DRAFT ENVIRONMENTAL ASSESSMENT

10 BROADWAY CURVE

Interstate 10 Broadway Curve: I-17 (Split) to SR202 (Santan Freeway)

Maricopa County, Arizona

October 2019

Federal Aid No. 010-C(220)T

ADOT (TRACS) No. 010 MA 149 F0072 01C

ADOT

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Arizona Department of Transportation pursuant to 23 United States Code 327 and a Memorandum of Understanding dated April 16, 2019 and executed by the Federal Highway Administration and Arizona Department of Transportation.

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Draft Environmental Assessment

For

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October 2019

Approved by: Paul O'Brien Date: 10/2/19

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Administrator
Environmental Planning
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This Environmental Assessment has been prepared in accordance with provisions and requirements of Title 23 Code of Federal Regulations Parts 771 and 774, relating to the implementation of the National Environmental Policy Act of 1969 [42 United States Code 4332(2)(c)].

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Abbreviations

ACS ..... American Community Survey
ADA ..... Americans with Disabilities Act
ADEQ ..... Arizona Department of Environmental Quality
ADOT ..... Arizona Department of Transportation
ADT ..... average daily traffic
AGFD ..... Arizona Game and Fish
APE ..... Area of Potential Effects
ASR ..... Alternatives Selection Report
BE ..... Biological Evaluation
BG ..... Block Group
CAAA ..... Clean Air Act Amendments of 1990
CE ..... Categorical Exclusion
CEQ ..... Council on Environmental Quality
CFR ..... Code of Federal Regulations
CH_4 ..... methane
CO ..... carbon monoxide
CO_2 ..... carbon dioxide
CO_2e ..... carbon dioxide equivalent
CT ..... Census Tract
CWA ..... Clean Water Act
dB(A) ..... A-weighted decibels
DCR ..... Design Concept Report
Draft EIS ..... Draft Environmental Impact Statement
DHOV ..... Direct HOV
DMS ..... dynamic messaging signs
du/ac ..... dwelling units per acre
EA ..... Environmental Assessment
EIS ..... Environmental Impact Statement
EJ ..... Environmental Justice
EPA ..... U.S. Environmental Protection Agency
ERNS ..... Emergency Release Notification System
FAA ..... Federal Aviation Administration
FEMA ..... Federal Emergency Management Agency
FHWA ..... Federal Highway Administration
FIRM ..... Flood Insurance Rate Maps
FONSI ..... Finding of No Significant Impact
GHG ..... greenhouse gases
GPL ..... general-purpose lane
HCS ..... Highway Capacity Software
HEI ..... Health Effects Institute
HOV ..... high-occupancy vehicle
HPA ..... Highest Performing Alternative
I-10 ..... Interstate 10
I-17 ..... Interstate 17
JD ..... jurisdictional delineation
kV ..... kilovolt
$L_{Aeq(h}$ ..... 1-hour A-weighted equivalent sound level
LEDPA ..... Least Environmentally Damaging Alternative

LEP ..... Limited English Proficiency
Leq ..... equivalent sound level
LOS ..... level-of-service
LUST ..... leaking underground storage tank
MAG ..... Maricopa Association of Governments
MOU ..... Memorandum of Understanding
MP ..... mile post
mph ..... miles per hour
MS4 ..... municipal separate storm sewer system
MSAT ..... Mobile Source Air Toxic
NAAQS ..... National Ambient Air Quality Standards
N_2O ..... nitrous oxide
NAC ..... Noise Abatement Criteria
NAR ..... Noise Abatement Requirements
NEPA ..... National Environmental Policy Act
NHPA ..... National Historic Preservation Act
NPDES ..... National Discharge Elimination System
NRHP ..... National Register of Historic Places
O_3 ..... ozone
OHWM ..... Ordinary High Water Mark
OWJ ..... Officials with Jurisdiction
Pb ..... lead
PISA ..... Preliminary Initial Site Assessment
$PM_{2.5}$ ..... Particulate matter smaller than or equal to 2.5 microns in size
PM_{10} ..... Particulate matter smaller than or equal to 10 microns in size
RCRA ..... Resource Conservation Recovering Act
ROW ..... right-of-way
RTP ..... Regional Transportation Plan
SHPO ..... State Historic Preservation Office
SO_2 ..... sulfur dioxide
SR ..... State Route
SRP ..... Salt River Project
TCP ..... traditional cultural property
TI ..... traffic interchange
TIP ..... Transportation Improvement Plan
Title VI ..... Title VI of the Civil Rights Act of 1964
US ..... United States
USACE ..... U.S. Army Corps of Engineers
U.S.C. ..... United States Code
USFWS ..... U.S. Fish and Wildlife Service
UST ..... underground storage tank
VCP ..... Voluntary Cleanup Program
VMT ..... vehicle miles travelled
Waters ..... Waters of the U.S.

ENVIRONMENTAL COMMITMENTS

ADOT and the Contractor shall follow the Federal laws and regulations, guidelines, and ADOT's Standards and Specifications listed below to avoid, minimize, and mitigate impacts for all relevant environmental resources:

- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
- Uniform Relocation Act Amendments of 1987
- ADOT's Right of Way Procedures Manual
- Title VI of the Civil Rights Act of 1964
- ADOT's Public Involvement Plan
- ADOT's Air Quality Guidebook
- ADOT's Clean Water Act Section 404/401 Guidance Manual
- ADOT's Temporary Traffic Control Design Guidelines
- ADOT's Erosion and Pollution Control Manual
- ADOT's 2017 Noise Abatement Requirements
- ADOT's Standard Specifications for Road and Bridge Construction
- SAF-6.01 Asbestos Management Policy
- ADOT's Roadside Vegetation Management Guidelines

MITIGATION MEASURES

The following mitigation measures are not subject to change without prior written approval from Arizona Department of Transportation (ADOT) Environmental Planning. These mitigation measures would be updated as required in the Final EA and in any final design stages of the project.

ADOT Design Responsibilities

- As part of section 404 Permit conditions, permanent wetland impacts would be mitigated by compensatory mitigation (in-lieu fees) prior to the start of construction.
- Floodplain impacts would be coordinated with the Maricopa County Flood Control District.

ADOT District Responsibility

- If any active bird nests cannot be avoided by vegetation clearing or construction activities, the Engineer would contact the Arizona Department of Transportation Environmental Planning biologist (602.712.7134 or 602.712.7767) to evaluate the situation.

ADOT Roadside Development Responsibilities

- Protected native plants within the project limits would be impacted by this project; therefore, the ADOT Roadside Development Section would determine if the Arizona

Department of Agriculture would need to be notified. If so, the ADOT Roadside Development Section would send notification at least 60 calendar days prior to the start of construction.

Contractor Responsibilities

- The Contractor would contact the ADOT Planning Historic Preservation Team (602.712.6371 or 602.712.7767) 14 days prior to construction to ensure that the terms and stipulations of Attachment Six (6) of the Programmatic Agreement have been fulfilled.
- The Contractor would contact the ADOT Environmental Planning Historic Preservation Team (602.712.6371 or 602.712.2343) at least 10 (ten) business days prior to the start of ground-disturbing activities to arrange for qualified personnel to monitor and be present during construction.
- Where feasible, the noise barriers required as mitigation measures would be constructed as early as possible in the construction phasing to shield adjacent properties from construction-related noise.
- As part of section 404 Permit conditions, permanent wetland impacts would be mitigated by compensatory mitigation (in-lieu fees) prior to the start of construction.
- If vegetation clearing would occur during the migratory bird breeding season (March 1- August 31), the contractor would avoid any active bird nests. If active nests cannot be avoided, the contractor would notify the Engineer to evaluate the situation. During the non-breeding season (September 1- February 28), vegetation removal is not subject to this restriction.
- Prior to construction, all personnel who will be on-site, including, but not limited to, contractors, contractor's employees, supervisors, inspectors, and subcontractors, would review the Arizona Department of Transportation Environmental Planning "Western Burrowing Owl Awareness" flier.
- If any burrowing owls or active burrows are identified, the contractor would notify the Engineer immediately. No construction activities would take place within 100 feet of any active burrow.
- If the Engineer in cooperation with the Environmental Planning Biologist determines that burrowing owls cannot be avoided, the contractor would employ a qualified biologist holding a permit from the US Fish and Wildlife Service to relocate burrowing owls from the project area, as appropriate.
- To prevent the introduction of invasive species seeds, all earthmoving and hauling equipment should be washed prior to entering the construction site and the contractor should inspect all construction equipment and remove all attached debris, including plant parts, soil, and mud, prior to the equipment entering the construction site.
- To prevent invasive species seeds from leaving the site, the contractor would inspect all construction and hauling equipment and remove all debris, including plant parts, soil, and mud, prior to leaving the construction site.

I. INTRODUCTION

I.A. Explanation of an Environmental Assessment

This Draft Environmental Assessment (EA) for Interstate 10 Broadway Curve: I-17 (Split) to SR 202 (Santan Freeway), herein referred to as I-10 Broadway Curve, was prepared in accordance with the National Environmental Policy Act (NEPA), as amended (42 United States Code [U.S.C.] §§ 4321 et seq.), and Council on Environmental Quality (CEQ) regulations that implement NEPA (40 Code of Regulations [CFR] §§ 1500 to 1508), with the Arizona Department of Transportation (ADOT) acting as the lead federal agency. The environmental review, consultation, and other actions required by applicable federal environmental laws for this project have been carried out by ADOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding (MOU) dated April 16, 2019 and executed by the Federal Highway Administration (FHWA) and ADOT.

Per CEQ regulations (40 CFR Section 1508.9), the basic function of an EA is to describe: a) the need for a Preferred Alternative, b) alternatives for implementing or constructing a Preferred Alternative, and c) the environmental impacts of a Preferred Alternative. This document serves as a tool for ADOT in identifying potentially significant impacts of the Preferred Alternative on social, economic, and environmental resources, and measures that can mitigate these impacts.

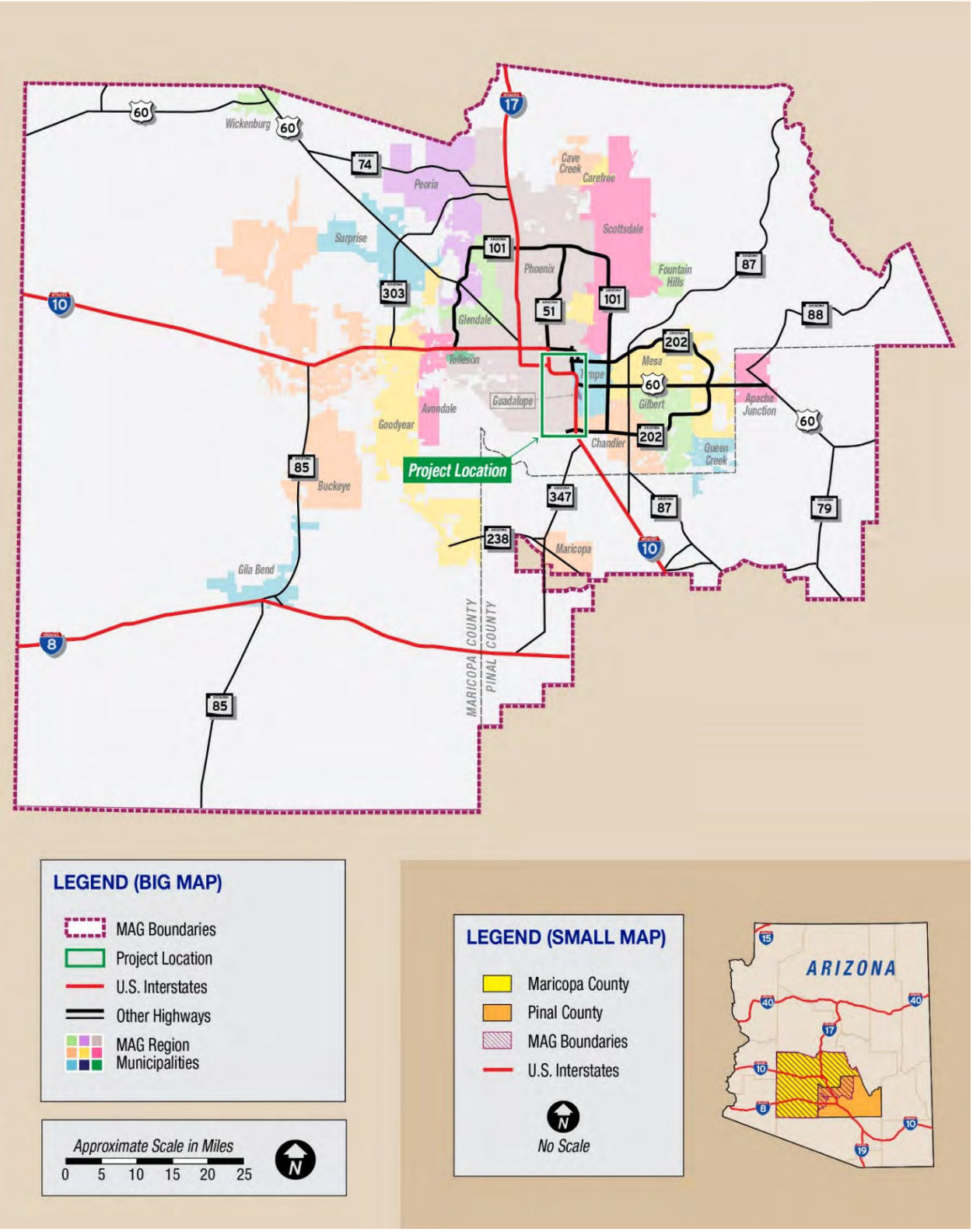
Based on the impacts identified, the Draft EA provides the basis for ADOT to determine whether an environmental impact statement should be prepared for the Preferred Alternative. The Draft EA also summarizes the public, agency, and tribal participation process associated with the Preferred Alternative and lists the agencies and persons consulted (40 CFR 1501.3, 1508.9).

I.B. Location

The project is located within the City of Phoenix, the City of Tempe, the Town of Guadalupe, and the City of Chandler, all within Maricopa County and the Maricopa Association of Governments (MAG) region (**Figure I-1**). The project occupies portions of Township 1 North, Range 3 East, portions of Sections 14, 23, and 24; Township 1 North, Range 4 East, portions of Sections 17, 18, 19, 20, 29, 32, and 33; and Township 1 South, Range 4 East, portions of Sections 5, 8, 17, 20, and 29, on the Phoenix, Tempe, and Guadalupe, Arizona, U.S. Geological Survey 7.5-minute Topographic Quadrangles.

The project vicinity includes commercial and light industrial buildings, several residential areas, a shopping center, recreational areas, and two cemeteries. Pedestrian facilities and trees are limited within the study area. The general landscape is industrial and suburban.

Figure I-1. Project Location



The project's study area is defined as an area approximately 1/8 (0.125) mile around the existing ADOT right-of-way (ROW), including any parcels that may be affected (temporarily or permanently) by proposed improvements. The study area begins on the west with the Interstate 17 (I-17) (I-10 Milepost [MP] 149.5), continues east and south on Interstate 10 (I-10) to the State Route (SR) 202L Santan Freeway (MP 161), and extends approximately 1.0 mile north along the SR 143 Hohokam Expressway and approximately 1.0 mile east along the United States Route (US) 60 Superstition Freeway (**Figure I-2**).

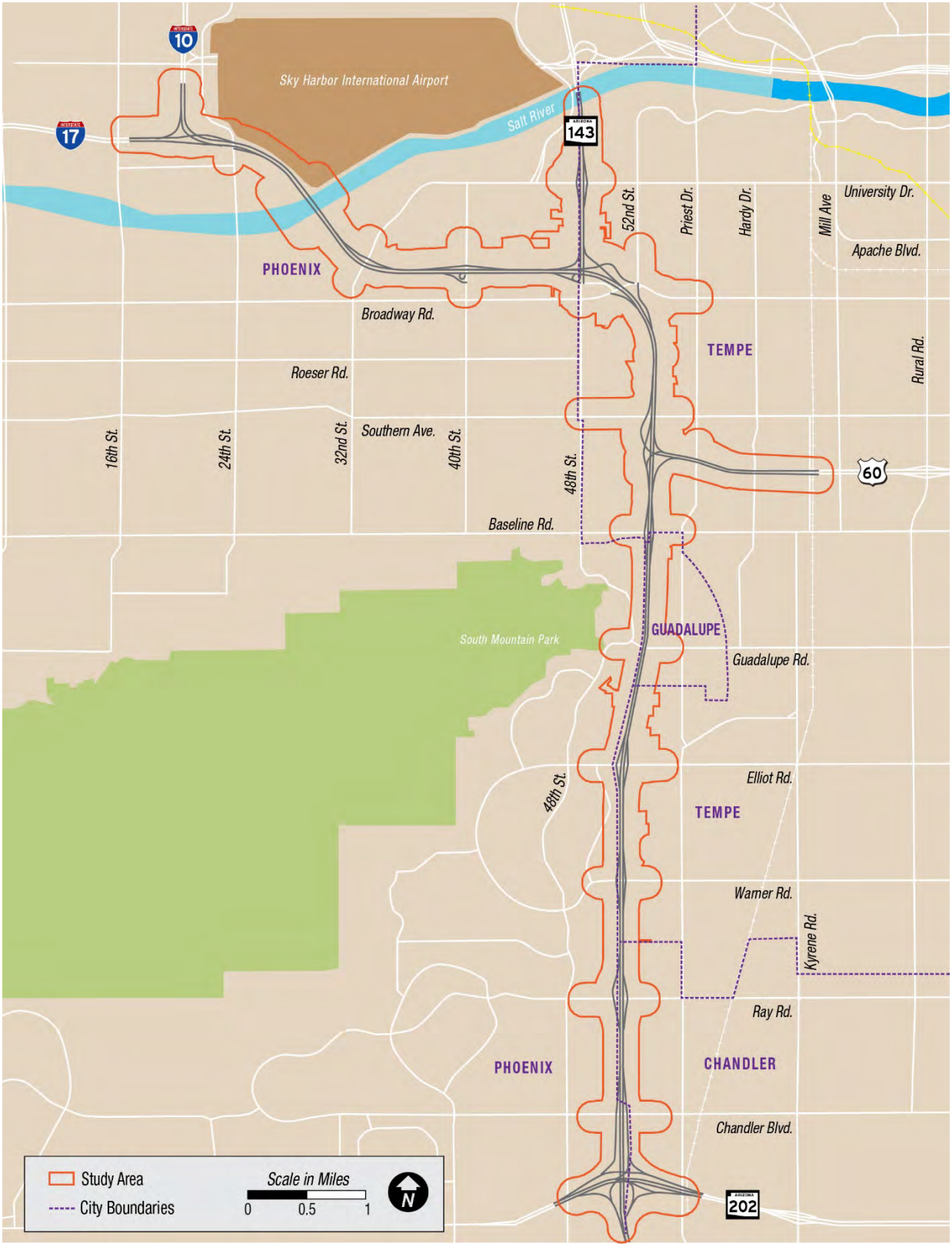
I.C. Project Background and Overview

ADOT, FHWA, and MAG have been developing aspects of this project concept for many years. Improvements to this segment of I-10, including the Collector-Distributor (C-D) roadway concept (a C-D road is a road that runs parallel to the freeway and connects the main lanes of the freeway and frontage roads or ramps), were initially developed in the 1988 *Interstate 10 Corridor Refinement Study* (ADOT 1988) (**Table I-1**). Following the 1988 study, the proposed improvements were further explored in the *I-10 Corridor Improvement Study* (ADOT 2007) and again in 2014 through the *Spine Corridor Study* (MAG 2014) and the *Interstate 10 Near Term Improvements Study* (ADOT 2014a).

Table I-1. Previous Related Studies Along the Study Area

Study	Summary
Interstate 10 Corridor Refinement Study, ADOT 1988	The original study, conducted in 1988, that defined an ultimate C-D concept for improving I-10 between I-17 and Rural Road, including revisions to SR 143, Broadway Road, Superstition Freeway, and Baseline Road traffic interchanges. Some improvements were implemented in the early 1990s resulting in the current I-10 configuration.
I-10/I-17 Corridor Improvement Study EIS, (ADOT and FHWA 2009) (Canceled)	Beginning in 2002, ADOT and FHWA developed corridor planning studies in the form of design concept reports and EIS studies. These studies considered ways to meet future travel demand on I-10 and I-17. "A notice to rescind the EIS was published in the federal register
Interstate 10 Near Term Improvements Study, ADOT 2014	ADOT developed a set of near-term capacity improvements for the segment of -10 between SR 143 and the SR 202 /South Mountain Freeway. The study evaluated existing roadway conditions and determined traffic operational improvements to I-10 in the study area within the existing ROW.
I-10/I-17 Spine Corridor Master Plan and PEL Study, (MAG, ADOT, and FHWA 2017)	MAG, ADOT, and FHWA partnered to develop a long-term vision for the central 31-mile "spine" of the regional freeway network in Phoenix. This study provides a comprehensive overview of the corridor, including existing facilities, existing and future (2040) traffic conditions. It identified a range of potential near-term and long-term improvements.
National I-10 Freight Corridor Study, (Wilbur Smith Associates 2003)	A joint effort by eight departments of transportation: California, Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and Florida. The purpose was to analyze current and projected freight movements, assess the impact of freight volumes on the transportation system, and develop strategies for improving flow. This corridor study concluded that additional lanes would better accommodate slow-moving traffic, thereby facilitating truck movements in the corridor.

Figure I-2. Study Area



The Preferred Alternative recommended in the pre-final Design Concept Report (DCR) for the Near-Term Improvements Study is a refined version of the original recommendation from the *Spine Corridor Study* (MAG 2014). The Preferred Alternative includes an enhanced version of the C-D concept, which was originally added to the Regional Transportation Plan (RTP) in 2004, when the county voters approved funding for Proposition 400.

