Interstate 10 - Phoenix to California Border, Multimodal Corridor Profile Study

Task Assignment MPD 09-11

Final Report

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Arizona Department of Transportation

Multimodal Planning Division

Prepared by

HDR Engineering, Inc.

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Abbreviations and Acronyms

101L	Loop 101
202L	Loop 202
303L	Loop 303
AADT	annual average daily traffic
ADEQ	Arizona Department of Environmental Quality
AMA	active management area
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
APE	area of potential effects
A.R.S.	Arizona Revised Statutes
AZ	Arizona
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway Company
CAA	Clean Air Act
CAP	Central Arizona Project
C.F.R.	Code of Federal Regulations
CRIT	Colorado River Indian Tribes
CWA	Clean Water Act
EB	eastbound
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
GIS	geographic information system
GWSI	Groundwater Site Inventory
HAP	hazardous air pollutant
HDMS	Heritage Data Management System
HOV	high-occupancy vehicle
HPMS	Highway Performance Monitoring System
I	Interstate
I-8	Interstate 8
I-10	Interstate 10
I-17	Interstate 17
I-40	Interstate 40
INA	Irrigation Non-Expansion Area
IRI	International Roughness Index
ISA	Initial Site Assessment
ITS	intelligent transportation systems
L	Loop
LESA	Land Evaluation and Site Assessment
LOS	level of service
MAG	Maricopa Association of Governments
MBTA	Migratory Bird Treaty Act
MCDOT	Maricopa County Department of Transportation
METRO	Valley Metro Rail Inc.
mg/l	milligrams per liter
MP	milepost
MPO	metropolitan planning organization
MVMT	million vehicle miles traveled
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NAP	Noise Abatement Policy
National Register	National Register of Historic Places
NB	northbound
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resource Conservation Service
OHV	off-highway vehicle
OP	overpass
PAG	Pima Association of Governments
PEL	Planning and Environmental Linkages
PSR	Present Serviceability Rating
PVNGS	Palo Verde Nuclear Generating Station
PVVTA	Palo Verde Valley Transit Authority
RCBC	reinforced concrete box culvert
RID	Roosevelt Irrigation District
RMP	Resource Management Plan
RPTA	Regional Public Transportation Authority
RTP	*Regional Transportation Plan*
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	southbound
SHPO	State Historic Preservation Office(r)
SR	State Route
SRP	Salt River Project
TAC	Technical Advisory Committee
TCP	traditional cultural property
TDS	total dissolved solids
TI	traffic interchange
Title VI	Title VI of the Civil Rights Act of 1964
TNW	traditional navigable waters
UP	underpass
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
U.S.C	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
WACOG	Western Arizona Council of Governments
WB	westbound
WSC	Wildlife of Special Concern

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Executive Summary

The Arizona Department of Transportation (ADOT) is the lead agency for this multimodal study of Interstate 10 (I-10) between the California border and downtown Phoenix (I-10 Corridor). Past corridor profile studies of I-10 have primarily focused on vehicular travel. This study employs a more holistic approach and serves as a benchmark for future studies. The intent is to assess the I-10 Corridor as a highway and as a travelshed; evaluating vehicular issues as well as issues relating to transit, rail, and air service in the corridor.

Corridor overview

As a continuous coast-to-coast route, I-10 is a principal freight route connecting the southern California ports with the Phoenix metropolitan area and major metropolitan areas in Texas and Florida. In Arizona, I-10 extends 391 miles from Ehrenberg in the west to San Simon in the east. I-10 serves multiple functions: it provides an important east–west route through the state; it connects Phoenix and Tucson, the state's two largest cities; and it is a critical component of the Phoenix metropolitan area's regional freeway system.

The "I-10 Corridor" as referred in this report, runs from the California border to downtown Phoenix (at Central Avenue, deck park tunnel, milepost 146). The I-10 Corridor is located within La Paz and Maricopa Counties. La Paz County is part of the planning area of the Western Area Council of Governments (WACOG) and the metropolitan planning organization (MPO) for Maricopa County is the Maricopa Association of Governments (MAG). The I-10 Corridor is also located within the ADOT Yuma and Phoenix Construction and Maintenance Districts.

Study overview

The primary purpose and need for this study is to consolidate the myriad of planning documents for the I-10 Corridor (primarily in the MAG region) and develop a clear vision for future transportation needs along the I-10 Corridor.

Within La Paz County (WACOG region), this study will result in evaluation and recommendation of potential projects to meet the multimodal transportation needs of the I-10 Corridor.

Within Maricopa County, MAG member agencies have adopted the *Regional Transportation Plan* (RTP) and accepted the *Interstate 10 – Hassayampa Valley Roadway Framework Study* which identifies a vision and needs for the I-10 Corridor. Therefore, this study will concentrate on compiling the recommendations from previous studies into a single resource focused on the I-10 Corridor. This study will not recommend new alternatives and improvements within the MAG region.

Ultimately, the prioritization of projects in the I-10 Corridor is a multi-agency effort among FHWA, ADOT, MAG, and WACOG.

Outreach

The study was led by a Technical Advisory Team (TAC) made of representatives from ADOT, FHWA, MAG, WACOG, La Paz County, and Maricopa County. The TAC met regularly to discuss study objectives and to review study deliverables.

Other corridor stakeholders included federal, state, and local agencies; tribal entities, community and business leaders; and other transportation-related groups. Key stakeholders were interviewed during the study to identify background information, transportation issues, and potential projects in the I-10 Corridor.

A public meeting was held in Quartzsite (La Paz County) on November 8, 2012. The meeting was attended by 13 people, including two elected officials from Quartzsite. The study team presented information related to the plan for improvements and requested comments on issues related to the study. No public meetings were held in Maricopa County because this study did not recommend any new alternatives or improvements within Maricopa County. A study newsletter was distributed to members of the public and stakeholders to introduce the study and solicit input. The public was also able to provide input from the study web page and toll-free study information line.

Current and Future Conditions

The initial phase of the study included an inventory of existing conditions and a forecast of future conditions in the I-10 Corridor.

A primary purpose of this study was to consolidate the numerous planning studies related to I-10 into a single document covering the I-10 Corridor. The study team reviewed over 60 previous and ongoing studies.

Building upon these previous studies, the study team inventoried the characteristics of the I-10 Corridor into categories consistent with the study objectives of:

- preservation
- community character
- movement of people, goods, and services
- safety and security
- environment and natural resources

The following sections identify key findings from each category.

Preservation

- Begining at the California border, I-10 has two lanes in each direction. This configuration continues until Verrado Way in Buckeye where it widens to three lanes in each direction. At Loop 303, I-10 widens again to four lanes in each direction and adds a high-occupancy vehicle (HOV) lane in each direction, continuing to Central Avenue in downtown Phoenix.
- In La Paz County, there are ten interchanges along I-10. The connecting roads primarily serve local traffic in Ehrenberg or Quartzsite or serve as regional connectors to other parts of the county.
- Roads in Maricopa County, especially the metropolitan Phoenix area, are built upon a one-mile grid system. Almost all of the major north-south arterials connect to I-10 with a traffic interchange.

Additionally, there are three existing and two planned freeway-to-freeway system traffic interchanges along the I-10.

- Due to the high volume of heavy vehicle traffic, pavement conditions along the I-10 Corridor continue to be a major concern.
- Of the 136 bridge structures along the I-10 Corridor, 22 are eligible for rehabilitation, 32 are functionally obsolete based on current design standards for clearances or shoulder widths, and 1 is structurally deficient. There are three major river bridges for the Colorado River, Hassayampa River, and Agua Fria River.
- There are 220 concrete box culvert structures along the I-10 Corridor. All but 10 are located west of SR 85. They are typically provided in the desert areas to allow stormwater to flow under I-10 from north to south.

Community character

- Land owners within the I-10 Corridor include private entities, the Bureau of Land Management (BLM), Arizona State Land Department (ASLD), Bureau of Reclamation (BOR), and the Colorado River Indian Tribes (CRIT).
- Almost all of the surrounding land in Maricopa County is developable, while in La Paz County developable land is more dispersed and there are large areas of undevelopable land (BLM and BOR administered lands).
- There are a number of special events including rock and gem shows in Quartzsite and NASCAR races in Avondale that attract visitors and affect traffic along I-10.
- There are numerous recreational trails or paths that cross I-10. Also, there are a number of parks in close proximity to I-10. I-10 between the California border and SR 85 is relatively bicycle friendly while east of SR 85, bicycle traffic is prohibited.
- I-10 is identified by BLM as a major energy corridor. Major utilities including high-voltage power, canals, and gas lines cross the I-10 Corridor.
- The Union Pacific Railroad company operates parallel to the I-10 Corridor in the Phoenix metropolitan area. The Burlington Northern-Santa Fe Railroad company operates along the US 60/Grand Avenue corridor and crosses under I-10 near 7th Avenue.

Movement of people, goods, and services

- The I-10 Corridor currently operates at desirable levels of service (LOS) west of Litchfield Road. As I-10 enters downtown Phoenix, the LOS declines to failing (E or F).
- Assuming no improvements are made, the long-term projections result in failing LOS (E or F) along I-10 from 411th Avenue (just east of La Paz County border) to downtown Phoenix. In La Paz County, the long-term operations of I-10 would be LOS C which is not desirable for rural conditions. An additional two to four lanes would be needed along I-10 to improve LOS to acceptable levels.
- The Town of Quartzsite provides demand-responsive transit service with the Desert Roadrunner within Quartzsite Monday through Friday to seniors and persons with disabilities. Greyhound provides passenger transportation for its bus station in Quartzsite with intercity service to Phoenix and Indio, California.
- Valley Metro transit services using I-10 include freeway bus rapid transit/express routes, which use HOV facilities to connect park-and-ride lots with major activity centers and downtown Phoenix. There are three park and ride lots adjacent to the I-10 Corridor at Jackrabbit Trail, Dysart Road, and 79th Avenue.
- Freight transportation is important to Arizona's economy as well as the U.S. economy as a whole. Within Arizona, the primary mode for transporting freight is by truck. Currently, approximately 10,000 trucks cross the Arizona-California border on a daily basis. The long-range traffic projections estimate that the daily trucks would double to over 20,000 heavy vehicles per day.
- Other modes of freight movement include rail and air cargo. By weight, over 75 percent of rail freight passes through Arizona, 21 percent is delivered to Arizona from outside sources and 2 percent originates in Arizona destined for out-of-state delivery. Almost all air cargo in Arizona passes through Phoenix Sky Harbor International Airport.

Safety and security

- There were over 11,000 crashes along I-10 in the 5-year period between 2006 and 2010. There were 130 fatal crashes, representing just over 1 percent of all crashes. Within the study corridor, the highest rate of fatal crashes occurred on I-10 between the Maricopa County border and SR 85. The most common occurrence for these crashses were single-vehicle overturning.
- The Ehrenberg port of entry is located at milepost 3.8 along I-10, just east of the Arizona-California border. It is open 24 hours per day and 7 days per week to monitor all commercial traffic entering Arizona.
- The Palo Verde Nuclear Generating Station (PVNGS) is located approximately 6 miles south of I-10, near the town of Wintersburg. I-10 serves as a principal evacuation route within the PVNGS Emergency Planning Zones. The area between mileposts 90 and 101 is within the 10-mile radius of the zones.

Environment and natural resources

- Major water resources in the I-10 Corridor include groundwater wells, washes and rivers, and the Central Arizona Project canal.
- The I-10 Corridor crosses through multiple Federal Emergency Management Agency (FEMA) floodplains as defined by the Colorado River, Hassayampa River, Agua Fria River, and many other washes.
- The topography along the I-10 Corridor is relatively flat, with road elevations ranging between approximately 1,000 and 1,200 feet above sea level. I-10 passes through or close to a number of mountain ranges including Dome Rock Mountains, Plomosa Mountains, Granite Wash Mountains, Big Horn Mountains, and White Tank Mountains.

- The I-10 Corridor acts as a major barrier to the movement of wildlife. State and regional agencies have identified a number of wildlife movement corridors that cross the I-10 Corridor. There are also likely state and federal protected plant and animal species that are present throughout the I-10 Corridor.
- Archaeological surveys have been previously completed throughout the I-10 Corridor. It is likely that places of traditional cultural importance to Native American Tribes are present in and close to the I-10 Corridor. Such places could include trails, native plant and natural resource gathering areas, locations of ceremonial activities, and culturally important landscape features such as mountains, rivers, and vistas.
- Although much of the existing agricultural land in Maricopa County is being converted to residential and commercial uses, there are still large areas of potential prime and unique farmland along the I-10 Corridor in areas such as Tonopah, Vicksburg, and Quartzsite.

Plan for improvements

The list of projects in the I-10 Corridor were divided into two categories: those that are funded and programmed either through the ADOT five-year construction program or through the MAG RTP; and those that have been proposed in previous planning studies, but funding has not been identified.

Programmed projects

Major funded projects in fiscal years 2013 to 2017 include:

- reconstruction of the Ehrenberg port of entry
- intersection improvements at the West Quartzsite traffic interchange
- pavement rehabilitation at multiple locations
- construction of a system traffic interchange connecting SR 303L and I-10 in Goodyear
- construction of a system traffic interchange connecting SR 202L and I-10 in Phoenix
- construction of a new traffic interchange at Perryville Road and I-10 in Goodyear
- construction of new park-and-ride lots near I-10 in Buckeye and Avondale
- initial planning, design, and construction of light rail extension from downtown Phoenix to I-10 and 79th Avenue
- rehabilitation and expansion of state-wide airports
- initial construction of Northern Parkway between SR 101L and SR 303L

Major projects programmed in the RTP for fiscal years 2018 to 2031 include:

- widening of I-10 between SR 85 and Verrado Way to three lanes in each direction
- construction of the SR 30 freeway (parallel to I-10 in southwest Phoenix metropolitan area)
- construction of SR 303L south of I-10
- construction of a new traffic interchange at El Mirage Road

Potential projects

Over 60 potential projects were identified for the I-10 Corridor. The types of the projects included:

- deficiencies identified by study analysis
- needs identified in previous long-range planning studies
- recommendations from stakeholders that have been identified in planning documents

Ultimately, the prioritization of projects in the I-10 Corridor is a multi-agency effort among FHWA, ADOT, MAG, and WACOG.

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1. Study Description

The Arizona Department of Transportation (ADOT) is the lead agency for this multimodal study of Interstate 10 (I-10) between the California border and downtown Phoenix (I-10 Corridor). Past corridor profile studies of I-10 have primarily focused on vehicular travel. This study employs a more holistic approach and serves as a benchmark for future studies. The intent is to assess the I-10 Corridor as a highway and as a travelshed; evaluating vehicular issues as well as issues relating to transit, rail, and air service in the corridor.

1.1 Corridor overview

I-10 and Interstate 40 are the only Interstate highways that cross the entire state of Arizona. As a continuous coast-to-coast route, I-10 is a principal freight route connecting the southern California ports with the Phoenix metropolitan area and major metropolitan areas in Texas and Florida. In Arizona, I-10 extends 391 miles from Ehrenberg in the west to San Simon in the east. I-10 serves multiple functions: it provides an important east–west route through the state; it connects Phoenix and Tucson, the state's two largest cities; and it is a critical component of the Phoenix metropolitan area's regional freeway system.

The corridor location, shown in Figure 1.1 and referred to as the "I-10 Corridor" in this report, runs from the California border to downtown Phoenix (at Central Avenue, deck park tunnel, milepost 146). The analysis area has been defined as up to 1 mile on either side of I-10, with consideration of greater distance for key roads, populations, and multimodal opportunities.

The I-10 Corridor is located within La Paz and Maricopa Counties. The boundary between the two counties is located at approximately milepost 71 along I-10. La Paz County is part of the planning area of the Western Area Council of Governments (WACOG) and the metropolitan planning organization (MPO) for Maricopa County is the Maricopa Association of Governments (MAG). The boundary between WACOG and MAG is the same as the county boundaries. The I-10 Corridor is also located within the ADOT Yuma and Phoenix Construction and Maintenance Districts. The boundary between the two ADOT Districts is just west of State Route (SR) 85 at approximately milepost 112 (see Figure 1.2).

The functional classification of I-10 within the corridor is "Interstate." The area between the California border and SR 85 is classified as rural, while the area between SR 85 and downtown Phoenix is classified as urban.

1.2 I-10 Corridor agency roles

The primary agencies with active roles in the funding, planning, approving, constructing, and maintaining of projects along the I-10 Corridor are the Federal Highway Administration (FHWA), ADOT, WACOG, and MAG. The following sections provide a brief description of each agency's role.

FHWA

FHWA is the lead federal agency on transportation projects that require a federal action such as approving funding or approving new or modified access points along the Interstate system. FHWA serves primarily in an oversight role during the preliminary design and environmental clearance process ensuring that the National Environmental Policy Act (NEPA) is followed in developing environmental clearance documents (categorical exclusions, environmental assessments, or environmental impact statements) for a project.

ADOT

ADOT implements projects within the state highway system (Interstates, U.S. highways, and state highways). Project implementation includes planning, environmental clearance, right-of-way acquisition, design, construction, and maintenance. The types of projects range from pavement preservation and shoulder improvements to new freeway or highway corridors. ADOT is the primary statewide long-range transportation planning agency. Within Maricopa County, ADOT defers to MAG for long-range planning efforts, but is still the lead agency in implementing the freeway and highway program.

Figure 1.1 | Project location

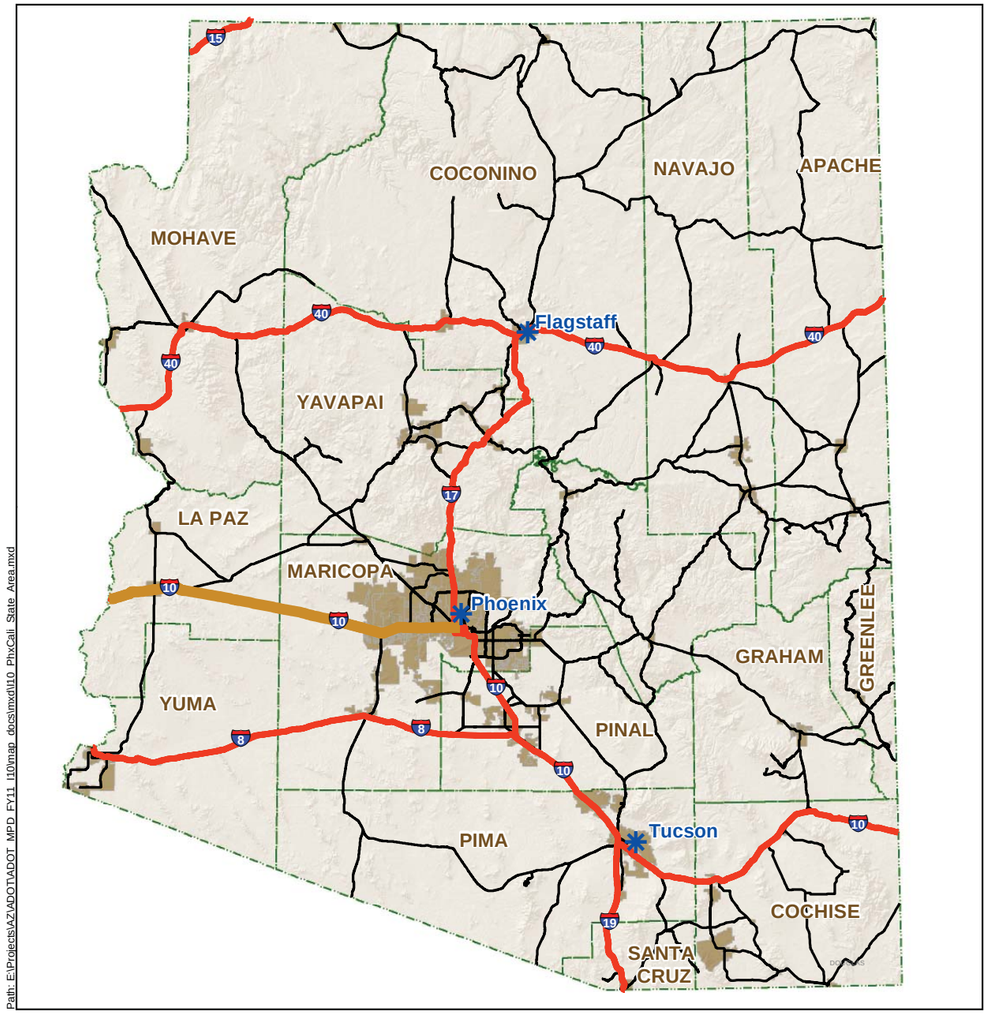
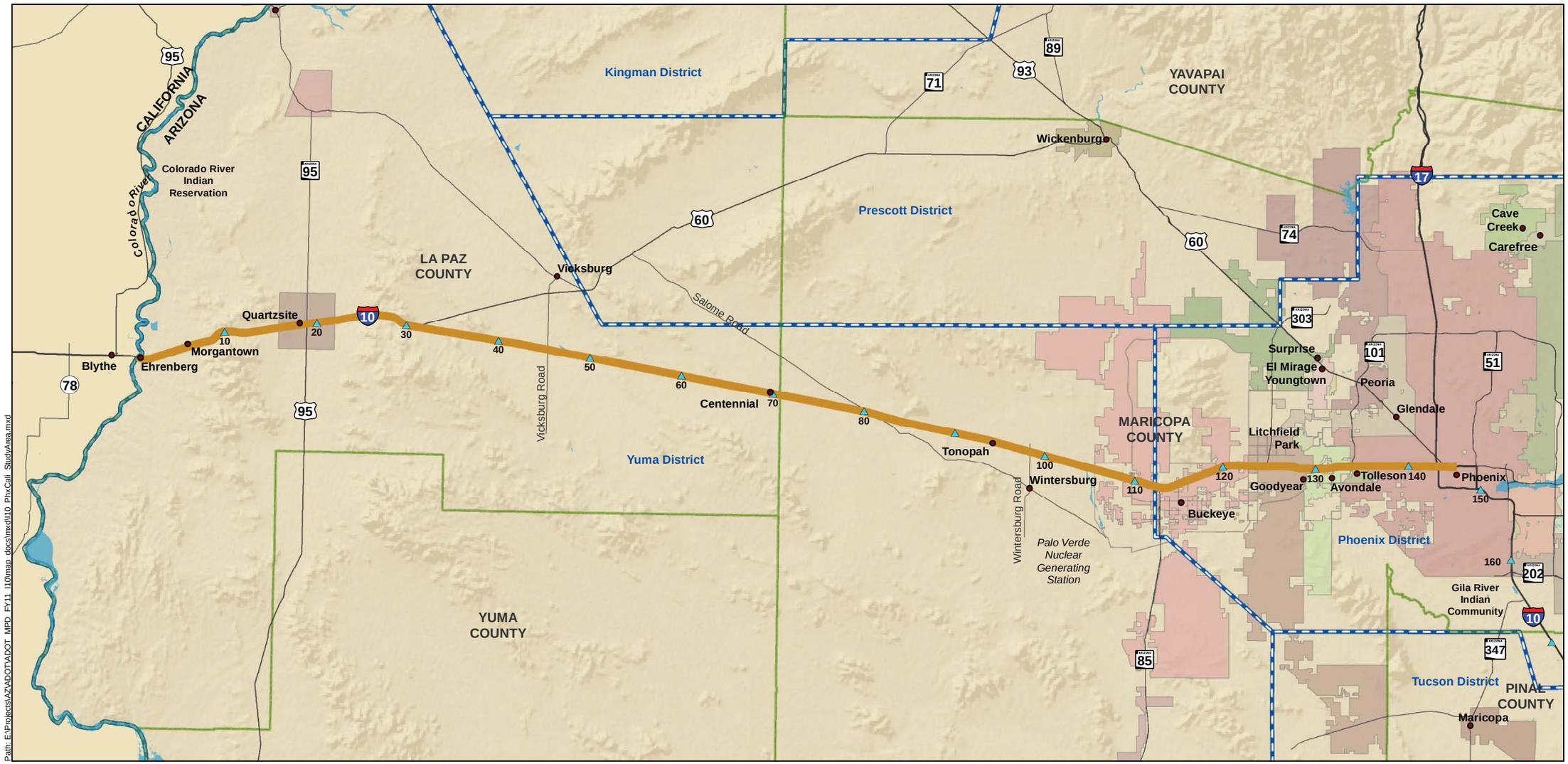


Figure 1.2 | I-10 Corridor



- City
- Milepost
- Project location*
- Lake
- County boundary
- ADOT Districts

*Study area extends 1 mile north and south of I-10

0 2.5 5 10 15 20 miles

1 in = 10 miles

NORTH

Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

Path: E:\Projects\AZ\ADOT\ADOT_MPD_FY11_I10\map_docs\mxd\I10_PhxCali_StudyArea.mxd

MPO/COG

With respect to transportation projects, WACOG and MAG serve as planning agencies that set priorities for scheduling and funding of projects. As mentioned above, ADOT takes a larger role in long-range planning outside of Maricopa County because the resources available to (Council of Governments) COGs are limited. Within Maricopa County, MAG is responsible for long-range transportation planning, traffic forecasting, and air quality conformity analysis. Based on this; the purpose, need, goals, and objectives for this study will be different for the I-10 Corridor within the WACOG region and the MAG region.

1.3 Planning and environmental linkages

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), includes several provisions intended to enhance the consideration of environmental issues and impacts within the transportation planning process. It encourages the use of planning documents as outlined in the NEPA process. In the past year, one such program—Planning and Environmental Linkages (PEL)—has been promoted by the Federal Highway Administration (FHWA) as a way for states and local agencies to more efficiently deliver transportation projects.

The PEL process seeks to result in subarea and corridor studies that can be used more directly in the NEPA process. Effective, conceptual-level transportation planning studies that follow the PEL process provide opportunities to identify important issues early and to build the agency, stakeholder, and public understanding necessary to successfully address those issues. Such early, integrated planning is not driven solely by regulatory requirements and the quest for more efficient and effective processes, although those are desirable results. Transportation and environmental professionals—as well as those in MPOs, state and federal resource agencies, and nongovernmental organizations—are finding that early collaboration helps achieve broader transportation and environmental stewardship goals through better decisions regarding programs, planning, and projects.

ADOT PEL process

The ADOT PEL process is being applied to the I-10 Corridor study and, thus, this study serves as a test case for future use of the PEL process. The PEL document has three components:

- Questionnaire for Transportation Planners – Part 1 (completed at the beginning of the transportation planning study)
- Questionnaire for Transportation Planners – Part 2 (completed at the end of the transportation planning study)
- Checklist for Environmental Planners – Part 3 (completed after Part 1 and 2 at the end of the transportation planning study)

Completion of the questionnaire and checklist serves dual objectives:

- Provides guidance to transportation planners on the level of detail needed to ensure that information collected and decisions made during the transportation planning study can be used during the NEPA process for a proposed transportation project.
- Provides the future NEPA study team with documentation on the outcomes of the transportation planning process, including the history of decisions made and the level of detailed analysis undertaken.

When conducting a transportation planning study that links to future NEPA process, major issues include:

- identifying the appropriate level of environmental analysis for the study
- identifying the appropriate level of agency, stakeholder, and public involvement
- identifying unique study concurrence points for seeking agreement from relevant resource agencies, stakeholders, and the public
- developing a process to ensure that the study will be recognized as valid within the NEPA process
- identifying when to involve resource agencies in the study, and to what extent they influence decision making
- achieving concurrence with ADOT and U.S. Department of Transportation managers and regulators on use of these studies in the NEPA process

The completed PEL document is included in Appendix A for reference.

1.4 Purpose and need

The primary purpose and need for this study is to consolidate the myriad of planning documents for the I-10 Corridor (primarily in the MAG region) and develop a clear vision for future transportation needs along the I-10 Corridor.

Within La Paz County (WACOG region), this study will result in:

- Formulation of a multimodal transportation plan that incorporates highway and transit travel modes and complements the area's current and future development patterns.
- Analysis of the physical layout and number of general purpose and special-use travel lanes needed to serve the future I-10 Corridor travel demand.
- A plan to address freight needs within and through the I-10 Corridor.
- Consideration of community character and potential impacts throughout the planning process.
- A determination of changes in access patterns within the I-10 Corridor that could encourage better multimodal cohesion and connectivity and improve safety.

Within Maricopa County, MAG member agencies have adopted the *Regional Transportation Plan* (RTP) and accepted the *Interstate 10 – Hassayampa Valley Roadway Framework Study* which identify a vision and needs for the I-10 Corridor. Therefore, this study will concentrate on compiling the recommendations from previous studies into a single resource focused on the I-10 Corridor. This study will not recommend new alternatives and improvements within the MAG region.

The study approach developed for the I-10 Corridor can be applied to other Statewide corridor studies in the future.

1.5 Goals, objectives, and evaluation criteria

Although the purpose and need differs between the WACOG and MAG region, the overall goals and objectives for the I-10 Corridor remain the same:

- Compile planned and potential projects to assist ADOT and regional and local agencies in the preservation of transportation right-of-way.
- Document planned and potential improvements to assist local governments in identifying compatible land use and zoning for adjacent development.
- Identify environmental issues and concerns.
- Compile planned and potential projects for consideration in the priority programming process.
- Evaluate the appropriateness of current and emerging intelligent transportation systems (ITS) technologies.
- Forecast future travel demand within the I-10 Corridor. Travel forecasts from ADOT's statewide model will be used within La Paz County and MAG's travel forecasts will be used within Maricopa County.
- Document alternative transportation opportunities that are being considered and studied.

This study will result in a coordinated multimodal transportation plan for the I-10 Corridor that addresses these objectives.

Criteria measures were developed in relation to the goals and objectives for each characteristic of the I-10 Corridor (preservation, community character, movement of people, goods, and services, safety and security, and environment and natural resources). The criteria are presented in Appendix B.

Ultimately, the prioritization of projects in the I-10 Corridor is a multi-agency effort among FHWA, ADOT, MAG, and WACOG.

1.6 Stakeholder and public outreach

Given the length of the corridor and the importance of the I-10 Corridor, numerous groups could be interested in the outcomes of this study. Implementation of an effective stakeholder and public outreach program facilitates the identification of community issues early in the process.

Typically, an outreach program that informs and educates governmental agencies, Tribal nations, private businesses, and the public greatly reduces the probability of study delays by resolving and addressing community concerns. In addition, the outreach program is consistent with the PEL requirements to obtain meaningful stakeholder and public participation, helping to produce widely supported and sustainable results.

Stakeholder outreach

The approach to stakeholder outreach has evolved throughout the study to ensure that stakeholders are informed and interests are served while feedback reaches the study team. At the onset, study information was distributed to a broad audience that includes federal, state, and local agencies; Tribal entities, community and business leaders; and other transportation-related groups using a database developed for stakeholder outreach (see the sidebar on the following page for a list of stakeholders). A number of approaches were used to facilitate the information sharing:

- Stakeholder interviews: stakeholder interviews were held during the first alternatives development phase of the study. The interviewees provided background information for the study team and recommended potential projects or issues in the I-10 Corridor. See Appendix C for summaries of the stakeholder interviews.
- Technical Advisory Committee (TAC): The TAC is comprised of agency representatives who agreed to participate in the study development and who met at key milestones throughout the study (see sidebar on the following page for a list of agencies represented on the TAC). The TAC meetings allowed input from agencies with a significant interest in the study progress.
- The entire list of stakeholders was notified via email that the draft Final Report was posted to the *I-10, Phoenix to California Border, Multimodal Corridor Profile Study* webpage for review and comment. Stakeholders were provided 30 days to respond with comments prior to the report being finalized.

Public outreach

The public involvement program was designed to encourage public input and comment and provide opportunities for meaningful communication between the study team and the public. A number of approaches were used to engage the public:

- Newsletter: A newsletter was developed for introducing the study and requesting input from the public and stakeholders. Within La Paz County, the newsletter was emailed to the ADOT Communications distribution list as well as other agency stakeholders. In Maricopa County, the newsletter was distributed by MAG to member agency representatives. See Appendix C for a copy of the newsletter.
- Public meeting: A public meeting was held in Quartzsite (La Paz County) on November 8, 2012. The meeting was attended by 13 people, including two elected officials from Quartzsite. The study team presented information related to the plan for improvements and requested comments on issues related to the study. No public meetings were held in Maricopa County because this study did not recommend any new alternatives or improvements within Maricopa County. See Appendix C for a summary of the public meeting.
- Website: A study web page, hosted on the ADOT Multimodal Planning Division website, was developed early in the study process. The study web page is user-friendly and interactive to allow for efficient communication of study information and gathering of public comments.
- Telephone contact: A toll-free study information line was used to provide the public and stakeholders with details about the study status, upcoming meetings, and ways to request/review materials.

I-10 Corridor Stakeholders

These stakeholders have been identified as having an interest in this study and will be invited to participate in the public and agency involvement process:

Federal

Bureau of Land Management
Bureau of Reclamation
Department of Homeland Security
*Federal Highway Administration**
Federal Transit Administration
U.S. Army Corps of Engineers
U.S. Customs and Border Protection
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Tribal Nations

Colorado River Indian Tribes
Gila River Indian Community
Hopi Tribe
Pascua Yaqui Tribe

State Agencies

Arizona Army National Guard
Arizona Department of Environmental Quality
Arizona Department of Public Safety
*Arizona Department of Transportation**
Arizona Game and Fish Department
Arizona State Land Department
California Department of Transportation
California Highway Patrol

Regional Agencies

Flood Control District of Maricopa County
*La Paz County**
*Maricopa Association of Governments**
*Maricopa County**
*Western Arizona Council of Governments**

Local

City of Avondale
City of Blythe
City of Goodyear
City of Litchfield Park
City of Phoenix
City of Tolleson
Ehrenberg
Tonopah
Town of Buckeye
Town of Quartzsite

Businesses

Chambers of commerce
Major employers
Phoenix International Raceway
Tourist and visitor information centers
Recreational vehicle and mobile home parks

Private Transportation Entities

Amtrak
Arizona and California Railroad
Arizona Trucking Association
Buckeye Municipal Airport
Burlington Northern Santa Fe Railroad
Northern Arizona Intergovernmental Public Transportation Authority
Phoenix Airport Authority (Phoenix Sky Harbor International Airport and Phoenix Goodyear Airport)
Union Pacific Railroad
Valley Metro/METRO

Other organizations

Arizona Public Service
Central Arizona Project
Colleges, schools, and school districts
Major hospitals and medical centers
Palo Verde Nuclear Generating Station
Salt River Project
Public

** members of the TAC*

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2. History of the I-10 Corridor

2.1 Construction

Initial planning for the Interstate System dates back to the late 1930s and early 1940s. The designation of routes began in 1947, but the commitment to build the roadways did not come until President Eisenhower signed the Federal-Aid Highway Act of 1956. The Act designated the Interstate System as "essential to the national interest" and provided the foundation for funding (Weingroff 2006).

The very first stretch of I-10 was built in Arizona. It included a bridge across the Colorado River and limited access approaches connecting the towns of Blythe, California, and Ehrenberg, Arizona. Prior to construction of the bridge, motorists crossed the Colorado River on a ferry (Dedera 1990).

Construction of I-10 continued from west to east through western Arizona. By 1970, approximately 80 miles of I-10 had been completed from Ehrenberg to the Salome Highway interchange. In the next 10 years, another 50 miles of I-10 was completed, stretching the Interstate into western Phoenix. It took another 10 years to complete the final section of I-10 between 91st Avenue and Central Avenue. This final section of I-10 represented not only the final section in Arizona, but also the final section of I-10 in the United States.

The planning for this final section of I-10 within the Phoenix urban area began as far back as 1960. At that time, I-10 was envisioned as an elevated freeway that would soar ten stories above Phoenix's Central Avenue and would include a "Helicoil" system traffic interchange with Interstate 17 (I-17). The freeway plans became increasingly controversial and contentious among members of the public and local, regional, and state agencies. Multiple public hearings and city referendum elections were held with regard to the I-10 freeway.

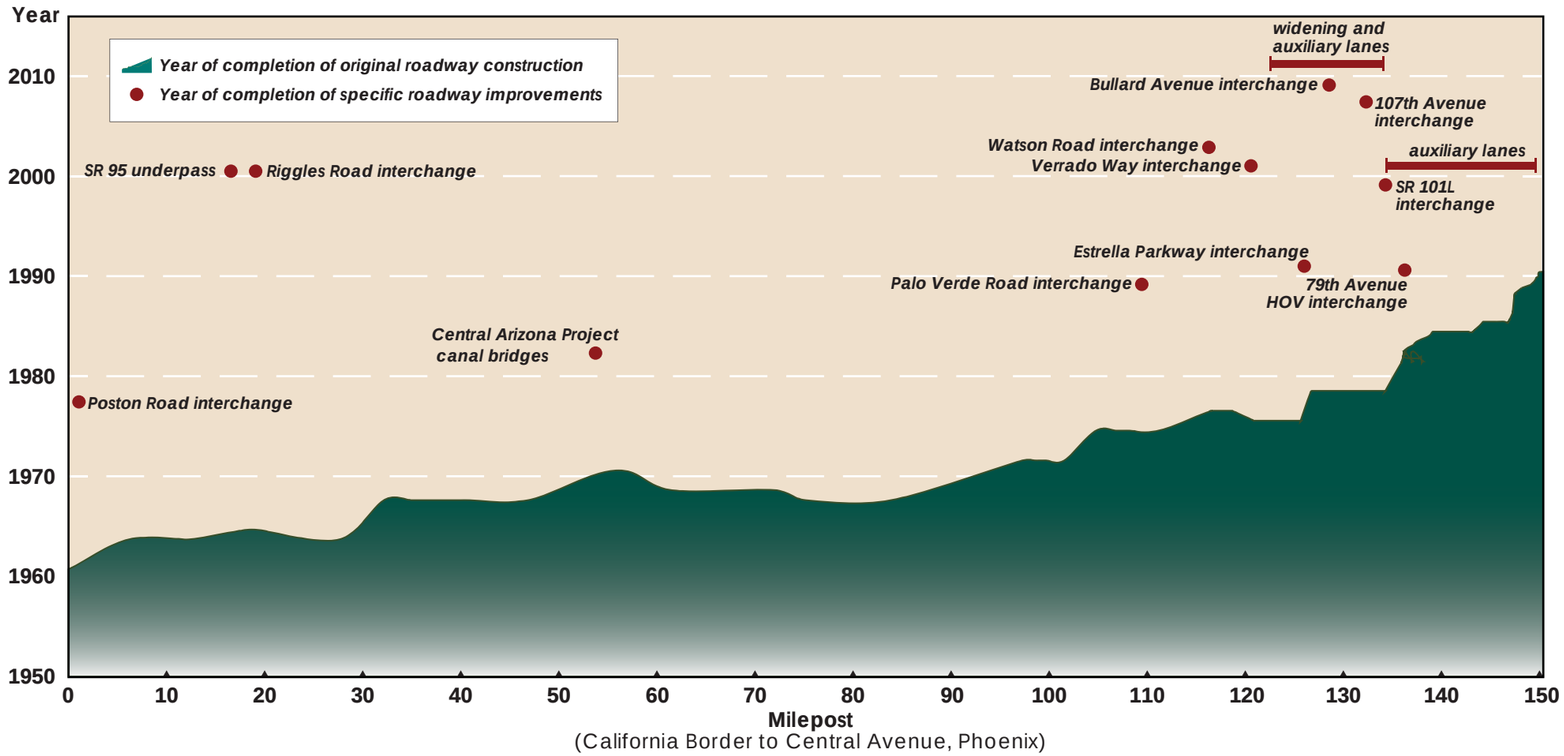
After 15 years of coordination and compromise, the MAG Regional Council adopted the recommended I-10 alignment and ADOT and FHWA finalized the environmental impact statement (EIS) for I-10 between 91st Avenue and downtown Phoenix. Construction continued through the 1980s. On August 10, 1990, ADOT opened the "missing link" of I-10—below ground through a tunnel topped by a long grassy strip called the Margaret T. Hance Park, which links the communities on either side of the highway (Dedera 1990).

An overview of construction activity along the I-10 Corridor is presented in Figure 2.1. A list of construction projects is provided in Appendix D. Since the primary roadway was completed, a number of projects have added traffic interchanges, grade separations (bridge overpasses or underpasses), and additional through and auxiliary lanes. New traffic interchanges were constructed at:

- Poston Road
- Riggles Road
- Palo Verde Road
- Watson Road
- Verrado Way
- Estrella Parkway
- Bullard Avenue
- 107th Avenue
- SR 101L
- 79th Avenue

New grade separations were added for SR 95 and for the Central Arizona Project canal. In response to increased traffic volumes, I-10 has been widened to add additional through lanes, high-occupancy vehicle (HOV) lanes, and auxiliary lanes between Verrado Way and downtown Phoenix.

Figure 2.1 | I-10 Corridor construction



2.2 Previous planning studies

A primary purpose of this study is to consolidate the numerous planning studies related to I-10 into a single document covering the I-10 Corridor. The study team reviewed over 60 previous and ongoing studies. Summaries of each document, organized by date of document completion, are provided in Appendix E. The following section groups these studies by general topic and provides a brief overview of the type of information provided and where in this document the information is presented.

Study themes

Environmental clearances and design concepts

Prior to final design and construction of projects, ADOT typically must complete an environmental clearance document that satisfies NEPA requirements and must produce a design concept report. These documents provide the most detailed environmental and engineering information. Completed studies include:

- *Interstate 10 Final Environmental Impact Statement* (ADOT 1978)
- *SR 85, Gila Bend to I-10, Final Environmental Assessment and Design Concept Report* (ADOT 2002)
- *Interstate 10 (Papago) Median Widening, Final Design Concept Report, SR 85 to SR 303L and SR 303L to SR 101L* (ADOT 2006)
- *Interstate 10 (Papago) Outside Widening, Final Design Concept Report, Sarival Avenue to SR 101L* (ADOT 2007)
- *Interstate 10 (Papago Freeway) Widening, SR 101L to Interstate 17, Initial Design Concept Report* (ADOT 2008)
- *SR 303L, I-10 to US 60, Environmental Assessment and Design Concept Report* (ADOT 2008)

Ongoing studies include:

- South Mountain Freeway Environmental Impact Statement and Location/Design Concept Report (ADOT)
- SR 30 Environmental Assessment and Location/Design Concept Report (ADOT)

These studies were primarily used to document environmental and engineering components of recent and upcoming construction projects in the metropolitan Phoenix area.

General plans

The I-10 Corridor passes through a number of local jurisdictions. Each jurisdiction regularly updates a general plan that documents its goals and objectives related to land use, growth and development, transportation, and recreation. I-10 factors greatly in almost all aspects of the following jurisdictions' general plans.

- City of Avondale (2002)
- City of Blythe (2007)
- Town of Buckeye (2008)
- City of Goodyear (2011)
- City of Phoenix (2002)
- Town of Quartzsite (2003)
- City of Tolleson (2005)

These plans identify jurisdiction's future land use plans and identify future road corridors and interchange locations.

Regional or area transportation plans

Regional agencies such as counties, MPOs, or ADOT regularly complete regional or area transportation studies to determine future needs. These studies typically assess existing and future conditions related to land use, socioeconomics, and transportation; identify alternatives (lane widening, new roads, new modes, etc.); and make recommendations for short-, mid-, and long-range improvements. Completed studies include:

- *Tonopah/Arlington Area Plan* (Maricopa County 2000)
- *Maricopa County 2020, Eye to the Future* (Maricopa County 2002)
- *Northwest Area Transportation Plan* (MAG 2003)
- *SR 85 Corridor Area Plan* (Maricopa County 2003)
- *Southwest Area Transportation Plan* (MAG 2003)
- *Regional Transportation Plan* (and updates) (MAG 2003)
- *ADOT Long-Range Transportation Plan – MoveAZ* (ADOT 2004)
- *Regional Freeway Bottleneck Study* (MAG 2006)
- *Interstate 10 – Hassayampa Valley Roadway Framework Study* (MAG 2007)
- *Statewide Transportation Framework Study – Western Arizona* (ADOT 2008)
- *Southern California Association of Governments (SCAG) Regional Transportation Plan* (SCAG 2008)
- *MAG and PAG External Travel Study* (MAG 2009)
- *I-8 and I-10/Hidden Valley Roadway Framework Study* (MAG 2009)
- *La Paz Transportation Planning Study* (ADOT 2010)
- *ADOT Statewide Transportation Planning Framework – "bqAZ"* (ADOT 2010)
- *Statewide Transportation System Needs Assessment* (California Transportation Commission 2011)
- *ADOT Long-Range Transportation Plan – "What Moves You Arizona?"* (ADOT 2011)

Ongoing studies include:

- Central Framework Study (MAG, Phoenix)
- California Interregional Blueprint (Caltrans 2012)

These studies were primarily used to identify future improvements including new lanes, new road corridors, and new interchange locations in the I-10 Corridor.

Multimodal studies

Agencies have placed increased emphasis on identifying alternative modes of travel to passenger cars. These studies evaluate potential improvements including HOV lanes, bus routes, commuter rail routes, bicycle and pedestrian routes, and airports. Completed studies include:

- *High Occupancy Lanes and Value Lanes Study* (ADOT 2002)
- *High-Capacity Transit Study* (MAG 2003)
- *Statewide Bicycle and Pedestrian Plan* (ADOT 2003)
- *HOV Lanes – Issues and Options for Enforcement* (ADOT 2004)

- *Maricopa County Regional Trail System Plan* (Maricopa County 2004)
- *Arizona State Airports System Plan* (ADOT 2008)
- *Buckeye Municipal Airport Master Plan* (Buckeye 2007)
- *Glendale Municipal Airport Master Plan* (Glendale 2009)
- *Park-and-Ride Reprioritization Study* (Regional Public Transit Authority [RPTA] 2008)
- *Arizona Rural Transit Needs Study* (ADOT 2008)
- *Comprehensive Arterial Bus Rapid Transit Planning Study* (RPTA 2009)
- *Pedestrian Safety Action Plan* (ADOT 2009)
- *MAG Regional Transit Framework Study* (MAG 2010)
- *Commuter Rail System Study* (MAG 2010)
- *RPTA Short Range Transit Plan* (RPTA 2011)
- *Bicycle Safety Action Plan* (ADOT 2012)

Ongoing studies include:

- Statewide Bicycle and Pedestrian Plan Update (ADOT)
- METRO Phoenix West Alternatives Analysis (RPTA)
- Freeway Express Bus BRT Operating Plan (RPTA)

These studies were primarily used to identify existing and planned multimodal facilities in the I-10 Corridor.

Truck or freight studies

Truck traffic and the movement of freight is a major consideration along the I-10 Corridor, which is an important route to support the movement of goods within Arizona and the United States as a whole. Completed studies include:

- *I-10 National Freight Study* (Texas Department of Transportation 2003)
- *Regional Freight Assessment* (MAG 2004)
- *Internal Truck Travel Survey and Truck Model Development Study* (MAG 2007)
- *Arizona Multimodal Freight Analysis Study* (ADOT 2007)

Ongoing studies include:

- Freight Transportation Framework Study (MAG)

These studies were used to document the existing and future levels of freight movement by truck, rail, and air within the I-10 Corridor, Maricopa County, and Arizona.

Corridor studies

Corridor studies typically follow regional or area transportation studies and precede environmental clearance and design concept development. Typically, the studies evaluate alternatives and identify a preferred alignment that can be protected for future construction. Completed studies include:

- CANAMEX Corridor Study
- *Interstate 10 West, Corridor Profile Study* (ADOT 2005)
- *I-10 Integrated Corridor Management System* (ICMS) (MAG 2007)
- *Hidden Waters Parkway Corridor Feasibility Study* (Maricopa County Department of Transportation [MCDOT] 2010)
- *Turner Parkway Feasibility Study* (MCDOT 2010)
- *McDowell Parkway Corridor Feasibility Study* (MCDOT 2010)
- *Northern Parkway/Tonopah Parkway Corridor Feasibility Study* (MCDOT 2011)
- *Hidden Waters Parkway North Corridor Feasibility Study* (MCDOT 2012)
- Northwest Parkway (Hassayampa Section) Corridor Feasibility Study (MCDOT 2012)
- Yuma Parkway Corridor Feasibility Study (MCDOT 2012)

These studies provide a greater level of detail than regional studies and were primarily used to document future road corridors that would intersect I-10.

Transportation improvement programs

ADOT—as well as counties, MPOs, and COGs—annually publish a 5-year construction program. This program contains fiscally constrained transportation projects, by year. The versions of these documents used in this study to document planned improvements include:

- MAG Transportation Improvement Program (TIP), Fiscal Years 2011–2015
- MCDOT TIP, Fiscal Years 2011–2015
- ADOT State TIP (STIP), Fiscal Years 2011–2014
- WACOG Region Transportation Improvement Program, Fiscal Years 2012–2016

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3. Preservation

This section discusses the major capital investments that influence vehicular travel along I-10 between the California border and central Phoenix. It begins with an overview of the road network in the study area and then describes in detail the major elements that make up I-10.

The I-10 Corridor's future performance depends on the balance between preserving existing facilities and expanding the capacity and capabilities within the corridor. For each element, the existing conditions, future programmed (funded) and planned (unfunded) conditions, and any deficiencies or needs were identified. The deficiencies were based on the preservation of the element and were identified by comparing the existing conditions with criteria found in the ADOT Roadway Design Guidelines. Deficiencies related to capacity are described in subsequent sections of the report.

3.1 Road network

The network of roads, highways, and freeways that cross I-10 or run parallel to I-10 complement the overall multimodal characteristics of the I-10 Corridor. These roads encompass a wide range of classifications and serve diverse purposes. The following sections describe the existing and future network of roads in the I-10 Corridor.

Existing conditions

The existing road network is presented in Figure 3.1 and is described, by county, in the following sections.

La Paz County

Most roads that cross I-10 in La Paz County serve local traffic in Ehrenberg and Quartzsite. A few roads and interchanges away from the towns provide access to remote mining or recreational facilities. Major roads that serve regional traffic include:

- Ehrenberg-Parker Highway (Mohave Road) is the major road in Ehrenberg and connects to communities along the Colorado River including Parker, approximately 40 miles to the north.
- US 95 begins at the Mexican border in San Luis, Arizona, crosses Interstate 8 (I-8) in Yuma, Arizona, and continues north to I-10 at Quartzsite. In Quartzsite, US 95 continues along I-10 west into California and then continues north to Las Vegas, Nevada.
- SR 95 begins in Quartzsite as an extension of US 95 and continues north through Parker, Lake Havasu, and Bullhead City.
- US 60 begins at I-10 and continues northeast through Vicksburg and Wickenburg. A number of unincorporated towns (mainly mobile home parks or recreation vehicle parks) are located along US 60 between I-10 and Vicksburg.
- Vicksburg Road begins at I-10 and extends north to Vicksburg. There are trucking-related services at the I-10 interchange and large agricultural and dairy farms north of I-10. Vicksburg Road ends in the town of Vicksburg, where it connects to US 60 (to Wickenburg) and SR 72 (to Parker and Lake Havasu).

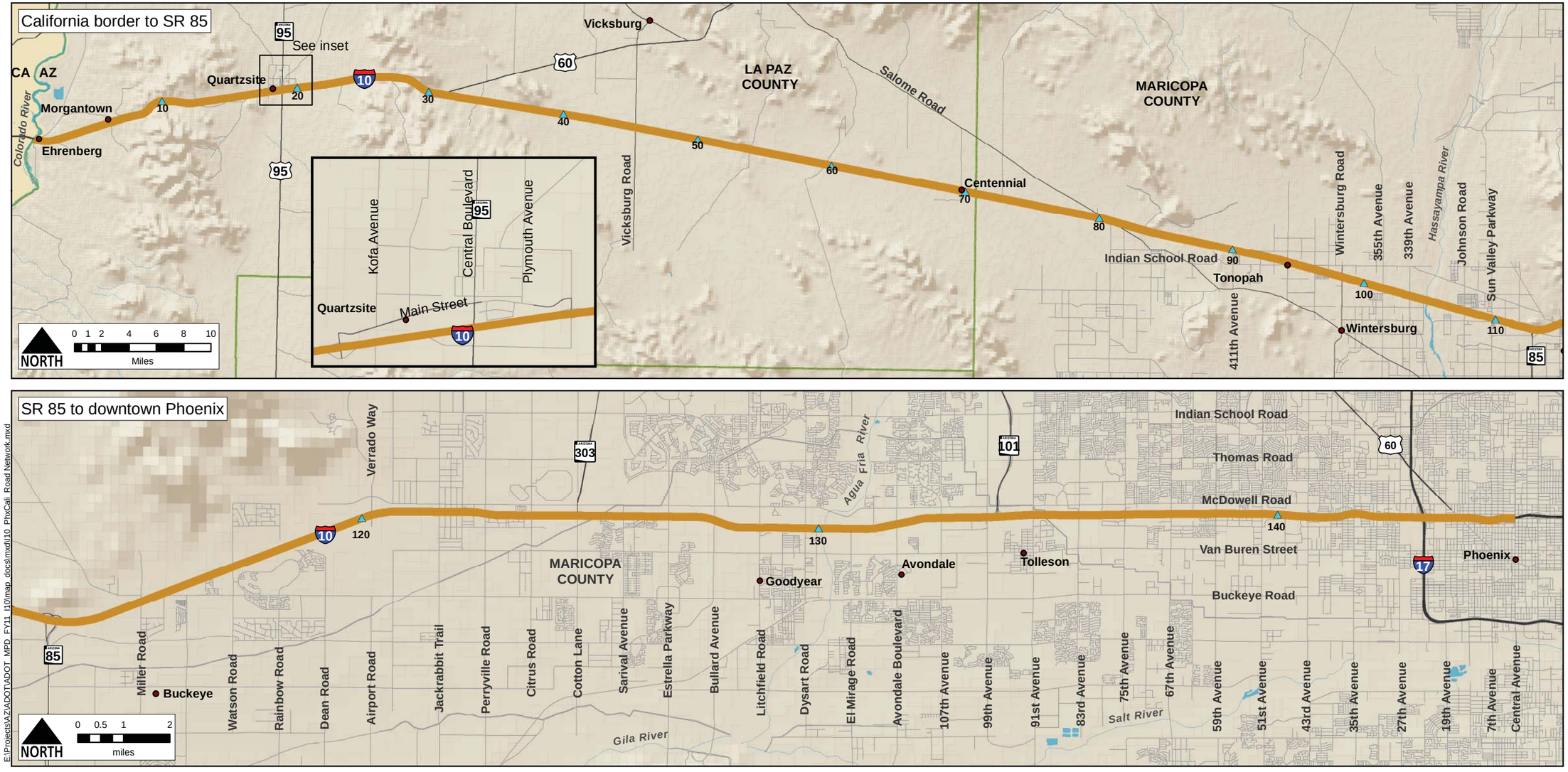
Maricopa County

Beginning in the west, the first road to cross I-10 in Maricopa County is Salome Highway, which runs in a northwestern to southeastern direction and connects a number of small communities. At 411th Avenue in Tonopah, the adjacent road network begins to resemble the north–south and east–west arterial street grid system of the Phoenix metropolitan area. Between 411th Avenue and SR 85, the network is less dense, with greater than 1-mile spacing. East of SR 85 into downtown Phoenix, the arterial street grid has 1-mile spacing.

