could be considered a noise-sensitive receiver if it is planned, designed, and programmed. A development is considered planned, designed, and programmed if the local jurisdiction has issued a construction permit prior to the Date of Public Knowledge of the formal environmental document. If a construction permit is issued for the proposed residential development prior to completion of the future environmental document for this project, an assessment of potential noise impacts at those receivers will need to be conducted.

4.10 Air

The Clean Air Act and Amendments (CAAA) and NEPA require that air quality impacts be addressed in the preparation of environmental documents. Under the CAAA, areas are classified by levels of ambient air pollution and whether they attain the National Ambient Air Quality Standards (NAAQS) or are in non-attainment of the standards. There are NAAQS for six pollutants, referred to as "criteria pollutants" and include carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. The proposed project is in an area that is in attainment for all criteria pollutants.

5.0 Public Involvement

The public participation plan for this study included two facets of public involvement. The first was the creation of a Technical Advisory Committee composed of various stakeholders within the corridor. The second was public outreach including newsletters and public meetings.

5.1 Project Stakeholders

Many agency and private stakeholders were involved with the alternatives development and evaluation of the Great Western including the following:

- Yavapai County
- Arizona Department of Transportation (ADOT)
- Federal Highway Administration (FHWA)
- Town of Prescott Valley
- Town of Chino Valley
- City of Prescott
- Central Yavapai Metropolitan Planning Organization (CYMPO)
- Granite Dells Ranch Holdings, LLC
- Arizona State Land Department (ASLD)
- Deep Well Ranch
- Cortez Enterprises
- Town of Dewey-Humboldt
- Granite Dells Estates Properties, Inc
- US Fish & Wildlife Services (USFWS)
- Arizona Game & Fish Department (AGFD)
- The Nature Conservancy

5.2 Stakeholder Coordination

Independent one-on-one meetings were held with each stakeholder to gain an understanding of the problems, issues, opportunities and community suggestions regarding the ultimate roadway classification, alignment, and connections. The information gathered was also incorporated into the evaluation framework that was utilized to assess alternative alignment concepts.

An initial agency and stakeholder scoping meeting was held on February 4, 2009 to allow all stakeholders to present their issues, concerns, and needs regarding the study area and verify the project scope of work and study limits. At this scoping meeting, it was decided that the Technical Advisory Committee would be formed and progress meetings would be held monthly during the alternatives development and evaluation phase. Subsequently, the consultant team and advisory committee met monthly from March 2009 to August 2009. During these monthly meetings, the alternatives evaluation criteria were developed, the evaluation process was presented and agreed upon, and the stakeholders participated in the development of the alignment alternatives, which allowed for the development and evaluation of alternatives in a collaborative effort between the project study team and the project stakeholders. Consensus was obtained among the agencies and stakeholders regarding the initial recommended alternative and implementation phasing prior to presentation to the public.

Meeting minutes from the one-on-one stakeholder meetings are included in Appendix F of the *Great Western Corridor Environmental Overview*.

5.3 Public Outreach

Two public meetings were conducted to allow public input opportunities regarding the project. The first public meeting was held on February 4, 2009 at the Antelope Hills Golf Course Old Clubhouse in Prescott. The purpose of this meeting was to familiarize the general public with the project and to identify their concerns and needs within the study area in order to gain input for the development of evaluation criteria and alignments. Twenty-nine community members attended this public meeting. The meeting was announced via a newspaper advertisement and mailed newsletters. Comment forms and newsletters were provided at the meeting to allow a forum for formal public input. All presentation materials were also presented on the Yavapai County Public Works website for further public comment opportunities. The meeting newsletters, newspaper ads, presentation boards, and a summary of public comments can be found in Appendix G of the *Great Western Corridor Environmental Overview*.

The second public meeting was held on July 22, 2009 at the Antelope Hills Golf Course Old Clubhouse in Prescott. The purpose of this meeting was to present the four alignment alternatives and the comparative evaluation of the alternatives, and solicit public input on the initial recommendations. Twenty-nine community members attended this public meeting. The meeting was again announced via a newspaper advertisement and mailed newsletters. All presentation materials were also presented on the Yavapai County Public Works website for further public comment opportunities. The meeting newsletters, newspaper ads, presentation boards, and a summary of public comments can also be found in Appendix G of the *Great Western Corridor Environmental Overview*.

6.0 Alternatives Development & Evaluation

6.1 Background

As previously mentioned, Yavapai County, ADOT and CYMPO have all identified a need for this corridor through prior investigations and studies. The *Final Corridor Evaluation/Location Report* prepared by Dava & Associates, dated January 2002, studied the potential extension of Glassford Hill Road and documented the evaluation process, alternate and recommended routes for this corridor. Yavapai County completed an update of this January 2002 report that describes the design criteria for the corridor, provides an alternate connection location to SR 89A at Great Western Road and included an evaluation of a free-flow system interchange at SR 89A.

Following these reports, it became apparent that the entire corridor would need to be evaluated to establish an optimum alignment for a long-range planning solution that would meet the needs of the stakeholders while maintaining favorable traffic operations for the entire corridor. In order to identify a recommended alternative that would achieve this goal, a structured, multi-step alternatives development and evaluation process was utilized. This process included data collection (presented in Sections 2, 3 and 4), evaluation criteria development, alternative development, evaluation of alternatives, and recommendations to the public.

6.2 Evaluation Criteria

In order to evaluate each alternative alignment, a set of evaluation criteria was needed to compare the alignments to one another. The criteria provide a framework to recommend the most feasible plan for the corridor. The evaluation criteria were derived through input from the stakeholders and the agency and public scoping meetings. The evaluation categories included economic development, transportation systems, engineering considerations, environmental considerations, and construction and maintenance costs.

Each of these categories was then broken down into specific evaluation criteria. The evaluation criteria represent specific issues that were of concern. In order to evaluate the criteria for the alternatives, it was necessary to also include performance measures. The performance measures are qualitative or quantitative measurements that can be made which apply to each criterion.

The evaluation categories, evaluation criteria and performance measurements that were agreed upon for the project are presented below.

- **Economic Development**
  - **Effects to adjacent parcels**

    Performance Measures
    - Acres of new right-of-way required from existing developments or proposed near-term developments
    - Total acres of new right-of-way required
    - Number of remnant parcels and bisected parcels

  - **Access to potential future economic centers**

    Performance Measures
    - Average distance from traffic interchange locations to future employment and retail centers per the general plans

- **Gross land disturbance**

  Performance Measures
  - Acres of land disturbed by the project, either permanently or during construction

- **Transportation Systems**
  - **Compatibility with regional system**

    Performance Measures
    - Compatibility with existing facility types; maintains similar design speed and criteria; meets driver expectations
    - Maintains continuity of state and regional roadways; does not require through traffic to "exit" to continue regional trip

  - **Compatibility with local system**

    Performance Measures
    - Ability to extend facility and/or connect to local roadway network west of SR 89
    - Ability to extend facility to/or connect to local roadway network south of SR 89A

  - **Access to local roadway network:** This criterion is related to the importance of coordinated long-range planning for growth, by showing the degree to which each alternative was consistent with the adopted General Plans and other relevant planning documents of study area jurisdictions (primarily the City of Prescott, Prescott Valley and Chino Valley).

    Performance Measures
    - Distance from proposed traffic interchange locations to future arterial roadways based on general plans and Chino Valley SATS
    - Adequate number of traffic interchanges along the corridor to handle anticipated future traffic volumes
    - Provision for nearby parcels to have the ability to access regional roadways, may include frontage roads
    - Proximity of first feasible local direct access location north of SR 89A
    - Ability to comply with ADOT Statewide Access Management Guidelines

  - **Traffic Operations**

    Performance Measures
    - Operational level of service along the proposed mainline
    - Operational level of service, including weaving movements, at the junction with SR 89
    - Operational level of service, including weaving movements, at the junction with SR 89A
    - Operational level of service, including weaving movements, at proposed local service traffic interchange locations

  - **Accommodates pathways and trails**

    Performance Measures
    - Ability to preserve existing pathways and trails
    - Ability to accommodate planned pathways and trails

- **Engineering Considerations**
  - **Impacts to Prescott Airport / Ernest A. Love Field**

    Performance Measures
    - Interference with proposed runway extension or Part 77 surfaces

- **Utility Coordination**

  Performance Measures
  - Number and type of existing utility relocations that may be required
  - Compatibility with proposed future utility corridors

- **Compliance with design guidelines**

  Performance Measures
  - Ability to meet county and/or state design guidelines

- **Drainage Considerations**

  Performance Measures
  - Number of large drainage structures required

- **Implementation of facility**

  Performance Measures
  - Ability to construct new facility while minimizing impacts to existing traffic
  - Ability to divide construction into fundable projects
  - Ability to implement phased cross-section

- **Earthwork considerations**

  Performance Measures
  - Volume of cut/fill and earthwork movement required

- **Bridge structure considerations**

  Performance Measures
  - Number of bridge structures, excluding local service traffic interchanges

- **Environmental Considerations**

  - **Effects on water resources**

    Performance Measures
    - Number of existing well sites that may be disturbed
    - Approximate total area of disturbance to potential waters of the U.S.
    - Encroachment on Granite Creek/minimize fill or structural elements in the creek

  - **Disturbance of hazardous materials sites:** This criterion identifies potential conflicts with sites contaminated with hazardous pollutants. Such conflict could potentially lead to site remediation to hinder further contamination, or require special precautions during construction.

    Performance Measures
    - Number of existing and suspected sites that may be disturbed

  - **Effects on biological resources**

    Performance Measures
    - Area of existing vegetation removed or disturbed
    - Potential effects on threatened and endangered species and their habitats
    - Potential effects on state species and their habitats, including native plants
    - Number of crossing opportunities for Pronghorn Antelope at large box culverts or bridge crossing structures
    - Potential fragmentation of Pronghorn Antelope habitat
    - Potential effects on priority conservation areas and priority grasslands

- **Effects on cultural resources**

  Performance Measures
  - Number of potential cultural or historic sites that may be disturbed

- **Compatibility with land use**

  Performance Measures
  - Potential conflicts with existing and adopted future land uses
  - Number of potential 4(f) or 6(f) sites that may be disturbed

- **Effects on farmlands**

  Performance Measures
  - Acres of existing Prime and Unique farmland that may be converted

- **Effects on water quality**

  Performance Measures
  - Total acres of impervious surface leading to storm water runoff

- **Effects on air quality:** This criterion is related to the potential for the added vehicles and traffic associated with the new facility to effect local air quality.

  Performance Measures
  - Total number of traffic interchanges and controlled intersections along the corridor

- **Visual compatibility:** This criterion is related to the compatibility of the facility with the existing landscape and scenic quality in the study area.

  Performance Measures
  - Consistency with the existing landscape

- **Visibility:** This criterion is related to the importance of aesthetics by evaluating the potential for the new facilities to be seen by residents and viewers that would be sensitive to changes in their views of the landscape.

  Performance Measures
  - Visibility to highly sensitive viewers

- **Potential to warrant noise abatement**: This criterion compares the potential for each alternative to result in traffic noise levels high enough to warrant noise abatement measures.

  Performance Measures
  - Number of sensitive receivers within 1,000 feet from the new edge of pavement

- **Disproportionate effects on protected populations:** This criterion compares the potential for the project impacts to have disproportionate adverse affects to any low income, minority, or other protected populations.

  Performance Measures
  - Difference between the percentage of population that is protected (Title VI/Environmental Justice) within the affected census block groups and the percentage of population that is protected within Yavapai County

- ***Construction & Maintenance Costs***
  - **Planning level cost estimates**

Performance Measures
- Total construction cost based on current unit costs (excludes right-of-way costs)
- Expected average annual maintenance costs for ultimate facility

These criteria have been incorporated into evaluation matrices. For simplicity and comparative purposes, multiple matrices were developed: a mainline alignment matrix, a SR 89 TI matrix, a Chino Valley TI matrix, and a SR 89A TI matrix. Each matrix only includes criteria which are applicable to the specific alternatives analysis; therefore some criteria are used in multiple matrices while others are only used once. The results of alternatives evaluations are presented in the following sections.

6.3 Roadway Cross-Section

Prior to the development of mainline alternatives, it was necessary to establish a roadway cross-section that would be utilized. As discussed in previous sections, the corridor warrants a high speed/high capacity facility as established in prior reports. In order to verify this condition, the traffic volumes anticipated along the corridor were evaluated. **Table 5** represents the capacity of typical roadway facilities.

The 2030 traffic projections presented in **Figure 10** indicate that the average daily traffic (ADT) volumes on Great Western will range from roughly 60,000 vpd to 90,000 vpd. These volumes indicate that a minimum a 4-lane freeway facility (high capacity/access controlled) is warranted.

In order to maintain acceptable levels of service in 2030, the facility would require a 6-lane roadway section. However to plan for additional traffic volumes beyond year 2030, an 8-lane section will be included in the mainline evaluation. Input from stakeholders and the general public indicated that an open-median cross-section was favorable to maintain a rural visualization and feel throughout the corridor. **Figure 14** displays the recommended typical cross-section based on projected volumes and stakeholder input.

Table 5. Typical Roadway Facility Capacities

Type of Facility		LOS E		
		4-lane	6-lane	8-lane
Freeway[1]	directional pc/hr	4,500	6,750	9,000
TI's ≥ 1 mile	2-way pc/hr	9,000	13,500	18,000
55 mph	ADT *	90,000	135,000	180,000
Multi-Lane Highway[1]	directional pc/hr	3,420	5,130	6,840
Signals ≥ 2 miles	2-way pc/hr	6,840	10,260	13,680
50 mph	ADT *	68,400	102,600	136,800
AZ Parkway (MLT)[2]	directional vph	2,000	3,000	4,000
Signals ≤ 1/2 mile	2-way vph	4,000	6,000	8,000
45 mph	ADT *	40,000	60,000	80,000
Arterial/Urban Street[1]	directional vph	1,700	2,550	3,400
Signals ≤ 1/3 mile	2-way vph	3,400	5,100	6,800
40 mph (Class II)	ADT *	34,000	51,000	68,000

*Assume peak hour/ADT ratio = 0.10

Sources: 1. Highway Capacity Manual 2000 for Freeway, Multi-lane Highway, Urban Street
2. MCDOT Enhanced Parkway Study, August 2007, prepared by Morrison Maierle for Arizona Parkway

It is recommended the cross section be constructed in phases, with the initial phase providing a total of four lanes. **Figure 14** shows a phasing concept that constructs the outside lanes in the initial phase with the ultimate ramp and gore geometry constructed. The inside shoulder in the initial phase will ultimately serve as future travel lanes, therefore, the pavement section should match the travel lane section. This phasing approach allows a relatively large work zone within the median for the future lane construction. However, the actual construction phasing should be evaluated in greater detail during final design.

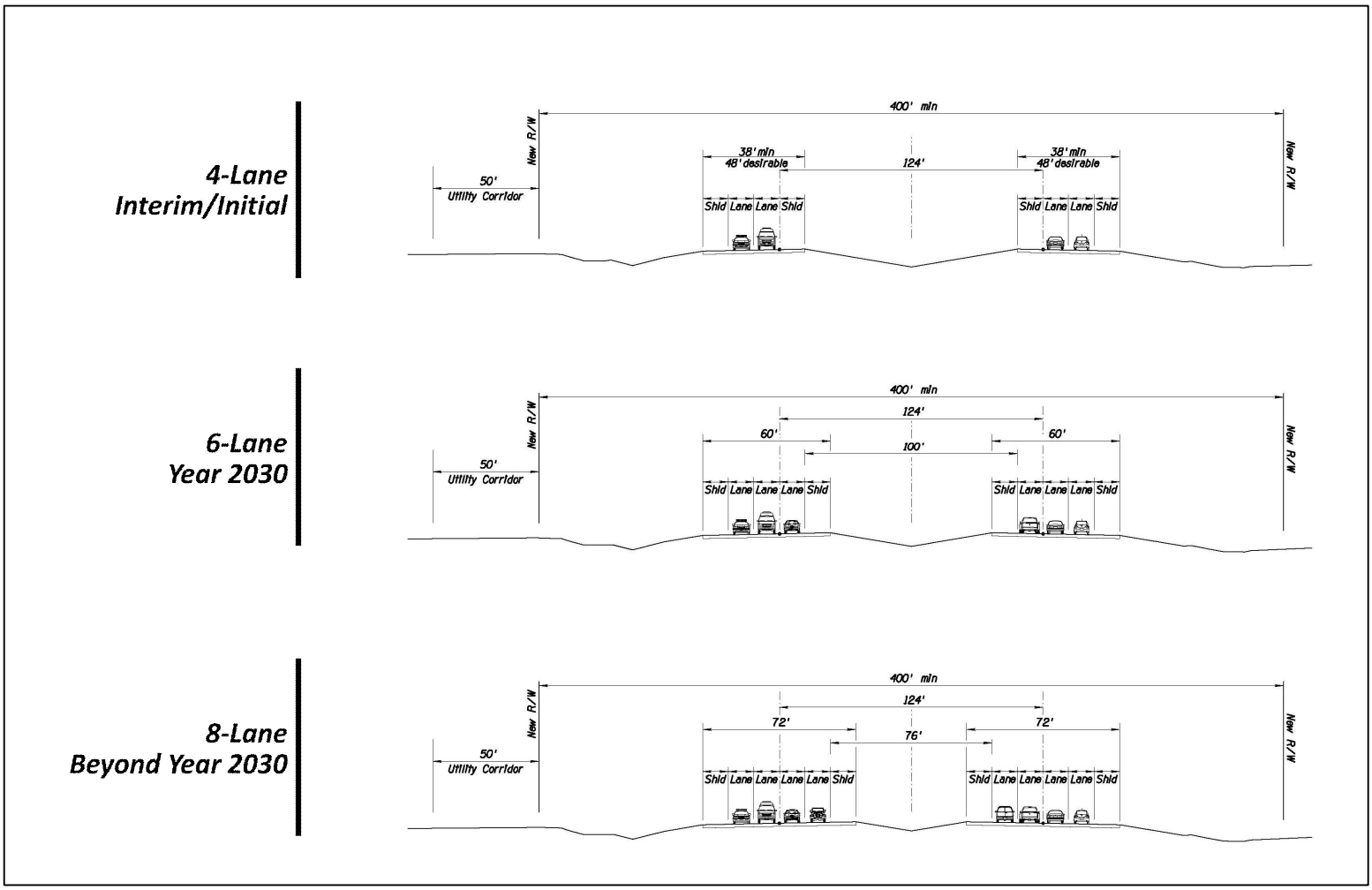


Figure 14. Recommended Typical Cross Section

6.4 Mainline Alternatives

Alternative Descriptions

Input from the stakeholders and the project team was combined to create feasible conceptual alternative mainline corridor alignments. Four conceptual alternatives were developed for evaluation and are shown in **Figure 15**.

Alternative 1

Alternative 1 corridor alignment runs along the Great Western Road section line in the north-south corridor. The alignment transitions to the west with a curve at the northern end in order to navigate around the basaltic Black Hill which was previously mentioned in the existing topographic features. However, the alignment slightly crosses the basaltic Black Hill at the northern limits of the topographic formation. It runs along the Road 5 South section line for the entire east-west corridor, which includes the Granite Creek crossing, and terminates at SR 89. **Figure 16** displays the conceptual layout of Alternative 1.

Alternative 2

Alternative 2 corridor alignment runs along the Glassford Hill Road section line in the north-south corridor. The alignment transitions to the west with a curve and runs along the Road 5 South section line for the entire east-west corridor, which includes the Granite Creek crossing, and terminates at SR 89. The alignment slightly crosses the basaltic Black Hill at the northern limits of the topographic formation. **Figure 17** displays the conceptual layout of Alternative 2.

Alternative 3

Alternative 3 corridor alignment "hugs" the Great Western Road section line while staying primarily on ASLD parcels in the north-south corridor until one mile south of the Road 5 South section line. The alignment then bisects Section 8 in order to traverse the basaltic Black Hill at a low point. It continues north until it transitions east-west and crosses Granite Creek at the narrowest floodway point about ¾ mile north of Road 5 South. The alignment then continues south west until it meets with the Road 5 South section line about 1½ miles east of SR 89. It then runs along the Road 5 South section line for the remainder of the east-west corridor and terminates at SR 89. **Figure 18** displays the conceptual layout of Alternative 3.

Alternative 4

Alternative 4 corridor alignment runs along the Glassford Hill Road section line in the north-south corridor for two miles north of SR 89A. The alignment then transitions to the west running on a diagonal line to the middle of Section 8, where it runs east-west to cross Granite Creek approximately ½ mile south of Road 5 South at the narrowest point of the defined channel. The alignment then continues north west until it meets with the Road 5 South section line about two miles east of SR 89. It then runs along the Road 5 South section line for the remainder of the east-west corridor and terminates at SR 89. **Figure 19** displays the conceptual layout of Alternative 4.