The Preferred Alternative would include an enhanced C-D Roadway Concept, based on the original version recommended in the 1988 study, that would provide additional general-purpose lanes (GPL) along the existing freeway mainline between 40th Street and Ray Road, in addition to high-occupancy vehicle (HOV) lanes (including direct HOV connections between I-10 and SR 143), and new parallel local lanes (C-D lanes). Capacity and operational improvements would include reconstruction of traffic interchanges and bridges, including the I-10/SR 143 interchange, and the addition of bicycle and pedestrian crossings across I-10 at Alameda Road and the Western Canal.

In accordance with CEQ regulations implementing NEPA, potential environmental impacts of the Preferred Alternative are compared to a No-Build Alternative in which proposed capacity and operational improvements to I-10 in the study area would not occur. The No-Build Alternative includes existing transportation services and facilities in addition to improvements currently under construction or committed for funding in the RTP through the design year 2040.

Should it be determined that the Preferred Alternative would not result in significant adverse impacts on the natural, built, socioeconomic, or cultural environment that could not be avoided, minimized, or otherwise mitigated, a Finding of No Significant Impact (FONSI) would be issued and approved by ADOT—allowing the freeway to proceed to final design and construction.

II. PURPOSE AND NEED

II.A. Introduction

The purpose and need statement identifies specific measurable transportation problems (needs) that the project will address (purpose). This purpose and need chapter has been prepared based on CEQ NEPA regulation (40 CFR 1502.13), FHWA NEPA regulations (23 CFR 771), and CEQ and FHWA guidance, including FHWA Technical Advisory T 6640.8A. It identifies and documents the current conditions using the analysis year 2018 and the future conditions projected out to 2040 in the study area.

This project is mainly located on I-10 between MP 140.9 and MP 160.5 within the cities of Phoenix, Tempe, Chandler, and the Town of Guadalupe in Maricopa County, Arizona. I-10 is a key component of the National Highway System and a major element of the MAG-adopted Regional Transportation Plan Freeway Program. The project also includes segments of SR 143, from Broadway Road to the south bank of the Salt River and US 60 from I-10 to Hardy Drive. See Chapter I., Introduction, for more information regarding the study area and proposed improvements.

II.B. Project Purpose

The purpose of the I-10 Broadway Curve project is to improve traffic operations and reduce congestion on I-10 while maintaining regional mobility and access for economic centers and providing an improved transportation system linkage.

II.C. Project Needs

The existing traffic congestion continues to increase from the extensive growth the valley has been experiencing. Recognized as a potential transportation problem in the early 2000s, the already challenged movement of goods, services, and people would experience major delays in the foreseeable future. Travel demand from the projected growth in population, housing, and employment would continue to outpace the facility's capacity to handle the demand, thereby delaying transit services and increasing the travel time of commercial and non-commercial motorists in congested conditions.

According to the U.S. Census Bureau, Maricopa County gained over 80,000 residents between July 1, 2015 and July 1, 2016, making it the fastest growing county in the United States. This segment of I-10 serves the growing communities in the south and east valley, the downtown Phoenix metropolitan area, and other major employment centers. The MAG Region was one of the fastest-growing metropolitan areas in the United States from the early 1950s to the mid-1990s, with a population increase of more than 500 percent. In 2000, the region was ranked as the 14th-largest metropolitan area in the country with an estimated population of 4.7 million (U.S. Census Bureau); it was ranked the 11th largest in 2017. This projected surrounding community and employment center growth indicates congestion will increase, especially as it

relates to the current operational issues and the need for enhanced ways to collect and distribute volumes.

II.C.1. Need Based on Regional Mobility and Access

Even though the population in the study area is projected to increase only by 6 percent, the employment is projected to spike up 22 percent. The reason for minimal increase in population in the study area is due to its location within an urban core with minimal vacancy for housing developments. The growth in employment and minimal housing development in the study area will cause the work force to drive farther from areas with available housing to these employment centers and result in congestion on roads during peak periods.

As shown in **Table II-1**, Maricopa County's population is expected to increase by nearly 33 percent between 2018 and 2040. Much like the county's population, employment is projected to grow from nearly 2.0 million jobs in 2018 to nearly 2.7 million in 2040, a 43 percent increase (MAG 2019).

Table II-1. Social and Economic Changes (Study Area and Maricopa County)

Year	Population		Employment	
	Study Area	Maricopa County	Study Area	Maricopa County
2018	80,000	4,276,000	148,000	1,936,000
2040	85,000	5,682,000	181,000	2,763,000
% increase	6%	33%	22%	43%

Source: 2019 MAG Socioeconomic Projections

Maricopa County population and employment projections indicate that growth will continue in the area **(Figure II-1)**.

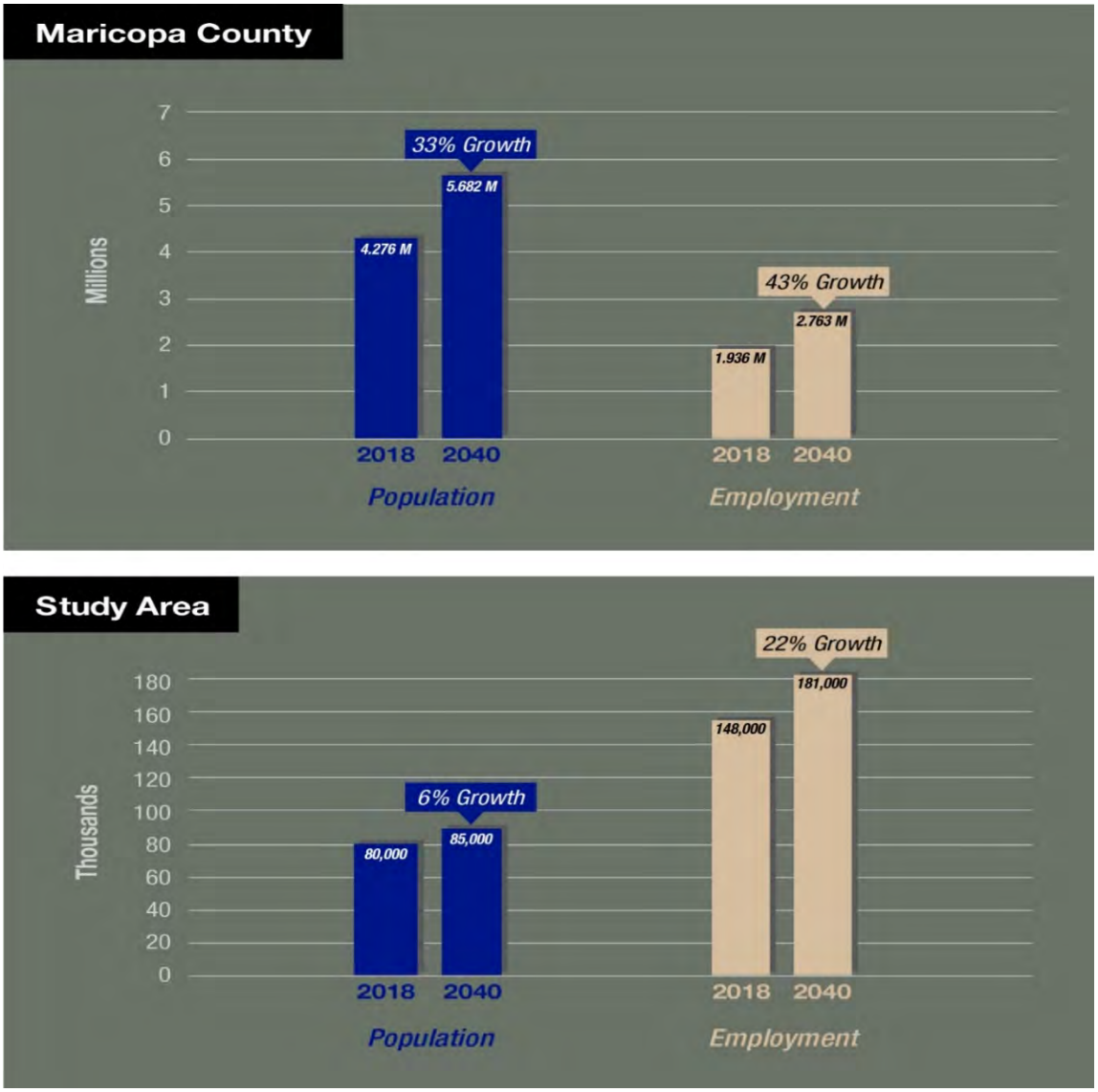
The I-10 corridor within the study area has attracted substantial commercial and industrial development, with more than 30 percent of the land in the study area dedicated to employment land uses as discussed in Section IV.B., Land Ownership, Jurisdiction, and Land Use. Most of the area within and adjacent to I-10 study area contains existing economic activity centers with many major employers that use I-10 as the main route to access their businesses **(Figure II-2)**. The economic vitality of area businesses is linked to the access, connections, and visibility provided by I-10, as businesses have chosen sites in proximity to I-10 to distribute their own products and/or to attract consumers.

I-10 currently serves as a major commuter route for residents of the MAG Region, including those who work at the businesses listed in **Figure II-2** and other employment centers within the region. The I-10 corridor also provides access to the Phoenix Central Business District, the City of Tempe, Arizona State University, and other commercial, industrial, warehouse, and distribution employers throughout the area.

In addition to operating as a commuter route, I-10 is at the center of the Regional Freeway System, facilitating access to the entire MAG Region and beyond. This segment of I-10 is also a primary freight corridor within the county, as well as between Maricopa County and other parts

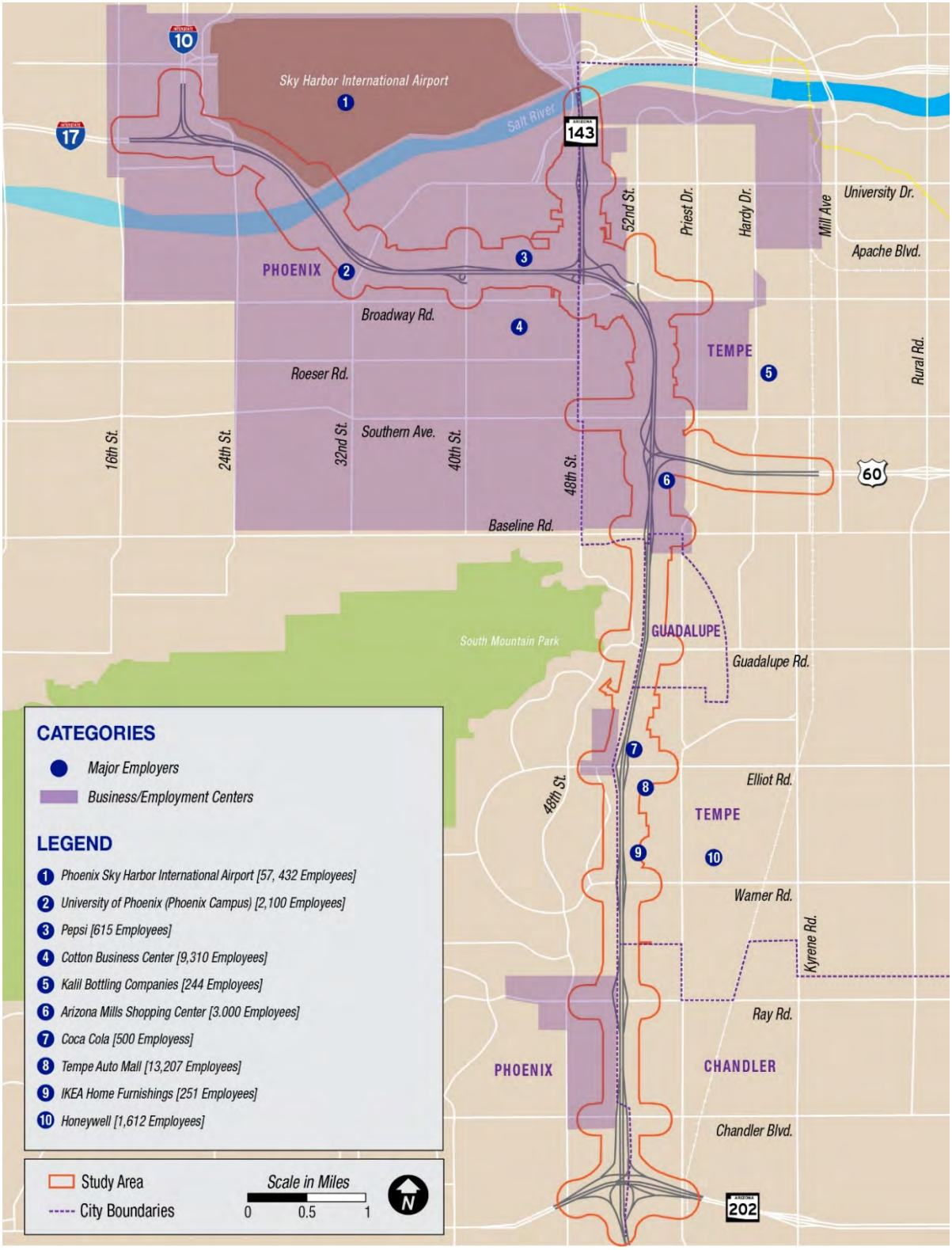
of Arizona and the nation. This is consistent with the population and employment growth shown in **Table II-1**. Improvements to I-10 are needed to maintain the functionality and mobility of the corridor and to maintain access to major employment centers in the area.

Figure II-1. Population and Employment Growth (Maricopa County and Study Area)



Source: 2019 MAG Socioeconomic Projections

Figure II-2. Employment Centers and Major Employers within or Close to the Study Area



Source: 2016 MAG Socioeconomic Projections and Economic Impact of The Phoenix Airport System (2017)

II.C.2. Need Based on Traffic Operations

Travel demand models are generally used to forecast traffic flows 20 to 30 years in the future on a transportation system to identify any system deficiencies that may not exist today. MAG used the regional travel demand model to produce average daily traffic (ADT) and peak volumes for various segments of I-10 for 2018 and 2040. While the study area extends south to SR202L, there would be no capacity improvement south of Ray Road under the Preferred Alternative; therefore, no traffic analysis was performed for the segment south of Ray Road. The projected 2040 volumes without the project (No-Build) were compared to the 2018 existing volumes to assess the anticipated traffic growth.

Although the daily traffic volumes do not show a big spike between 2018 and 2040, congestion levels during peak hours along I-10 within the study area would further degrade by 2040 if no improvements were implemented. As discussed in the previous section, the increase in economic activity in, and adjacent to, the study area, would cause travel times to and from employment centers to be extended even further. In addition, overall use of this segment of I-10 to regional employment centers during peak hours would also further degrade operational conditions. The LOS analysis will assess the road's operating conditions on a scale of A through F, as shown in **Table II-2**.

Table II-2. Level of Service Designations

Level of Service	Description
A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Forced or breakdown

Source: Highway Capacity Manual and American Association of State Highway Transportation Officials

Highway Capacity Software was used to calculate the LOS along I-10 for the existing (2018) conditions and future (2040) No-Build conditions. The results show that on both the eastbound and westbound direction of the highway there will be congestion along most of the highway. Longer delays in segments of the corridor which would result in an overall delay throughout the study area would occur by 2040 if no improvements were incorporated. **Figure II-3** and **Table II-3** show the LOS for various segments of the highway for AM and PM peak hours in 2018 and projected 2040. The peak period in the morning is from 6 AM to 9 AM and in the afternoon, it is from 2 PM to 6 PM. The peak hour times are just the hour within the peak period that sees the greatest amount of traffic to assume the worst-case scenario within each of those peak periods.

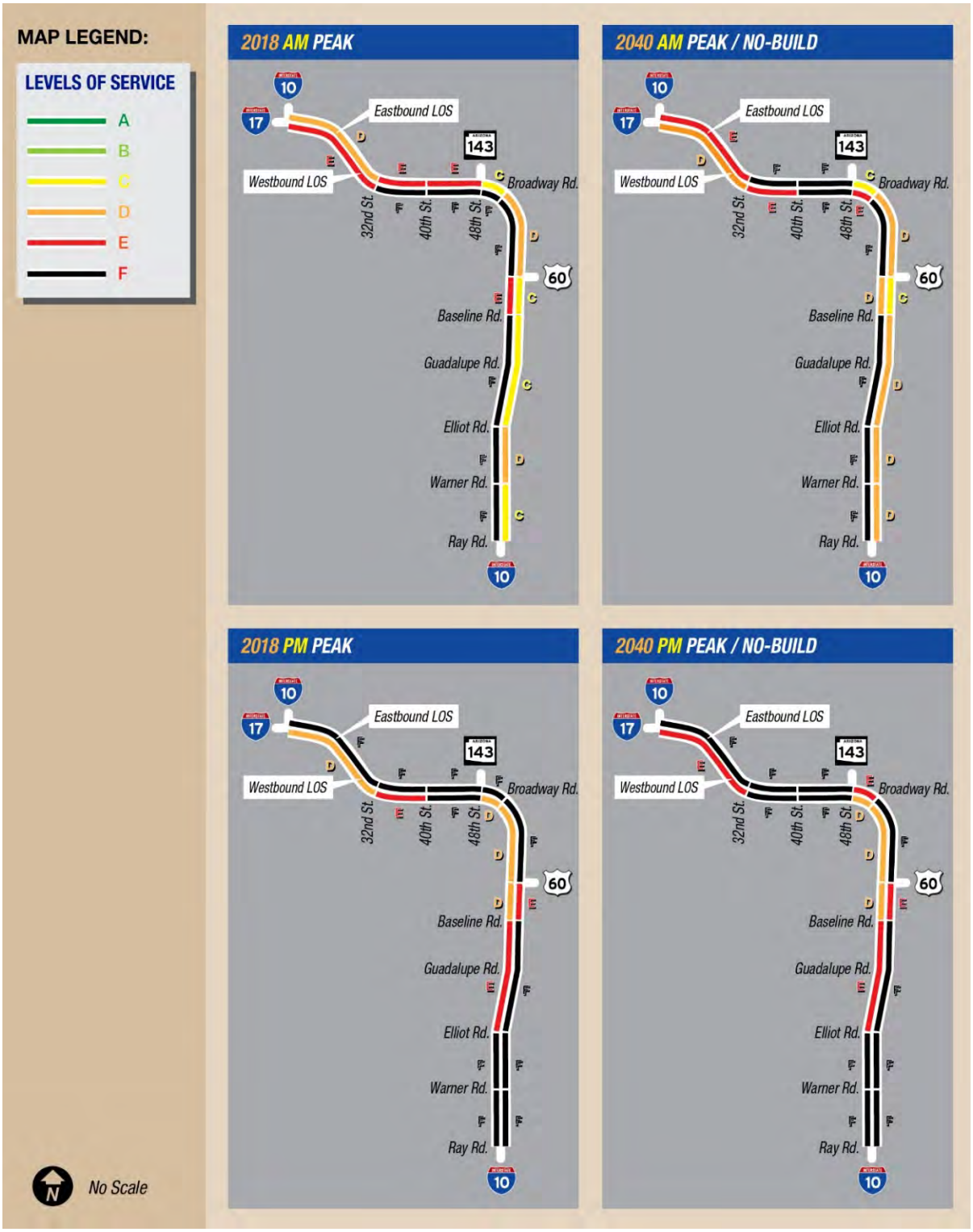
Table II-3. Existing and Future No-Build Alternative Levels of Service on I-10 (Study Area, AM/PM Peak Periods)

I-10 Segments		AM Peak				PM Peak			
		Westbound		Eastbound		Westbound		Eastbound	
From	To	2018	2040	2018	2040	2018	2040	2018	2040
I-17 Split	32nd Street	E	D	D	E	D	E	F	F
32nd Street	40th Street	F	E	E	F	E	F	F	F
40th Street	48th Street/ SR 143	F	F	E	F	F	F	F	F
48th Street/ SR 143	Broadway Road	F	E	C	C	D	D	F	E
Broadway Road	US 60	F	F	D	D	D	D	F	F
US 60	Baseline Road	E	D	C	C	D	D	E	E
Baseline Road	Elliot Road	F	F	C	D	E	E	F	F
Elliot Road	Warner Road	F	F	D	D	F	F	F	F
Warner Road	Ray Road	F	F	C	D	F	F	F	F

Note: Level of Service was calculated using Highway Capacity Software
Note: Analysis extends only to Ray Road as the Preferred Alternative does not include additional capacity improvements south of Ray Road.

As shown in **Figure II-3**, even under the existing conditions, no segments of I-10 operate at a free-flow condition during the peak hours with LOS A or B; and several segments operate at failing LOS of E and F. Under the 2040 No-Build Alternative, additional segments of I-10 would fail and operate at the unacceptable LOS E and F when compared to the existing (2018) conditions. Congestion is anticipated to increase in both the AM and PM peak along various segments within the study area resulting in additional delays and mobility issues. The level of congestion is anticipated to be more severe in various segments of the corridor, if no improvements were implemented and there is a need for improvements to maintain the functionality and mobility in this corridor by year 2040.

Figure II-3. Existing and Future No-Build Alternative LOS on I-10 (Study Area, AM/PM Peak Periods)



Note: Analysis extends only to Ray Road as the Preferred Alternative does not include additional capacity improvements south of Ray Road.

II.C.3. Need Based on System Linkages

The Regional Freeway System is one of the components of MAG's RTP to address the region's transportation needs; it was designed to function as part of an integrated transportation network including the bus services. System continuity is important in optimizing the effectiveness of various transportation modes including personal vehicles, carpools, and bus services. Although many bus routes cross or run parallel to I-10, there are several bus routes listed in **Table II-4** that utilize the corridor and are directly affected by the corridor's performance (**Figure II-4**).