The primary regional facilities that connect to I-10 or run parallel to I-10 include:

- Sun Valley Parkway is a four-lane road that begins at I-10 approximately 2 miles west of SR 85 and continues north approximately 13 miles before turning east around the White Tank Mountains. The parkway was constructed by private interests to serve proposed residential developments. Palo Verde Road extends south of I-10 on the same alignment.
- SR 85 begins at the Mexican border in Lukeville, Arizona, crosses I-8 in Gila Bend, and ends at I-10 in Buckeye. The segment between the Gila River and I-10 was recently widened to two lanes in each direction. The road is designated as a truck bypass for the Phoenix metropolitan area (I-10 to SR 85 to I-8 to I-10).
- Maricopa County Route 85 is a major road that parallels I-10 approximately 3 miles to the south beginning at Turner Road. The route is one of the only continuous east–west roads south of I-10 and continues east until transitioning into Buckeye Road in Phoenix.
- SR 303L (or Loop 303) is currently under construction. The ultimate facility will include a fully access-controlled six-lane freeway. The freeway will begin at I-10 and Cotton Lane, continue north to US 60/Grand Avenue, and curve east and connect to I-17. Much of the freeway between US 60 and I-17 is complete or well underway. Construction of Loop 303 between I-10 and US 60 began in early 2012. Loop 303 is also planned to be extended south of I-10 and connect with other future facilities.
- SR 101L (or Loop 101, Agua Fria Freeway) is a fully access-controlled six-lane freeway that begins at I-10 near 99th Avenue and continues north for 13 miles before curving east and continuing to loop around the Phoenix metropolitan area.
- I-17 is a fully access-controlled eight-lane freeway (three general purpose lanes and one HOV lane in each direction). I-17 begins at I-10, southeast of downtown Phoenix, continues west looping south around downtown Phoenix before curving north at approximately 19th Avenue. The system traffic interchange with I-10 is locally referred to as "the stack." I-17 continues north, connecting the Phoenix metropolitan area with northern Arizona communities including Prescott, Sedona, and Flagstaff.

Figure 3.1 | Existing road network

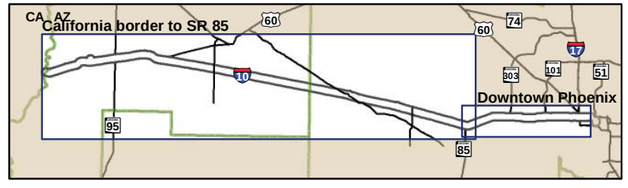


City
Milepost
Project location*
Stream
Lake
County boundary

*Study area extends 1 mile north and south of I-10

Source: ADOT

Date: 2/7/2012



ADOT

Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

- US 60/Grand Avenue is a high-capacity arterial street that enters the northwestern metropolitan area and runs to the southeast into downtown Phoenix where it crosses I-10 at approximately 17th Avenue. US 60 provides local access to the cities of Glendale, Peoria, and Surprise while connecting the Phoenix metropolitan area with Wickenburg and on a more regional scale, Las Vegas, Nevada.

Future conditions

Local, regional, county, and state agencies have identified the need for new major transportation facilities as well as the widening of existing facilities to satisfy future travel demand. This section describes proposed enhancements to the existing road network.

La Paz County

The most recent transportation planning study for La Paz County that included recommendations for future transportation improvements was the *La Paz Transportation Planning Study* (ADOT 2010). The major road network improvements identified in the study include:

- reconstructing major roadways such as the Ehrenberg-Parker Highway, US 60, and Vicksburg Road with wider shoulders, additional through lanes or new passing lanes, and improved drainage facilities
- widening US 95/SR 95 north and south of Quartzsite
- reconstructing all I-10 traffic interchanges to latest standards and signalizing ramp intersections as warranted
- paving roads such as Avenue 75E, which services the unincorporated town of Centennial, near I-10

These proposed projects are not currently included in the WACOG or ADOT construction programs.

Maricopa County

The *Regional Transportation Plan* (RTP), adopted by MAG in 2003 and funded by a voter-approved 1/2-cent sales tax in 2004, provides the blueprint for future transportation improvements in Maricopa County between 2006 and 2026. The RTP includes multimodal improvements throughout the county. The completed and programmed improvements to I-10 are discussed in the following sections. Improvements programmed for adjacent facilities are shown in Figure 3.2 and described below:

- SR 303L is proposed to be extended south of I-10 for approximately 5 miles to a connection with a proposed new freeway, SR 30.
- SR 30 (referred to as the I-10 Reliever) is a proposed new freeway that would parallel I-10 approximately 4 miles to the south between SR 303L and SR 202L (Loop 202, South Mountain Freeway).
- SR 202L is a proposed new freeway that would connect to I-10 at approximately 59th Avenue and continue south and east around the South Mountains connecting back to I-10 at milepost 167. The South Mountain Freeway (as well as its combination with SR 30 and SR 303L) would provide an alternate route to I-10 through downtown Phoenix for travelers going from the east to the west parts of the Phoenix metropolitan area.
- SR 101L will be widened to include an additional general purpose lane and a new HOV lane in each direction. The ultimate configuration would include four general purpose lanes and an HOV lane in each direction. Also, direct HOV ramps will be constructed to connect SR 101L and I-10 in the west-to-north and south-to-east directions.
- I-17 will be improved to provide additional capacity through the Phoenix metropolitan area. ADOT is currently evaluating potential options for the I-17 corridor.

These projects are in different stages of the environmental clearance, design, and construction processes. The ADOT Valley Project Management group oversees these projects.

In 2007, MAG completed the long-range *Interstate 10 – Hassayampa Valley Roadway Framework Study* (Framework Study) to initiate the transportation planning process west of the Phoenix metropolitan area between Tonopah and SR 303L. This area is expected to experience significant growth in the next 40 years.

The Framework Study's main objectives were to identify future traffic interchange locations along I-10 and to develop a conceptual network of roads (varying from arterial streets to freeways). A major outcome of this study was the introduction of a new type of road facility, termed an "Arizona Parkway." The Arizona Parkway adds traffic-carrying capacity by eliminating left-turn movements at intersections and by accommodating those left turns at U-turn breaks in the median on the departure side of intersections. This parkway configuration is expected to provide greater capacity (up to 100,000 vehicles per day), less delay, and less potential for collisions than a typical urban arterial street. The conceptual network of new freeways and Arizona Parkways is presented in Figure 3.2. The planned freeways include:

- The new Hassayampa Freeway, currently being considered as Interstate 11 and part of the CANAMEX Corridor, would run north–south and cross I-10 near milepost 100.
- SR 85 would be upgraded to a fully access-controlled freeway south of I-10 to at least the Gila River.
- SR 30 would be extended west from SR 303L, connecting to SR 85 and ultimately ending at the Hassayampa Freeway.
- SR 303L would be extended south from SR 30 to serve the area south of the Gila River.

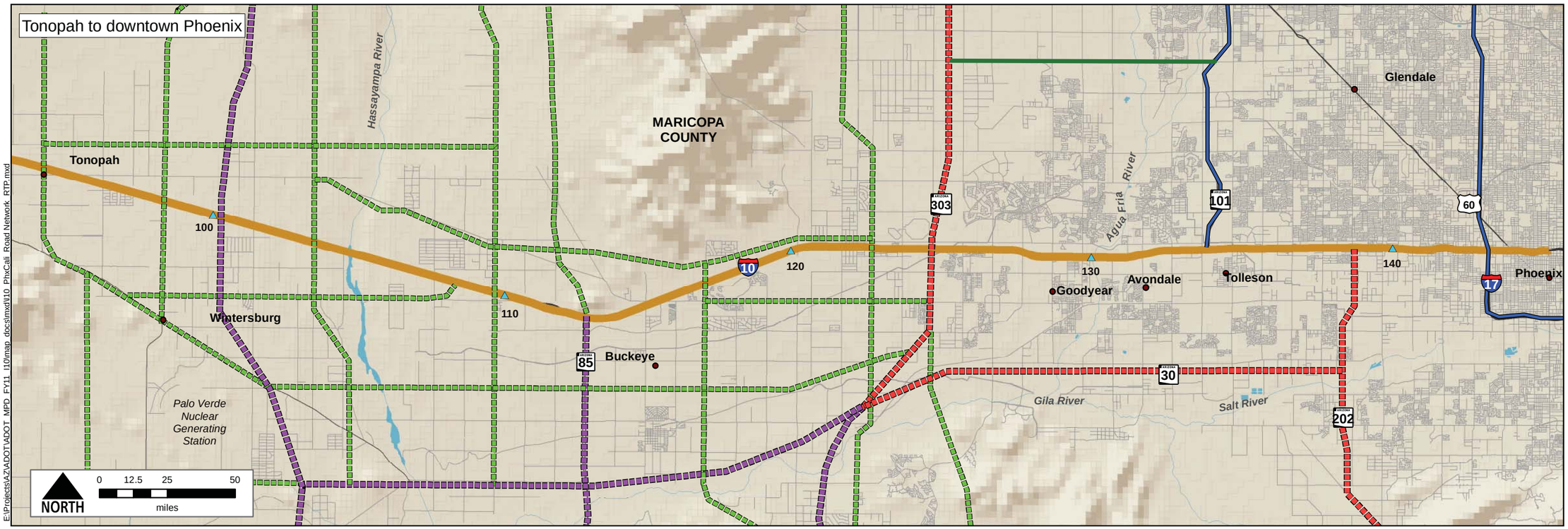
MCDOT has taken the lead in conducting studies to identify preferred alignments for the Arizona Parkways. As with all projects in the Framework Study, no construction funding has been identified.

3.2 Interstate 10

As the heaviest-travelled Interstate facility in Arizona, substantial investments have been made in the I-10 Corridor. This section describes, in detail, the I-10 Corridor elements, including:

- right-of-way
- travel lanes
- shoulders
- pavement

Figure 3.2 | Future road network, MAG region



*Study area extends 1 mile north and south of I-10

Source: ADOT, MAG 2007, MAG 2010

- median
- side slopes
- bridges
- drainage structures and facilities
- walls
- tunnels
- interchanges
- ITS
- other supporting ADOT facilities such as rest areas, maintenance yards, and field offices

Right-of-way

Right-of-way is defined as the permanent land area used for the construction and operation of I-10. The right-of-way includes all of the I-10 cross-sectional elements including medians, traffic lanes, shoulders, slopes, walls, ramps, lighting, signals, drainage, and other essential parts of the facility. Fencing is provided along the right-of-way boundary to delineate the right-of-way limits and to impede unauthorized access. The land on which I-10 has been constructed represents a major investment of resources.

The ADOT Right-of-Way Group provides a full range of services to support the state highway system. Individual sections are responsible for activities associated with plans, surveys, and legal descriptions; right-of-way project coordination, property valuation, and appraisal review; property management; acquisitions and relocations; and property disposals, condemnation coordination, and preparation of Arizona State Transportation Board resolutions.

Existing conditions

Historic right-of-way plans were obtained from the ADOT Plans Section and were reviewed to determine the width of land available along the corridor. In general, the minimum right-of-way width is 300 feet. Wider sections are provided for areas with interchanges and drainage facilities. A table presenting the right-of-way plans and related information is in Appendix F.

Deficiencies

There are no known right-of-way deficiencies. As future improvements are evaluated, the existing right-of-way should be identified from available plans. New right-of-way requirements should be coordinated with the appropriate section of the ADOT Right-of-Way Group.

Travel lanes

I-10 was originally constructed with two travel lanes in each direction separated by a wide open median west of Dysart Road and with three general purpose lanes and an HOV lane in each direction east of Dysart Road into downtown Phoenix. As traffic increased in urban areas, sections of I-10 were widened to meet the demand.

Figure 3.3 depicts typical cross sections for I-10. Depending on the adjacent environment, other elements such as traffic barriers, walls, lights, signs, signals, and drainage facilities may also be present. The conditions of all of these elements should be monitored to ensure safe and efficient operations along the roadway.

The roadway characteristics data were primarily derived from the Highway Performance Monitoring System (see sidebar on this page for more information). To verify the monitoring system data and to incorporate any recent changes, the study team also reviewed as-built plans, aerial photography, and the ADOT Highway Video Log.

Existing conditions

The number of through lanes along I-10 are summarized in Table 3.1 and are shown in Figure 3.4.

La Paz County

I-10 has two travel lanes in each direction between the California border and the La Paz County line. Adjacent to some on- and off-ramps, acceleration or deceleration lanes allow traffic to merge into or diverge from traffic safely and efficiently.

Maricopa County

I-10 has two travel lanes in each direction between the La Paz County line and Verrado Way, three travel lanes in each direction between Verrado Way and Estrella Parkway, and four travel lanes in each direction east of Estrella Parkway to downtown Phoenix. In the area with four lanes in each direction, there are short segments with three or five travel lanes. These are generally located near the system traffic interchanges (at SR 101L and I-17) and are provided to allow traffic travel to and from the crossing facility with minimal conflicts. The lanes presented in Table 3.1 represent the basic number of continuous lanes that are used by vehicles passing through the corridor.

In addition to the general purpose lanes, HOV lanes are provided in the urban area between Cotton Lane (SR 303L) and downtown Phoenix. These lanes are used for transit and carpooling. In sections of I-10 with more than two lanes in each direction, auxiliary lanes are provided between successive on- and off-ramps with spacing of 1 mile or less.

Future conditions

La Paz County

There are no programmed or planned projects to add lanes to I-10 in La Paz County.

Maricopa County

Three areas of I-10 between SR 85 and downtown Phoenix have construction projects programmed in the RTP (see Figure 3.4). In chronological order, based on the latest update to the RTP, these would include:

- Construction of the I-10 and SR 303L system traffic interchange began in late 2011 and will continue through 2014. The system traffic interchange will replace the existing Cotton Lane interchange (see *Traffic interchanges*, on page 3-14, for more information). Additional lanes for the directional ramps will be constructed along I-10 for 2 to 3 miles on each side of SR 303L.
- Planning and preliminary design of the I-10 and SR 202L (South Mountain Freeway) system traffic interchange is ongoing. If approved, construction could begin as early as 2014. The new freeway corridor would connect to I-10 at approximately 59th Avenue. The connection would include reconstruction of adjacent interchanges as well as construction of additional lanes along I-10 for the directional ramps.

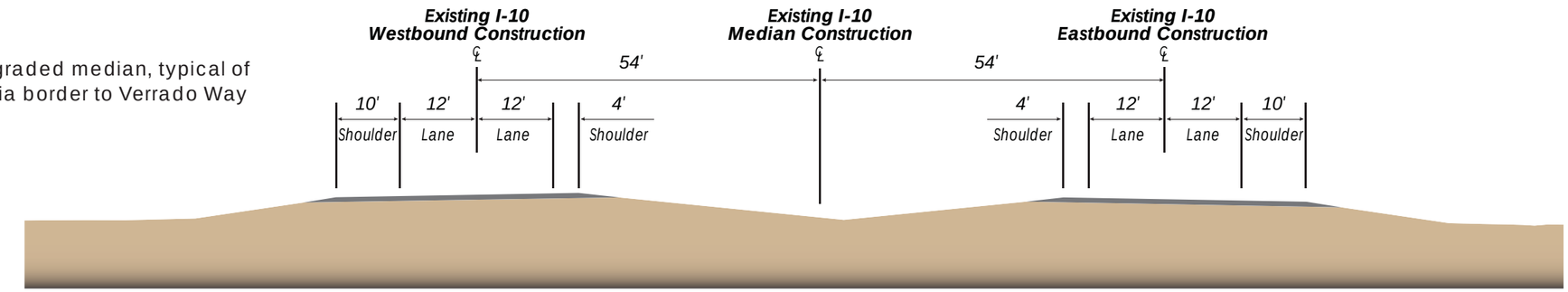
Highway Performance Monitoring System

The ADOT Data Section administers the HPMS, America's national database of highway information, as mandated by FHWA. Roadway extent, use, condition and performance data are collected annually and are submitted to FHWA to provide Congress with a policy tool for major highway legislation and funding decisions.

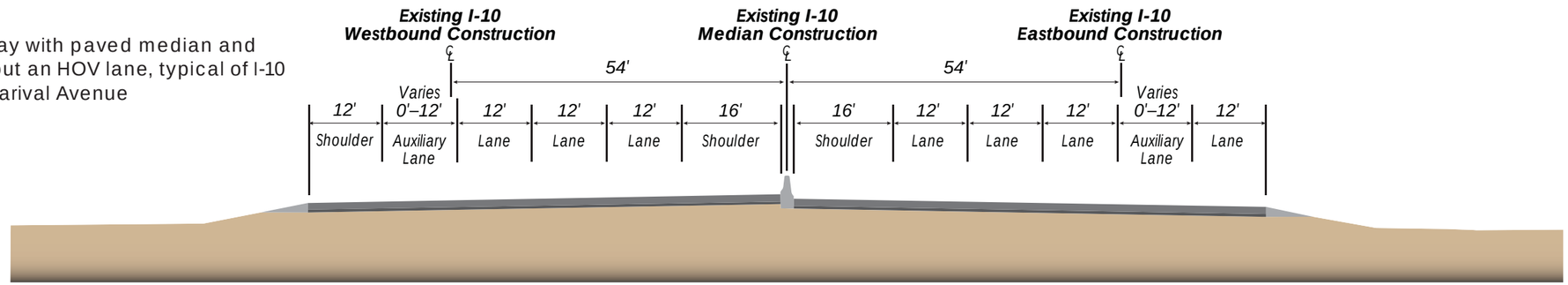
In addition to being an important source of information for indicators of performance on a national basis, Arizona's HPMS program also considers local community transportation system condition and performance as critical knowledge for assisting in transportation planning decisions at the state and local government levels. The HPMS data are collected, reviewed, and disseminated using GIS.

Figure 3.3 | I-10 typical cross sections

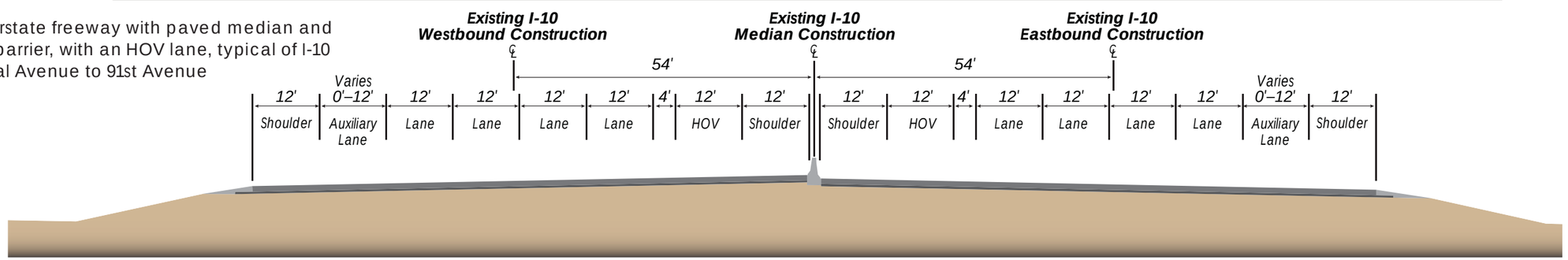
Rural Interstate with graded median, typical of I-10 from the California border to Verrado Way



Urban Interstate freeway with paved median and concrete barrier, without an HOV lane, typical of I-10 from Verrado Way to Sarival Avenue



Urban Interstate freeway with paved median and concrete barrier, with an HOV lane, typical of I-10 from Sarival Avenue to 91st Avenue



Urban Interstate freeway with graded median with an HOV lane, typical of I-10 from 91st Avenue to Central Avenue

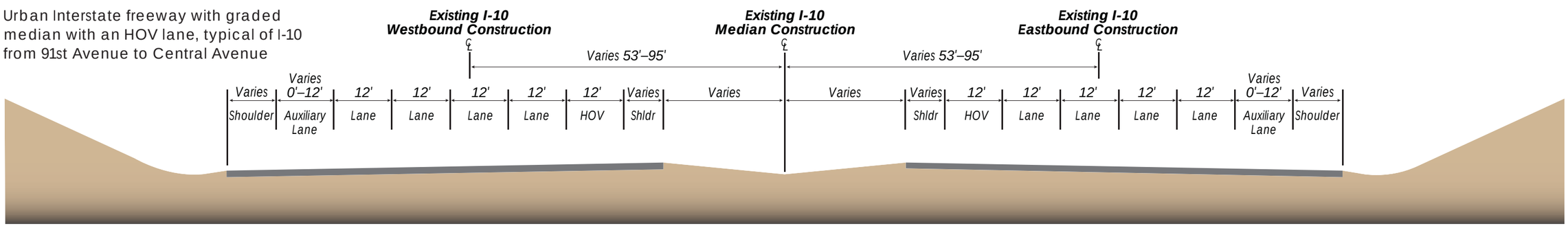
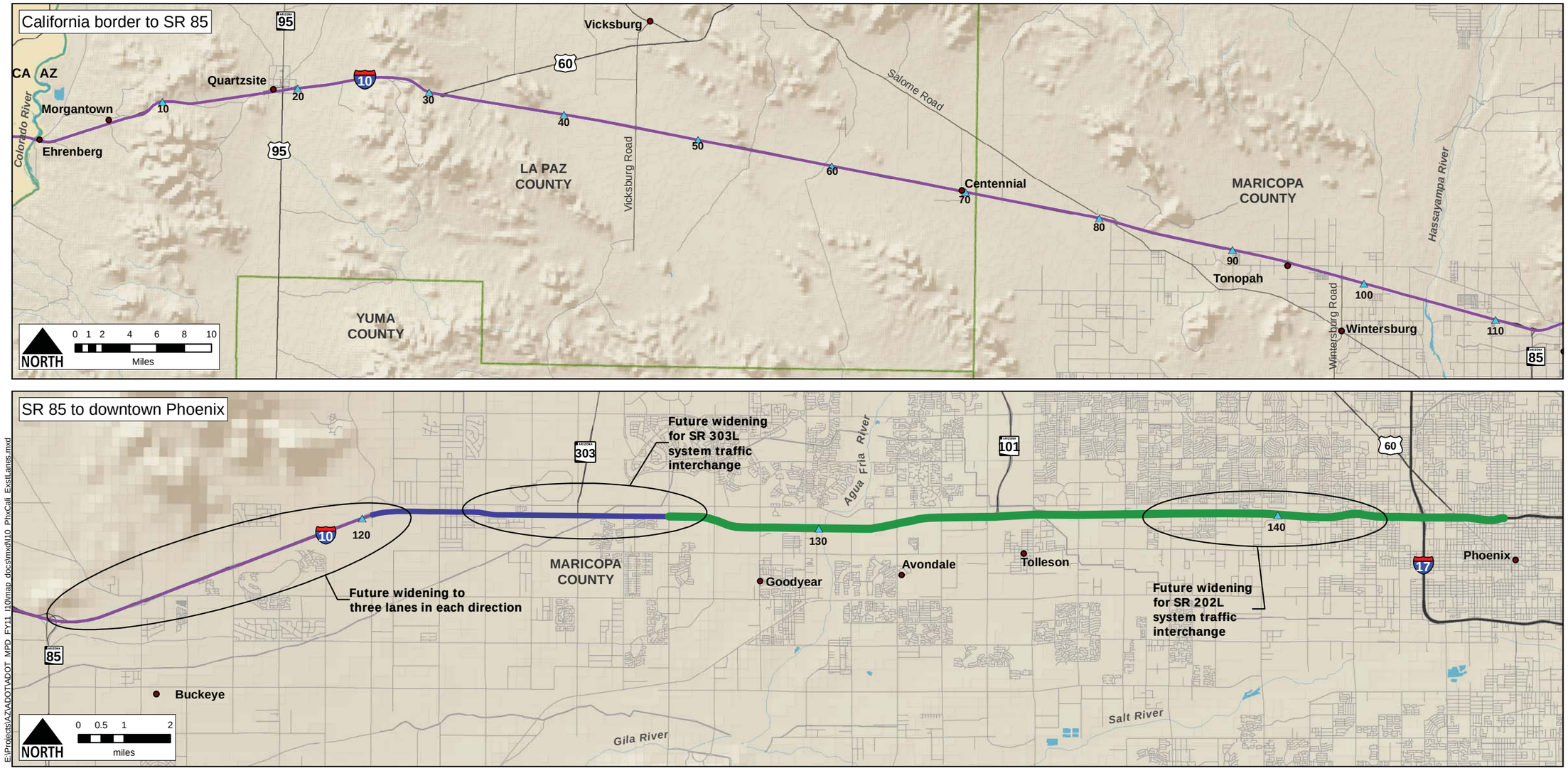


Table 3.1 | I-10 lanes and shoulders by segment

Begin milepost	Start	End milepost	End	Length (miles)	Number of through lanes		Total through lanes	Minimum through lane width (feet)	HOV lanes (eastbound + westbound)	Inside shoulder width (feet)		Outside shoulder width (feet)	
					eastbound	westbound				eastbound	westbound	eastbound	westbound
0.00	California State Line	0.71	Ehrenberg - Parker Highway	0.71	2	2	4	12	0	10	10	12	12
0.71	Ehrenberg - Parker Highway	5.85	Tom Wells Road	5.14	2	2	4	12	0	4	4	10	10
5.85	Tom Wells Road	11.93	Dome Rock Road	6.08	2	2	4	12	0	4	4	10	10
11.93	Dome Rock Road	17.49	West end of Quartzsite	5.56	2	2	4	12	0	4	3	10	9
17.49	West end of Quartzsite	19.80	East end of Quartzsite	2.31	2	2	4	12	0	4	3	10	9
19.80	East end of Quartzsite	26.66	Gold Nugget Road	6.86	2	2	4	12	0	4	4	10	10
26.66	Gold Nugget Road	31.17	US 60	4.51	2	2	4	12	0	4	4	10	10
31.17	US 60	45.37	Vicksburg Road	14.20	2	2	4	12	0	4	4	10	10
45.37	Vicksburg Road	53.98	Hovatter Road	8.61	2	2	4	12	0	4	4	10	10
53.98	Hovatter Road	69.66	Avenue 75 E	15.68	2	2	4	12	0	4	4	10	10
69.66	Avenue 75 E	81.24	Salome Highway	11.58	2	2	4	12	0	3.5	3.5	9.5	10
81.24	Salome Highway	94.17	411th Avenue - Tonopah	12.93	2	2	4	12	0	3.5	3.5	9.5	10
94.17	411th Avenue - Tonopah	98.30	Wintersburg Road	4.13	2	2	4	12	0	4	4	10	10
98.30	Wintersburg Road	103.45	339th Avenue	5.15	2	2	4	12	0	4	4	10	10
103.45	339th Avenue	109.68	Palo Verde Road	6.23	2	2	4	12	0	4	4	10	10
109.68	Palo Verde Road	112.74	SR 85	3.06	2	2	4	12	0	4	4	10	10
112.74	SR 85	114.86	Miller Road	2.12	2	2	4	12	0	4	4	10	10
114.86	Miller Road	117.00	Watson Road	2.14	2	2	4	12	0	4	4	10	10
117.00	Watson Road	120.20	Verrado Way	3.20	2	2	4	12	0	4	4	9	10
120.20	Verrado Way	121.70	Jackrabbit Trail	1.50	3	3	6	12	0	16	16	12	12
121.70	Jackrabbit Trail	124.71	SR 303 / Cotton Lane	3.01	3	3	6	12	0	16	16	12	12
124.71	SR 303 / Cotton Lane	126.69	Estrella Parkway	2.00	3	3	6	12	0	4	4	10	10
126.69	Estrella Parkway	127.69	Bullard Avenue	1.00	4	4	8	12	2	12	12	12	12
127.69	Bullard Avenue	128.71	Litchfield Road	1.02	4	4	8	12	2	12	12	12	12
128.71	Litchfield Road	129.70	Dysart Road	0.99	4	4	8	12	2	12	12	12	12
129.70	Dysart Road	131.70	Avondale Boulevard	2.00	4	4	8	12	2	12	12	12	12
131.70	Avondale Boulevard	133.69	99th Avenue	1.99	4	4	8	12	2	12	12	12	12
133.69	99th Avenue	134.68	91st Avenue	0.99	4	4	8	12	2	8	8	10	10
134.68	91st Avenue	135.66	83rd Avenue	0.98	4	4	8	12	2	10	10	10	10
135.66	83rd Avenue	136.16	79th Avenue (HOV)	0.50	4	4	8	12	2	10	10	10	10
136.16	79th Avenue (HOV)	136.69	75th Avenue	0.53	4	4	8	12	2	10	10	10	10
136.69	75th Avenue	137.68	67th Avenue	0.99	4	4	8	12	2	10	10	10	10
137.68	67th Avenue	138.66	59th Avenue	0.98	4	4	8	12	2	10	10	10	10
138.66	59th Avenue	139.65	51st Avenue	0.99	4	4	8	12	2	8	8	10	10
139.65	51st Avenue	140.65	43rd Avenue	1.00	4	4	8	11	2	8	8	10	10
140.65	43rd Avenue	141.66	35th Avenue	1.01	4	4	8	11	2	8	8	10	10
141.66	35th Avenue	142.66	27th Avenue	1.00	4	4	8	11	2	8	8	10	10
142.66	27th Avenue	143.18	I-17	0.52	4	4	8	11	2	8	8	10	10
143.18	I-17	143.66	7th Avenue	1.48	4	4	8	12	2	8	8	10	10
144.66	7th Avenue	145.66	Central Avenue	1.00	4	4	8	12	2	12	12	10	10

Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties

Figure 3.4 | Existing lanes

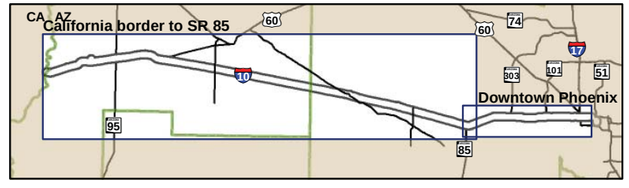


City
Milepost
Stream
Lake
County boundary

Existing Lanes
4
6
8

Note: Future widening identified in the map are programmed projects funded by the Regional Transportation Plan.

Date: 6/20/2012



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- Construction of a third lane in each direction between SR 85 and Verrado Way is programmed in the RTP for the time period between 2026 and 2030.

The RTP also included capacity enhancements (additional lanes) for I-10 between SR 101L and I-17; however, planning for these improvements has been put on hold because of funding limitations.

The *Interstate 10 – Hassayampa Valley Roadway Framework Study* identified needs for additional lanes along I-10 west of SR 303L beyond those funded in the RTP. In general, I-10 would need to be widened to five lanes in each direction from SR 303L to the Maricopa County line.

Deficiencies

Deficiencies related to capacity are addressed in Section 5.1, *Vehicular traffic flow*, on page 5-1. With respect to lane widths, the ADOT Roadway Design Guidelines expressly state that:

> *The width of all traffic lanes including through lanes, auxiliary lanes between interchanges, HOV lanes, ramp and frontage road lanes, left-turn and right-turn lanes shall be 12 feet except at urban intersections where right-of-way restrictions and existing roadway conditions govern. (Section 301.3)*

Based on this criteria, the only deficiencies are located on the urban section of I-10 between SR 101L and I-17. In this area, some 11-foot and 11.5-foot lanes are used because of physical constraints. Any planned improvements in this area should account for widening these lanes to the desirable 12-foot width.

Shoulders

The paved shoulders along I-10 provide refuge for stalled or distressed vehicles as well as for police enforcement.

Existing conditions

The existing shoulder widths are summarized in Table 3.1.

Deficiencies

The guidelines for minimum paved shoulder widths along a facility such as I-10 are presented in Table 3.2. Based on this criterion, a number of sections of I-10 do not meet the current standard for paved shoulder widths. Any planned improvements in these areas should account for widening the paved shoulders to the minimum or desirable widths.

Table 3.2 | Paved shoulder widths for controlled-access highways

	Minimum paved shoulder width in direction of travel (feet)	
Number of lanes	Left	Right
4	4	10
6 or more	10[a]	10[a]

Source: ADOT 2007

[a]12 feet desirable with truck traffic greater than 250 vehicles per hour

Pavement

The pavement or structural materials that make up the travel lanes and shoulders represent one of the most important elements of I-10—the conditions of which are evaluated daily by hundreds of thousands of motorists. ADOT's mission with regard to pavement is to enhance the state's investment in its highways by providing high-quality, durable pavements.

The ADOT Materials Group provides a full range of geotechnical, design, management, and testing services to support the state highway system. ADOT's Pavement Management Section maintains a database of pavement conditions as part of the Highway Performance Monitoring System.

Existing conditions

The I-10 travel lanes and shoulders consist of either flexible, asphaltic concrete or rigid, Portland cement concrete pavement. In general, asphaltic concrete is used in the rural areas and Portland cement concrete pavement is used in urban areas where overall traffic and truck traffic volumes are higher.

Deficiencies

Pavement condition ratings are derived from one of two measures: International Roughness Index (IRI) and the Present Serviceability Rating (PSR). The IRI measures the cumulative deviation from a smooth surface in inches per mile. The PSR is a subjective rating system based on a scale of 1 to 5. Table 3.3 presents the relationship between the two rating measures and the more general descriptions, from "very good" to "poor." FHWA defines an acceptable ride quality as any IRI rating of 170 or less.

Table 3.3 | Interstate pavement ratings

Category	Present Serviceability Rating	International Roughness Index (inches/mile)
Very good	≥ 4	< 60
Good	3.5 to 3.9	60 to 94
Fair	3.1 to 3.4	95 to 119
Mediocre	2.6 to 3.0	120 to 170
Poor	≤ 2.5	> 170

Source: FHWA 2007

The I-10 pavement conditions, based on the IRI rating, are shown in Figure 3.5. No segments of I-10 receive poor ratings. Segments of fair or mediocre pavement were found in the area between mileposts 130 and 137 (from the Agua Fria River to just east of SR 101L, but the mediocre- and fair-rated pavement was replaced during the recent I-10 median and outside widening projects) and between mileposts 143 and 145 (from I-17 to downtown Phoenix).

As portions of I-10 transition from rural to urban conditions, it will be important to replace the existing asphaltic concrete pavement with Portland cement concrete pavement to handle future traffic volumes.

Barriers

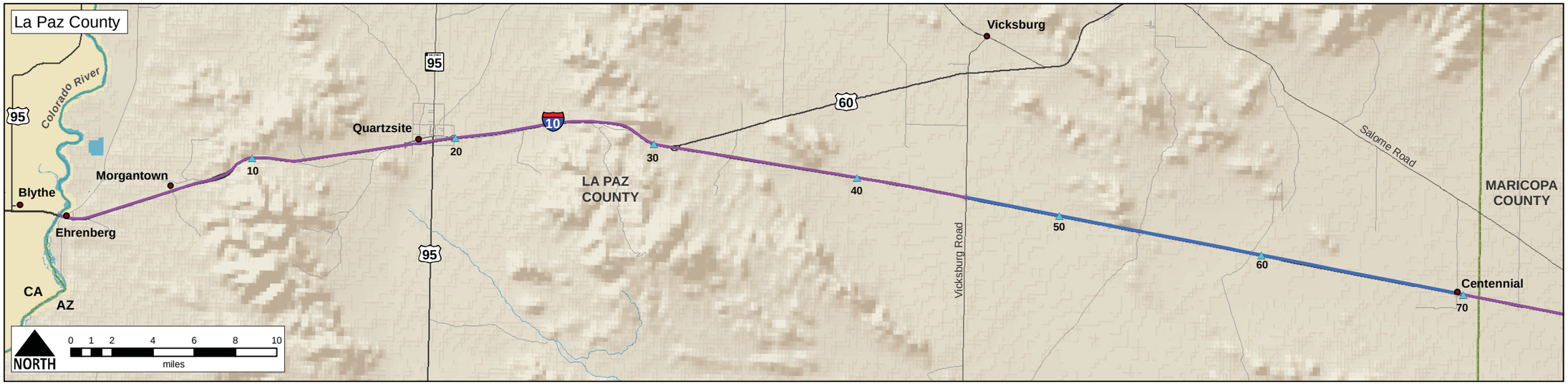
Traffic barriers are found along I-10 within the median of the road and at the outside edge of the road (see sidebar on this page). In the median, traffic barriers protect vehicles from crossing into the other direction of travel. Typically, concrete barriers are used when the median

Barriers

Guardrail

Concrete barrier with rockfall fence

Figure 3.5 | Pavement conditions



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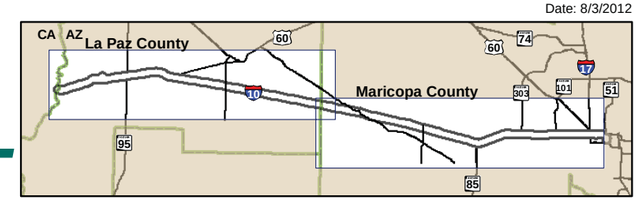
City
Milepost
Stream
Lake
County boundary

International Roughness Index
- Very good
- Good
- Fair
- Mediocre

Source: ADOT 2009

Date: 8/3/2012



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is paved, cable barriers are used when it is unpaved, and no barrier is used when there is a wide, open median. At the outside of the roadway, concrete barriers or metal guardrails are used to protect vehicles from obstacles or steep slopes near the edge of the travel lanes.

Medians

The median width is the distance between the edges of the inside travel lanes of a divided highway such as I-10. As shown previously in Figure 3.3, the median width along I-10 varies. In rural areas, a width of approximately 76 feet is provided where the terrain or other physical features do not constrain the roadway alignment. A wider or variable-width median is used where the terrain lends itself to independent roadway alignments for economic or aesthetic reasons. In urban areas, the original wide medians have been reduced to accommodate the addition of through lanes and HOV lanes.

In the area between SR 101L and I-17, the I-10 Final EIS required that a 50-foot-wide median remain open for potential use as a high-capacity transit corridor as mitigation for the construction of I-10 through adjacent neighborhoods. METRO, in coordination with ADOT, is currently studying alternative transit modes, such as light rail transit or bus rapid transit, for implementation within this area of I-10.

Bridge structures

This section presents an inventory of existing bridge structures within the I-10 corridor. The ADOT Bridge Group is responsible for the effective use of modern technology and resources for furnishing structure design, structure construction assistance, and structure management necessary to provide and maintain safe and functional structures on Arizona's highways. The Bridge Group also maintains an inventory of structures and regularly inspects and rates the condition of each structure.

Existing conditions

Bridges have been incorporated into the I-10 Corridor in areas where grade separation is required for crossing roads or drainage facilities. There are 136 bridges at 92 sites (at some locations, individual bridges are present for eastbound and westbound I-10). A description of each bridge, including the year built, type, spans, span and structure lengths, skew, vertical clearance, and sufficiency rating, are provided in Appendix G. The location of each bridge is shown in Figure 3.6.

Deficiencies

The sufficiency rating, which indicates bridge sufficiency to remain in service, is expressed as a percentage—100 percent represents an entirely sufficient bridge and 0 percent represents an entirely insufficient bridge. Bridges with a sufficiency rating greater than 80 are considered in good condition, between 50 and 80 are eligible for rehabilitation, and less than 50 are eligible for replacement or rehabilitation. Additionally, structures are classified with the letter "F" or "S" to refer to a structure as "functionally obsolete" or "structurally deficient," respectively. Whereas the sufficiency rating is based on an inspection of the bridge strength and conditions, a designation of being obsolete or deficient typically means that the structure does not meet current criteria pertaining to shoulder widths, railing types, and vertical clearances. A blank field in the rating form indicates a railroad or pedestrian bridge. A summary of the bridge sufficiency ratings is presented in Table 3.4.

Overall, 84 percent of the bridges along I-10 are in good condition and 16 percent are eligible for rehabilitation. None of the bridges require replacement based on the sufficiency rating. There are 32 bridges that are functionally obsolete and 1 bridge that is structurally deficient. There are 5 pedestrian bridges and no railroad bridges in the I-10 Corridor. The status of notable bridges include:

- The Colorado River Bridge is structurally deficient and has a sufficiency rating of 65.78 making it eligible for rehabilitation.
- The Hassayampa River and Agua Fria River bridges are all in good condition.
- All of the bridges at the I-10 and I-17 stack interchange are in good conditions, but are functionally obsolete due to inadequate shoulder widths.

Table 3.4 | Bridge sufficiency rating summary

Sufficiency rating	Condition index	Number of bridges
< 50	Eligible for replacement or rehabilitation	0
50 to 80	Eligible for rehabilitation	22
> 80	Good condition	114
F	Functionally obsolete	32
S	Structurally deficient	1
Null	Pedestrian bridge	5

Drainage structures and facilities

Another major structure type along the I-10 Corridor is the reinforced concrete box culvert (RCBC). These drainage structures convey stormwater under I-10 in areas where bridges are not economical. The RCBCs are inventoried and rated using the same system as described in the bridge section.

Other major drainage facilities in the corridor include channels, basins, pipes, and pump stations.

Existing conditions

There are 220 RCBC structures along the I-10 Corridor. The locations are shown in Figure 3.7. All but 10 of the RCBCs are located within the Yuma District. They are typically provided in the desert areas to support the pass-through drainage system. Stormwater generally flows in the washes running perpendicular under I-10 from north to south.

In the urban area, most notably between the Agua Fria River and downtown Phoenix, stormwater is conveyed parallel to I-10. Between the river and 43rd Avenue, the runoff flows in a concrete-lined channel or RCBC on the northern side of I-10. Between 43rd and 27th Avenues, the runoff is captured in drainage inlets and flows in a buried RCBC on the northern side of I-10. Drainage basins are strategically located to meter the flow through the channel and from other drainage systems (such as along SR 101L). In locations where I-10 is depressed below existing ground, pump stations are provided.

Bridges

Agua Fria River Bridge

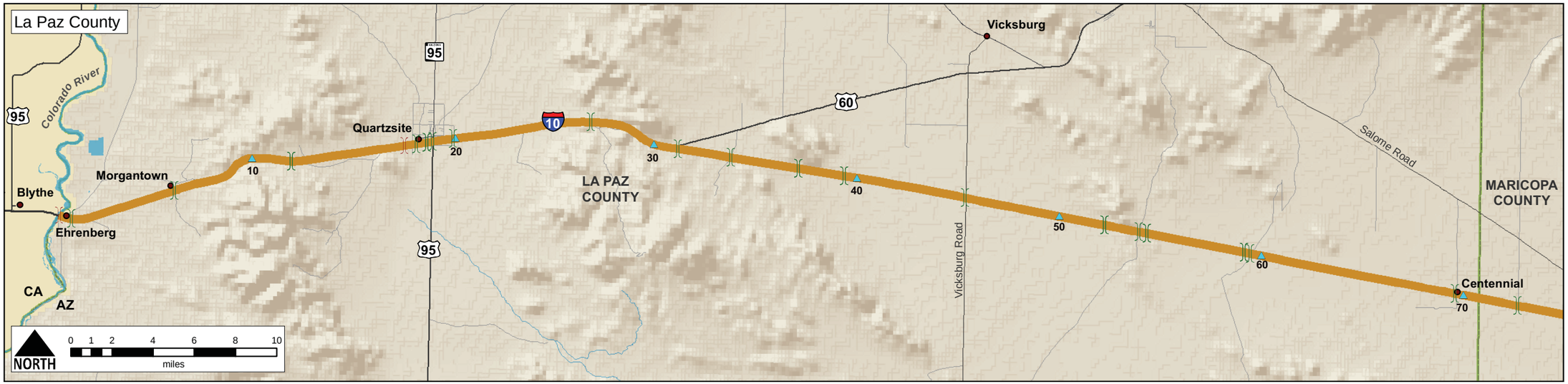
Colorado River Bridge

Pedestrian bridge

I-10 underpass

I-10 overpass

Figure 3.6 | Bridges



City
Milepost
Project location*
Stream
Lake
County boundary

Bridge–good condition
Bridge–eligible for rehabilitation

*Study area extends 1 mile north and south of I-10

Source: ADOT

Date: 8/3/2012

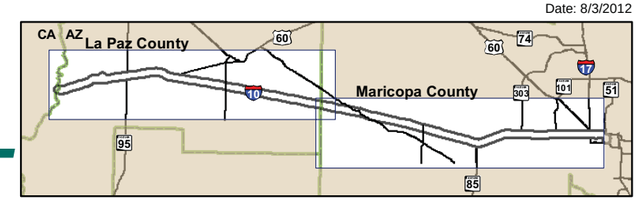


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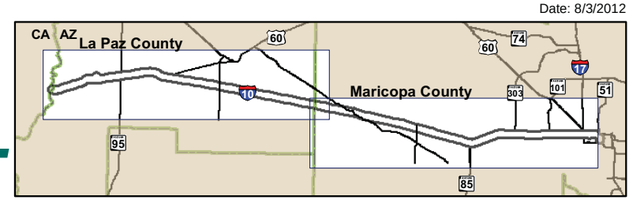
Figure 3.7 | Culverts and noise walls

- City
- Milepost
- Project location*
- Stream
- Lake
- County boundary
- Reinforced concrete box culvert–good condition
- Reinforced concrete box culvert–eligible for rehabilitation
- Noise wall

*Study area extends 1 mile north and south of I-10 *Source: ADOT*

Date: 8/3/2012



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Drainage Facilities

Concrete box culverts under I-10

Pipe culvert under I-10

Conveyance channel

Pump station

These stations pump the water from I-10 up and into the drainage channel. East of I-17, the runoff flows in buried pipes and a RCBC, ultimately outfalling to the Salt River.

A complete inventory of RCBC structures is provided in Appendix H.

Future conditions

New drainage structures, basins, and pipes will be constructed adjacent to I-10 for the I-10 and SR 303L system traffic interchange. Additionally, a concrete-lined channel, parallel to I-10, will extend west from SR 303L to approximately 1/2 mile west of Citrus Road to collect on- and off-site runoff.

As other projects are developed along I-10, analysis of the existing and proposed drainage conditions will be needed. For example, additional pavement from widening projects increases the on-site runoff because a permeable surface (dirt, landscaping) is converted to an impermeable surface (pavement). In Maricopa County, coordination with the Flood Control District of Maricopa County will be an important factor for identifying drainage solutions that improve flood protection for I-10 as well as adjacent communities.

Deficiencies

The sufficiency summary of the RCBC structures is presented in Table 3.5. Of the 220 structures, 82 percent are in good condition and 18 percent are eligible for rehabilitation. No RCBC structures have a rating below 50.

The pump stations are in generally good condition, but experience a shortage of spare parts for the natural gas engines that power the pumps. Some of the engines originally ran on diesel, but they were later converted to run on natural gas.

Table 3.5 | Culvert sufficiency summary

Sufficiency rating	Condition index	Number of culverts
< 50	Eligible for replacement or rehabilitation	0
50 to 80	Eligible for rehabilitation	39
> 80	Good condition	181

Walls

The final class of major structural elements along I-10 are retaining walls and noise walls. Earth retaining walls are provided in areas where the normal fill or cut slope would extend beyond acceptable limits. Retaining walls are classified according to the manner in which they retain the earth:

- gravity walls use the weight of the wall to resist the overturning forces of the earth
- cantilever walls use the bending resistance of a thin wall supported on a footing to retain the earth
- mechanically stabilized walls are mechanically integrated with the earth to form a stable mass to resist the overturning forces
- pile walls retain the earth through the bending strength of piles embedded in the earth.

Noise walls are one method used by ADOT to abate traffic noise impacts on adjacent properties. Additional information related to the ADOT noise policies are provided in Noise impacts, on page 4-17. The height, length, and placement of the walls are based on results from traffic noise modeling.

Both retaining walls and noise walls are more common along I-10 in urban areas. These areas present greater constraints and higher cost for land, which make retaining walls more cost-effective than additional right-of-way. The need for noise walls is greater with higher traffic volumes and more dense adjacent development.

ADOT does not keep an inventory of walls along its highways. Each District is responsible for inspecting and maintaining the walls in its area. The existing noise walls along the I-10 Corridor were located using aerial photography and the ADOT Video Log; they are presented in Figure 3.7.

Tunnel

At the very eastern terminus of the study area, I-10 passes through what is locally termed the Deck Park Tunnel. The name comes from the fact that the tunnel is not a traditional tunnel, but was actually constructed as 19 bridges built side-by-side. Covering the bridge decks is the Margaret T. Hance Park (see sidebar on next page).

Local reporter, Mark Bonan, captured the essence of the deck park tunnel in an article in 1989 (Bonan 1989):

> *Beyond providing a state of the art transportation facility, the highway's designers have overcome a multitude of social, economic, and environmental challenges that go hand-in-hand with establishing a modern highway through the center of a city.*
>
> *In the historic heart of downtown Phoenix, the Deck section of the I-10 Papago Freeway is an innovative design solution that preserves the continuity of the many historic and commercial districts, neighborhoods in the area, while providing a futuristic urban park to enhance the comprehensive downtown revitalization program.*

The deck park tunnel is approximately 2,900 feet long and covers the section of I-10 between 3rd Avenue and 3rd Street. The tunnel provides five lanes of travel in each direction in two outer tubes. A central tube provides space for two lanes. While initially built as a bus station, it has never been used.

The tunnel section includes extensive systems for:

- ventilation – eight high-powered fans circulate air through the tunnel
- fire suppression – air quality is constantly monitored to check for buildup of poisonous or flammable gases
- vehicle monitoring – loops and video cameras monitor traffic flow and alert emergency responders to any incidents
- lighting – over 3,500 lights illuminate the tunnel for drivers

The maintenance of these systems requires constant monitoring and periodic closures of I-10. Transport of hazardous materials is prohibited through the tunnel.

Traffic interchanges

I-10 is a fully access-controlled facility and, as such, motorists can only enter and exit I-10 using traffic interchanges.

FHWA is responsible for overseeing the Interstate system. Any new interchange would constitute a change in access to the Interstate and, thus, must be approved by FHWA. FHWA has developed basic guidelines for requesting changes in access along the Interstate system. These guidelines, Interstate System Access Informational Guide (USDOT-FHWA 2010), reflect the direction of the SAFETEA-LU; clarify the requirements of operational and safety studies; and reference applicable federal laws, regulations, and policies.

Two types of traffic interchanges are found along I-10: system and service. System traffic interchanges provide a free-flow connection between two access-controlled, high-speed facilities. Service traffic interchanges provide freeway access to and from the local arterial street network. Within these categories, there are a number of interchange types, such as diamond, trumpet, loop, and directional, which are generally named based on their layout (see sidebar on following page).

Existing conditions

The existing I-10 interchanges are listed in Table 3.6 and displayed in Figure 3.8. Within the I-10 Corridor, four interchanges are system traffic interchanges: at US 60, SR 85, SR 101L, and I-17. There are 39 service traffic interchanges, of which 33 provide full access (all directions) and 6 provide half-access (only one direction). Two of the six half-access interchanges are restricted to HOV users.

Future conditions

La Paz County

The La Paz Transportation Planning Study (ADOT 2010) recommended that by 2020, the interchange ramps at the Poston Road and West Quartzsite Road traffic interchanges should be reconstructed. Also, the ramp intersection control at the West Quartzsite Road traffic interchange should be upgraded with signals. By 2030, all of the traffic interchange ramps within La Paz County should be reconstructed. As warranted, the intersection control at additional locations should be upgraded with signals. The study did not identify the need for any new traffic interchanges.

Maricopa County

A number of new traffic interchanges were included in the RTP (see Figure 3.8 and Table 3.7). Construction of a new system traffic interchange for SR 303L and I-10 is scheduled began in late 2011. The project includes removal of the existing Cotton Lane traffic interchange and the construction of a split-diamond interchange with half-access at Citrus Road and Sarival Avenue, connected by frontage roads. Because of funding limitations, the system traffic interchange will be constructed in phases, with the northern half in phase 1 and the southern half in phase 2. ADOT received approval of the change of access for the system traffic interchange from FHWA in 2008.

Planning and preliminary design of the I-10 and SR 202L (South Mountain Freeway) system traffic interchange is ongoing. If approved, construction could begin as early as 2014. The new freeway corridor would connect to I-10 at approximately 59th Avenue. The connection would include reconstruction of adjacent interchanges and a new direct HOV connection for the west-to-south and north-to-east traffic movements.