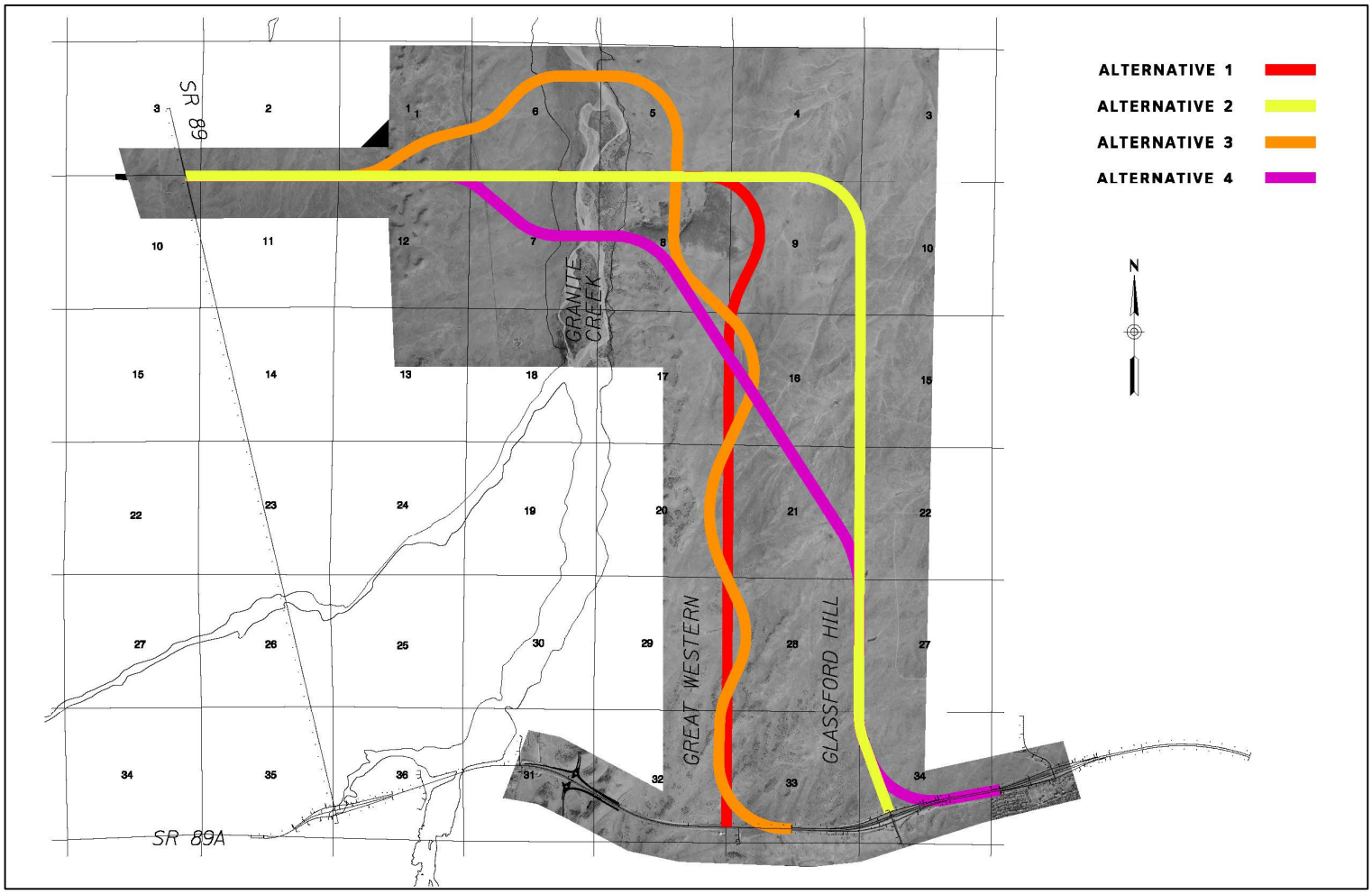


Figure 15. Feasible Alternatives

Figure 16. Alternative 1

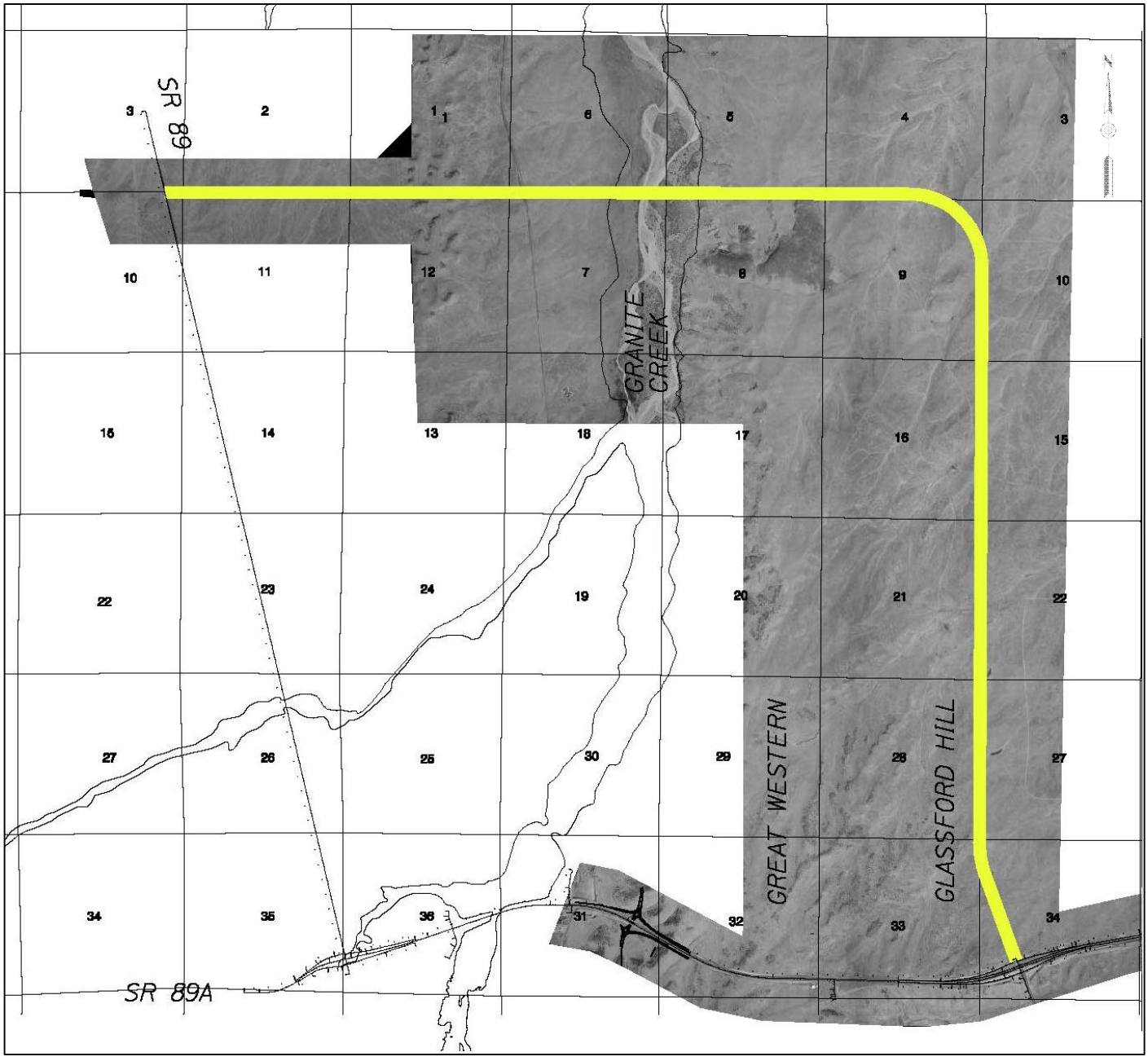


Figure 17. Alternative 2

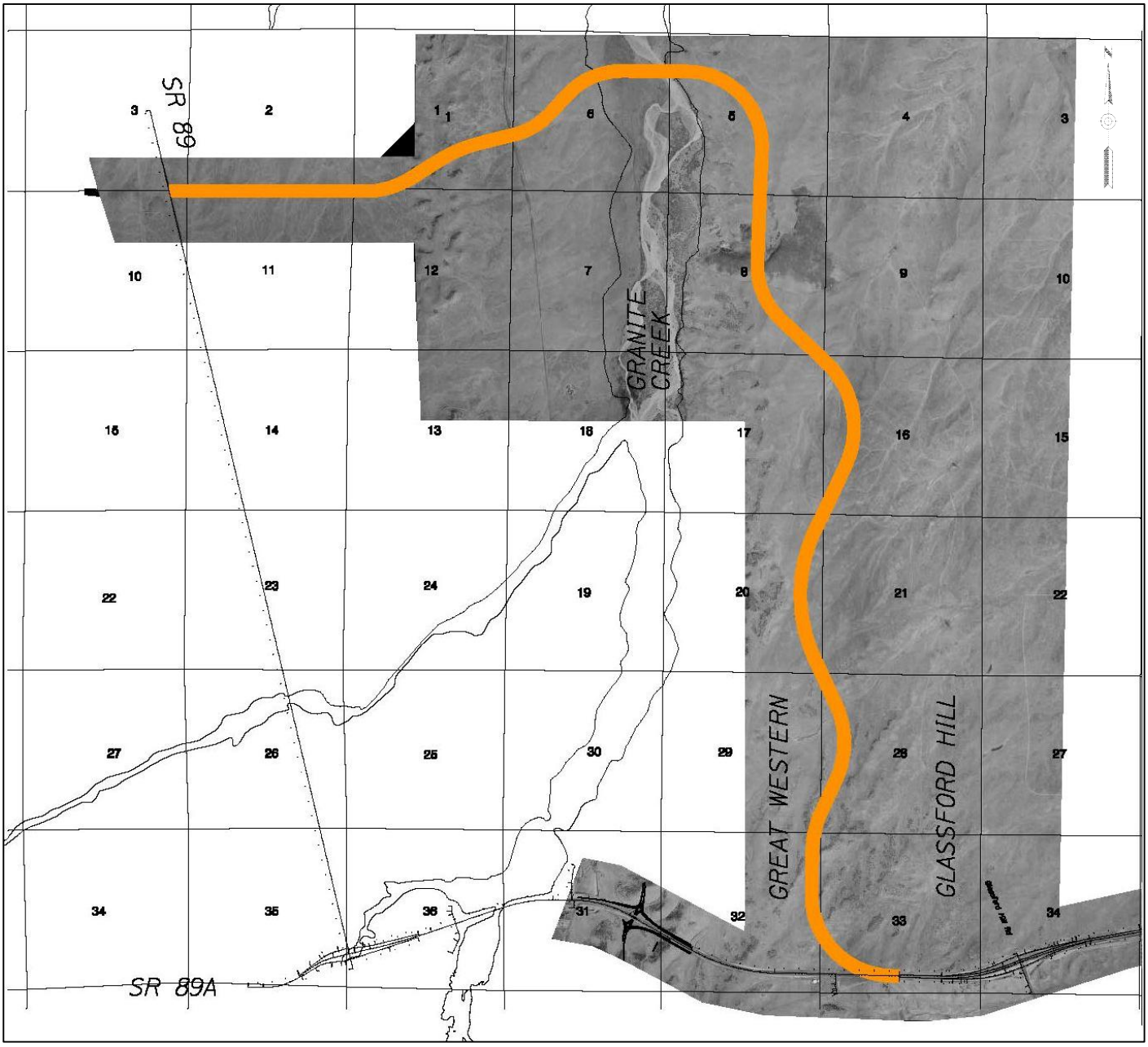


Figure 18. Alternative 3

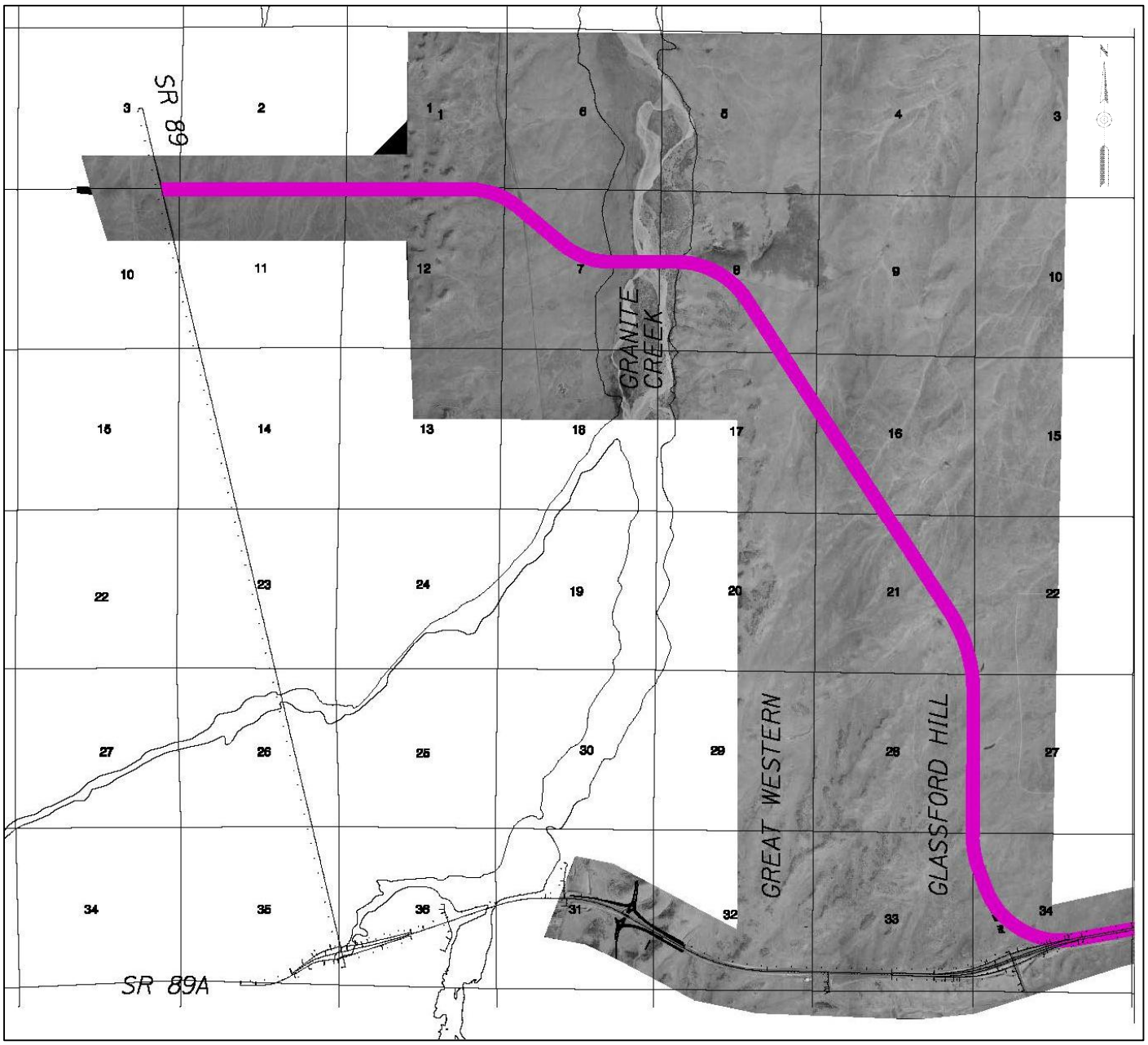


Figure 19. Alternative 4

Alternatives Evaluation

Table 6 presents the comparative evaluation of the four mainline alternatives. For comparison purposes, a "Most Desirable" rating was represented by a filled-in circle, a "Less Desirable" rating by a half-filled circle, and a "Least Desirable" rating by an empty circle.

Alternative 1

Alternative 1 extends from SR 89A at Great Western Road to SR 89 at Road 5 South. Alternative 1 received a "most desirable" rating for most of the given criteria. It is 9.2 miles long, making it the second shortest alignment. This factor leads to less total land disturbance than Alternatives 2 and 3. It also contributes to the least amount of new right-of-way needed, the fewest number of large drainage structures needed, and the lowest construction costs. Alternative 1 is desirable for minimizing utility conflicts considering most of the existing and proposed utility corridors are on the Glassford Hill Road section line. This alternative was also desirable for a variety of environmental impacts including pronghorn habitat fragmentation and visibility. Being closer to Granite Creek represents a lower potential for a large fragmentation of the pronghorn antelope habitat by leaving more open space. In addition, it is one of the furthest alignments from Viewpoint Drive, where existing residences are located, thereby minimizing visibility.

Alternative 2

Alternative 2 extends from SR 89A at Glassford Hill Road to SR 89 at Road 5 South. Alternative 2 scored poorly in a variety of categories. It is 9.8 miles long, making it the second longest alignment, leading to greater total land disturbance then Alternatives 1 and 4. It also requires a greater amount of new right-of-way. It has the greatest number of large drainage structures needed, and greater construction costs than Alternatives 1 and 4. The alternative would run down the location of existing and future planned utility corridors. Alternative 2 is the closest alignment to the pronghorn habitat and existing residential; therefore this alternative proved least desirable for environmental impacts including pronghorn habitat fragmentation and visibility. The alignments which are farther away from Granite Creek have a higher potential for a large fragmentation of the pronghorn antelope habitat.

Alternative 3

Alternative 3 scored least desirable for the greatest number of criteria. It is 10.3 miles long, making it the longest alignment. This alternative has the greatest disturbance of land, requires the greatest area of new right-of-way, and has the highest potential construction costs. As discussed in the alternative descriptions, Alternative 3 "hugs" the Great Western section line while staying on ASLD parcels. Due to the alignment, it has the highest number of private parcel fragmentation. However, Alternative 3 is desirable for minimizing utility conflicts since most of the existing and proposed utility corridors are on the Glassford Hill Road section line. It is also located close to Granite Creek, which provides a more desirable rating for pronghorn habitat fragmentation and visibility.

Alternative 4

Alternative 4 extends from SR 89A at Glassford Hill Road to SR 89 at Road 5 South. Alternative 4 was "less desirable" for most of the criteria. It is 9.1 miles long, making it the shortest alignment. This factor leads to the least total land disturbance, and least amount of new right-of-way required. However, by traveling diagonally through the north-south corridor, it presents a high potential for fragmentation of private parcels. The alignment scored moderately for the environmental impacts including pronghorn habitat fragmentation and visibility, as it bisects a large amount of open area and the southern two miles of the corridor is near existing residential development.

Table 6. Mainline Alternatives Evaluation

Evaluation Category	Evaluation Criteria	Performance Measure	Alt 1	Alt 2	Alt 3	Alt 4
		TOTAL ROADWAY LENGTH	**9.2 mi**	**9.8 mi**	**10.3 mi**	**9.1 mi**
Economic Development	Effects to adjacent parcels	Acres of new R/W required from existing developments or proposed near-term developments	●	●	●	●
		Total acres of new R/W required	●	◒	○	●
		Number of remnant parcels & bisected parcels	●	●	○	◒
	Access to potential future economic centers	Average distance from traffic interchange locations to future employment and retail centers per the general plans	●	○	●	◒
	Gross land disturbance	Acres of land disturbed by the project, either permanently or during construction	◒	○	○	●
Engineering Considerations	Impacts to Prescott Airport	Interference with proposed runway extension or Part 77 surfaces.	●	●	●	●
	Utility coordination	Number & type of existing utility relocations that may be required	◒	○	●	◒
		Compatibility w/proposed future utility corridors	●	◒	●	◒
	Compliance with design guidelines	Ability to meet county and/or state design guidelines	●	●	●	●
	Drainage considerations	Number of large drainage structures required	●	○	●	◒
	Implementation of facility	Ability to construct new facility while minimizing impacts to existing traffic	●	●	●	●
		Ability to divide construction into fundable projects	●	●	●	●
		Ability to implement phased cross-section	●	●	●	●
	Earthwork considerations	Volume of cut/fill and earthwork movement required	●	◒	○	◒
	Bridge structure considerations	Number of bridge structures, excluding local service traffic interchanges	◒	◒	◒	◒
Construct/ Maint Costs	Planning level cost estimates	Total construction cost based on current unit costs (excludes right of way costs)	●	◒	○	◒
		Expected average annual maintenance costs for ultimate facility	◒	◒	◒	◒
Transportation Systems	Compatibility with regional system	Compatibility with existing facility types; maintains similar design speed and criteria; meets driver expectations	●	●	●	●
	Access to local roadway network	Distance from proposed traffic interchange locations to future arterial roadways based on general plans and Chino Valley SATS	●	●	●	●
		Adequate number of traffic interchanges along the corridor to handle anticipated future traffic volumes	●	●	●	●
		Ability to comply with ADOT Statewide Access Management Guidelines	●	●	●	●
	Traffic operations	Operational level of service along the proposed mainline	●	●	●	●
	Accommodates pathways and trails	Ability to preserve existing pathways and trails	N/A	N/A	N/A	N/A
		Ability to accommodate planned pathways and trails	●	●	●	●

Table 6. Mainline Alternatives Evaluation continued

Evaluation Category	Evaluation Criteria	Performance Measure	Alt 1	Alt 2	Alt 3	Alt 4
		TOTAL ROADWAY LENGTH	**9.2 mi**	**9.8 mi**	**10.3 mi**	**9.1 mi**
Environmental Considerations	Effects on water resources	Number of existing well sites that may be disturbed	●	◒	●	◒
		Approximate total area of disturbance to potential waters of the U.S.	◒	◒	●	◒
		Encroachment on Granite Creek / minimize fill or structural elements in the creek	◒	◒	●	◒
	Disturbance of hazardous materials sites	Number of existing & suspected sites that may be disturbed	●	●	●	●
	Effects on biological resources	Area of existing vegetation removed or disturbed	●	◒	○	●
		Potential effects on threatened and endangered species and their habitats	●	●	●	●
		Potential effects on state species and their habitats, including native plants	●	●	●	●
		Number of crossing opportunities for Pronghorn Antelope at large box culverts or bridge crossing structures	◒	◒	◒	◒
		Potential fragmentation of Pronghorn Antelope habitat	●	○	◒	◒
		Potential effects on priority conservation areas and priority grasslands	●	◒	○	●
	Effects on cultural resources	Number of potential cultural or historic sites that may be disturbed	◒	◒	◒	◒
	Compatibility with land use	Potential conflicts with existing and adopted future land use	●	●	●	●
		Number of potential 4(f) or 6(f) sites that may be disturbed	●	●	●	●
	Effects on farmlands	Acres of existing Prime and Unique farmland that may be converted	●	●	●	●
	Effects on water quality	Total acres of impervious surface leading to storm water runoff	●	◒	○	●
	Effects on air quality	Total number of traffic interchanges and controlled intersections along the corridor	N/A	N/A	N/A	N/A
	Visual compatibility	Consistency with the existing landscape	◒	◒	◒	◒
	Visibility	Visibility to highly sensitive viewers	●	◒	●	◒
	Potential to warrant noise abatement	Number of sensitive receivers within 1,000 feet from the new edge of pavement	●	●	●	●
	Disproportionate effects on protected populations (Title VI/Environmental Justice)	Difference between the percentage of population that is protected (Title VI/Environmental Justice) within the affected census block groups and the percentage of population that is protected within Yavapai County	◒	◒	◒	◒

LEGEND

Most Desirable
Most Desirable (all alternatives scored equally)
Less Desirable
Least Desirable

Based on this analysis, Alternative 1 is recommended as the single alternative to be carried forward as the recommended mainline corridor alignment for further evaluation. This alternative is discussed in detail in Section 7 of this report.