Table II-4. Transit Routes Utilizing I-10 (Study Area)

Bus Route #	Route Description
520	Tempe Express
521	Tempe Express
522	Tempe Express
531	Mesa/Gilbert Express
533	Mesa Express
541	Chandler/Mesa Express
542	Chandler Express
I-10 E	I-10 East RAPID

Source: 2019 Valley Metro

In the I-10 Corridor, express bus service exists along I-10, US 60, and the Santan Freeway, mainly operating in the HOV lanes. According to the MAG RTP, HOV lanes will be added to the entire Regional Freeway System over the next 20 years. Increased future congestion on I-10, especially within the study area, would tend to degrade freeway and express bus service by adding more traffic to the HOV lanes in which these buses travel. As a result, improvements to I-10 would help improve the intermodal service as it exists today, accommodate planned expansion in the future, and provide the capacity needed for increased travel demand.

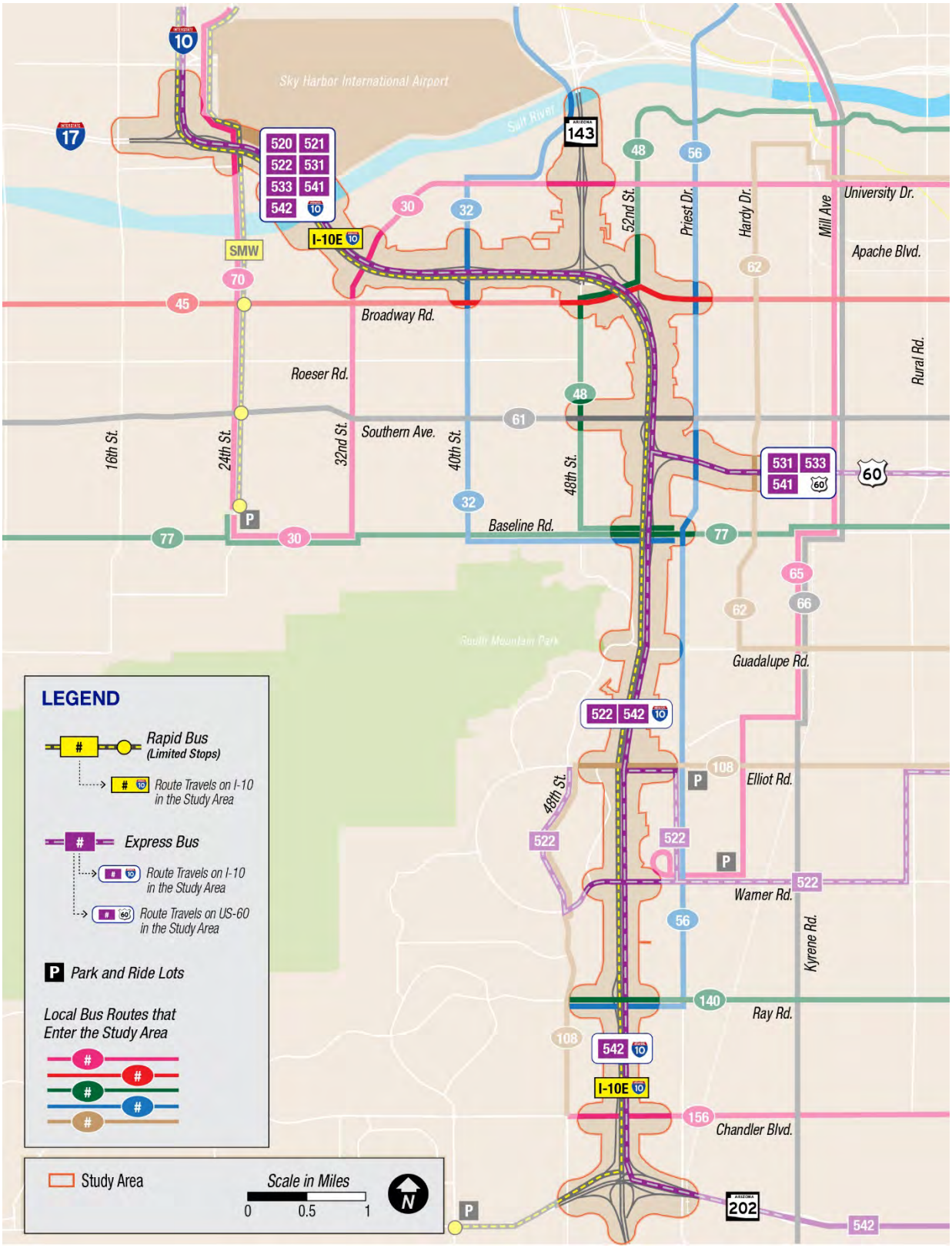
II.C.4. Summary

The traffic operations along the I-10 and interchanges in the study area would further degrade with the growth indicators forecasted for the foreseeable future. Without major improvements, the I-10 in the study area would suffer degraded traffic conditions, travel delays, and challenging mobility for moving goods, services, and people through the study area.

The Preferred Alternative would address the needs in the study area by:

- Maintaining the current functionality and mobility of the I-10 corridor
- Providing regional mobility and access for economic centers
- Accommodating current and planned system linkages for bus services using I-10

Figure II-4. Bus Service Routes Intersecting the Study Area



Source: 2019 Valley Metro

II.D. Conformance with Regulations, Land Use Plans, and Other Plans

The Preferred Alternative would be consistent with and supported by the land use plans and policies of the jurisdictions along the corridor, including:

- *FY 2018 MAG Transportation Improvement Program (TIP)* (MAG 2017)
- *Regional Transportation Plan Freeway Program Phases I-IV* (ADOT 2014b)
- *What Moves You Arizona, Long-Range Transportation* (ADOT 2018)
- *Central Phoenix Transportation Framework Study* (MAG 2013a)

III. ALTERNATIVES ANALYSIS

This EA presents the development of alternatives in the context of the transportation issues, opportunities, and limitations that formed the basis for the options faced by the decision makers and the public. Through the current study and studies that preceded it (summarized below), numerous alternatives were objectively explored in detail by multi-disciplined teams, presented to the public for consideration and comments, and evaluated and screened through documented processes.

III.A. Prior Studies and Alternatives

Improvement concepts for the highway system in the metropolitan Phoenix region are continuously being developed to accommodate future land uses and projected traffic volumes and adopted into MAG's long-range transportation plans. The section of freeway that is the subject of this EA, consisting of I-10 from the I-17 Split to the SR 202L Santan Freeway, extending on SR 143 (Hohokam Expressway) approximately 1 mile north of I-10 and on US 60 (Superstition Freeway) approximately 1 mile east of I-10, has been the topic of numerous transportation studies over several decades.

Past transportation studies covering this section of I-10 recognized capacity and operational limitations in light of current and projected volumes and developed alternative solutions and screening processes that have eventually resulted in the development of this EA's Preferred Alternative. The following studies developed improvement alternatives through interdisciplinary team dialogues that included the FHWA, MAG, ADOT technical staff, and agency stakeholders, as well as input obtained through public outreach.

- *Interstate 10 Corridor Study* (ADOT 1988)
- *I-10 Corridor Improvement Study* (ADOT 2007)
- *Spine Corridor Study* (MAG 2014)
- *Interstate 10 Near Term Improvements Study* (ADOT 2014a)

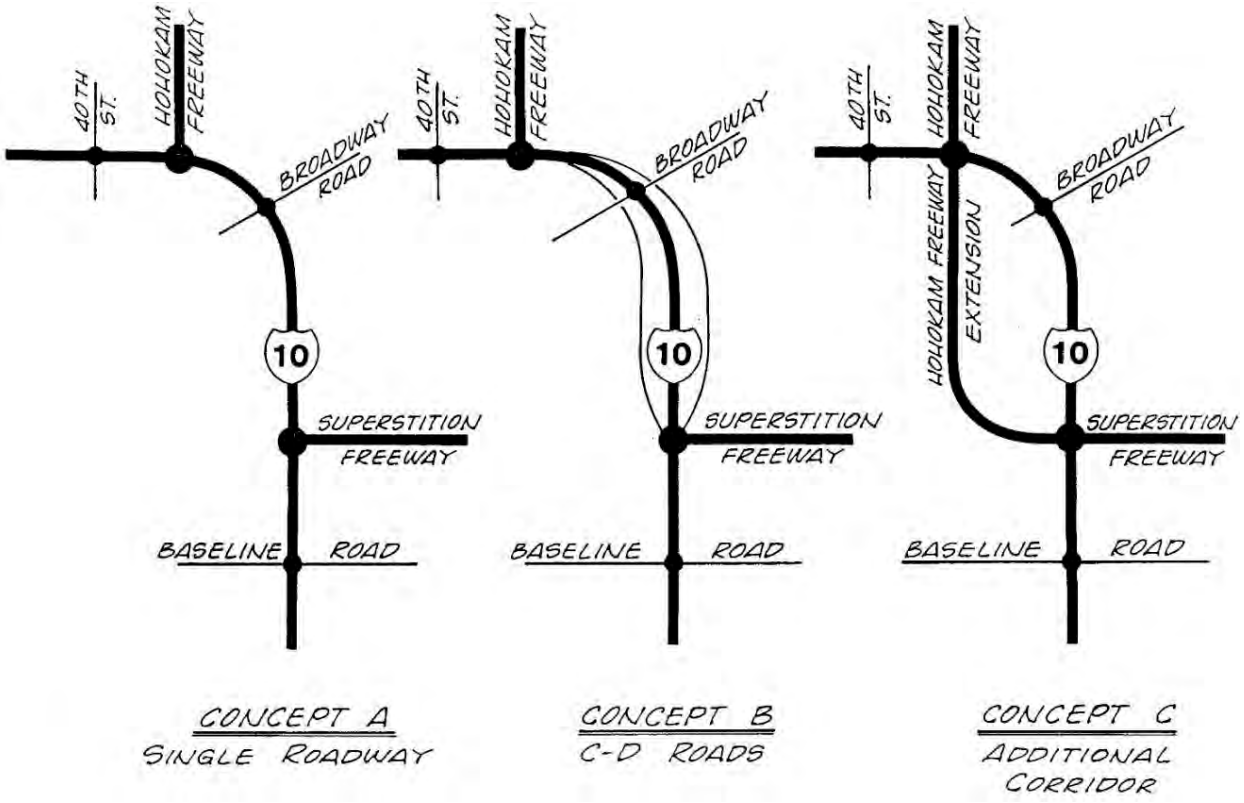
The alternative solutions developed and evaluated in these studies included all or parts of the study area examined in this EA. In each study, the alternatives were subjected to a series of screenings based on a set of criteria developed for that study, in each case concluding with a single alternative being selected, recommended, or preferred. These studies occurred over several decades, and each one contributed key design and operational characteristics that were carried forward in the alternatives developed for subsequent studies and ultimately influenced the Preferred Alternative that is the subject of this EA.

III.A.1. Interstate 10 Corridor Study

The *Interstate 10 Corridor Study* (ADOT 1988) considered projected traffic volumes for the year 2005 and forecasted average daily traffic (ADT) to be 250,000 vehicles in the segment of I-10 between 48th Street and the Superstition Freeway (approximately MP 153-155) known as the

Broadway Curve, owing to the interstate's 90-degree bend at this location. The study developed a number of high-level transportation improvement concepts that were eventually screened down to three alternative improvement concepts that were advanced for further study. As illustrated in **Figure III-1**, these consisted of A) keeping I-10 as a single roadway while adding lanes, B) constructing a collector-distributor (C-D) road system, and C) extending the Hohokam Freeway south along 48th Street to the Superstition Freeway. These three alternative concepts were evaluated on basis of: improving operations, enhancing safety, relative costs, ease of implementation, and potential for environmental impacts.

Figure III-1. Alternative Improvement Concepts from the 1988 I-10 Corridor Study

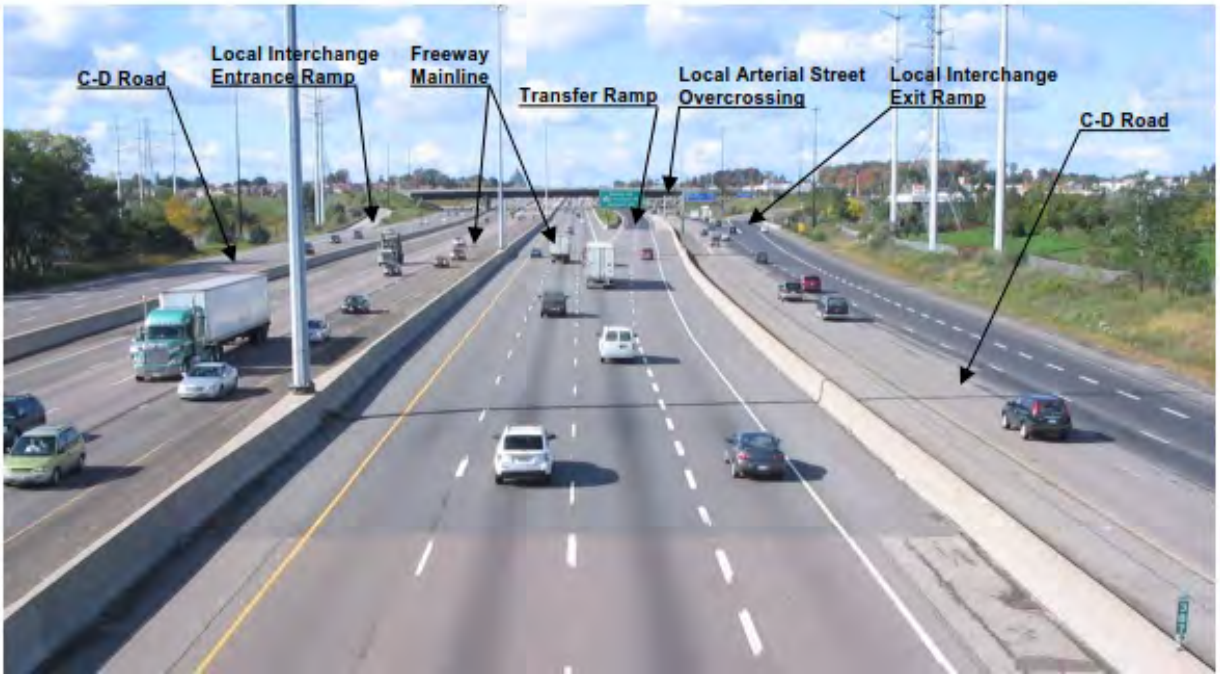


Source: Phase II Report, I-10 Corridor Study – 40th Street to Baseline Road, ADOT (1988)

Based on this evaluation, Concept B (C-D road) was selected and included in MAG's Regional Transportation Plan (RTP) and Transportation Improvement Plan (TIP). As shown in the above figure, C-D roads run parallel to the main travel lanes, separating through and local traffic. **Figure III-2** illustrates the separation of local traffic from through (express) traffic on a freeway with C-D roads.

Key design criteria from this study's C-D road concept that influenced the current Preferred Alternative were improved operations provided by added capacity, enhanced safety through the reduction of weaving movements, and endeavors to keep right-of-way impacts to a minimum.

Figure III-2. Freeway with Collector–Distributor Roads



Source: Highway 401 in Toronto, Canada, taken from Initial Design Concept Report, I-10 Corridor Improvement Study (SR 51 to Santan Freeway), ADOT (2011)

III.A.2. I-10 Corridor Improvement Study

In 2004, Maricopa County voters approved Proposition 400, which funded the transportation improvements in the RTP. ADOT and FHWA subsequently initiated the *I-10 Corridor Improvement Study* (ADOT 2007) to develop alternative C-D road concepts for section of that includes the current study area. This study developed an Alternatives Selection Report (ASR), an Initial Design Concept Report (DCR), and a Draft Environmental Impact Statement (EIS) that evaluated improvement options within the study area and their effects. Traffic counts at the Broadway Curve taken in 2006 had increased to an ADT of approximately 294,000, considerably exceeding the 2005 forecast. The ASR generated five I-10 widening alternatives, summarized in **Table III-1**, through a screening process that identified the alternatives and local access options that would advance into the next stage of development.

Table III-1. Widening Alternatives from the 2007 I-10 Corridor Improvement Study Alternatives Selection Report

Alternative	Description	Disposition
ASR 1	1998 Express/Local Lanes Concept	Eliminated from further consideration
ASR 2	Express/Local Lanes Concept with more Express, Local, and HOV Lanes than ASR Alternative 1	Carried forward as Alternative A in the Initial Design Concept Report
ASR 3	Express/Local Lanes Concept with continuous elevated HOV Viaduct between I-17 and US 60	Eliminated from further consideration
ASR 4	Express/Local Lanes Concept: Same as ASR Alternative 2 with one lane in each direction shifted from Local to Express	Carried forward as Alternative B in the Initial Design Concept Report
ASR 5	I-10 Widening Concept	Eliminated from further consideration

The evaluation criteria developed to screen the I-10 widening alternatives in this study consisted of the following:

- Operational performance throughout the study area
- Geometric design
- Local access
- Environmental
- Right-of-way (ROW) impacts (acreage and cost)
- Business and residential displacements
- Preliminary construction cost
- Constructability
- Plan compatibility
- Local agency acceptance

Public agencies involved in the *I-10 Corridor Improvement Study* included ADOT, FHWA, MAG, Valley Metro (the metropolitan transit authority), the Federal Aviation Administration (FAA), the Town of Guadalupe, and the cities of Phoenix, Tempe, and Chandler. Public input was also solicited through the NEPA Scoping conducted for the Draft EIS that was prepared (though not published) for this study. The screening process resulted in ASR Alternatives 2 and 4 being further developed in the Initial DCR for the *I-10 Corridor Improvement Study* as Alternatives A and B, respectively. ADOT developed three more alternatives (C, D, and E) by making various modifications to Alternative A. In addition, local access variants were applied to Initial DCR Alternative A to yield Initial DCR Alternatives A-1, A-2, and A-3 (**Table III-2**).

Table III-2. Widening Alternatives from the 2007 I-10 Corridor Improvement Study Design Concept Report

Alternative	Description	Disposition
Initial DCR A	C-D road concept with three to six express lanes in each direction throughout	eliminated
Initial DCR A-1	Same as Initial DCR A with 24th Street ramps from local lanes	recommended
Initial DCR A-2	Same as Initial DCR A with Single Point Urban Interchange at Buckeye Road	(outside the current study area) eliminated
Initial DCR A-3	Same as Initial DCR A with Sky Harbor Airport west entrance and braided ramp at Baseline Road	eliminated
Initial DCR B	Modified Initial DCR A with one lane in each direction of travel shifted from local to express	eliminated
Initial DCR C	Modified Initial DCR A with one lane in each direction of travel shifted from express to local	eliminated
Initial DCR D	Modified Initial DCR A removing eastbound "express-to-local" transfer ramps at 32nd Street and westbound "express-to-local" transfer ramps at Broadway Road	eliminated
Initial DCR E	Modified Initial DCR D with one lane in each direction of travel shifted from express to local	eliminated

In this screening, Alternative A-1 scored the highest, and was advanced as the Build Alternative to be evaluated in the *I-10 Corridor Improvement Study Draft EIS* (ADOT and FHWA 2009). Key features from the *I-10 Corridor Improvement Study* carried forward to the Preferred Alternative for this EA include balancing the number of express and local lanes while minimizing the need for additional ROW, avoiding displacements, and providing understandable guide signing consistent with driver expectations.

The *I-10 Corridor Improvement Study*, along with a concurrent corridor study for I-17 in the Phoenix metropolitan area, indicated the need for as many as six additional lanes on certain segments of the freeway corridors. However, the MAG Regional Freeway and Highway Program funding did not support this configuration. In the midst of the EIS process for the *I-10 Corridor Improvement Study*, which included Public Scoping and numerous stakeholder meetings, ADOT and MAG determined that completing separate improvement studies and NEPA documents for the two connected Interstates might not result in the best overall plan, and in October 2012 agreed to rescind the separate corridor studies for I-10 and I-17 and develop in their place a single study encompassing a geographical area that included both of these interstates and the roadway network surrounding them.

III.A.3. Spine Corridor Study

In February 2014, pursuant to the cancellation of the *I-10 Corridor Improvement Study* and I-17 study mentioned above, MAG launched the *Spine Corridor Study* (MAG 2014) to develop a Corridor Master Plan for the transportation "backbone" through metropolitan Phoenix beginning

at the north with the I-17 interchange with SR 101L (Agua Fria/Pima Freeway) and continuing south through the I-10/I-17 Split to the I-10 interchange with SR 202L (Santan Freeway).

The Spine study incorporated public outreach and involvement into the alternatives development process. Documentation of the multi-part alternative screening process as well as study documents, public outreach reports, and bilingual meeting materials are available on that project's website, https://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan.

After four levels of *Spine Corridor Study* alternatives screening, two hybrid options of a managed lane system were compared to determine which configuration best served the Spine Corridor. Screening principles and evaluation criteria were categorized into five areas:

- Optimize – Use available infrastructure by engaging technology
- Expand/Modernize – Upgrade the system to address growth beyond what optimization can provide
- Sustainability – Improvements that protect, enhance, or restore the environment; emphasize energy efficiency; and minimize life cycle costs
- Performance – Focus on meeting trip demand and provide system reliability
- Implementation – Craft alternatives by bundling best performing improvements

Based on the alternatives development, screening, and agency and public input phases of the study, the *Spine Corridor Study* recommended Spine Alternative HPA 2, which was adopted by the MAG Regional Council on May 24, 2017 into the draft 2040 RTP. The key features of the recommended Spine alternative that influenced the development of the Preferred Alternative in the current Draft EA were having two continuous HOV lanes in each direction on I-10 between US 60 and the I-17 Split, and direct HOV connections between I-10 and SR 143, along with the addition of bicycle and pedestrian crossings over I-10.