I-10 Deck Park Tunnel

Vehicles entering and exiting the tunnel

Vehicles within the tunnel

Aerial view of the deck park

Table 3.6 | Existing traffic interchanges

Milepost	Crossing facility	– type	Interchange type	Ramp intersection control
0.62	Poston Road	two-lane arterial	diamond	stop
5.84	Tom Wells Road	two-lane arterial	diamond	stop
11.95	Dome Rock Road	two-lane arterial	diamond	stop
17.50	West Quartzsite Road	two-lane arterial	diamond	stop
19.90	Riggles Avenue	two-lane arterial	diamond	stop
26.65	Gold Nugget Road	two-lane arterial	diamond	stop
31.17	US 60	two-lane highway	trumpet	free-flow
45.34	Vicksburg Road	two-lane arterial	spread diamond	stop
53.94	Hovatter Road	two-lane arterial	spread diamond	stop
69.60	Avenue 75 E	two-lane arterial	spread diamond	stop
81.21	Salome Road	two-lane arterial	spread diamond	stop
94.15	411th Avenue	two-lane arterial	spread diamond	stop
98.29	Wintersburg Road	two-lane arterial	spread diamond	stop
103.44	339th Avenue	two-lane arterial	diamond	stop
109.68	Palo Verde Road	four-lane arterial	diamond	stop
112.75	SR 85	four-lane highway	directional (south)	free-flow
114.84	Miller Road	two-lane arterial	diamond	stop
116.97	Watson Road	four-lane arterial	diamond	signal
120.26	Verrado Way	four-lane arterial	diamond	signal
121.67	Jackrabbit Trail	two-lane arterial	diamond	stop
124.69	Cotton Lane	four-lane arterial	diamond	stop
126.67	Estrella Parkway	six-lane arterial	diamond	signal
127.67	Bullard Avenue	six-lane arterial	diamond	signal
128.68	Litchfield Road	six-lane arterial	diamond	signal
129.67	Dysart Road	six-lane arterial	diamond	signal
131.68	Avondale Boulevard	six-lane arterial	diamond	signal
132.66	107th Avenue	four-lane arterial	half-diamond (west)	signal
133.66	99th Avenue	six-lane arterial	diamond	signal
133.66	SR 101L	six-lane freeway	directional (north)	free-flow
134.67	91st Avenue	four-lane arterial	half-diamond (east)	signal
135.66	83rd Avenue	six-lane arterial	diamond	signal
136.10	79th Avenue (HOV)	two-lane collector	half-diamond (east)	signal
136.68	75th Avenue	six-lane arterial	diamond	signal
137.65	67th Avenue	six-lane arterial	diamond	signal
138.66	59th Avenue	six-lane arterial	diamond	signal
139.65	51st Avenue	five-lane arterial	diamond	signal
140.65	43rd Avenue	five-lane arterial	diamond	signal
141.66	35th Avenue	five-lane arterial	diamond	signal
142.65	27th Avenue	four-lane arterial	half-diamond (west)	signal

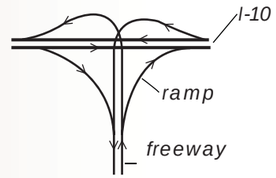
Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties *(continued on page 3-18)*

Traffic interchanges

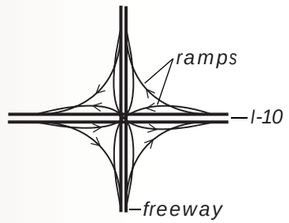
Traffic gains access to I-10 using system and service traffic interchanges. System traffic interchanges are interchanges connecting a freeway with another freeway or major highway, such as the I-10/I-17 Stack in downtown Phoenix. Service traffic interchanges provide freeway access to and from the local arterial street network, such as I-10 and Vicksburg Road.

System traffic interchanges:

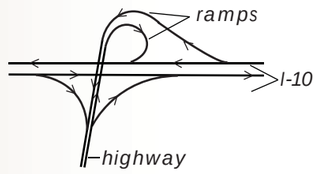
Three-leg directional interchange



Four-leg directional interchange

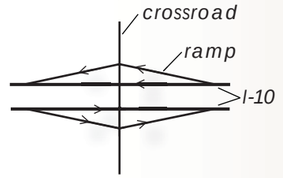


Trumpet interchange

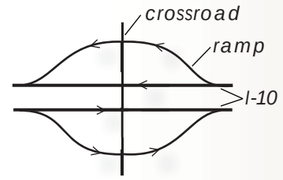


Service traffic interchanges:

Diamond interchange



Spread diamond interchange



Single-point urban interchange

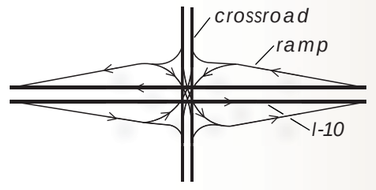
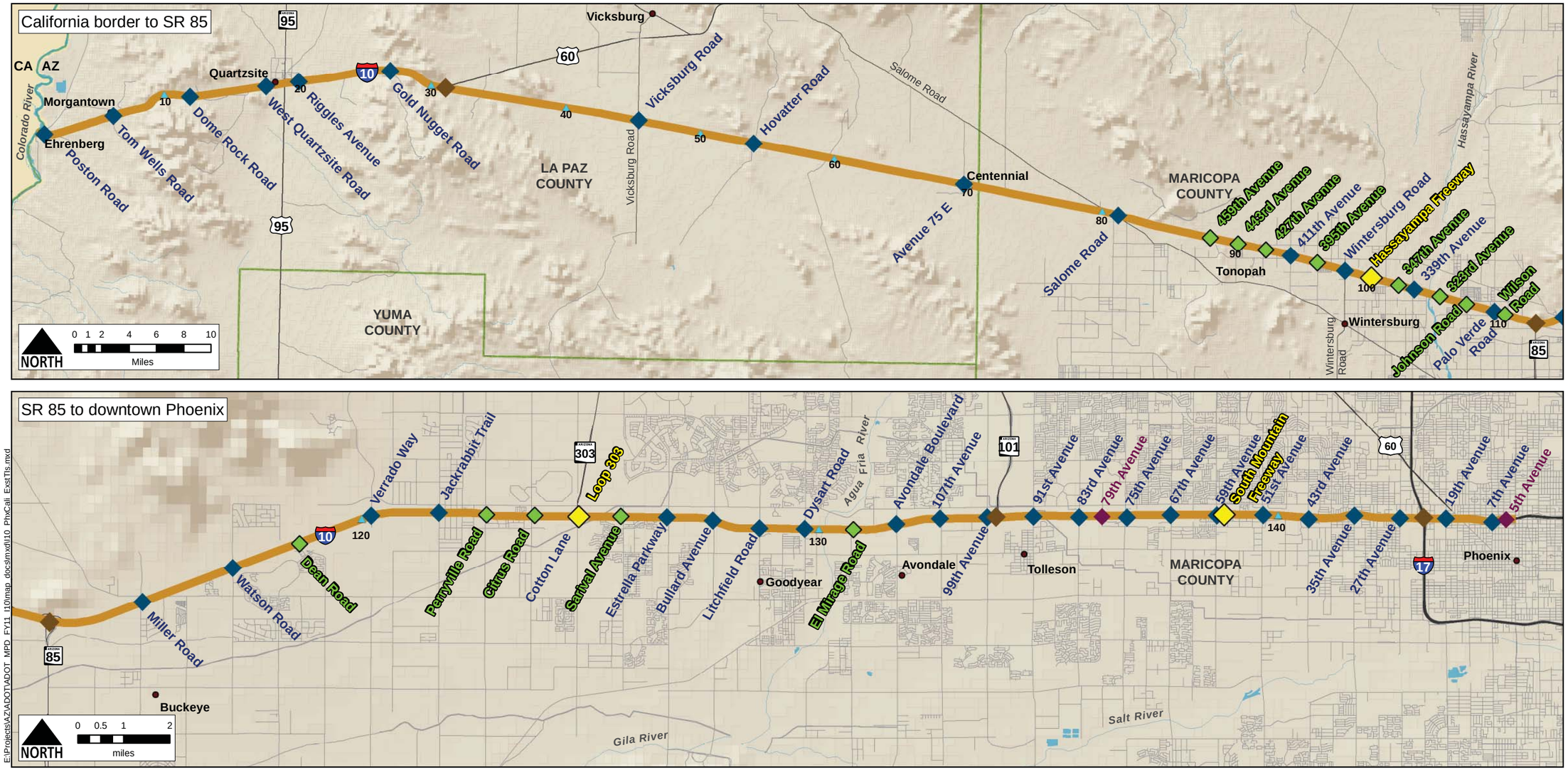


Figure 3.8 | Interchanges



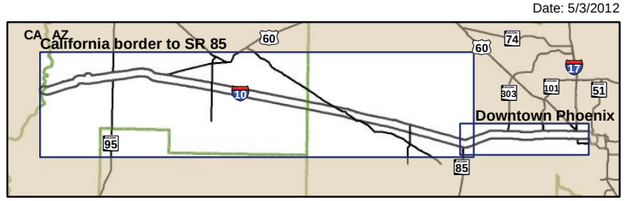
City
Milepost
Project location*
Stream
Lake
County boundary

Existing HOV-only interchange
Existing service traffic interchange
Existing system traffic interchange
Future service traffic interchange
Future system traffic interchange

*Study area extends 1 mile north and south of I-10

Source: ADOT

Date: 5/3/2012



ADOT

Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

Table 3.6 | Existing traffic interchanges (continued)

Milepost	Crossing facility – type		Interchange type	Ramp intersection control
142.83	I-17	six-lane freeway	fully directional	free-flow
143.77	19th Avenue	four-lane arterial	half-diamond (east)	signal
144.66	7th Avenue	six-lane arterial	single-point urban	signal
144.72	5th Avenue (HOV)	two-lane collector	half-diamond (west)	signal

Table 3.7 | Future programmed and planned traffic interchanges

Milepost	Crossing facility – type		Interchange type
Regional Transportation Plan			
122.69	Perryville Road	four-lane arterial	diamond
123.69	Citrus Road	four-lane arterial	half-diamond (west)
124.69	SR 303L	six-lane freeway	fully directional
125.69	Sarival Avenue	four-lane arterial	half-diamond (east)
130.68	El Mirage Road	four-lane arterial	service
138.66	SR 202L (South Mountain Freeway)	six-lane freeway with direct HOV connection	directional (south)
Interstate 10/Hassayampa Valley Roadway Framework Study			
88.15	459th Avenue	arterial	service
90.15	443rd Avenue	arterial	service
92.15	427th Avenue	parkway	service
96.25	395th Avenue	arterial	service
100.50	Hassayampa Freeway	freeway	fully directional
102.45	347th Avenue	arterial	service
105.50	323rd Avenue	arterial	service
107.60	Johnson Road	arterial	service
110.70	Wilson Road	arterial	service
119.30	Dean Road	four-lane arterial	diamond

Planning and preliminary design for a new service traffic interchange at I-10 and Perryville Road was completed in November 2012 and construction activities are scheduled to begin in spring 2013. A service traffic interchange at I-10 and El Mirage Road is also included in the RTP; however, preliminary design has not begun.

One of the main objectives of the *I-10 – Hassayampa Valley Roadway Framework Study* (MAG 2007) was to identify locations for future traffic interchanges along I-10 between SR 303L and the Maricopa County boundary (see Figure 3.8 and Table 3.7). Further study and evaluations would be necessary to determine the best design for these future interchanges, which would also require approval for a change in access from FHWA.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) is the application of computers, electronics, control systems, communications technologies, and management strategies to transportation systems in an integrated manner, providing travel information to increase the safety and efficiency of the surface transportation system.

The ADOT Transportation Technology Group is responsible for the planning, development, deployment, management, and operation of ITS in Arizona. Services and infrastructure that are managed by the Transportation Technology Group include the 511 call center, emergency call boxes along highways, closed-circuit television cameras, dynamic message signs, ramp meters, vehicle detectors, and construction and weather advisories. In Maricopa County, MAG has ITS oversight and planning responsibilities.

Existing conditions

Most of the existing ITS facilities are located within the urban area of Maricopa County as part of ADOT's Freeway Management System. This is because ITS is meant to make existing transportation systems more efficient in handling congested conditions. However, some ITS facilities provide travel advisories in rural areas.

Dynamic message signs provide motorists with a wide range of information such as traffic conditions, weather conditions, Amber alerts, and construction activities. The dynamic message signs along I-10 are shown in Figure 3.9.

Eleven closed-circuit television cameras provide continuous views of I-10 traffic between SR 101L and the deck park tunnel. The cameras are spaced at mile intervals. Also, eight cameras are located within and around the tunnel (four in each direction).

Ramp meters are in operation on virtually every on-ramp from 83rd Avenue to 7th Avenue. West of 83rd Avenue, ramp metering is less pervasive; however, most of the interchanges between Verrado Way and 83rd Avenue have the infrastructure necessary to activate ramp metering when warranted by the I-10 main line conditions.

Future conditions

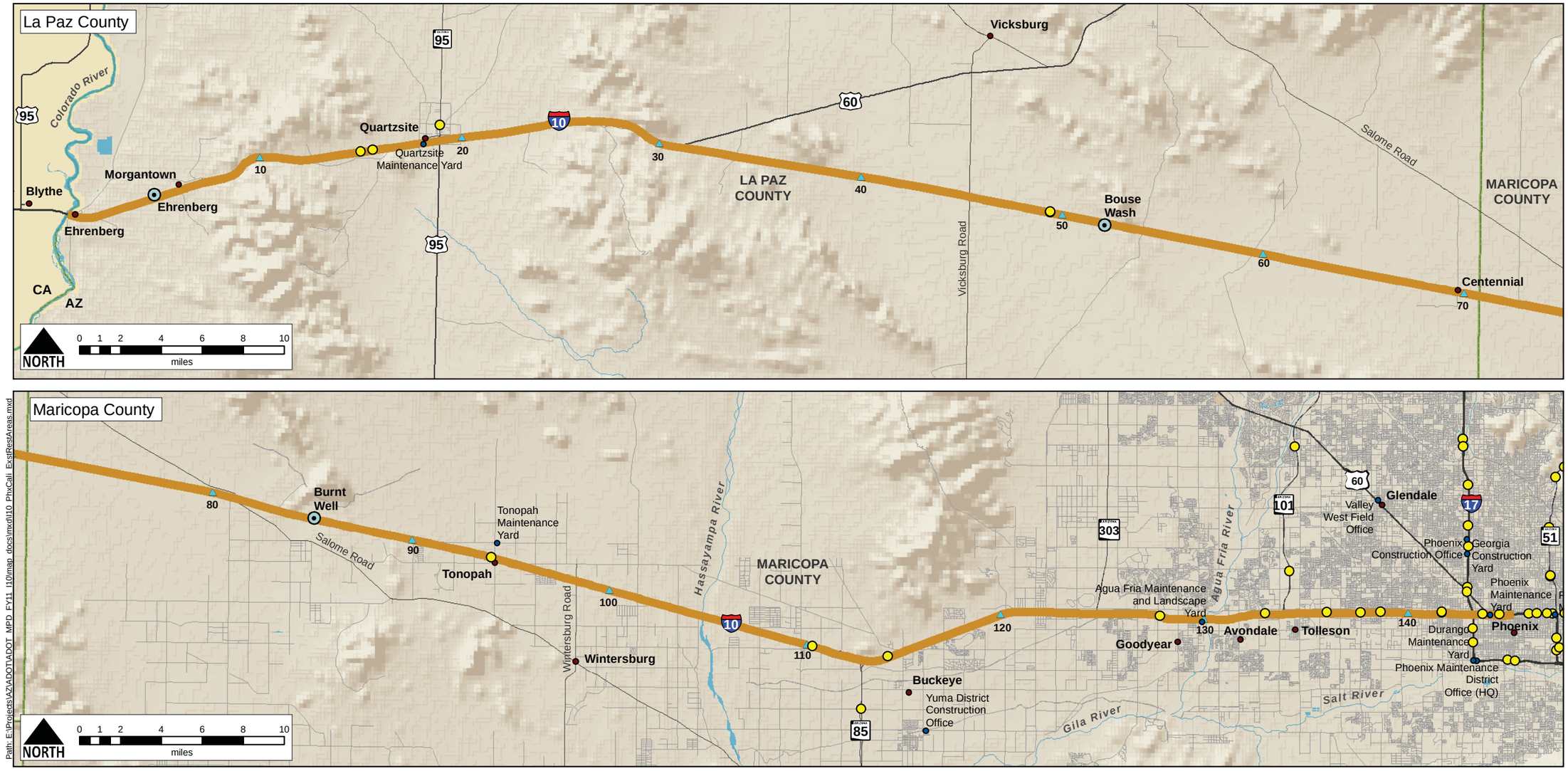
The Transportation Technology Group continues to expand ITS capabilities in the I-10 Corridor by including the necessary infrastructure (conduit, pull boxes, etc.) in recently completed and planned construction projects.

Intelligent Transportation Systems

Permanent and modile message boards alert drivers to changing driving conditions

Sensors and weigh-in-motion used at the port of entry

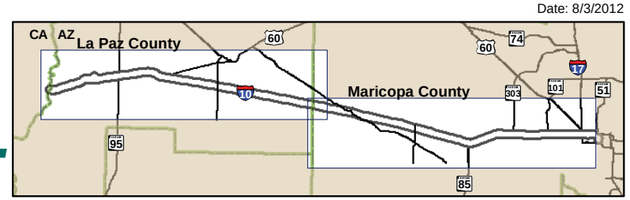
Figure 3.9 | ITS, rest areas, and ADOT facilities



City
Milepost
Project location*
Stream
Lake
County boundary
Dynamic message sign
Rest area
ADOT maintenance and construction facilities

*Study area extends 1 mile north and south of I-10 *Source: ADOT*

Date: 8/3/2012



Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

Deficiencies

As congestion along I-10 continues to extend west of 83rd Avenue, it may be necessary to add ramp meters to a number of on-ramps, especially in the eastbound direction.

Rest areas

Three rest areas are located along the I-10 Corridor:

- Ehrenberg (milepost 5)
- Bouse Wash (milepost 53)
- Burnt Well (milepost 86)

As shown in Figure 3.9, each rest area is located in rural areas west of SR 85. All three are open to the public and are operated and maintained by ADOT.

Because of the cost associated with maintaining rest areas, ADOT has begun evaluating options for partnering with private companies to maintain rest areas. Currently, 13 of the 34 state highway rest areas are owned, operated, and maintained by non-ADOT entities.

Maintenance and construction facilities

The maintenance and construction operations along I-10 are facilitated from field offices. Figure 3.9 shows the location of field offices in the area around the I-10 Corridor.

The highest density of facilities is located within the metropolitan Phoenix area. Outside of this area, the I-10 Corridor is served from facilities located in Buckeye, Tonopah, and Quartzsite.

4. Community Character

This section describes the land use, socioeconomics, and nonvehicular transportation services that define the communities surrounding the I-10 Corridor.

4.1 Communities

The following sections provide an introduction to the communities that I-10 travels through. The incorporated areas of each community are shown in Figure 4.1.

La Paz County

La Paz County, located in the central and western portion of the state along the Colorado River, is Arizona's second least-populated county (the 2010 Census population is 20,489). Tourism and agriculture are the lead components of the county's economy (La Paz County 2008). The Arizona Agriculture Statistics Service shows that agricultural production accounts for nearly 123,000 acres in crop production at a market value of nearly $137 million dollars (Arizona Cooperative Extension 2010).

Ehrenberg

Ehrenberg is just over the border from Blythe, California, on the Colorado River. This unincorporated census-designated place had a 2010 population of 1,470. The town, originally founded on a historical Colorado River crossing, is a popular location for recreational vehicle visitors in the winter, when the seasonal population increases greatly.

Quartzsite

Quartzsite is located at the junction of I-10 and US 95, approximately 17 miles east of the California border. Quartzsite, with a 2010 population of 3,677, has a median age of 68 years, nearly two times the state's median age of 36 years. Tourism is the major contributor to Quartzsite's economy. The retail trade and services sectors benefit from visitors who reside at the numerous (more than 70) mobile home and trailer parks in the vicinity during the winter months. Major gem, mineral, and general swap shows attract approximately 1.5 million people annually (Arizona Department of Commerce 2009).

Maricopa County

Maricopa County is located in the central and southern portion of the state. I-10 cuts through the middle of the county east-to-west. Maricopa County is Arizona's fifth-largest county by land area (9,200 square miles) and is its most populous, with 3.8 million people (U.S. Census Bureau 2010). Within Maricopa County is the Phoenix metropolitan statistical area, the fourteenth-largest metropolitan area in the United States.

Tonopah

Tonopah is a census-designated place in Maricopa County, approximately 50 miles west of Phoenix off I-10. The community is near the Palo Verde Nuclear Generating Station (PVNGS), the largest nuclear power plant in the country. More information on PVNGS may be found in Section 6.5.

Buckeye

Buckeye is located approximately 25 miles east of Tonopah along I-10. I-10 runs east-to-west through the town and bisects it into northern and southern portions. Buckeye extends from south of the Gila River to north of the White Tank Mountains, and has a planning area of 595 square miles. Buckeye's 2010 population was 50,876. At buildout, Buckeye could be home to as many as 1.7 million people.

Goodyear

Goodyear abuts Buckeye to the west and Avondale to the east, with I-10 traversing its northern portion. The City's planning area is approximately 245 square miles, which includes the Sonoran Valley planning area annexed in April 2007. The Sonoran Valley planning area extends the Goodyear planning area 15 miles south to unincorporated Mobile. Goodyear's 2010 population was 65,275.

Avondale

Avondale is east of Goodyear, with I-10 traversing its northern portion. The area north of I-10 is largely developed, while the area south of I-10 to the Gila River is expected to approach build-out by 2038. The City's planning area is approximately 94 square miles (City of Avondale 2011). Avondale's 2010 population was 76,238.

Tolleson

Tolleson, roughly 6 square miles in size, is located west of downtown Phoenix. Once largely an agricultural community, the city has a strong commercial and industrial base, tied closely to its access to I-10. Tolleson's 2010 population was 6,545.

Phoenix

Phoenix is located immediately east of Avondale. Phoenix is the state capitol and the largest city in Arizona, with a 2010 population of 1,445,632 and a planning area of approximately 645 square miles. Within Phoenix, I-10 has a system traffic interchange with I-17 at the eastern end of the study area. I-17 is the principal north-to-south highway in Arizona.

Blythe, California

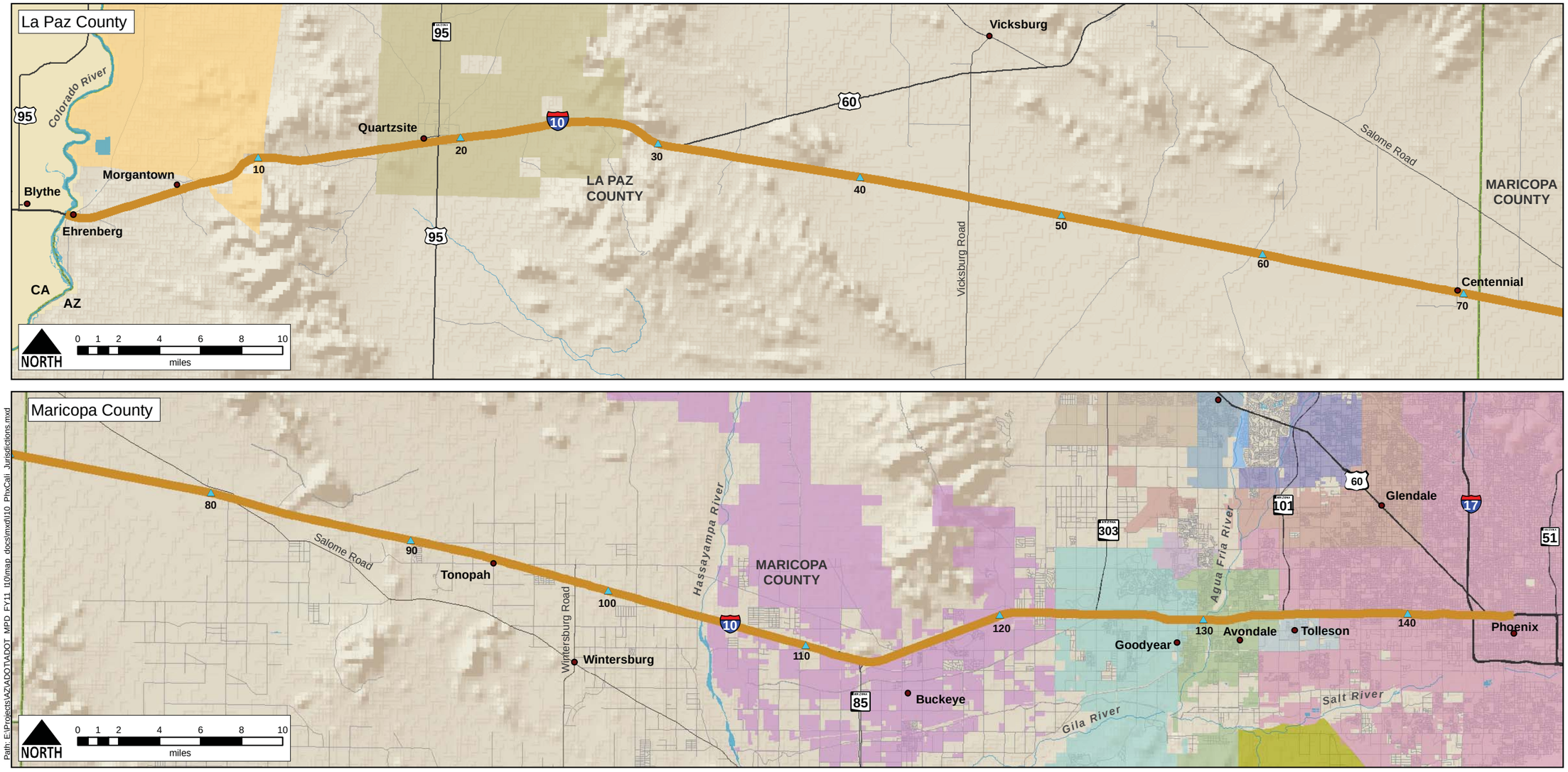
Blythe is located along I-10 approximately 3 miles west of the Arizona border. Blythe was incorporated in 1916 and had a 2010 population of 20,817. The City's mild winter weather and proximity to the Colorado River support the agricultural and tourist enterprises.

4.2 Land ownership

This section describes existing land ownership for the I-10 Corridor. Transportation planning in the corridor should be a coordinated effort with the various land administrators affected by I-10.

Land within the study area is managed by the entities shown in Figure 4.2. Table 4.1 summarizes the land areas managed by each entity. While nearly half (47 percent) of the land in the corridor is privately held, the majority of the privately held land is located in Maricopa County. The Bureau of Land Management (BLM) is the next-largest landowner in the corridor, with 29 percent of the land. The majority of BLM land in the corridor is located in La Paz County (90 percent). State

Figure 4.1 | Jurisdictions



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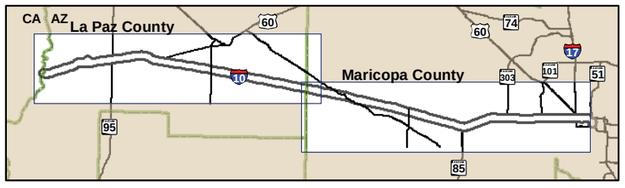
City
Milepost
Project location*
Stream
Lake
County boundary

Avondale
Buckeye
Colorado River Indian Tribes
El Mirage
Gila River Indian Community

Glendale
Goodyear
Litchfield Park
Parker
Peoria

Phoenix
Quartzsite
Surprise
Tolleson
Youngtown

Date: 8/3/2012



*Study area extends 1 mile north and south of I-10

Source: ADOT 2009

Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

Figure 4.2 | Land ownership

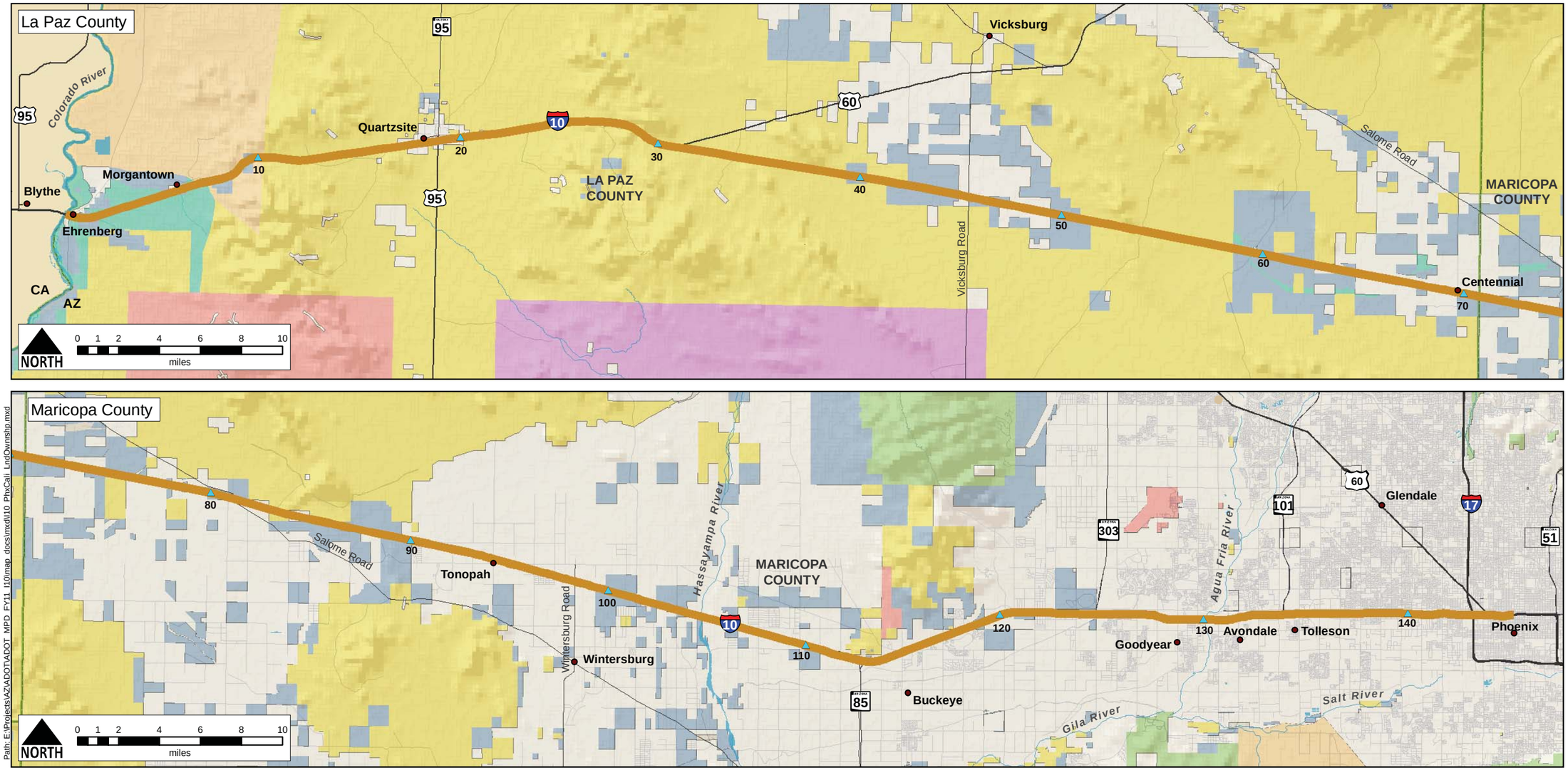


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Table 4.1 | Land ownership

Land ownership	La Paz County (acres)	Percentage of total	Maricopa County (acres)	Percentage of total	Total
Bureau of Land Management	49,102	90	5,645	10	54,747
Bureau of Reclamation	6,247	100	-	-	6,247
Colorado River Indian Tribes	3,750	100	-	-	3,750
Military reservation	-	-	14	100	14
Private land	14,170	16	72,662	84	86,832
State Trust land	17,259	49	17,631	51	34,889
Total	90,528		95,951		186,479

Trust Land is the next largest category, and this land is almost equally divided in the corridor between La Paz and Maricopa Counties (49 and 51 percent, respectively). The remaining landowners in the corridor—the Bureau of Reclamation and the Colorado River Indian Tribes (3 and 2 percent, respectively)—are located in La Paz County.

Bureau of Land Management

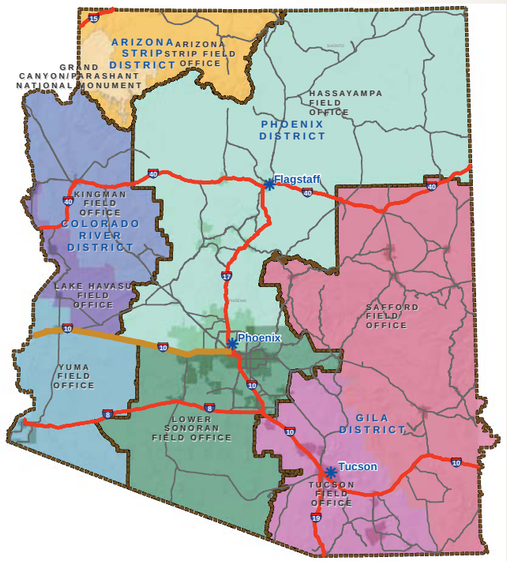
BLM's Arizona offices are divided into districts and field offices:

- *Arizona Strip District: Arizona Strip and Grand Canyon/Parashant National Monument Field Offices*
- *Colorado River District: Kingman, Lake Havasu, and Yuma Field Offices*
- *Phoenix District: Hassayampa and Lower Sonoran Field Offices*
- *Gila District: Safford and Tucson Field Offices*

Each field office has developed a Resource Management Plan *(RMP) that outlines policies for the management of resources within its area. The RMPs provide guidance for a number of issues of note for the I-10 corridor, including:*

- *minerals*
- *recreation*
- *travel management*
- *utility and energy corridors*
- *wildlife movement and habitat*

Additional details of each issue are presented in the related sections of this report.



Bureau of Land Management

BLM administers approximately 30 percent of the land in the study area, most of which is located in La Paz County. BLM is authorized to sell land when it is specifically identified for disposal in its planning documents (see sidebar on this page for more information on BLM).

Arizona State Land Department

The Arizona State Land Department administers State Trust Lands. These lands were granted to Arizona by the federal government when the area was established as a territory in 1863, with additional lands conveyed to Arizona as it prepared for statehood under the Enabling Act of 1910. There are thirteen beneficiaries that receive money from the sale of State Trust Land. The primary beneficiary, with approximately 90 percent of the land in trust, is common schools (kindergarten - 12th grade).

Approximately 19 percent of the land in the study area is State Trust Land, split almost equally between La Paz and Maricopa Counties.

Bureau of Reclamation

The Bureau of Reclamation administers much of the land along the Colorado River where I-10 crosses into Arizona from California. It's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Colorado River Indian Tribes Reservation

The Colorado River Indian Tribes (CRIT) Reservation extends along the Colorado River on both the Arizona and California side and includes almost 300,000 acres of land. The primary community in the CRIT Reservation is Parker, Arizona, located approximately 42 miles north of I-10. The primary economic activity on the CRIT Reservation is agriculture.

4.3 Land use

The I-10 corridor travels through largely undeveloped land from the California border east to the Phoenix metropolitan area, with minor exceptions (see Figure 4.3).

La Paz County

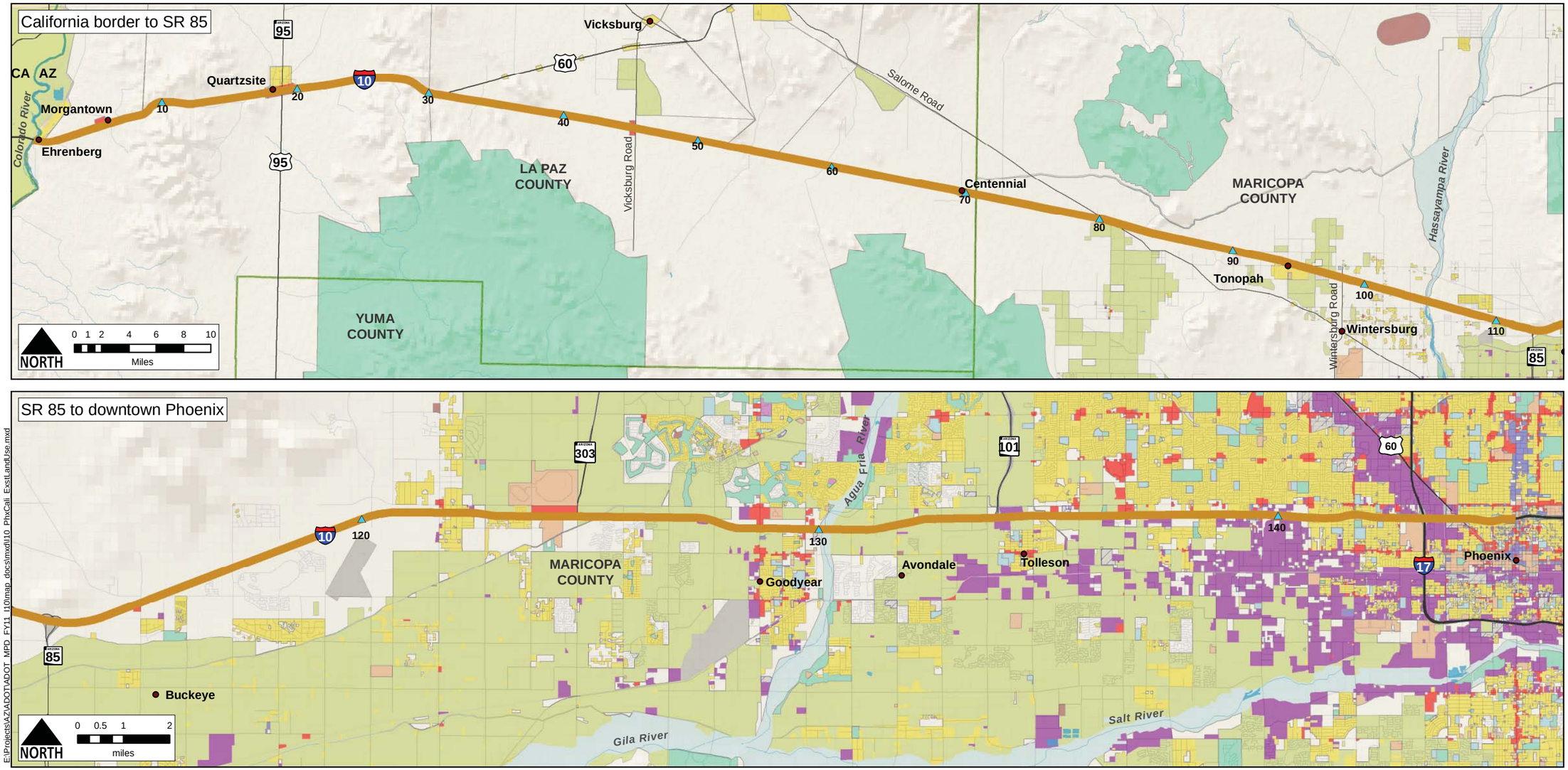
There are relatively small areas of residential and commercial development at Ehrenberg and Quartzsite (described previously). Areas of agriculture are located north of I-10, along the Colorado River on the CRIT Reservation, as well as near the Hayden-Rhodes Aqueduct north of the Vicksburg traffic interchange. Much of the land in the corridor is owned by BLM or the Arizona State Land Department and, as such, it is not currently available for development.

Truck stops are located at the Tom Wells and Vicksburg Roads traffic interchanges; however, there is little additional development before Tonopah, located in Maricopa County.

Maricopa County

While there is more developable land (defined as private and Arizona State Land Department land shown in Figure 4.4) near and east of the La Paz and Maricopa County border, development other than agricultural land west of Wintersburg Road is limited. Between Wintersburg Road and SR 85, there is scattered residential development. East of SR 85, the southern portion of the corridor is increasingly developed with residential subdivisions. East of Jackrabbit Trail, both the northern and southern portions of the corridor are largely developed with residential and commercial uses. East of SR 101L to approximately 35th Avenue, the southern portion of the corridor includes largely

Figure 4.3 | Existing land use



*Study area extends 1 mile north and south of I-10

Source: MAG (2000), 2010 aerial photography analysis

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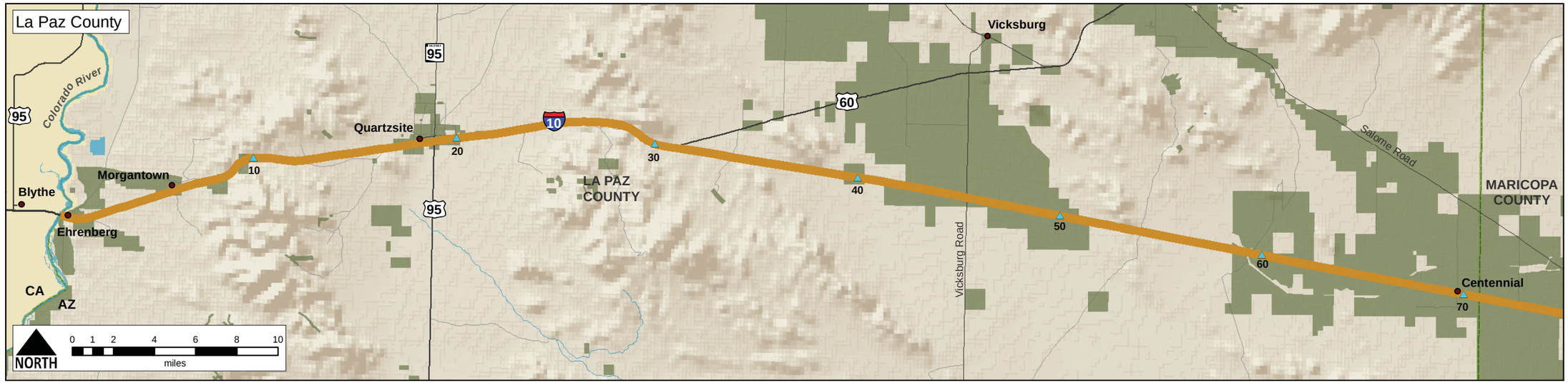
Figure 4.4 | Developable land



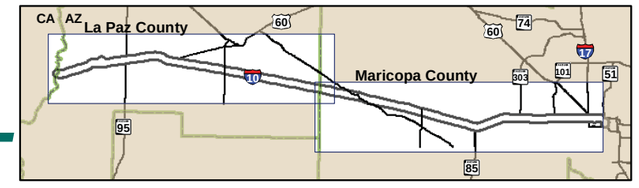
Path: E:\Projects\AZ\ADOT\ADOT_MPD_FY11_I10\map_docs\mxd\I10_PhxCali_DevelopLand.mxd

City
Milepost
Project location*
Stream
Lake
County boundary

Developable land
Developable land is characterized as either private or Arizona State Trust Land

*Study area extends 1 mile north and south of I-10 *Source:* ALRIS (2011)

Date: 8/3/2012



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warehouse and industrial uses, while commercial and residential uses are found in the northern portion of the corridor.

Within Maricopa County, the amount of agricultural land in the Study Area decreases from west to east, illustrating the increasing density of residential, commercial, and industrial development as one travels toward central Phoenix.

4.4 Socioeconomics

Existing population data for areas surrounding the I-10 Corridor are based on the recently released 2010 Census. Future population projections for the state of Arizona are produced by the Arizona State Demographer's Office, part of the Office of Employment and Population Statistics in the Department of Administration. Future population projections for Maricopa County are produced by MAG. Neither of these projections have been updated to reflect the 2010 Census counts. The latest approved projections are from 2006 and 2007, respectively, and do not reflect the economic downturn that began in 2007. Revised projections from the State Demographer's Office and MAG are not expected until the end of 2012. With that said, these projections represent the best information available and are presented in the following sections (see sidebar on this page for more information).

Population

The 2010 population density for the areas surrounding the I-10 Corridor is presented in Figure 4.5. The following sections provide additional observations related to the current and projected population in La Paz and Maricopa Counties.

La Paz County

The 2010 Census population for La Paz County is 20,489, up 4 percent from 2000, when the population was 19,715 (U.S. Census Bureau 2000). As shown in Table 4.2, the population in La Paz County and Quartzsite has grown by 4 percent and 10 percent, respectively, between 2000 and 2010. The population is projected to continue growing at a relatively slow rate when compared to the state as a whole or neighboring Maricopa County.

Overall, the population density within La Paz County is low today and is projected to remain low in the future.

Maricopa County

The 2010 Census population for Maricopa County is 3.8 million, up 24 percent from 2000, when the population was 3.1 million. As shown in Table 4.2, communities in the western portion of the Phoenix metropolitan area experienced tremendous growth between 2000 and 2010. The 2035 projections for Maricopa County show continued high growth, especially for communities in the western portion of the Phoenix metropolitan area.

Table 4.2 | Population

Place	2000	2010	2035	Percentage growth 2000 to 2010	Projected percentage growth 2010 to 2035
Arizona	5,130,632	6,392,017	11,049577	25	73
La Paz County	19,715	20,489	29,054	4	42
Quartzsite	3,354	3,677	4,912	10	34
Maricopa County	3,072,149	3,817,117	6,545,000	24	71
Avondale	33,883	76,238	135,272	112	77
Buckeye	6,537	50,876	504,403	678	891
Goodyear	18,911	65,275	358,656	245	449
Phoenix	1,321,045	1,445,632	2,303,633	9	59
Tolleson	4,974	6,545	10,194	32	56

Sources: Arizona Department of Administration 2006, MAG 2009, U.S. Census Bureau 2000 and 2010

The majority of the area between SR 101L and downtown Phoenix has a relatively high population density. The pockets with lower values are areas of industrial or commercial land uses. The population density west of SR 101L is beginning to increase, consistent with the growth that has occurred and is projected to continue to occur in the future.

Housing

The housing density for the areas surrounding the I-10 Corridor is presented in Figure 4.6. Notable observations from the figure include:

- The highest density of dwellings is located north of I-10 between SR 303L and downtown Phoenix.
- Residential density is low in the area west of SR 85.

Employment

The employment density for the areas surrounding the I-10 Corridor is presented in Figure 4.7. Notable observations from the figure include:

- There are few employers in the area west of SR 85.

Status of Population Projections

The following note is displayed on the website of the Arizona Office of Population and Employment Statistics:

2006–2055 POPULATION PROJECTIONS

NOTE: These projections were made in 2006 by the Population Statistics Units at the Department of Economic Security. We are keenly aware that they are now outdated. We are working diligently on producing a new projection series based on Census 2010. However, proper projection methods call for more detailed demographic data than currently available. We are scheduled to release the new projections by the end of 2012. We will do everything possible to release them ahead of schedule.

The table below compares the "projected" 2010 population as documented in 2006 and the "actual" 2010 population from the Census. Consistently, the 2006 projections are approximately 10 percent higher than the actual count.

Area	*2010 Census*	*2010 Projection*	*Percentage difference*
Arizona	*6,392,017*	*6,999,810*	*10*
La Paz County	*20,489*	*22,632*	*10*
Maricopa County	*3,817,117*	*4,217,427*	*10*

Figure 4.5 | 2010 Population density

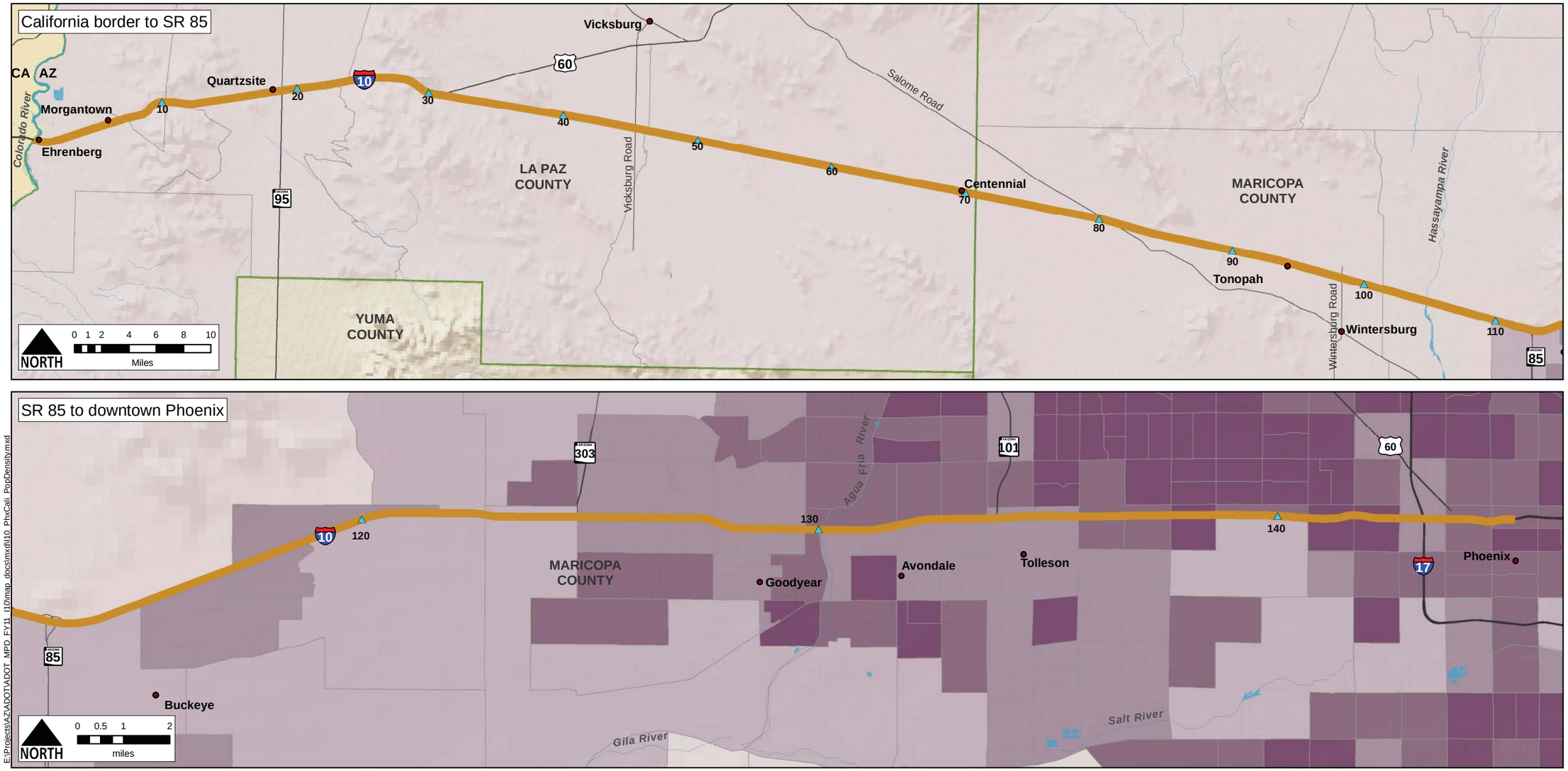
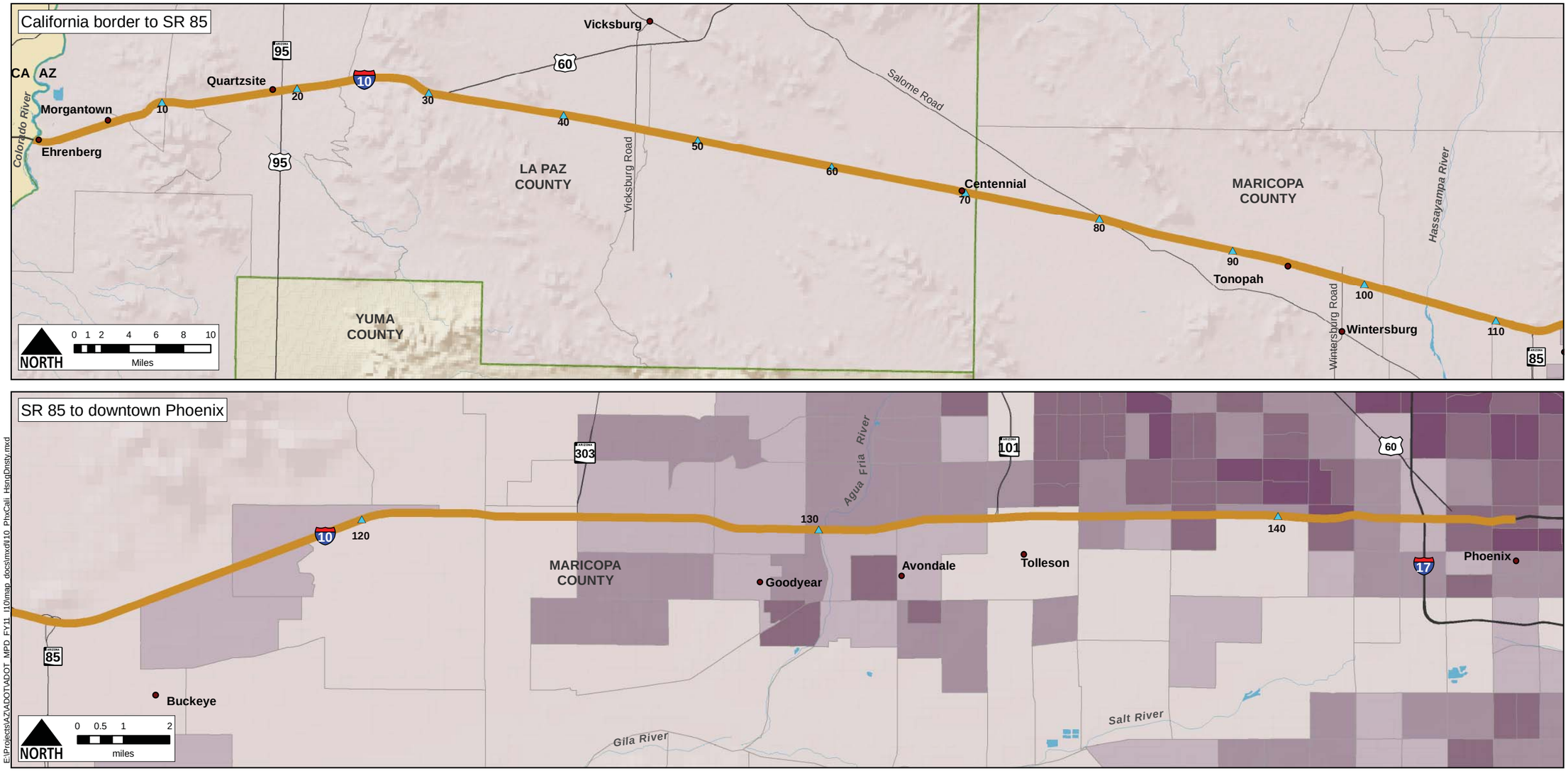


Figure 4.6 | 2010 Housing density



City
Milepost
Project location*
Stream
Lake
County boundary

Dwellings per square mile

0–500
501–1,000
1,001–2,000
2,001–3,000
3,001–12,345

*Study area extends 1 mile north and south of I-10

Source: U.S. Census Bureau (2010)

Date: 2/7/2012

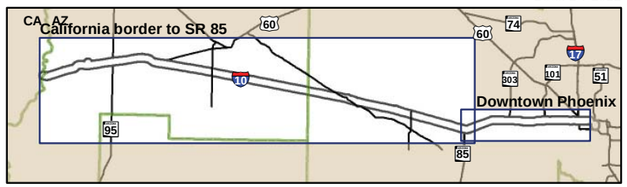


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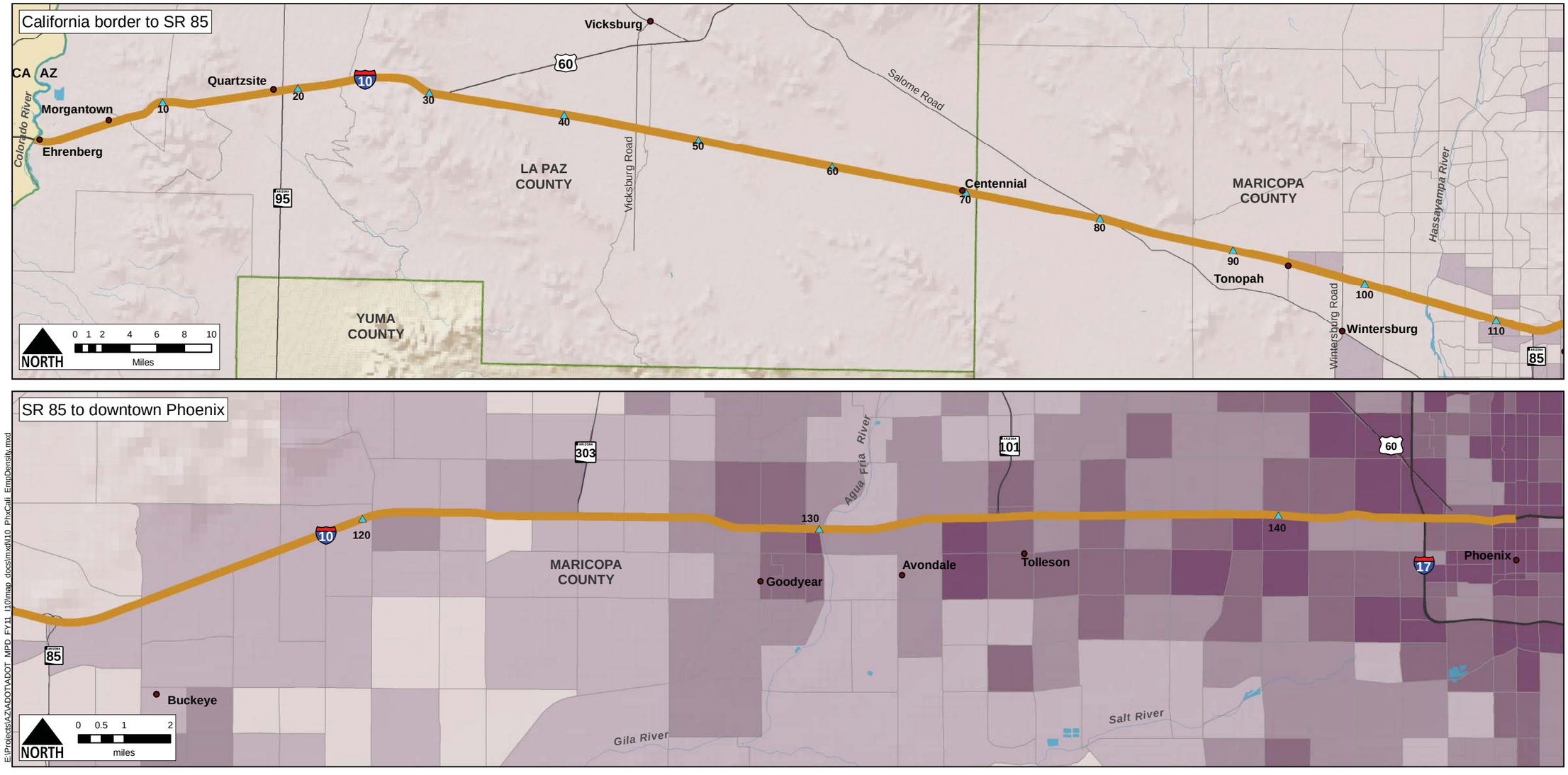
Figure 4.7 | 2010 Employment density



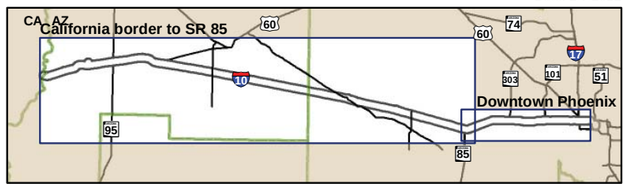
City
Milepost
Project location*
Stream
Lake
County boundary

Jobs per square mile
0–25
26–500
501–1,500
1,501–4,000
4,001–151,100

*Study area extends 1 mile north and south of I-10

Source: Maricopa County, Maricopa Association of Governments (2007); La Paz County, 2009 Business Patterns (2009)
For this graphic La Paz County total employment is distributed proportionately to La Paz Census Tracts, based on population.