6.5 SR 89 Traffic Interchange Options

The new access controlled facility will intersect with SR 89 on the Road 5 South section line. Options for this intersection were developed independently of the mainline alternatives. All of the options developed at this location could be applied to any of the mainline alternatives presented in Section 6.4. This intersection involves an at-grade highway (SR 89) and a fully access controlled facility (Great Western); therefore a traffic interchange configuration is warranted. The traffic interchange will involve ramp connections to Great Western while SR 89 traffic will be required to pass through some type of controlled intersection. The year 2030 traffic volumes indicate as many as 1,300 vph are anticipated for the southbound to eastbound and the westbound to northbound movements. Traffic interchange options at SR 89 were explored in order to develop feasible alternatives to accommodate the future traffic volumes.

SR 89 TI Option Descriptions

Option A

The SR 89 TI Option A includes a diamond traffic interchange configuration with signal or roundabout controlled intersections on SR 89. There would be an opportunity to include a free westbound to northbound right-turning movement with either signal or roundabout control. All other turning movements would be provided through the signals or roundabouts. Great Western could be extended to the west to provide for a future east-west facility west of SR 89. The SR 89 traffic interchange Option A is shown on **Figure 20**.

Option B

The SR 89 TI Option B includes a modified diamond traffic interchange configuration with signal or roundabout controlled intersections on SR 89. In addition to the diamond traffic interchange, this configuration includes a southbound to eastbound loop ramp. The loop ramp will eliminate the southbound to eastbound left turning movement from the southern intersection of the interchange. There would be an opportunity to include a free westbound to northbound right-turning movement with either signal or roundabout control. All other turning movements would be provided through the signals or roundabouts. Great Western could be extended to the west to provide for a future east-west facility west of SR 89. The SR 89 traffic interchange Option B is shown on **Figure 21**.

Option C

The SR 89 TI Option C includes a diamond traffic interchange configuration with signal or roundabout controlled intersections on SR 89. In addition to the diamond traffic interchange, this configuration includes a southbound to eastbound flyover ramp. The flyover ramp would begin south of Road 4 South and connect to eastbound Great Western east of the diamond interchange ramp. The flyover ramp would effectively remove the southbound to eastbound left-turning vehicles completely from the traffic interchange controlled intersections. There would be an opportunity to include a free westbound to northbound right-turning movement with either signal or roundabout control. All other turning movements would be provided through the signals or roundabouts. Great Western could be extended to the west to provide for a future east-west facility west of SR 89. The SR 89 traffic interchange Option C is shown on **Figure 22**.

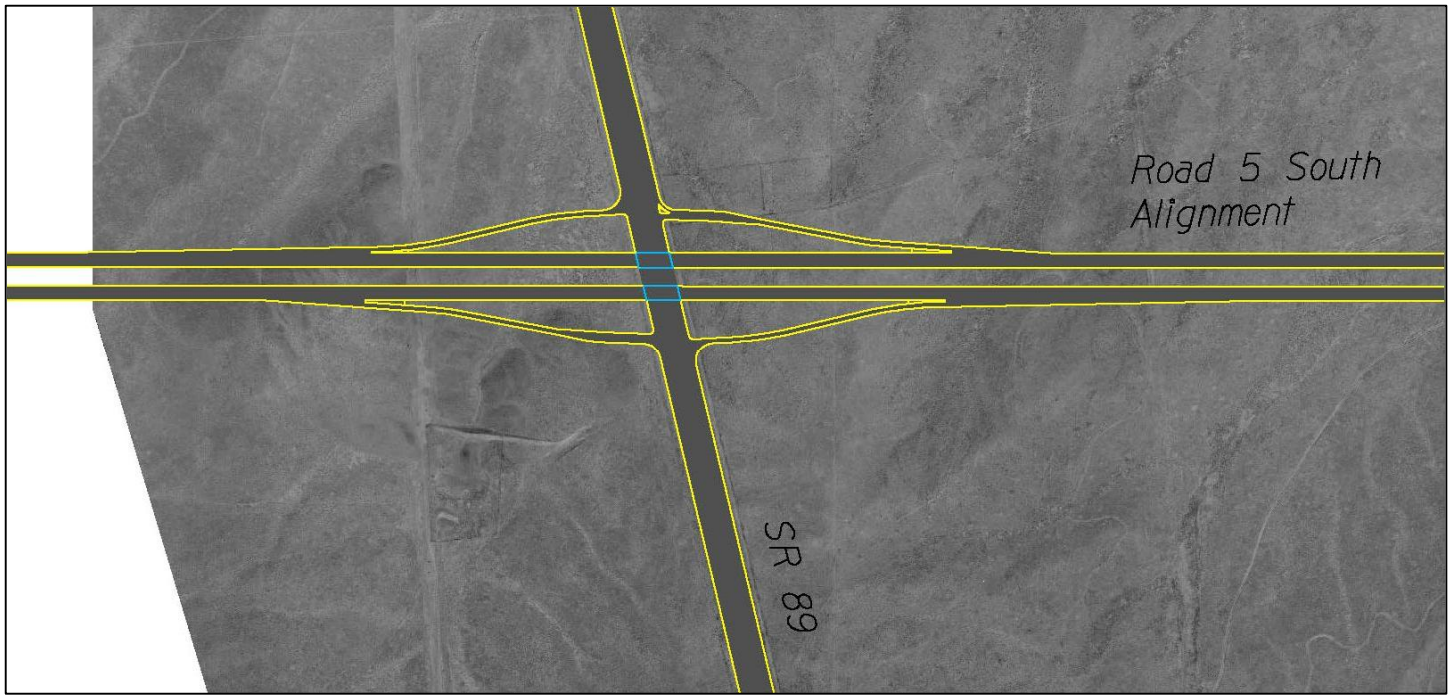


Figure 20. SR 89 TI Option A

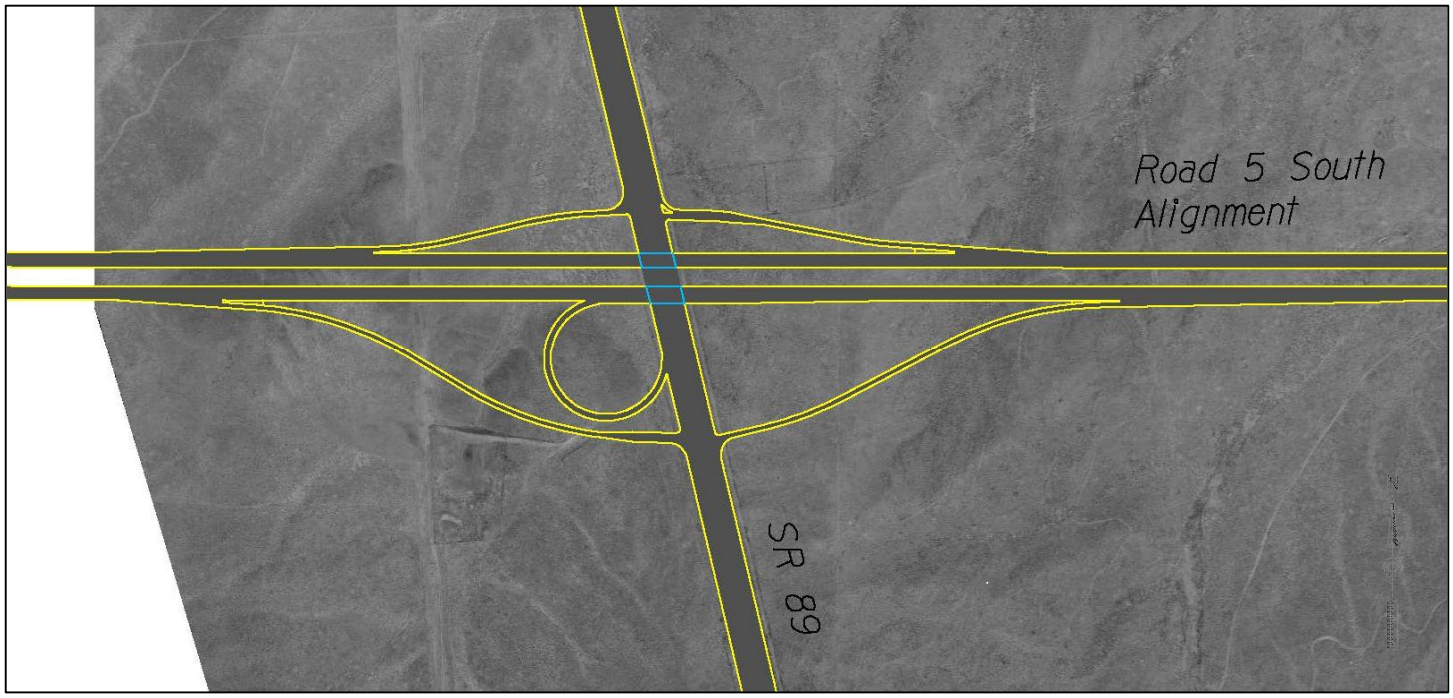


Figure 21. SR 89 TI Option B

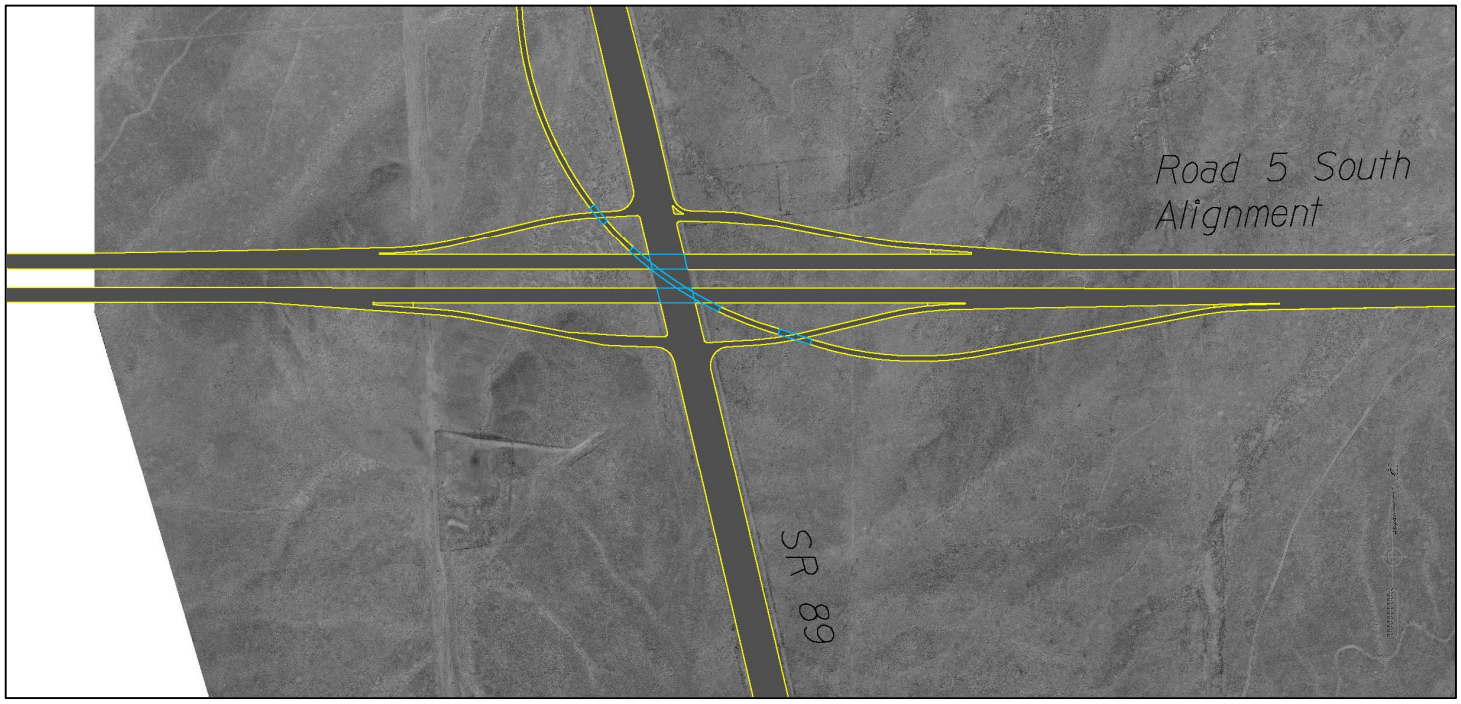


Figure 22. SR 89 TI Option C

SR 89 TI Options Evaluation

Table 7 displays the comparative evaluation of the three SR 89 TI options. For comparison purposes, a "Most Desirable" rating was represented by a filled-in circle, a "Less Desirable" rating by a half-filled circle, and a "Least Desirable" rating by an empty circle.

Table 7. SR 89 TI Options Evaluation

Evaluation Category	Evaluation Criteria	Performance Measure	Option A	Option B	Option C
			Diamond TI	Diamond TI with Loop Ramp	Diamond TI with Flyover Ramp
Engineering Considerations	Implementation of facility	Ability to construct new facility while minimizing impacts to existing traffic	●	◒	○
Construction Costs	Planning level cost estimates	Total construction cost based on current unit costs (excludes right of way costs)	●	◒	○
Transportation Systems	Compatibility with regional system	Maintains continuity of state and regional roadways; does not require through traffic to "exit" to continue regional trip	●	●	●
	Compatibility with local roadway system	Ability to extend facility and/or connect to local roadway network west of SR 89	●	●	●
	Traffic operations	Operational level of service, including weaving movements, at the junction with SR 89	○	◒	●

LEGEND

● **Most Desirable**
◒ **Less Desirable**
○ **Least Desirable**

Option A

The SR 89 TI Option A received "most desirable" ratings for the greatest number of criteria compared to the other options. All options will be compatible with the regional and local roadway systems. Option A has the least amount of potential impacts to existing traffic during construction and had the lowest total construction costs. However, Option A received a "least desirable" ranking for operational traffic conditions.

Option B

The SR 89 TI Option B received "less desirable" for most of the criteria. The option has moderate potential impacts to existing traffic during construction. Option B had higher total construction costs compared to Option A, because it has an additional ramp to construct. Option B is anticipated to have better traffic operational characteristics than Option A; however, the option is still not anticipated to have acceptable operations.

Option C

The SR 89 TI Option C received "least desirable" for two of the five criteria utilized. The option is anticipated to have the most impacts to existing traffic during construction. Option C had the highest total construction costs with the requirement of an additional structure. Option C is

anticipated to have the best traffic operational characteristics than the other options; however, the option is still not anticipated to have acceptable operations.

The preliminary results indicate that Option C will provide the best operation characteristics for the SR 89 TI, although some movements will experience LOS 'F'. Further analysis of these options with an updated travel demand model will need to be conducted in order to provide a recommendation for the traffic interchange. It is anticipated the Chino Valley Extension will attract additional vehicle trips and reduce the future peak hour volumes at this TI. Although Option A is shown to provide the least desirable traffic operations, it carries a predominant number of "most desirable" ratings for the other evaluation criteria. No recommendations are made for this TI, however, for the purposes of identifying a potential future right of way footprint, Option A was developed further into 15% design plans. Other options may be evaluated with a future study when more traffic data information is available.

6.6 Chino Valley Extension System Traffic Interchange Options

The Chino Valley Extension will begin near the southern end of the Town of Chino Valley at the Great Western Corridor alignment. Options for this intersection were developed independently of the mainline alternatives and could be applied to any of the mainline alternatives presented in Section 6.4. This intersection involves two fully access controlled facilities; therefore a system interchange configuration is warranted. Throughout the development of these options, it was important to consider that Great Western will be constructed prior to Chino Valley Extension, and therefore an interim condition needed to be considered. This interim condition may be in place for a number of years. System interchange options at Chino Valley Extension were explored in order to develop a plan to accommodate both the ultimate and interim conditions at this location.

Chino Valley Extension System TI Option Descriptions

Option A

Option A includes a three-level system traffic interchange configuration. Option A represents a typical three legged system interchange. The configuration maintains a continuous north-south movement. The Great Western north-south corridor would ultimately continue north as the Chino Valley Extension. The east-west segment of the facility on the Road 5 South alignment would intersect the future corridor with grade separated ramps. An interim northbound to westbound roadway connection would need to be constructed prior to the Chino Valley Extension construction. This ramp would ultimately be removed from the system configuration and replaced with a grade separated ramp. The Chino Valley Extension system traffic interchange Option A is shown on **Figure 23**.

Option B

Option B includes a two-level system traffic interchange configuration. Similar to Option A, Option B maintains a continuous north-south movement. The Great Western north-south corridor would ultimately continue north as the Chino Valley Extension. The east-west segment of the facility on the Road 5 South alignment would intersect the future corridor with an eastbound to northbound loop ramp. The construction of a loop ramp would eliminate a level within the system; two of the system ramps would no longer need to cross each other. An interim northbound to westbound roadway connection would need to be constructed prior to the Chino Valley Extension construction. This ramp would ultimately be removed from the system configuration and replaced with a grade separated ramp. The Chino Valley Extension system traffic interchange Option B is shown on **Figure 24**.

Option C

Option C includes a three-level system traffic interchange configuration. Option C maintains the ultimate mainline facility through movement from north-south to east-west. Therefore, the ultimate facility would include a horizontal curve to connect Great Western/Glassford Hill Road to Road 5 South Alignment. The Chino Valley Extension would intersect the corridor with grade separated ramps. There would be no interim ramps required for this configuration. The Chino Valley Extension system traffic interchange Option C is shown on **Figure 25**.