III.A.4. I-10 Near Term Improvements

Through a separate but parallel effort with the *Spine Corridor Study*, ADOT identified several freeway capacity improvements that could be carried forward and implemented in the near term for the segment of I-10 between SR 143 and SR 202L (Santan Freeway) and in 2014 initiated a DCR and environmental study, including stakeholder outreach and public involvement, to evaluate these improvements. The study area included the segment of US 60 (Superstition Freeway) from the I-10/US 60 Interchange (MP 172.0) east to Hardy Drive (MP 173.0). Screening criteria included lane balance, stakeholder support, public acceptance, and avoiding the potential to cause additional congestion. Continuing the 3-lane westbound C-D road on I-10 from US 60 beyond Alameda Drive was a key outcome of the alternatives screening that was carried forward into the Preferred Alternative examined in this EA.

III.B. Alternatives Considered

This section focuses on the Preferred Alternative currently being studied and its connection to the development and screening of alternatives from the transportation planning studies described in the previous section. In 2017, ADOT began refining the Preferred Alternative concept recommended in the DCR that was drafted for the *Interstate 10 Near Term Improvements Study* (ADOT 2014a), which in turn followed the recommended alternative from the *Spine Corridor Study* (MAG 2014), to develop a schematic design for a design-build procurement package for the segment of I-10 from the I-17 Split to the SR 202L Santan Freeway.

Prior to the initiation of the NEPA process for this study and subsequent development of the Draft EA, ADOT reviewed the prior planning studies and made a preliminary assessment of the results of their alternatives analyses. **Table III-3** shows the Design Criteria used in the screening process, with Screening Levels 1-4 representing the improvement features that were developed and advanced through prior transportation studies, and Screening Level 5 showing the criteria that were added in the development of the Preferred Alternative.

Table III-3. Screening Criteria for the Preferred Alternative

Screening Level	Source Report	Criteria
1	Interstate 10 Corridor Study (ADOT 1988)	▪ Improve operation ▪ Enhance safety ▪ Minimize environmental impacts
2	I-10 Corridor Improvement Study (ADOT 2007)	▪ Balance express versus local lanes ▪ Minimize additional ROW ▪ Avoid residential and business displacements ▪ Provide understandable guide signing consistent with driver expectations
3	Spine Corridor Study (MAG 2014)	▪ Provide additional HOV lanes ▪ Add Direct HOV connections between I-10 and SR 143 ▪ Include bicycle and pedestrian crossings over I-10
4	I-10 Near Term Improvements	▪ Keep I-10 westbound C-D road as 3 lanes from US 60 past Alameda Drive ▪ Support by public and agency stakeholders
5	Interstate 10 Broadway Curve: I-17 (Split) to SR202 (Santan Freeway)	▪ Knowledge from prior I-10 corridor improvement studies ▪ Enhance bicycle and pedestrian safety at 32nd Street TI ▪ Improve circulation at I-10/SR143/Broadway Road interchanges ▪ Provide Bicycle/Pedestrian connectivity on Western Canal Trail across I-10

III.B.1. Public and Agency Scoping

The NEPA scoping for this Draft EA solicited public and agency input on the proposed adoption of the decisions and analyses undertaken in the prior planning studies that formed the basis of the Preferred Alternative, leveraging the public outreach and agency coordination that had already occurred as part of the previous studies and are available online. A scoping meeting for

the public and agency representatives was held on February 26, 2019, to share information about the existing and future need for transportation enhancements in the study area and ADOT's project development process. Chapter V., Public Involvement/Project Coordination, provides details about the scoping meeting and associated outreach activities.

III.B.2. Preferred Alternative

ADOT has taken the alternatives that were developed and screened in prior transportation studies, incorporated input from the public and stakeholder outreach undertaken in those studies as well as input from the current study, and in collaboration with MAG and local agencies, built on these findings to arrive at a Preferred Alternative for this Draft EA. Construction of the Preferred Alternative would consist of the following major elements:

- Widening to the outside and restriping I-10 within the study limits
- Widening the existing Salt River Bridge to accommodate seven GPLs and two HOV lanes between 24th Street and 32nd Street
- Flaring the west end of the bridge to accommodate proposed future reconstruction of the I-10/I-17 system interchange
- Reconstructing the SR 143, Broadway Road, and 48th Street interchanges and connect them to new C-D roads
- Constructing a direct HOV connection between SR 143 and I-10 to and from the east
- Modifying the 40th Street TI by eliminating the westbound off ramp and the existing eastbound loop on-ramp, and relocating the 40th Street eastbound off-ramp
- Widening the westbound I-10 to eastbound US 60 ramp
- Relocating the existing westbound US 60 to westbound I-10 ramp to accommodate the westbound C-D road and construct a new ramp providing access to the westbound C-D road from westbound US 60
- Installing Dynamic Message Signs along the freeway within the construction limits

Without major improvements, the I-10 in the study area would suffer degraded traffic conditions, travel delays, and challenging mobility for moving goods, services, and people through the study area. The Preferred Alternative would address the needs in the study area by:

- Maintaining the current functionality and mobility of the I-10 corridor
- Providing regional mobility and access for economic centers
- Accommodating current and planned system linkages for bus services using I-10

The Preferred Alternative would improve transportation conditions on I-10 in the study area by increasing capacity and reducing weaving movements on the interstate. The direct HOV lane between I-10 and SR 143 would offer a choice for drivers and lead to more reliable traffic conditions.

Figure III-3 through **Figure III-8** illustrate major elements of the proposed Preferred Alternative at a schematic level which includes a simplified diagram of potential lane configurations and interchanges and is subject to change as the design advances.

III.B.3. No-Build Alternative

The No-Build Alternative serves as a baseline for comparison to evaluate the Preferred Alternative in accordance with NEPA. Capacity and operational improvements to I-10 in the study area would not occur under this alternative. However, maintenance of the existing roadway would continue. The No-Build Alternative would also include existing transportation services and facilities, plus improvements already under construction or committed for funding in the RTP through the design year 2040. These include the freeway facility projects in the Phoenix metropolitan area shown in **Table III-4**.

Table III-4. Planned and Programmed Projects in MAG 2040 RTP

Freeway	Segment	Project Description
I-10 Papago	SR 202L Santan to Riggs Road	Add HOV and GPLs
I-17 Black Canyon	I-10 Split to 19th Avenue	Add lanes and rebuild interchanges
	19th Avenue to SR 101L	Reconstruct mainline and construct HOV lanes
	I-10 Split Interchange	Add DHOV freeway ramps
SR 30 Tres Rios	SR 85 to I-17	Construct new freeway, including I-17 system interchange
SR 101L Price	Baseline Road to SR 202L Santan	Add GPLs
SR 202L Santan	US 60 to I-10	Add GPLs
SR 202L South Mountain	I-10 Papago to I-10 Maricopa	Design, build, and maintain new freeway

The No-Build Alternative does not meet the purpose and need because it does not provide increased capacity on I-10, nor does it improve travel reliability or mobility. Compared to the Preferred Alternative it does not maintain the current functionality and mobility of the I-10 corridor, provide regional mobility and access for economic centers or accommodate current and planned system linkages for bus services using I-10.

Figure III-3. Preferred Alternative Schematic: I-17 Split to West of 32nd Street

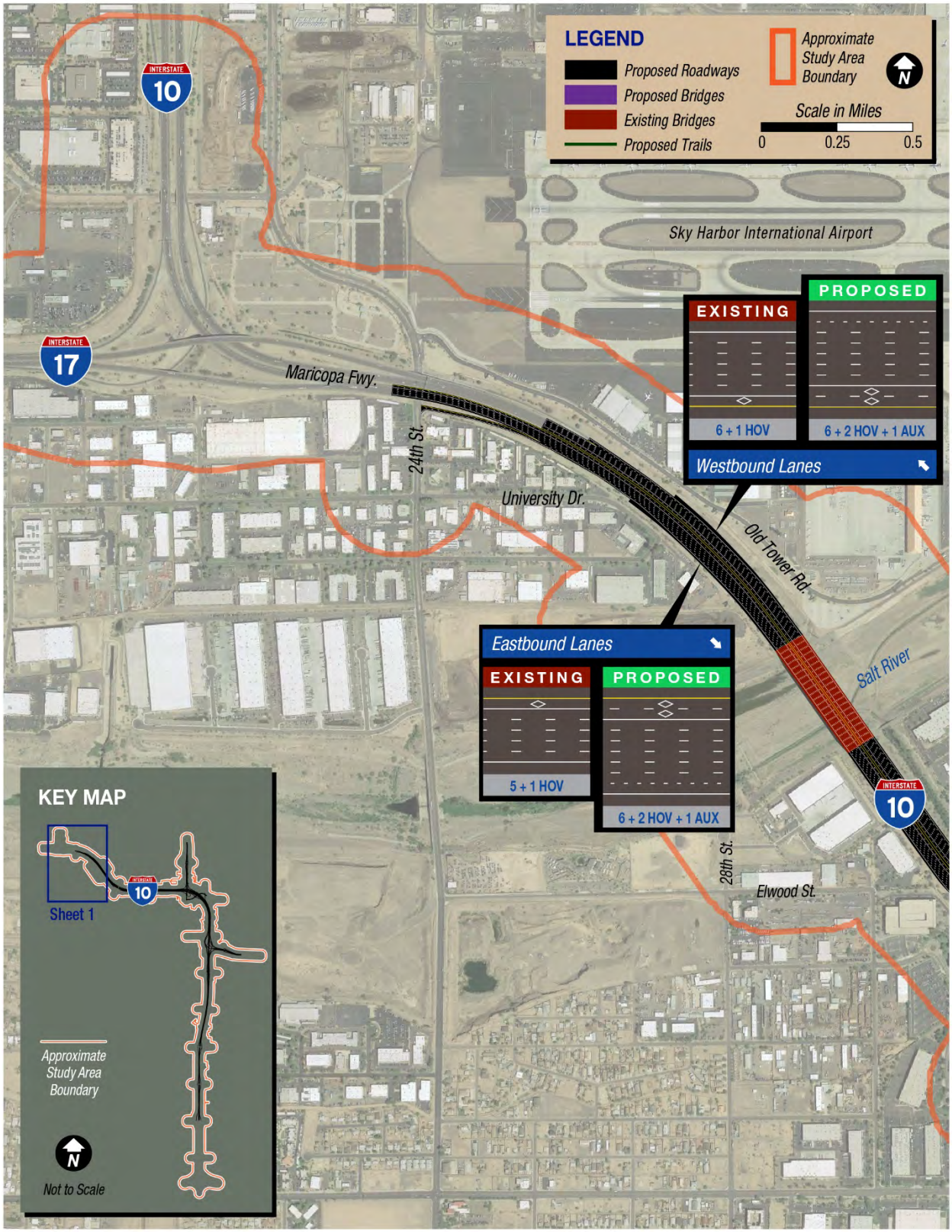


Figure III-4 Preferred Alternative Schematic: West of 32nd Street to East of 40th Street

Figure III-5 Preferred Alternative Schematic: East of 40th Street to Alameda Drive (including SR 143 Hohokam Expressway)

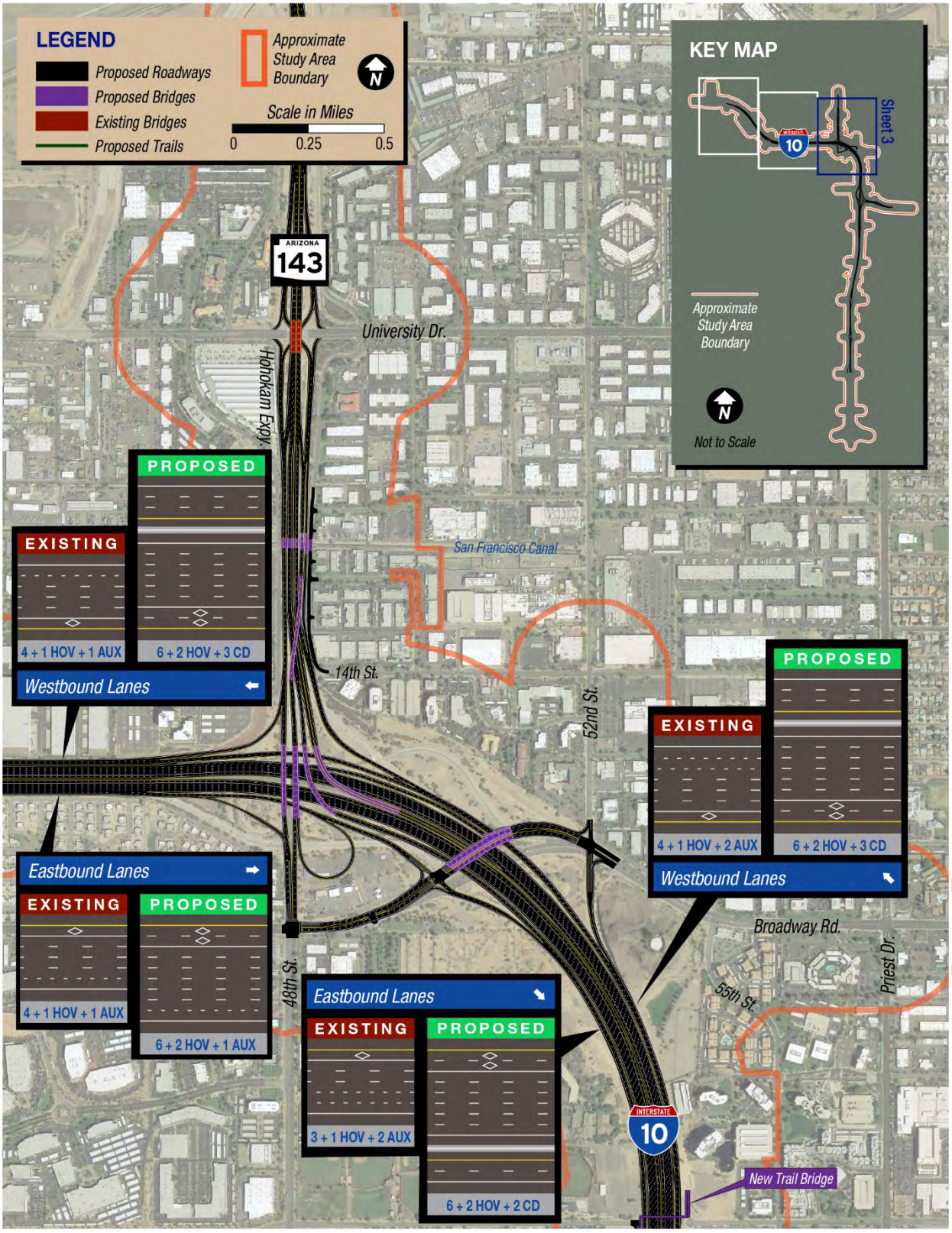


Figure III-6. Preferred Alternative Schematic: Alameda Drive to South of Baseline Road (including US 60 Superstition Freeway)

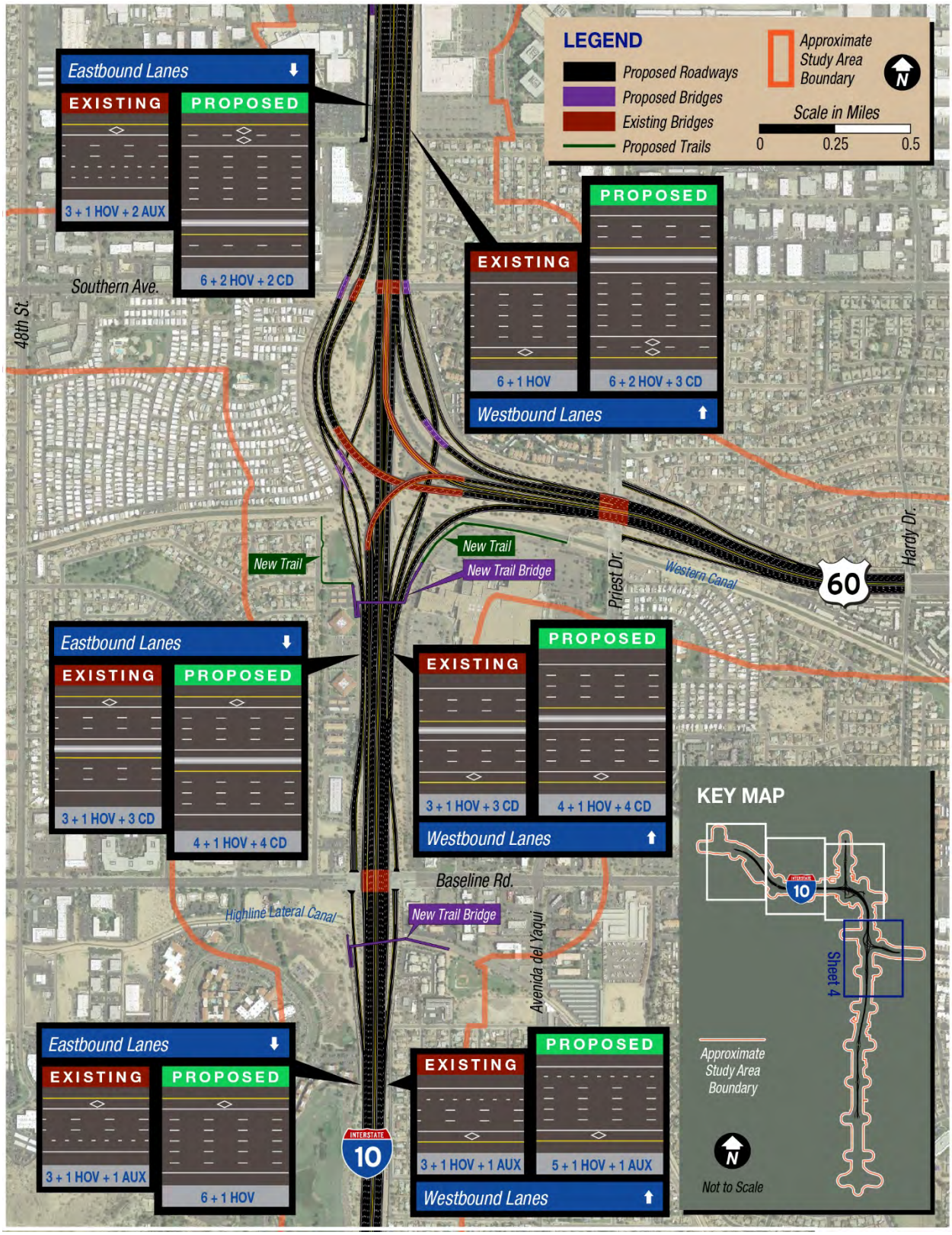


Figure III-7. Preferred Alternative Schematic: South of Baseline Road to South of Elliot Road