Date: 2/7/2012



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- Relatively higher-density employment areas are located between SR 101L and downtown Phoenix, primarily in areas near the I-10 Corridor.

4.5 Environmental justice

The U.S. Environmental Protection Agency (EPA) and FHWA define environmental justice as "fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies" (EPA 2012). Environmental justice principles and procedures are followed to improve all levels of transportation decision making. Title VI prohibits discrimination on the basis of race, color, or national origin. The 1994 Executive Order 12898 on environmental justice addresses minority and low-income populations. The rights of women, the elderly, and the disabled are protected under related statutes. This Presidential Executive Order and other related statutes fall under the umbrella of Title VI.

Three fundamental environmental justice principles apply to the transportation project development process:

- avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations
- ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations

Effective transportation decision making depends on understanding and properly addressing the unique needs of different socioeconomic groups. Properly implemented, environmental justice principles and procedures improve all levels of transportation decision making. The approach will:

- make better transportation decisions that meet the needs of all people
- design transportation facilities that fit more harmoniously into neighborhoods
- provide opportunities for neighborhood input in the process, including identifying potential effects and mitigation measures in consultation with affected neighborhoods and improving accessibility to public meetings, official documents, and notices to affected neighborhoods
- improve data collection, monitoring, and analysis tools that assess the needs of, and analyze the potential impacts on, minority and low-income populations
- avoid disproportionately high and adverse impacts on minority and low-income populations
- minimize and/or mitigate unavoidable impacts by identifying concerns early in the planning phase and providing offsetting initiatives and enhancement measures to benefit affected neighborhoods

The five minority groups addressed by Title VI and Executive Order 12898 are:

- Black (a person having origins in any of the black racial groups of Africa)
- Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
- Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
- American Indian and Alaska Native (a person having origins in any of the original peoples of North America and who maintains cultural identification through Tribal affiliation or community recognition)
- Some other race (a person who does not identify with one of the previously listed four races), or persons of more than one race

A member of a low-income population is defined as "a person whose household income is at or below the Department of Health and Human Services poverty guidelines" (FHWA 1998). The U.S. Department of Health and Human Services poverty guidelines state that the poverty income level for a family of four in 2011 was $22,350.

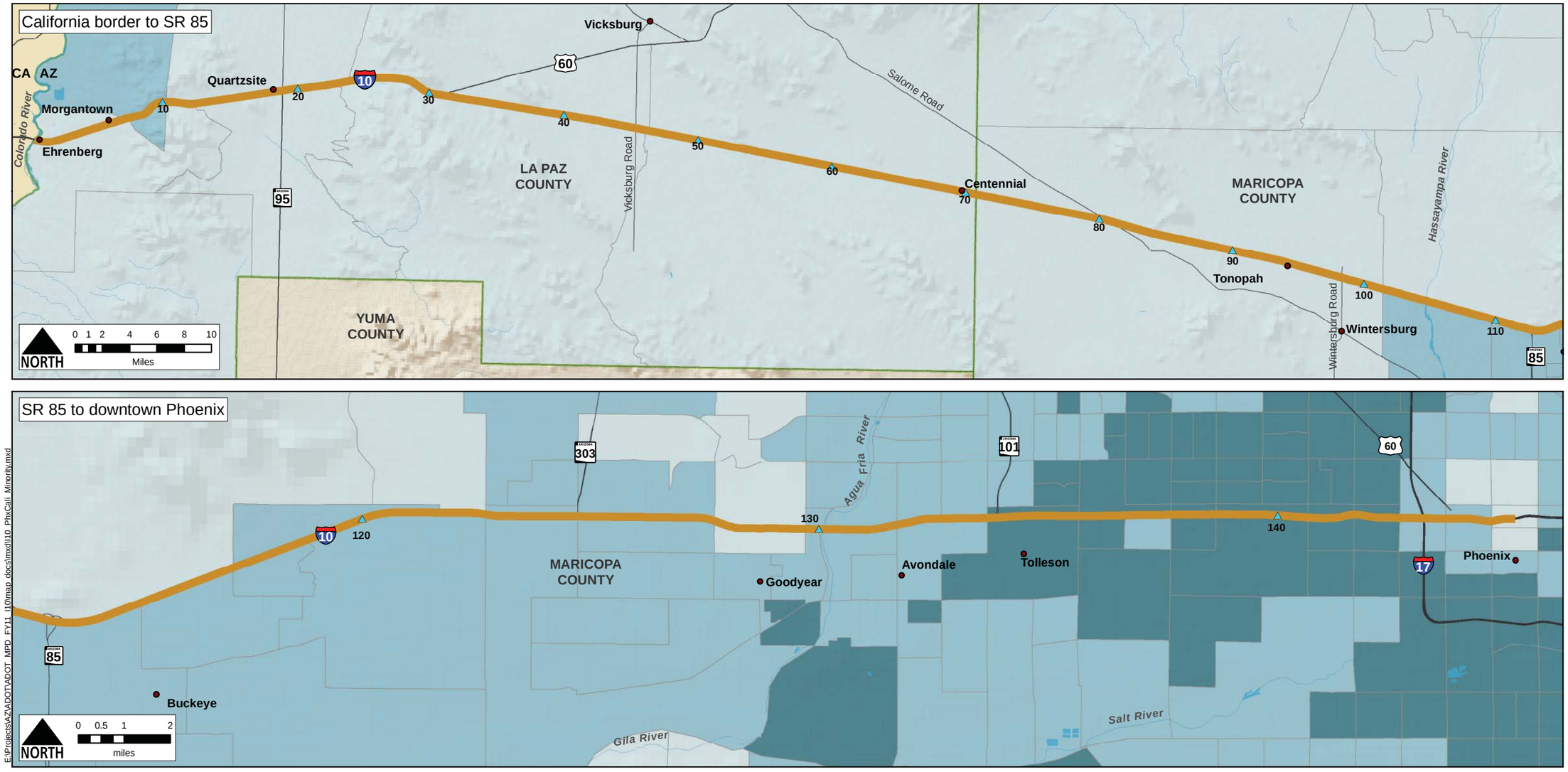
A geographic area is considered to have a minority or low-income population if more than 50 percent of its population meets the previously described minority or low-income definitions or if its minority or low-income population percentage is meaningfully greater in the affected area than is that for the general population. Other protected populations include concentrations of elderly, disabled, and female heads of household.

The geographic distribution of the Title VI and environmental justice populations in the area surrounding the I-10 Corridor is presented in Figures 4.8 to 4.12. For each group, the percentage within the census block was compared to the percentage for Arizona and categorized as below the Arizona percentage, at or above the Arizona percentage, and over twice the Arizona percentage. Notable observations from the figures include:

- The population surrounding I-10 between SR 85 and downtown Phoenix has a minority percentage greater than and mostly over two times as high as the Arizona percentage. The high minority percentage near the California border is within CRIT land.
- The downtown Phoenix area has a high percentage of low-income population. There are also census tracts of low-income populations in Goodyear near milepost 130 and within the CRIT land near the California border.
- Few areas surrounding the I-10 Corridor contain a high percentage of elderly people.
- The majority of the I-10 Corridor passes through areas where the percentages of disabled populations is greater than or equal to the Arizona average.
- The area between SR 85 and downtown Phoenix have a high percentage of female heads of household.

The majority of census blocks with high concentrations of Title VI and environmental justice populations are within the metropolitan Phoenix area. Any future projects proposed along the I-10 Corridor should consider these factors in both the evaluation of alternatives and in the opportunities provided for public involvement.

Figure 4.8 | Minority populations distribution

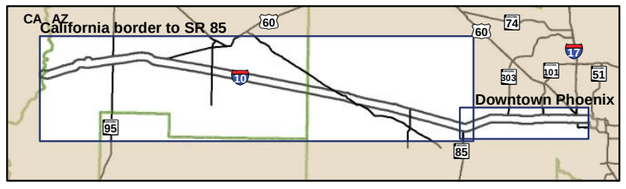


City
Milepost
Project location*
Stream
Lake
County boundary

Minority

Less than 42.2% (below Arizona percentage)
Greater than or equal to 42.2% (at or above Arizona percentage)
Greater than 84.4% (more than twice Arizona percentage)

Date: 2/7/2012



*Study area extends 1 mile north and south of I-10

Source: U.S. Census Bureau (2010)

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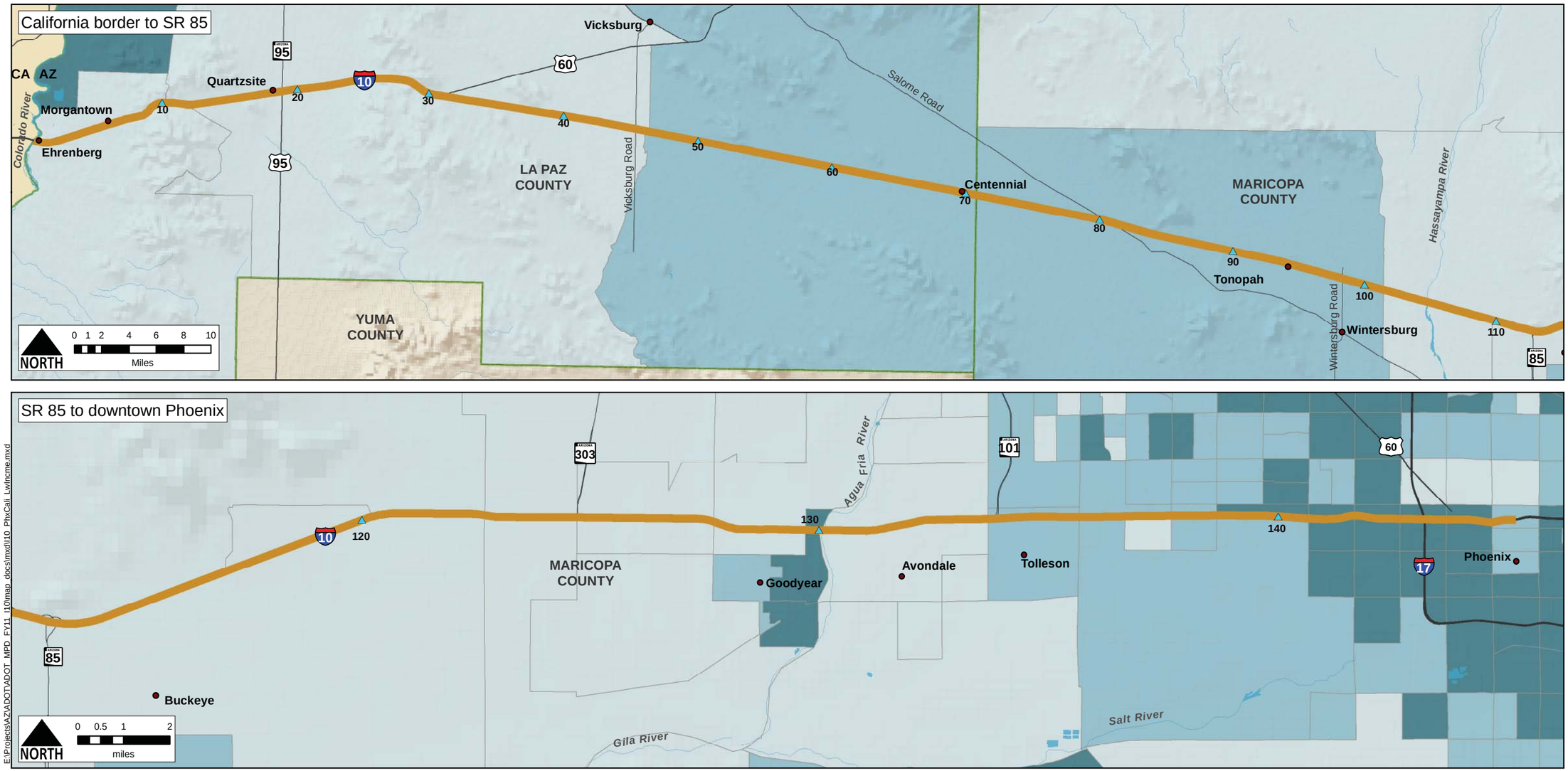
Figure 4.9 | Low-income populations distribution



City
Milepost
Project location*
Stream
Lake
County boundary

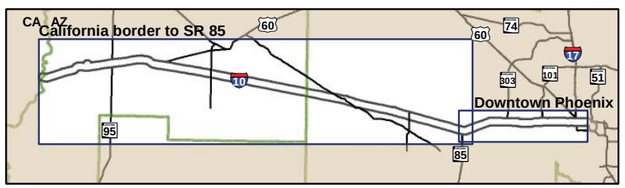
Low-income Population

Less than 14.7% (below Arizona percentage)

Greater than or equal to 14.7% (at or above Arizona percentage)

Greater than 29.4% (more than twice Arizona percentage)

Date: 2/7/2012



*Study area extends 1 mile north and south of I-10

Source: American Community Survey (2005–2009)

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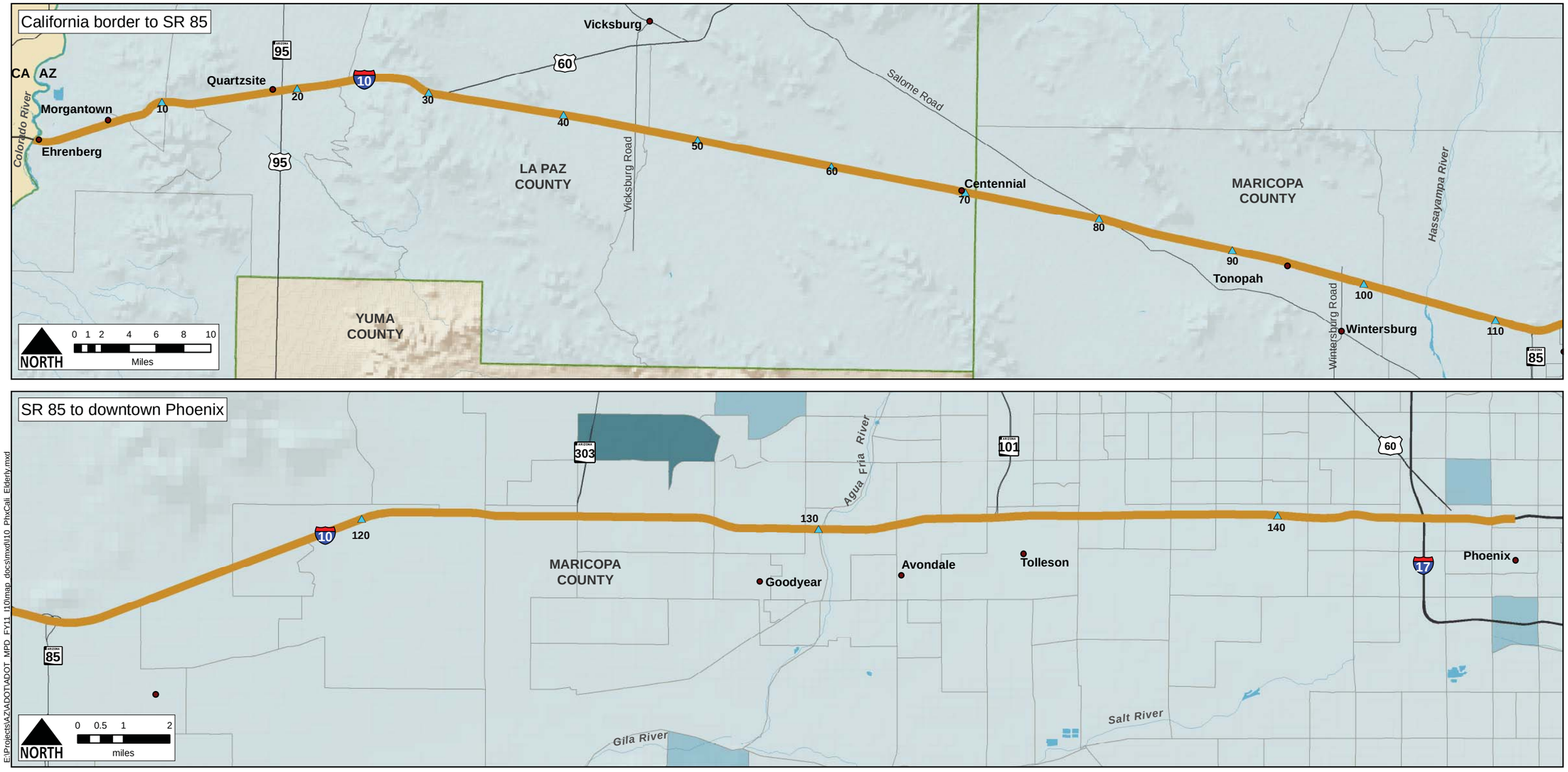
Figure 4.10 | Elderly populations distribution

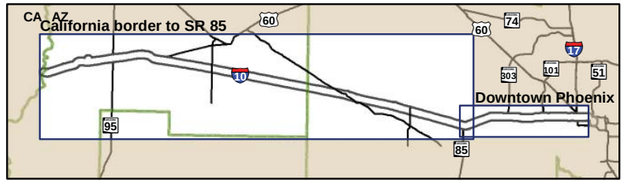


- City
- Milepost
- Project location*
- Stream
- Lake
- County boundary

Elderly (age 65 or greater) Population

- Less than 13.8% (below Arizona percentage)
- Greater than or above 13.8% (at or above Arizona percentage)
- Greater than 27.6% (more than twice Arizona percentage)

Date: 2/7/2012



*Study area extends 1 mile north and south of I-10

Source: U.S. Census Bureau (2010)

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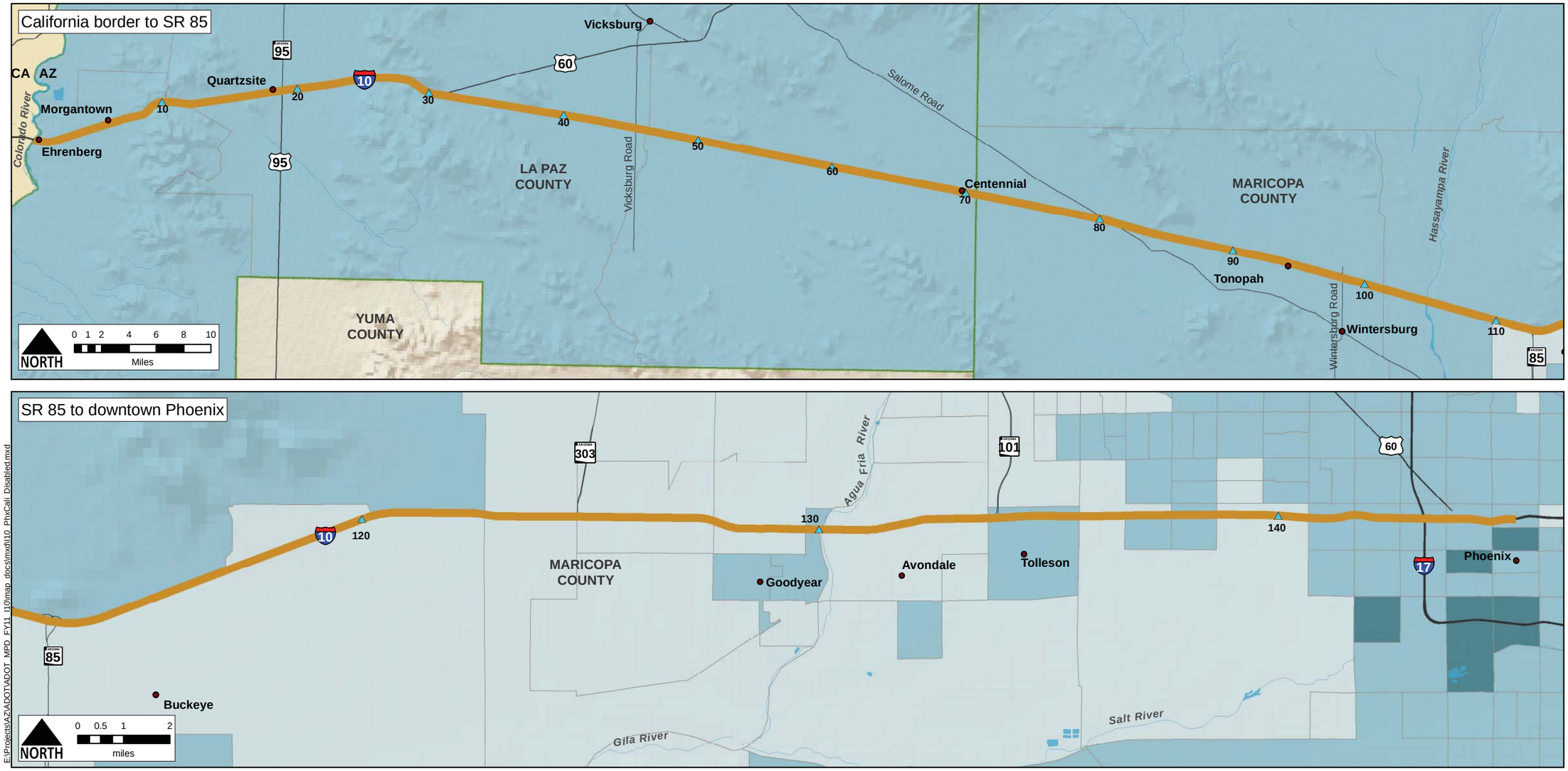
Figure 4.11 | Disabled populations distribution

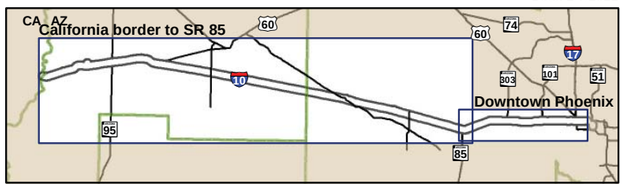


City
Milepost
Project location*
Stream
Lake
County boundary

Disabled Population

Less than 19.3% (below Arizona percentage)
Greater than or equal to 19.3% (at or above Arizona percentage)
Greater than 38.6% (more than twice the Arizona percentage)

Date: 2/7/2012



*Study area extends 1 mile north and south of I-10

Source: U.S. Census Bureau (2010)

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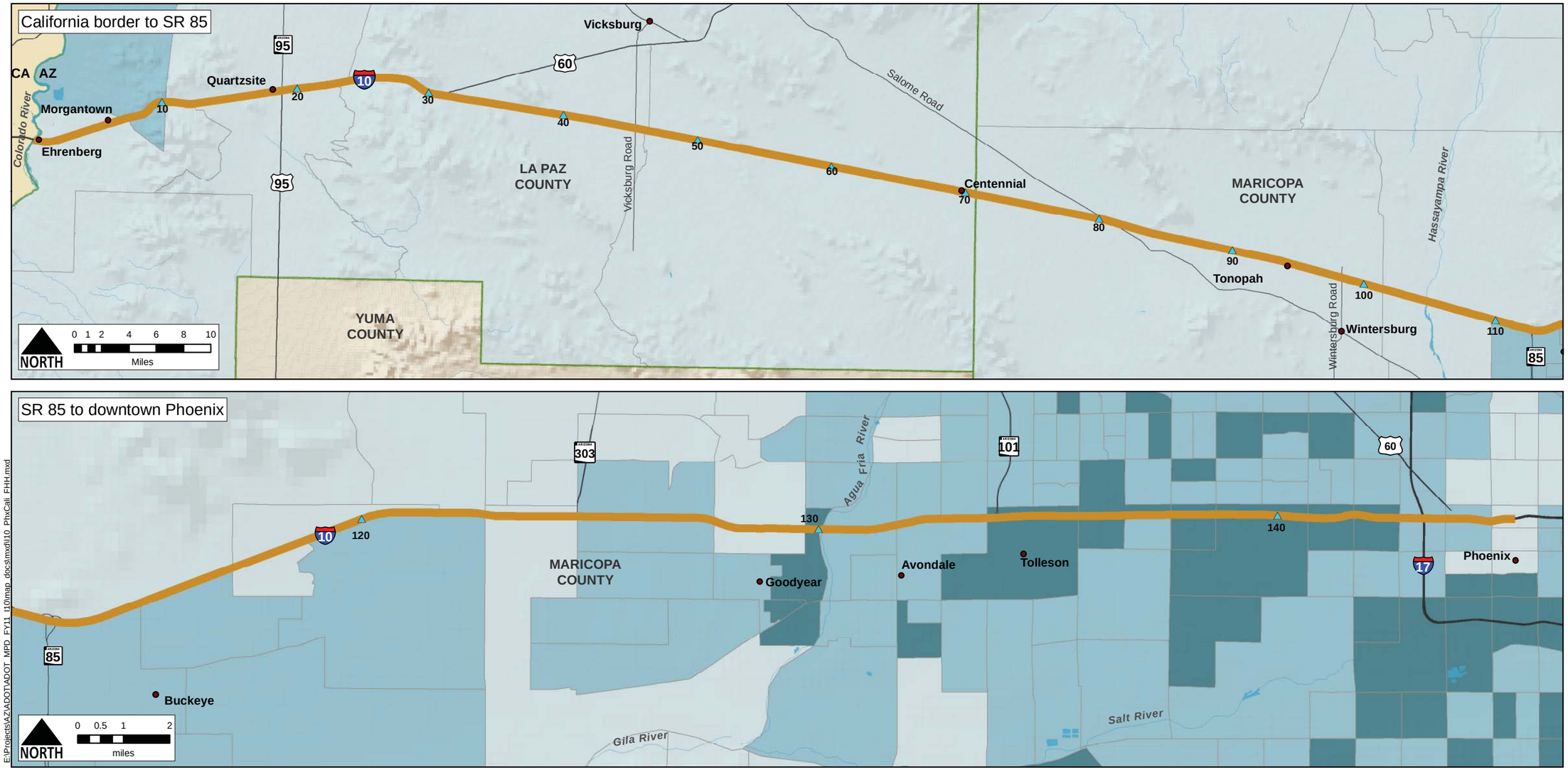
Figure 4.12 | Female heads of household populations distribution



City
Milepost
Project location*
Stream
Lake
County boundary

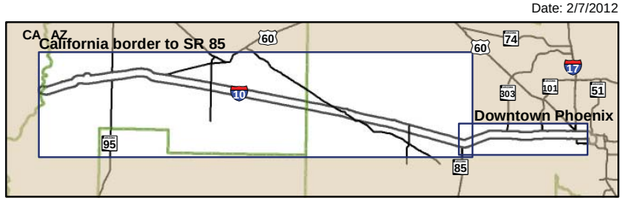
Female Heads of Household (with children under 18 years of age) Population

Less than 8.5% (below Arizona percentage)

Greater than or equal to 8.5% (at or above Arizona percentage)

Greater than 17% (more than twice Arizona percentage)

Date: 2/7/2012



*Study area extends 1 mile north and south of I-10

Source: U.S. Census Bureau (2010)

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4.6 Special event facilities

Special event facilities promote economic activity for surrounding areas, but also produce increased traffic congestion and delays. The majority of special event facilities identified were major sporting event venues and concert halls within the Phoenix metropolitan area. Outside of this area, there are also large trade shows in Quartzsite that attract hundreds of thousands of annual visitors to the I-10 Corridor. The following sections describe the use and schedule of events for each facility. Additional information is presented in Table 4.5, and locations are shown in Figure 4.13.

La Paz County

Quartzsite Shows

The Quartzsite Shows show grounds are located south of I-10 along SR 95 adjacent to the Tyson Wells site. Some of the major events at this site include a classic car show; a sports, vacation, and recreational vehicle show; and a hobby, craft, and gem show.

Tyson Wells

The Tyson Wells site is located in the southwestern corner of I-10 and SR 95 in Quartzsite. The 25-acre site provides over 800 booths during annual events showcasing rocks, gems, minerals, crafts, antiques, and other items.

Maricopa County

Arizona Exposition and State Fair

The state fair grounds encompass over 80 acres of land. Concerts during the fair are held on-site at the Phoenix Veterans Memorial Coliseum (former home of the Phoenix Suns). The State Fair runs annually from mid-October to early November. Secondary uses for the fair grounds include trade shows and corporate events.

Chase Field

Located in downtown Phoenix, Chase Field is home to Major League Baseball's Arizona Diamondbacks. The capacity of the stadium is approximately 49,000 for baseball games. The baseball season runs from April to October, with most games held on weekday evenings and on weekend days or evenings. In 2011, Chase Field hosted the Major League Baseball All-Star Game.

Secondary uses for Chase Field include sporting events such as soccer and football games, motocross races, or monster car exhibitions. The stadium is also used for concerts and trade shows.

Ashley Furniture Homestore Pavilion

The open-air amphitheater seats 8,000 in a covered pavilion and an additional 12,000 on a large grassy hillside behind the main seats. The concert season generally runs from April through October.

Jobing.com Arena

Located in Glendale, Jobing.com Arena is home to the National Hockey League's Phoenix Coyotes. The capacity of the arena is approximately 17,000 for hockey games. The hockey season runs from October to April, with all games occurring in the evenings.

The arena also serves as a primary concert venue for artists playing in the Phoenix metropolitan area. The arena has also hosted special sporting events such as National Collegiate Athletic Association Tournament games.

Phoenix Convention Center

The Phoenix Convention Center is located in downtown Phoenix. Recently expanded and remodeled in 2008, it offers more than 900,000 square feet of meeting and event space. The site hosts a wide variety of trade shows, expositions, and conventions.

In addition to the convention center, a number of museums, concert halls, and theatres are located in downtown Phoenix that provide year-round entertainment opportunities.

Phoenix International Raceway

The Phoenix International Raceway annually hosts NASCAR race weekends in both February and November. The grandstands seat approximately 76,000. There are additional viewing areas on an adjacent hillside and in the race track's infield area. Special race-event detouring has been developed by ADOT in coordination with Avondale and Goodyear.

University of Phoenix Stadium

Located in Glendale, the University of Phoenix Stadium is home to the National Football League's Arizona Cardinals. The stadium can seat up to 78,000 for football games. The football season runs from September to January. The stadium hosted the 2009 Super Bowl and will host the game again in 2015.

College football's Fiesta Bowl is held at the stadium annually in early January, and the National Championship game is held at the stadium once every 4 years. Other uses include major concerts, monster car exhibitions, motocross races, World Wrestling Federation events, and trade shows.

Table 4.5 | Special event facilities

Facility	City	Location	Main attraction	Secondary attractions
Arizona Exposition and State Fair	Phoenix	19th Avenue and McDowell Road	State and Maricopa County Fair	Trade shows
Chase Field	Phoenix	7th Street and Jefferson Street	Arizona Diamondbacks	Trade shows, concerts
Ashley Furniture Homestore Pavilion	Phoenix	83rd Avenue and Encanto Boulevard	Concerts	
Jobing.com Arena	Glendale	Glendale Avenue and SR 101L	Phoenix Coyotes	Trade shows, concerts
Phoenix Convention Center	Phoenix	3rd Street and Washington Street	Major conventions	Trade shows
Phoenix International Raceway	Avondale	Avondale Boulevard and Baseline Road	NASCAR races	Trade shows, race showcases
Quartzsite Shows	Quartzsite	I-10 and SR 95	Sports, vacation, and RV shows	Hobby, craft, and classic car shows
Tyson Wells	Quartzsite	I-10 and SR 95	Rock and Gem Show	Hobby, craft, and antique shows
University of Phoenix Stadium	Glendale	Bethany Home Road and SR 101L	Arizona Cardinals	Trade shows, concerts
US Airways Center	Phoenix	1st Street and Jefferson Street	Phoenix Suns	Concerts, basketball showcases

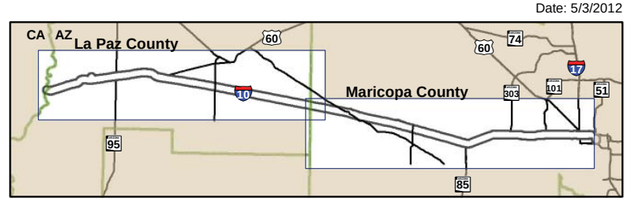
Figure 4.13 | Special event facilities

City
Milepost
Project location*
Stream
Lake
County boundary

Special event facilities

*Study area extends 1 mile north and south of I-10

Date: 5/3/2012



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US Airways Center

Located in downtown Phoenix, the US Airways Center is home to the National Basketball Association's Phoenix Suns and the Women's National Basketball Association's Phoenix Mercury. The Phoenix Suns season runs from November to April, while the Phoenix Mercury season runs from June to September. The arena seats approximately 18,000 for basketball games. Secondary uses of the arena include concerts, trade shows, and festivals.

4.7 Parks and recreational facilities

Parks, trails, and other recreational facilities are an important aspect of the quality of life of a community. This section provides an overview of parks and recreational facilities near the I-10 Corridor. It is primarily focused on parks and recreational aspects of trails. Bicycle and pedestrian facilities that serve more of a transportation mode are discussed separately in the following section.

The types of recreational opportunities in the I-10 Corridor are diverse and include, but are not limited to:

- Mountain and desert multiuse trails provide unlimited opportunities for hiking, horseback riding, and off-highway vehicle (OHV) activities. These activities are a major tourist attraction for La Paz County.
- Parks provide diverse opportunities for recreational activities, from playgrounds at local city parks to hiking, mountain biking, and camping at regional county parks.

The facilities have been grouped by the agencies and organizations that have the responsibility for management, operation, and planning. Most of the facilities are shown in Figure 4.14.

Bureau of Land Management

The BLM provides opportunities for quality recreational experiences on their land to support national and local economies and to improve the health and well-being of the public. The following listed activities are available on BLM-administered land near I-10.

- Biking, hiking, horseback riding, and OHV riding
  - The thousands of miles of BLM-managed desert and mountain roads in La Paz County are primarily used by OHVs; however, they also provide opportunities for other nonmotorized activities.
  - To preserve desert habitat, BLM typically restricts such uses to existing or designated roads and trails.
  - The Ehrenberg Sandbowl, located just south of I-10, is open to OHVs and provides hilly, sandy terrain and a network of roads and trails.
- Floating, fishing, and picnic areas
  - The A-7 and A-10 day-use parks located south of Ehrenberg along the Colorado River provide opportunities for numerous outdoor activities.
- Camping
  - A number of 14-day camping areas (Hi Jolly, Domerock Mountain, Plomosa, Scadden Wash, and Road Runner) are located in and around Quartzsite.
  - The La Posa Long Term Visitor Area provides opportunities for stays up to 7 months. There are four campgrounds on the approximately 11,400 acres.
- Scenic drives
  - The Harquahala Mountain Back Country Byway is accessed near the I-10 and Salome Road interchange. The rugged drive provides access to the Harquahala Mountains, the highest point in southwestern Arizona.
- Rockhounding, hunting, target shooting
  - There are no designated areas for these activities, however, unless specifically prohibited, they are allowed on all BLM public lands.

BLM also offers designated areas for wildlife watching, access to cultural and historic resources and national monuments; however, none of these activities are directly accessed from the I-10 Corridor.

La Paz County

La Paz County manages six parks. Three community parks provide picnic areas, fields, and playgrounds; two parks located near Parker provide opportunities for swimming, fishing, boating, and other water-related activities; and a park between Salome and Senden on US 60 includes camping sites and access to OHV trails.

The Ehrenberg Community Park is located just north of I-10 in Ehrenberg on Parker/Poston Road (see Figure 4.14). The park is a partnership between La Paz County and the Ehrenberg Improvement Association.

The La Paz County Comprehensive Plan (La Paz County 2005) includes goals and objectives to support expansion of the county's parks and recreation system. The goals and objectives include working with BLM and the Arizona State Land Department to maintain and enhance open space within the county and add new County parks, with a focus on boating, camping, hiking, walking, biking, and equestrian uses.

Town of Quartzsite

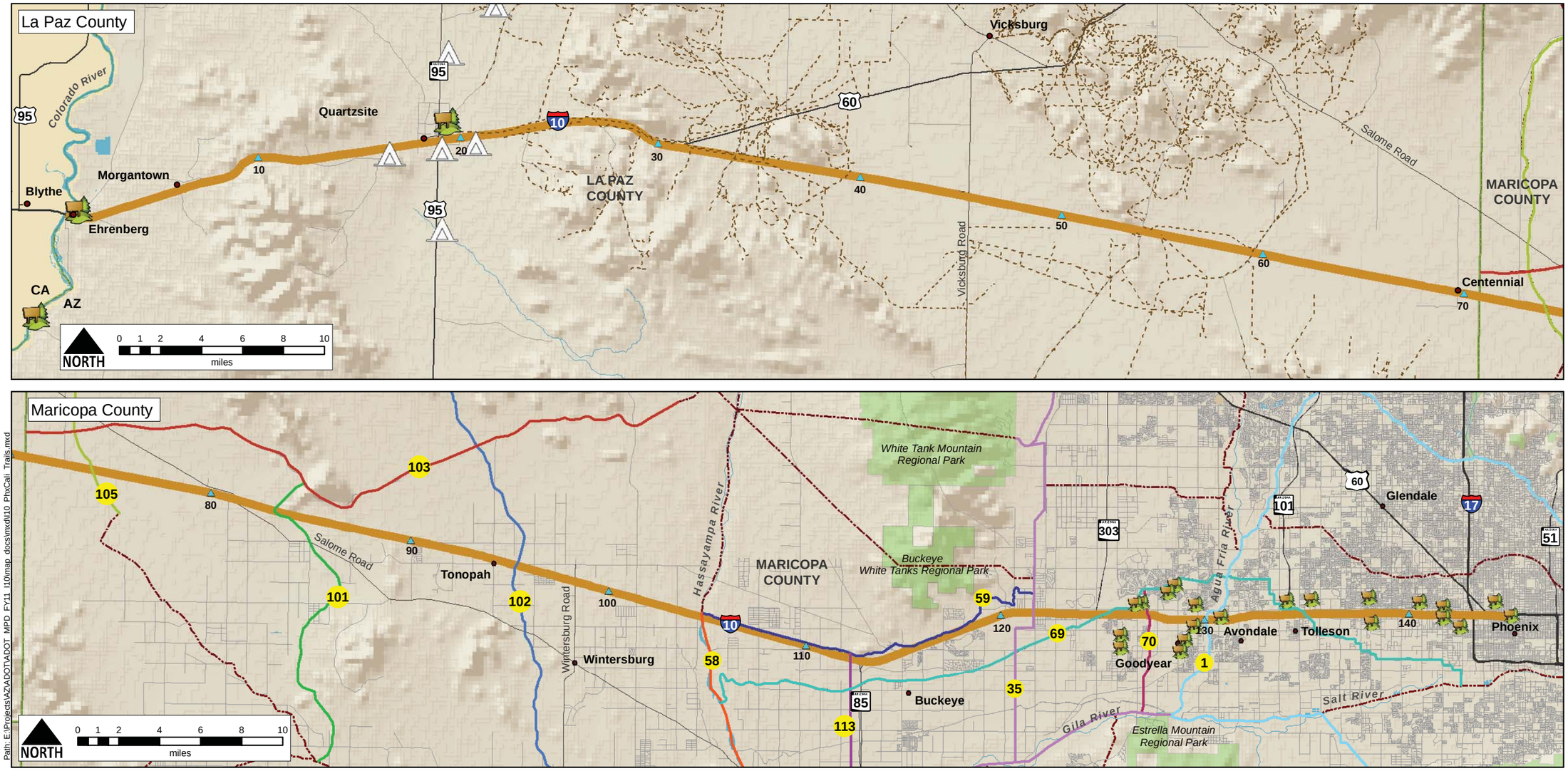
Quartzsite has one regional park, Town Park, which encompasses 80 acres. Town Park currently consists of a volleyball court, a basketball court, children's play equipment, and donated fighter jets that serve as an ornamental display in the park.

The General Plan identifies the need for additional park and recreational facilities and a system of bicycle, pedestrian, and equestrian trails along the washes that pass through town.

Maricopa County

Maricopa County retains a similar vision to BLM when it comes to balancing providing access to nature through regional parks, trails and programs while preserving open spaces and natural habitat. The backbone of the park system is the Maricopa Trail, which encircles the Phoenix metropolitan area and connects the County's ten regional parks.

Figure 4.14 | Recreational facilities

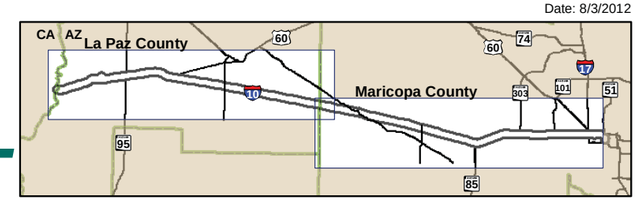


City
Milepost
Project location*
Stream
Lake
County boundary

Campground
Day-use parks
BLM off-highway vehicle trails (Lake Havasu Field Office)
Maricopa County Trails near I-10 (see Table 4.6)
Other Maricopa County trails

*Study area extends 1 mile north and south of I-10

Date: 8/3/2012



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Parks

The County manages ten regional parks; three of which would be primarily accessed using the I-10 Corridor.

- Buckeye Hills Regional Park consists of over 4,400 acres of pristine desert adjacent to the Gila River just west of SR 85. The hiking, camping, and overall trail system is primitive and has not been developed. The park is home to the General Joe Foss Shooting Complex.
- White Tank Mountain Regional Park is the largest park in the county system, at nearly 30,000 acres. The park is north of I-10 and west of SR 303L. The park is made up of the White Tank Mountains and includes multiple campgrounds with recreational vehicle access and picnic sites, and over 25 miles of multiuse trails for biking, hiking, and horseback riding.
- Estrella Mountain Regional Park became the first regional park in 1954 and covers almost 20,000 acres. The park is accessed from Estrella Parkway south of I-10. The park includes a golf course, baseball fields, rodeo arena, and competitive mountain bike track. These facilities are in addition to campgrounds, picnic sites, and over 33 miles of multiuse trails for biking, hiking, and horseback riding.

Trails

Within Maricopa County there is a highly developed trail system for pedestrian, equestrian, and bicycle use. Motorized vehicles are prohibited from using any of the County trails. The system of trails, developed by the Maricopa County Trail Commission, includes over 100 segments, of which 10 have been identified as either crossing or close to the I-10 Corridor. These trails are listed in Table 4.6 and highlighted in Figure 4.14.

The highest priority trails in the system are the Sun Circle Trail and the Maricopa Trail. The Sun Circle Trail was first envisioned in the 1960s as a hiking and horseback riding trail system, using the canal banks originally built by the Hohokam in 500 A.D. In 1977, the Sun Circle Trail was accepted into the National Trails System and designated a National Recreational Trail (Maricopa County Trail Commission 2004).

Table 4.6 | Maricopa County trails near I-10

Segment	Name	Location related to I-10
1	Sun Circle Trail	crosses at the Agua Fria River
35	Maricopa Trail	crosses just west of Jackrabbit Trail
58	Hassayampa River	crosses at the Hassayampa River
59	Buckeye Flood Retardant Structure	parallel, just north of I-10 near SR 85
69	RID Canal	crosses near 99th Avenue
70	Bullard Wash	crosses just west of Bullard Avenue
101	Harquahala flood retardant structure	crosses near milepost 83
102	Old Camp Wash	crosses just east of Tonopah
105	Tiger Wash	crosses near milepost 75
113	Flood Control District regional conveyance channel	parallel, just north of I-10 in western Maricopa County

Source: MCTC 2004

The Maricopa Trail is 242 miles long and circles the entire metropolitan Phoenix area while providing a nonmotorized connection among the ten county regional parks and other local parks. Completion of the Maricopa Trail is a top priority for the County parks and recreation department.

Local agencies in Maricopa County

Providing open spaces and recreational opportunities is also a goal of towns and cities in the urban areas of Maricopa County. The parks shown in Figure 4.14 are generally located within 1 mile of I-10. They provide a range of services, from large community parks with ball fields, tennis and basketball courts, and swimming pools to smaller neighborhood parks with playground equipment and park benches. By jurisdiction, the parks include:

- Buckeye
  - — Buckeye White Tanks Regional Park
- Goodyear
  - — Canada Village
  - — McDowell RID
  - — Bullard Wash Phase 2
  - — Palm Valley
  - — Parque de Paz
  - — Wildflower North
- Avondale
  - — Friendship Park
- Tolleson
  - — Tolleson Veterans Park
  - — 95th Avenue Park
- Phoenix
  - — 95th Avenue and Encanto Park
  - — Desert Star
  - — Sunridge
  - — Desert West
  - — Sueno
  - — Falcon
  - — 32nd Avenue and McDowell Road
  - — Willow
  - — Encanto Park
  - — University
  - — Hu-O-Te
  - — Margaret T. Hance Park

4.8 Bicycle and pedestrian facilities

The previous section discussed opportunities for bicycling and walking as recreational activities. This section considers bicycling and walking as a fundamental mode of transportation (nonmotorized travel) and the facilities that support the functional purposes of such trips.

The road network (travel lanes, shoulders, or designated bicycle lanes) provides the primary facilities used by bicyclists. Arizona Revised Statutes (A.R.S.) § 28-812, which grants a bicyclist on a roadway or on a shoulder of a roadway "all the rights and … all the duties" applicable to a motorist, made bicycling a viable form of

transportation because it gave bicyclists the right to use any roadway in the state, except where prohibited.

The road network (shoulders and sidewalks) also provides the primary facilities used by pedestrians.

Federal transportation legislation has continually supported consideration of nonmotorized alternatives in transportation plans and the need to accommodate bicyclists and pedestrians in the planning and design of roadway projects.

In reviewing the goals, objectives, and plans from each agency and jurisdiction, a common theme was the continued and expanded support for nonmotorized travel opportunities. Options include adding bicycle lanes and sidewalks to existing transportation corridors or developing new multimodal trails along canal banks, washes, or other natural routes.

Arizona Department of Transportation

ADOT has developed a bicycle and pedestrian plan that encompasses all of Arizona. The purpose of the Statewide Bicycle and Pedestrian Plan (ADOT 2003) is to provide a long-term plan for a system of shared roadways and bicycle and pedestrian facilities for the ADOT State Highway System.

The main criteria used to evaluate highways as potential bicycle and pedestrian corridors included:

- right shoulder width
- volume to capacity ratio
- speed limit
- percentage truck traffic

A score was assigned to all state highway segments for the criteria listed above to quantitatively represent bicycling conditions. Segments that have scores greater than 18 are considered to have conditions favorable to bicycling. Segments with scores between 13 and 17 typically have a favorable condition such as a wide right shoulder or low traffic volume, with one or two other parameters having average conditions. Lastly, those segments with scores of less than 12 have less favorable conditions. I-10 between the California border and SR 303L scored greater than or equal to 18, making it relatively bicycle friendly.

A.R.S. § 28-733 allows ADOT to restrict the use of bicycles on controlled-access highways such as I-10. Bicycles may be prohibited from using controlled-access highways on the recommendation of the District Engineer with the approval of the State Traffic Engineer. Bicycles are currently prohibited on the section of I-10 from Verrado Way (milepost 120.22) in Buckeye to Kolb Road (milepost 270.59) in Tucson. It is anticipated that as the Phoenix metropolitan area continues to develop, this restriction could move further west.

La Paz County

Outside of I-10, there is no continuous system of pedestrian or bicycle facilities within La Paz County or cities located in the county. The County's Comprehensive Plan included the following potential actions to enhance nonmotorized travel:

- create a regional bicycle network that ties the county's towns together
- locate bicycle facilities as an integral part of the road system in the form of bicycle lanes or wide paved shoulders
- include sidewalks, paths, or trails when development or improvements occur
- nonvehicular facilities should be developed in a coordinated and systematic effort to ensure relevant connectivity and to ensure that facilities connect key destinations to encourage use

Town of Quartzsite

There are currently no nonmotorized routes within Quartzsite. Quartzsite would benefit from a local circulator transit system, especially for the many senior visitors who might not be up to lengthy bike rides for shopping, dining, and other trips. Nevertheless, a network of bike paths and lanes, together with a complementary network of pedestrian sidewalks and multiuse paths, is needed in Quartzsite (ADOT 2010).

Maricopa County and local agencies

As described in the previous section, there is an extensive network of nonmotorized trails throughout Maricopa County. These recreational trails are supplemented by a generally universal desire by MCDOT and local agencies to incorporate bicycle lanes and sidewalks or multiuse paths into the cross section for arterial streets.

New or widened roads typically include striped bicycle lanes 4 to 6 feet wide and detached sidewalks or multiuse paths 5 to 10 feet wide.

4.9 Public transportation facilities

This section describes the existing public transportation infrastructure. Public transportation service, routes, and demand are described in further detail in Section 5.2, *Transit services*. Predominantly, public transportation facilities are owned and operated by local and regional agencies or MPOs. Types of facilities include transit stations, bus stops and pullouts, and park-and-ride lots.

La Paz County

No public transportation facilities are located within the towns along I-10 in La Paz County.

Maricopa County

Within Maricopa County, park-and-ride lots support the freeway bus rapid transit/express routes. Existing park-and-ride lots are located:

- in Goodyear on the southern side of Cornerstone Boulevard, just west of Dysart Road
- in Phoenix at 79th Avenue, located at the southeastern corner of 79th Avenue and McDowell Road
- in Buckeye at Jackrabbit Trail just north of McDowell Road

Two transit centers are located close to the I-10 Corridor. The Desert Sky Mall Transit Center is located at 79th Avenue and Encanto Boulevard (approximately 1 mile north of I-10) and provides connections to four local routes, an express route, and a RAPID route. The Central Station is located on Van Buren Street between 1st Avenue and Central Avenue in downtown Phoenix (approximately 1 mile south of I-10). The Central Station provides transfers between multiple local, express, and RAPID bus routes and the METRO light rail line.