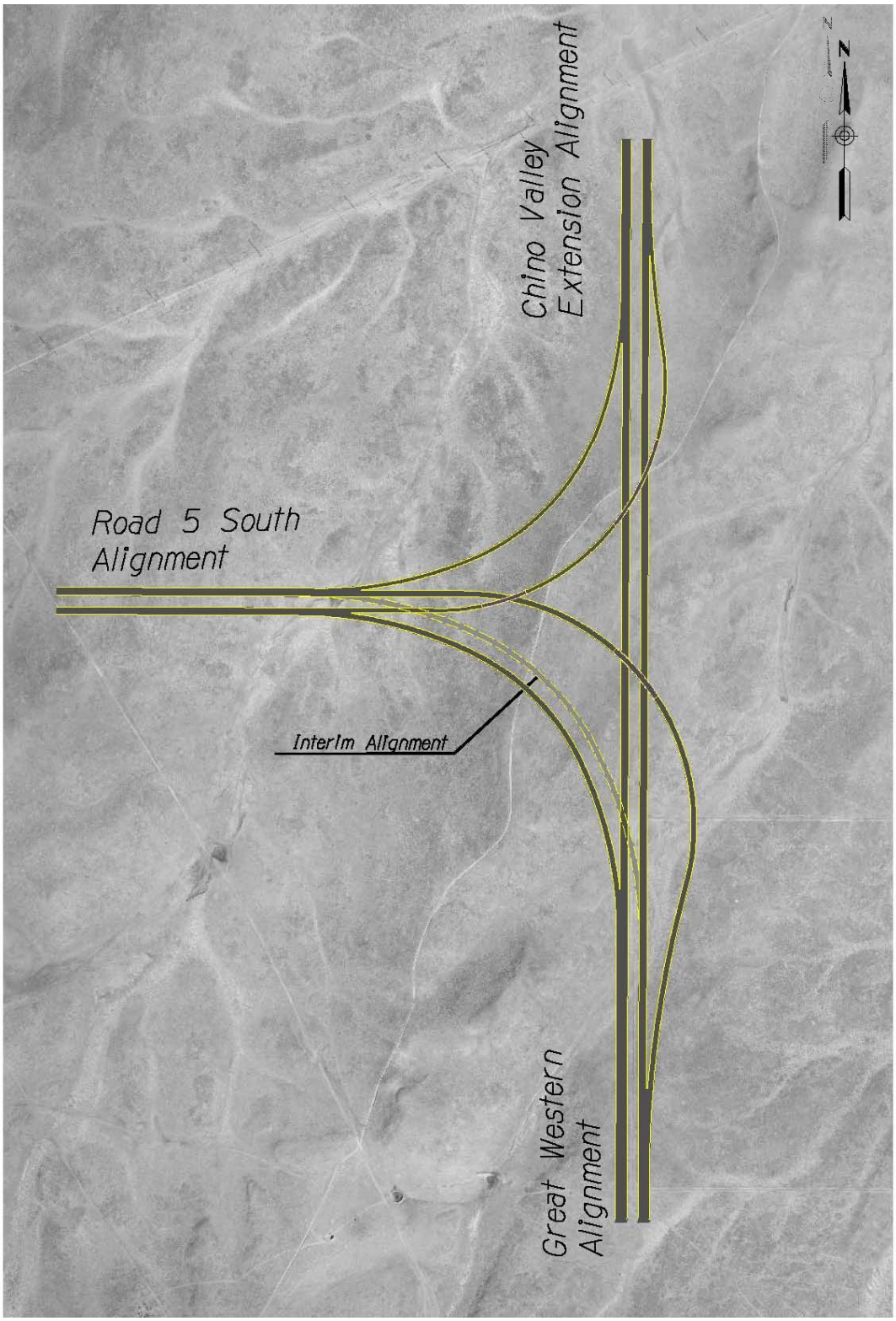


Figure 23. Chino Valley Extension TI Option A

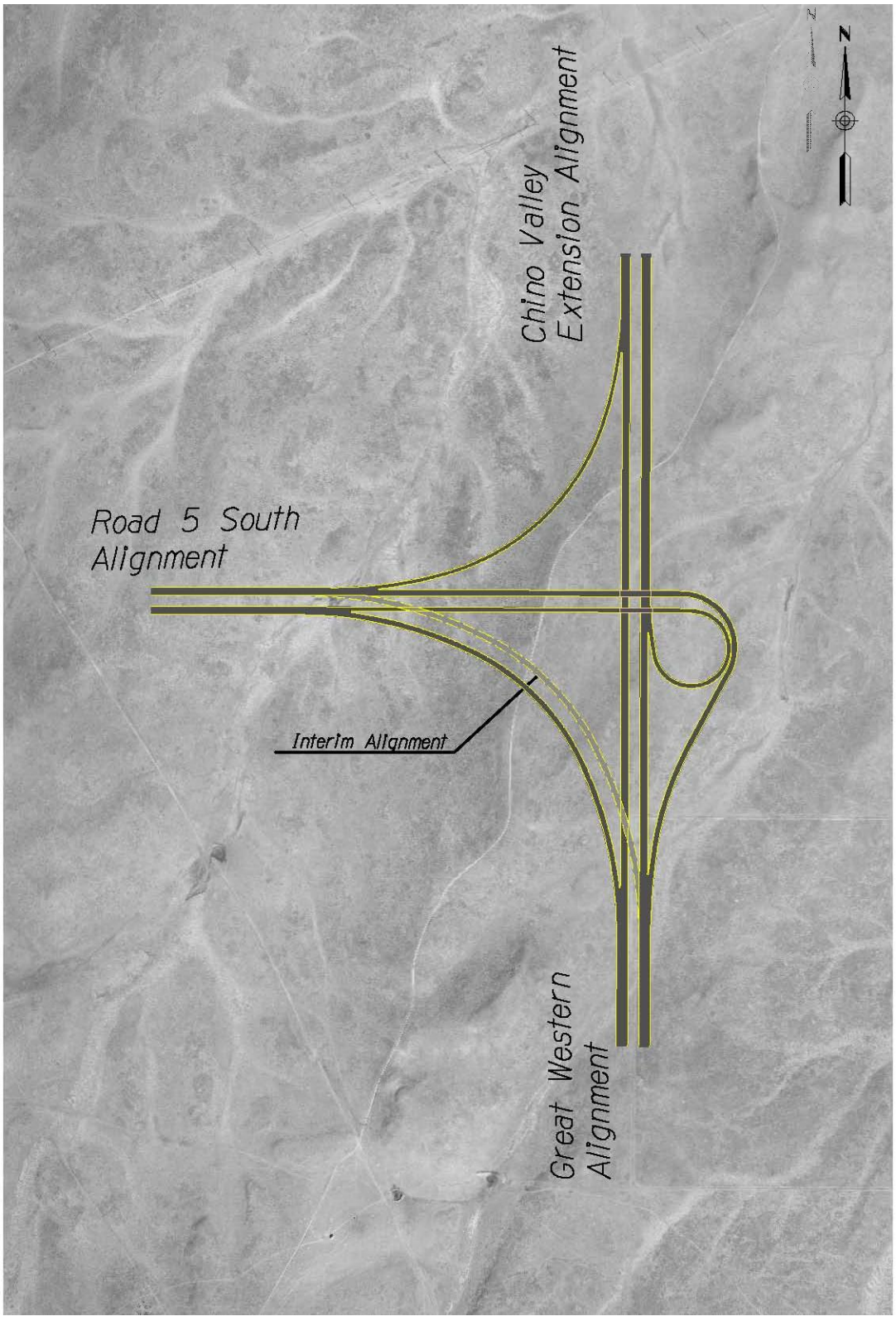


Figure 24. Chino Valley Extension TI Option B

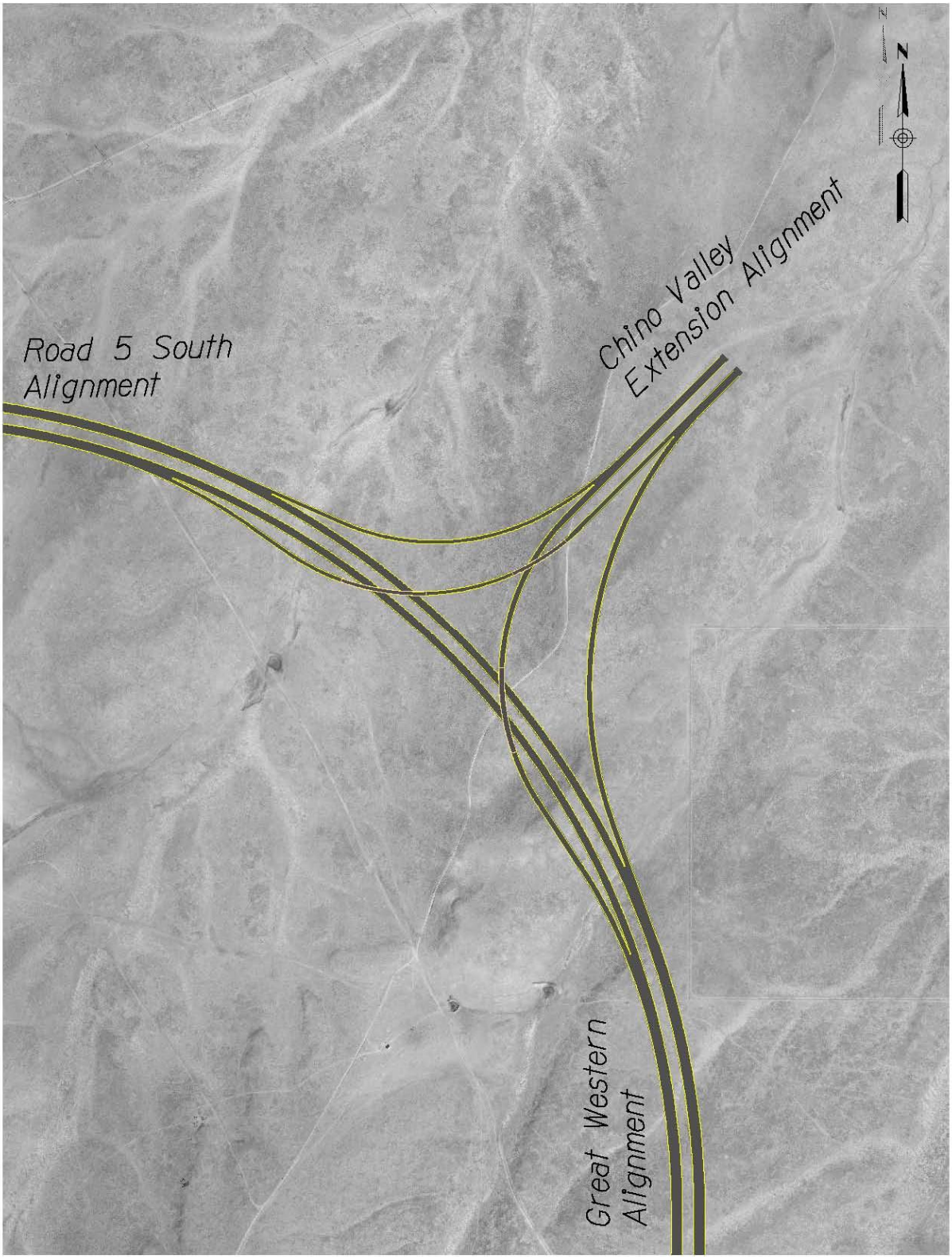


Figure 25. Chino Valley Extension TI Option C

Chino Valley Extension System TI Options Evaluation

Table 8 presents the comparative evaluation of the three Chino Valley Extension system interchange options. For comparison purposes, a "Most Desirable" rating was represented by a filled-in circle, a "Less Desirable" rating by a half-filled circle, and a "Least Desirable" rating by an empty circle.

Table 8. Chino Valley Extension System TI Options Evaluation

Evaluation Category	Evaluation Criteria	Performance Measure	Option A Great Western-Chino Ext with Flyover Ramps	Option B Great Western-Chino Ext with EB-NB Loop Ramp	Option C Great Western-Rd 5 South with Flyover Ramps
Engineering Considerations	Implementation of facility	Ability to construct new facility while minimizing impacts to existing traffic	●	●	
Construction Costs	Planning level cost estimates	Total construction cost based on current unit costs (excludes right of way costs)	○	●	
Transportation Systems	Compatibility with regional system	Maintains continuity of state and regional roadways; does not require through traffic to "exit" to continue regional trip	●	●	
	Traffic operations	Operational level of service of TI	●		●

LEGEND

● **Most Desirable**
◒ **Less Desirable**
○ **Least Desirable**

As previously mentioned, the current year 2030 travel demand model does not include the Chino Valley Extension to the north of Great Western. Therefore, no traffic volumes were available to evaluate the traffic operations of the Chino Valley Extension system TI options. However, operational characteristics of the types of ramps included in each option indicate which options might ultimately perform better. Option B includes a loop ramp for the eastbound to northbound movement. Due to the loop ramp design characteristics, particularly design speed, these types of ramps generally hold less capacity than a standard free flowing directional ramp and are not desirable for a system to system ramp. Therefore, it can be anticipated that Option B will be less desirable than Options A or C for traffic operations. Further analysis of these options with an updated model will need to be conducted in order to provide a recommendation for the system traffic interchange.

Option A

The Chino Valley Extension TI Option A received "most desirable" ratings for three of the four criteria included in the evaluation. Option A has the least amount of potential impacts to existing traffic during construction and is anticipated to maintain acceptable traffic operational conditions within the system. The configuration also maintains continuity of the regional roadways by maintaining a north-south through movement in the ultimate condition. However, Option A received a "least desirable" ranking for total construction costs. The configuration includes a three-level system and an interim ramp; therefore contributing to the highest planning costs of the three options.

Option B

The Chino Valley Extension TI Option B also received "most desirable" ratings for three of the four criteria included in the evaluation. Option B has the lowest total construction costs and is anticipated to have a low amount of potential impacts to existing traffic during construction. The configuration also maintains continuity of the regional roadways by maintaining a north-south through movement in the ultimate condition. However, Option B received a "less desirable" ranking for traffic operations of the system TI.

Option C

The Chino Valley Extension TI Option C received "less desirable" ratings for three of the five criteria utilized. The option is anticipated to have the most impact to existing traffic during construction. Future ramp bridge construction will require more significant traffic control to construct the Chino Valley Extension. The option does not maintain the continuity of the regional roadways in the ultimate condition and therefore rated less desirable for the compatibility with the regional system. Option C is anticipated to have acceptable traffic operations at the system TI.

The overall results of the evaluation criteria show Option B with the greatest number of "desirable" ratings. However, the loop ramp included in this option is typically not desirable within a system traffic interchange. No recommendations are made for this system TI, however, for the purposes of identifying a potential future right of way footprint, Option A was developed further into 15% design plans.

6.7 SR 89A System Traffic Interchange Options

The new access controlled facility will intersect with SR 89A at either the Glassford Hill Road or Great Western Road alignment. Options for this intersection were developed independently of the mainline alternatives and could be applied to any of the mainline alternatives presented in Section 6.4. This intersection involves two full access controlled facilities; therefore a traffic system interchange configuration is warranted. Existing diamond traffic interchanges are located along SR 89A at Glassford Hill Road and Viewpoint Drive. As discussed in Section 3.2, a diamond traffic interchange on SR 89A at Granite Dells Parkway will also be constructed in the near future. With three diamond traffic interchanges already in place, weaving operations play a vital role in developing alternatives for the SR 89A system traffic interchange. Traffic system interchange options at SR 89A were explored in order to develop a plan to accommodate future access needs for the area and maintain regional connectivity and local access while maintaining acceptable traffic operations.

SR 89A System TI Option Descriptions

Option A

The SR 89A Option A includes a three-level system traffic interchange configuration located at Great Western Road. The configuration maintains SR 89A as an east-west continuous facility. The Great Western north-south corridor connects to SR 89A through four system free-flow ramps. The new access controlled facility transitions to an arterial roadway to the south of SR 89A through frontage roads which exit and enter the mainline north of the system TI. The diamond TI's at Granite Dells Parkway and Glassford Hill Road would be maintained with the addition of one-way frontage roads which connect these crossroads to the Great Western access-controlled corridor. A frontage road intersection at Great Western Road would be located under the system traffic interchange. The frontage road intersections can be controlled by signals or roundabouts. The SR 89A system traffic interchange Option A is shown on **Figure 26**.

Option B

The SR 89A Option B includes a three-level system traffic interchange configuration located at Glassford Hill Road. The configuration maintains SR 89A as an east-west continuous facility. The Glassford Hill access-controlled north-south corridor connects to SR 89A through four system free-flow ramps. The new access controlled facility would not connect to Glassford Hill Road south of SR 89A. However, it is possible for a transition or continuation to the south. The diamond traffic interchanges at Viewpoint Drive and Glassford Hill would be maintained. Although not shown on the figure, it is assumed a new diamond TI would be located at Great Western Road. The existing Glassford Hill Road diamond interchange would be located under the system interchange. The SR 89A system traffic interchange Option B is shown on **Figure 27**.

Option C

The SR 89A Option C includes a three-level system traffic interchange configuration located at Great Western Road. The configuration transitions the mainline facility on SR 89A from the east to continue to the Great Western access-controlled north-south corridor. SR 89A to the west of the facility would connect to this new mainline through four system free-flow ramps. Great Western Road would not transition to the south. The diamond TI's at Granite Dells Parkway and Glassford Hill Road would be maintained. The SR 89A system traffic interchange Option C is shown on **Figure 28**.

Option D

The SR 89A Option D includes a three-level system traffic interchange configuration located at Glassford Hill Road. Similar to Option C, the configuration transitions the mainline facility on SR 89A from the east to continue on the Glassford Hill Road access-controlled north-south corridor. SR 89A to the west of the facility will connect to this new mainline through four system free-flow ramps. The new access controlled facility would not transition to the south of SR 89A, and therefore the existing Glassford Hill Road/SR 89A TI would need to be removed and Glassford Hill traffic redirected to one of the adjacent diamond traffic interchanges. The diamond traffic interchange at Viewpoint Drive would be kept in place. It is also assumed that a new diamond TI would be located at Great Western Road. The SR 89A system traffic interchange Option D is shown on **Figure 29**.