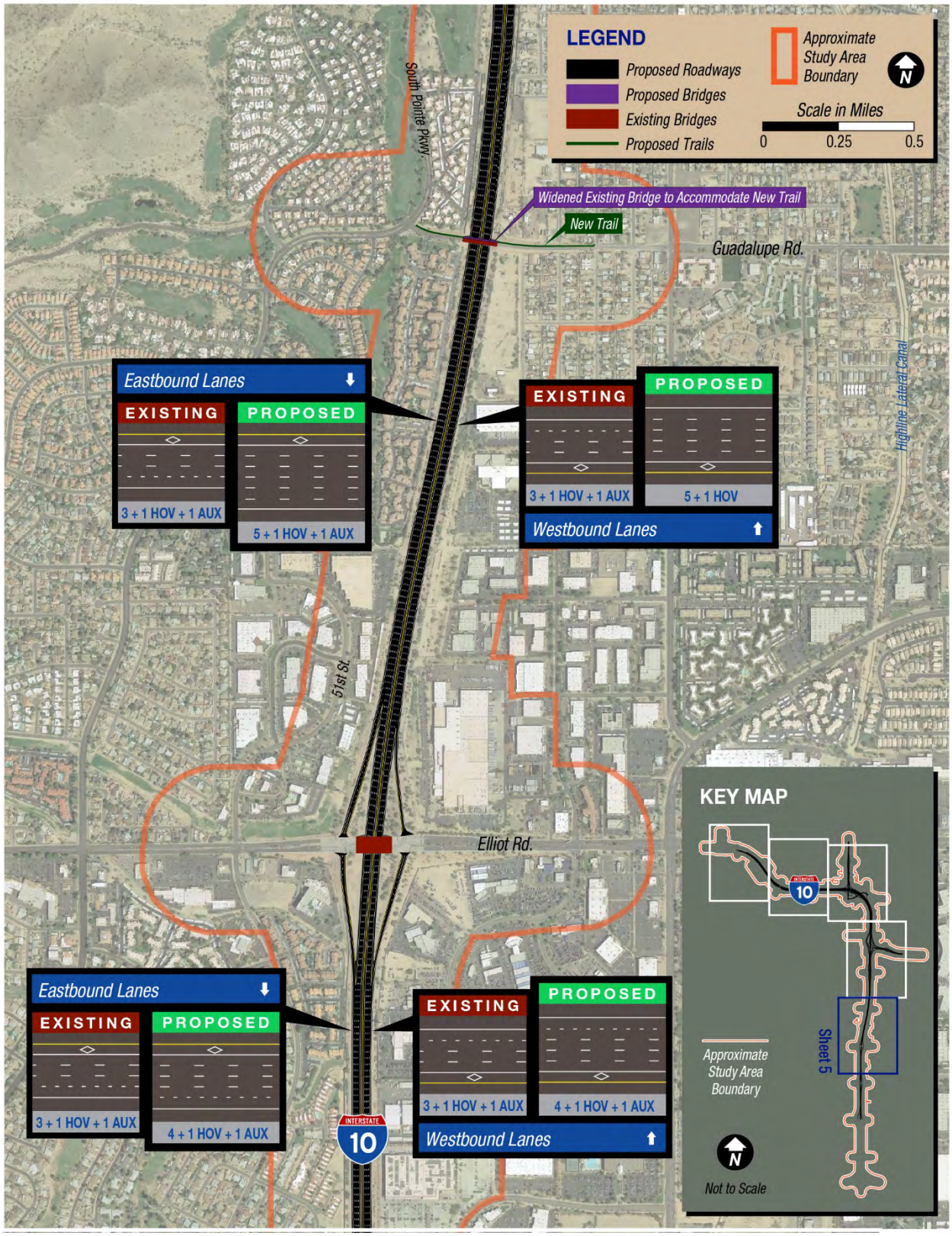
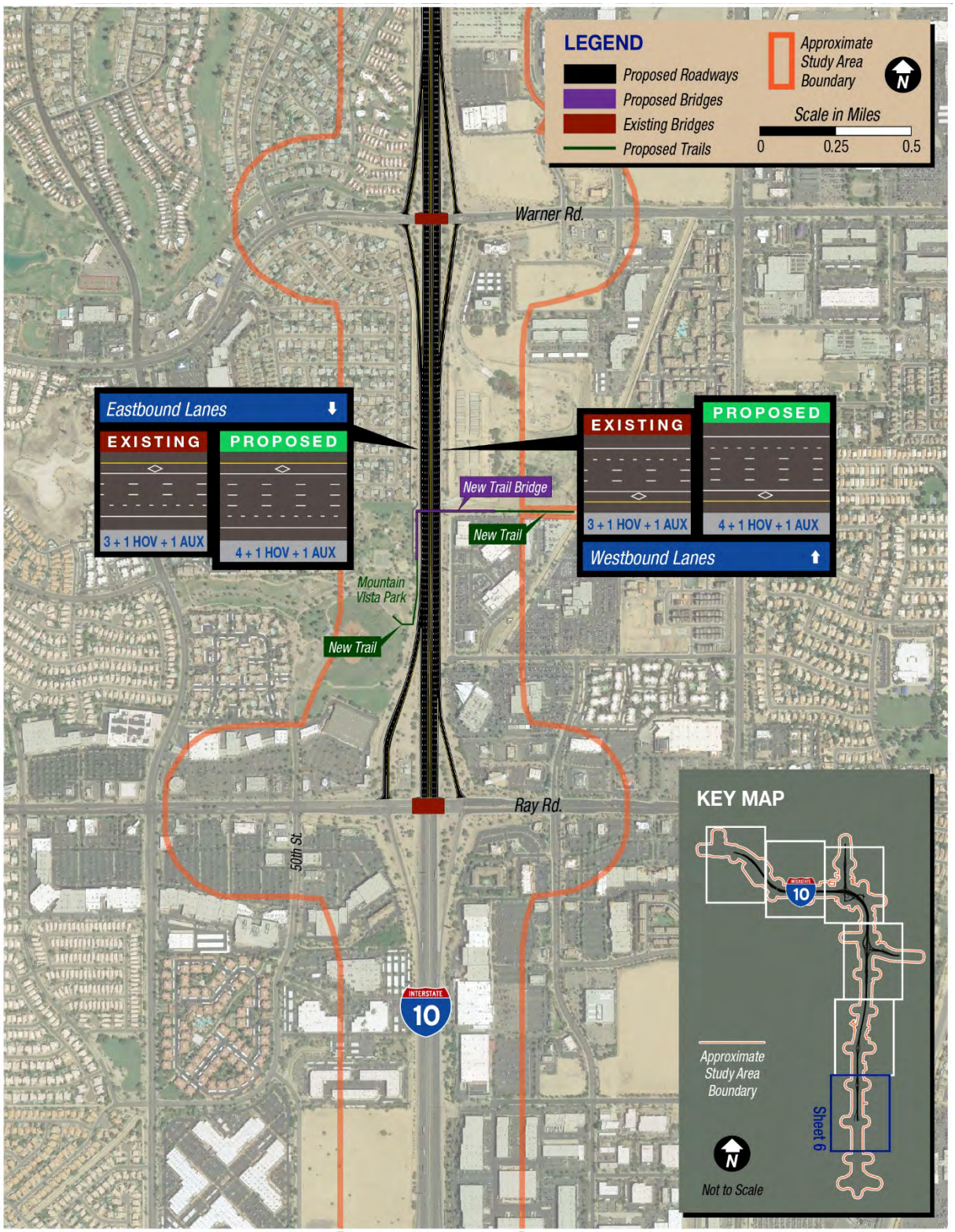


Figure III-8. Preferred Alternative Schematic: South of Elliot Road to Ray Road



Note: Although the study area extends to SR 202, the Preferred Alternative only includes capacity improvements to Ray Road based on the traffic needs.

IV. AFFECTED ENVIRONMENT

IV.A. Environmental Issues Eliminated from Detailed Study

Based on early coordination and a review of the study area, the following resources will not be evaluated in this document because they are not present in the study area and/or the Preferred Alternative does not have any impact to them:

- Section 6(f) protected recreational areas
- Prime or unique farmlands
- Sole source aquifers
- Scenic roads and parkways
- Wild and scenic rivers
- Wilderness areas
- National natural landmarks
- Coastal zones or barriers
- Outstanding waters
- National Landmark

IV.B. Land Ownership, Jurisdiction, and Land Use

Land use policies influence the location, rate, and form of economic development, which results in decisions for transportation and infrastructure improvements. Understanding the designated land use types is important in order to consider the compatibility of the project with existing and future land uses and to calculate the conversion of various land uses to transportation use. Jurisdiction is the entity that mandates the zoning and future land use of the area and since this project extends through multiple jurisdictions, future land use for these jurisdictions was studied to assure the project is not conflicting with their plans. The Land ownership is also discussed in this section to demonstrate the owner of the parcels that would be partially or fully acquired to accommodate the construction of the project.

IV.B.1. Existing Conditions

This project is located within an urban area of the MAG metropolitan region, along portions of the City of Phoenix, City of Tempe, City of Chandler, and the Town of Guadalupe (see **Figure I-2**). Most land abutting the I-10 freeway mainline and the associated interchanges within the study area is owned by ADOT. Existing (2017) and future General Plan buildout scenario land use designations (zoning designations) were analyzed using land use data from MAG (**Figure IV-1**). The existing land use dataset combines data from the Maricopa County Assessor's Office, Arizona State Trust and federal ownership. The future General Plan buildout data overrides the "areas with developable land uses (e.g., vacant, agriculture) with anticipated land uses prescribed within municipal developments and general plans." Which also accounts for the various jurisdictions within the MAG region (MAG Land Use Explorer). Out of the 11 land use types that MAG designates, 10 designations exist in the study area and they are described in **Table IV-1**.

Figure IV-1 indicates that aside from ADOT's ROW, most of the study area's existing land use is comprised of industrial uses, followed by commercial, office, and residential land uses. The industrial land uses are spread throughout the corridor and have a higher concentration between the I-17 split and the beginning of the US 60 off ramp. The commercial land uses also occur throughout the corridor, and the residential land uses are mostly in pockets such as the I-10/US 60 interchange, between Baseline Road and Guadalupe Road, and along the west side of I-10 to the SR 202L interchange.

Since the study area is mostly built out, land use projections estimate mostly minor changes to the few parcels of vacant land for future land use. Land currently designated as vacant makes up 4 percent of the study area and those parcels are projected to be developed (**Figure IV-1**). Overall, the future projections include slight increases in development for all land uses, including new residential units between Baseline Road and Guadalupe Road east of I-10, business park and mixed-use developments around the SR 202L interchange, and an expansion for the Arizona Grand Exhibit Hall.

Figure IV-1. Existing and Future Land Uses within the Study Area

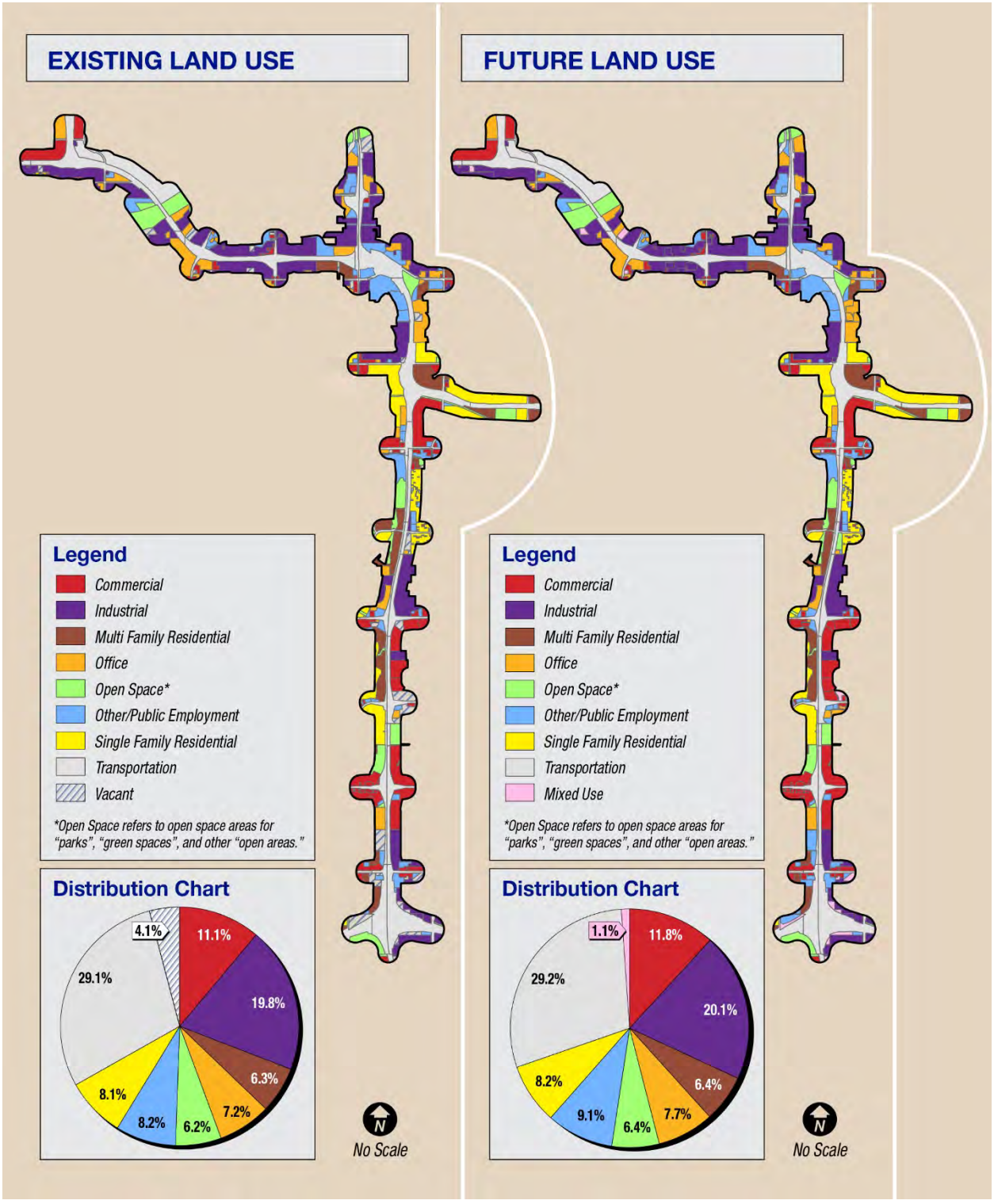


Table IV-1. Land Use Descriptions

Designation	Description
Commercial	Areas developed for commercial business operations
Industrial	Areas developed for storage, warehouse, laboratory, or manufacturing land uses
Mixed use	Areas for mix of commercial business operations and residential dwelling units
Multi-family residential	Medium (5-10 dwelling units per acre (du/ac)) to high rise residential (> 50 du/ac)
Office	Office spaces with height ranges from low rise (1-4 stories), mid-rise (5-12 stories), and high rise (13 stories or more)
Open space	Areas open to the public for recreational or conservation purposes, including parks, golf courses, preserves, ranges, restricted parcels, and water bodies
Other employment	Areas that may include low-density retail such as Amusement, Movie Theater, Specialty Retail, to high-density retails such as Community or Regional Retail
Single-family residential	Low Density – Less than 1 du/ac; Medium Density – 1 to 4 du/ac; High Density – More than 4 du/ac – Includes Mobile Homes
Transportation	Includes transportation infrastructure such as freeways, arterials, ROWs, parking lots and structures, park-and-ride lots, transit centers, public roadways, and public use airports
Vacant	Includes Vacant and Under Construction land uses

IV.B.2. Environmental Consequences

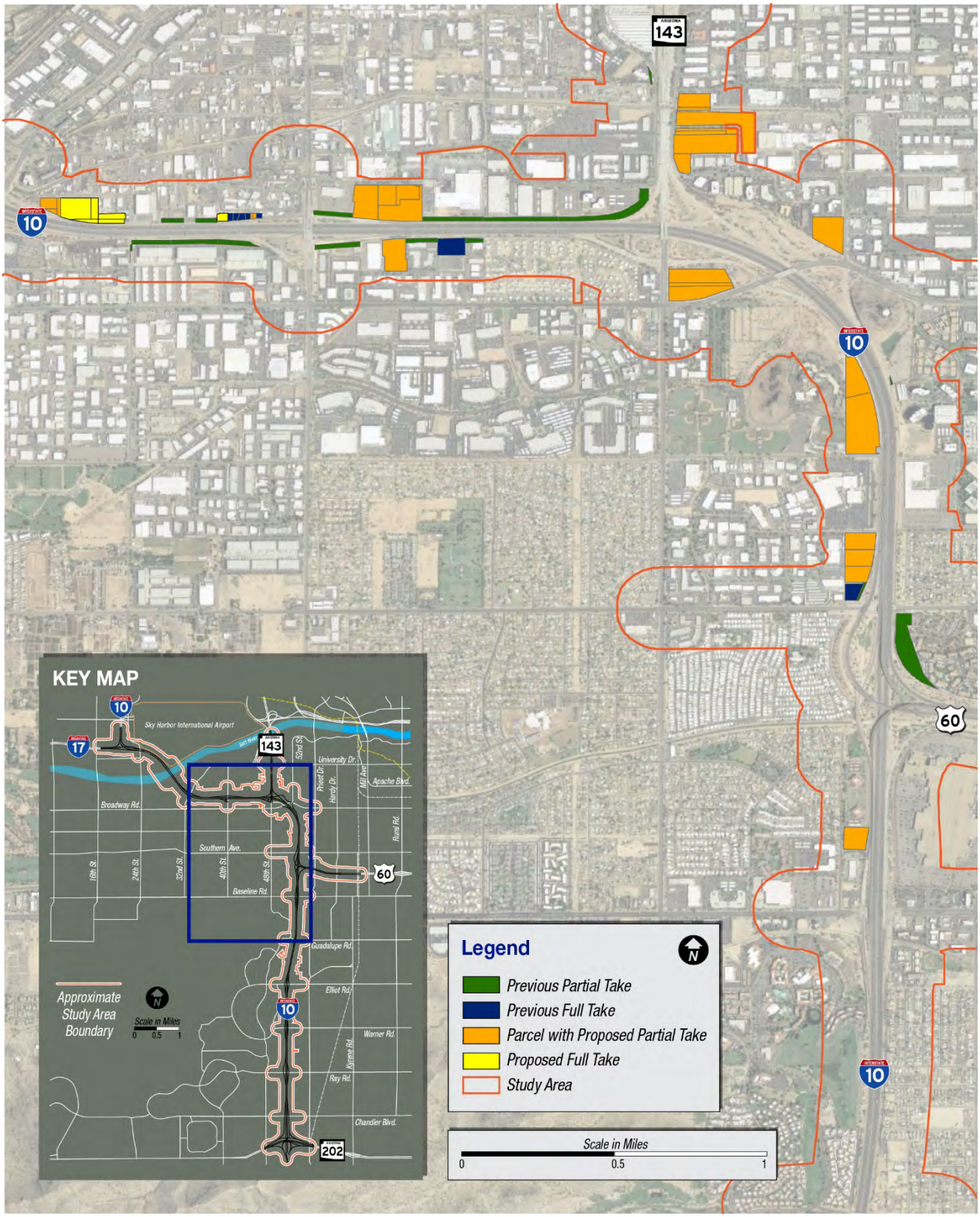
Preferred Alternative

The land use impacts analysis evaluates the conversion of current land uses to transportation ROW within the study area. Because ADOT owns most of the abutting the I-10 freeway mainline and interchanges, most of the improvements associated with the Preferred Alternative are within ADOT's existing ROW, and therefore only a negligible amount of land (less than one percent of the total study area) would be converted to a transportation use.

In anticipation of the need to improve the capacity on I-10, as part of the previous studies discussed in Chapter III, Alternatives Analysis, ADOT acquired land from 24 parcels abutting the highway between 2008 and 2014, as shown in **Figure IV-2**. These parcels are concentrated between the SR 143 interchange and the southern edge of the Broadway Curve. Seven parcels were full takes and the remaining 17 parcels were partial takes.

At this schematic level of design, there are 26 partial takes and 6 full acquisitions anticipated with construction of the Preferred Alternative (**Figure IV-2**). The anticipated partial takes are in various places along both sides of I-10 between 32nd Street and Guadalupe Road and include parking lots, billboard sites, storage unit, and other commercial and industrial land use. The anticipated full takes are concentrated on the north side of I-10 between 32nd Street and 40th Street. These takes are mostly commercial or industrial facilities and do not include residential properties.

Figure IV-2. Previous and Potential Right-of-Way Acquisitions in the Study Area



Note: The ROW acquisition may change based on the final design.

The land use changes associated with the Preferred Alternative would not adversely impact the planned land uses because most of the proposed improvements happen within ADOT's existing ROW with minimal ROW acquisition. The changes are compatible with existing and future land use plans and support the goals and objectives of adopted local jurisdictions' (Tempe, Phoenix, Chandler, and Town of Guadalupe) land use plans.

No-Build Alternative

The No-Build Alternative has no impacts on land ownership, jurisdiction, or land use. An initial review suggests that there is no development planned within the study area that would impact land ownership, jurisdiction, or land use.

IV.B.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Uniform Relocation Act Amendments of 1987, ADOT's Right of Way Procedures Manual, Title VI of the Civil Rights Act of 1964, and ADOT's Public Involvement Plan.

IV.B.4. Conclusion

The I-10 Expansion project has been planned by MAG, the county, and the surrounding cities and towns since the early 2000s, per studies such as the *I-10 Corridor Improvement Study* (ADOT 2017), and the *Spine Corridor Master Plan* (MAG 2017).

Multiple years of outreach to affected property owners has mitigated the impacts and no residential relocations are anticipated with construction of this project. This project is also consistent with City and County land use plans; therefore, there would be no significant impacts to future land use.

IV.C. Socioeconomic Considerations

This section discusses socioeconomic aspects of the study area. Social resources define the neighborhood characteristics and contribute to the quality of life in the area. The social resources within the project's study area are analyzed to identify any impacts that the proposed project may have to these resources that could alter the character of the area, along with community continuity and cohesion and livability of the area. Elements that contribute to social resources include schools, churches, parks, shopping, and emergency services.

Also, discussed in this section are resources that contribute to the economic vitality of the area such as population, housing, and employment characteristics of the study area and potential economic impacts of the Preferred Alternative on these features.

IV.C.1. Existing Conditions

Figure IV-3 shows the location of public services and facilities, community organizations, and privately operated recreational facilities in the vicinity of the study area.

Recreation

A variety of recreational resources are located within the study area, including parks, golf courses, stadium, and trails. Parks and recreation areas including trails that are protected under Section 4(f) is discussed in Section IV.F., Section 4(f) Resources. **Figure IV-3** shows the location of the recreational areas within the study area that are privately owned or operated.

Public Services and Facilities and Community Organizations

For the purpose of this document, public services and facilities include law enforcement, fire protection, educational institutes and schools, health care facilities, libraries, and post offices. Community organizations include cemeteries, churches, and places of worship.

One U.S. Post Office is located within the study area at 11010 S. 51st Street in Phoenix (number 16 on the map). Two cemeteries are located within the study area: Double Butte Cemetery (number 5 on the map) and Twin Buttes Cemetery (number 6 on the map). Community organizations and public service facilities within the study area are shown in **Figure IV-3**.

Neighborhood Continuity

The study area comprises four municipalities: City of Phoenix, City of Tempe, City of Chandler, and the Town of Guadalupe.

The City of Phoenix is divided into 15 urban villages. The western portion of the study area is located within the city limits of Phoenix and stretches through villages of Central City, South Mountain, and Ahwatukee Foothills. The interstate is the eastern boundary of these villages. Most of the City of Tempe is located on the east side of the interstate, along with the Town of Guadalupe. Only a small portion of the study area on the south end lies within the City of Chandler.

Figure IV-3. Community Facilities in the Study Area

Source: Google Earth, MAG Neighborhood Explorer, Field Review

Land uses along the corridor vary from multifamily and single-family residential to industrial, commercial, and recreational. The surface street network and bridges across the freeways provide continuity between various land uses and neighborhoods. Pedestrian crossings and bike lanes within the study area provide multimodal connections and contribute to the livability of the study area neighborhoods. Additionally, Phoenix Sky Harbor International Airport, Tempe Diablo Stadium, Arizona Mills shopping mall, Sea Life Aquarium, South Mountain Resort, and the historic district of Guadalupe all contribute to the unique and diverse character of the study area.