4.10 Airports

The Aviation Group within ADOT's Multimodal Planning Division performs the following functions:

- encourage and advance the safe and orderly development of aviation in the state
- assemble and distribute information relating to aviation to the public
- provide funding to public airports for planning, land acquisition, and construction projects
- accept federal and other monies for airport development or air navigation facilities
- make recommendations on legislative and policy issues

Three public airports are served by I-10 within the study area (see Figure 4.15):

- Buckeye Municipal Airport
- Phoenix Goodyear Airport
- Glendale Municipal Airport

Other airports that are either not public or are located just outside the study area, but remain important to surrounding communities, include (see Figure 4.15):

- Phoenix Sky Harbor International Airport
- Luke Air Force Base
- Avi Suquilla Airport

La Paz County

Avi Suquilla Airport

Avi Suquilla Airport is located outside of the study area, approximately 40 miles north of I-10 along SR 95 in Parker, Arizona. The community airport is owned and operated by the CRIT and is one of the only airports serving communities in western Arizona.

Maricopa County

Buckeye Municipal Airport

Buckeye Municipal Airport is owned and operated by the Town of Buckeye. It is classified as a community airport and provides services including flight training, sky diving, aircraft storage, and self-serve fuel. In 2007, the Town completed an airport master plan that outlines a financially feasible development program that will satisfy aviation demand and be compatible with community development, alternative transportation modes, and the environment.

Phoenix Goodyear Airport

The Phoenix Goodyear Airport is part of the City of Phoenix airport system and is classified as a reliever airport for Phoenix Sky Harbor International Airport. The Phoenix Goodyear Airport provides a fixed-use operator and services tailored to private airplanes accessing the southwestern Phoenix metropolitan area.

Glendale Municipal Airport

Glendale Municipal Airport is owned and operated by the City of Glendale. It is classified as a reliever airport for Phoenix Sky Harbor International Airport. The Glendale Municipal Airport is a full-service airport tailored to private airplanes accessing the northwestern Phoenix metropolitan area.

Phoenix Sky Harbor International Airport

Phoenix Sky Harbor International Airport serves as a hub of transportation and economic activity in the Phoenix metropolitan area and along the I-10 Corridor. Although located approximately 6 miles east of the study area, it is important to consider its effects on all aspects of the area. On an average day, Sky Harbor Airport serves:

- more than 1,200 aircraft arrivals and departures
- more than 100,000 passenger arrivals and departures
- more than 600 tons of air cargo

The major source of funding for development and operation of these municipal airports is grants from the Federal Aviation Administration and ADOT.

Luke Air Force Base

Luke Air Force Base is located approximately 5 miles north of I-10 along Litchfield Road. The base is a primary training ground for F-16 fighter pilots and maintainers. The base is home to 138 aircraft, 24 squadrons, four tenant units, and over 5,200 military and civilian personnel. The flight paths for the base's two runways extend across I-10 near Perryville Road. Additionally, the noise contours for the aircraft activities cross I-10 in the area of Perryville Road.

4.11 Railroads

The Union Pacific Railroad (UPRR) and the Burlington Northern Santa Fe (BNSF) Railway are the only companies that maintain existing tracks in the area of the I-10 Corridor (see Figure 4.15). Presently, the Phoenix metropolitan area is off the main lines of both BNSF and UPRR, and is serviced by branch lines of these companies.

UPRR maintains a freight rail line that enters the metropolitan region from the southeast and travels through the communities of Phoenix, Tolleson, Avondale, Goodyear, and Buckeye. In 1995, approximately 90 miles of UPRR track to the west, between Buckeye and Wellton, located in Yuma County, was abandoned and is no longer in use for the purpose of transporting goods. The UPRR line does not cross I-10 within the study area. At one time, a spur crossed under I-10 between Dysart Road and Litchfield Road, but it has since been abandoned.

BNSF currently operates a primary line that extends from central Phoenix and through the communities of Glendale, Peoria, El Mirage, Surprise, and Wickenburg. The line extends to the far northwestern section of Maricopa County and then extends through northern Arizona to Flagstaff, where it connects to the BNSF main track, providing continental service to a variety of areas throughout the country. In relation to I-10, the BNSF line parallels US 60/Grand Avenue and crosses I-10 at approximately 19th Avenue before terminating in downtown Phoenix.

4.12 Utilities

Limited information concerning utilities is provided in this section. This is intended as an overview and, if further information is needed, additional engineering studies should be conducted or specific engineering drawings or reports reviewed.

Figure 4.15 | Railroads and airports

City
Milepost
Project location*
Stream
Lake
County boundary
Railroad
Airport
Military air base

*Study area extends 1 mile north and south of I-10 *Source: ADOT*

Date: 8/3/2012

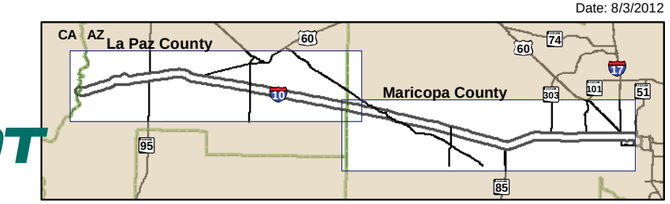

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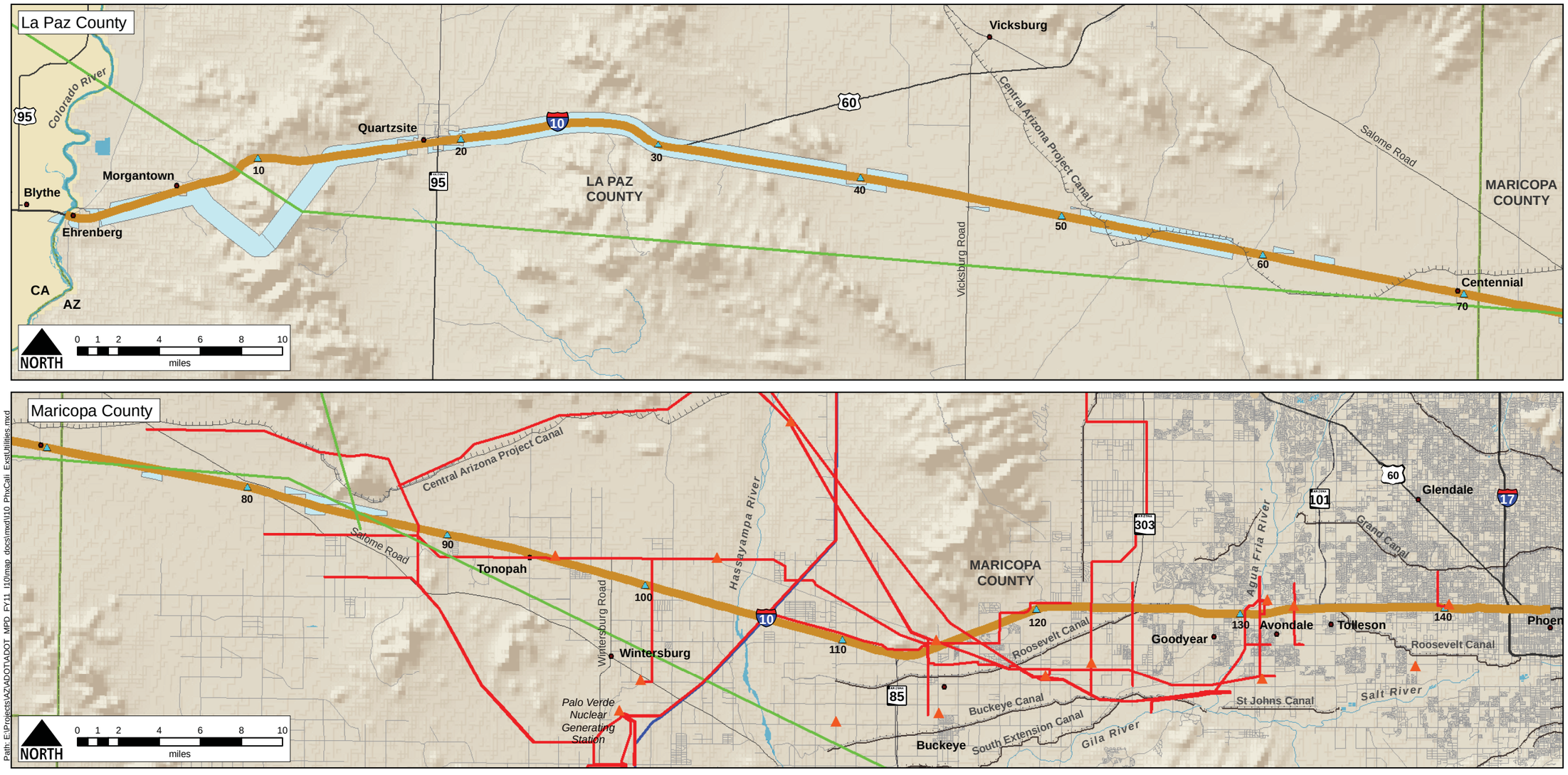
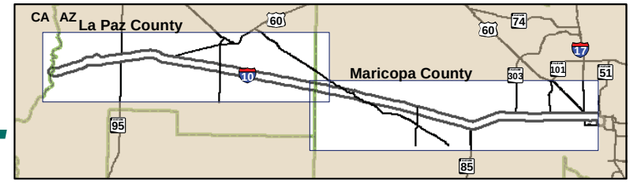
Figure 4.16 | Utilities



- City
- Milepost
- Project location*
- Stream
- Lake
- County boundary
- Existing power line corridor
- Natural gas line corridor
- Transwestern gas pipeline
- Utility substation
- BLM Section 368 energy corridor
- Canal

*Study area extends 1 mile north and south of I-10 *Source:* BLM, 2011 aerial photography analysis

Date: 8/3/2012



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Major utility infrastructure that would require considerable consideration in evaluating future transportation improvements is presented in Figure 4.16. The figure shows generalized known locations of various utilities and does not attempt to provide information on the available capacity or condition of these facilities.

The followings sections provide an overview of the following utilities:

- high-voltage power lines
- solar and wind developments
- high-pressure gas and fuel lines
- canals and water lines

Although not depicted in the figure or discussed in this report, other utilities including municipal water and sewer lines, low-voltage power distribution lines, service gas lines, and telecommunication (fiber optic and other) and cable lines also represent a major consideration for the evaluation and development of future projects in the I-10 Corridor.

High-voltage power lines

Numerous high-voltage (230 kilovolts and higher) power line corridors crisscross the landscape and the I-10 Corridor between the Maricopa County boundary and downtown Phoenix. These corridors bring electricity into the metropolitan area from the Hoover Dam and the Palo Verde Nuclear Generating Station. Primary owners of the high-voltage power lines include:

- Salt River Project (SRP)
- Arizona Public Service (APS)
- Western Area Power Administration (Western)

The high-voltage power lines and associated towers are cost-prohibitive to move and, therefore, create a major constraint for widening of I-10 and/or construction of new interchanges.

Solar and wind developments

BLM has identified a corridor through BLM land along I-10 and roughly equivalent to the study area as a Section 368 Energy Corridor. Section 368 requires that BLM conduct environmental reviews needed to complete the designation of Section 368 energy corridors (see sidebar on this page for more information on Section 368). While a programmatic EIS was prepared, the evaluation of future project-related environmental impacts must await site-specific proposals and the required site-specific environmental review (a quantifiable and accurate evaluation of impacts at the local project level can be made only in response to an actual proposed energy project or when a proposal for an action with specific environmental consequences exists).

In Arizona, BLM has 31 applications for solar projects, of which about 20 are located in the area surrounding the I-10 Corridor. Development of solar energy projects has been assigned a high priority within BLM. Two leading projects within the I-10 Corridor are described below.

In December 2011, the U.S. Department of the Interior approved the Sonoran Solar Energy Project to be developed on 2,013 acres of BLM land in Buckeye. The solar project will be located 14 miles south of I-10 just east of SR 85 and will tie into existing transmission lines in the area. The project is expected to produce 300 megawatts (enough to serve 90,000 homes) and represents the first large-scale solar project on public land in Arizona.

The Quartzsite Solar Energy Project proposes to construct a 100-megawatt solar-powered electrical generation facility in La Paz County about 10 miles north of I-10 adjacent to SR 95. The generation plant, power line, and ancillary facilities would be on BLM-administered land. Final approval of the NEPA document and right-of-way clearance is anticipated in 2012.

In Arizona, BLM has over 11 applications for wind projects; however, none are located in the area of the I-10 Corridor. They are predominantly located in the northwestern area of Arizona.

Gas pipelines

A primary metropolitan pipeline terminal facility is located south of I-10 along 51st Avenue. The "tank farm" stores refined oil and gasoline products that are transferred to trucks. It is the terminal for main pipelines that transport gasoline from California and New Mexico, and contains a series of smaller pipelines that connect to Phoenix Sky Harbor International Airport and Luke Air Force Base. A number of known large-diameter interstate and intrastate gas pipelines cross the I-10 Corridor. Primary operators of these gas lines include:

- El Paso Natural Gas Company operates two pipelines that originate near the southeastern corner of La Paz County; one of these pipelines parallels I-10 (see Figure 4.16). El Paso Natural Gas is actively involved in the regional distribution of natural gas products for residential and commercial use.
- Southwest Gas is primarily involved in the distribution of natural gas products for residential and commercial uses. These smaller-diameter pipelines cross I-10 in the Phoenix metropolitan area.
- Kinder Morgan operates gas pipelines in the Phoenix metropolitan area that run parallel to the UPRR tracks south of I-10 and feed the tank farm at 51st Avenue.
- Energy Transfer owns the Transwestern Pipeline, which transports natural gas from basins in New Mexico and Texas to markets in the Midwest, Texas, Arizona, New Mexico, Nevada, and California through approximately 2,700 miles of large-diameter pipeline. In Arizona, a main line pipe runs east-to-west near Interstate 40 and a spur pipeline runs south from the main line roughly along I-17 and enters the Phoenix metropolitan area in the northwest.

Canals and water lines

This section focuses on facilities such as canals and siphons that deliver continuous water for irrigation purposes. These types of facilities are of concern because construction within their footprints or modifications to existing structures are typically restricted to an annual dryup period that lasts only a short time. Primary facilities, by owner, include:

- Central Arizona Project operates a concrete-lined canal that originates at Lake Havasu, crosses I-10 at mileposts 52, 54, and 59 in La Paz County, circles

Section 368 Energy Corridor

Section 368 of the Energy Policy Act of 2005, Public Law 109-58 (H.R. 6), enacted August 8, 2005, directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior (the Agencies) to designate under their respective authorities corridors on federal land in 11 Western States (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors).

Section 368 requires the Agencies to conduct any "environmental reviews" necessary to complete the designation of Section 368 energy corridors. The proposed designation of Section 368 energy corridors would not result in any direct impacts on the ground that may significantly affect the quality of the human environment.

Nevertheless, the Agencies prepared a Programattic EIS to conduct a detailed environmental analysis at the programmatic level and to integrate NEPA at the earliest possible time. The proposed designation of more than 6,000 miles of Section 368 energy corridors among the various Agency land use plans is a forward-looking response, mandated by statute, to address a national concern.

north, then east around the Phoenix metropolitan area and ultimately ends in Pinal County.

- Roosevelt Irrigation District (RID) operates a concrete-lined canal that begins approximately 3 miles south of I-10 near 19th Avenue. The canal is fed by a number of wells located throughout southwestern Phoenix. The main canal runs west-to-east and crosses I-10 at milepost 125 (between Cotton Lane and Sarival Avenue) and 134 (just east of 91st Avenue).
- SRP also operates a number of canals in the Phoenix metropolitan area. None of the main canals cross I-10; however, a number of piped laterals cross I-10 between SR 101L and I-17. Because I-10 is depressed in this section, the water is siphoned from one side to the other. Previous studies in this area have identified these siphons as a major concern because relocations are only possible during the dryup period and only 2 to 3 of the 9 to 10 siphons can be relocated any given year.

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5. Movement of People, Goods, and Services

A primary purpose of the Interstate system is the efficient movement of people, goods, and services. This section describes the current and future conditions (volumes and overall level of service) related to the movement of vehicular traffic, transit, truck-freight, and rail-freight within the I-10 Corridor.

5.1 Vehicular traffic flow

ADOT Multimodal Planning Division collects, produces, and maintains a wide array of highway use and performance information. The types of data disseminated for use include:

- Annual average daily traffic (AADT) data are calculated in a number of methods based on the type of count performed or available. In its most basic form, AADT is represented by the average of a continuous, 365-day count. When this type of data is not available, AADT is calculated using other methods, such as averaging a shorter duration count and factoring based on time of year, using previous counts and factoring based on anticipated growth, or using adjacent count information and factoring by historical differences.
- K Factor represents the percentage of the AADT that occurs during the peak hour. ADOT equates this value to the 30th highest hourly volume of the year (out of 8,760 possible hours in a calendar year) expressed as a percentage of the AADT volume.
- D Factor represents the directional split of traffic during the peak hour. ADOT equates this value to the percentage of traffic moving in the peak travel direction during the 30th highest hourly volume of the year.
- T Factor is the percentage of the AADT volume generated by trucks or commercial vehicles. The percentage of trucks is determined by conducting traffic counts that include vehicle classifications, typically by the number of axles. T Factors are reported for both 2008 and 2009 (most recent years data is available from ADOT).

All of these data are routinely used in the evaluation and preliminary design of highway projects. AADT, K Factor, and D Factor are used in the derivation of highway congestion measurements. AADT and truck percentage are very important in the design of pavement structural sections.

The performance of I-10 is presented as level of service (LOS), a qualitative description of the operating performance of a roadway segment using a report-card approach to describing traffic conditions, with an "A" describing free flow traffic conditions with minimal delays and an "F" describing excessive delays resulting from heavy traffic congestion. Visual depictions of each LOS grade are provided in the sidebar on this page.

For the evaluation of the operational performance of I-10, planning-level LOS thresholds were developed. The thresholds are based on the Quality/Level of Service Handbook developed by the Florida Department of Transportation (2002) and as modified by MAG for use in the Phoenix metropolitan area (2007). The thresholds, presented in Table 5.1, represent the maximum capacity at each LOS for two-way daily travel.

Existing conditions

An overview of the existing (2009) traffic flow data is presented in Table 5.2.

Traffic data

As shown in Figure 5.1, the daily traffic volumes in 2009 generally increase from west to east with approximately 17,000 to 25,000 vehicles per day in La Paz County. At the western edge of Maricopa County, the daily use is approximately 23,000 vehicles per day; near downtown Phoenix, the daily use is approximately 260,000 vehicles per day. The highest daily traffic volume is approximately 290,000 vehicles, located just west of the I-17 system traffic interchange.

The K factor is relatively consistent within the rural and urban areas. In the rural areas between the California border and SR 303L in Maricopa County, the K factor is 12 or 11 percent. In the urban area east of SR 303L to downtown Phoenix, the K factor is 8 or 7 percent. The K factor calculated for the Phoenix metropolitan area is relatively low when compared to other urban areas (usually 8 to 9 percent).

The direction of the traffic flow during the peak hour varies throughout the I-10 Corridor. The D Factor ranges from 53 to 67 percent. The highest D Factor occurs in Phoenix between 99th Avenue and I-17, a crucial commuting corridor for the metropolitan area.

The percentage of trucks presented in Table 5.2 has been broken into single trucks and combination trucks using the FHWA Vehicle Classification Scheme F. In general, single trucks include buses, recreational vehicles, and two-, three-, and four-axle single unit trucks. Combination trucks include single- and multi-trailer trucks with four or more axles. The T Factor is 37 or 38 percent truck in the rural area of I-10

Table 5.1 | Level of service thresholds

Lane configuration	Average daily traffic LOS B	LOS C	LOS D	LOS E
Rural conditions				
4 lanes	37,100	49,900	59,400	63,700
4 lanes + 2 HOV lanes	46,000	62,300	74,200	81,000
6 lanes	54,800	74,600	89,000	98,300
6 lanes + 2 HOV lanes	64,100	87,400	103,900	115,500
Urban conditions				
4 lanes	48,600	66,800	82,300	88,700
4 lanes + 2 HOV lanes	63,500	90,100	114,400	127,700
6 lanes	70,000	101,300	131,200	149,100
6 lanes + 2 HOV lanes	82,800	119,700	155,100	176,200
8 lanes	95,500	138,100	178,900	203,200
8 lanes + 2 HOV lanes	108,200	156,600	202,700	230,400
10 lanes	120,900	175,100	226,400	257,500
10 lanes + 2 HOV lanes	133,700	193,500	250,300	284,500
12 lanes	146,400	211,900	274,100	311,500
12 lanes + 2 HOV lanes	169,100	240,100	304,600	335,600

Sources: Florida Department of Transportation 2002; MAG 2007

Levels of service

LOS A

LOS B

LOS C

LOS D

LOS E

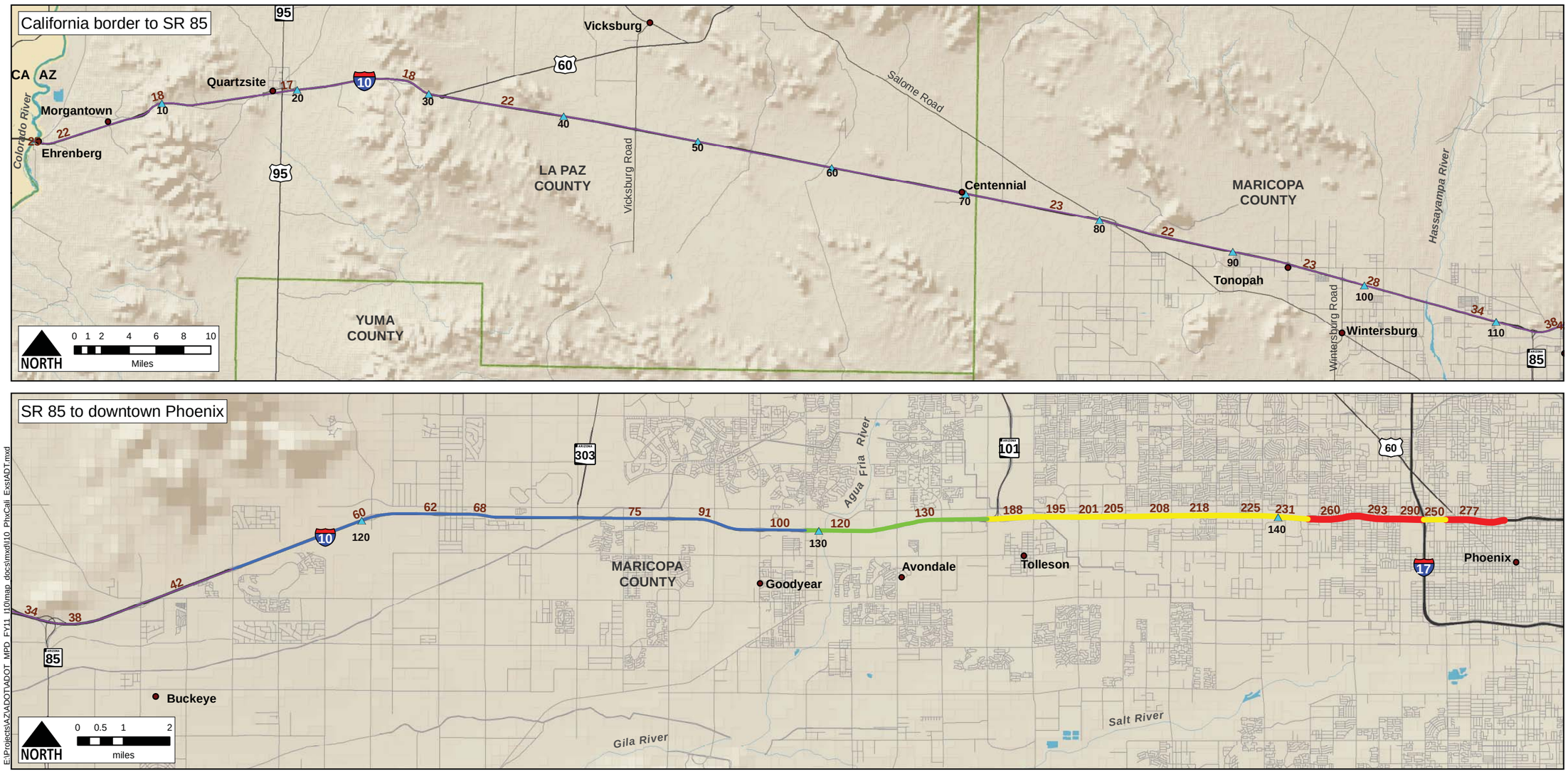
LOS F

Table 5.2 | I-10 traffic overview, 2009

Begin milepost	Start	End milepost	End	Length (miles)	Total through lanes	AADT	K Factor	D Factor	Percent single trucks	Percent combination trucks	Level of service
0.00	California State Line	0.71	Ehrenberg - Parker Highway	0.71	4	25,000	12	56	7	30	B
0.71	Ehrenberg - Parker Highway	5.85	Tom Wells Road	5.14	4	21,500	12	56	7	30	B
5.85	Tom Wells Road	11.93	Dome Rock Road	6.08	4	17,500	12	56	7	30	B
11.93	Dome Rock Road	17.49	West end of Quartzsite	5.56	4	18,000	12	56	7	30	B
17.49	West end of Quartzsite	19.80	East end of Quartzsite	2.31	4	17,000	12	56	7	30	B
19.80	East end of Quartzsite	26.66	Gold Nugget Road	6.86	4	17,500	12	56	7	30	B
26.66	Gold Nugget Road	31.17	US 60	4.51	4	18,000	12	56	7	30	B
31.17	US 60	45.37	Vicksburg Road	14.20	4	22,000	12	56	7	30	B
45.37	Vicksburg Road	53.98	Hovatter Road	8.61	4	22,000	12	65	7	31	B
53.98	Hovatter Road	69.66	Avenue 75 E	15.68	4	22,000	12	65	7	31	B
69.66	Avenue 75 E	81.24	Salome Highway	11.58	4	23,000	12	65	7	31	B
81.24	Salome Highway	94.17	411th Avenue - Tonopah	12.93	4	22,500	12	65	7	31	B
94.17	411th Avenue - Tonopah	98.30	Wintersburg Road	4.13	4	23,000	12	65	7	31	B
98.30	Wintersburg Road	103.45	339th Avenue	5.15	4	28,500	12	65	7	31	B
103.45	339th Avenue	109.68	Palo Verde Road	6.23	4	33,500	12	65	7	31	B
109.68	Palo Verde Road	112.74	SR 85	3.06	4	33,500	12	65	7	31	B
112.74	SR 85	114.86	Miller Road	2.12	4	37,500	11	55	4	22	B
114.86	Miller Road	117.00	Watson Road	2.14	4	42,000	11	55	4	22	B
117.00	Watson Road	120.20	Verrado Way	3.20	4	59,500	11	55	4	22	C
120.20	Verrado Way	121.70	Jackrabbit Trail	1.50	6	61,500	11	55	4	22	B
121.70	Jackrabbit Trail	124.71	SR 303L / Cotton Lane	3.01	6	68,500	11	55	4	22	B
124.71	SR 303L / Cotton Lane	126.69	Estrella Parkway	2.00	6	75,000	8	58	4	14	C
126.69	Estrella Parkway	127.69	Bullard Avenue	1.00	8+HOV	91,000	8	58	4	14	B
127.69	Bullard Avenue	128.71	Litchfield Road	1.02	8+HOV	91,000	8	58	4	14	B
128.71	Litchfield Road	129.70	Dysart Road	0.99	8+HOV	100,000	8	58	4	14	B
129.70	Dysart Road	131.70	Avondale Boulevard	2.00	8+HOV	120,000	8	58	4	14	C
131.70	Avondale Boulevard	133.69	99th Avenue	1.99	8+HOV	130,000	8	58	4	14	C
133.69	99th Avenue	134.68	91st Avenue	0.99	8+HOV	188,000	8	67	6	5	D
134.68	91st Avenue	135.66	83rd Avenue	0.98	8+HOV	195,000	8	67	6	5	D
135.66	83rd Avenue	136.16	79th Avenue (HOV)	0.50	8+HOV	201,000	8	67	6	5	D
136.16	79th Avenue (HOV)	136.69	75th Avenue	0.53	8+HOV	205,000	8	67	6	5	E
136.69	75th Avenue	137.68	67th Avenue	0.99	8+HOV	208,000	8	67	6	5	E
137.68	67th Avenue	138.66	59th Avenue	0.98	8+HOV	218,000	8	67	6	5	E
138.66	59th Avenue	139.65	51st Avenue	0.99	8+HOV	225,000	8	67	6	5	E
139.65	51st Avenue	140.65	43rd Avenue	1.00	8+HOV	231,000	8	67	6	5	F
140.65	43rd Avenue	141.66	35th Avenue	1.01	8+HOV	260,000	8	67	6	5	F
141.66	35th Avenue	142.66	27th Avenue	1.00	8+HOV	293,000	8	67	6	5	F
142.66	27th Avenue	143.18	I-17	0.52	8+HOV	290,000	8	67	6	5	F
143.18	I-17	143.66	7th Avenue	1.48	8+HOV	277,000	7	53	5	6	F
144.66	7th Avenue	145.66	Central Avenue	1.00	8+HOV	260,000	7	53	5	6	F

Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties

Figure 5.1 | Existing daily traffic volumes, 2009



City
Milepost
Stream
Lake
County boundary

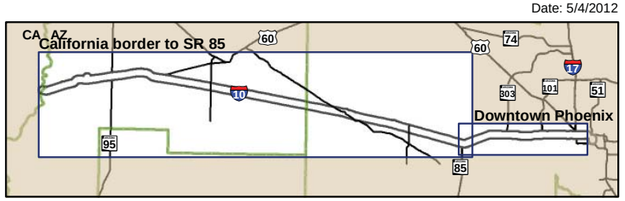
Annual average daily traffic

##* < 50,000
50,000–100,000
100,000–150,000
150,000–250,000
> 250,000

*Values in map represent 1,000s of vehicles

Source: ADOT

Date: 5/4/2012



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between the California border and SR 85. East of SR 85, the percentage begins to decrease steadily until reaching approximately 11 percent in the area between 99th Avenue and downtown Phoenix.

Level of service

The existing LOS along I-10 is presented in Table 5.2 as well as shown graphically in Figure 5.2. I-10 performs at LOS C or better from the California border to SR 101L (99th Avenue). East of SR 101L, the operations begin to deteriorate, with LOS D between SR 101L and 79th Avenue, LOS E between 79th Avenue and 51st Avenue, and LOS F between 51st Avenue and Central Avenue.

Future conditions

The following sections describe the development of the traffic projections and the results of the analysis of the future conditions.

Travel demand models

The future traffic conditions were estimated using the travel demand models from ADOT and MAG. ADOT has developed the statewide Arizona Travel Demand Model (AZTDM) to complement regional model analyses by focusing on "external" interregional travel and goods movement estimates. The AZTDM provides traffic projections for the short-range (2015), which includes all improvements planned in the current *State Transportation Improvement Program*, and in the long-range (2035), which includes all anticipated improvements from the state and regional *Long-Range Transportation Plan*.

The MAG Regional Travel Demand Model is used for transportation planning within Maricopa County. It uses detailed land use and socioeconomic projections to forecast travel within the Phoenix metropolitan area. The MAG model provides traffic projections for the short-range (2021) and long-range (2031). The lane configurations of each horizon year are based on the anticipated construction of projections in the *Transportation Improvement Program* and *Regional Transportation Plan*.

Based on the model's purpose and coverage, the AZTDM was used from the California border to the end of the MAG model extents (approximately milepost 94) and the MAG model was used from there into downtown Phoenix. The traffic volume projections were not smoothed at the break between the two models. Although the horizon years don't match exactly, the short- and long-range projections models were considered for each.

Traffic data

The short- and long-range traffic projections used for this study are presented in Table 5.3 and depicted in Figures 5.3 and 5.4. The short-range projections range from 26,000 to 293,000 vehicles per day and the long-range projections range from 44,000 to 302,000 vehicles per day. The buildup of traffic along I-10 continues to follow a similar pattern as the 2009 traffic counts.

This traffic buildup is depicted as a comparative line chart in Figure 5.5. Notable observations from Figure 5.3 include:

- Total growth is represented in the figure by the space between subsequent lines. The largest growth (over 100,000 vehicles per day between 2009 and the long-range projections) is anticipated to occur in the area between milepost 117 and 130 (Watson Road to SR 101L).
- The point at which the line charts begin to angle upwards moves farther west over time (milepost 125 in 2009; milepost 115 in short-range projections; milepost 100 in long-range projections). This represents the expansion of the Phoenix metropolitan area in Maricopa County.

Level of service

The projected LOS in the short- and long-range horizons along I-10 is presented in Table 5.3. With the short-range projections, I-10 is forecast to perform at LOS D or better from the California border to 339th Avenue (milepost 103). East of 339th Avenue, almost all of I-10 is forecast to operate at LOS E or F.

The conditions with the long-range projections would be no better. Even with the widening between SR 85 and Verrado Way and the completion of other adjacent freeway corridors (as planned in the RTP), the operations on I-10 would be poor. In La Paz County, I-10 would operate at LOS C. In Maricopa County, almost the entire length (except for the area west of 411th Avenue) would operate at LOS E or F.

Deficiencies

The ADOT Roadway Design Guidelines state:

> *Design levels of service shall be in accordance with Table 103.2A. Where a range is shown, the higher level of service should be provided except where costs or environmental constraints justify the lower level of service.*

For access-controlled highways, the design LOS is D in urban/fringe urban areas and B in other areas (C is acceptable in mountainous areas). Using the thresholds from Table 5.1 and the traffic projections from Table 5.3, the number of lanes needed to provide LOS D in the urban areas and LOS B in the rural areas were determined (see Table 5.3).

These needs were then compared to recommendations and deficiencies identified in recent regional and statewide long-range transportation plans:

- The *I-10 West Corridor Profile Study* (ADOT 2005) identified the need for four general purpose lanes between Wintersburg Road and Palo Verde Road, six lanes between Palo Verde Road and SR 85, eight lanes between SR 85 and SR 303L, and ten lanes between SR 303L and SR 101L.
- The *I-10/Hassayampa Valley Roadway Framework Study* (MAG 2007) concluded that by the region's buildout, I-10 would need to include eight general purpose lanes plus HOV lanes between 459th Avenue and SR 303L. Additional lanes would be needed in the short-range from SR 303L to SR 85, in the long-range from SR 85 to the proposed Hassayampa Freeway, and beyond the long-range horizon from the proposed Hassayampa Freeway to 459th Avenue.
- The recommended alternative in the *I-10 (Papago) Initial DCR, SR 101L to I-17* (ADOT 2009) included twelve general purpose lanes.

Figure 5.2 | Existing level of service

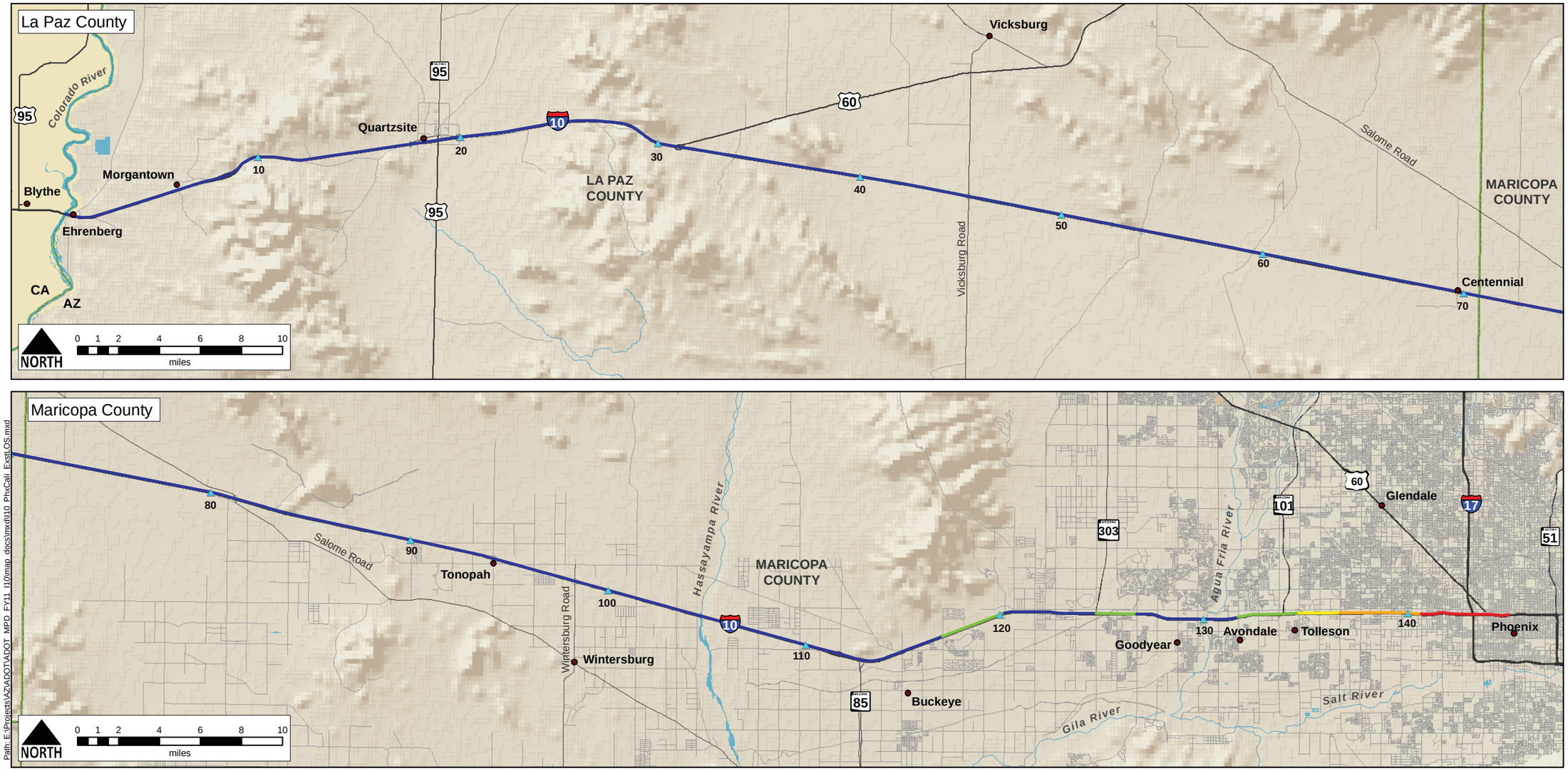

Table 5.3 | I-10 traffic overview with short- and long-range traffic projections

Begin milepost	Start	End milepost	End	Length (miles)	Short-range traffic projections				Long-range traffic projections			
					Through lanes	ADT	LOS	Additional lanes needed	Through lanes	ADT	LOS	Additional lanes needed
0.00	California State Line	0.71	Ehrenberg - Parker Highway	0.71	4	26,300	B	0	4	44,000	C	2
0.71	Ehrenberg - Parker Highway	5.85	Tom Wells Road	5.14	4	26,700	B	0	4	44,900	C	2
5.85	Tom Wells Road	11.93	Dome Rock Road	6.08	4	26,700	B	0	4	45,000	C	2
11.93	Dome Rock Road	17.49	West end of Quartzsite	5.56	4	26,700	B	0	4	45,000	C	2
17.49	West end of Quartzsite	19.80	East end of Quartzsite	2.31	4	25,400	B	0	4	43,100	C	2
19.80	East end of Quartzsite	26.66	Gold Nugget Road	6.86	4	29,100	B	0	4	48,800	C	2
26.66	Gold Nugget Road	31.17	US 60	4.51	4	29,100	B	0	4	48,800	C	2
31.17	US 60	45.37	Vicksburg Road	14.20	4	29,100	B	0	4	48,600	C	2
45.37	Vicksburg Road	53.98	Hovatter Road	8.61	4	28,900	B	0	4	48,600	C	2
53.98	Hovatter Road	69.66	Avenue 75 E	15.68	4	28,900	B	0	4	48,600	C	2
69.66	Avenue 75 E	81.24	Salome Highway	11.58	4	29,300	B	0	4	49,200	C	2
81.24	Salome Highway	94.17	411th Avenue - Tonopah	12.93	4	29,300	B	0	4	49,200	C	2
94.17	411th Avenue - Tonopah	98.30	Wintersburg Road	4.13	4	49,300	C	0	4	72,700	F	2
98.30	Wintersburg Road	103.45	339th Avenue	5.15	4	57,200	D	0	4	78,400	F	2
103.45	339th Avenue	109.68	Palo Verde Road	6.23	4	67,100	F	2	4	104,500	F	2
109.68	Palo Verde Road	112.74	SR 85	3.06	4	84,300	F	2	4	106,500	F	2
112.74	SR 85	114.86	Miller Road	2.12	4	87,300	E	2	6	134,900	E	HOV
114.86	Miller Road	117.00	Watson Road	2.14	4	89,800	F	2	6	131,700	E	HOV
117.00	Watson Road	120.20	Verrado Way	3.20	4	121,000	F	2	6	166,800	F	2+HOV
120.20	Verrado Way	121.70	Jackrabbit Trail	1.50	6	142,800	E	2	6	175,200	F	2+HOV
121.70	Jackrabbit Trail	124.71	SR 303L / Cotton Lane	3.01	6	162,000	F	2	6	196,400	F	2+HOV
124.71	SR 303L / Cotton Lane	126.69	Estrella Parkway	2.00	6	156,200	E	2	6	227,000	F	4
126.69	Estrella Parkway	127.69	Bullard Avenue	1.00	8+HOV	196,000	D	0	8+HOV	235,000	F	2
127.69	Bullard Avenue	128.71	Litchfield Road	1.02	8+HOV	207,400	E	2	8+HOV	239,000	F	2
128.71	Litchfield Road	129.70	Dysart Road	0.99	8+HOV	213,500	E	2	8+HOV	232,300	F	2
129.70	Dysart Road	131.70	Avondale Boulevard	2.00	8+HOV	233,400	F	2	8+HOV	242,600	F	2
131.70	Avondale Boulevard	133.69	99th Avenue	1.99	8+HOV	242,800	F	2	8+HOV	246,100	F	2
133.69	99th Avenue	134.68	91st Avenue	0.99	8+HOV	242,800	F	2	8+HOV	246,600	F	2
134.68	91st Avenue	135.66	83rd Avenue	0.98	8+HOV	263,900	F	4	8+HOV	266,000	F	4
135.66	83rd Avenue	136.16	79th Avenue (HOV)	0.50	8+HOV	256,200	F	4	8+HOV	257,200	F	4
136.16	79th Avenue (HOV)	136.69	75th Avenue	0.53	8+HOV	256,200	F	4	8+HOV	244,800	F	4
136.69	75th Avenue	137.68	67th Avenue	0.99	8+HOV	268,700	F	4	8+HOV	270,400	F	4
137.68	67th Avenue	138.66	59th Avenue	0.98	8+HOV	248,800	F	4	8+HOV	249,400	F	4
138.66	59th Avenue	139.65	51st Avenue	0.99	8+HOV	253,800	F	4	8+HOV	268,800	F	4
139.65	51st Avenue	140.65	43rd Avenue	1.00	8+HOV	279,200	F	4	8+HOV	291,500	F	4
140.65	43rd Avenue	141.66	35th Avenue	1.01	8+HOV	283,600	F	4	8+HOV	293,900	F	4
141.66	35th Avenue	142.66	27th Avenue	1.00	8+HOV	292,700	F	4	8+HOV	301,200	F	4
142.66	27th Avenue	143.18	I-17	0.52	8+HOV	280,100	F	4	8+HOV	283,500	F	4
143.18	I-17	143.66	7th Avenue	1.48	8+HOV	286,200	F	4	8+HOV	284,000	F	4
144.66	7th Avenue	145.66	Central Avenue	1.00	8+HOV	276,300	F	4	8+HOV	273,100	F	4

Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties; Short-range is between 2015 and 2021; Long-range is between 2031 and 2035; additional lanes are to reach LOS B in rural areas and LOS D in urban areas.
Sources: AZTDM2 (2015 and 2035) used between milepost 0 and 94.17; MAG Regional Travel Demand Model (2021 and 2031) used between milepost 94.17 and 145.66

Figure 5.3 | Short-range traffic projections

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Figure 5.4 | Long-range traffic projections

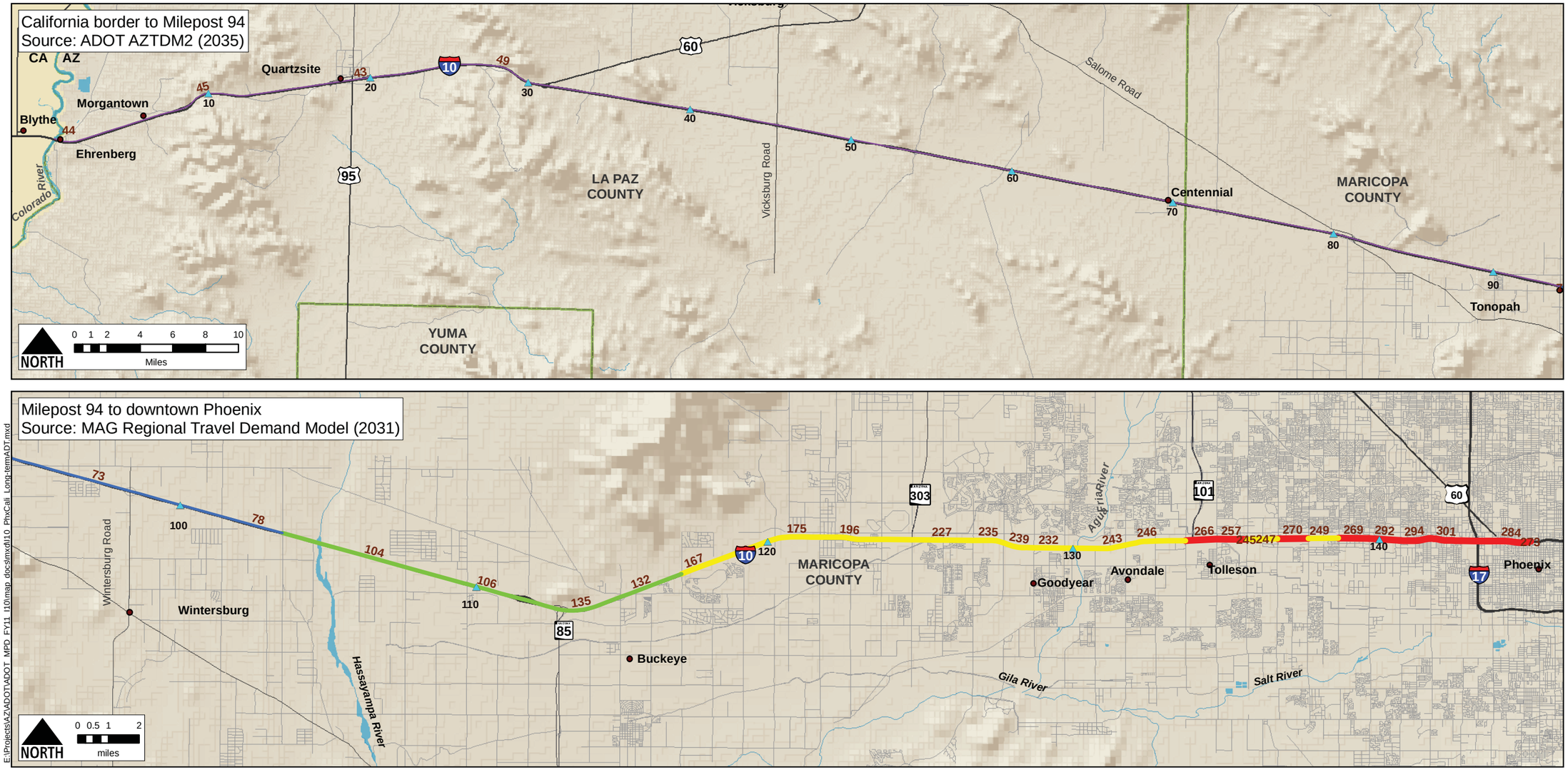
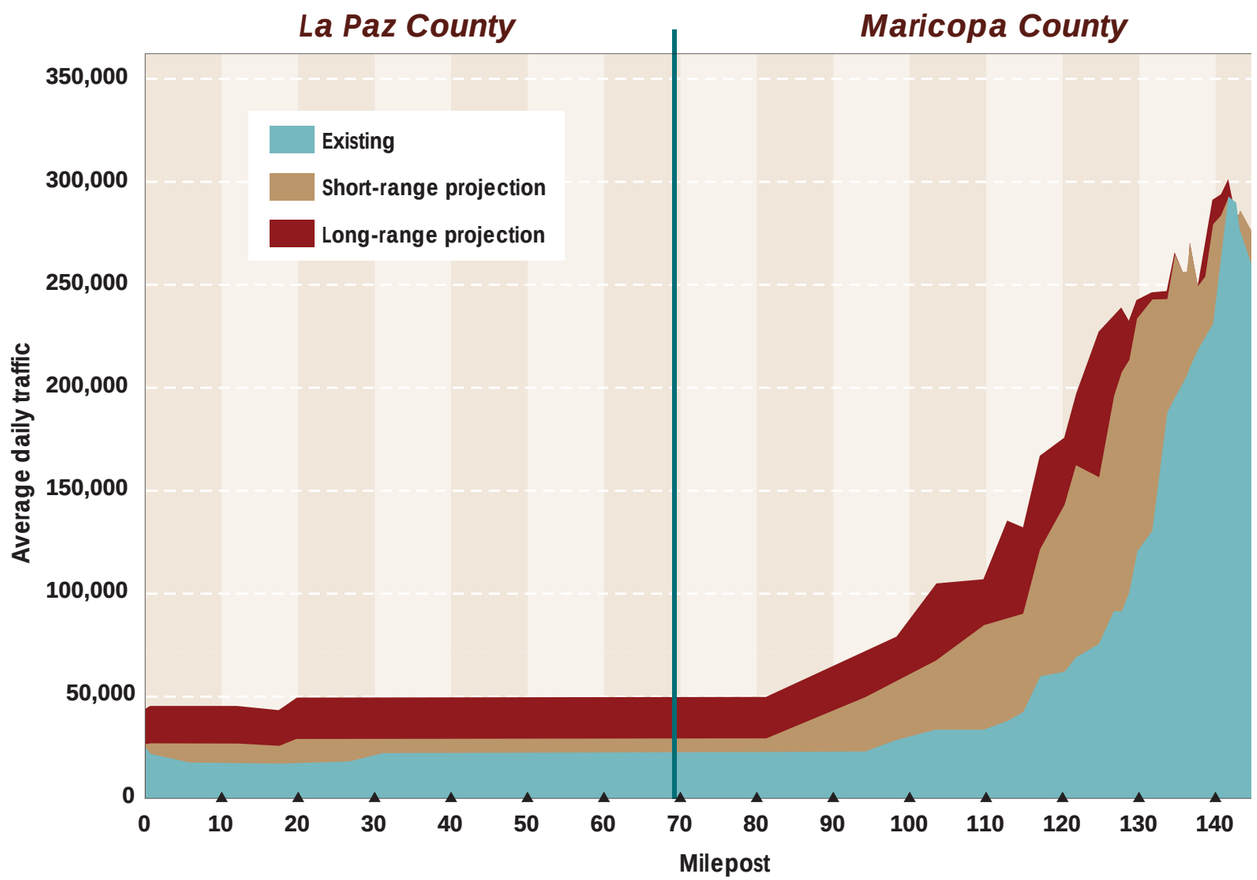


Figure 5.5 | Average daily traffic by milepost



Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties; Short-range is between 2015 and 2021; Long-range is between 2031 and 2035

Sources: AZTDM2 (2015 and 2035) used between milepost 0 and 94.17; MAG Regional Travel Demand Model (2021 and 2031) used between milepost 94.17 and 145.66

- The ADOT *Long-Range Transportation Plan* (ADOT 2011a) recommended widening all of the rural Interstate sections to six total lanes.

Based on the previous studies and the results presented in Table 5.3, build-out of the I-10 Corridor could include:

- six lanes from the California border to the Maricopa County border
- eight lanes plus HOV lanes from the Maricopa County border to SR 303L
- ten lanes plus HOV lanes from SR 303L to SR 101L
- twelve lanes with HOV lanes from SR 101L to downtown Phoenix

The ability to make these identified improvements heavily depend on funding availability and other physical and environmental constraints throughout the corridor. The improvements would be implemented over a long period of time and in stages through the I-10 Corridor. Also, MAG is currently studying alternative lane management techniques to increase capacity without the need to add substantial lanes.

5.2 Transit services

La Paz County

WACOG prepared the Western Arizona Regional Coordination Plan for La Paz and Mohave Counties in 2008. The plan provides detailed information on transit services offered in the western portion of the state.

La Paz County Transit is based in Parker and provides advance reservation services on a scheduled basis to the general public, with priority for seniors and persons with disabilities. Locations that are served include Salome/ Wenden, Parker, Ehrenberg, and Bouse, along with Wickenburg and Surprise to the east. Reservations are required, and the service has semiregular routes that may only operate if enough riders are present. Routes include:

- Parker (town) Route
- Parker Dam Route
- Salome/Wenden Route
- Ehrenberg/Bouse Route

La Paz County Transit service is currently provided in four passenger vans, each with a capacity of between eight and ten passengers. Service is funded by the County, the WACOG Area Agency on Aging/DES, and fare revenues.

ADOT's *Arizona Rural Transit Needs Study* (2008) did not recommend any new or expanded services in La Paz County, given the low population and transit demands.

Town of Quartzsite

The Town of Quartzsite provides demand-responsive service with the Desert Roadrunner within Quartzsite Monday through Friday to seniors and persons with disabilities. Service is also provided to special community events on weekends. Once a week, service is provided to the surrounding communities of Blythe and Parker. Once a month, service is provided to Lake Havasu City, with service twice a month to Yuma.

The Palo Verde Valley Transit Authority (PVVTA) operates the Desert Roadrunner, a deviated fixed-route service based in Blythe, California. The service operates almost entirely in California but provides service across the state line to Ehrenberg. Service operates Monday through Thursday, 5:40 a.m. to 10:30 p.m.; Fridays from 5:40 a.m. to 7:30 p.m.; on Saturdays, Sundays, and some holidays from 8 a.m. to 5:30 p.m. Since it is a deviated fixed-route service, the bus will travel up to three-quarters of a mile on either side of the route. Reservations are required at least 30 minutes in advance for off-route pick-up or drop-off and are subject to limited availability.