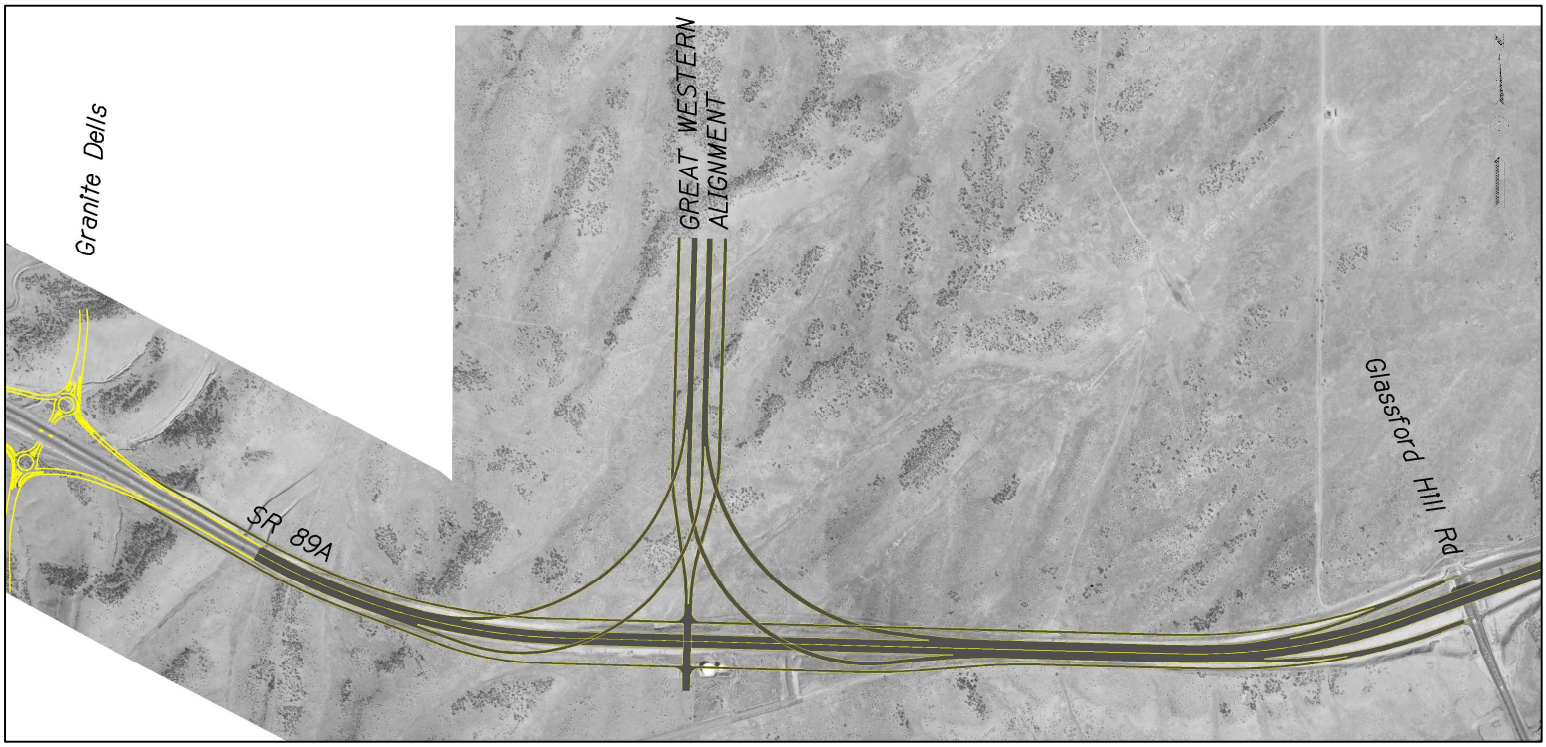


Figure 26. SR 89A TI Option A

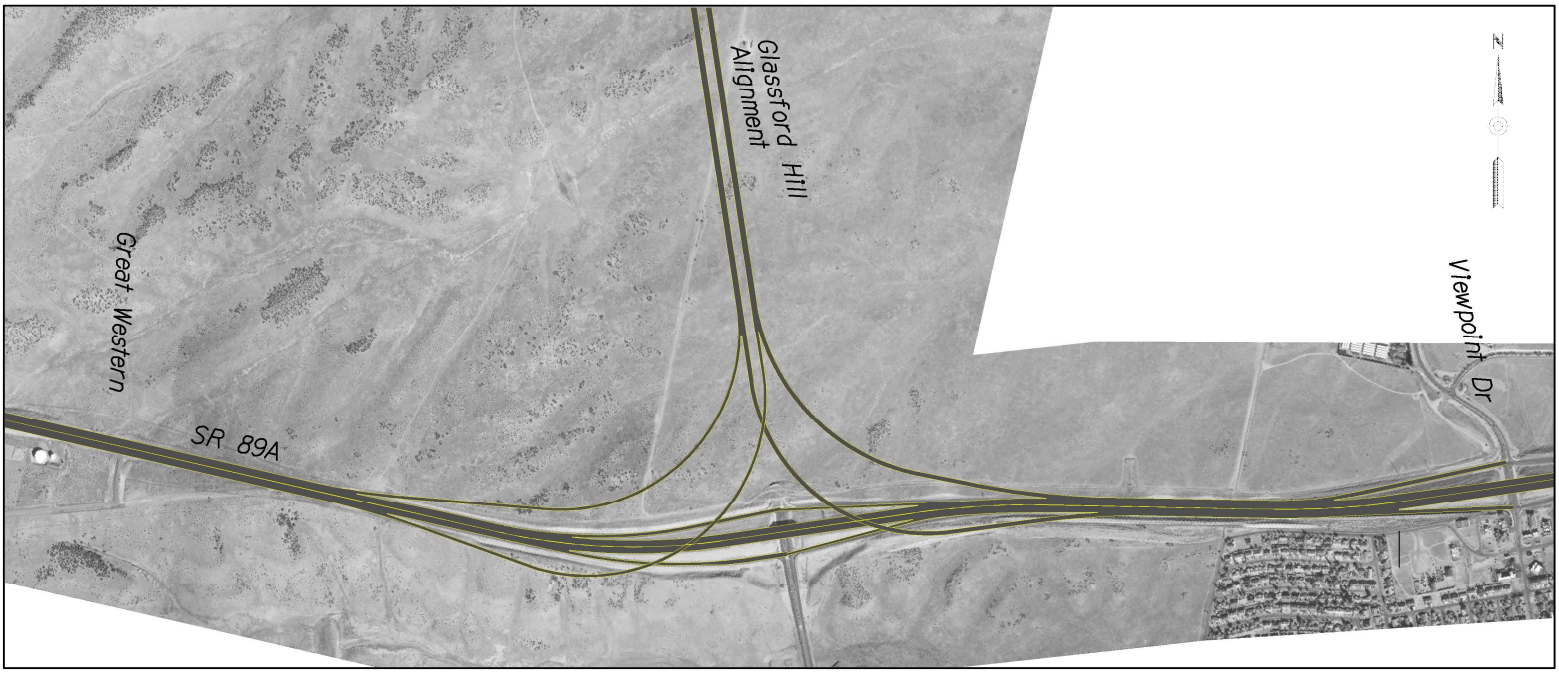


Figure 27. SR 89A TI Option B

Figure 28. SR 89A TI Option C

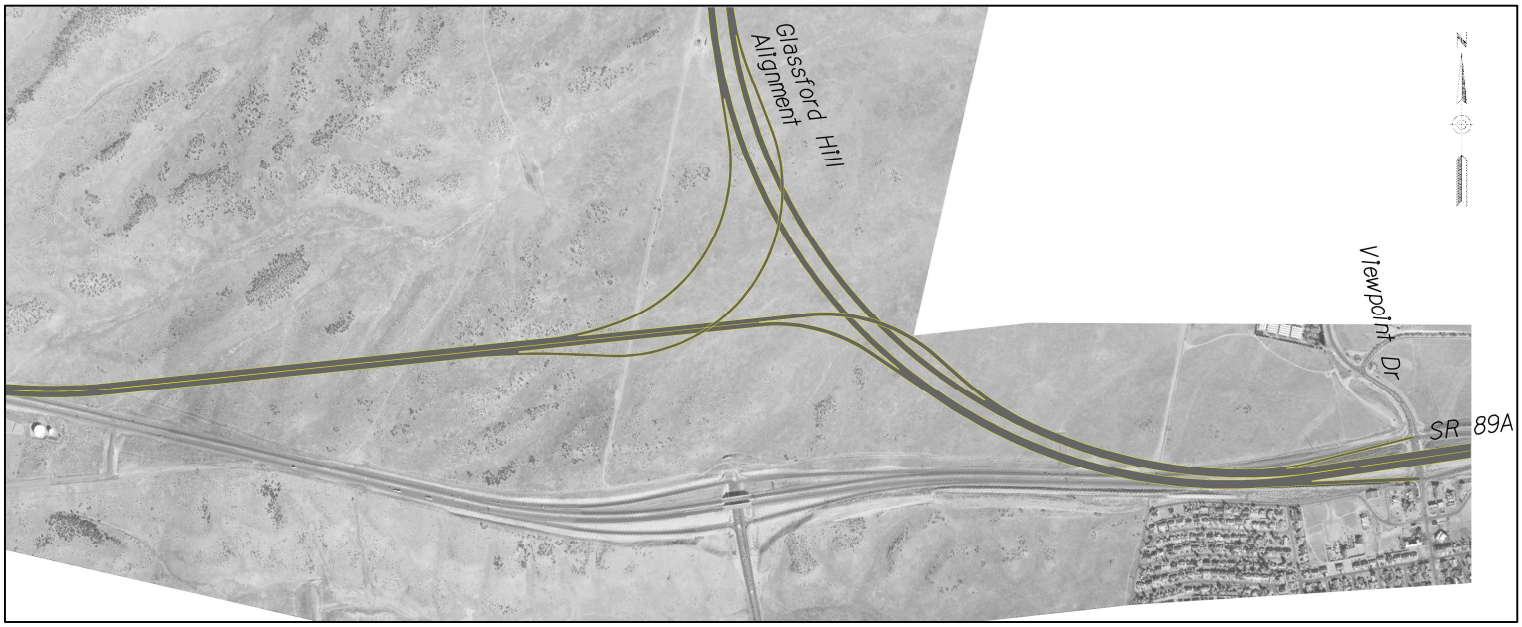


Figure 29. SR 89A TI Option D

SR 89A System TI Traffic Review

Following the development of the four SR 89A TI options, a detailed traffic operational analysis was conducted. In reviewing the projected year 2030 peak hour traffic volumes presented in the AATP, it became evident that there is a high traffic demand at the service traffic interchanges at Granite Dells Parkway, Great Western Road, and Glassford Hill Road. This is a result of the future land uses adjacent to SR 89A, which are primarily regional commercial and employment which generate significant traffic volumes.

In order to provide acceptable weaving operations, Options A and C at Great Western Road were progressively modified and evaluated based on LOS analyses, weaving movements, and FHWA guidelines. The progression for Glassford Hill Road options would be practically identical and therefore modifications were only implemented on Options A and C.

LOS analyses for weaving movements were based on the HCM manual. Throughout each level of progression, weaving operational analyses were conducted in order to establish if the option would have an acceptable LOS 'D' or better for weaving conditions. The ramp and arterial conditions were evaluated based on volume to capacity ratios.

Option A went through a progression of 4 levels. **Figure 30** displays the Level 1 concept as a line diagram. Level 1 was slightly different than the original Option A described above, being that the frontage roads have not been included at this level. Diamond traffic interchanges are located at Glassford Hill Road and Granite Dells Parkway with a system traffic interchange at Great Western Road. This option is operationally undesirable because the weaving segments on the SR 89A mainline are projected to fail due to insufficient distance between on-ramps and off-ramps.

The option was then progressed to a Level 2 concept which is displayed as a line diagram on **Figure 31**. Level 2 modifies the option with the addition of a one-way frontage road system and split diamond traffic interchanges at Glassford Hill Road and Granite Dells Parkway. The inside ramps at the adjacent cross roads have been removed and the traffic redistributed to the remaining ramps and frontage road system. This option is undesirable because the remaining ramps become overloaded since the volume to capacity ratio is too high. In addition, the ramp intersections at the cross roads are projected to fail.

With further refinements, the option moved to a Level 3 concept which is displayed as a line diagram on **Figure 32**. Level 3 modifies the option with the addition of a diamond traffic interchange at Great Western Road underneath the system traffic interchange. The interchanges at Glassford Hill Road and Granite Dells Parkway have been modified to half diamond traffic interchanges. The weaving and ramp operations are anticipated to operate acceptably with this configuration. However, Great Western Road to the south of SR 89A is projected to be over capacity. In addition, the FHWA does not typically support half-diamond traffic interchanges, and the option would still eliminate access points on SR 89A which are currently in place or anticipated in the near future.

Option A then progressed to a Level 4 concept which is displayed as a line diagram on **Figure 33**. Level 4 includes full diamond traffic interchanges at all three cross roads: Granite Dells Parkway, Glassford Hill Road, and Great Western Road. The system ramps have been "braided" with the diamond traffic interchange ramps; this includes a grade separation of the system ramps from the adjacent local diamond TI ramps. The configuration is projected to provide acceptable weaving operations because the gore locations of the system ramps are pushed back to avoid weaving conflicts with adjacent traffic interchanges. The diamond traffic interchange ramps have acceptable volume to capacity ratios. The option would require more right-of-way and total cost but operationally is it the most viable alternative. Therefore, the Level 4 configuration was moved forward for analysis as ***Option E*** included in the SR 89A TI Options Evaluation Matrix.

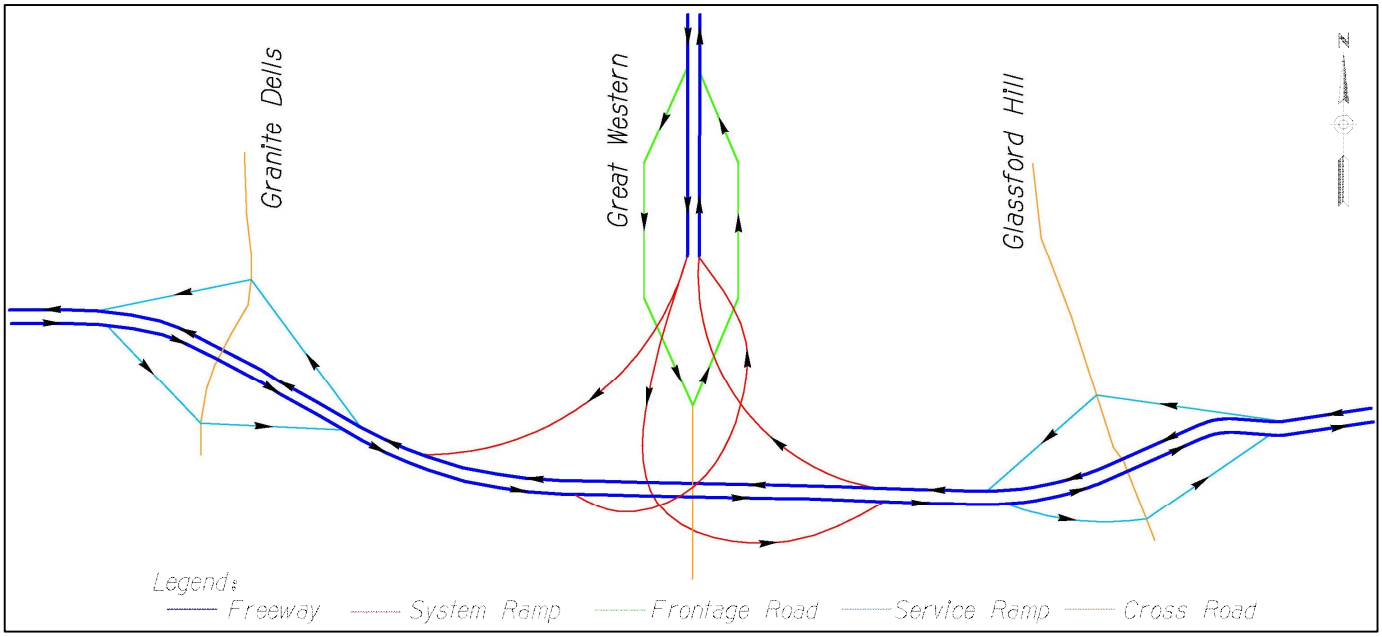


Figure 30. SR 89A TI Option A- Level 1

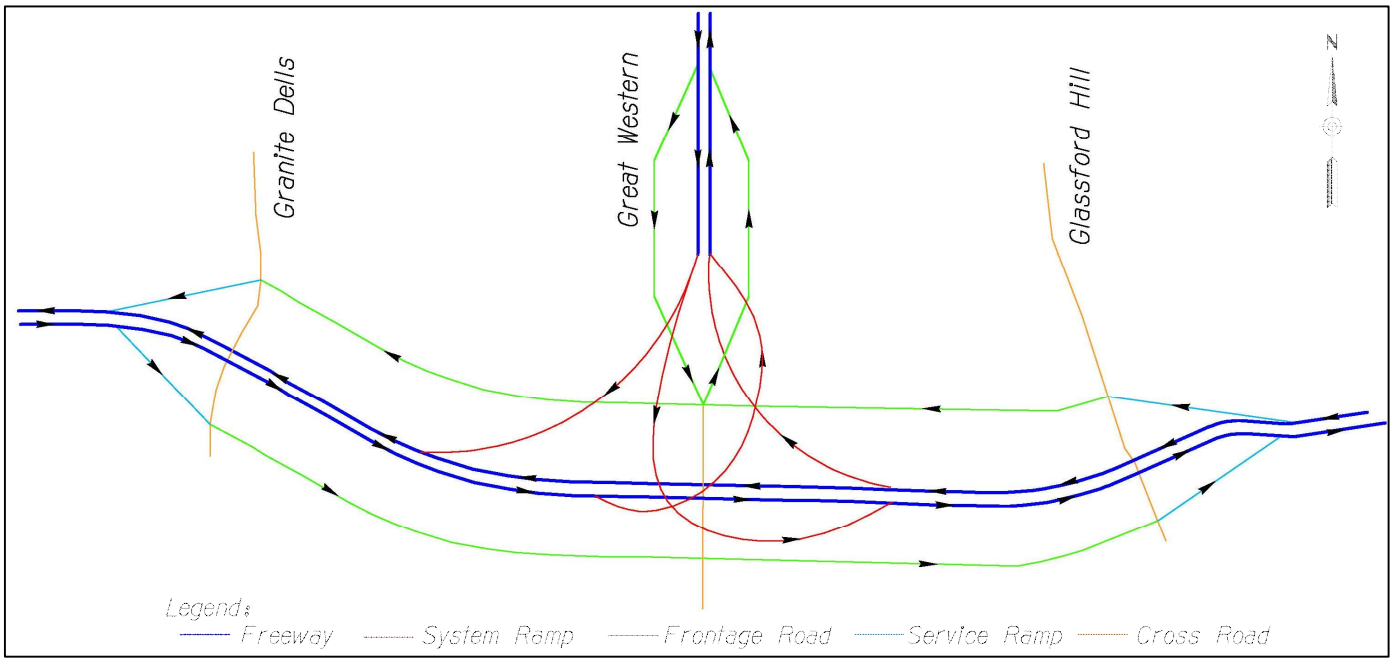


Figure 31. SR 89A TI Option A- Level 2

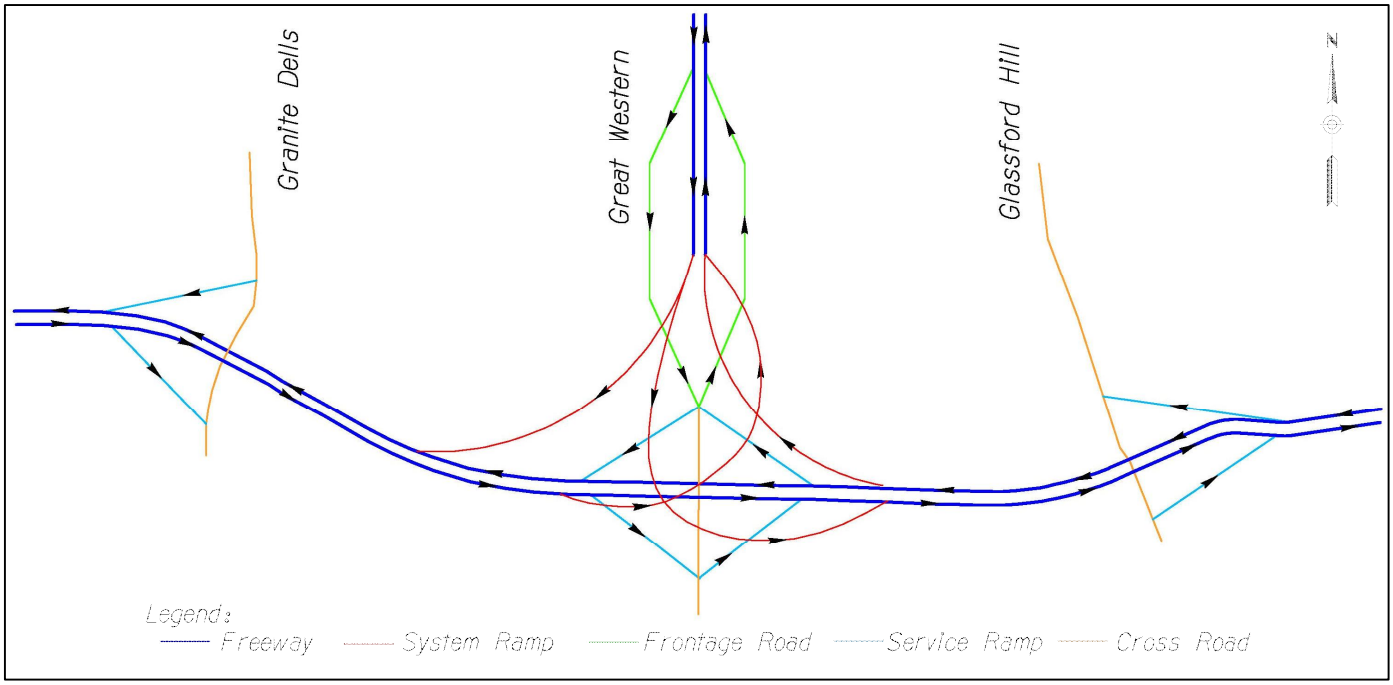


Figure 32. SR 89A TI Option A- Level 3

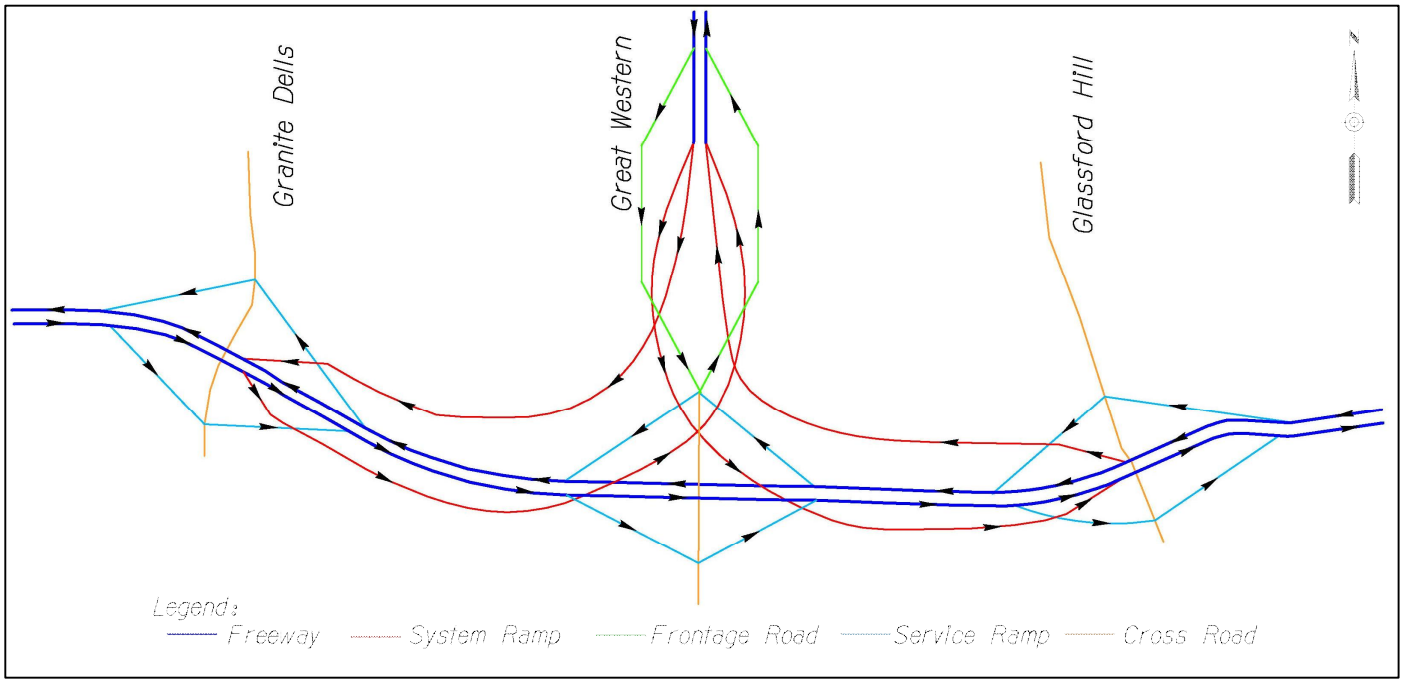


Figure 33. SR 89A TI Option A- Level 4

Option C also went through a progression of 3 levels. **Figure 34** displays the Level 1 concept as a line diagram. Level 1 was the same as the original Option C described previously. Diamond traffic interchanges are located at Glassford Hill Road and Granite Dells Parkway with a system traffic interchange at Great Western Road. This option is operationally undesirable because the weaving segments on the SR 89A mainline are projected to fail due to insufficient distance between on-ramps and off-ramps.