Population and Housing Conditions

The population and housing within the study area are projected to grow at a rate much slower than the rest of Maricopa County through 2040, primarily because most of the project study area is either within ADOT's ROW or is zoned for industrial uses, and minimal vacant land is available within the study area for residential development. **Table IV-2** shows projected population growth within the study area compared to that of Maricopa County for the same period.

Table IV-2. Population Growth, 2018-2040 (Study Area and Maricopy County)

Year	Study Area		Maricopa County	
	Total Population	Percentage Growth	Total Population	Percentage Growth
2018	80,000	-	4,276,000	-
2020	82,000	2.50%	4,418,000	3.32%
2030	84,000	5.00%	5,082,000	18.85%
2040	85,000	6.25%	5,682,000	32.88%

Source: 2019 MAG Socioeconomic Projections

The number of housing units within the study area also reflects a slower future growth rate as compared to Maricopa County as a whole, as shown in **Table IV-3**. This rate is expected to decline over time due to the area approaching full buildout.

Table IV-3. Housing Growth, 2018-2040 (Study Area and Maricopa County)

Year	Study Area		Maricopa County	
	Total Units	Percentage Growth	Total Units	Percentage Growth
2018	80,000	-	4,276,000	-
2020	82,000	2.50%	4,418,000	3.32%
2030	84,000	2.44%	5,082,000	15.03%
2040	85,000	1.19%	5,682,000	11.81%

Source: 2019 MAG Socioeconomic Projections

Business Type and Tax Base

About 40 percent of the study area is comprised of land uses that provide tax revenue and employment for the residents of the county and MAG region.

The study area includes part of Phoenix Sky Harbor International Airport. It is also home to a variety of businesses that cater to airport activity. These are predominantly hotels; other businesses include airport parking and car rental offices.

The Arizona Grand Resort and Spa and the Phoenix Marriott Resort Tempe at The Buttes are both within the study area and adjacent to I-10 with many other hotels in close proximity of the study area.

Many auto dealerships are located within the study area along I-10, including those in the Tempe Autoplex along the east side of I-10 south of Elliot Road in Tempe.

Arizona Mills, a large shopping mall with a movie theater, is located southeast of the junction of I-10 and US 60. Strip malls and standalone large-scale retail stores are also located within the study area.

Office parks and industrial parks are common in and around the study area, especially in the northern portion near Phoenix Sky Harbor International Airport.

Tempe Diablo Stadium is the home field for night games of the Arizona League Tempe Angels baseball team, and hosts spring training for the Los Angeles Angels. The stadium facility can host approximately 9,500 spectators and abuts I-10 on the west side of the study area north of Alameda Drive. **Figure IV-4** depicts the major business, retail, and entertainment facilities within or close to the study area.

IV.C.2. Environmental Consequences

Preferred Alternative

Recreation

Refer to the Section 4(f) discussion in Section IV.F. regarding impacts to publicly owned and operated recreational facilities within the study area. The Preferred Alternative would require a partial acquisition of the parking lot of the Tempe Diablo Stadium; however, this acquisition would not impact the recreational value of the parcel, nor would it interfere with the activities in the stadium.

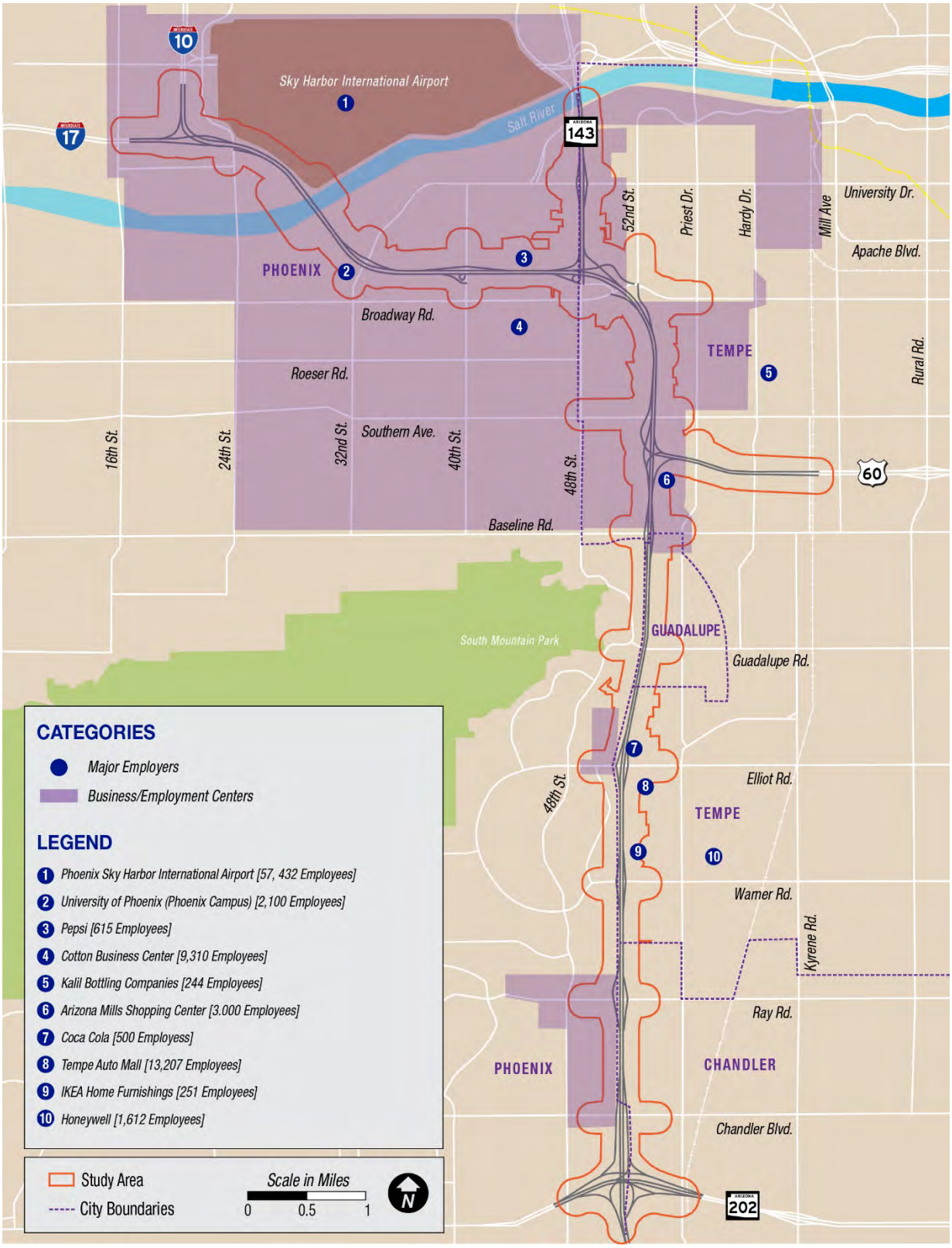
Schools

The project would not directly impact any schools within the study area. Additionally, access to schools within the study area would not be altered as a result of this project. Potential enhancement to sidewalks and intersections within the study area may improve pedestrian access to schools in the study area. During construction, temporary changes to vehicular and pedestrian routes may be required within the project vicinity.

Public Services and Facilities and Community Organizations

The project would not impact any community organizations or public facilities within or adjacent to the study area. Emergency services would not be directly impacted by the Preferred Alternative. During construction, temporary changes to emergency response routes may be required within the project vicinity.

Figure IV-4. Employment Centers and Major Employers Within or Close to the Study Area



Source: Google Earth, MAG Neighborhood Explorer, Field Review

Neighborhood Continuity

The project would not affect neighborhood continuity within or around the study area. Most improvements would be within the existing ADOT ROW, with ROW acquisition limited to industrial facilities and parking, causing no change or disruption to the character of neighborhoods in the study area. There would be no full residential acquisitions, and the few businesses planned to be relocated do not contribute to neighborhood cohesion. See Section IV.D. Title VI and Environmental Justice for more information about the adjacent communities' demographics.

Construction of this project would not introduce any new barriers in the urban fabric of the area. Access to facilities located on one side of the freeway corridor by residents who live on the opposite side would remain at their existing locations across I-10 and US 60. Two pedestrian bridges and the addition of a multi-use path to an existing bridge are planned as part of this project (see **Figure IV-10** through **Figure IV-12**)to improve multimodal connectivity within the area, as discussed in Section IV.F. The bridge locations are as follows:

- Alameda Drive: To provide pedestrian access to Tempe Diablo Stadium from the east side of I-10
- Western Canal Trail: To connect trailhead north of Arizona Mills mall across I-10 to approximately W. Riviera Circle south of the canal
- Sun Circle Trail: Widening the existing W. Guadalupe Road/Calle Guadalupe bridge over I-10 to accommodate the Sun Circle Trail multi-use path

Construction activities associated with the Preferred Alternative could have a short-term impact on residents in the study area. Local residents would temporarily experience increased noise, vibration, dust, and traffic restrictions during construction. During construction, temporary changes to vehicular and pedestrian routes may be required within the project vicinity. The Preferred Alternative would provide long-term benefits for residents, businesses, and visitors in the study area, including maintaining transportation mobility. Implementation of the Preferred Alternative would further benefit the local community by accommodating future travel demand.

Economic Conditions

The Preferred Alternative would not directly impact the economic conditions within the study area. however, it will result in minor temporary impacts to the businesses. Implementation of the Preferred Alternative would benefit area businesses by improving access and accommodating future travel demand, along with providing improved exposure of local retailers to the traveling public. During construction of the Preferred Alternative, access to retail and commercial businesses would be maintained, but some temporary restrictions and detours may be in place during construction.

No-Build Alternative

Recreational resources, schools, and neighborhood continuity would not be impacted by the No-Build Alternative. However, there would be indirect impacts to public services and economic conditions of the area with the No-Build Alternative. The response times for emergency responders such as police, fire, and ambulance services could be adversely affected by increased congestion under the No-Build Alternative.

The No-Build Alternative would result in increased traffic congestion in the area as growth and development continue. This could impede travel to and from destinations and make it difficult to attract or retain businesses in and around the study area.

IV.C.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Uniform Relocation Act Amendments of 1987, ADOT's Right of Way Procedures Manual, Title VI of the Civil Rights Act of 1964, and ADOT's Public Involvement Plan.

IV.C.4. Conclusion

Services, residential, and commercial development would not be impacted adversely by construction of this project, since most of the improvements would take place within the existing ADOT ROW. There would be no additional residential relocations, and only a few business relocations with this project, which would not impact the social or economic conditions of the study area. Since the project only widens an existing highway, no new barriers would be introduced to the study area that would affect community cohesion. Instead, project elements include the addition of pedestrian crossings across the highway that would improve connectivity for trails and between neighborhoods. If the Preferred Alternative is selected, access to businesses and residences would be maintained but could be temporarily impacted during construction.

The implementation of the Preferred Alternative would benefit the social and economic welfare of the area by reducing congestion and improving mobility.

IV.D. Title VI and Environmental Justice

Title VI of the Civil Rights Act of 1964 (Title VI) is a federal law that protects individuals and groups from discrimination on the basis of their race, color, and national origin in programs and activities that receive federal financial assistance. Executive Order 12898, Federal Actions to Address Environmental Justice (EJ) in Minority Populations and Low-Income Populations, directs that federal programs, policies, and activities not have disproportionately high and adverse human health and environmental effects on minority and low-income populations.

The Executive Order 13166 requires Federal agencies to identify any need for services to those with limited English proficiency (LEP) and develop and implement a system to provide those services so LEP persons can have meaningful access to them.

The rights of women, the elderly, and the disabled are protected under related statutes. These statutes include the following: Section 162 (a) of the Federal-Aid Highway Act of 1973 (23 USC 324) (sex), Age Discrimination Act of 1975 (age), and Section 504 of the Rehabilitation Act of 1973/Americans With Disabilities Act of 1990 (disability).

IV.D.1. Existing Conditions

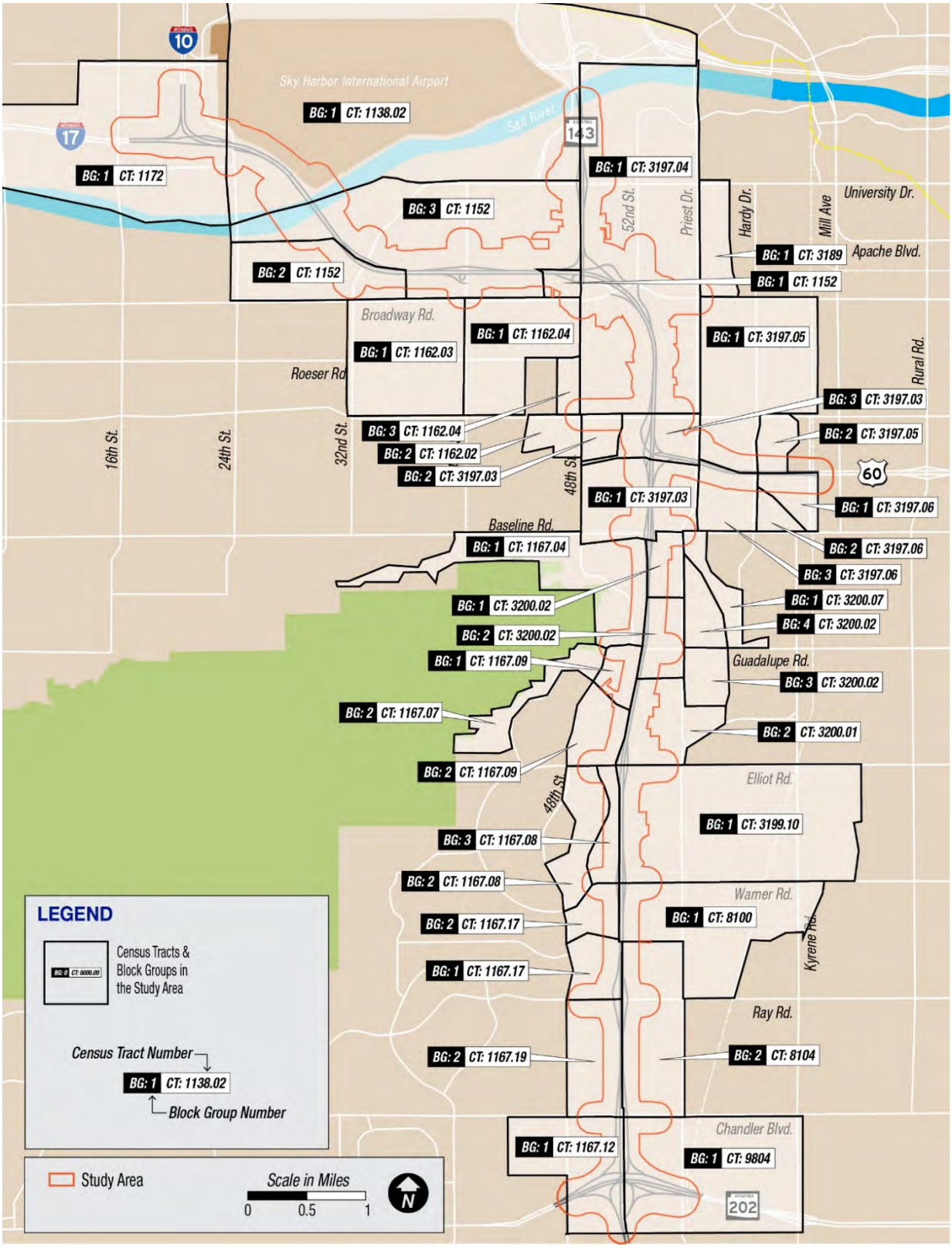
To complete a Title VI/EJ evaluation, the study area populations were compared against the state of Arizona and Maricopa County. To identify the study area population, the results for all CTs and BGs that intersect the study area were aggregated. Based on the latest available data for CTs and BGs, the U.S. Census 2010 and the American Community Survey (ACS) 5-year estimate were used to conduct the analysis. **Table IV-4** shows the sources for the data presented in the following subsections.

Table IV-4. Census Data Sources

Data	Source
Disabled Population	2011-2015 ACS 5-Year Estimates: Table S1810 Disability Characteristics
Low-Income Population	2011-2015 AVS 5-Year Estimates: Table B17021 Poverty Status of Individuals in the Past 12 Months by Living Arrangement
Elderly and Minority Populations	2010 U.S. Census: Summary File 1: Tables P1 Total Population; P12 Sex by Age; P3 Race; and P4 Hispanic or Latino Origin
Female Head of Household Population	2010 U.S. Census: Table P19 Household Size by Household Type by Presence of Own Children

The study area encompasses parts of 39 census tract (CT) block groups (BG), as shown on **Figure IV-5**. BGs allow for a more accurate view of the demographics; however, not all the population characteristics are available at the BG level.

Figure IV-5. 2010 Census BGs Intersecting the Study Area



Source: US Census Bureau

Low-Income

Low-income populations are defined as any readily identifiable group of low-income persons (household income is at or below the Department of Health and Human Services poverty guidelines) who live in geographic proximity per Executive Order 12898. In 2010, the poverty guideline was $23,050 for a family of four.

Table IV-5 shows the percentage of low-income population living within the study area BGs compared to the county and state.

Minorities

Table IV-6 summarizes data gathered from the 2010 Census on minority populations. Minorities include:

- Black (a person having origins in any of the black racial groups of Africa)
- Hispanic or Latino (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)
- American Indian and Alaskan Native (a person having origins in any of the original people of North America, South America, including Central America, and who maintains cultural identification through tribal affiliation or community recognition)
- Native Hawaiian or Other Pacific Islander (people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands)

Hispanic is classified as an ethnicity rather than a race in the US Census to avoid double counting, because a person who self-identifies as Hispanic may be of any race. Therefore, for purposes of Environmental Justice analysis, the total population within the geographic area being analyzed minus the total White, non-Hispanic/Latino population would generate the total minority population.

Low Income and Minority Populations within Study Area

The low-income and minority demographics in the vicinity of the project, are shown in **Table IV-5** and **Table IV-6** and illustrated in **Figure IV-6**.

As shown in the tables, many of the study area BGs have a considerably higher percentage of low-income population and minority than the county and state, and the study area as whole has a higher percentage of low-income and minority population. Therefore, an Environmental Justice analysis is required for the low-income and minority population in accordance to Executive Order 12898 to identify if the project results in disproportionately high and adverse impacts to these populations.