PVVTA is administered by the City of Blythe, which oversee the administration, marketing, planning and financial aspects on behalf of the agency. PVVTA's fleet consists of two classic American trolleys, one gasoline-powered van, and six diesel-powered, 16- to 24-passenger cutaways.

Intercity Bus and Rail Passenger Transportation in La Paz County is provided by Greyhound. Its bus station is located in Quartzsite. From Quartzsite, passengers may take direct intercity service to Phoenix or to Indio, California. Continuing or connecting services from those locations to many other destinations are available. The Greyhound station in Quartzsite is located at Pilot Travel Center, 1201 West Main Street.

Maricopa County

Valley Metro Regional Public Transportation Authority (RPTA) operates the regional public transit system in the Phoenix metropolitan area. Valley Metro is a political subdivision of the State of Arizona and is overseen by a board of elected officials. Membership is open to all municipalities in Maricopa County and to the County government. Currently, the 18 participating communities are **Avondale**, Chandler, El Mirage, Fountain Hills, Gilbert, Glendale, **Goodyear**, Guadalupe, Litchfield Park, Mesa, Paradise Valley, Peoria, **Phoenix**, Scottsdale, Sun City, Surprise, Tempe, and **Tolleson** (bold cities are those incorporated places in Maricopa County through which the I-10 Corridor passes).

The primary goals of Valley Metro RPTA are to ensure that a viable public transportation system is provided for regional mobility, to ease traffic congestion, and to improve air quality. The RPTA is responsible for distributing public information for transit and for managing and operating regional bus and dial-a-ride services, the regional ridesharing program, a regional vanpool program, and elements of the countywide trip reduction program and clean air campaign.

Valley Metro transit services using I-10 include freeway bus rapid transit/express routes, which use HOV facilities to connect park-and-ride lots with major activity centers, including core downtown areas. Freeway routes provide suburb-to-suburb as well as suburb to central city connections using the regional freeway system and intermediate stops. Regional funding has been allocated for bus rapid transit/express operations throughout the RTP planning period.

Currently, three lines use I-10: Avondale Express (Route 560), Goodyear/ Downtown Express (Route 562), and Northwest Valley (Route 573). The 2003 *High Capacity Transit Study* by MAG recommended additional bus rapid transit service on I-10 from the SR 101L interchange to the SR 303L interchange.

The RTP includes regional funding for the completion of six additional light rail transit segments on the system. One of these is an 11-mile extension in the I-10 Corridor west to 79th Avenue. This extension is currently under study by Valley Metro (MAG 2010). The concept of high-capacity transit along I-10 originated with the 1978 EIS for I-10. It identified the dedication of a 50-foot-wide median for future high-capacity transit use as a mitigation measure. METRO is currently evaluating alternatives for high-capacity transit within the I-10 Corridor, including use of the open median. A portion of the recommended route would follow the I-10 freeway between I-17 and the 79th Avenue Park-and-Ride. The train would operate within the I-10 freeway median from I-17 for approximately 3 miles before transitioning to the northern side of I-10 near 47th Avenue. From 47th Avenue to 79th Avenue, it would remain on the northern side of the I-10.

While no commuter rail service is currently offered in the Phoenix metropolitan area, the 2005 *Interstate 10 West Corridor Profile Study* recommended that commuter rail service be established along the UPRR tracks between downtown Phoenix and Buckeye.

The MAG *Regional Transit Framework Study* (2010) made recommendations to improve transit service throughout the region. The study identified the I-10 West corridor, from 79th Avenue to Avondale Boulevard, as having the highest overall potential to increase mobility. The segment from Avondale Boulevard to Wintersberg Road has a lower potential to increase mobility. The study presented three alternative transit investment frameworks, each with increased investment in transit service, frequency, and capital improvements along the I-10 West corridor.

5.3 Freight movement

Freight transportation is important to Arizona's economy as well as the U.S. economy as a whole. Within Arizona, the primary mode for transporting freight is by truck. The 2007 Arizona Multimodal Freight Analysis Study reported that of the over 550 million tons of freight transported in Arizona, 76 percent is transported by truck, 24 percent by rail, and 0.1 percent by air (ADOT 2007).

There have not been any specific analyses of freight movement along I-10 within the study area. More general studies looking at truck-freight movement along I-10 at a national level and multimodal freight flow within Arizona and Maricopa County were reviewed, and the following sections provide information and draw conclusions for the I-10 Corridor.

Truck

The I-10 Corridor, with connections to ports in Los Angeles and Long Beach, California, provides a primary avenue for truck-freight transport into Arizona. The existing and projected daily truck traffic volumes along I-10 are presented in Table 5.4. Notable observations from the table include:

- In 2009, just over 9,000 trucks crossed the Arizona and California border per day.
- In 2009, there was an initial drop in truck traffic east of SR 85, which shows that approximately 3,000 trucks per day or 20 to 25 percent of trucks use SR 85 and I-8 to bypass the Phoenix metropolitan area.
- In 2009, the total truck traffic volume along I-10 in the metropolitan Phoenix area is more than triple the initial volume crossing the California border. This supports the conclusion that a significant number of trucks internal to the metropolitan area use I-10 on a daily basis.

National I-10 corridor

FHWA studied truck-freight movement along I-10 from the west coast in California to the east coast in Florida (Texas Department of Transportation 2003). Broad observations for the national corridor include:

- States are responsible for building, maintaining, and operating highways that carry the bulk of the nation's freight—nearly 80 percent of all domestic tonnage and 60 percent of intercity ton miles. Continued investment in highways is fundamental to maintaining the nation's freight transportation infrastructure.
- The continued trend toward a service economy, where reliability is essential, will increase the volume of freight traffic on highways at a projected pace nearly twice that of automotive traffic by 2025. Worsened highway congestion and capacity constraints impose costs on producers and consumers, and worsen conditions for the traveling public.
- Increasing capacity in high-volume corridors is the single best method for lowering highway congestion. Moreover, providing capacity works best when incorporating key technologies such as ITS/Commercial Vehicle Operations, as well as innovations in automated truck separation employing mass flow techniques to enhance freight productivity.

Specific lessons learned from the I-10 Freight Study for Arizona included:

Table 5.4 | I-10 truck traffic overview, 2009 and short- and long-range projections

Begin milepost	Start	End milepost	End	2009 truck AADT	Short-range truck ADT	Long-range truck ADT
0.00	California State Line	0.71	Ehrenberg - Parker Highway	9,250	9,400	18,900
0.71	Ehrenberg - Parker Highway	5.85	Tom Wells Road	7,955	9,500	19,000
5.85	Tom Wells Road	11.93	Dome Rock Road	6,475	9,700	19,300
11.93	Dome Rock Road	17.49	West end of Quartzsite	6,660	9,700	19,300
17.49	West end of Quartzsite	19.80	East end of Quartzsite	6,290	9,600	19,100
19.80	East end of Quartzsite	26.66	Gold Nugget Road	6,475	10,500	20,500
26.66	Gold Nugget Road	31.17	US 60	6,660	10,500	20,500
31.17	US 60	45.37	Vicksburg Road	8,140	10,500	20,500
45.37	Vicksburg Road	53.98	Hovatter Road	8,360	10,400	20,600
53.98	Hovatter Road	69.66	Avenue 75 E	8,360	10,400	20,600
69.66	Avenue 75 E	81.24	Salome Highway	8,740	10,500	20,600
81.24	Salome Highway	94.17	411th Avenue - Tonopah	8,550	10,500	20,600
94.17	411th Avenue - Tonopah	98.30	Wintersburg Road	8,740	7,395	10,178
98.30	Wintersburg Road	103.45	339th Avenue	10,830	7,436	9,408
103.45	339th Avenue	109.68	Palo Verde Road	12,730	8,723	11,495
109.68	Palo Verde Road	112.74	SR 85	12,730	9,273	10,650
112.74	SR 85	114.86	Miller Road	9,750	11,349	13,490
114.86	Miller Road	117.00	Watson Road	10,920	11,674	13,170
117.00	Watson Road	120.20	Verrado Way	15,470	14,520	16,680
120.20	Verrado Way	121.70	Jackrabbit Trail	15,990	14,280	15,768
121.70	Jackrabbit Trail	124.71	SR 303L / Cotton Lane	17,810	16,200	17,676
124.71	SR 303L / Cotton Lane	126.69	Estrella Parkway	13,500	17,182	20,430
126.69	Estrella Parkway	127.69	Bullard Avenue	16,380	21,560	21,150
127.69	Bullard Avenue	128.71	Litchfield Road	16,380	22,814	23,900
128.71	Litchfield Road	129.70	Dysart Road	18,000	25,620	23,230
129.70	Dysart Road	131.70	Avondale Boulevard	21,600	25,674	24,260
131.70	Avondale Boulevard	133.69	99th Avenue	23,400	29,136	27,071
133.69	99th Avenue	134.68	91st Avenue	20,680	29,136	27,126
134.68	91st Avenue	135.66	83rd Avenue	21,450	31,668	29,260
135.66	83rd Avenue	136.16	79th Avenue (HOV)	22,110	30,744	30,864
136.16	79th Avenue (HOV)	136.69	75th Avenue	22,550	30,744	29,376
136.69	75th Avenue	137.68	67th Avenue	22,880	32,244	32,448
137.68	67th Avenue	138.66	59th Avenue	23,980	29,856	29,928
138.66	59th Avenue	139.65	51st Avenue	24,750	30,456	29,568
139.65	51st Avenue	140.65	43rd Avenue	25,410	30,712	29,150
140.65	43rd Avenue	141.66	35th Avenue	28,600	34,032	32,329
141.66	35th Avenue	142.66	27th Avenue	32,230	35,124	33,132
142.66	27th Avenue	143.18	I-17	31,900	33,612	31,185
143.18	I-17	143.66	7th Avenue	30,470	28,620	25,560
144.66	7th Avenue	145.66	Central Avenue	28,600	27,630	27,310

Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties; Short-range is between 2015 and 2021; Long-range is between 2031 and 2035
Sources: AZTDM2 (2015 and 2035) used between milepost 0 and 94.17; MAG Regional Travel Demand Model (2021 and 2031) used between milepost 94.17 and 145.66

- Truck movements along the I-10 Corridor in Arizona are expected to double by 2025. Automobile traffic, however, represents the dominant share, partly because of the corridor's role as a stimulant for urban and residential development.
- Improving SR 85 between I-8 and I-10 would improve this bypass around Phoenix, diverting through automobile and truck traffic to cut congestion and improve economic efficiency and public safety.

Arizona

The analysis of truck movement within Arizona found the following distribution of trips (ADOT 2007):

- 55 percent through trips
- 23 percent internal trips
- 12 percent inbound trips
- 10 percent outbound trips

The top destination or origin for through, inbound, and outbound trips is California (ADOT 2007). Although not directly stated in the study, it could be concluded that the I-10 Corridor is the primary route for these through, inbound, and outbound trips.

The state freight study also reported that of the 95 million tons of freight with internal trips, 37 percent had an origin and destination within Maricopa County. Movement between Maricopa County and La Paz County was not a primary origin-destination pair and represented less than 2 percent of the total tonnage within Arizona.

Maricopa County

In 2004, MAG completed a study that assessed the multimodal freight movement within Maricopa County. An update to this study is currently underway; however, revised information is not available at this time. The 2004 study found that the modal split of freight flow within the county was 86 percent trucks, 13 percent rail, and 1 percent air cargo.

When assessing outgoing and incoming truck freight in Maricopa County, the highest origin-destination pair was the other Arizona counties. Of note to this study, however, was that La Paz County ranked second-to-last among the 14 other counties for freight movement to and from Maricopa County.

Outside of Arizona, Maricopa County receives the largest portion of inbound freight from the Los Angeles area, which would predominately arrive by way of trucks on I-10. The I-10 freight corridor is supported by a high density of freight terminals (warehouses, distribution hubs, etc.) and trucking companies located within 3 to 4 miles south of I-10 between 83rd Avenue and downtown Phoenix.

The MAG study also noted the increase of freight movement between Mexico and Maricopa County and the high reliance (over 90 percent) on the use of trucks to move goods between the two areas.

Rail

The rail industry typically transports goods that are not necessarily time sensitive, often carrying bulk goods such as farm products, automobiles, coal, chemicals, food products, lumber, and metallic and nonmetallic items. A description of existing rail lines was provided previously in Section 4.12, *Railroads*. The following sections describe freight movement by rail within Arizona and Maricopa County.

Arizona

The analysis of rail-freight movement within Arizona found the following distribution of tonnage (ADOT 2007):

- 75 percent through trips
- 2 percent internal trips
- 21 percent inbound trips
- 2 percent outbound trips

The majority of rail-freight passing through Arizona travels between Illinois and California and between Texas and California. Of the top ten pairs of origins and destinations, California accounted for either the origin or destination. The primary commodity destined for Arizona is coal coming from New Mexico (ADOT 2007).

Maricopa County

Because there are no through rail lines within Maricopa County, all of the freight movement is either inbound or outbound. In 2001, a little over 7 million tons (approximately 88 percent of the total rail-freight movement in Maricopa County) entered the county and only a little less than 1 million tons (12 percent) exited the county (MAG 2004).

Air

The movement of air cargo is primarily for time-sensitive goods such as express packages, mail, passenger packages, and baggage articles. Phoenix Sky Harbor International Airport serves as the primary hub for inbound and outbound air freight. The airport provides active cargo facilities to support integrated and nonintegrated services for shipping companies such as United Parcel Service and Federal Express. Phoenix-Mesa Gateway Airport in Mesa (approximately 28 miles southeast of downtown Phoenix) continues to expand its capabilities to increase regular and chartered air cargo movement as an alternative to Sky Harbor and for companies located nearby.

Arizona

In 2005, around 200,000 tons of cargo were flown out of Arizona and around 300,000 tons of cargo were flown in. The primary destination for air cargo is Los Angeles, and the type of cargo is mail and express packages The primary origin of inbound air cargo is from Los Angeles and San Francisco, and the type of cargo is machinery and mail and express packages (ADOT 2007).

Maricopa County

Because the primary air cargo hubs in Arizona are located in Maricopa County, the distribution and observations for Maricopa County are the same as those previously presented for Arizona.

6. Safety and Security

This section presents an overview of existing safety conditions and factors of the I-10 Corridor. The initial assessment includes an analysis of crashes from the last 5 years. Any areas of concern are identified and potential measures are discussed to improve safety conditions. Other factors that are included in the review of safety and security include roadway geometry, access control, ports of entry, and emergency response plans.

6.1 Crash history

The crash history for the I-10 Corridor for the 5-year period between January 1, 2006, and December 31, 2011, was obtained from the ADOT Traffic Records Section (ADOT 2011b). This section presents the analysis of crash data provided by ADOT.

The overall statistics for I-10 during the 5-year period include:

- 11,752 total crashes
- 130 fatal crashes (1.1 percent of all crashes)
- 3,360 injury crashes (28.6 percent of all crashes)
- 8,262 property damage-only crashes (70.3 percent of all crashes)

Crash rates

The crash rate (crashes per million vehicle miles traveled [MVMT]) was calculated for I-10 by using the number of crashes, AADT, and segment lengths. The overall crash rate for the 5-year analysis period was 0.95 crashes per MVMT. The fatal crash rate was 1.05 per 100 MVMT. The total crash rate for the state of Arizona over a similar time frame was 2.08 crashes per MVMT and fatal crash rate was 1.41 fatal crashes per 100 MVMT.

Detailed crash data for each segment of I-10 is presented in Table 6.1. The crash rates along each section of I-10 are displayed in Figure 6.1. The crash rate along I-10 in the more rural area between the California border and SR 303L is relatively low, average of 0.50 crashes per MVMT. East of SR 303L, much of I-10 experiences higher crash rates per MVMT and more total crashes per mile. This is likely attributable to the higher traffic volumes, greater congestion, and tightly spaced interchanges along I-10 in the urban areas of Phoenix.

Fatal crashes

The fatal crashes in the I-10 Corridor were reviewed to determine whether there were any trends related to the cause of the crash. For the analysis, the I-10 Corridor was divided into three segments: La Paz County, rural Maricopa County, and urban Maricopa County. There were 37, 49, and 44 fatal crashes in each segment, respectively. The detailed crash information is presented in Figure 6.3. Notable observations from the figure include:

- In the rural Maricopa County area, there is a much higher proportion of fatal crashes in the eastbound direction than the westbound direction. The other segments experience a fifty-fifty split by direction.
- The urban Maricopa County area experienced a higher proportion of fatal crashes at night than in the other two segments.
- The majority of crashes in the rural areas included an overturned vehicle. In the urban area, the majority of fatal crashes included multiple vehicles.

Pedestrian or cyclist crashes

Crossing controlled-access highways can be a barrier for people on foot or operating a bicycle. In ADOT's analyses of pedestrian and motor vehicle crash data and bicycle and motor vehicle crash data, some of the highest crash locations were at controlled-access highway interchanges, including I-10 (ADOT 2009 and 2012a).

ADOT's safety action plans for bicycles and pedestrians identify specific improvements that could be made at these high-crash locations. Two key recommendations from the ongoing update to the *Statewide Bicycle and Pedestrian Plan* are to 1) incorporate bicycles and pedestrians into the design process focusing on traffic interchanges, intersections, and signals and 2) support local agencies and jurisdictions to establish connectivity and alternative routes to state highways through local jurisdictions. In urban areas, mid-mile crossings of I-10 would provide an alternative route from traffic interchange areas.

6.2 Geometric design

The Interstate design standards in Arizona are governed by the latest versions of the ADOT RDG and the American Association of State Highway and Transportation Officials (AASHTO) *Policy on the Geometric Design of Highways and Streets*. These documents cover all aspects of the roadway prism. Many of the physical requirements were presented previously in Section 3.2, *Interstate 10*. This section presents information related to the vertical and horizontal geometric characteristics of the I-10 Corridor, which directly affects the design speed of the roadway. An inventory of the horizontal and vertical curves along the I-10 Corridor were developed using the historic as-built documents. The curve tables are provided in Appendix I.

Interstate projects are required to complete an AASHTO Controlling Design Criteria Report. This report documents items such as nonconforming design features, proposed project design criteria, vertical curves, and bridge evaluations. New construction projects are generally required (unless provided a design exception) to upgrade any nonconforming design feature to the current standard.

6.3 Access control

The ADOT RDG states:

> *The access-control limits for a fully access-controlled freeway will be broken at its intersection with the crossroad at an interchange. Full access control shall extend along the crossroad a minimum of 300 feet beyond the end of the ramp radius return.*

Access control along crossroads is becoming more and more important to the long-range operational performance of traffic interchanges. To support

Table 6.1 | I-10 crash overview

Begin milepost	Start	End milepost	End	Length (miles)	Fatal crashes	Per mile	Injury crashes	Per mile	Property damage only crashes	Per mile	Total crashes	Per mile	Crash rate (crashes per MVMT)
0.00	California State Line	0.71	Ehrenberg - Parker Highway	0.71	0	0.0	2	2.8	9	12.7	11	15.5	0.32
0.71	Ehrenberg - Parker Highway	5.85	Tom Wells Road	5.14	0	0.0	60	11.7	104	20.2	164	31.9	0.77
5.85	Tom Wells Road	11.93	Dome Rock Road	6.08	1	0.2	28	4.6	76	12.5	105	17.3	0.45
11.93	Dome Rock Road	17.49	West end of Quartzsite	5.56	5	0.9	24	4.3	53	9.5	82	14.7	0.40
17.49	West end of Quartzsite	19.80	East end of Quartzsite	2.31	2	0.9	8	3.5	12	5.2	22	9.5	0.27
19.80	East end of Quartzsite	26.66	Gold Nugget Road	6.86	8	1.2	32	4.7	52	7.6	92	13.4	0.35
26.66	Gold Nugget Road	31.17	US 60	4.51	5	1.1	49	10.9	67	14.9	121	26.8	0.68
31.17	US 60	45.37	Vicksburg Road	14.20	4	0.3	80	5.6	131	9.2	215	15.1	0.40
45.37	Vicksburg Road	53.98	Hovatter Road	8.61	5	0.6	48	5.6	89	10.3	142	16.5	0.42
53.98	Hovatter Road	69.66	Avenue 75 E	15.68	7	0.4	100	6.4	167	10.7	274	17.5	0.46
69.66	Avenue 75 E	81.24	Salome Highway	11.58	11	0.9	92	7.9	136	11.7	239	20.6	0.53
81.24	Salome Highway	94.17	411th Avenue - Tonopah	12.93	22	1.7	64	4.9	122	9.4	208	16.1	0.41
94.17	411th Avenue - Tonopah	98.30	Wintersburg Road	4.13	4	1.0	13	3.1	51	12.3	68	16.5	0.37
98.30	Wintersburg Road	103.45	339th Avenue	5.15	2	0.4	29	5.6	60	11.7	91	17.7	0.36
103.45	339th Avenue	109.68	Palo Verde Road	6.23	7	1.1	41	6.6	99	15.9	147	23.6	0.41
109.68	Palo Verde Road	112.74	SR 85	3.06	3	1.0	40	13.1	54	17.6	97	31.7	0.55
112.74	SR 85	114.86	Miller Road	2.12	0	0.0	25	11.8	51	24.1	76	35.8	0.56
114.86	Miller Road	117.00	Watson Road	2.14	2	0.9	31	14.5	50	23.4	83	38.8	0.48
117.00	Watson Road	120.20	Verrado Way	3.20	5	1.6	77	24.1	116	36.3	198	61.9	0.59
120.20	Verrado Way	121.70	Jackrabbit Trail	1.50	4	2.7	46	30.7	71	47.3	121	80.7	0.74
121.70	Jackrabbit Trail	124.71	SR 303L / Cotton Lane	3.01	3	1.0	118	39.2	252	83.7	373	123.9	0.99
124.71	SR 303L / Cotton Lane	126.69	Estrella Parkway	1.98	0	0.0	102	51.5	220	111.1	322	162.6	1.14
126.69	Estrella Parkway	127.69	Bullard Avenue	1.00	1	1.0	98	98.0	223	223.0	322	322.0	1.89
127.69	Bullard Avenue	128.71	Litchfield Road	1.02	1	1.0	99	97.1	267	261.8	367	359.8	2.11
128.71	Litchfield Road	129.70	Dysart Road	0.99	1	1.0	75	75.8	188	189.9	264	266.7	1.18
129.70	Dysart Road	131.70	Avondale Boulevard	2.00	4	2.0	150	75.0	349	174.5	503	251.5	0.99
131.70	Avondale Boulevard	133.69	99th Avenue	1.99	1	0.5	154	77.4	418	210.1	573	287.9	0.99
133.69	99th Avenue	134.68	91st Avenue	0.99	2	2.0	86	86.9	236	238.4	324	327.3	1.20
134.68	91st Avenue	135.66	83rd Avenue	0.98	3	3.1	98	100.0	286	291.8	387	394.9	1.37
135.66	83rd Avenue	136.16	79th Avenue (HOV)	0.50	2	4.0	84	168.0	260	520.0	346	692.0	2.10
136.16	79th Avenue (HOV)	136.69	75th Avenue	0.53	1	1.9	46	86.8	96	181.1	143	269.8	0.90
136.69	75th Avenue	137.68	67th Avenue	0.99	2	2.0	115	116.2	303	306.1	420	424.2	1.20
137.68	67th Avenue	138.66	59th Avenue	0.98	1	1.0	105	107.1	342	349.0	448	457.1	1.24
138.66	59th Avenue	139.65	51st Avenue	0.99	3	3.0	110	111.1	264	266.7	377	380.8	0.99
139.65	51st Avenue	140.65	43rd Avenue	1.00	2	2.0	115	115.0	382	382.0	499	499.0	1.24
140.65	43rd Avenue	141.66	35th Avenue	1.01	0	0.0	128	126.7	461	456.4	589	583.2	1.30
141.66	35th Avenue	142.66	27th Avenue	1.00	3	3.0	194	194.0	550	550.0	747	747.0	1.61
142.66	27th Avenue	143.18	I-17	0.52	0	0.0	143	275.0	412	792.3	555	1067.3	2.32
143.18	I-17	143.66	7th Avenue	1.48	3	2.0	235	158.8	648	437.8	886	598.6	1.34
144.66	7th Avenue	145.66	Central Avenue	1.00	0	0.0	216	216.0	535	535.0	751	751.0	1.61

Note: solid line represents the approximate location of the boundary between La Paz and Maricopa Counties

Figure 6.1 | Crash rate

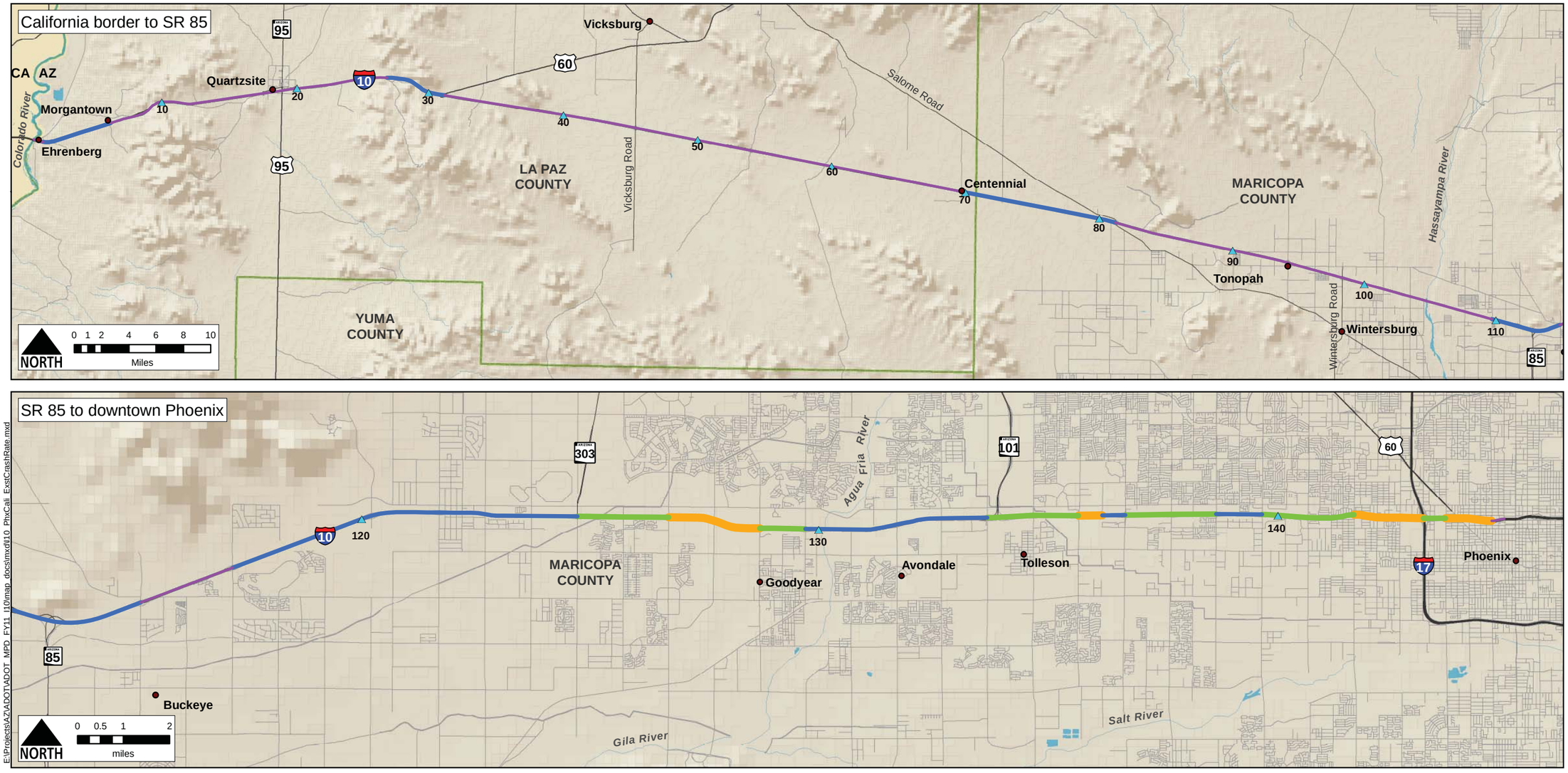
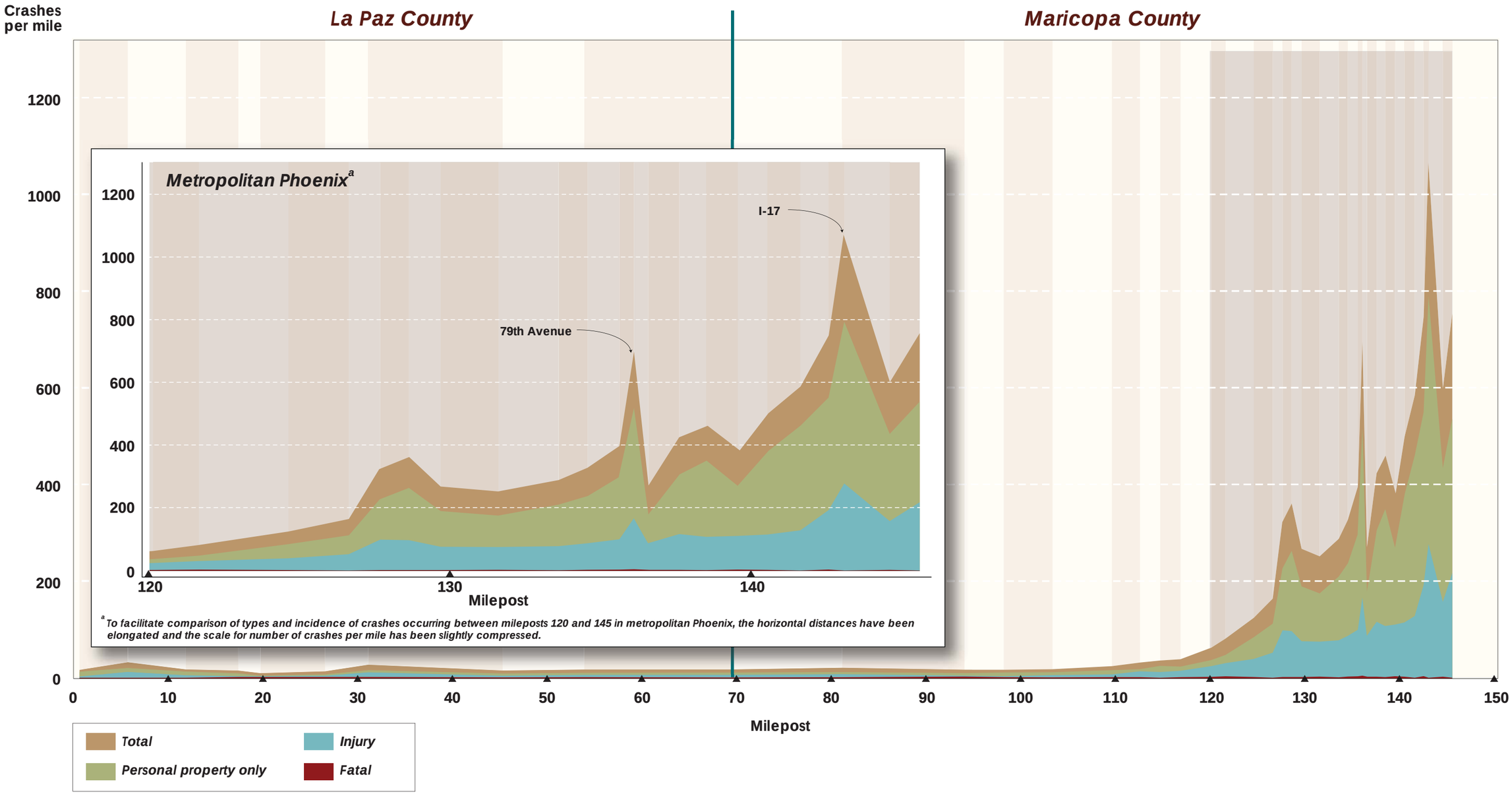
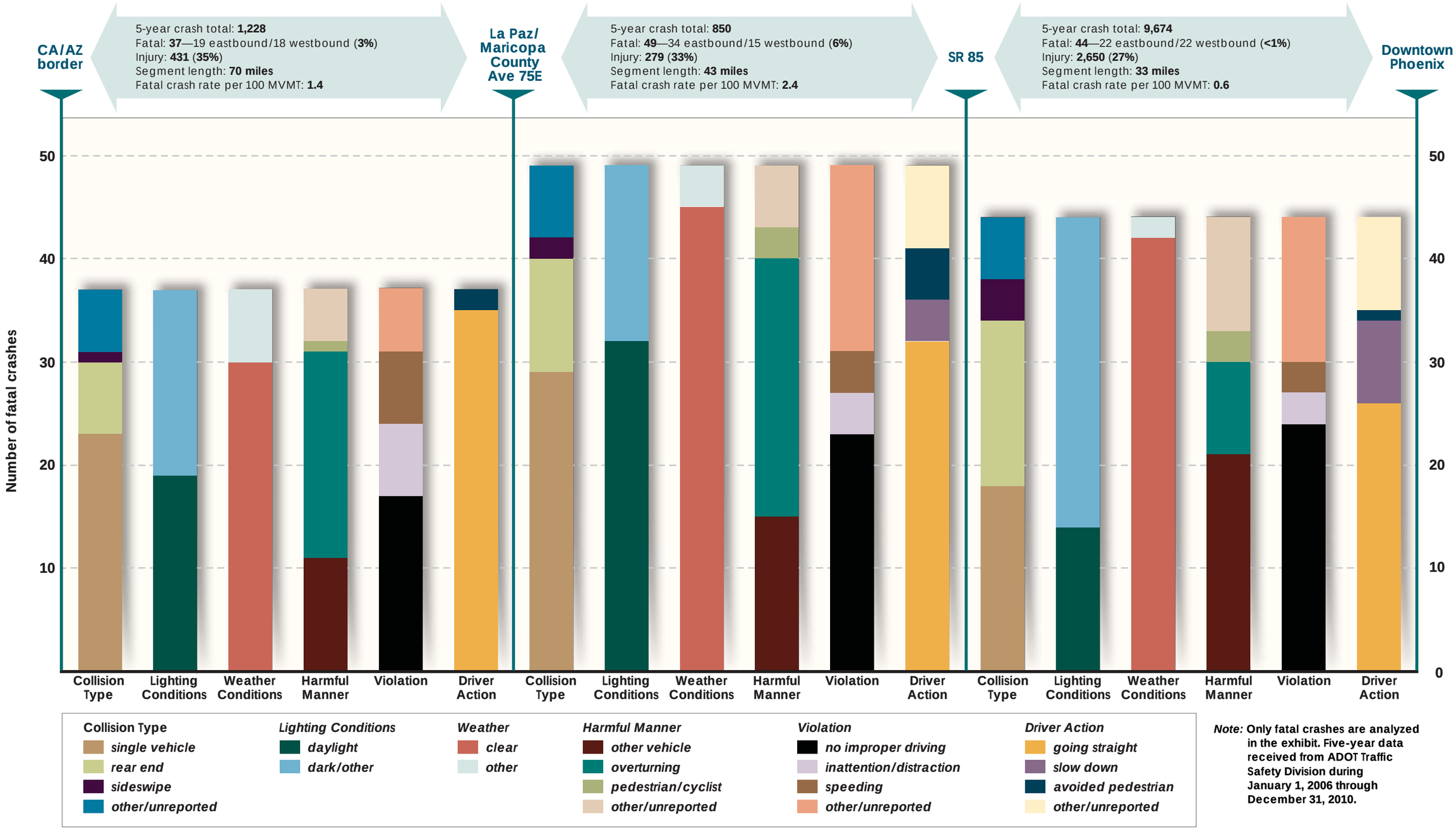


Figure 6.2 | Crashes per mile by type and milepost



Note: Vertical bands represent beginning and ending locations named in Table 6.1.

Figure 6.3 | Fatal crash inventory



Note: Only fatal crashes are analyzed in the exhibit. Five-year data received from ADOT Traffic Safety Division during January 1, 2006 through December 31, 2010.

this observation, ADOT has developed a model for establishing access control limits along crossroads that exceed the 300 feet prescribed in the ADOT RDG. The *Draft ADOT Access Control Model for Crossroads on Controlled Access Highways* (ADOT 2006c) identifies implementation standards, exceptions, and responsibilities for applying the access control model. For a fully developed urban area, the following minimum distances are recommended:

- 990 feet from on-ramp radius return or lane taper to nearest access upstream (right-in/right-out only)
- 750 feet from off-ramp radius return or lane taper to first access on right (right-in/right-out only)
- 1320 feet from off-ramp radius return or lane taper to first median access on the left
- 2640 feet from off-ramp radius return or lane taper to first signalized intersection

6.4 Ports of entry

Ports of entry monitor all commercial traffic entering Arizona for registration, taxes, size and weight restrictions, commercial driver license requirements, insurance requirements, and equipment safety requirements. The ports issue permits as required.

The Ehrenberg port of entry is located at milepost 3.8 along I-10, just east of the Arizona-California border. It is open 24 hours per day and 7 days per week. ADOT's tentative five-year construction program for 2013 through 2017 includes $16 million for upgrades to the Ehrenberg port of entry.

6.5 Palo Verde Nuclear Generating Station emergency evacuation plan

PVNGS is located an 4,080 acres of land approximately 6 miles south of I-10, near the town of Wintersburg. The plant employees approximately 2,500 people.

Public health and safety is the primary concern of the Maricopa County Department of Emergency Management in the event of an incident at PVNGS. The State of Arizona and Maricopa County prepare and maintain a joint "Offsite Emergency Response Plan for the Palo Verde Nuclear Generating Station" to ensure a coordinated response to protect the public from the effects of radiation exposure in the event of an incident with off-site consequences. Should an emergency response be necessary, the Governor or his or her designee is responsible for deciding which protective measures will be implemented within the Emergency Planning Zones.

I-10 serves as a principal evacuation route within the Emergency Planning Zones. The area between mileposts 90 and 101 is within the 10-mile radius of the zones. Proposed improvements or construction activity within this area should be coordinated with the Maricopa County Department of Emergency Management to ensure evacuation plans reflect any restrictions or changes along I-10.

7. Environment and Natural Resources

This section presents information related to the environment and natural resources within the I-10 Corridor and surrounding area. For each resource, information related to the governing regulations, analysis methodology, and affected environment is provided. The outcomes of this analysis will be captured in the PEL checklist described in Section 1.5. This will help to inform future project-level environmental investigations of the issues identified during this study.

7.1 Water resources

Water resources considered in this section include:

- surface water (including treated effluent)
- groundwater and wells
- surface water and groundwater quality
- irrigation districts
- irrigation conveyance infrastructure

Information regarding floodplains, drainage, and jurisdictional waters can be found in separate sections.

Existing land use in the I-10 Corridor is primarily rangeland and open space, with some agricultural, residential, and limited areas of commercial and industrial uses. Both surface water (including treated effluent) and groundwater are found in the study area, with such water being used for agricultural irrigation and domestic, commercial, and industrial uses.

Surface water

The major surface water features that cross the I-10 Corridor include (from west to east) the Colorado River, Hassayampa River, and the Agua Fria River (see Figure 7.1). The Colorado River is perennial (year-round flow), but the Hassayampa and the Agua Fria Rivers are intermittent (flow in response to storms or upstream releases). Many ephemeral washes also cross the I-10 Corridor. In the Basin and Range Lowlands, streams typically flow only in response to rainfall runoff (ephemeral type streams) (U.S. Geological Survey 2000). The natural surface runoff that occurs in central Arizona is erratic in rate, volume, and frequency; is usually sediment laden; and exists only briefly, after local precipitation (U.S. Department of the Interior 1979).

Surface water quality

In Arizona, nonpoint source pollution causes most surface water quality impacts (Arizona Department of Environmental Quality [ADEQ] 2010). The 305(b) Water Quality Assessment Report (required to be published biennially) describes the status of surface and groundwater resources in Arizona in relation to state water quality standards. The report is so named because it fulfills requirements of Section 305(b) of the Clean Water Act (CWA). Accompanying the report is a list of Arizona's impaired waters, as required by Section 303(d) of the CWA.

Water quality limited waters are water bodies assessed by ADEQ as having impaired quality that would require more than existing technology and permit controls to achieve or maintain water quality standards for intended uses in accordance with CWA Section 303(d). The CWA Section 303(d) list identifies those waters that are impaired and indicates the pollutant(s) causing impairment (ADEQ 2007).

Quality of water in the study area is influenced by several factors. Total dissolved solids (salts) are the major constituent associated with degraded water quality. Sources of total dissolved solids (TDS) include mining operations, wastewater treatment plant effluent discharges, agricultural practices (including irrigation return flows), and other activities in the watershed associated with nonpoint source pollution (ADEQ 2007).

Groundwater

Groundwater aquifers are located beneath the study area, and they are primarily alluvial aquifer systems. Parts of the I-10 Corridor are located in the Phoenix Active Management Area (AMA) and the Harquahala Irrigation Non-Expansion Area (INA) (see Figure 7.1). Both the AMA and the INA are regulated by the State of Arizona through the Groundwater Management Act and are administered by the Arizona Department of Water Resources (ADWR). Groundwater in the AMA and INA are a source of water for public use. In 1985, the Central Arizona Project began deliveries of Colorado River surface water to urbanized areas of central Arizona (such as the Phoenix AMA), which has decreased the use of groundwater as a source of public water. Groundwater use in the INA is primarily for agricultural purposes. Much of the normal runoff from the watersheds percolates into the soil, recharging local and regional aquifers.

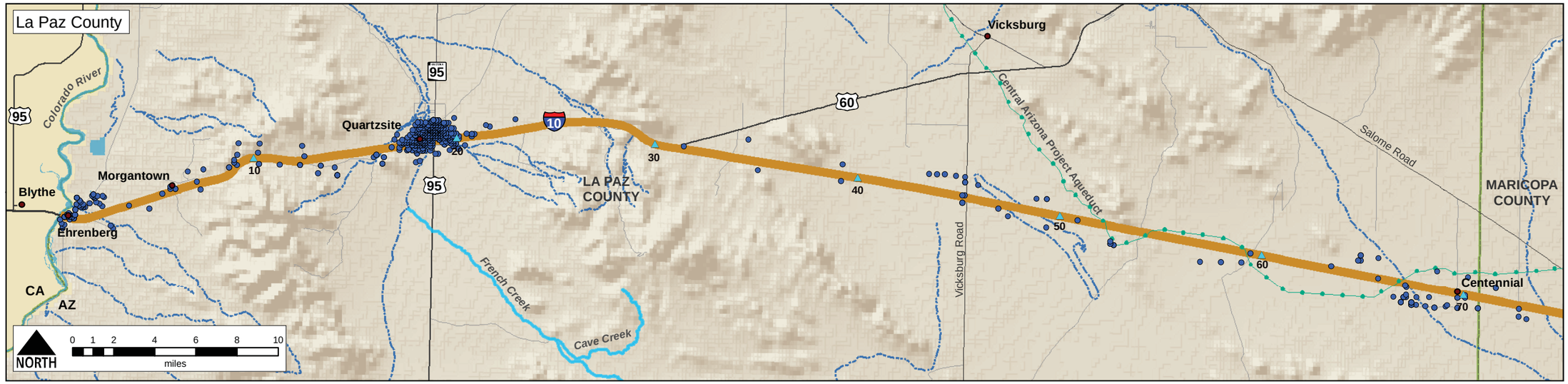
The Phoenix AMA has a statutory goal of achieving safe yield by 2025. Safe yield is the average quantity of groundwater pumped from AMA aquifers annually, and must not exceed the amount that is naturally or artificially recharged. When an area is designated as an INA (such as Harquahala), a restriction is placed on increasing the number of irrigated acres in the area. Grandfathered irrigation rights are extensive in the Harquahala INA (ADWR 2011a).

ADWR administers groundwater use through the implementation of five successive management plan periods designed to produce a safe yield by 2025 (ADWR 1999). We are currently in the fourth management period (2010–2020). Groundwater overdraft has created problems such as the loss of aquifer recharge storage capacity and increased well drilling and pumping costs. In areas of severe groundwater depletion, the ground surface may subside, causing cracks or fissures that can damage roads, building foundations, and other underground infrastructure.

Depth to groundwater varies throughout the study area (location and over time) because of fluctuations in annual precipitation and associated groundwater pumping and recharge.

Multiple irrigation districts in the Study Area use groundwater as the water supply for irrigated agriculture. The RID uses surface and groundwater supplies and receives wastewater treatment plant effluent from the City of Phoenix. Approximately 85 percent of all the groundwater RID pumps comes from its own well field in the southwestern portion of the SRP service

Figure 7.1 | Water resources



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City
Milepost
Project location*
Stream
Lake
County boundary

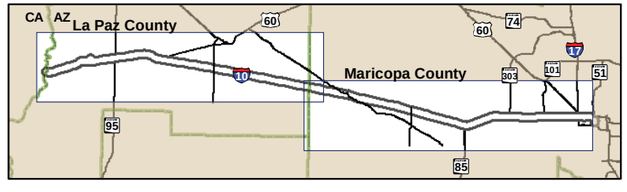
Groundwater well
Central Arizona Project Aqueduct
Canal
Wash

Harquahala INA boundary
Phoenix AMA boundary

*Study area extends 1 mile north and south of I-10

Source: ALRIS (1993), ADWR (2010, 1982)

Date: 8/3/2012



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area just east of the Agua Fria River. RID annually purchases effluent from the City of Phoenix 23rd Avenue Wastewater Treatment Plant under a three-way exchange agreement between the City of Phoenix and SRP. RID began accepting up to 30,000 acre-feet of effluent from the City of Phoenix in 1995 through this water exchange agreement (City of Phoenix 2005).

Groundwater quality

The ability to use groundwater is limited both by the total concentration and the type of salt and mineral solids dissolved in the water. In Arizona, water containing more than 1,000 milligrams per liter (mg/L) of TDS is generally not preferred for potable water supply without treatment, but water containing as much as 3,000 mg/L of TDS is used for irrigation. The EPA secondary maximum contaminant level (nonenforceable) for TDS is 500 mg/L for potable water supplies.

Groundwater quality data for the study area are available in "Arizona's Integrated 305(b) Water Quality Assessment and 303(d) Listing Report" (ADEQ 2009). The report describes the status of surface and groundwater resources in Arizona in relation to state water quality standards.

Groundwater wells

ADWR regulates the drilling, installation, and abandonment of groundwater wells. It maintains a database containing well information that is updated annually. Types of wells in the ADWR database include monitoring, piezometer, production, geotechnical, observation, domestic, test, irrigation, and abandoned. There are 3,244 existing and active groundwater wells in the study area (see sidebar on this page for an example of a well site) (ADWR 2011b). If a well were affected by transportation infrastructure construction, well abandonment and compensation (drilling a new well) may be required. Irrigation districts in the study area use groundwater wells, and have both surface (canals) and subsurface (pipes) conveyance infrastructure associated with their operations.

If a well were affected by roadway construction, well abandonment and compensation (drilling a new well) may be required (ADWR 2008). According to ADOT's Right-of-Way Group, if a well were to be acquired, the water would be replaced (ADOT 2005).

Affected wells that require full replacement by drilling a new well would be replaced in compliance with ADWR well spacing and impact rules. ADWR well spacing and well replacement rules state that a person proposing to construct a well that will be located in approximately the same location as the well it is replacing must file a notice of intent to drill the well, but is not required to obtain a well permit or comply with the well spacing criteria in R12-15-1302 through R12-15-1307. According to R12-15-1308 (replacement wells in approximately the same location), a proposed replacement well is allowed to be located no greater than 660 feet from the original well location without the requirement to conduct a new well hydrologic impact analysis (ADWR 2006).

Potential impacts

Roadway projects typically would generate impacts on surface water resources. Types of impacts can include increases in sediment loading into receiving water courses, release of pollutants generated by vehicles using the completed facility, and erosion of unprotected banks. Creation of new roadways would increase the impervious surface area and increase runoff quantities and peak flow rates during storms.

Future improvement projects in the study area could affect existing wells located within the right-of-way (Figure 7.1). Effects on wells may include physical damage or impact to the well casing or wellhead, restriction in required access to the wellhead, restricted use of the well, and/or administrative barriers to the well or use of the well. A field well verification would need to be conducted prior to construction of any future improvements. Typical groundwater well infrastructure in the study area is illustrated in the sidebar on this page.

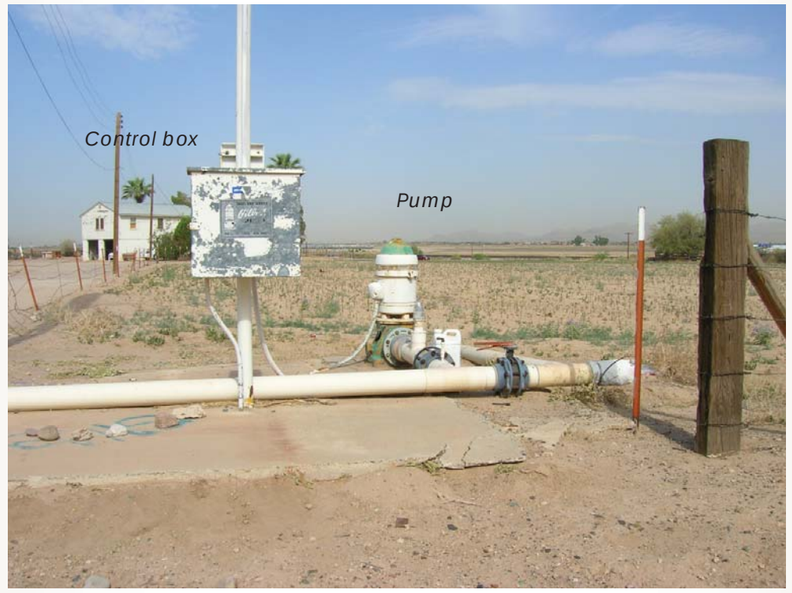
Next steps: data and process

The following data would need to be obtained and analyzed for future improvement projects:

- Depth to groundwater and groundwater quality – The ADWR Groundwater Site Inventory database contains detailed well and groundwater data, and can be used to confirm depth-to-groundwater data shown in the ADWR 2002–2003 water surface elevation maps.
- Groundwater wells – The ADWR "55" database may be used to develop a list of registered wells that exist within the study area.
- Confirm irrigation districts in the Study Area – Known irrigation districts include RID, SRP, St. Johns Irrigation District, and Buckeye Water Conservation and Drainage District.
- Analyze current surface water quality.
- Determine whether any perennial stream reaches are impaired waters by reviewing Arizona's or EPA's list of impaired waters.

Groundwater well

A typical wellhead includes a control box, pump, and piping to extract the water and deliver it to the owner



Comparison of future alternatives

Environmental analysis would be conducted by comparing each alternative for a proposed improvement project in the study area. The direct impacts from each alternative on each resource would be determined based on the designed (preliminary) right-of-way width. Digital geographic information system (GIS) data would be used to determine potential direct groundwater well impacts, potential irrigation system infrastructure impacts, and potential surface water resource impacts associated with the proposed improvements.

7.2 Floodplains

In the riverine sense, a floodplain is a relatively flat, lowland area that adjoins inland streams and is floodprone when high runoff occurs. However, floodplains are not always associated with inland streams; low-lying inland areas located in natural depressions or bordered by human-built or natural obstructions are often subject to flooding because of the lack of outfall channels. Floodplains are a critical part of a river or stream ecosystem. They function as water filters, flood buffers, and nurseries, and are major biological centers where flora and fauna often thrive.

Floodplains are defined as the area that would contain a flood with a probability of occurring once every 100 years (also known referred to as a 100-year flood). A floodway is the area of the floodplain where the water is likely to be the deepest with the highest velocity currents, and which should be kept free of obstructions to allow floodwaters to move downstream. As defined by the Federal Emergency Management Agency (FEMA), the floodway consists of the channel of a watercourse and adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

FEMA Flood Zones

Floodplains within and around the study area were determined using FEMA Flood Insurance Rate Maps (FIRMs). The FEMA FIRMs include Special Flood Hazard Areas, which classify the 100-year floodplains into different zones based on the depth and risk of flooding, existing protection, and method of determining the floodplain.

- Zone A: Areas of 100-year floods determined by approximate methods; no base flood elevations determined
- Zone AE: Areas of 100-year floods determined by detailed analysis; base flood elevations determined
- Zone AO: Areas of 100-year shallow flooding (1 to 3 feet); base flood elevations determined
- Zone X: Areas of or outside the 500-year floods; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 100-year flood

Floodplains identified

The primary FEMA-mapped floodway and floodplain features within the I-10 Corridor are the following:

- Colorado River
- Wash near Quartzsite
- Wash near Vicksburg Road
- Wash west of Centennial
- Hassayampa River
- Agua Fria River

There may be many additional floodplains within the study area that have not been identified at this time. Figure 7.2 shows the location of the mapped floodplains along the I-10 Corridor.

Regulatory setting

The federal policies and procedures for encroachments on floodplains are set forth in 23 Code of Federal Regulations (C.F.R.) § 650.111. In an effort to minimize impacts associated with the modification of floodplains, Executive Order 11988 (Floodplain Management) directs federal agencies to avoid actions located in or adversely affecting floodplains unless there is no practicable alternative, take action to mitigate losses if avoidance is not practicable, and establish a process for flood hazard evaluation based on the 100-year, or base flood, standard of the National Flood Insurance Program. Federal, state, and/or local agencies have developed requirements for development within the floodplain. FEMA enforces the minimum regulatory standards for development in floodplains. City, county, and state agencies may enforce more restrictive requirements that can vary by jurisdiction.

Mitigation measures

If avoidance of floodplains is not feasible, construction of bridges and culverts would reduce impacts to the floodplains.