The option was then progressed to a Level 2 concept which is displayed as a line diagram on **Figure 35**. Level 2 modifies the option by implementing half-diamond traffic interchanges at Glassford Hill Road and Granite Dells Parkway. The inside ramps at these adjacent cross roads have been removed and the traffic redistributed to the remaining ramps. This option is undesirable since the remaining ramps become overloaded because the volume to capacity ratio is too high. In addition, the ramp intersection at the cross roads are projected to fail.

With further refinements, the option moved to a Level 3 concept which is displayed as a line diagram on **Figure 36**. Level 3 includes full diamond traffic interchanges at all three cross roads: Granite Dells Parkway, Glassford Hill Road, and Great Western Road. The system ramps to-from SR 89A east have been "braided" with the local diamond traffic interchange ramps at Glassford Hill Road; this includes a grade separation of the system ramps from the diamond ramps. The configuration provides acceptable weaving operations because the gore locations of the system ramps are pushed back to avoid weaving conflicts with adjacent traffic interchanges. The diamond traffic interchange ramps have acceptable volume to capacity ratios. However, the option does not provide access between Great Western Road South or Glassfod Hill Road to-from SR 89A west. The option would require more right-of-way and total cost but operationally is a viable alternative. Therefore, the Level 3 configuration was moved forward for analysis as ***Option F*** included in the SR 89A TI Options Evaluation Matrix.

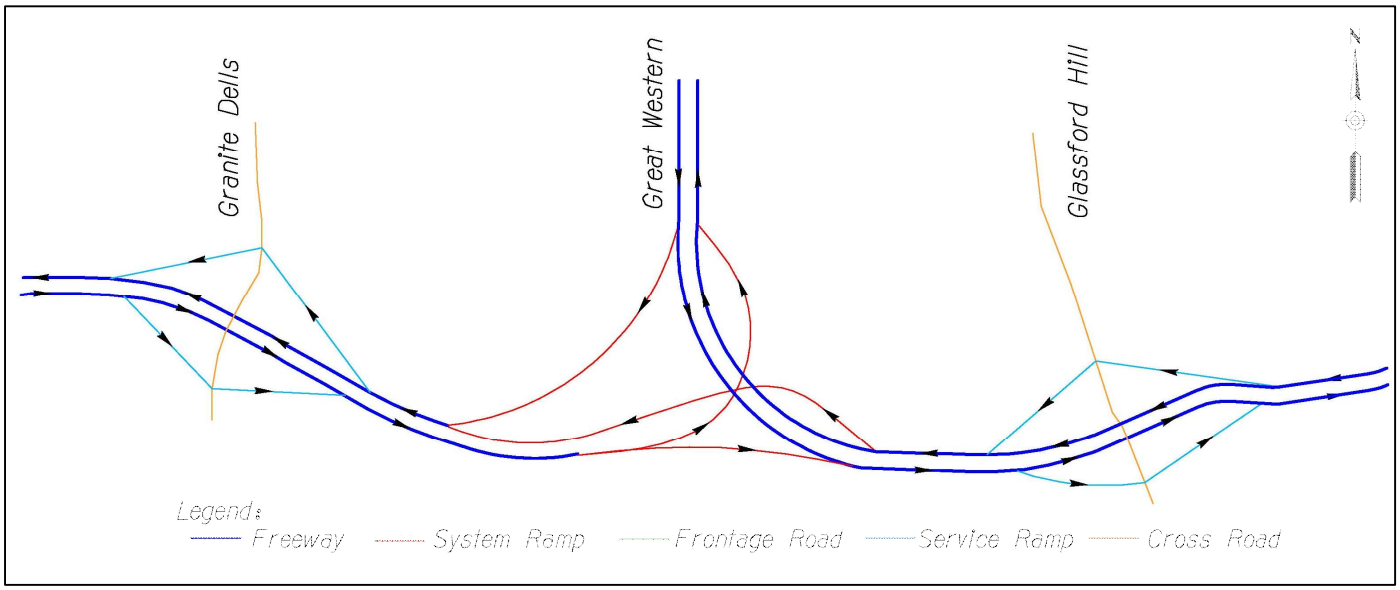


Figure 34. SR 89A TI Option C- Level 1

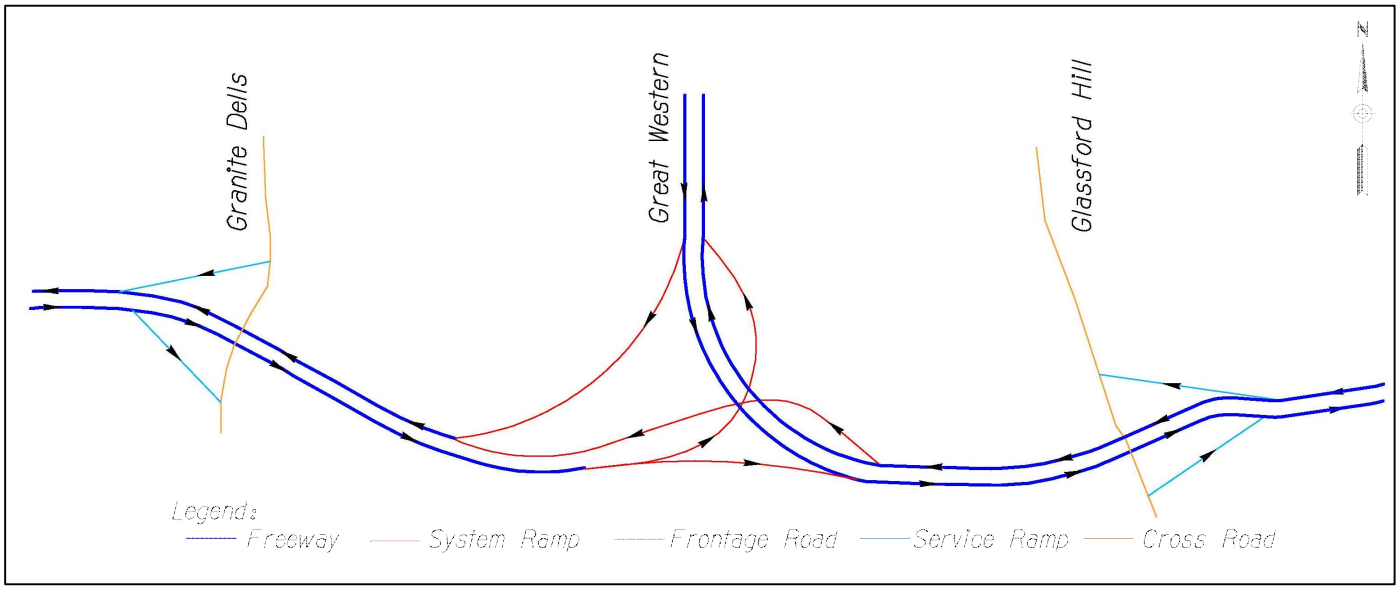


Figure 35. SR 89A TI Option C- Level 2

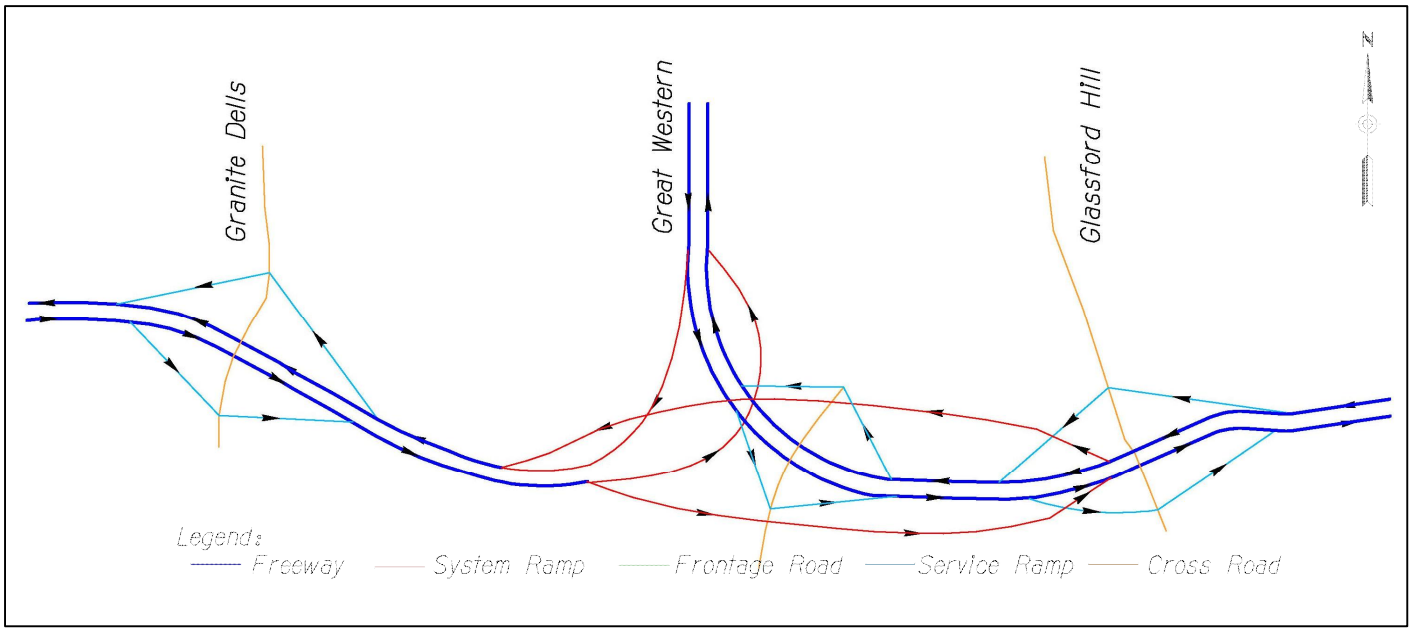


Figure 36. SR 89A TI Option C- Level 3

SR 89A System TI Options Evaluation

Table 9 presents the comparative evaluation of the six SR 89A system traffic interchange options. For comparison purposes, a "Most Desirable" rating was represented by a filled-in circle, a "Less Desirable" rating by a half-filled circle, and a "Least Desirable" rating by an empty circle.

Option A

The SR 89A TI Option A received "most desirable" ratings for four of the seven criteria included in the evaluation. Option A has the least amount of potential impacts to existing traffic during construction, has the ability to extend the facility south of SR 89A connecting to the local roadway system, and has one of the lowest total costs of all the options. All options rated the same for the proximity of first feasible direct access location north of SR 89A. However, Option A rated "less desirable" for local access near SR 89A; there is not direct access available from all the cross roads on SR 89A. The configuration also received a "least desirable" rating for operational level of service; as discussed in the previous section, the weaving operations are anticipated to fail.

Option B

The SR 89A TI Option B rated very similar to Option A; it received "most desirable" ratings for four of the seven criteria included in the evaluation. Option B has the least amount of potential impacts to existing traffic during construction, has the ability to extend the facility south of SR 89A connecting to the local roadway system, and has one of the lowest total costs of all the options. However, Option B also rated "less desirable" for local access near SR 89A; there is not direct access available from all the crossroads on SR 89A. The configuration also received a "least desirable" rating for operational level of service since the weaving operations are anticipated to fail.

Option C

The SR 89A TI Option C received "least desirable" ratings for three of the seven criteria included in the evaluation. Option C has the greatest amount of potential impacts to existing traffic during construction and does not have the ability to extend the facility south of SR 89A connecting to the local roadway system. However, Option C does have compatibility with the regional system; it maintains the continuous regional roadways as the through facilities. It rated "least desirable" for local access near SR 89A; there are multiple access points that will not be provided due to the configuration. The configuration received a "least desirable" rating for operational level of service; as discussed in the previous section, the weaving operations are anticipated to fail. Total costs are "less desirable" than Options A and B.

Option D

The SR 89A TI Option D rated similar to Option C; it received "least desirable" ratings for three of the seven criteria included in the evaluation. Option D also has the greatest amount of potential impacts to existing traffic during construction and does not have the ability to extend the facility south of SR 89A connecting to the local roadway system. Option D does have compatibility with the regional system by maintaining the continuous regional roadways as the through facilities. It also rated "least desirable" for local access near SR 89A. The configuration received a "least desirable" rating for operational level of service since the weaving operations are anticipated to fail. Total costs are "less desirable" than Options A and B.

Table 9. SR 89A TI Options Evaluation

Evaluation Category	Evaluation Criteria	Performance Measure	Option A	Option B	Option C	Option D	Option E	Option F
			SR 89A Mainline with System TI at Great Western	SR 89A Mainline with System TI at Glassford Hill	SR 89A-Great Western Mainline with System TI	SR 89A-Glassford Hill Mainline with System TI	SR 89A Mainline with System TI at Great Western using Braided Ramps	SR 89A-Great Western Mainline with System TI using Braided Ramps
Engineering Considerations	Implementation of facility	Ability to construct new facility while minimizing impacts to existing traffic	●	●	○	○		
Construction Costs	Planning level cost estimates	Total construction cost based on current unit costs (excludes right of way costs)	●	●			○	○
Transportation Systems	Compatibility with regional system	Maintains continuity of state and regional roadways; does not require through traffic to "exit" to continue regional trip			●	●		
	Compatibility with local roadway system	Ability to extend facility and/or connect to local roadway network south of SR 89A	●	●			●	●
	Access to local roadway network	Provision for nearby parcels to have the ability to access regional roadways, may include frontage roads (pertains to parcels adjacent to the system TI and south of SR 89A)			○	○	●	
		Proximity of 1st feasible local direct access location north of SR 89A	●	●	●	●	●	●
	Traffic operations	Operational level of service, including weaving movements, at the junction with SR 89A	○	○	○	○	●	◒

LEGEND

● **Most Desirable**
◒ **Less Desirable**
○ **Least Desirable**

Option E

The SR 89A TI Option E received "most desirable" ratings for four of the seven criteria included in the evaluation. As discussed previously, Option E has been optimized for acceptable traffic operations and local access. Therefore, Option E is anticipated to operate with the best traffic operations as compared to the other options. The option has the ability to extend the facility south of SR 89A connecting to the local roadway system and provides for access from all the cross roads intersecting SR 89A. Option E is anticipated to have one of the highest total costs than the other options; however, it is anticipated to be implemented easily with little impacts to the existing traffic during construction.

Option F

The SR 89A TI Option F received "less desirable" ratings for four of the seven criteria included in the evaluation. As discussed previously, Option F was also optimized for acceptable traffic operations and local access. However, after optimization, the option was still lacking in both future operations and local access. Local access is still limited from the adjacent cross roads to SR 89A. The option has the ability to extend the facility south of SR 89A connecting to the local roadway system and maintains the regional continuous roadways. However, Option F is anticipated to have one of the highest total costs than the other options, and it is anticipated to be difficult to implement with potential impacts to the existing traffic during construction.

The overall results of the evaluation criteria show Option E with the greatest number of "most desirable" ratings. Option E rated the most desirable for local access and maintaining acceptable traffic operations. The option does not change the alignment of SR 89A and will allow for easier implementation of the ultimate facility. No recommendations are made for this system TI, however, for the purposes of identifying a potential future right of way footprint, Option E was developed further into 15% design plans along with an option that maintains SR 89A to Great Western as the mainline alignment. Further analysis of all options with an updated travel demand model will need to be conducted in order to provide recommendations for the SR 89A system traffic interchange. Other options may also be evaluated when more information is available.

6.8 Local Traffic Interchange Locations

The consultant team met with the agency and land owner stakeholders to determine future local TI locations along the Alternative 1 corridor alignment. Due to the weaving maneuvers at the system TI's at SR 89A and Chino Valley Extension, minimum spacing of 1½ miles must be maintained between the local TI's and the system TI's. Therefore, the length of the north-south segment of Great Western allows for two local TI's between SR 89A and Chino Valley Extension. The stakeholder consensus was to locate the first TI on the section line approximately two miles north of SR 89A and the second TI 1½ miles north of the first TI location. This maintains at least the minimum spacing to each of the system TI's and provides adequate spacing between the two local TI's for acceptable future weaving maneuvers.

Based on the year 2030 model presented in the City of Prescott AATP study, it is evident there will be significant traffic volumes within the first mile of the corridor north of SR 89A. This area is anticipated to be developed as heavy commercial, retail and employment land uses. Therefore, a large volume of local traffic is anticipated to continue north for the Great Western Road arterial to access this development. In order to separate local traffic from regional traffic on the Great Western regional roadway system, frontage roads are recommended to extend from Great Western Road to the first TI north of SR 89A.

Along the east-west segment of the corridor, one local TI location has been identified on the section line approximately one mile west of Granite Creek. Again, this location was developed with the adjacent land owners and local agencies and received consensus from all stakeholders.

The proposed TI location is approximately two miles east of SR 89. This spacing would allow for an additional interchange between this TI and SR 89 if future volumes warranted it. Based on year 2030 traffic projections, an additional TI is not warranted and therefore, is not proposed in this study.

7.0 Major Design Features of the Recommended Corridor Alignment

Mainline Alternative 1 is the recommended Great Western corridor alignment. The alignment begins at SR 89A at Great Western Road and follows the section line north, turning west at the Road 5 South section line and terminating at SR 89. This alignment is 9.2 miles in total length and essentially parallels Granite Creek in the north-south direction. The proximity to Granite Creek maintains large open spaces for pronghorn and other wildlife and maximizes the distance of the new roadway facility from the existing residential land uses near Viewpoint Drive.

The Great Western access-controlled corridor is proposed to transition to Great Western Road arterial south of SR 89A via ramps and frontage roads. This provides a physical exit and entrance from the high speed facility to the local roadway facility that requires drivers to consciously reduce their driving speed. The frontage roads are recommended to extend north to the first TI location on Great Western in order to keep the local traffic separate from the regional traffic within two miles of the corridor. Year 2030 volumes show approximately 90,000 vpd within the first mile segment north of SR 89A, which includes both local and regional traffic volumes. The frontage roads will carry a majority of the local traffic originating south of SR 89A thus providing the needed capacity for regional traffic on the mainline system. Given the heavy local traffic volumes and capacity needs on the frontage road system, access to these frontage roads should be limited to no less than ½-mile spacing based on section line and mid-section line roadway alignments.

Two local TI locations have been identified on the north-south segment of the corridor, and one local TI location has been identified on the east-west segment of the corridor. All local TI's will be the responsibility of local developers to construct as traffic volumes warrant. This alternative, including the local TI locations, is presented in **Figure 37**.