Table IV-5. Low-Income Population

Geography	Total Population	Below poverty level	% low-income
Arizona	6,488,917	1,180,690	18%
Maricopa County	3,965,553	673,527	17%
Study Area	52,428	10,698	20%
BG 1, CT 1138.02*	0	0	—
BG 1, CT 1152	920	429	47%
BG 2, CT 1152	928	431	46%
BG 3, CT 1152	793	210	26%
BG 2, CT 1162.02	2,111	830	39%
BG 1, CT 1162.03	1,204	668	55%
BG 1, CT 1162.04	1,496	157	10%
BG 3, CT 1162.04	574	113	20%
BG 1, CT 1167.04	1,760	126	7%
BG 2, CT 1167.07	985	32	3%
BG 2, CT 1167.08	1,182	67	6%
BG 3, CT 1167.08	1,215	156	13%
BG 1, CT 1167.09	1,133	77	7%
BG 2, CT 1167.09	675	53	8%
BG 1, CT 1167.12	1,935	306	16%
BG 1, CT 1167.17	2,327	240	10%
BG 2, CT 1167.17	1,808	78	4%
BG 2, CT 1167.19	1,397	159	11%
BG 1, CT 1172	357	194	54%
BG 1, CT 3189	2,428	886	36%
BG 1, CT 3197.03	1,550	221	14%
BG 2, CT 3197.03	612	42	7%
BG 3, CT 3197.03	1,920	498	26%
BG 1, CT 3197.04	1,563	327	21%
BG 1, CT 3197.05	1,586	508	32%
BG 2, CT 3197.05	850	121	14%
BG 1, CT 3197.06	1,483	717	48%
BG 2, CT 3197.06	1,004	84	8%
BG 3, CT 3197.06	3,048	660	22%
BG 1, CT 3199.10	2,628	249	9%
BG 2, CT 3200.01	1,450	289	20%

Table IV-5. Low-Income Population (continued)

Geography	Total Population	Below poverty level	% low-income
BG 1, CT 3200.02	1,092	211	19%
BG 2, CT 3200.02	1,812	405	22%
BG 3, CT 3200.02	1,365	356	26%
BG 4, CT 3200.02	1,703	510	30%
BG 1, CT 3200.07	1,311	134	10%
BG 1, CT 8100	1,844	91	5%
BG 2, CT 8104	369	53	14%
BG 1, CT 9804	10	10	100%

Source: 2011-2015 ACS 5-Year Estimates: Table B17021 Poverty Status of Individuals in the Past 12 Months by Living Arrangement
** This BG only includes the Phoenix Sky Harbor International Airport parcel therefore the population for this BG is recorded as 0.*
Notes:
Income in the past 12 months below poverty level

Table IV-6. Minority Populations

Geography	Total Population	Racial Minority	Racial Minority %	Black	Black %	Asian	Asian %	Native American	Native American %	Pacific Islander or Native Hawaiian	Pacific Islander or Native Hawaiian %	Other	Other %	Hispanic or Latino	Hispanic or Latino %
Arizona	6,392,017	1,724,896	27%	259,008	4%	176,695	3%	296,529	5%	12,648	0.2%	980,016	15%	1,895,149	30%
Maricopa County	3,817,117	1,030,336	27%	190,519	5%	132,225	3%	78,329	2%	7,790	0.2%	621,473	16%	1,128,741	30%
Study Area	50,820	21,444	42%	4566	9%	2,302	5%	4,679	9%	250	0.5%	9,647	19%	17,288	34%
BG 1, CT 1138.02	17	13	76%	8	47%	0	0%	1	6%	0	0%	4	24%	7	41%
BG 1, CT 1152	879	619	70%	203	23%	8	1%	70	8%	20	2%	318	36%	453	52%
BG 2, CT 1152	932	697	75%	255	27%	0	0%	38	4%	0	0%	404	43%	621	67%
BG 3, CT 1152	812	591	73%	256	32%	2	0%	54	7%	42	5%	237	29%	370	46%
BG 2, CT 1162.02	1,537	787	51%	146	9%	17	1%	48	3%	4	0%	572	37%	1085	71%
BG 1, CT 1162.03	906	662	73%	282	31%	15	2%	28	3%	1	0%	336	37%	447	49%
BG 1, CT 1162.04	1,612	859	53%	215	13%	49	3%	68	4%	29	2%	498	31%	893	55%
BG 3, CT 1162.04	936	528	56%	67	7%	5	1%	32	3%	1	0%	423	45%	700	75%
BG 1, CT 1167.04	1,574	409	26%	149	9%	52	3%	55	3%	8	1%	145	9%	267	17%
BG 2, CT 1167.07	1,405	149	11%	38	3%	41	3%	4	0%	1	0%	65	5%	143	10%
BG 2, CT 1167.08	1,048	99	9%	20	2%	24	2%	16	2%	0	0%	39	4%	91	9%
BG 3, CT 1167.08	1,174	259	22%	96	8%	38	3%	44	4%	5	0%	76	6%	175	15%

Table IV-6. Minority Populations (continued)

Geography	Total Population	Racial Minority	Racial Minority %	Black	Black %	Asian	Asian %	Native American	Native American %	Pacific Islander or Native Hawaiian	Pacific Islander or Native Hawaiian %	Other	Other %	Hispanic or Latino	Hispanic or Latino %
BG 1, CT 1167.09	957	292	31%	97	10%	56	6%	37	4%	0	0%	102	11%	154	16%
BG 2, CT 1167.09	832	163	20%	46	6%	29	3%	11	1%	2	0%	75	9%	148	18%
BG 1, CT 1167.12	2,246	677	30%	184	8%	165	7%	84	4%	9	0%	235	10%	417	19%
BG 1, CT 1167.17	2,087	945	45%	390	19%	135	6%	142	7%	5	0%	273	13%	478	23%
BG 2, CT 1167.17	1,934	699	36%	219	11%	101	5%	116	6%	1	0%	262	14%	407	21%
BG 2, CT 1167.19	1,344	539	40%	155	12%	159	12%	66	5%	5	0%	154	11%	249	19%
BG 1, CT 1172	521	249	48%	13	2%	0	0%	14	3%	0	0%	222	43%	456	88%
BG 1, CT 3189	2,133	765	36%	167	8%	54	3%	144	7%	23	1%	377	18%	620	29%
BG 1, CT 3197.03	1,916	673	35%	170	9%	42	2%	63	3%	15	1%	383	20%	714	37%
BG 2, CT 3197.03	649	28	4%	10	2%	4	1%	1	0%	0	0%	13	2%	33	5%
BG 3, CT 3197.03	1,783	594	33%	172	10%	130	7%	90	5%	12	1%	190	11%	336	19%
BG 1, CT 3197.04	1,483	453	31%	102	7%	55	4%	45	3%	9	1%	242	16%	417	28%
BG 1, CT 3197.05	1,708	685	40%	195	11%	43	3%	130	8%	1	0%	316	19%	575	34%
BG 2, CT 3197.05	983	229	23%	69	7%	34	3%	27	3%	3	0%	96	10%	210	21%

Table IV-6. Minority Populations (continued)

Geography	Total Population	Racial Minority	Racial Minority %	Black	Black %	Asian	Asian %	Native American	Native American %	Pacific Islander or Native Hawaiian	Pacific Islander or Native Hawaiian %	Other	Other %	Hispanic or Latino	Hispanic or Latino %
BG 1, CT 3197.06	1,522	759	50%	58	4%	30	2%	49	3%	2	0%	620	41%	1084	71%
BG 2, CT 3197.06	908	356	39%	67	7%	143	16%	21	2%	1	0%	124	14%	169	19%
BG 3, CT 3197.06	2,516	1,088	43%	216	9%	101	4%	118	5%	20	1%	633	25%	968	38%
BG 1, CT 3199.10	2,285	488	21%	59	3%	285	12%	27	1%	5	0%	112	5%	255	11%
BG 2, CT 3200.01	1,380	740	54%	191	14%	195	14%	134	10%	11	1%	209	15%	292	21%
BG 1, CT 3200.02	1,320	1,030	78%	16	1%	0	0%	584	44%	0	0%	430	33%	909	69%
BG 2, CT 3200.02	1,588	1,203	76%	20	1%	0	0%	703	44%	3	0%	477	30%	1054	66%
BG 3, CT 3200.02	1,038	854	82%	46	4%	0	0%	531	51%	0	0%	277	27%	637	61%
BG 4, CT 3200.02	1,577	1,343	85%	2	0%	0	0%	1,003	64%	0	0%	338	21%	837	53%
BG 1, CT 3200.07	1,035	387	37%	53	5%	56	5%	65	6%	11	1%	202	20%	328	32%
BG 1, CT 8100	1,711	343	20%	44	3%	187	11%	11	1%	1	0%	100	6%	207	12%
BG 2, CT 8104	517	180	35%	70	14%	39	8%	5	1%	0	0%	66	13%	80	15%
BG 1, CT 9804	15	10	67%	0	0%	8	53%	0	0%	0	0%	2	13%	2	13%

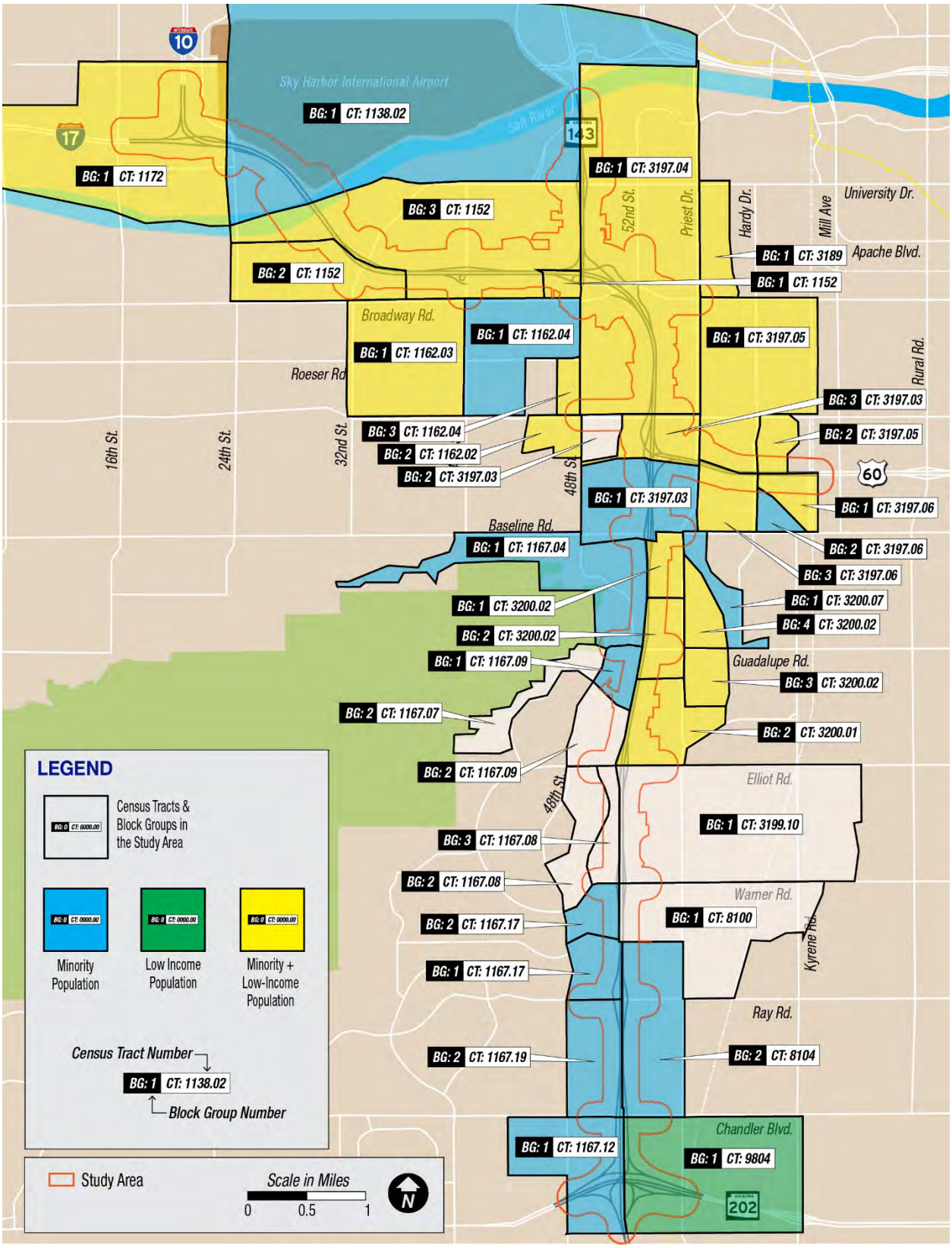
Source: 2010 U.S. Census: Summary File 1: Tables P1 Total Population; P3 Race; and P4 Hispanic or Latino Origin

Notes:

Minority: Residents who identify themselves as any race other than White: Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some other Race, and Two or More Races.

Other: Residents who identify themselves as Some Other Race, and Two or More Races

Figure IV-6. Block Groups with Minority and Low-Income Populations



Limited English Proficiency

To ensure all people who want to learn about the project and engage in the decision-making regardless of the level of their English proficiency; a four-factor analysis was performed to identify the languages that are present in the area and require translation assistance. This analysis included analyzing:

- The number and proportion of LEP persons in the cities of Phoenix, Tempe and Chandler, and the Town of Guadalupe.
- The frequency with which LEP persons are likely to interact with the project
- The importance of program services/activities to the LEP persons
- The resources available and costs of materials and services needed to provide language assistance

The analysis concluded that other than Spanish; Chinese, Korean, and Vietnamese languages are also prominent in the area and therefore, ADOT will provide translation for all four languages upon request.

Disabled

The decennial census does not include information regarding individuals with disabilities. The ACS 5-year estimate includes these data. For this analysis, disabled persons include only civilian, non-institutionalized persons with sensory, physical, mental, self-care, employment-related, and/or going-outside-of-the-home disabilities. ACS estimates disability counts from samples taken at the CT level and does not report these data at the BG level.

The estimated percentages of people with disabilities within the study area CTs vary from lower to higher than those for the county and state, as shown in **Table IV-7**; however, collectively, the proportion of disabled individuals estimated in the study area does not exceed that estimated for the county and state.

Table IV-7. Disabled Population

Geography	Total Population	Disabled Population	% Disabled
Arizona	6,533,509	800,210	12.2%
Maricopa County, Arizona	3,988,822	417,695	10.5%
Study Area	96,819	8,252	8.5%
CT 1138.02	0	0	—
CT 1152	2,670	180	6.7%
CT 1162.02	5,392	529	9.8%
CT 1162.03	4,788	303	6.3%
CT 1162.04	3,444	256	7.4%
CT 1167.07	2,622	271	10.3%
CT 1167.08	5,242	701	13.4%
CT 1167.09	1,808	99	5.5%
CT 1167.12	6,276	320	5.1%
CT 1167.17	4,136	381	9.2%
CT 1167.19	6,492	310	4.8%
CT 1172	1,080	160	14.8%
CT 3189	6,606	515	7.8%
CT 3197.03	4,351	883	20.3%
CT 3197.04	1,563	80	5.1%
CT 3197.05	3,212	285	8.9%
CT 3197.06	5,535	370	6.7%
CT 3199.10	4,558	209	4.6%
CT 3200.01	6,585	639	9.7%
CT 3200.02	6,012	763	12.7%
CT 3200.07	7,587	388	5.1%
CT 8100	1,846	143	7.7%
CT 8104	5004	467	9.3%
CT 9804	10	0	0%

Source: 2011-2015 ACS 5-year Estimates: Table S1810 Disability Characteristics

Notes:

Disabilities include: sensory (severe vision or hearing impairment); physical (limited basic physical activity); mental (difficulty learning, remembering, or concentrating); self-care (difficulty dressing, bathing, or getting around inside the home); go-outside (difficulty going outside the home alone to shop or visit a doctor's office); difficulty working at a job or business).

ACS estimates disability counts from samples taken at the CT level and does not report these data at the BG level.

Elderly

Elderly populations consist of people who are age 65 and older. While elderly residents are present in all BGs, the percentage of this population in the overall Study Area is less than the elderly populations in Maricopa County and the state (**Table IV-8**).

Table IV-8. Elderly Populations

Geography	Total Population	Elderly	Elderly %
Arizona	6,392,017	881,831	14%
Maricopa County, Arizona	3,817,117	462,641	12%
Study Area	50,820	3,791	7%
BG 1, CT 1138.02	17	2	12%
BG 1, CT 1152	879	11	1%
BG 2, CT 1152	932	37	4%
BG 3, CT 1152	812	19	2%
BG 2, CT 1162.02	1,537	70	5%
BG 1, CT 1162.03	906	32	4%
BG 1, CT 1162.04	1,612	57	4%
BG 3, CT 1162.04	936	52	6%
BG 1, CT 1167.04	1,574	166	11%
BG 2, CT 1167.07	1,405	173	12%
BG 2, CT 1167.08	1,048	475	45%
BG 3, CT 1167.08	1,174	127	11%
BG 1, CT 1167.09	957	56	6%
BG 2, CT 1167.09	832	67	8%
BG 1, CT 1167.12	2,246	98	4%
BG 1, CT 1167.17	2,087	45	2%
BG 2, CT 1167.17	1,934	75	4%
BG 2, CT 1167.19	1,344	48	4%
BG 1, CT 1172	521	31	6%
BG 1, CT 3189	2,133	132	6%
BG 1, CT 3197.03	1,916	112	6%
BG 2, CT 3197.03	649	382	59%
BG 3, CT 3197.03	1,783	237	13%
BG 1, CT 3197.04	1,483	96	6%
BG 1, CT 3197.05	1,708	112	7%
BG 2, CT 3197.05	983	77	8%
BG 1, CT 3197.06	1,522	36	2%
BG 2, CT 3197.06	908	20	2%
BG 3, CT 3197.06	2,516	105	4%
BG 1, CT 3199.10	2,285	205	9%
BG 2, CT 3200.01	1,380	18	1%

Table IV-8. Elderly Populations (continued)

Geography	Total Population	Elderly	Elderly %
BG 1, CT 3200.02	1,320	115	9%
BG 2, CT 3200.02	1,588	158	10%
BG 3, CT 3200.02	1,038	51	5%
BG 4, CT 3200.02	1,577	126	8%
BG 1, CT 3200.07	1,035	48	5%
BG 1, CT 8100	1,711	106	6%
BG 2, CT 8104	517	14	3%
BG 1, CT 9804	15	0	0%

Source: 2010 U.S. Census: Summary File 1: Tables P1 Total Population; P12 Sex by Age;
Notes:
Elderly includes all residents of age 65 and older.

Female Head of Household

Female head-of-household populations consist of households with children under 18 years of age headed by an unmarried female. Decennial data for female heads-of-household was available at the block-group level and are listed in **Table IV-9**.

The percentage of female heads-of-household within the study area BGs ranges between lower to higher than state and county percentages, with the study area's overall average slightly higher than Maricopa County and Arizona.

Table IV-9. Female Head of Household Population

Geography	Total Households	Female Head of Household	Female Head of Household %
Arizona	2,380,990	169,397	7%
Maricopa County, Arizona	1,411,583	102,915	7%
Study Area	20,476	1,787	9%
BG 1, CT 1138.02	4	0	0%
BG 1, CT 1152	245	53	22%
BG 2, CT 1152	248	46	19%
BG 3, CT 1152	234	52	22%
BG 2, CT 1162.02	389	36	9%
BG 1, CT 1162.03	318	67	21%
BG 1, CT 1162.04	540	42	8%
BG 3, CT 1162.04	237	27	11%
BG 1, CT 1167.04	873	46	5%
BG 2, CT 1167.07	608	25	4%
BG 2, CT 1167.08	669	15	2%
BG 3, CT 1167.08	646	46	7%
BG 1, CT 1167.09	519	33	6%
BG 2, CT 1167.09	348	26	7%
BG 1, CT 1167.12	1,156	107	9%
BG 1, CT 1167.17	1,000	141	14%
BG 2, CT 1167.17	918	87	9%
BG 2, CT 1167.19	736	46	6%
BG 1, CT 1172	149	22	15%
BG 1, CT 3189	860	78	9%
BG 1, CT 3197.03	626	41	7%
BG 2, CT 3197.03	429	0	0%
BG 3, CT 3197.03	968	46	5%
BG 1, CT 3197.04	635	31	5%
BG 1, CT 3197.05	608	81	13%
BG 2, CT 3197.05	429	35	8%
BG 1, CT 3197.06	457	61	13%
BG 2, CT 3197.06	415	13	3%
BG 3, CT 3197.06	1,100	95	9%
BG 1, CT 3199.10	830	38	5%
BG 2, CT 3200.01	656	58	9%
BG 1, CT 3200.02	339	63	19%
BG 2, CT 3200.02	378	37	10%

Table IV-9. Female Head of Household Population (continued)

Geography	Total Households	Female Head of Household	Female Head of Household %
BG 3, CT 3200.02	245	78	32%
BG 4, CT 3200.02	330	29	9%
BG 1, CT 3200.07	434	30	7%
BG 1, CT 8100	615	33	5%
BG 2, CT 8104	280	23	8%
BG 1, CT 9804	5	0	0%

Source: 2010 U.S. Census: Table P19 Household Size by Household Type by Presence of Own Children
Notes:
Households headed by a female with unmarried children under 18 years of age and no husband present

IV.D.2. Environmental Consequences

An adverse effect is a significant individual or cumulative human health or environmental effects (e.g. the displacement of a household structure or business as a requirement to build a project). A Disproportionately High and Adverse Effect on Minority and Low-income Populations is an adverse effect that:

- Is predominately borne by a minority population and/or a low-income population, or
- Will be suffered by the minority populations and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population.

Preferred Alternative

Depending on their proximity to the project, construction of the Preferred Alternative could temporarily adversely affect disabled, low-income, elderly, minority, and female head-of-household populations during construction. During construction, study area residents would experience temporary delays and slower speeds; however, access to businesses and neighborhoods would be maintained at all times. Traffic delays and slower speeds would be experienced equally by everyone who lives or passes through the study area; therefore, all population segments, including low-income and minority populations, would be affected to the same degree by construction of the Preferred Alternative. As such, these temporary impacts would not fall disproportionately on low-income and minority populations.

ROW acquisition associated with the Preferred Alternative would not result in displacement of any residents within the study area. There are 26 partial and 6 full acquisition of commercial properties. The businesses that would be relocated due to construction of this project do not cater specifically to the low-income and minority populations; therefore, their displacement would not disproportionally impact the noted populations.

No-Build Alternative

The No-Build Alternative would not have a disproportionately high and adverse impact on disabled, low-income, elderly, minority, or female head-of -household populations.

IV.D.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Uniform Relocation Act Amendments of 1987, ADOT's Right of Way Procedures Manual, Title VI of the Civil Rights Act of 1964, and ADOT's Public Involvement Plan.

IV.D.4. Conclusion

The BGs in the study area have a higher percentage of minority, low-income population, and female heads-of-household than the State of Arizona and Maricopa County; however, much of the Preferred Alternative's improvements are within ADOT ROW and would not require full or partial acquisition of any residential properties within the area or properties that serve low-income or minority populations. The Preferred Alternative would not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of Executive Order 12898.

IV.E. Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. 300101) and NEPA require federal agencies to consider the effects of their undertakings on historic properties and afford the State Historic Preservation Office (SHPO) and other interested parties opportunity to comment on such undertakings. To comply with these laws, cultural resources staff meeting the Secretary of the Interior's Professional Qualifications Standards completed a survey and evaluation of built historic properties for the I-10 Broadway Curve project.

Historic properties include prehistoric and historic districts, sites, buildings, structures, and objects included in, or eligible for inclusion in the National Register of Historic Places (NRHP). Historic properties may be eligible for inclusion in the NRHP if they possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of the following 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 that represents the work of a master, or that possesses high artistic values, or that represents a significant distinguishable entity whose components may lack individual distinction.
- Criterion D: Have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

Section 106's implementing regulations at 36 CFR 800 provide a process for federal agencies to assess the effects that an undertaking may have on historic properties located within an undertaking's Area of Potential Effects (APE) and to consult with the SHPO and other parties regarding those findings. Effects include physical disturbance to, or destruction of, the characteristics that qualify a historic property for NRHP listing and impacts to a historic property as the result of visual, auditory, or atmospheric intrusions.

There are three possible effect determinations:

- "No historic properties affected," which applies in cases where either there are no historic properties within the APE, or if historic properties are present, the undertaking would have no effect on them; that is, none of the characteristics that qualify the property for inclusion in the NRHP would be altered (36 CFR 800.4(d)(1)).
- "No adverse effect," which applies when an undertaking would alter, either directly or indirectly, the characteristics that qualify the property for NRHP listing, but only to a minor degree, or in a manner that is consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines. This effect determination is made most commonly when historic properties, such as buildings and structures, are being subject to restoration, rehabilitation, stabilization,

hazardous materials remediation, and provision of access for individuals with disabilities (36 CFR 800.5(b)).