Future data needs

The following information and data would be needed in the assessment of floodplain impacts related to proposed improvement projects:

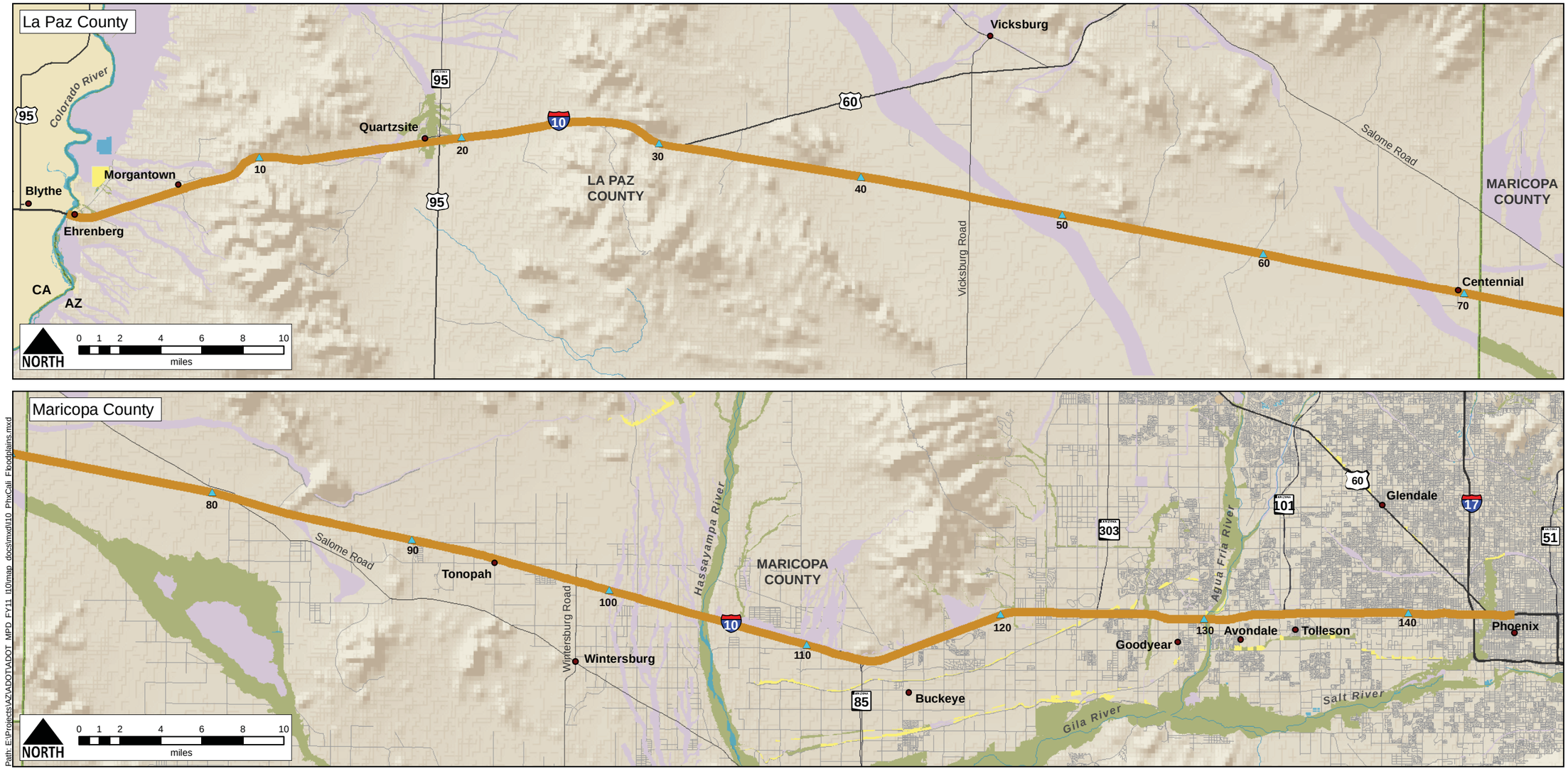
- FIRMs
- Flood Insurance Studies
- Identification of floodplain regulations for applicable jurisdictions

7.3 Jurisdictional waters

Waters of the United States (also known as jurisdictional waters), as defined in 33 C.F.R. § 328.3, are interstate "navigable waters" (defined in 33 C.F.R. § 329) of the United States, including the territorial seas, that are currently, have been used in the past, or may be used in the future for foreign or interstate commerce. These are any water body that has been used, is being used, or could be used to transport goods or services (including recreation) for interstate or foreign commerce. Specifically, such waters include interstate lakes, rivers, streams (including intermittent streams), and tributaries of those waters, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds whose use, degradation, or destruction could affect interstate or foreign commerce activities.

The CWA regulates discharges of pollutants into jurisdictional waters. Any project that involves activity within a jurisdictional water requires authorization under Section 404 of the CWA, which regulates the dredge

Figure 7.2 | Floodplains



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Federal Emergency Management Agency Floodplain

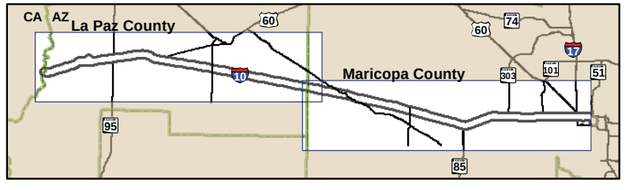
- Zone AE: Areas of 100-year flood; base flood elevations and flood hazard factors determined
- Zone A: Areas of 100-year flood; base flood elevations and flood hazard factors not determined
- Zone AO: Areas of 100-year shallow flooding (1 to 3 feet); base flood elevations and flood hazard factors determined
- Zone X: Area outside of 100-year flood

- City
- Milepost
- Project location*
- Stream
- Lake
- County boundary

*Study area extends 1 mile north and south of I-10

Source: FEMA (LaPaz County, 2005; Maricopa County, 2008)

Date: 8/3/2012



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and fill of materials into jurisdictional waters, including wetlands. The U.S. Army Corps of Engineers (USACE) administers Section 404 of the CWA, with oversight authority from EPA. USACE regulates jurisdictional waters through the use of general nationwide permits and specific individual permits. Nationwide permits apply to categories of activities that will cause minimal adverse environmental effects. Individual permits are intended to authorize activities with more than minimal adverse environmental impacts. The types of activities that may affect jurisdictional waters are fundamental to the associated permitting requirements and development of appropriate mitigation measures. Section 404 permits require water quality certification as set forth in Section 401 of the CWA prior to discharging fill material into jurisdictional waters. Section 401 of the CWA provides states with the authority to certify federally permitted activities in waters in order to prevent violation of state water quality standards. On nontribal lands, the certification process is administered by ADEQ.

USACE determines whether a feature is a jurisdictional water eligible for protection under the CWA. The types of jurisdictional waters that are regulated in the southwestern United States include ephemeral washes, intermittent and perennial streams, riverbeds, wetlands, and other special aquatic sites. The physical attributes of a water body are a key component of the jurisdictional waters determination. In two 2006 court cases, Rapanos v. United States and Carabell v. United States, the Supreme Court addressed instances where the federal government can apply the CWA. These cases challenged federal jurisdiction to regulate isolated wetlands under the CWA. In response to the 2006 Supreme Court cases, the EPA headquarters provided a guidance document (Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States, December 2, 2008) to EPA regions and USACE districts to ensure that jurisdictional determinations and permitting are consistent with the decision. The guidance addresses which waters are subject to CWA regulations and identifies waters that fall under USACE's jurisdiction. This guidance further defined jurisdictional waters, within 33 C.F.R § 328.3(a), as traditional navigable waters (TNWs) or those waters (including ephemeral washes) that demonstrate a significant nexus, or surface connection, to a TNW. According to this guidance USACE "will assert jurisdiction over TNWs, wetlands adjacent to TNWs, non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally, wetlands that directly abut such tributaries" and wetlands and other waters with a significant nexus to TNWs (EPA and USACE 2008).

Jurisdictional waters that cross the I-10 Corridor include the Colorado River, Hassayampa River, and the Agua Fria River, in addition to numerous named and unnamed washes and canals. The Colorado River is considered a TNW.

7.4 Topography and geology

This section provides an overview of the geologic setting, geotechnical, and geologic conditions within and surrounding the study area. The evaluation is based on available information on regional and local geology, mining activity, regional and local seismicity, and regional and local land subsidence and earth fissuring.

Topography

The topography along the I-10 Corridor is relatively flat, with road elevations ranging primarily between 1,000 and 1,200 feet above sea level. Near the Colorado River at the western edge of the corridor, the elevation drops to approximately 700 feet. A more detailed overview of the I-10 profile was provided previously in Section 6.2, *Geometric design*.

I-10 passes through or close to the following mountain ranges:

- Dome Rock Mountains (near milepost 9)
- Plomosa Mountains (near milepost 27)
- Granite Wash Mountains (near milepost 53)
- Big Horn Mountains (near milepost 83)
- White Tank Mountains (near milepost 111)

Mountain grades are experienced only through the Dome Rock Mountains, as I-10 passes through low-lying areas or just avoids outcroppings of the other four mountain ranges.

The topography of the adjacent area generally slopes from north to south across the I-10 Corridor. Most, if not all, of the washes and other waterways cross perpendicular to I-10.

Geology

The I-10 Corridor lies within the desert region of the Basin and Range Physiographic Province. The geology of the area surrounding the I-10 Corridor is presented in Figure 7.3. The information presented in Figure 7.3 is from the Arizona Geological Survey and represents a general overview of rock and soil conditions.

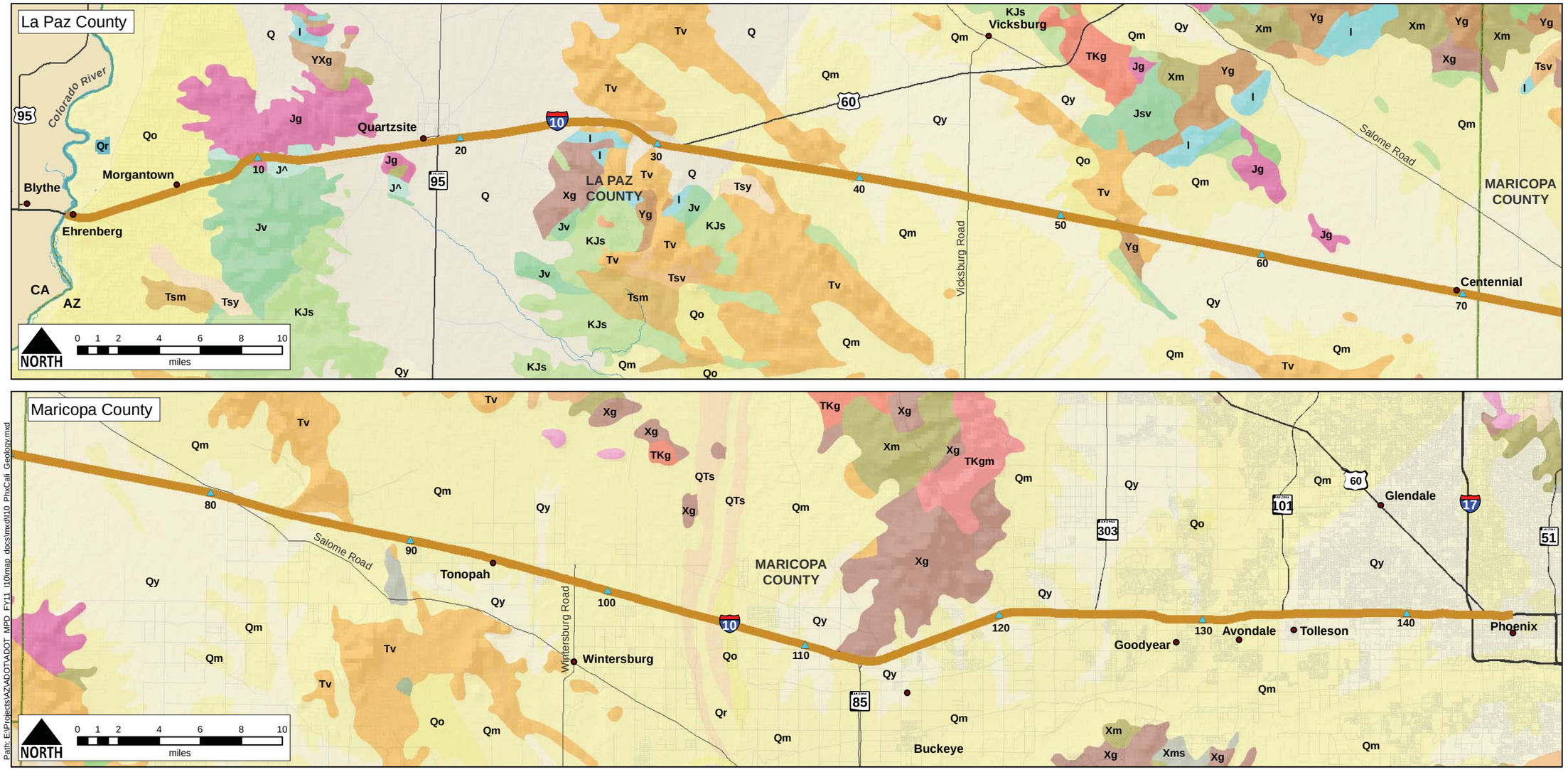
As described in the previous section, the majority of I-10 travels through the flat desert area of Arizona that is primarily surficial deposits (soils, deposits, and residual materials) denoted by the "Q" legend items. In the areas of the mountain ranges, I-10 passes through more distinct materials such as granite, volcanic, and sedimentary rocks.

7.5 Biological resources

Plant communities

The study area and surrounding land fall within the Lower Colorado River Valley subdivision of the Sonoran Desert (see Figure 7.4). This community ranges in elevation from sea level to 2,500 feet above mean sea level and is characterized by blue palo verde (Parkinsonia florida), catclaw acacia (Acacia greggii), honey mesquite (Prosopis glandulosa), ironwood (Olneya tesota), and desert broom (Baccharis sarothroides) along drainages and ocotillo (Fouquieria splendens), creosote bush (Larrea tridentata), and brittlebush (Encelia farinosa) in flat, open areas. Various cactus, including saguaro (Carnegiea gigantea), cholla (Cylindropuntia spp.), and prickly pear (Opuntia spp.) are sparse to moderately abundant (Turner and Brown 1994).

Figure 7.3 | Geology



City
Milepost
Project location*
Stream
Lake
County boundary

*Study area extends 1 mile north and south of I-10 *Source: Arizona Geological Survey 2011*

Date: 8/3/2012

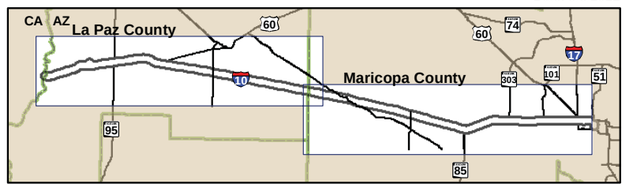


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Figure 7.4 | Plant communities

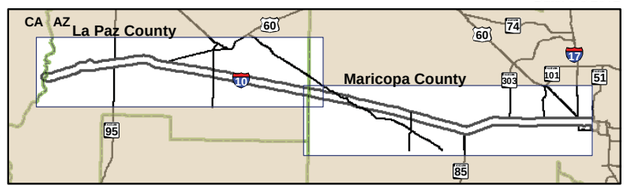
City
Milepost
Project location*
Stream
Lake
County boundary

Biotic communitites

Lower Colorado River Subdivision–Sonoran Desertscrub
Arizona Upland Subdivision–Sonoran Desertscrub
River

*Study area extends 1 mile north and south of I-10 *Source:* Nature Conservancy (2006)

Date: 8/3/2012



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A small area in the western portion of the study area falls within the Arizona Upland subdivision of the Sonoran Desert. This community ranges in elevation from 1,000 feet above mean sea level to 3,000 feet above mean sea level. Common species include mesquite, ironwood, palo verde (Parkinsonia spp.), and crucifixion thorn (Castela emoryi). Abundant cacti include saguaro, fishhook barrel cactus (Ferocactus wislizeni), pincushion (Pediocactus spp.), and many types of cholla (Turner and Brown 1994).

Riparian and wetland communities

No riparian or wetland areas exist in the study area. The Hassayampa River is ephemeral where it crosses I-10. Vegetation is denser at this location and includes tamarisk (Tamarix spp.) and mesquite. Numerous smaller ephemeral washes cross I-10 throughout the corridor; however, none support a riparian or wetland community. The shoreline where the I-10 Corridor crosses the Colorado River exhibits a low to moderate density of tree species, with bare uplands.

Protected native plants

Native plants protected under the Arizona Native Plant Act include all cacti, yucca, agave, and many wild-growing (i.e., not planted for landscaping) leguminous tree species. No formal inventory of protected native plants has been conducted within the study area; however, native plants do occur. Native plants include, but are not limited to, mesquite, palo verde, and a variety of cacti such as cholla, prickly pear, and saguaro. Compliance with the Arizona Native Plant Act for proposed improvements would require notification to the Arizona Department of Agriculture with the filing of a Notice of Intent to Clear Land.

Additionally, the "Native Plant Salvage and Replanting Evaluation Guidelines (Appendix L)" found in ADOT's long-range planning Guidelines for Highways on Bureau of Land Management and U.S. Forest Service Lands would be followed for all state and federal lands in the study corridor.

Threatened and endangered species

The U.S. Fish and Wildlife Service (USFWS) list of federally listed species for La Paz and Maricopa Counties, as shown in Table 7.1, was reviewed by a qualified biologist to determine species with potential to occur in the study area. The results of the review are presented in the table.

Migratory Bird Treaty Act

Migratory birds, most notably raptors, could nest or forage in the study area. These migratory birds are all protected under the Migratory Bird Treaty Act of 1918. Compliance with the Act would be achieved as long as no harm occurs to the species and/or nests and their contents. Species with a high likelihood of being present in the study area include, but are not limited to, the Western burrowing owl (Athene cunicularia hypugaea), red-tailed hawk (Buteo jamaicensis), and cactus wren (Campylorhynchus brunneicapillus).

Arizona Game and Fish Department Heritage Data Management System

The Arizona Game and Fish Department Heritage Data Management System manages and stores the locations of all agency special status species recorded during surveys. A query of the system returned survey results and agency designations for seven special status species occurring within 2 miles of the study area. These species are presented in Table 7.2.

Wildlife of Special Concern is a state designation for species whose occurrence in Arizona is or may be at jeopardy, as designated by the Arizona Game and Fish

Table 7.1 | Federally listed species found in La Paz and Maricopa Counties

Common name	Scientific name	Status[a]	Suitable habitat present	Occupied habitat likely present	Critical habitat present
Arizona cliffrose	*Purshia subintegra*	E	no	no	no
bonytail chub	*Gila elegans*	E	no	No	no
California least tern	*Sterna antillarum browni*	E	no	no	no
desert pupfish	*Cyprinodon macularius*	E	no	no	no
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	E	no	no	no
lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E	yes	possible, not likely	no
Mexican spotted owl	*Strix occidentalis lucida*	T	no	no	no
razorback sucker	*Xyrauchen texanus*	E	yes	yes	yes
Sonoran pronghorn	*Antilocapra americana sonoriensis*	E	yes	possible	no
southwestern willow flycatcher	*Empidonax traillii extimus*	E	no	no	no
woundfin	*Plagopterus argentissimus*	E	no	no	no
Yuma clapper rail	*Rallus longirostris yumanensis*	E	no	no	no
desert tortoise, Sonoran population	*Gopherus agassizii*	C	yes	yes	no
roundtail chub	*Gila robusta*	C	yes	yes	no
Sprague's pipit	*Anthus spragueii*	C	no	no	no
Tucson shovel-nosed snake	*Chionactis occipitalis klauberi*	C	yes	possible, not likely	no
yellow-billed cuckoo	*Coccyzus americanus*	C	no	no	no

Source: U.S. Fish and Wildlife Service. August 22, 2011.

[a] E – endangered; T – threatened; C – candidate

Table 7.2 | Arizona Game and Fish Department database results

Common name	Scientific name	Status[a]	General location
bald eagle wintering population	Haliaeetus leucocephalus	SC, WSC, MBTA, S	east
California leaf-nosed bat	Macrotus californicus	WSC	east
cave myotis	Myotis velifer	SC, S	throughout
desert tortoise, Sonoran population	Gopherus agassizii	C, WSC	throughout
great egret	Ardea alba	WSC, MBTA	Colorado River
razorback sucker	Xyrauchen texanus	E, CH, WSC	Colorado River
southwestern willow flycatcher	Empidonax traillii extimus	E, MBTA, WSC	Colorado River
western burrowing owl	Athene cunicularia hypugaea	SC, MBTA, S	east

Source: AGFD HDMS; accessed December 1, 2011

[a] E – endangered; C – candidate; S – sensitive; SC – species of concern; CH – critical habitat; MBTA – Migratory Bird Treaty Act; WSC – Wildlife of Special Concern

Department. Wildlife of Special Concern have no legal protection; however, there is a trend at the local, county, and state levels to address these species as conditions of permitting. A Species of Concern, according to USFWS, is a species that may be of concern to USFWS, but has no official status. A BLM Sensitive Species occurs on BLM land and is considered sensitive by the Arizona State Office.

Wildlife corridors

The Arizona Wildlife Linkages Workgroup, a collaborative effort between public and private organizations to address habitat fragmentation throughout the state, identified potential wildlife linkage zones across the state. The mission of the group is "to identify and promote wildlife habitat connectivity using a collaborative, science based effort to provide safe passage for people and wildlife." The zones identify opportunities to both prevent loss of wildlife connectivity and create accommodations to reestablish connectivity. The Arizona Wildlife Linkages Workgroup identified 152 linkages within Arizona. Those close to or crossing the I-10 Corridor are presented in Figure 7.5. The zones are primarily located between mountain ranges and along waterways or ephemeral washes.

7.6 Section 6(f) and 4(f)

This section provides an overview of two regulatory actions that must be considered during the NEPA process.

Section 6(f)

Section 6(f) of the Land and Water Conservation Fund Act (LWCFA), administered by the Interagency Committee for Outdoor Recreation (IAC) and National Park Service (NPS), pertains to projects that would cause impacts on or result in the permanent conversion of outdoor recreational property acquired with LWCFA assistance. The LWCFA established the Land and Water Conservation Fund (LWCF), a matching assistance program providing grants paying half the acquisition and development cost of outdoor recreational sites and facilities. Section 6(f) prohibits the conversion of property acquired or developed with these grants to a nonrecreational purpose without approval from IAC and NPS. NPS must ensure replacement lands of equal value, location, and usefulness are provided as conditions of approval for land conversions (16 U.S.C. §§ 460l-4 through 460l-11).

Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act states that the Secretary of Transportation may approve a transportation program or project . . .

> *requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if—(1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use. (49 United States Code [U.S.C.] § 303)*

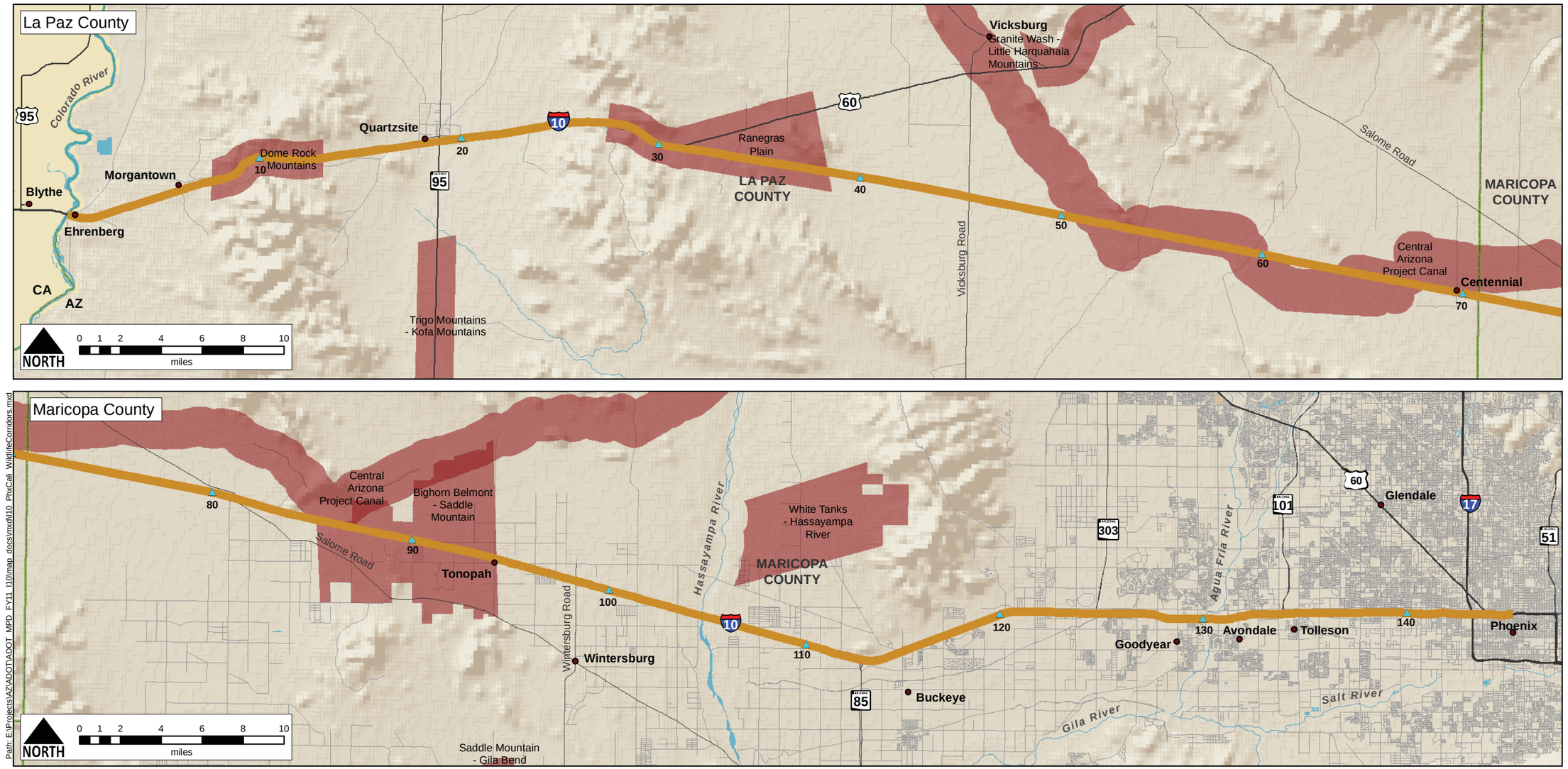
A "use" of a Section 4(f) resource, as defined in 23 C.F.R. § 774.17, occurs 1) when land is permanently incorporated into a transportation facility (a direct use), 2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservationist purpose (a direct use), as determined by the criteria in 23 C.F.R. § 774.13(d), or 3) when there is a constructive use of land as determined by the criteria in 23 C.F.R. § 774.15.

A constructive use of a Section 4(f) resource occurs when the transportation project does not incorporate land from the Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished (23 C.F.R. § 774.15).

For example, a constructive use can result when one or more of the following occur:

- The projected noise level attributable to the proposed project substantially interferes with the use and enjoyment of a noise-sensitive facility of a resource protected by Section 4(f). FHWA has defined this noise level as 67 dBA or higher.
- The proximity of the proposed project substantially impairs aesthetic features or attributes [such as blocking the view from a Section 4(f) property] of a resource protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the resource. An example of such an effect would be locating a proposed transportation facility in such proximity that it obstructs or eliminates views that are considered part of an NRHP-eligible, architecturally significant, historical property's Section 4(f) eligibility. Another

Figure 7.5 | Wildlife corridors



example would be locating a proposed transportation facility in such proximity that it detracts from the setting of a park or historic site which derives its value in substantial part because of its setting.

- The proposed project results in a restriction on access that substantially diminishes the utility of a significant publicly owned park, recreation area, or historic site.

Next Steps

Resources eligible for protection under Section 6(f) or 4(f) were not identified at this time. However, this report does provide descriptions of recreational facilities in Section 4.8, *Parks and Recreation Facilities,* and historic properties in Section 7.7*, Cultural Resources.* Additional analysis and consultation would be required during the NEPA process to evaluate the potential impact of a proposed project on resources eligible for protection under Section 6(f) or 4(f).

7.7 Cultural resources

The I-10 Corridor passes through the desert of western Arizona, which has a rich cultural heritage represented by a diversity and abundance of cultural resources. Archaeological and historic cultural resources are those places that represent the visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and importance, among other considerations; some are clearly evident on the landscape, while others are buried or only visible to knowledgeable people. Cultural resources may also include traditional cultural properties (TCPs), which are places or natural resources on the landscape that are important to the historically rooted beliefs, customs, and practices of contemporary communities and, in particular, Native American Tribes. The cultural significance of TCPs is defined by their association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community. Considerations of the identification, preservation, and management of cultural resources are integral aspects of any development project or management plan, as these important resources not only require regulatory compliance, but define our history and heritage at the local, state, and national levels.

Federal regulatory statutes

The two primary federal laws requiring cultural resource management compliance for a federal project or undertaking involving federal agencies are NEPA and the National Historic Preservation Act (NHPA). Other federal legislation that could apply—depending on the location and scope of a project—includes the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, and the Native American Graves Protection and Repatriation Act.

National Environmental Policy Act

Transportation projects requiring a federal action (FHWA approval, federal funding, etc.) must comply with NEPA (42 U.S.C. § 4321–4347). NEPA requires that federal agencies work to preserve not only natural resources but also important historical and cultural aspects of our national heritage [42 U.S.C. § 4331(b)(4)]. Consideration of the potential effects on cultural resources is, therefore, an integral component of the NEPA process at any level of evaluation, whether it be a categorical exclusion, environmental assessment, or EIS.

National Historic Preservation Act

Cultural resources include archaeological sites, historic buildings and structures, artifacts, and places of traditional, religious, and cultural significance. A "historic property" refers to cultural resources that are included, or eligible for inclusion, in the National Register of Historic Places (National Register). The NHPA of 1966, as amended (16 U.S.C. § 470) requires federal agencies to take into account the effects of their undertakings on historic properties, and afford the State Historic Preservation Office, and other parties with a demonstrated interest, with a reasonable opportunity to comment on such undertakings. Regulations for Protection of Historic Properties (36 C.F.R. Part 800) implement Section 106 of the NHPA. These regulations define a process for responsible federal agencies to consult with the State or Tribal Historic Preservation Officer, Native American groups, other interested parties, and, when necessary, the Advisory Council on Historic Preservation to ensure that historic properties are duly considered in projects with a federal nexus. FHWA would typically serve as the lead federal agency responsible for NHPA Section 106 compliance for federally sponsored transportation projects along the I-10 Corridor.

To be determined eligible for inclusion in the National Register, cultural resource properties must be important in American history, architecture, archaeology, engineering, or culture. In addition, properties must possess integrity of location, design, settings, materials, workmanship, feeling, and association, and meet at least one of four criteria:

- Criterion A – be associated with events that have made a significant contribution to the broad patterns of our history
- Criterion B – be associated with the lives of persons significant in our past
- Criterion C – embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction
- Criterion D – have yielded, or may be likely to yield, information important in prehistory or history

Properties may be of local, state, or national importance. Typically, historic properties are at least 50 years old, but younger properties may be considered for National Register listing if they are of exceptional importance.

Under the NHPA, the area of potential effects (APE) defines the spatial limits for the consideration of impacts to cultural resources. The APE is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist [36 C.F.R. Part 800.16(d)]. The APE is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking. For transportation projects along the I-10 Corridor, the APE for the consideration of direct impacts would typically be the project footprint within which heavy earthmoving

and construction activities would take place. The APE for the consideration of indirect impacts could extend beyond the project limits so that effects of changes to visual and acoustic settings, which often contribute to the National Register eligibility of architectural resources (e.g., buildings, historical districts) and TCPs (e.g., shrines, ceremonial locations, and natural features), can be considered and evaluated.

Traditional cultural properties

The National Register contains a wide range of historic property types, reflecting the diversity of the nation's history and culture. As noted previously, districts, sites, buildings, structures, and objects are all included in the National Register if they meet the criteria specified in the National Register's Criteria for Evaluation [36 C.F.R. § 60.4]. Such properties reflect many kinds of significance in architecture, history, archaeology, engineering, and culture. There are many definitions of the word "culture," but in National Register programs, the word is understood to mean the traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community, be it an Indian Tribe, a local ethnic group, or the people of the nation as a whole.

One kind of cultural significance a property may possess, and that may make it eligible for inclusion in the National Register, is traditional cultural significance. The NPS defines "traditional" in this context as those beliefs, customs, and practices of a living community of people that have been passed down through generations, usually orally or through practice (NPS 1990). The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices (NPS 1990).

Thus, NPS generally defines a TCP as a property that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

Traditional cultural values are often central to the way a community or group defines itself, and maintaining such values is often vital to maintaining the group's sense of identity and self respect. Properties to which traditional cultural value is ascribed often take on this kind of vital significance, so that any damage to or infringement upon them is perceived to be deeply offensive to, and even destructive of, the group that values them. As a result, it is extremely important that TCPs be considered carefully in planning. Furthermore, it is important that such properties, when they are eligible for inclusion in the National Register, be nominated to the National Register or otherwise identified in inventories for planning purposes.

TCPs are often hard to recognize. A TCP such as a traditional ceremonial location might be a mountaintop, a lake, or a stretch of river; a culturally important neighborhood may look like any other aggregation of houses; and an area where culturally important economic or artistic activities have been carried out may look like any other building, field of grass, or piece of forest in the area. As a result, such places may not necessarily be readily identifiable through conventional archaeological, historical, or architectural surveys. The existence and significance of such locations often can be ascertained only through interviews with knowledgeable users of the area, consultations with community leaders, or through other forms of ethnographic research.

State regulatory statutes

In addition to federal regulations, projects involving state agencies must also comply with Arizona's preservation laws, the Arizona State Historic Preservation Act of 1982 (A.R.S. §§ 41-861 through 41-864) and the Arizona Antiquities Act (A.R.S. §§ 41-841 through 41-847). The Arizona State Historic Preservation Act stipulates that state agencies work to identify and preserve significant historic properties and provide the State Historic Preservation Office an opportunity to comment on any agency plans that affect properties listed in or eligible for listing in the Arizona Register of Historic Places. The Arizona Antiquities Act prohibits excavation of historic or prehistoric sites on land owned or controlled by the State of Arizona or local governments without a permit.

Data review

Cultural resources along the I-10 Corridor are defined archaeologically primarily by the Paleo-Indian, Archaic, Patayan, and Hohokam cultural traditions, which together represent 10,000 years of prehistoric human occupation in western Arizona (e.g., Cordell 1997; Gumerman 1991; Rogers 1945; Spier 1970; Stone 1991). The ancestors of Arizona's contemporary Native American tribes were active throughout the I-10 corridor during the Proto-historic period, approximately A.D. 1500s to Spanish Contact. Sites dating to this transitional period are often difficult to detect archaeologically due to the nature of site composition and changes in cultural patterns. Cultural resources from the subsequent historic period are diverse, with associations relating to railroad settlement, mining, ranching, commerce, military operations, and agriculture, just to name a few. Native American Tribes in Arizona with cultural affiliations or claims to the I-10 Corridor and associated cultural sites (archaeological, ethnographic, and TCPs) in the region include the Ak Chin Indian Community, Chemehuevi Tribe, Cocopah Tribe, CRIT, Fort Mojave Tribe, Fort Yuma-Quechan Tribe, Gila River Indian Community, Hopi Tribe, Moapa Band of the Paiute, Pascua Yaqui Tribe, Salt River Pima-Maricopa Indian Community, Tohono O'odham Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe.

A cursory review of the AZSITE database was performed to gain a general sense of existing survey coverage within 1 mile of the I-10 Corridor. Archaeological surveys have been performed along the entire length of the I-10 right-of-way between Phoenix and the California border. Some of the surveys took place more than 10 years ago; therefore, those portions may require reevaluation. In addition, numerous archaeological surveys have taken place within a mile of I-10; however, the vast majority of land adjacent to the Interstate has not been previously surveyed. Therefore, any development project involving land outside the existing I-10 right-of-way would likely require additional evaluation of cultural resources.

The Historic Preservation Team Portal, ADOT's GIS-based database for cultural resources, was consulted to provide a summary of previous survey projects along the

I-10 Corridor and a sample of site types encountered. The portal indicated that 33 cultural resources surveys have been performed along the I-10 Corridor (see Table 7.3). These studies have documented 38 archaeological and historic sites. Prehistoric site types recorded include artifacts scatters, habitations, villages, and rock rings. Historic site types documented include trash scatters/dumps, irrigation canals and wells, abandoned highway segments, mines, homesteads, rock features, railroads, and drainage structures. While no TCPs are documented in the Historic Preservation Team portal, it is likely that places of traditional cultural importance to Native American Tribes are present in and close to the I-10 Corridor. Such places could include trails, native plant and natural resource gathering areas, locations of ceremonial activities, and culturally important landscape features such as mountains, rivers, and vistas.

Transportation projects and management plans developed for the I-10 Corridor would require cultural resource evaluations in compliance with federal and state regulations. Such studies would include formal Class I and Class III surveys for the evaluation of archaeological resources; architectural inventories for the evaluation of historic buildings, structures, and the built environment; and consultations with Native American Tribes and other cultural groups early and as needed during the planning process for the evaluation of TCPs and other culturally important traditional resources. Any cultural resources determined eligible for or listed on the National Register that cannot be avoided and/or that would be adversely affected by an undertaking would require mitigation.

7.8 Farmland

An analysis of prime and unique farmland must be conducted when a "federal action" is anticipated related to proposed improvements along the I-10 Corridor. Specifically, this section will address compliance with Farmland Protection Policy Act (FPPA) regulations (7 C.F.R. § 658).

The FPPA requires identification of proposed actions that would affect any land classified as prime or unique farmland before federal agency approval of any activity that would convert farmland to other uses. The Natural Resources Conservation Service (NRCS), part of the U.S. Department of Agriculture (USDA), administers the FPPA as it relates to protection of farmland.

The FPPA was put forth by Congress as a result of a substantial decrease in the amount of open farmland. The Secretary of Agriculture is required under the FPPA to set criteria to identify and take into account the potential effects of federal agency activities on the preservation of farmland. Agencies must consider alternative actions and ensure that their programs are compatible with state and local government programs. The FPPA regulations (7 C.F.R. § 658.5) establish the criteria for such evaluation, with an emphasis on urban aspects of proposed programs. In 7 C.F.R. § 658.3, it is stated that the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses will be minimized. In 7 C.F.R. § 658.4, it states that federal programs shall be administered in a manner that, as practicable, will be compatible with state and local government and private programs and policies to protect farmland. It requires identification of proposed federal actions that would affect any land classified as prime and unique farmland and the consideration of alternative actions.

Identification of potential prime and unique farmland

The FPPA governs the definition and identification of prime and unique farmland. The FPPA states that "the purpose of the Act is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses." It requires identification of proposed actions that would affect any land classified as prime or unique farmland before federal approval of any activity that would convert farmland into other land uses. Other uses would include conversion to right-of-way for transportation uses.

Pursuant to the FPPA, "farmland" includes:

- Prime – Land that "has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber." [7 U.S.C. § 4201(c)(1)(A)]
- Unique – Land other than prime farmland that is used for the production of specific high value food and fiber crops, such as citrus, tree nuts, olives, cranberries, fruits, and vegetables. "It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods." [7 U.S.C. § 4201(c)(1)(B)].
- Other – This encompasses farmland, "other than prime or unique farmland, that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate State or unit of local government agency or agencies, and that the Secretary determines should be considered as farmland for the purposes of this chapter." [7 U.S.C. § 4201(c)(1)(C)]

To rate the relative impact of projects on farmland, as required by the FPPA, federal agencies must complete portions of the Farmland Conservation Impact Rating. The NRCS-CPA-106 form should be used for highway and transportation corridor projects, and the "Corridor Type Site Assessment Criteria" are the specific criteria expected to be used for projects in the I-10 Corridor study area (see Appendix J). The NRCS-CPA-106 form is based on a Land Evaluation and Site Assessment (LESA) rating system. The LESA system is a two-component numerical rating system that measures the quality of farmland. One evaluation component measures soil quality and the second evaluation component measures other factors of farm viability such as parcel size.

In 7 C.F.R. §§ 658.2–658.3, a description of land not subject to (not protected by) provisions of the FPPA is provided:

- land that receives a combined score of less than 160 points from the LESA criteria

Table 7.3 | I-10 Corridor cultural resource surveys

Reference	Institution	Title
Curtis 1988a	Archaeological Research Services, Inc.	Cultural Resources Survey of an 85 Ace Parcel Adjacent to the North Side of Interstate 10 in Goodyear, Western Maricopa County, Arizona
Curtis 1989	Archaeological Research Services, Inc.	A Cultural Resources Survey at the Location of the Proposed Bullard Avenue Interchange along Interstate 10, Northwest of Goodyear, Western Maricopa County Arizona.
Rosenburg 1983	Arizona Department of Transportation	An Archaeological Survey of the Reems Road Traffic Interchange at I-10 Project I-10-2(104), Maricopa County, Arizona
Dobschuetz and Garcia 2000a	Eco Plan Associates, Inc.	A Cultural Resources Survey of the Proposed Airport Road Interchange on Interstate 10, Maricopa County, Arizona
Dobschuetz and Garcia 2000b	Eco Plan Associates, Inc.	A Cultural Resources Survey of the Watson Road Interchange on Interstate 10, Maricopa County, Arizona
Montero 1999	Entranco, Inc.	A Cultural Resource Survey of Disposal Site D-M-100, a 93.8-Acre Parcel Adjacent to the North Side of Interstate 10, Maricopa County, Arizona
Dosh 1997	Northland Research, Inc.	Cultural Resources Survey U.S. Interstate Highway 10 Pre-Pass Site near Ehrenberg, La Paz County, Arizona
Kwiatkowski 1997	Archaeological Research Services, Inc.	A Cultural Resources Survey of 12.29 Miles of Interstate 10 Right-of-Way (Mileposts 11.71 to 24.00) near Quartzsite, La Paz County, Arizona
Stone 1996	Archaeological Research Services, Inc	Cultural Resources Survey of a CA 75 Acre Arizona Department of Transportation-Owed Disposal Parcel Located North of Interstate 1-10 and East of the 75E Traffic Interchange, Approximately 70 Miles West of Phoenix, Maricopa and La Paz Counties, Arizona
Rosenberg 1985	Arizona Department of Transportation	Cultural Resources Inventory Report for Project I-10-2-911 Hassayampa River Bridge Scour Protection, Maricopa County, Arizona
Rodrigues and Ogren	Entranco, Inc.	A Cultural Resource Survey of 30.00 Miles (1,373.22 Acres) along Interstate 10 between Milepost 45.00 and 75.00, East of the Vicksburg Road Interchange, Yuma Maintenance District, La Paz and Maricopa Counties, Arizona.
Walsh and Ogren 2002	Entranco, Inc.	A Cultural Resource Survey of 37.20 Miles (1,221.87 Acres) along Interstate 10 Between Mileposts 75.00 and 112.20: Adobe Flats-Junction State Route 85/Tonopah, Yuma Maintenance District, Maricopa County, Arizona
Stone 1995	Archaeological Research Services, Inc.	Cultural Resources Survey of the Burnt Well Rest Area along Interstate-10, Approximately Eight Miles West of Tonopah, West-Central Maricopa County, Arizona
Larkin and Giacobbe 1998a	Stantech Consulting, Inc.	A Cultural Resource Pedestrian Survey for the Arizona Department of Transportation of Ten Locations in the Yuma District, I-10 at Mileposts 81.24, 94.15, 98.29, & 103.45 and I-8 at Mileposts 2.00, 7.63, 42.06, 102.23, 115.62, & 119.42, Maricopa and Yuma Counties, Arizona
Larkin and Giacobbe 1998b	Stantech Consulting, Inc.	A Cultural Resource Pedestrian Survey for the Arizona Department of Transportation of One Location in the Yuma District, I-10 at Milepost 0.7, La Paz County, Arizona
Touchin and Brodbeck 2002	HDR Engineering, Inc.	A Cultural Resources Survey of the Buckeye Watershed Section Disposal Parcel, North of Interstate-10 from Approximately Milepost 105 to Milepost 119, Maricopa County, Arizona
Woodall 1993	Archaeological Research Services, Inc.	Cultural Resources (Archaeological) Survey of a Ca. 13.5 Acre Parcel Near Palo Verde Road and Interstate 10, Maricopa County, Arizona
Harmon 1993	Archaeological Research Services, Inc.	A Cultural Resources (Archaeological) Survey of a 15 Acre Parcel of Private Property Adjacent to the Southwest Corner of the Interstate 10/ Palo Verde Road Interchange, Central Maricopa County, Arizona
Brodbeck 2001	HDR Engineering, Inc.	A Cultural Resources Survey for Traffic Sign Replacement along the Interstate 10 Corridor from 15th Avenue to 115th Avenue (Mileposts 131.3-144.3), Maricopa County, Arizona
Curtis 1988b	Archaeological Research Services, Inc.	Cultural Resources Survey of a One-half Acre Parcel Adjacent to Interstate 10 in Ehrenberg, La Paz County, Arizona
Peoples and Garcia 2000	EcoPlan Associates, Inc.	A Cultural Resources Survey of Additional Easements for the I-10 East Quartzsite Traffic Interchange and the SR 95 Widening Projects, Quartzsite, La Paz County, Arizona
Stone 1993	Archaeological Research Services, Inc.	Cultural Resources Survey of 6.03 Acres of Arizona Department of Transportation-Owned Right-of-Way and Private Lands Directly North of the Interstate-10/Quartzsite West Traffic Interchange, Quartzsite, La Paz County, Arizona
Hathaway 1999	Archaeological Research Services, Inc.	Cultural Resources Surveys of Six Corridors for the Installation of Five Variable Message Signs within Arizona Department of Transportation Right-of-Way along Interstates 8, 10, and 17 in Maricopa, Yuma, and La Paz Counties, Arizona
Benjamin 2002	Entranco, Inc.	A Cultural Resource Survey of 32.71 Miles (1,461.79 Acres) along Interstate 10 Between Mileposts 0.00 and 11.71, and between Mileposts 24.00 and 45.00, Ehrenberg to the Vicksburg Road Interchange, Yuma Maintenance District, La Paz County, Arizona
Touchin and Brodbeck 2003	HDR Engineering, Inc.	A Cultural Resources Survey Along the Interstate Corridor from State Route 85 to the Loop 101 Freeway (Mileposts 112.20 to 134.00), Maricopa County, Arizona
Turner and Davis 2005	Carter & Burgess, Inc.	A Cultural Resources Survey of Three Crossroads Along Interstate 10 at 411th Avenue (Milepost 94.17), 339th Avenue (Milepost 103.45) and Palo Verde Road (Milepost 109.68) between Tonopah and Buckeye, Maricopa County, Arizona
Davis 2006	Carter & Burgess, Inc.	A Cultural Resources Survey of Disposal D-Y-033, North of Interstate 10 Between Milepost 69 and 70, West of Tonopah, La Paz County, Arizona
Bellavia and others 2006	SWCA, Inc.	Cultural Resources Survey of a Proposed Traffic Interchange on Interstate-10 for the Desert Creek Development near Milepost 105.52, Maricopa County, Arizona
Jolly and others 2006	Archaeological Consulting Services, Ltd.	Cultural Resources Survey for Planned Traffic Interchange Improvements Along Interstate-10 at 43rd and 51st Avenues, Phoenix, Maricopa County, Arizona
Brodbeck and Silverman 2006	HDR Engineering, Inc.	A National Register Eligibility Assessment of the Bullard Wash Drainage Ditch, Interstate 10, Milepost 127.17, Maricopa County, Arizona
Turner 2006	Carter & Burgess, Inc.	A Cultural Resources Survey of Approximately 2.8 Acres between Milepost 3.44 and Milepost 3.81 along Interstate 10, at the Ehrenberg Port of Entry, La Paz County, Arizona.
Silverman 2006	HDR Engineering, Inc.	A Class III Cultural Resources Survey Outside the Interstate 10 Right-of-Way (MP 125.98 to MP 134.08), Between Sarival Avenue and State Route 101L (Loop 101), Maricopa County, Arizona
Hooper and others 2009	URS Corporation	Cultural Resource Survey for Proposed Improvements of the Avondale Boulevard/Interstate 10 Traffic Interchange, Maricopa County, Arizona

Source: ADOT Historic Preservation Team Portal; accessed November 2011.

Figure 7.6 | Farmland

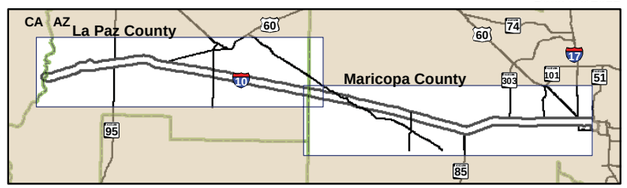
City
Milepost
Project location*
Stream
Lake
County boundary

Areas of potential prime and unique farmland

*Study area extends 1 mile north and south of I-10

Source: 2011 aerial photography analysis

Date: 8/3/2012



ADOT

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- land identified as an "urbanized area" on U.S. Census Bureau maps
- land with a "tint overprint" on the U.S. Geological Survey topographical map
- areas shown as white (not farmland) on USDA Important Farmland Maps (these are sites that do not contain prime, unique, statewide, or locally important farmland)
- areas shown as "urban built up" on USDA Important Farmland Maps (consistent with the guidance of the National Resources Inventory for mapping urban built up areas [areas 10 acres or larger without structures are not considered urban built up and are subject to the FPPA])
- land in water storage, including land that has been acquired or planned for water storage prior to August 4, 1984
- farmland already in urban development or water storage includes all such land with a density of 30 structures per 40-acre area
- land used for national defense purposes
- private land where no federal funds or technical assistance is used

Exemptions to the FPPA include:

- construction or improvement projects considered to be "beyond the planning stage and in either the active design or construction state on August 4, 1984." A project is considered to be "beyond the planning stage and in either the active design or construction state on August 4, 1984" if, on or before that date, actual construction of the project had commenced
- acquisition of land or easements for the project occurred or all required federal agency planning documents and steps had been completed and accepted, endorsed, or approved by the appropriate agency
- a final EIS had been filed with EPA or an environmental assessment had been completed and a finding of no significant impact was executed by the appropriate agency official
- engineering or architectural design had begun or such services had been secured by contract

It is expected that prime and unique farmland exists within the 2-mile-wide I-10 Corridor based on the existence of prime and unique soil types and irrigation infrastructure. Figure 7.6 illustrates the general locations where prime and unique farmland is anticipated.

Potential impacts

The types of environmental impacts expected as a result of proposed improvements within the I-10 Corridor would include:

- Direct conversion: actions or projects would result in making land nonfarmable; action (building or construction) on a specific area would result in a direct impact
- Cumulative: may include isolation of remnant parcels (agricultural land that would be bisected by a project such as a highway, resulting in two isolated parcels)
- Indirect (secondary): taking land adjacent to a specific impact area out of agricultural production

Where farmland would be affected, a map showing the location of all farmland in the project impact area would be developed. In addition, a discussion of the impacts, alternatives, and identification of measures to avoid or reduce the impacts would be needed.

Next steps: data and process

The following data would need to be obtained and analyzed for future improvement projects:

- USDA soil data from published reports or the NRCS online "web soil survey"
- Irrigation district information from ADWR
- USDA National Agricultural Statistics Service data (use to complete parts of form NRCS-CPA-106)

The following processes and determinations would need to be completed:

- Identify soil types using the most current soil survey data.
- Identify whether soil types are considered prime and unique as identified on the USDA prime and unique farmland soils list.
- Determine whether irrigation water delivery systems are associated with identified farmland in the study area.
- Determine whether prime and unique farmland in the study area meets the FPPA exemption criteria.
- Conduct field visits to the study area, with key observations to include confirmation of irrigated agriculture and irrigation infrastructure.
- Determine the total acreage of prime and unique farmland in the study area, and the acreage of prime and unique farmland directly affected by action alternative(s).
- Develop an aerial-based figure that illustrates the extent and quantity of prime and unique farmland in the study area (GIS-based figure).
- Complete NRCS-CPA-106 form, with FHWA/ADOT completing Parts I, II, IV, and VII, and NRCS completing Parts III, IV, and V. (ADOT prefers to submit a letter to NRCS requesting scoring of Parts III, IV, and V, with a figure and GIS files accompanying the letter.)

A key step in the prime and unique farmland analysis is determining whether water delivery irrigation systems are associated with identified farmland in the study area. An aerial photograph of the study area would be used to confirm land under cultivation that appears to be irrigated, then GIS would be used to calculate the total acreage affected by each action alternative.

Farmland that is assessed as prime or unique, as defined in 7 C.F.R. Part 658.5(c), is then scored using form NRCS-CPA-106 (Farmland Conversion Impact Rating). The USDA National Agricultural Statistics Service data should be used to complete parts of the form. The data used for this form include farm sizes and numbers for study area counties. Where the LESA combined score (from the NRCS-CPA-106 form) is 160 points or greater, alternatives to avoid and/or minimize farmland impacts must be evaluated.

7.9 Hazardous materials

ADOT maintains a protocol for assessing hazardous waste issues for single sites and corridors. For the corridor process, three steps are followed:

1. corridor-level Initial Site Assessment (ISA) (minimum acceptable effort level for a major freeway corridor)
2. periodic ISA updates (to maintain ASTM conformance)
3. site-specific ISAs for acquisition parcels

Each step follows the investigative process outlined in ASTM E 1527-05, which has been adopted by EPA as equivalent to the "All Appropriate Inquiry" clause included in the 1980 Comprehensive Environmental Response, Compensation, and Liability Act and the 2002 Brownfields Act. This protocol, primarily designed for single-site Phase I Environmental Site Assessments (ISA is ADOT's term for this work), can be altered to fit linear corridor projects. The ASTM and ADOT protocols for Phase I work include four investigative elements:

1. review of regulatory history of sites located on or near the corridor (all-inclusive of federal, state, local, and Tribal environmental laws and site lists)
2. site reconnaissance by an appropriately-qualified environmental professional (as defined in ASTM E 1527-05)
3. interviews with site operators or persons familiar with historical waste operations at identified sites of concern
4. review of historical data sources

Generally, the corridor-level ISA is performed once the study area is defined, during the environmental documentation process (categorical exclusion, environmental assessment, or EIS). The main purpose of the corridor-level ISA is to identify issues and constraints related to hazardous waste sites and to allow the study team to consider these issues during corridor selection. ISA updates are generally conducted every year (on long-term projects), or at an interval determined to be appropriate by ADOT's Hazardous Materials Coordinator. Site-specific ISAs are performed on individual properties once the final corridor footprint has been selected, prior to actual right-of-way acquisition.