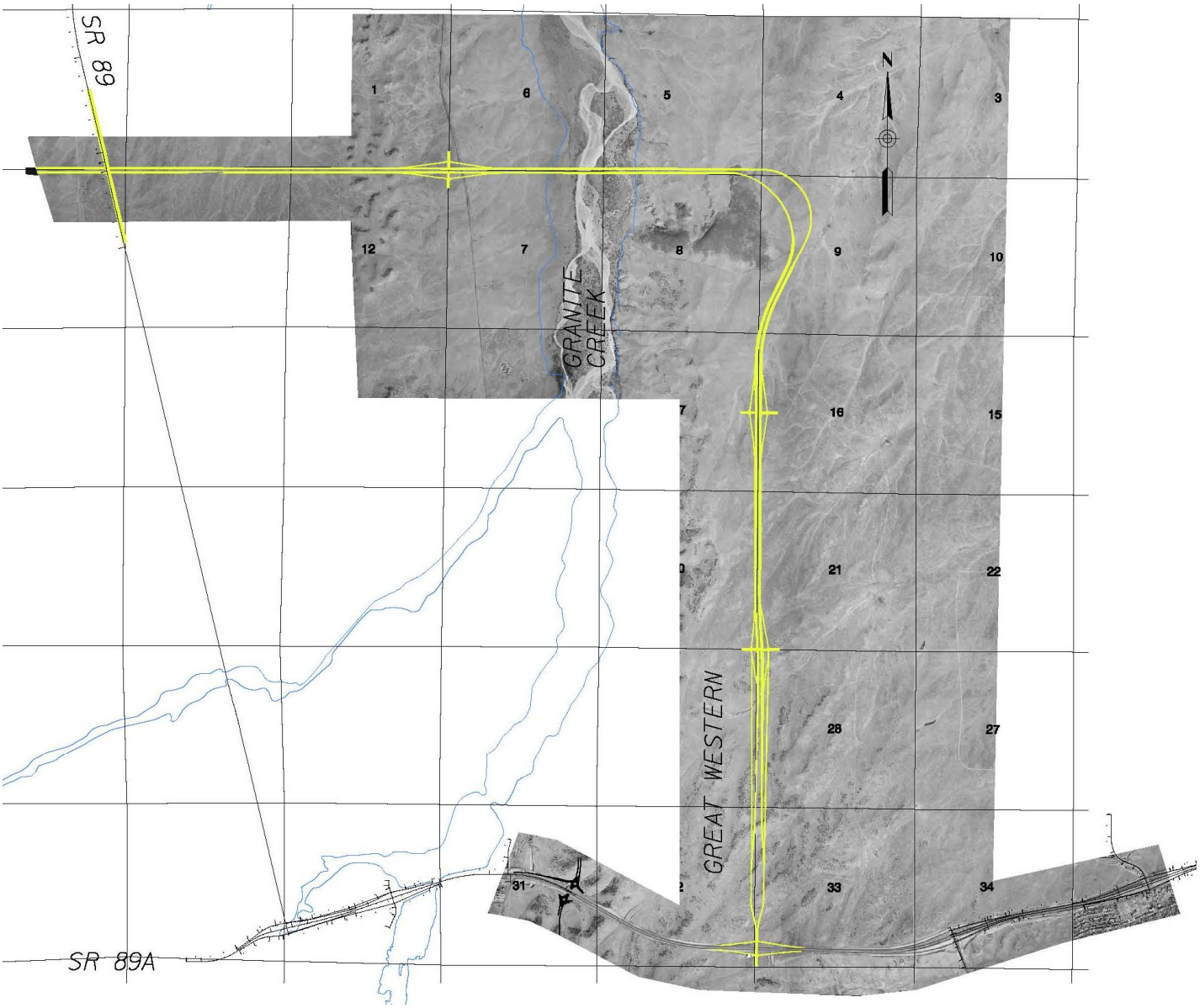


Figure 37. Great Western Corridor Alignment

7.1 Design Controls

Great Western is classified as a fringe-urban access controlled facility. A summary of the design controls for the mainline lanes is provided in **Table 10**. A summary of the design controls for the service and system interchange ramps are provided in **Tables 11 and 12**.

Table 10. Design Controls for Great Western Mainline

Description	Design Criteria - Desirable	Criteria Source	Comments
Roadway Classification	Fringe Urban to Future Urban (Urban Controlled-Access)	RDG Section 306	
Terrain	Rolling		
Level of Service (LOS)	C - D	RDG Table 103.2A	Controlled-Access Highway, Urban/Fringe Urban Areas
Design Speed	65 mph	RDG Table 101.3	Controlled-Access Highway, Urban/Fringe Urban Areas
ADT	54,000	CYMPO Regional Transportation Study 2006	Approximate Projected Year 2030 Traffic Volumes
Design Vehicle	WB-67	RDG Table 407.2	
Horizontal Alignment			
Control Location	Regardless of the number of lanes in the initial construction, the axis of rotation should be at the centerline of each four-lane ultimate roadway.	RDG Section 202.2A, Fig 202.2B	Set 4 lane interim typical section profile grades to be able to keep 6:1 or flatter (10:1 desirable) median slopes for 8 lane typical section.
Stopping Sight Distance	645'	RDG Fig. 201.2 / AASHTO Exhibit 3-1	For Effective Grade = 0
Radius			
Max. Radius	9046.71' (0°-38'-00")	RDG Section 202.3B	
Min. Radius	2291.83' (2°30'00" - no spirals)	RDG Table 202.3B	
Max. Degree of Curve	2°30'00"	RDG Table 202.3B	
Minimum Horiz Curve Length	500' + 100' increase for each central angle degree below 5°; Min = 15 x Design Speed = 975'	RDG Section 203.5	
Reverse Curves	0.80 * (Sum of the Ls's)	RDG Section 203.7, Figure 202.3A	Should be Avoided
Compound Curves	R(Longer) $\leq$ to 1.5*R(Shorter)	RDG Section 203.6	Should be Avoided
Maximum Delta without Curve	0°-45'-00"	RDG Section 203.5	
Superelevation	e_{max}= 6%	RDG Table 202.1A	Controlled Access Urban Highway
Superelevation Runoff	Varies	RDG Table 202.3B	
Vertical Alignment			
Control Location	Regardless of the number of lanes in the initial construction, the axis of rotation should be at the centerline of each four-lane ultimate roadway.		
Maximum Gradient	3%	RDG Table 204.3	Controlled-Access Highway, Urban/Fringe Urban Area - 65 mph
Minimum Gradient	0.5%	RDG Section 204.3	Curb & gutter -elevation > 4000'
Vertical Grade Break	0.2%	RDG Section 204.4A	Design Speed Above 50 mph
Crest Curve K-value	193'	AASHTO Exhibit 3-72	2004 AASHTO, pg 272

Table 10 Design Controls for Great Western Mainline continued

Description	Design Criteria - Desirable	Criteria Source	Comments
Sag Curve K-value	157'	AASHTO Exhibit 3-75	2004 AASHTO, pg 277
Min. Vertical Curve Length	800' min	RDG Table 204.4	Controlled Access - Urban Areas
Vertical Clearance			
Over/Under Roadway	16.5'	RDG Section 206.4	Per rev. Bridge Design Guidelines, Sec. 2 9/29/08
Over Railroad	23.5'	RDG Section 206.4	Per rev. Bridge Design Guidelines, Sec. 2 9/29/08
Under Pedestrian Structure	17.5'	RDG Section 206.4	Per rev. Bridge Design Guidelines, Sec. 2 9/29/08
Cross Sectional Elements			
Lane Widths			
Thru Lanes	12'	RDG Section 301.3	
Turning Lanes	12'	RDG Section 301.3	
Usable Shoulder Widths			
Inside	12'	RDG Table 302.4	Controlled Access Highway - Ultimate 4 lanes each direction - Greater than 3 requires 12' shoulders
Outside	12'	RDG Table 302.4	Controlled Access Highway - Ultimate 4 lanes each direction - Greater than 3 requires 12' shoulders
Cross Slope (Lane & Shldr)	2%	RDG Section 301.2	
Cross Slope Breakover	2% Max	RDG Section 504.3	Between Mainline and Auxiliary lane or parallel off/on ramp.
Medians			
Median Type	Divided - Highway open median sloped downward from the subgrade hinge point at slope rates 6:1 or flatter but no steeper than 4:1		Allows for future option of paving median and adding lanes if needed. Median Barrier would be required.
Width	76' for 8 lane section (No Median Barrier)	RDG Section 306	
Curb Offset to Near Lane			
Inside	N/A		N/A
Outside	N/A	RDG Section 306	10'
Side Slopes			
Cut/Fill Slopes	6:1 or Flatter Preferred, 9' from EOP	RDG Section 306.4, Std C-02.20	
Outside of 9' 6:1 Slope	4:1 fill 3:1 cut	RDG Section 306.4, Std C-02.20	Check with Roadside Development on the use of 3:1 (with barrier) in fill condition
Subgrade Slopes	Match PVT Slope	ADOT Std. Dwg C-02.20	
Clear Zone Width	30'	RDG Table 303.2A	Design Speed 65 mph > 6000 ADT
Border Width	N/A		
Sidewalk Width	N/A		
Turn Lanes			
Design Vehicle	WB-67	RDG Table 407.2	
Taper Rate or Length	Varies	See ADOT Traffic PGP 430	
Braking and Decel Length	Varies	See ADOT Traffic PGP 430	

Table 10 Design Controls for Great Western Mainline continued

Description	Design Criteria - Desirable	Criteria Source	Comments
Corner Radii	Varies	AASHTO Int Design pg 401	Will accommodate Design Vehicle radius
Intersections			
Intersection Sight Distance	Varies	RDG Section 408	Will meet Std according to type
Corner Radii			
Streets		See ADOT Traffic PGP 430	
Design Vehicle	WB-67	RDG Table 407.2	
Corner Radii	Varies	AASHTO Int Design pg 401	Will accommodate Design Vehicle radius
Drainage			
Pavement Drainage			
Storm Drain System	10-Year Storm	ADOT RDG Table 603.2B	50-year storm for depressed roadways
Cut & Median Ditches	10-Year Storm	ADOT RDG Table 603.2B	
Bridge & Culvert Cross Drainage	50-Year Storm	ADOT RDG Table 603.2A	Not to increase 100-year WSE

RDG = Roadway Design Guidelines, 2007 and latest revisions, ADOT Roadway Engineering Group

ADOT Std. Dwg. = Construction Standard Drawings, May 2007 and latest revisions, Division of Highways

AASHTO = A Policy on Geometric Design of Highways and Streets, 2004, American Association of State Highway and Transportation Officials

ADOT Traffic PGP = Traffic Engineering Policies, Guidelines, and Procedures, 02/02/09, ADOT Traffic Group

Table 11. Design Controls for Service Interchange Ramps

Description	Desirable Design Criteria	Criteria Source	Comments
Roadway Classification	Service Ramp		Fringe Urban to Future Urban - Controlled Access Mainline
Design Speed	Exit Gore: 60mph	RDG Section 503.3	Parallel-Type Ramp based on mainline design speed of 65
	Entrance Gore: 55 mph	RDG Section 503.3	Parallel-Type Ramp based on mainline design speed of 65
	Body of Ramp: 50 mph	RDG Section 503.3	Parallel-Type Ramp based on mainline design speed of 65
Design Vehicle	WB-67	RDG Table 407.2	
Horizontal Alignment			
Control Location	Ramp Centerline		
Stopping Sight Distance	Exit Gore: 855'	AASHTO Exhibit. 3-1	1.5*SSD
	Entrance Gore: 495'	AASHTO Exhibit. 3-1	
	Body of Ramp: 425'	AASHTO Exhibit. 3-1	
	At Crossroad: 250'	AASHTO Exhibit. 3-1	
	Loop Ramps 200'	AASHTO Exhibit. 3-1	
Radius			
Min. Radius	1432.40' (4°-00'-00" - no spirals)	RDG Table 202.3B	50 mph body
Max. Radius	5729.58' (1°-00'-00")	RDG Table 202.3B	50 mph body
Minimum Horiz Curve Length	300' /500'	RDG Section 504.2	300' low speed / 500' high speed locations
Superelevation	e_{max}=6%	RDG Section 504.3	
Superelevation Runoff	48' - 147'	RDG Table 202.3B	Ranging from 50 mph to 60 mph design speeds
Tangent Approach to Cross Road	160' or greater	RDG Section 504.2	
Compound Curves	2:1	RDG Section 504.2	
Vertical Alignment			
Control Location	Centerline of the ramp		
Intersection Vertical Profile			
Maximum Gradient on any Leg	N/A		
Algebraic Diff. Minor Grade Major Cross slope	N/A		
Ramps			
Maximum Down Gradient	5%	RDG Section 504.1	3% within 400' of cross road intersection
Maximum Up Gradient	4%	RDG Section 504.1	3% within 400' of cross road intersection
Minimum Gradient	0.25%	RDG Section 504.1	0.40% for road with curb and gutter

Table 11 Design Controls for Service Interchange Ramps continued

Description	Desirable Design Criteria	Criteria Source	Comments
Minimum Vertical Curve Length	400' min	RDG 504.1/ Fig 204.4A & C	200' minimum at terminus with a crossroad depending on ramp design speed. Refer to 204.4A and C for curve lengths required to provide minimum stopping sight distance.
Vertical Clearance			
Over/Under Roadway	16.5'	RDG Section 206.4	Per rev. Bridge Design Guidelines, Sec. 2 9/29/08
Angular Grade Break at Cross Rd	2%	RDG Section 504.1	
Cross Sectional Elements			
Lane Widths			
Thru Lanes	12'	RDG Section 504.5	
Turning Lanes	NA		
Ramp Shoulder Widths			
Inside	2'	RDG Section 504.5/Table 302.4	Add 2' shy for barrier
Outside	8'	RDG Section 504.5/Table 302.4	2' Rt & Lt at Cross Road terminus
Cross Slope (Lane & Shoulder)	2%	RDG Section 301.2	
Side Slopes			
Cut/Fill Slope	6:1	RDG Fig 303.1, RDG Figure 504.4A	To slope hinge
Outside of 6:1 Slope	4:1 Fill, 3:1 Cut	RDG Fig 303.1	Urban freeway design
Clear Zone Width	20'	RDG Table 303.2A	Design Speed 50 mph - Over 6000 ADT
Border Width	N/A		
Entrance lane drop taper	50:1	RDG Figure 504.8A	
Exit lane add taper	25:1	RDG Figure 504.7	
Lane drop	Design speed:1	RDG Section 207	
Lane Add	25:1	RDG Section 207	
Intersections			
Corner Radii / Streets			
Design Vehicle	WB-67	RDG Table 407.2	
Corner Radii	75' radius Right Turns (face of curb)	RDG Fig 505.1B	Use AutoTURN program if necessary
	15' radius Left Turns (face of curb)	RDG Fig 505.1B	Use 3-center curve if necessary

RDG = Roadway Design Guidelines, 2007 and latest revisions, Roadway Engineering Group

Table 12. Design Controls for System Interchange Ramps

Description	Design Criteria - Desirable	Criteria Source	Comments
Roadway Classification	System Ramp		Fringe Urban to Future Urban - Controlled Access Mainline
Design Speed	Exit Gore: 65mph desirable; 60 mph minimum	RDG Section 503.3	System Ramp based on mainline design speed of 65
	Entrance Gore: 55mph	RDG Section 503.3	System Ramp based on mainline design speed of 65
	Body of Ramp: 55mph	RDG Section 503.3	System Ramp based on mainline design speed of 65
Design Vehicle	WB-67	RDG Table 407.2	
Horizontal Alignment			
Control Location	Ramp Centerline		
Stopping Sight Distance	Exit Gore: 968'	RDG Fig. 201.2 / AASHTO Exhibit 3-1	1.5*SSD
	Entrance Gore: 495'	RDG Fig. 201.2 / AASHTO Exhibit 3-1	
	Body of Ramp: 495'	RDG Fig. 201.2 / AASHTO Exhibit 3-1	
Radius			
Min. Radius	1637.02' (3°30'00" - no spirals)	RDG Table 202.3B	55mph body
Max. Radius	6875.50' (0°-50'-00")	RDG Table 202.3B	55mph body
Min. Radius	2291.83' (2°30'00" - no spirals)	RDG Table 202.3B	65mph desirable initial curve
Max. Radius	9046.79' (0°-38'-00")	RDG Table 202.3B	65mph desirable initial curve
Minimum Horiz Curve Length	500' + 100' increase for each central angle degree below 5°; Min = 15 x Design Speed	RDG Section 203.5	
Superelevation	e_{max}= 6%	RDG Section 504.3	
Superelevation Runoff	52'-154'	RDG Table 202.3B	Ranging from 55 mph to 65 mph design speeds
Compound Curves	2:1	RDG Section 504.2	
Vertical Alignment			
Control Location	Centerline of the ramp		
Ramps			
Maximum down Gradient	5%	RDG Section 504.1	
Maximum up Gradient	4%	RDG Section 504.1	
Minimum Gradient	0.40%	RDG Section 504.1	concrete barrier on system ramp (structures)
Minimum Vertical Curve Length	400' min	RDG 504.1/ Fig 204.4A & C	
Vertical Clearance			
Over/Under Roadway	16.5'	RDG Section 206.4	Per rev. Bridge Design Guidelines, Sec. 2 9/29/08
Angular Grade Break at Cross Rd	N/A		

Table 12 Design Controls for System Interchange Ramps continued

Description	Design Criteria - Desirable	Criteria Source	Comments
Cross Sectional Elements			
Lane Widths			
Thru Lanes	12'	RDG Section 504.5	2 lanes on system ramp structure
Ramp Shoulder Widths			
Inside	6'	RDG Table 302.4	
Outside	10'	RDG Table 302.4	
Cross Slope (Lane & Shoulder)	2% min (see super elevation diagrams)	RDG Section 301.2	Cross Slope Breakover 2% Max
Side Slopes			
Cut/Fill Slope	6:1	RDG Fig 303.1, RDG Figure 504.4A	To slope hinge
Outside of 6:1 Slope	4:1 Fill, 3:1 Cut	RDG Fig 303.1	Urban freeway design
Clear Zone Width	24'	RDG Table 303.2A	Design Speed 55 mph - Over 6000 ADT
Border Width	N/A		
Barrier Height	42"		
Entrance lane drop taper	N/A		
Exit lane add taper	N/A		
Lane drop	N/A		
Lane Add	N/A		

RDG = Roadway Design Guidelines, 2007 and latest revisions, ADOT Roadway Engineering Group

ADOT Std. Dwg. = Construction Standard Drawings, May 2007 and latest revisions, Division of Highways

AASHTO = A Policy on Geometric Design of Highways and Streets, 2004, American Association of State Highway and Transportation Officials

7.2 Great Western Cross Section

The recommended cross section for the new roadway facility is an ultimate eight-lane access-controlled highway section with a 76-foot open median. This median width provides adequate separation between opposing travel lanes and will not require a median barrier. The section provides four 12-foot travel lanes in each direction and 12-foot inside and outside shoulders, per current ADOT design standards. The minimum right of way width for this cross section is 400 feet. A 50-foot utility easement adjacent to the access control limits is also recommended on the south and west sides of the corridor. The recommended cross section is presented in **Figure 38**.

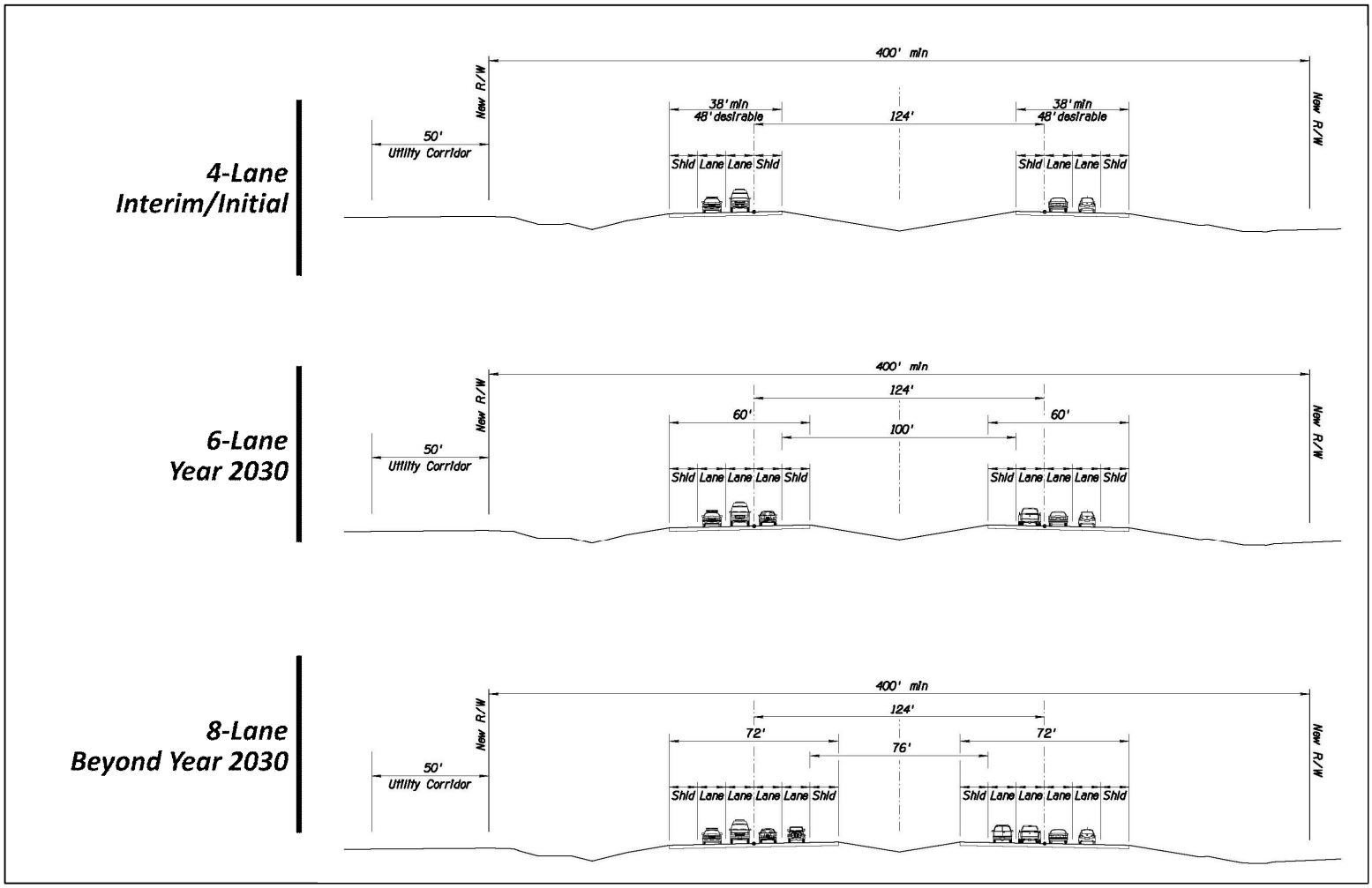


Figure 38. Great Western Cross Section

7.3 SR 89A Widening

The projected year 2030 traffic volumes from the City of Prescott Airport Area Transportation Plan (AATP) show roughly 130,000 vpd on SR 89A east of Great Western. This will require a minimum of four through lanes in each direction on SR 89A mainline. The AATP model shows roughly 105,000 vpd on Great Western west of SR 89A which is anticipated to operate at LOS D with the planned three through lanes in each direction.

7.4 Horizontal and Vertical Alignments

Plan and profile sheets are provided in **Appendix A**. The plans include the horizontal and vertical alignments for the proposed Great Western mainline.

The locations of the local three TI's along Great Western were developed based on stakeholder input, proposed land uses, and a minimum spacing criterion of 1½ miles. Plan and profile sheets were not developed for these service TI's, however typical diamond TI layouts are shown on the plan sheets. Initial horizontal and vertical alignments were developed for the TI's and cross roads in order to determine the mainline profile and estimate future right-of-way needs. Based on the Great Western mainline profile and the existing ground profile the northern two local crossroads are proposed to cross over Great Western. The southern-most local TI is proposed to have the crossroad constructed under the Great Western mainline. This is due to the fact that the Great Western profile is above grade at this location and the existing ground is sloping away from the mainline corridor, which would require the crossroad profile to chase grade for a significant distance if it were constructed over the mainline.

Plan and profile sheets for the system TI's are provided in **Appendix B**. Although no formal recommendations are provided regarding the configuration of these TI's, potential horizontal and vertical alignments were developed in order to identify an initial right-of-way footprint.

7.5 Access Control

Full access control is recommended along the full limits of the Great Western corridor in accordance with ADOT and FHWA Access Control Policy requirements. Limited access control is also recommended along the frontage roads adjacent to the corridor with intersection access to the frontage road limited to ½-mile spacing on the section line and mid-section line roadways.

At the local TI's, the access control on the crossroad shall be per the current ADOT access control policy requirements. A minimum spacing of ¼-mile is recommended from the crossroad and ramp intersection to the next adjacent intersection on the crossroad.

On Great Western Road, south of SR 89A, it is recommended no intersections be allowed north of the proposed Dells Ranch Road, which is approximately 1,000 feet south of the local TI ramp intersection.

7.6 Right of Way

Acquisition of new right-of-way will be required along the full length of this corridor. A minimum right-of-way width of 400 feet with access control is recommended. A 50-foot wide utility easement adjacent to the roadway right-of-way and access control limits is recommended on the south and west sides of the corridor.

7.7 Drainage

The HEC-RAS program version 4.0 was used to analyze Granite Creek for the recommended corridor alignment. The existing conditions analysis conducted for the initial drainage report was

used as a basis for comparison with the proposed conditions. The hydraulic analysis of the bridge was performed using a span length of 125 feet, a pier width of 5.5 feet, and sloping abutments. The highest energy answer option was selected as the bridge modeling approach. The analysis was performed for a 16-span, 17-span, 18-span and 20-span bridge. The results indicate that a 17-span bridge best meets the criteria of a maximum one-foot rise in water surface elevation. The one-foot increase causes the top width of the floodplain at the bridge to expand approximately 130 feet from the floodplain limits established in the initial drainage report. The technical memorandum *Great Western Extension Granite Creek Bridge Crossing Hydraulic Analysis,* dated February 15, 2010 is included as **Appendix C**.

7.8 Earthwork

The profile for Great Western mainline has been designed to balance the earthwork for the whole project. The recommended implementation phasing for the project includes four phases. Phase 1 includes construction of the local SR 89A/Great Western Road TI and the local frontage roads. Phase 2 includes construction of Great Western mainline to the first local TI. Phase 3 continues the mainline to the second local TI on the north-south segment, and phase 4 completes the mainline from the second TI to SR 89. See Section 9 for additional details and a graphic of the recommended implementation phasing.

For the purposes of mainline alignment design and earthwork balance, the project is divided into three anticipated construction projects, referred to as Stages. Stage 1 includes only the frontage roads and the local section line crossroad at the first TI location. There will be excess fill material available from this stage since the crossroad is proposed to ultimately cross under Great Western mainline. This excess material can be used in Stage 2; Stage 2 includes the Great Western mainline from SR 89A to the second local TI, essentially the full north-south segment of the corridor. Stage 2 requires borrow material that is available from Stage 1; the excess material from Stage 1 will be greater than the borrow requirements for Stage 2.

Stage 3 includes construction of the full east-west segment of the corridor including the east ramps for a diamond TI at SR 89. The alignment crosses a range that requires significant cuts. Various depths of cut into this range were evaluated; the final profile optimizes the cut/fill and earthwork balance for this stage.

7.9 Structures / Foundations

The multi-phased project includes three intermediate local diamond interchanges, an interchange at SR 89 and Great Western/Road 5 South, a multi-span crossing over Granite Creek, and a potential system TI at the junction of SR 89A and Great Western. Up to six bridges may be needed for the SR 89A system TI configuration with twin-bridges likely at the other five locations. Based on existing information, it does not appear that foundations for any of the planned structures will encounter bedrock, at least at shallow depths. The soils present at depths of more than 10 feet (typical) should, however, be suitable for supporting bridge abutments and piers with either deep spread-type footings or drilled shafts for all but the Granite Creek crossing. At the creek crossing similar soils may be present at the abutments (depending on where located). The depths to competent materials are likely a few feet deeper within the limits of the existing creek bed. In any case, drilled shafts will likely be the preferred method of support for this crossing given the potential for scour. Driven piles could also be considered, however, with the advent of drilled shafts, the use of piles in Arizona has decreased dramatically over the past several years.

Foundation bearing pressures of 4 to 6 kips per square foot appear reasonable for TI bridge foundations embedded more than 10 feet below existing grades based on the available boring data. Economical excavations for footings can likely be made given the clay content of most soils that will permit relatively steep temporary excavations. Drilled shafts will develop high capacity with the firm to hard cemented soils present at depth. For preliminary estimates a minimum shaft diameter of 4.0 feet is recommended. Shaft depths of 50 to 80 feet are likely for the TI's with deeper shafts anticipated at the Granite Creek Crossing as dictated by the potential for scour.

7.10 Utility Coordination

Existing utilities within the study area include APS overhead and underground power distribution lines, Qwest underground telephone lines, Cable One underground fiber optic lines, Unisource underground gas lines, and Prescott Valley water lines. The planning efforts for this study and the development of the 15% design plans included coordination with each of these utility companies. Per ADOT policy, new utilities may be installed longitudinally within the rights-of-way outside the control of access lines of state highways provided certain conditions are met. All future utilities along the corridor should be located within the proposed 50-foot utility easement adjacent to the 400-foot roadway right of way.

It is anticipated that some utility impacts will occur within this project at the junctions with SR 89A and SR 89. These impacts will need to be addressed with the future recommendations for the system TI configurations. There is also an overhead power line that runs from SR 89 in a northeasterly direction and crosses the east-west segment of the corridor alignment.

7.11 Social, Economic, and Environmental Concerns

A separate Environmental Overview was prepared for the recommended Great Western corridor alignment and the potential system TI configurations. A summary of the findings of the environmental review is presented herein. The full report is presented within the *Great Western Corridor Environmental Overview*, dated March 2010.

7.11.1 Section 4(f)

There are no future trails or pathways planned within the extents of the Great Western Corridor. The Peavine is an existing, privately owned abandoned railroad corridor which crosses the east-west segment of the Corridor; the railroad corridor no longer has rail, but has the potential to become integrated into the City of Prescott's Rails to Trails program. This section of the railroad corridor is not included in any formal planning documents for the trail corridor since it is privately owned. However, within Prescott and Chino Valley the railroad corridor is an established trail called the Peavine Trail which could connect in the future.

7.11.2 Water Resources

The active channel of Granite Creek is likely jurisdictional. Construction within the active channel of Granite Creek would necessitate consultation with the Corps.

The majority of the Corridor is outside the 100-year floodplain (Zone X) as shown in **Figure 2,** *Project Study Area* with the exception of the area along Granite Creek in the north part of the Corridor. Any construction within the 100-year floodplain that could cause an increase in the flood depth must be coordinated with the Yavapai County Floodplain Manager.

7.11.3 Noise

The Corridor is surrounded by vacant, currently undeveloped land. As such, there are no existing residences or businesses within or near the project area that are close enough to the road to be affected by its noise.

There is a proposed residential development located south of SR 89A at the future Granite Dells Parkway traffic interchange. Current site plans indicate the houses could be located approximately 300 feet from the SR 89A/Great Western on and off ramps. According to ADOT's Noise Abatement Policy (ADOT 2005), a new development could be considered a noise-sensitive receiver if it is planned, designed, and programmed.

7.11.4 Air

The proposed project is in an area that is in attainment for all criteria pollutants.

7.11.5 Hazardous Materials

In November 2009, a Preliminary Initial Site Assessment (PISA) for hazardous materials was conducted for the Corridor. The PISA included a field reconnaissance and electronic database search. The results of the database search did not reveal any sources of concern as a result of the proposed improvements. This site reconnaissance did not reveal any indications of contamination within the project area or that would be affected by the project scope. Based on the results of the PISA, no further investigation of hazardous materials issues are recommended for this project. Once the construction area has been established, additional research and visual inspection should be performed to evaluate the potential presence of groundwater wells within the construction zone. Any such wells would need to be properly abandoned if they are disturbed. The PISA was approved by ADOT's Environmental Planning Group (EPG) on January 19, 2010.

7.11.6 Cultural Resources

A Class I cultural resources survey of the Great Western Corridor was undertaken to determine if a Class III field survey would be indicated. The Class I overview identified 15 surveys in conjunction with previous investigations that were either within or partially within the Corridor. The surveys cumulatively cover approximately five percent of the Corridor; therefore, a Class III field survey would be required before construction for the remaining unsurveyed portions of the Corridor. Five cultural resource sites were identified within the Corridor. Four of the five sites are linear features and one is a multi-component site.

7.11.7 Biological Resources

One of the largest populations of pronghorn in Arizona is found in central Yavapai County in the area bounded by Prescott, Prescott Valley, Chino Valley, Paulden and Seligman. AGFD refers to pronghorn in this area as the Central Yavapai County Herd. The area supports 15-25 percent of the statewide pronghorn population in one of the highest density populations in the state.

A pronghorn GPS movement study within the Corridor was initiated by AGFD in 2009-2010. Recommendations from this study will be available in spring 2011. The future design of Great Western will need to coordinate with AGFD to determine the need for, locations and design of pronghorn crossing structures (i.e. wildlife underpasses, overpasses) and any other measures (i.e. funnel fencing, etc.) necessary to maintain permeability in this area and mitigate the potential impacts of this new roadway on pronghorn movements. It is recommended the information available from AGFD be referenced by the local jurisdictions and developers to plan future wildlife corridors as part of the development process. This will align future crossings of the Great Western Corridor with the preservation of future open spaces for wildlife movement.

7.12 Estimate of Probable Costs

The initial order of magnitude project costs for the Great Western corridor, including mainline lanes and frontage roads, is $209,940,000 as shown in **Table 13**. The estimated unit costs are based on unit prices obtained from recent ADOT bid results.

Table 13. Estimate of Costs for Great Western Mainline and Frontage Roads

Item	Major Item Description	Unit	Quantity	Unit Price	Total
200	**EARTHWORK**				
	Clearing	Per mile	9.7	$200,000	$1,940,000
	Furnished water supply	Per mile	9.7	$50,000	$485,000
	Earthwork - Excavation	Cu.Yd.	2,754,000	$7	$19,278,000
	Earthwork - Borrow	Cu.Yd.	23,000	$9	$207,000
300	**BASE AND SURFACE TREATMENT**				
	New Asphalt Concrete Pavement-Mainline	Sq.Yd.	741,000	$38	$28,158,000
	New Asphalt Concrete Pavement-Frontage	Sq.Yd.	65,000	$42	$2,730,000
400	**STRUCTURES**				
	Structure	Sq.Ft.	231,000	$110	$25,410,000
500	**DRAINAGE**				
	Drainage (On site)	Per mile	9.7	$700,000	$6,790,000
	Drainage (Off site)	Per mile	9.7	$1,200,000	$11,640,000
600	**TRAFFIC ENGINEERING**				
	Signing & Pavement Marking	Per mile	9.7	$200,000	$1,940,000
700	**ROADSIDE DEVELOPMENT**				
	Landscaping	Per mile	9.7	$400,000	$3,880,000
800	**INCIDENTALS**				
	Mobilization	LSum	1	$1,200,000	$1,200,000
	Roadway appurtenances	Per mile	9.7	$400,000	$3,880,000
	SUBTOTAL - CONSTRUCTION ITEMS				**$107,538,000**
	Maintenance and Protection of Traffic		5%		$5,377,000
	Dust and Water Palliative		2%		$2,151,000
	Quality Control		2%		$2,151,000
	Construction Surveying		4%		$4,302,000
	Erosion Control		1%		$1,076,000
	Mobilization (8% of total construction cost)		8%		$13,622,000
	SUBTOTAL CONSTRUCTION ITEMS:				**$136,217,000**
	Unidentified Items		25%		$34,055,000
	TOTAL CONSTRUCTION COST:				**$170,272,000**
	Construction Engineering		14%		$23,839,000
	Engineering (includes survey and geotechnical)		8%		$13,622,000
	Utility Relocation		1%		$1,703,000
	TOTAL COST:				**$209,436,000**
	Project Maintenance Cost (including inflation)				$504,000
	TOTAL PROJECT COST:				**$209,940,000**

8.0 AASHTO Controlling Design Criteria

American Association of State Highway and Transportation Officials (AASHTO) Controlling Design Criteria have been reviewed for the existing roadways that will remain as a part of the proposed improvements, which includes SR 89 and SR 89A. ADOT Design Criteria has also been reviewed for the existing roadways. The existing vertical curve provides less stopping sight distance than the recommended minimum on the following vertical curve:

- Glassford Hill Road TI Ramp B (NB Exit Ramp): VPI Station 24+79.16 – 6' less than the recommended 258'.

A complete listing of the existing SR 89 and SR 89A features and evaluation results are presented within the *Initial AASHTO Controlling Criteria Report*, dated January 2009. This report is included in **Appendix D** along with a summary of the horizontal and vertical sight distance calculations.

9.0 Implementation Phasing

The corridor is recommended to be implemented in phases as presented in **Figure 39**. The first phase includes construction of the local SR 89A/Great Western Road TI, which is recommended in the SR 89A DCR. As development occurs north of SR 89A and warrants local access, it is recommended the frontage roads be constructed up to – and including – the first local TI cross road north of SR 89A.

Phase 2 includes construction of the Great Western mainline from SR 89A to the second local TI and construction of the local TI's on the north/south segment. The TI's may be constructed in phases, with the ramps being built in the initial phase and the bridge structure constructed in a future phase. It is recommended the initial Great Western mainline include the inside 12-foot shoulder, two 12-foot travel lanes, and 12-foot outside shoulders. Although 12-foot shoulders are not required adjacent to two travel lanes, this will provide logical construction joints for future widening.

Phase 3 includes construction of the entire Great Western mainline from the second TI to SR 89. It is anticipated the initial junction with SR 89 will be an at-grade intersection configuration until the facility is extended west. The limits of this study end at SR 89. Phase 3 also includes construction of the bridge structure at Granite Creek.

The implementation plan also includes a preliminary layout configuration for the Great Western/Chino Valley Extension system TI that assumes the ultimate mainline high-speed access-controlled facility will extend north-south between the two facilities. The projected year 2030 traffic volumes from AATP indicate a two-lane ramp will be needed to connect to the east-west segment of Great Western. Therefore, the proposed implementation plan presents construction of an at-grade two-lane north to west ramp as part of Phase 3. If/when the future Chino Valley Extension is added, the north-south mainline could be constructed to go over the two lane ramp, reducing throw-away cost for the initial Great Western implementation.

Phase 4 includes construction of the third local TI, which is assumed to be needed after mainline construction is complete. All local TI's will be the responsibility of local developers to construct based on a travel demand needs generated by adjacent development.

The ultimate configuration for all junctions with Great Western – including SR 89, SR 89A, and Chino Valley Extension – will need to be evaluated further when an updated travel demand model is available.

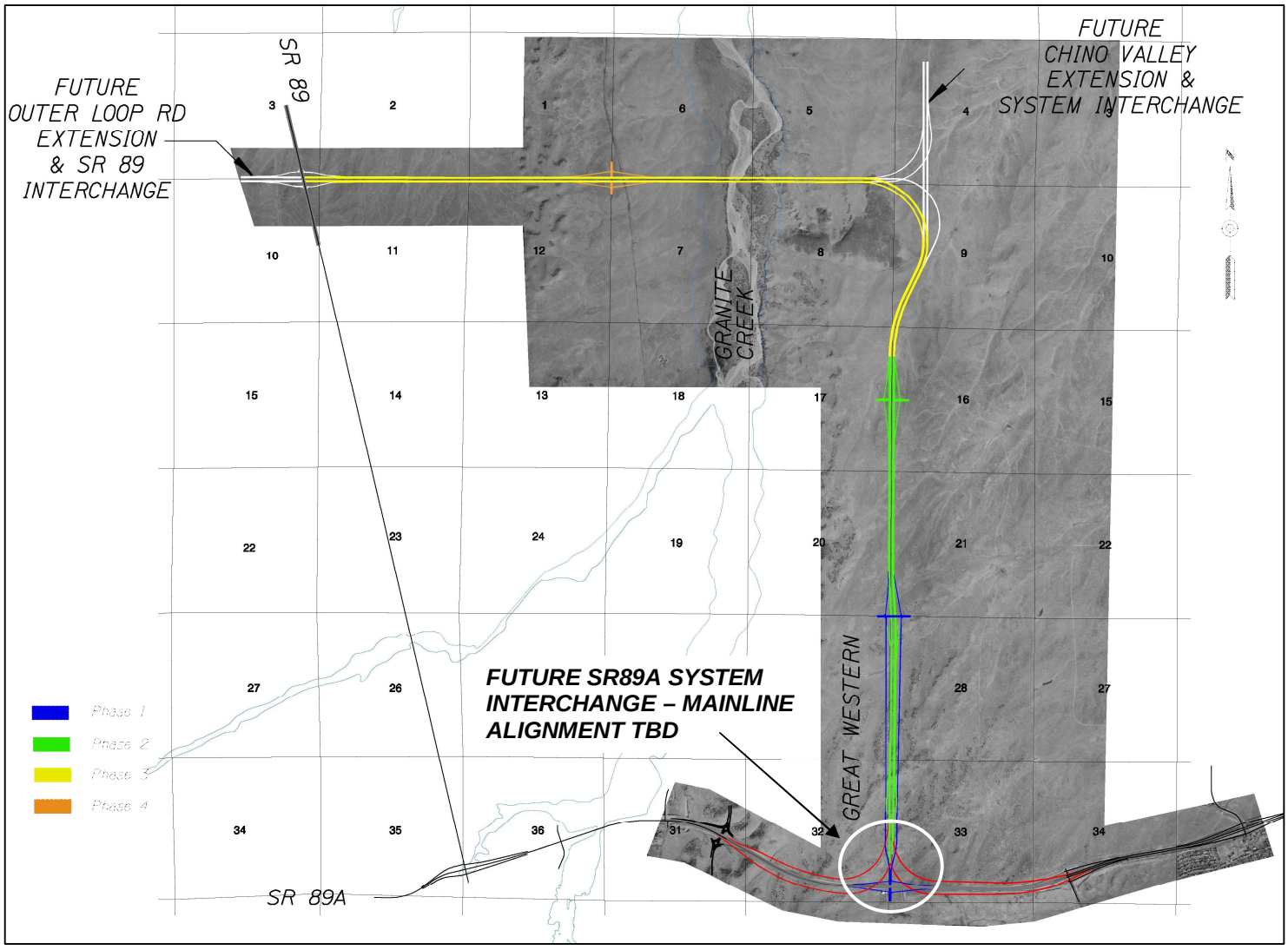


Figure 39. Recommended Implementation Phasing

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