For the I-10 Corridor from the Colorado River (state line) to downtown Phoenix, some segments have been studied in the form of ISAs, lead paint studies, and asbestos-in-concrete studies for previous projects. Notably, I-10 from approximately SR 85 to the I-17 system traffic interchange was studied from 2005 to 2010 as part of the I-10 widening project. Although these data exist, they are out of date according to ASTM, and would need to be revisited and updated. Other segments of I-10 may have been studied in the form of ISAs in the past, but coverage and dates of the studies would need to be confirmed with ADOT's Hazardous Materials Coordinator. In addition to previous studies, a comprehensive review of Arizona Department of Public Safety files for accidents/spills would need to be conducted.

7.10 Noise

FHWA is required to identify noise-sensitive land uses near its projects, to evaluate noise impacts on those land uses, and to consider noise abatement options. ADOT adopted and received formal FHWA approval for a Noise Abatement Policy (NAP) to outline the process of noise analysis and the evaluation of noise abatement. The current NAP became effective on July 13, 2011 (ADOT 2011).

The federal noise abatement criteria (NAC) for various types of land use activity categories are summarized in Table 7.4. Noise abatement must be considered when the future peak hour traffic noise from a project would approach or exceed the NAC. The ADOT NAP defines "approach" to mean being within 3 dBA, thereby requiring noise abatement considerations when the predicted future peak-hour traffic noise levels at Category B (residential) land uses is 64 dBA Leq. Additionally, mitigation must be considered for residential properties if future traffic noise levels exceed existing levels by 15 dBA.

The NAP also specifies evaluations related to the feasibility and reasonableness of abatement in terms of providing substantial noise reduction, cost-benefit considerations, maximum barrier heights, and other barrier design issues. The NAP defines the cost effectiveness of abatement as follows:

> *The maximum reasonable cost of abatement is $49,000 per benefited receiver (cost-per-benefited-receptor) with barrier costs calculated at $35 per square foot, $55 per square foot if constructed on a structure. The cost of an abatement measure is the total cost of that measure divided by all the benefited receptors protected by that abatement. The cost-per-benefited-receiver and barrier-cost-per-square-foot require ADOT approval, and will be re-calculated on a regular interval, not to exceed five years… The current values were approved by FHWA on 07/13/2011. (ADOT 2011c)*

As discussed in the section, *Walls*, on page 3-14, a number of noise walls exist along I-10 in the urban area. As I-10 continues to expand in lanes and traffic volumes and as development continues on land around the I-10 Corridor, noise mitigation will become a major consideration for future projects.

7.11 Air quality

The creation of the Clean Air Act (CAA) in 1963 implemented a national effort to maintain healthy air quality by controlling air pollution. The CAA provides the principal framework for national, state, and local efforts to protect air quality. The 1970, 1977, and 1990 CAA amendments renewed and intensified national efforts to reduce air pollution in the United States.

Air pollution comes from many different sources:

- stationary sources
  - — factories
  - — power plants
  - — dry cleaners
- mobile sources
  - — motor vehicles
  - — construction activities
  - — planes
  - — trains
- natural sources
  - — windblown dust
  - — wildfires

Table 7.4 | Federal noise abatement criteria

Activity category	Activity criteria[a,b] L eq(h)	L 10(h)	Evaluation location	Activity description
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[c]	67	70	Exterior	Residential.
C[c]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[c]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.
F	—[d]	—		Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	—	—		Undeveloped lands that are not permitted.

[a] Hourly A–weighted sound level in decibels (dBA); either Leq(h) or L10(h) (but not both) may be used on a project. [b] The Leq(h) and L10(h) activity criteria values are for impact determination only, and are not design standards for noise abatement measures.
[c] Includes undeveloped lands permitted for this activity category. [d] not applicable (or no standard exists)

The wide variety of pollutants from these sources can affect local and regional air quality.

While EPA regulates many air pollutants, certain pollutants are known as "criteria" air pollutants because EPA uses health-related criteria to establish permissible exposure levels. The permissible levels are known as the National Ambient Air Quality Standards (NAAQS). One set of limits (primary standards) protects health; another set (secondary standards) is intended to minimize environmental and property damage. Table 7.5 lists the NAAQS for criteria pollutants.

I-10 within the Phoenix metropolitan area is within nonattainment areas for particular matter (PM10), carbon monoxide, and ozone.

In addition to the criteria pollutants, EPA is concerned with what it terms hazardous air pollutants (HAPs), which are a range of compounds known for or suspected of having serious health or environmental impacts. Under the CAA, EPA regulates 188 HAPs. Most HAPs originate from human-made sources, including indoor sources such as fumes from cooking, home supplies, or building materials, and outdoor sources such as refineries, chemical plants, gasoline stations, and vehicle emissions. Some HAPs are also released from natural sources such as forest fires (FHWA 2006). Twenty-eight percent of overall HAPs emissions plus diesel particulate matter and diesel organic gases have been classified as on-road mobile source air toxics.

Any proposed improvements along the I-10 Corridor would be required to evaluate impacts with respect to increases or decreases in criteria air pollutants and

Table 7.5 | National Ambient Air Quality Standards

Pollutant	Average timing	Primary standard	Secondary standard
Carbon monoxide	1-hour	35 ppm	no standard
	8-hour	9 ppm	no standard
Nitrogen dioxide	Annual	0.053 ppm	0.053 ppm
	1-hour	0.1 ppm	no standard
Ozone	8-hour	0.075 ppm	0.075 ppm
Lead	Rolling 3-month	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
Sulfur dioxide	Annual	0.03 ppm	no standard
	24-hour	0.14 ppm	no standard
	1-hour	0.075 ppm	no standard
	3--hour	no standard	0.5 ppm
Particulate matter ($PM_{2.5}$)	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual	15 $\mu g/m^3$	15 $\mu g/m^3$
Particulate matter (PM_{10})	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$

Notes: ppm = parts per million; μg = microgram; m = meters

7.12 Visual resources

The need to assess visual resources for transportation corridors is grounded in federal law, policy, and agency recommendations. NEPA (42 U.S.C. §§ 4331–4332) requires the federal government

> *To use all practicable means … [to] … assure all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings … [Section 101(b)(2)]*

To this end, federal agencies are directed to

> *Identify and develop methods and procedures … which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations. [Section 101(2)(B)]*

Title 23 of the United States Code (U.S.C.), which governs FHWA, also calls for balancing the costs of minimizing or eliminating "the destruction or disruption of manmade and natural resources," specifically including, "esthetic values."

FHWA Technical Advisory Guidance for Preparing and Processing Environmental and Section 4(f) Documents (1987) specifically calls for an assessment of

The relationship of the impacts to potential viewers of and from the project, as well as measures to avoid, minimize, or reduce the impacts.

Assessment approach

The visual quality of a landscape is a combination of three factors: vividness, intactness, and unity. Vividness is the memorability of the landscape based on a striking and distinctive visual pattern. Intactness is the integrity of visual order in the natural and human-built landscape and the extent that the landscape is free from visually encroaching elements. Landscape unity is the degree to which visual resources of the landscape form a coherent, harmonious visual pattern (FHWA 1988).

Also considered in an assessment of effects on visual resources are any changes in visual pattern and visual character that would arise from construction and operation of a transportation project. Any landscape has a visual pattern that contributes to its distinctiveness and is established by the elements of form, line, color, and texture found in a landscape.

Four factors contribute to the visual pattern and character of a landscape: dominance, scale, diversity, and continuity. The position, contrast, extent, or importance of pattern elements contributes to their dominance. Relative size between landscape components and surroundings establishes relative scale in the landscape. Diversity is created by multiple elements and the relationship of elements to edges. Continuity is the uninterrupted flow of pattern elements in a landscape and visual relationships between immediately connected or related landscape components (FHWA 1988).

Within the study area, visual character is established through a combination of the dominance, scale, and continuity of the surrounding mountain landscapes; the scale and diversity of the desert floor; and the dominance and continuity of rivers and washes coursing through the landscape. Human-built elements within the study area provide an additional layer of complexity to the visual character.

Assessing visual resources in the I-10 Corridor and any impacts resulting from changes caused by development of improvements to the existing transportation infrastructure would be based on qualitative and quantitative analyses employing the terminology defined above.

Description of existing resources

The I-10 Corridor extends westward from dense urban conditions in Phoenix to remote, Sonoran Desert landscapes. Accordingly, the existing freeway and its structures and landscaping reflect these environments. In the Phoenix metropolitan area, the freeway is depressed and landscaped and uses associated structures whose design and colors help to provide motorist with some visual relief from probably the most stressful commute in the metropolitan area. For much of the year, drivers have to contend with both direct morning and evening sun, as well as year-round heavy congestion. In the remote areas, the freeway has no additional landscape treatment and few amenities.

A more detailed examination of the critical roadside treatments and corridor environment that affect perceived quality of existing visual resources is possible. Nassauer and Lawson (2004) identified four key landscape characteristics associated with highly noticeable roadside landscape aesthetic effects: maintenance, planting design, structural design, and vistas from freeways. The following discusses the above I-10 roadside landscape categories in light of these characteristics.

Maintenance

Structural materials that connote quality, care, and attention to detail enhance the aesthetic experience of freeways. Landscapes with such attributes require consistent attention to maintenance to sustain their highly preferred status. The one common element among least preferred roadside landscapes is poor maintenance. Nassauer and Lawson (2004) found that while good maintenance alone cannot create highly preferred landscapes, poor maintenance can cause an otherwise attractive landscape to be perceived as ordinary or unattractive. Overall, the I-10 roadsides along the entire corridor are well-maintained: they are free of trash, and sound barriers and bridges are not in need of repair or painting. In the urban area, trees are trimmed, and plantings are generally weed-free.

Planting design

In most studies of roadside landscapes, highly vegetated corridors are considered "beautiful" and "pleasant." Urban roadsides with trees—particularly large ones—are consistently highly preferred. While the whole corridor lies within the Sonoran Desert, whose arid climate supports little vegetation, in numerous places Phoenix-area I-10 landscapes have eucalyptus trees, one of the tallest tree species in Phoenix.

Good planting design also works to create attractive aspects in those landscapes that are overall less attractive. An example would be plantings positioned to screen or soften unattractive aspects of views. Almost all of the Phoenix-area I-10 bridge-land interfaces have been softened with trees.

The urban portion of the existing freeway has extensive landscape treatment, as illustrated in Figure 7.7, with an estimate of the percentage of Phoenix-area roadside treatment for each category shown in parentheses.

The following annotations describe these categories:

- barren edge – little roadside vegetation; adjacent properties buffered only by topography
- ornamental massing – installed native and nonnative trees and low-growing shrub masses tend to soften the visual obtrusiveness of built elements (particularly noise barriers) and to screen ground-level views
- tree buffer – relatively intermittent, dispersed trees visually buffer or soften obtrusiveness and edges of bridges, signs, walls, and buildings in the middleground and effect a better balance between built and natural elements
- tree screen – relatively opaque plantings of trees that tend to obscure what lies beyond the right-of-way; viewers cannot discern the purpose of buildings behind the screens

While the "ornamental massing" and the "tree buffer" categories provide only limited screening of the background, most of the study area roadway is depressed, and the middle- and background views are generally only of noise barriers and of earthen berms covered with decomposed granite. A uniformity of design, color,

Figure 7.7 | Roadside landscape assessment categories, representative photographs

MP 143.104 WB[a] **barren edge** (15%)

MP 134.902 EB **ornamental massing** (23%)

MP 139.712 WB **tree buffer** (23%)

MP 139.205 WB **tree screen** (2%)

Source: Arizona Department of Transportation PhotoLog 2006
[a] mileposts (MPs) from ADOT PhotoLog 2006; WB = westbound; EB = eastbound

Figure 7.8 | Rural I-10 landscape treatments

MP 78.372 WB[a] **open edge**

MP 28.565 WB **guardrail**

Source: Arizona Department of Transportation PhotoLog 2009
[a] mileposts (MPs) from ADOT PhotoLog 2009; WB = westbound

texture, and detailing characterizes both backgrounds and serves to tie together the roadside design of the whole I-10 corridor in the metropolitan area. Strategic selection and placement of the massed trees and shrubs provide variety in color, form, and texture to the overall planting design. All work together to enhance the sense of depth in an otherwise limited right-of-way. In the rural areas, as shown in Figure 7.8, landscape treatments are generally absent.

Structural design

Motorists generally prefer roadside landscapes that have "vegetation views," but also rate "built attractions" relatively high, suggesting public interest in an urban driving experience that includes a blend of natural and built elements (Nassauer and Lawson 2004). Travelers highly prefer planting designs and architectural treatments of walls and bridges that create a unified urban character. Good design includes architectural details such as railings, noise barriers, and wall and bridge materials, textures, color, and form. Nassauer and Larson (2004) found that well-designed bridges, walls, and railings improved perceived aesthetic values in otherwise unattractive landscapes. The Phoenix-area I-10 noise barriers and bridges are unified in design and detailing and serve, along with the planting design

and materials and topography, to create a changing, yet remarkably integrated visual experience.

Strip development along roadsides is considered "cluttered" and "ugly." Little such adjacent development is visible from the Phoenix-area freeway because of its depressed position and the presence of noise barriers, other walls, and landscaped earthen berms. More such clutter is visible along the corridor near the newest suburban shopping developments (near Estrella Parkway) and along the freeway in and near Quartzsite.

Most studies show poor preference ratings for scenes dominated by billboards or other signs. The corridor has few large billboards, with only a few being truly obtrusive (Figure 7.9). Billboards are more jarring to viewers in the remote areas when approaching Quartzsite and Ehrenberg.

Vistas

The corridor has no designated scenic vistas or other high-quality, scarce views (on a statewide basis) along its entire length. The only vistas afforded to drivers in the metropolitan area are at either system traffic interchange (I-17 or SR 101L). The eastbound vista at the I-17 interchange affords an excellent view of the Phoenix skyline (Figure 7.10).

Figure 7.9 | Billboards along I-10

MP 142.761 WB[a]

MP 138.848 EB

Source: Arizona Department of Transportation PhotoLog 2006
[a] mileposts (MPs) from ADOT PhotoLog 2006; WB = westbound; EB = eastbound

While the two vistas offer only one high-quality view, each offers outstanding views of extreme weather and sunrises and sunsets. Such sights serve to involuntarily focus the mind and thereby provide an opportunity to clear drivers' minds of more immediate, cognitively taxing concerns. Although the corridor provides no predictably beautiful or picturesque views, views of the occasional monsoon haboob or thunderhead with flashes of internal lightening impress with both their power and grandeur. In addition to these ephemeral sublime events, rainbows, sunrises, and sunsets can provide moments of awe and inspiration when weather and cloud formations permit.

In the remote, rural areas of the corridor, expansive views along nearly the entire corridor offer opportunities for such driving experiences at any time. The view of the Colorado River (Figure 7.11) offers no particularly outstanding view.

View of the freeway

Commercial sections in the urban areas of the I-10 corridor have, visually, turned their backs on or otherwise ignored I-10 (the freeway is largely depressed in Phoenix, furthering the physical separation established by the right-of-way and fencing). Few commercial facilities offer direct views down into the freeway corridor.

Figure 7.10 | View of Phoenix skyline

MP 143.33 EB[a]

Source: Arizona Department of Transportation PhotoLog 2006
[a] mileposts (MPs) from ADOT PhotoLog 2006; EB = eastbound

Figure 7.11 | View of Colorado River

MP 0.102 WB[a]

Source: Arizona Department of Transportation PhotoLog 2009
[a] mileposts (MP) from ADOT PhotoLog 2009; WB = westbound

The residential land use adjacent to the existing I-10 corridor in the metropolitan area is buffered from the sounds of freeway traffic by noise barriers. These walls block views of the freeway from these areas. Tops of trees are all that can be seen. Views and vistas in the metropolitan area are rare because of the flat topography and built-up nature of the surroundings. The presence of trees along the freeway—although seen only as clumps of treetops—provides a sense of interesting depth and a sense of being part of a larger landscape that extends beyond what one can immediately perceive.

Future changes

Continued development west of Phoenix will contribute to more of the corridor's visual resources becoming urban in context.

Gaps in available data

The ADOT Photo Log provides systematic historical and current coverage of the immediate visual resources along the entire length of I-10. This tool would permit both quantitative and qualitative analyses of the corridor's visual resources using the terminology described in the section, Assessment approach. Analyses of specific viewpoints can complement that evaluation.

8. Projects in the I-10 Corridor

8.1 Programmed projects

This section presents projects that are programmed for construction in the next five years (fiscal year 2013 to 2017) or are included in the MAG RTP. These projects have an identified construction timeframe and funding source and are included in Transportation Improvement Programs (TIPs) for the state, county, MPO, COG, or local government.

The list of programmed projects in the five-year construction programs is presented in Table 4.1 and displayed on a map in Figure 4.1. The table includes the budgeted funding as well as the anticipated construction timeframe. The additional projects that are included in the MAG RTP are presented in Table 4.2 and displayed in Figure 4.1.

The following sections provide additional descriptions of the I-10 Corridor projects as categorized by the need or mode served by the project.

Preservation

Much of the I-10 Corridor was constructed over 40 years ago, therefore maintaining the existing infrastructure is a high priority for ADOT. This is reflected in the five-year construction program.

Pavement

Pavement along a total of 28 miles of I-10 in eastern La Paz County will be removed and replaced in the next five years. The projects include a rubberized asphalt overlay.

Structures

There are no programmed projects for rehabilitation or replacement of existing bridge structures.

Drainage

Improvements to the drainage and pump stations within and around the Deck Park Tunnel are planned in 2014.

Interchanges

Spot improvements at the intersections of the ramps, crossroad, and frontage road at the West Quartzsite traffic interchange are programmed in 2015 to keep it functioning at an acceptable level. The improvements also focus on improving access for commercial trucks to the new truck stops being constructed as well as the proposed industrial park in Quartzsite.

Signs

ADOT recently adopted the latest version of the Manual on Uniform Traffic Control Devices and are upgrading signs as needed through the corridor. This project includes rehabilitation of the signs between SR 85 and Dysart Road.

Intelligent Transportation Systems

The funding within the MAG RTP includes the continued expansion of ITS in the region. In 2016, funding is allocated to design and construct freeway management systems between Dysart Road and 83rd Avenue.

Rest areas

Major infrastructure improvements are planned for the Bouse Wash Rest Area at milepost 52. The improvements include replacing two pond liners, improvements to the booster pump system and control, and some structural, mechanical and electrical systems upgrades.

Vehicular traffic

This section outlines projects programmed to add vehicular capacity or improve access to the I-10 Corridor.

Road

Within the next five years, two major new freeways are programmed for construction: SR 303L, which is already under construction and SR 202L, which is anticipated to begin construction in 2014. Both corridors represent significant transportation investments and will be constructed over a number of years.

Multiple projects are included in the MCDOT TIP for the Northern Parkway. The overall project includes construction of a six or more lane parkway along the east-to-west Northern Avenue alignment between SR 101L and SR 303L (see number 29 in Figure 4.1).

The purpose of the Miller Road project is to pave Miller Road from I-10 (milepost 114) to the Army National Guard Facility (see number 28 in Figure 4.1). The estimated cost is $440,000.

The RTP includes funding for the following planned projects in the I-10 Corridor:

- widening of I-10 between SR 85 and Verrado Way (funding included in the RTP)
- SR 30 freeway between SR 303L and SR 202L (parallels I-10)
- SR 303L south of I-10 to SR 30
- extension of SR 30 west of SR 303L to SR 85 as an interim facility including right-of-way acquisition

Interchanges

A number of new service traffic interchanges are planned to be constructed in the next five years, including:

- 395th Avenue (Belmont Road), a privately funded interchange near milepost 96
- Desert Creek, a privately funded interchange near milepost 105
- Perryville Road, and interchange funded by the RTP and located near milepost 122

The privately funded interchanges would provide access to planned residential master-planned communities. The Perryville Road traffic interchange would provide additional access to Goodyear and Buckeye and would be the connection point for a future Arizona Parkway corridor.

Both major freeway corridors, SR 303L and SR 202L, will connect to I-10 with freeway-to-freeway system traffic interchanges. The SR 303L interchange, located near milepost 125 is under construction and planned to be

Table 8.1 | Projects under construction or programmed for construction in the next five years (fiscal year 2013 to 2017)

ID	Source	Agency	Location - project	Category	ADOT District	County	I-10 Milepost	Funding	Fiscal Year
1	1	ADOT	Ehrenberg Port of Entry - reconstruct eastbound POE	Port of Entry	Yuma	La Paz	3	$16,000,000	2016
2	1	ADOT	West Quartzsite TI - intersection improvements	District minor projects	Yuma	La Paz	17	$2,000,000	2015
3	1	ADOT	MP 42 to Hovatter Road	Pavement preservation	Yuma	La Paz	42	$11,250,000	2015
4	1	ADOT	Bouse Wash Rest Area	Rest area preservation	Yuma	La Paz	52	$1,235,000	2013
5	1	ADOT	Gas Line Road to County line	Pavement preservation	Yuma	La Paz	63	$5,722,000	2013
6	1	Private	395th Avenue (Belmont Road) traffic interchange	Design and construction	Phoenix	Maricopa	96	$20,020,000	2013-2014
7	1	Private	Desert Creek traffic interchange	Design and construction	Phoenix	Maricopa	105	$20,040,000	2013-2014
8	1	ADOT	SR 85 to Dysart Road	Sign rehabilitation	Phoenix	Maricopa	112	$435,000	2013-2014
9	1	ADOT	SR 85 to Verrado Way (eastbound)	Pavement preservation	Phoenix	Maricopa	112	$5,251,000	2014
10	2	Buckeye	I-10 and Jackrabbit Trail	Park and ride lot	Phoenix	Maricopa	121	$2,898,201	2011
11	1	ADOT	Perryville Road traffic interchange	Construction	Phoenix	Maricopa	122	$23,300,000	2013
12	2	Goodyear	I-10 and SR 303L traffic interchange	Signal installation	Phoenix	Maricopa	125	$4,013,000	2011
13	1	ADOT	I-10 and SR 303L traffic interchange	Construction	Phoenix	Maricopa	125	$250,000,000	2011
14	1	ADOT	Dysart Road to 83rd Avenue	Design and construct FMS	Phoenix	Maricopa	130	$5,000,000	2016
15	1	ADOT	Dysart Road to SR 101L (Agua Fria)	Landscape construction	Phoenix	Maricopa	130	$3,800,000	2013
16	2	Avondale	I-10 and Avondale Boulevard	Park and ride lot	Phoenix	Maricopa	131	Unknown	2014
17	1	ADOT	SR 101L (Agua Fria) to I-17	Utility relocation	Phoenix	Maricopa	133	$14,400,000	2013-2014
18	1	ADOT	SR 101L (Agua Fria) to I-17, Phase I	Design general purpose lane	Phoenix	Maricopa	133	$4,800,000	2017
19	2	Valley Metro Rail	I-10 WEST Phoenix	Design, construction, right-of-way	Phoenix	Maricopa	136	$84,247,104	2012-2015
20	1	ADOT	I-10 and SR 202L traffic interchange	Design and right-of-way	Phoenix	Maricopa	139	$124,800,000	2014-2016
21	1	ADOT	Deck Park Tunnel - drainage improvements	District minor projects	Phoenix	Maricopa	144	$1,052,000	2014
22	1	ADOT	3rd Avenue to 3rd Street - pump station improvements	District minor projects	Phoenix	Maricopa	145	$368,000	2014
23	1	ADOT	Avi Suquilla	Airport - miscellaneous	Yuma	La Paz	NA	$10,860,000	2013-2017
24	1	ADOT	Buckeye Municipal	Airport - miscellaneous	Phoenix	Maricopa	NA	$11,522,470	2013-2017
25	1	ADOT	Glendale Municipal	Airport - miscellaneous	Phoenix	Maricopa	NA	$27,458,600	2013-2017
26	1	ADOT	Phoenix - Goodyear	Airport - miscellaneous	Phoenix	Maricopa	NA	$42,874,640	2013-2017
27	1	ADOT	Phoenix - Sky Harbor International	Airport - miscellaneous	Phoenix	Maricopa	NA	$313,388,918	2013-2017
28	3	MCDOT	Miller Road, I-10 to 1-mile north	Construct new road	Phoenix	Maricopa	NA	$440,000	2011
29	3	MCDOT	Northern Parkway, SR 101L to SR 303L	Phased construction of parkway	Phoenix	Maricopa	NA	$300,000,000	2011-2015

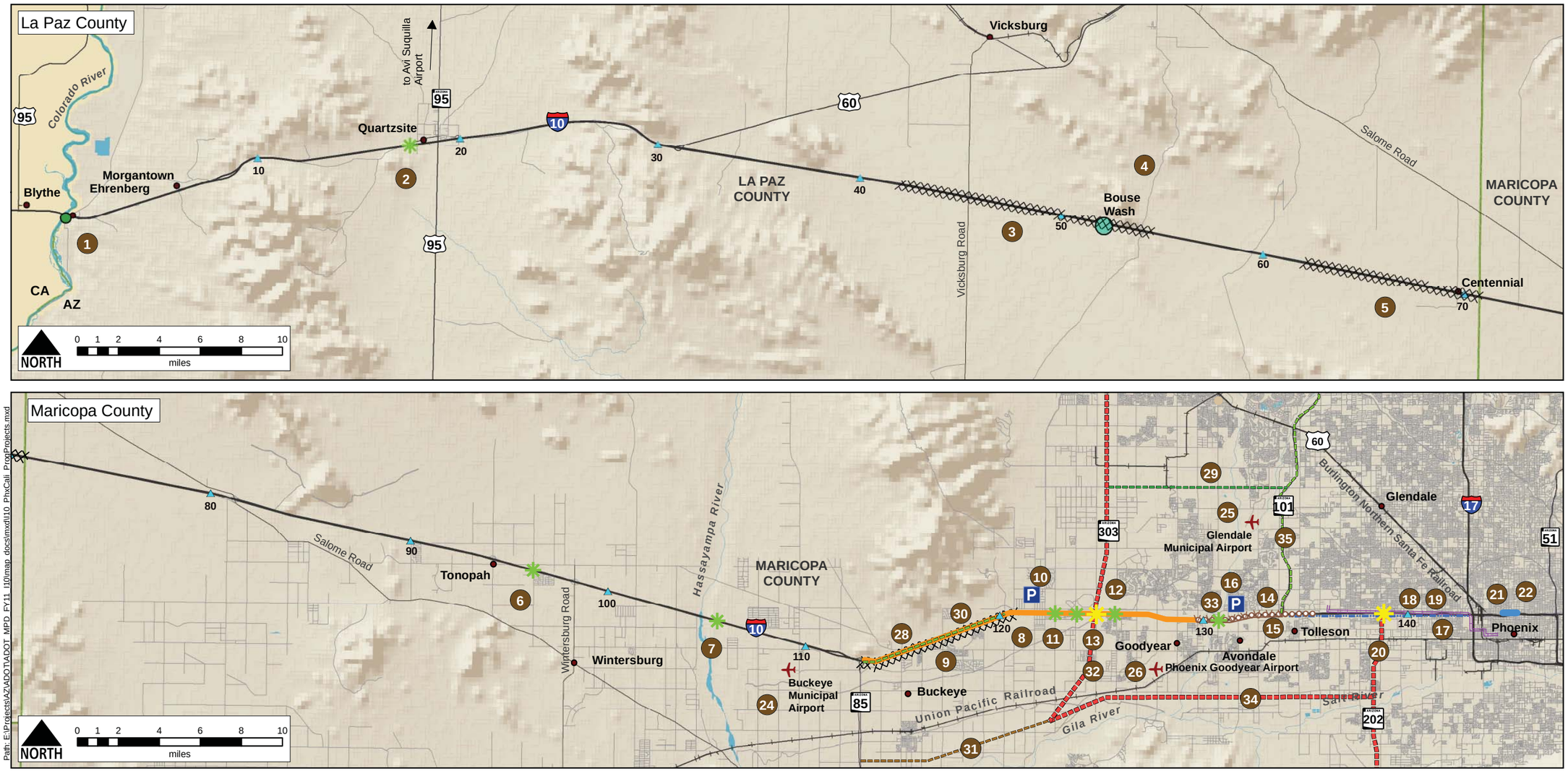
Sources:
1 Five-Year Transportation Facilities Construction Program, 2013 - 2017 [includes Highway Program, Regional Transportation Plan: Freeway Program, and Airport Capital Investment Program],
2 MAG Transportation Improvement Program, 2011 - 2015; 3 MCDOT Transportation Improvement Program, 2011 - 2015

Table 8.2 | Planned projects in the I-10 Corridor (fiscal year 2018 to 2031)

ID	Source	Agency	Location - project	Category	ADOT District	County	I-10 Milepost	Funding	Fiscal Year
30	1	ADOT	SR 85 to Verrado Way	widening from 4 to 6 lanes	Phoenix	Maricopa	112	$42,800,000	2026-2031
31	1	ADOT	SR 30, SR 85 to SR 303L	interim roadway and right-of-way protection	Phoenix	Maricopa	NA	$192,700,000	2030-2031
32	1	ADOT	SR 303L, I-10 to SR 30	new freeway	Phoenix	Maricopa	124	$336,000,000	2021-2025
33	1	ADOT	El Mirage Road	new arterial traffic interchange	Phoenix	Maricopa	130	$20,300,000	2021-2025
34	1	ADOT	SR 30, SR 303L to SR 202L	new parallel freeway corridor	Phoenix	Maricopa	NA	$1,364,200,000	2026-2031
35	1	ADOT	SR 101L, I-10 to US 60	widening from 6 to 8 general purpose lanes	Phoenix	Maricopa	133	$108,800,000	2027

Sources:
1 Regional Transportation Plan, 2010 Update (MAG 2010)

Figure 8.1 | Projects under construction or programmed for construction in the next five years



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- City
- Milepost
- Stream
- Lake
- County boundary
- Project ID, refer to Table 4.1
- Port of entry improvements
- Rest area improvements
- New or improved service traffic interchange
- New system traffic interchange
- Airport improvements
- Park and ride lot
- Drainage
- FMS
- Landscaping
- Light rail
- Pavement preservation
- Signs
- Utilities
- Widening
- New freeway
- New parkway
- Interim road and right-of-way

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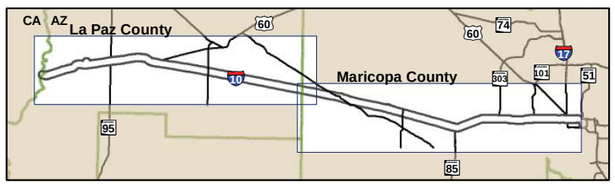


ADOT

Note: Items #23 and #27 are located outside map limits.

Interstate 10: Phoenix to California Border Multimodal Corridor Profile Study

completed by the end of 2014. The SR 202L interchange, located near milepost 139, may begin construction as early as 2014. Both interchanges include major reconstruction along I-10 and adjacent service traffic interchanges.

To prepare for the SR 202L system traffic interchange, utilities along I-10 between SR 101L and I-17 will need to be relocated. Funds have been programmed to advance this effort due to the lead time necessary.

The RTP also includes funding for:

- El Mirage Road and I-10 service traffic interchange
- SR 303L and I-10 system traffic interchange (south half)

Transit

This section outlines capital investments programmed to add bus or high-capacity transit capacity or improve access to transit options in the I-10 Corridor.

Bus

New park and ride lots are planned at Jackrabbit Trail and I-10 in Buckeye and at Avondale Boulevard and I-10 in Avondale. The lot in Buckeye is funded through the RTP while the Avondale lot is locally funded. Both areas would be served by existing express bus routes along I-10.

Light rail

The initial phases (environmental clearance, preliminary design, and right-of-way acquisition) of the new I-10 WEST Phoenix light rail corridor are programmed to begin in 2012. A map of the proposed alignment and stations are presented in the sidebar on this page.

Passenger rail

No capital improvements are programmed, however coordination and other activities are ongoing.

Air travel

The tentative five-year Airport Capital Improvement Program includes a total of $1.21 billion. The following sections provide a brief overview of the improvements programmed at the airports accessed from the I-10 Corridor.

Avi Suquilla

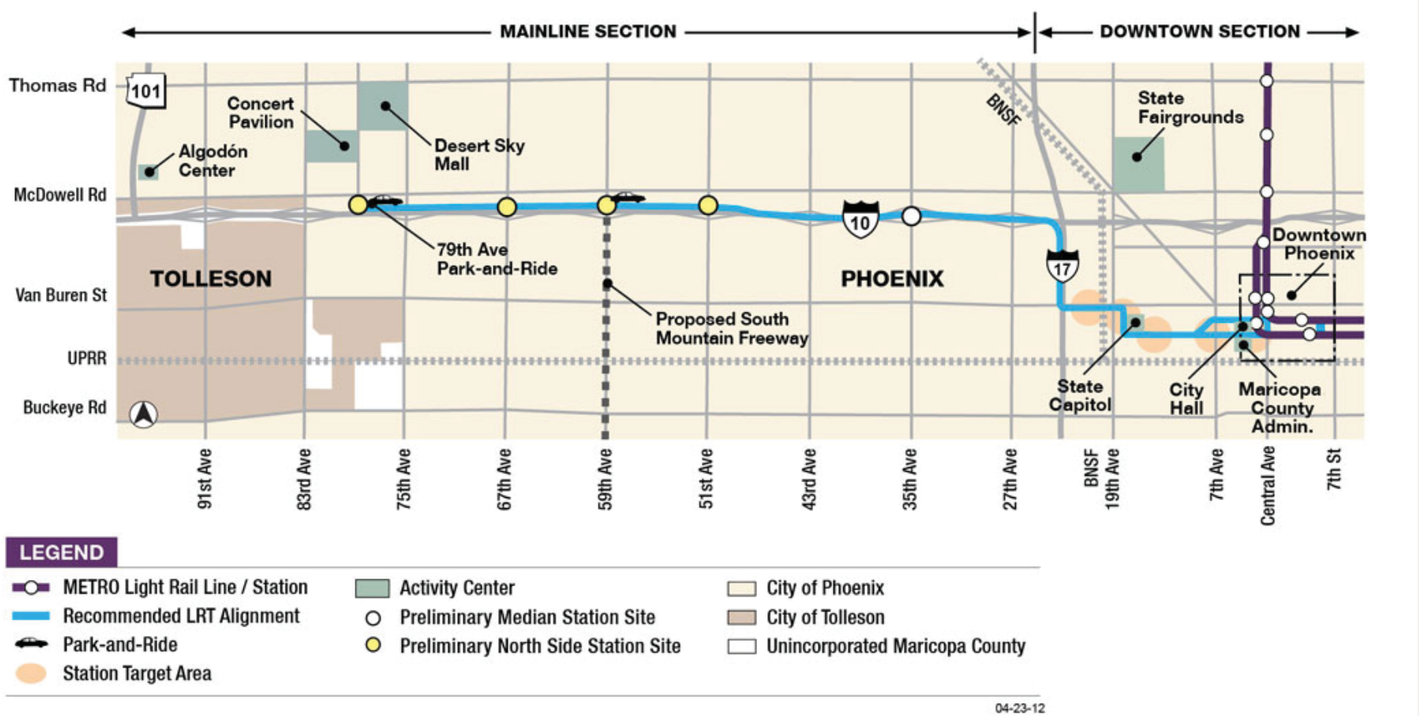
Avi Suquilla Airport is located outside of the study area, approximately 40 miles north of I-10 along SR 95 in Parker, Arizona. The airport is one of the only airports serving communities in western Arizona. Almost $11 million is programmed for the airport. The major projects are to improve site drainage, rehabilitate the runway pavement, construct a new taxiway, and expand the paved apron.

Buckeye Municipal

Almost $12 million is programmed for the airport. The major projects are to acquire land or easements for approaches, rehabilitation of runway pavement, and constructing fire suppression system and domestic water system.

I-10 WEST Phoenix light rail line

The Phoenix West extension will extend light rail 11 miles from downtown Phoenix, through the State Capitol area, to approximately 79th Avenue and I-10 freeway.



Glendale Municipal

Over $27 million is programmed for the airport. The major projects are to acquire land or easements for approaches and construction of new taxiways and runway extensions.

Phoenix - Goodyear

Almost $43 million is programmed for the airport. The major projects are to preserve apron and runway pavement and construction of new taxiways and runway extensions.

Phoenix - Sky Harbor International

Over $313 million is programmed for the airport. The major projects are to reconstruct the apron around Terminal 3 and 4 as well as the acquisition of adjacent land to mitigate noise impacts.

Freight

There are no known projects specifically related to the movement of freight through trucks and rail. Roadway improvements will facilitate truck traffic and the movement of freight. Also, private companies continue to implement enhancements to make their services more efficient and cost-effective. A number of large distribution warehouses, including companies like Amazon, have been constructed recently in the vicinity of I-10 and SR 303L.

Port of entry

The eastbound port of entry near the California border will be completely reconstructed and modernized in 2016 including upgrading the building and communications system to provide sufficient staging area and storage for trucks being processed. The port of entry ensures that large trucks are in good working condition and not overweight. It needs to be expanded with the latest technology to efficiently accommodate increasing truck volumes entering Arizona on I-10.

8.2 Potential projects

This section lists and describes potential projects in the I-10 Corridor. Types of projects include:

- deficiencies identified in Working Paper #1
- needs identified in long-range planning studies
- recommendations from stakeholders that have been identified in planning documents

A list of the potential projects are presented in Table 4.2. The projects are listed by general location in the I-10 Corridor from west to east. This study does not include recommendations related to prioritization of the projects. Projects would be prioritized by the resource agencies (such as ADOT, WACOG, and MAG) depending on the location or jurisdiction of the project.

Additional descriptions and information are provided by element in the following sections.

Preservation

Pavement

Pavement preservation is a high priority for ADOT. ADOT allocates annually a percentage of their total funding for pavement preservation projects around the state. The I-10 Corridor will continue to compete for these funds.

As improvements are made to I-10, it may be appropriate to replace the asphalt concrete with Portland cement concrete pavement to better handle the high truck and vehicular traffic volumes. The cement concrete is more rigid and is more able to withstand the loading from large trucks.

Structures

The section, *Bridge Structures*, on page 3-11, presented the sufficiency rating for all of the bridges in the I-10 Corridor. In total, 20 bridges are eligible for rehabilitation based on their sufficiency rating. Bridges eligible for rehabilitation are listed in Table 4.3.

There were also 39 culverts eligible for rehabilitation. ADOT should continue to monitor and inspect the bridges structures along I-10 to identify measures for extending the life of the structures.

During the evaluation of improvements to bridge structures or culverts, consideration should be given for including wildlife-related enhancements. I-10 passes through a number of wildlife linkage corridors identified by the Arizona Game and Fish Department.

Drainage

Runoff in the I-10 Corridor is typically north to south and the I-10 Corridor presents a barrier to this flow. As additional development occurs upstream and downstream of I-10 it will be important to participate in area drainage master planning efforts to ensure that I-10 is not adversely impacted.

The ADOT Yuma District has observed issues at the Centennial Wash and Bouse Wash with each overtopping during heavy storms.

Interchanges

The Yuma District has initiated the environmental clearance and final design for a roundabout project at the Poston Road traffic interchange. The roundabout would be located at the intersection just south of I-10 that includes the on- and off-ramps and frontage road. Funding for the project has not been identified at this time, but it should be ready for construction in 2013.

Additionally, the *La Paz Transportation Planning Study* identified the need to improve the intersections between the ramps and crossroads at all of the interchanges in La Paz County along I-10. These interchanges were built to rural standards and as development occurs they are not able to meet the traffic demand. The focus of the improvements would include:

- increased turning radii to allow large trucks to better navigate the intersections
- better lighting
- signalized intersections as warranted by traffic demand

Improvements at ramp and crossroad intersections will continue to be needed throughout the I-10 Corridor to provide efficient traffic operations and maintain access opportunities as growth and development occurs. Developers should conduct traffic studies as warranted

Table 8.3 | Potential projects in the I-10 Corridor

ID	Source	Agency	Location - project	Category	ADOT District	County	I-10 Milepost	Funding
1	1	ADOT	Miscellaneous	Pavement preservation	Yuma	La Pax	0-71	None
2	4	ADOT	California border to Maricopa County border	Widen from 4 to 6 lanes	Yuma	La Paz	0	None
3	1	ADOT	Ehrenberg Bridge	Bridge rehabilitation	Yuma	La Paz	0	None
4	3		Travel plaza at Ehrenberg interchange	Freight	Yuma	La Paz	1	None
5	5	ADOT	Poston Road TI	roundabout at south ramp intersection	Yuma	La Paz	1	None
6	3	ADOT	Tom Wells Road	interchange improvements	Yuma	La Paz	5	None
7	3	ADOT	Dome Rock Road	interchange improvements	Yuma	La Paz	11	None
8	3	ADOT	West Quartzsite Road	interchange improvements	Yuma	La Paz	17	None
9	1	ADOT	West Quartzsite TI UP	Bridge rehabilitation	Yuma	La Paz	17	None
10	3		Quartzsite local transit circulator	Transit	Yuma	La Paz		None
11	3		La Paz County regional bus service	Transit	Yuma	La Paz		None
12	3		Quartzsite airport	New airport and air cargo facilities	Yuma	La Paz		None
13	3		Arizona and California rail spur to Quartzsite	Freight	Yuma	La Paz		None
14	3	ADOT	Riggles Avenue	interchange improvements	Yuma	La Paz	19	None
15	3	ADOT	Gold Nugget Road	interchange improvements	Yuma	La Paz	26	None
16	3	ADOT	US 60	interchange improvements	Yuma	La Paz	31	None
17	3	ADOT	Vicksburg Road	interchange improvements	Yuma	La Paz	45	None
18	3	ADOT	Hovatter Road	interchange improvements	Yuma	La Paz	53	None
19	3	ADOT	Avenue 75 E	interchange improvements	Yuma	La Paz	69	None
20	4	ADOT	Maricopa County border to 459th Avenue	Widen from 4 to 6 lanes	Yuma	Maricopa	71	None
21	3	ADOT	Salome Road	interchange improvements	Yuma	Maricopa	81	None
22	2	ADOT	459th Avenue to Hassayampa Freeway	widen to 8 lanes plus 2 HOV lanes	Yuma	Maricopa	88	None
23	2	ADOT	459th Avenue	new arterial traffic interchange	Yuma	Maricopa	88	None
24	2	ADOT	443rd Avenue	new arterial traffic interchange	Yuma	Maricopa	90	None
25	2	ADOT	427th Avenue	new arterial traffic interchange	Yuma	Maricopa	92	None
26	2	ADOT	411th Avenue	improve to freeway-parkway interchange	Yuma	Maricopa	94	None
27	2	ADOT	395th Avenue	new arterial traffic interchange	Yuma	Maricopa	96	None
28	2	ADOT	Wintersburg Road	improve to freeway-parkway interchange	Yuma	Maricopa	98	None
29	2	ADOT	Hassayampa Freeway to SR 85	widen to 8 lanes plus 2 HOV lanes	Yuma	Maricopa	100	None
30	2	ADOT	Hassayampa Freeway	new system traffic interchange	Yuma	Maricopa	100	None
31	2	ADOT	347th Avenue	new arterial traffic interchange	Yuma	Maricopa	102	None
32	2	ADOT	323rd Avenue	new arterial traffic interchange	Yuma	Maricopa	105	None
33	2	ADOT	Johnson Road	new arterial traffic interchange	Yuma	Maricopa	107	None
34	2	ADOT	Palo Verde Road	improve to freeway-parkway interchange	Yuma	Maricopa	109	None
35	2	ADOT	Wilson Road	new arterial traffic interchange	Yuma	Maricopa	110	None
36	2	ADOT	SR 85	improve to fully directional system interchange	Phoenix	Maricopa	112	None
37	2	ADOT	SR 85 to SR 303L	widen to 8 lanes plus 2 HOV lanes	Phoenix	Maricopa	112	None
38	2	ADOT	Watson Road	improve to freeway-parkway interchange	Phoenix	Maricopa	116	None
39	2	ADOT	Dean Road	new arterial traffic interchange	Phoenix	Maricopa	119	None

(continued on next page)

Table 8.3 | Potential projects in the I-10 Corridor (continued)

ID	Source	Agency	Location - project	Category	ADOT District	County	I-10 Milepost	Funding
40	2	ADOT	Perryville Road	improve to freeway-parkway interchange	Phoenix	Maricopa	122	None
41	4	ADOT	Papago West Drain Bridge 107th Avenue	Bridge rehabilitation	Phoenix	Maricopa	132	None
42	4	ADOT	99th Avenue TI OP	Bridge rehabilitation	Phoenix	Maricopa	133	None
43	4	ADOT	Papago West Drain Bridge 99th Avenue	Bridge rehabilitation	Phoenix	Maricopa	133	None
44	4	ADOT	91st Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	134	None
45	4	ADOT	83rd Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	135	None
46	4	ADOT	75th Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	136	None
47	4	ADOT	67th Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	137	None
48	4	ADOT	59th Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	138	None
49	4	ADOT	51st Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	139	None
50	4	ADOT	51st Avenue Papago Drain Bridge	Bridge rehabilitation	Phoenix	Maricopa	139	None
51	4	ADOT	43rd Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	140	None
52	4	ADOT	35th Avenue TI UP	Bridge rehabilitation	Phoenix	Maricopa	141	None
53	4	ADOT	27th Avenue OP EB	Bridge rehabilitation	Phoenix	Maricopa	142	None
54	4	ADOT	5th Avenue UP and pedestrian UP	Bridge rehabilitation	Phoenix	Maricopa	144	None
55	4	ADOT	3rd Avenue UP and pedestrian UP	Bridge rehabilitation	Phoenix	Maricopa	144	None
56	4	ADOT	Central Avenue Bridge NB	Bridge rehabilitation	Phoenix	Maricopa	145	None
57	4	ADOT	Central Avenue Bridge SB	Bridge rehabilitation	Phoenix	Maricopa	145	None
58	4	ADOT	Deck At Central Avenue	Bridge rehabilitation	Phoenix	Maricopa	145	None
59	2		Yuma West Corridor	Commuter rail	Phoenix	Maricopa		None
60	2		BNSF to UPRR heavy rail line	Freight	Phoenix	Maricopa		None
61	2		Bus rapid transit along I-10, SR 30, SR 303L	Transit	Phoenix	Maricopa		None

Sources:
1 Regional Transportation Plan, 2010 Update (MAG 2010)
2 Interstate 10 - Hassayampa Valley Roadway Framework Study (MAG 2007)
3 La Paz Transportation Planning Study (ADOT 2010)
4 I-10 - Phoenix to California Border, Multimodal Corridor Profile Study, Working Paper #1
5 Stakeholder interviews

to identify needs for additional turn lanes, through lanes, and signalization.

Rest areas

Many of the rest areas in the I-10 Corridor are beyond their original design life and need major repairs or reconstruction. ADOT is currently evaluating rest area operations and maintenance. Based on the outcome from the analysis, improvements would be recommended and programmed. In other areas of the state, ADOT is using public-private partnership to fund the maintenance and operation of rest areas.

Vehicular traffic

This section outlines projects planned to add vehicular capacity or improve access to the I-10 Corridor.

Road

To improve safety and meet the travel demand of the future, I-10 will need to be widened to six lanes from the California border to 459th Avenue (western edge of the build-out Phoenix metropolitan area). Based on the traffic forecasts for 2035 presented in Working Paper #1, these additional lanes are not needed until after 2035.

In La Paz County, the widening may be constructed in phases near more developed areas such as Quartzsite. Coordination with the California Department of Transportation will be important to ensure the six-lane concept can be extended into California and the Blythe area.

In Maricopa County, the Hassayampa Framework Study recommended:

- additional general purpose and HOV lanes to the RTP-planned lanes between 459th Avenue and SR 303L (recommended in the Hassayampa Framework Study)
- extension of SR 303L south of SR 30 and the Gila River
- extension of SR 30 west of SR 303L to SR 85 and the Hassayampa Freeway
- construction of the new Hassayampa Freeway (potentially as I-11)

Interchanges

No additional interchanges beyond the existing locations in La Paz County have been proposed.

New or enhanced service and system traffic interchanges will be needed in the future to support the additional travel demand and development along the I-10 Corridor in western Maricopa County.

To support the planned road network west of SR 303L proposed in the Hassayampa Framework Study, a number of new service traffic interchanges would be needed. Additionally, a number of existing interchanges would need to be upgraded to "freeway-to-parkway" interchanges.

A major system traffic interchange would be needed for the intersection of I-10 and the future Hassayampa Freeway and the SR 85 system traffic interchange would need upgrades to allow for a connection north of I-10 to Turner Parkway.

Transit

This section outlines capital investment needs to add bus or high-capacity transit capacity or improve access to transit options in the I-10 Corridor.

Bus

The La Paz Study identified the need for expanded bus service including local circulators and rural/regional connections. A local circulator would be needed in Quartzsite while I-10 would be the primary route for regional service to Blythe or the Phoenix Area.

The Hassayampa Framework Study identified the need for extending high-capacity transit corridors, such as Bus Rapid Transit, along I-10 and other planned freeways such as SR 30 and SR 303L west to the Hassayampa Freeway.

Light rail

There are no current plans to extend the light rail corridor west of 79th Avenue. However, there are a number of proposed projects to improve the efficiency of the route, including:

- construction of direct access ramps from I-10 to I-17
- expanding the 79th Avenue park and ride station
- identifying and developing a new park and ride station at 59th Avenue and I-10
- construction of direct connection HOV ramps to and from I-10 on the west side of 79th Avenue providing access to the existing park and ride station

Passenger rail

MAG began studying commuter rail as a potential high capacity transit option in 2003. Since then, MAG has continued to refine and evaluate commuter rail options to serve the metropolitan Phoenix area. The *Commuter Rail System Study* (MAG 2010) included the Yuma West Corridor on the Union Pacific Railroad tracks that parallel I-10 from downtown Buckeye to downtown Phoenix. No specific projects have been identified to advance the Yuma West Corridor, however, the System Study identified near- and long-term implementation steps for commuter rail in general.

Near-term implementation steps

- periodic ridership forecast updates
- coordination with Union Pacific Railroad
- address enabling legislation regarding liability and indemnification
- coordination of infrastructure improvements with the railroads, ADOT, and local jurisdictions
- identify funding commitments
- initiate process for Federal funding
- develop and implement governance plan
- preserve future options
- local planning efforts

Long-term implementation steps

- formalize partnership with the railroads
- secure sources of funding including federal, state, regional and local public funding, as well as private sector participation
- design, construct, and operate initial commuter rail system
- continue planning to develop seamless transportation system and meet regional sustainability goals

In 2010, Phoenix joined the cities of Los Angeles and Las Vegas in the study of the feasibility of high-speed rail connecting the major metropolitan areas. The long-range vision is to establish a system of high-speed rail corridors with trains operating faster than 125 miles per hour to compete with air travel. The implementation of a high-speed rail network connecting Arizona with destinations in California and Nevada would be accomplished over several decades. Required studies and environmental clearances can take a decade or longer, and should be a priority for the near future (ADOT 2011d).

Air travel

The La Paz Study identified the need for a new airport in Quartzsite for air cargo to support the proposed industrial park in the northeast part of town (see additional discussion of industrial park in next section).

Each existing airport has developed a long-range plan for adding capacity and maintaining existing infrastructure. As funding is available from local, regional, state, and federal sources, they will continue to implement the capital improvements identified in the master plan.

Avi Suquilla

As funding becomes available, continue to implement the capital improvement plan and address the deficiencies identified in the *La Paz Transportation Planning Study*, including the reconstruction of the airport entry, access road, parking lot, and terminal facilities.

Buckeye Municipal

As funding becomes available, continue to implement the capital improvement plan from the Airport Master Plan (Buckeye 2009). The long-term plan for the airport includes strengthening the pavement, extending the length, and upgrading the design standards of the existing runway, constructing a parallel runway to meet long-term capacity needs, and the construction of landside facilities such as aircraft storage hangars, terminal buildings, aircraft parking aprons, hangar and apron access taxilanes, fuel storage facilities, and vehicle parking lots.

Glendale Municipal

As funding becomes available, continue to implement the capital improvement plan from the Airport Master Plan (Glendale 2009). The plan's goal is to provide the airport with the ability to meet the increasing demands on the airport by larger corporate aircraft, while also providing adequate space for the majority users of the airport which include piston-powered aircraft operators. There are no plans to extend the existing runway or add an additional runway.

Phoenix - Goodyear

As funding becomes available, continue to implement the capital improvement plan from the Airport Master Plan (Phoenix 2005). The plan's goal is to provide the airport with the ability to meet the demands generated by the large aircraft maintenance facilities on the airport, as well as providing adequate space for small, general aviation aircraft operators and increased use by operators of cabin class corporate aircraft.

Phoenix - Sky Harbor International

As funding becomes available, continue to implement the capital improvement plan. Major improvements planned for Sky Harbor include construction and operation of an automated people mover connecting the light-rail, terminals, and rental car center, decommissioning Terminal 2, and expanding Terminal 3. All of these improvements would help serve increased commercial flight demand while improving circulation and access.

Commercial service will also be served by the continued expansion of the Phoenix-Mesa Gateway Airport in east Mesa. The Gateway Airport continues to add additional commercial carriers and routes as a reliever airport for Sky Harbor.

Freight

The *La Paz Transportation Planning Study* conceptualized the potential for developing industrial areas along SR 95 north of Quartzsite as a potential intermodal distribution center. The industrial area would initially be accessed by roadway, but there are also opportunities to add air (see previous section) and rail terminals. If an Arizona and California Railroad rail spur is completed to Quartzsite, container freight from west coast ports could be delivered directly to Quartzsite and transferred to trucks, bypassing congested facilities and roads in Southern California.

The *La Paz Transportation Planning Study* also recommended that La Paz County work with ADOT and private interests to develop a travel plaza at the I-10 and Ehrenberg Parker Highway interchange in Ehrenberg to serve commercial trucking as well as the general public.

The *Hassayampa Framework Study* conceptualized a possible heavy rail line connecting the BNSF line along US 60 (Grand Avenue) to the UPRR line near the Palo Verde Nuclear Generating Station. The purpose of the line is to connect intermodal yards and allow the two carriers to exchange freight while bypassing the Phoenix area. The potential rail line would enhance industrial options in the area and would be in close proximity to the planned Hassayampa Freeway (I-11) which would continue north to Las Vegas and South to the Mexico border.

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