- "Adverse effect," which applies when an undertaking would alter, either directly or indirectly, the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the property's integrity of location, design, setting, materials, workmanship, feeling, or association, and is not consistent with the Secretary of the Interior's Standards for Treatment of Historic Properties (36 CFR 800.5(a)(1)).

IV.E.1. Existing Conditions

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. 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 this project, the APE extends along I-10 between its interchange with I-17 and the SR 202L/Santan Freeway. I-10 is a highly visible, elevated freeway located in a relatively flat area within the Salt River Valley. The existing freeway includes light poles, wayfinding signage, and large billboards along much of its length in addition to numerous overpasses, ramps, and interchanges.

The majority of the proposed project occurs within existing ADOT ROW, and much of the APE is concurrent with that ROW when activities are confined to it with no potential for visual effects. Where the Preferred Alternative requires additional ROW or where utilities would be moved, the entire parcel where the activity occurs was included within the APE. At this schematic level of design, ADOT anticipates that the Preferred Alternative would require Temporary construction easements (TCEs) from adjacent, private landowners including 19 TCEs along either side of I-10 between 40th Street and Ray Road, 1 TCE along 48th Street, 1 TCE along SR143, 2 TCEs along US 60. Additionally, areas of new ROW would include 18 parcels along I-10 between University Drive and Guadalupe Road, 1 parcel along 48th Street, and 4 parcels along SR143. The APE includes the existing I-10 ROW from milepost (MP) 150 to MP 161.71, the I-10 / I-17 traffic interchange (TI) near MP 150, 1.4 miles of existing SR143 ROW from its intersection with I-10 north, 1.45 miles of existing US 60 ROW from MP 172-173.5, up to 2,000 feet along cross roads north and south of their intersections with I-10, and the areas of TCEs and new ROW.

The APE considers new visual elements proposed as part of the project. To account for the introduction of dynamic messaging signs (DMS) placed within the freeway's median, the APE includes a quarter-mile radius around each proposed DMS. At the I-10 - SR143/Hohokam Expressway interchange, which would be reconfigured and reconstructed, the APE includes a half-mile radius around the interchange.

Project cultural resource evaluations included collecting information on previously identified and/or evaluated properties within the APE and conducting field investigations to survey and photograph previously undocumented historic buildings and linear resources constructed in 1974 or earlier. In general, properties less than 50 years of age are presumed to be ineligible for listing in the NRHP unless they possess exceptional importance. If the preferred alternative progresses, construction would occur after completion of the environmental review process. Thus, the

eligibility assessment includes resources 45 years of age or older to accommodate for this time span. Efforts were made to identify and evaluate all resources within the APE that meet this 45-year-age threshold.

Qualified architectural historians conducted research to identify previously unevaluated historic properties within the APE, as well as to identify built resources more than 45 years of age that would require evaluation as part of this project. This included examination of ADOT files, Maricopa County tax assessor data, Maricopa County historic aerial photography, AZSITE database (as the repository for available SHPO data), Phoenix Historic Property Register, Tempe Historic Property Register, Salt River Project records, Bureau of Reclamation documentation, and NRHP information. Additional research was conducted at the Tempe History Museum, Arizona State University, Tempe Public Library, Arizona State Library and Archives, the Phoenix Public Library, and online using the Arizona History Project and *The Arizona Republic* newspaper archives.

Qualified architectural historians completed a comprehensive field survey of the APE from February 25 through March 1, 2019. Using Maricopa County data, properties 45 years of age or older were identified and photographed. In some instances, the information did not appear to be accurate or reliable, so the historians visually confirmed year-built data for numerous additional built resources. Built environment resources for the Preferred Alternative are reported in the *Section 106 Built Environment Determinations of Eligibility and Assessment of Effects, I-10 Broadway Curve: I-17 Split to Loop 202 (Santan Freeway)* (Foell et al. 2019). Following submittal, ADOT, after consulting with Salt River Project (SRP) disagreed with the consultant's report recommendations and determined that three of the identified historic irrigation features comprising only laterals are not eligible for listing in the NRHP and are not contributing resources to NRHP-listed or eligible properties.

Built Environment

In total, seven built environment properties in the APE are listed in, determined eligible for listing in, or unevaluated and treated as eligible for listing in the NRHP. All built environment historic properties are shown in **Figure IV-7** and summarized in **Table IV-10***.*

The survey of built environment properties in the APE identified two previously evaluated built environment properties listed in the NRHP: Tempe Double Butte Cemetery (Pioneer Section) (NRHP No. 13000020) and Salt River Project Diversion and Conveyance System Historic District (NRHP No. 100001454).

Tempe Double Butte Cemetery (Pioneer Section) was listed in the NRHP in 2013 under Criterion A and Criterion Consideration D for its association with late-nineteenth and early twentieth century Tempe settlement and as the burial place for Tempe's earliest residents as the first recognized city cemetery. Project activities, including ramp modifications and bridge construction, occur outside the Tempe Double Butte Cemetery's historic property boundary in areas with extensive roadway and urban development.

Figure IV-7. National Register of Historic Places—Listed and Eligible Built Environment Properties in the APE

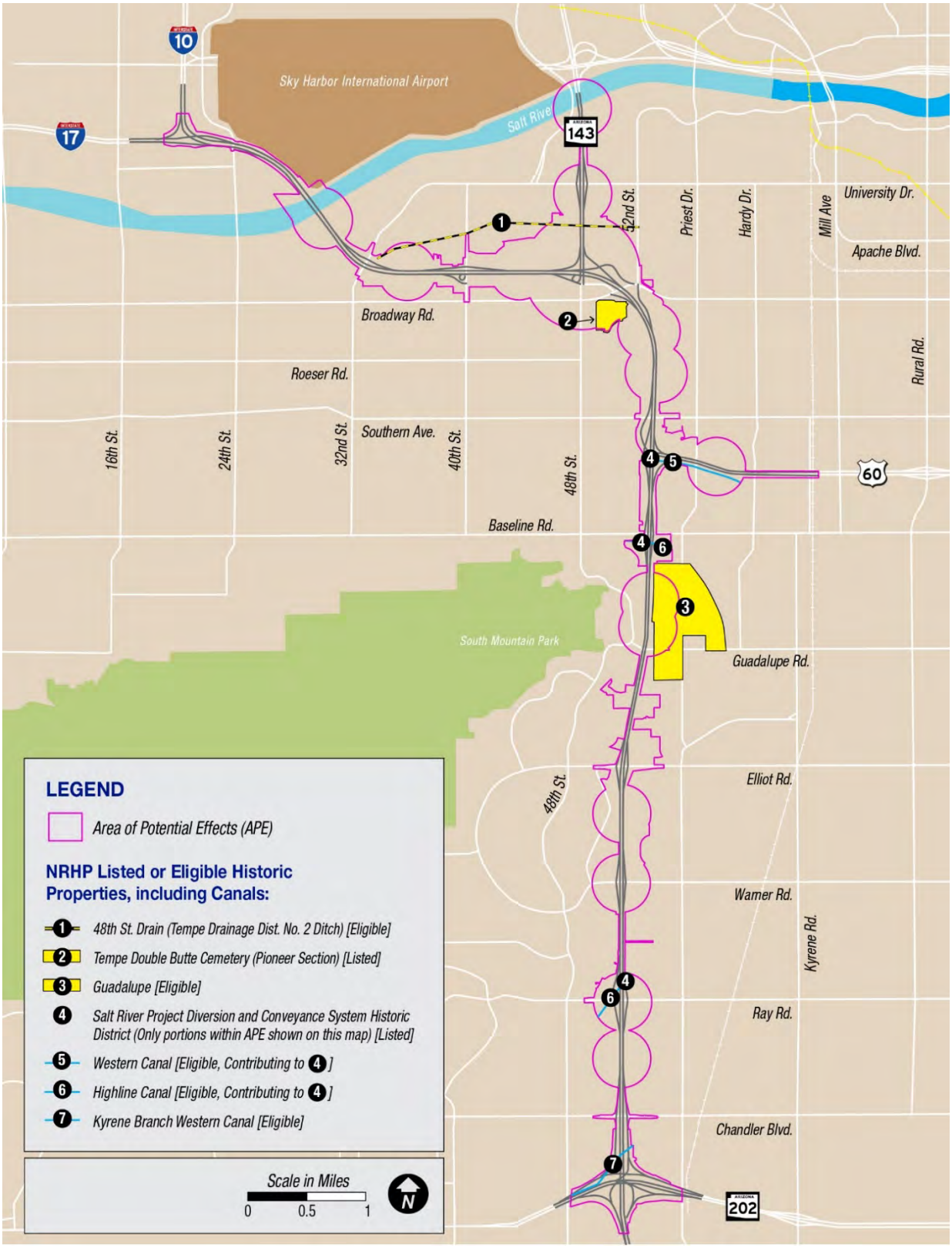


Table IV-10. National Register of Historic Places—Listed and Eligible Built Environment Properties in the APE

Map ID No.	Name	Description	NRHP Eligibility
1	48th Street Drain (Tempe Drainage District No. 2 Ditch)	Historic Irrigation Feature	Determined Eligible under Criteria A and C
2	Tempe Double Butte Cemetery (Pioneer Section)	Historic Cemetery	Listed under Criterion A and Criteria Consideration D
3	Guadalupe	Historic District	Determined Eligible under Criteria A, C, and D
4	Salt River Project Diversion and Conveyance System Historic District	Historic Irrigation Feature	Listed under Criterion A; includes Western and Highline Canals as Contributing Elements
5	Western Canal	Historic Irrigation Feature	Previously Determined Eligible under Criterion A; Contributing to Salt River Project Diversion and Conveyance System Historic District
6	Highline Canal	Historic Irrigation Feature	Previously Determined Eligible under Criterion A; Contributing to Salt River Project Diversion and Conveyance System Historic District
7	Kyrene Branch Western Canal	Historic Irrigation Feature	Previously Determined Eligible under Criterion A

Source: Section 106 Built Environment Determinations of Eligibility and Assessment of Effects, I-10 Broadway Curve: I-17 Split to Loop 202 (Santan Freeway) (Foell et al. 2019)

The Salt River Project Diversion and Conveyance System Historic District was listed in the NRHP in 2017 under Criterion A as one of the United States' earliest reclamation projects that led to further agricultural, industrial, and urban development in the Salt River Valley through increased water supply and available hydroelectric power. The historic district's historic property boundaries intersect the project APE in locations where the main canals of the Western Canal and Highline Canal traverse beneath I-10. These canals were also previously determined individually eligible for listing in the NRHP under Criteria A as part of the Salt River Project system. Project activities occur in areas where these main canals are not visible at the surface as they pass through culverts. Work in these areas includes road widening, striping, utility work, and ramp construction.

A third main canal, the Kyrene Branch Western Canal, is eligible for listing in the NRHP under Criterion A as part of the Salt River Project system. It traverses the APE's southern end where the canal is not visible; its location was determined using georeferenced 1902-1903 Bureau of Reclamation maps made available by the AZSITE database. Project activities in the vicinity of the Kyrene Branch Western Canal include paving and striping with potential for some utility work.

Architectural historians also identified and evaluated 46 previously unevaluated built environment resources. Forty-four of these resources were determined not eligible for listing in

the NRHP; most of the ineligible properties are 1960s and 1970s light industrial buildings that are either nondescript or substantially altered. Two additional built environment resources, the 48th Street Drain (Tempe Drainage District No. 2 Ditch) and Guadalupe, an early residential district, were determined eligible for listing in the NRHP.

The 48th Street Drain is determined eligible for listing in the NRHP under Criterion A for its association with early twentieth-century irrigation in the Salt River Valley at a time when the Salt River Project made significant improvements to water storage and irrigation infrastructure. That segment is also determined eligible under Criterion C as an early irrigation feature demonstrating the diversion-conveyance system constructed to remove water from, rather than irrigate, the Salt River Valley. Project activities in the vicinity of the 48th Street Drain include moving an existing culvert on the drain's east end and lining non-historic sections of the drain's west end with concrete. Any repairs made to the historic drain segment as a result of the project activities would utilize in-kind materials.

Guadalupe is determined eligible under Criterion A for its association with the Yaqui people who sought safety in the United States and their continued traditions, and under Criterion C for the architectural merit exhibited in Santa Lucia Pascua Yaqui Temple and Our Lady of Guadalupe Catholic Church. It is also determined eligible as a cultural landscape that exhibits traditional building forms and materials in the housing, as well as religious practices as represented by the two sacred buildings and plaza. Guadalupe is determined eligible under Criterion D for its potential to yield information about indigenous building techniques and materials since intensive investigations may reveal original materials and construction methods that have been covered by modern materials, alterations, and additions. Near Guadalupe, the Calle Guadalupe bridge over I-10 would be widened and improvements would be made to drainage features along that road. Outside of the historic property boundary, a proposed noise barrier wall would extend along I-10 and connect to an existing noise barrier wall currently located on Guadalupe's west side. Noise barrier wall installation is subject to an additional public involvement process.

Archaeology

Ten archaeological sites and 18 prehistoric canal segments are in the APE that are either NRHP-eligible or unevaluated for NRHP eligibility. Three sites, AZ T:12:19(PG), AZ T:12:137(ASM), and AZ U:9:12(PG) are adjacent to the APE and may require eligibility and/or boundary testing and other unevaluated sites would be tested prior to Final Design to determine eligibility by ADOT's cultural resources staff who meet the Secretary of the Interior's Professional Qualifications Standards. Archaeological sites are listed in **Table IV-11**.

Table IV-11. Archaeological Sites in the APE

Site Number	Site Type	NRHP Eligibility
AZ T:12:47 (ASM)	Prehistoric Habitation Site	Previously Determined Eligible under D
AZ T:12:19 (PG)	Prehistoric Habitation Site	Unevaluated
AZ T:12:137 (ASM)	Prehistoric Habitation Site	Previously Determined Eligible under D
AZ U:9:26 (ASM)	Prehistoric Habitation Site	Unevaluated
AZ U:9:186 (ASM)	Prehistoric Artifact Scatter and Canal	Unevaluated
AZ U:9:12 (PG)	Prehistoric Sherd Scatter	Unevaluated
AZ U:9:75 (ASM)	Prehistoric Canal Channels	Unevaluated
AZ U:9:76 (ASM)	Prehistoric Artifact Scatter	Unevaluated
AZ U:9:48 (ASM)	Hohokam, Euroamerican, Yaqui Village	Previously Determined Eligible under D
Midvale Terrace Gardens AZ U:9:9 (ASM)	Prehistoric Agricultural Area	Unevaluated
None	18 Prehistoric Canal Alignments	Unevaluated

Source: ADOT
Note: The archaeological sites are not mapped due to confidentiality requirements.

Traditional Cultural Properties

A traditional cultural property (TCP) is a property that is eligible for inclusion in the NRHP because of its 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. TCPs are often NRHP-eligible under Criterion A; however, other criteria may apply regarding their eligibility as TCPs.

Bat's Home is a TCP within the APE. In consultation with Salt River Pima-Maricopa Indian Community Tribal Historic Preservation Officer and the Gila River Indian Community Tribal Historic Preservation Officer, ADOT determined that Bat's Home is NRHP-eligible under Criteria A and D.

IV.E.2. Agency Coordination

On August 1, 2019, ADOT initiated Section 106 consultation with the SHPO, Bureau of Reclamation, City of Chandler, City of Phoenix, City of Tempe, Salt River Project, Town of Guadalupe, Ak-Chin Indian Community, Gila River Indian Community, Hopi Tribe, Pascua Yaqui Tribe, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, Tonto Apache Tribe, White Mountain Apache Tribe, and Yavapai-Apache Nation. ADOT provided each consulting party with a transmittal letter and the *Section 106 Built Environment Determinations of Eligibility and Assessment of Effects, I-10 Broadway Curve: I-17 Split to Loop 202 (Santan Freeway)* (Foell et al. 2019) report. The SHPO concurred with the contents of the transmittal letter and report on August 9, 2019.

IV.E.3. Environmental Consequences

Preferred Alternative

The cultural and historic resources identified in the APE of the Preferred Alternative through background research and field survey are listed in **Table IV-10** and **Table IV-11**.

Adverse Effects

Adverse effects are anticipated for AZ T:12:47(ASM) and AZ U:9:48(ASM). Effects on the remaining archaeological sites are unknown. Direct impacts to NRHP-eligible archaeological sites are likely to be adverse effects. However, the unevaluated sites would be tested before final design by ADOT to determine eligibility. Any sites determined to be not eligible are not historic properties and so would not be subject to an effects assessment.

No Adverse Effect

The Preferred Alternative would have no adverse effect to one NRHP-listed built environment historic property, five NRHP-eligible built environment historic properties, and one NRHP-eligible TCP in the APE. These historic properties include the Salt River Project Diversion and Conveyance System Historic District, Western Canal, Highline Canal, Kyrene Branch Western Canal, 48th Street Drain (Tempe Drainage District No. 2 Ditch), Guadalupe, and Bat's Home.

Proposed project activities span the Western, Highline, and Kyrene Branch Western Canals and no changes would occur to the canals' existing configuration or materials. As a result, the project would not adversely affect the integrity of the canals.

Temporary easements would be located within the historic property boundary of the 48th Street Drain (Tempe Drainage District No. 2 Ditch) in an area where a non-historic portion of the drain would be lined with concrete. In addition, an existing culvert on the drain's east end would be relocated to the east of its current position. No changes would occur to the drain's existing configuration; no original historic materials or alignment would be altered; and no other direct impacts are anticipated. Thus, the project would result in no adverse effect to the 48th Street Drain.

Proposed project activities within the historic district boundaries of Guadalupe would be minor and consistent with road and utility maintenance work to existing features within or near the district. A potential noise barrier along I-10 is proposed to be located outside of the Guadalupe historic property boundary to minimize the highway noise impact for the residential land uses in that area; it would not alter any significant viewsheds or physically affect the district. No adverse effects to the district or its contributing resources are anticipated.

I-10 is proximate to the Bat's Home TCP, which is surrounded by dense urban and suburban development. In the vicinity of Bat's Home, the proposed project work would include standard highway enhancements and modernizations that would improve the interstate's projected travel demand and improve congestion and travel time. These project activities would not alter any significant viewsheds or physically affect the TCP. Therefore, the project would have no adverse effect to Bat's Home.

No Effect

The Preferred Alternative would have no effect to the Tempe Double Butte Cemetery (Pioneer Section). All project activities would occur outside of the historic property boundary and are limited to areas nearest noncontributing features of the cemetery or near existing roadway elements; there would be no direct or indirect effects to the cemetery or its contributing features in areas of urban and interstate development.

No-Build Alternative

The No-Build Alternative would have no effect on cultural resources in the Study Area.

IV.E.4. Environmental Commitments and/or Mitigation Measures

Contractor Responsibilities

- The Contractor would contact the ADOT Planning Historic Preservation Team (602.712.6371 or 602.712.7767) 14 days prior to construction to ensure that the terms and stipulations of Attachment Six (6) of the Programmatic Agreement, entitled Programmatic Agreement Pursuant to Section 106 of the National Historic Preservation Act Regarding Implementation of Federal-Aid Transportation Projects in the State of Arizona have been fulfilled.
- The contractor would contact the ADOT Environmental Planning Historic Preservation Team (602.712.6371 or 602.712.2343) at least 10 (ten) business days prior to the start of ground-disturbing activities to arrange for qualified personnel to monitor and be present during construction.

IV.E.5. Conclusion

Within the APE, construction of the Preferred Alternative would result in no effect on one built environment historic property, no adverse effect on six built environment historic properties, no adverse effect on one TCP, and an adverse effect on two previously determined NRHP-eligible archaeological sites. Unevaluated archaeological sites would be tested prior to project construction to determine eligibility. Any archaeological sites determined to be not eligible are not historic properties and would therefore not be subject to an effects assessment.

IV.F. Section 4(f) Resources

Section 4(f) resources include publicly owned land of a public park, recreation area, wildlife and waterfowl refuge, or listed and eligible historic sites:

- "Publicly owned land is considered to be a park, recreation area or wildlife and waterfowl refuge when the land has been officially designated as such by a Federal, State or local agency, and the officials with jurisdiction over the land determine that its primary purpose is as a park, recreation area, or refuge. Primary purpose is related to a property's primary function and how it is intended to be managed. Incidental, secondary, occasional or dispersed activities similar to park, recreational or refuge activities do not constitute a primary purpose within the context of Section 4(f)" (FHWA 2012:23).
- "Section 4(f) applies when the land is one of the enumerated types of publicly owned lands and the public agency that owns the property has formally designated and determined it to be significant for park, recreation area, or wildlife and waterfowl refuge purposes. Evidence of formal designation would be the inclusion of the publicly owned land, and its function as a Section 4(f) property into a city or county Master Plan" (FHWA 2012:57).
- Historic sites include any properties listed on, or determined to be eligible for listing on, the NRHP that warrant preservation in place.

IV.F.1. Regulatory Context

This evaluation is prepared in compliance with:

- Section 4(f) of the Department of Transportation Act of 1966, 23 U.S.C. § 138 and 49 U.S.C. § 303
- NEPA of 1969
- 23 CFR 774
- *Section 4(f) Policy Paper* (FHWA, July 20, 2012)
- *Section 4(f) Manual* (ADOT 2019a)

While Section 4(f) is applicable to FHWA actions, ADOTs NEPA assignment MOU with FHWA provides ADOT approval authority. Section 4(f) of the US Department of Transportation Act of 1966, as amended, states that the administration "… 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 a 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 or 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 CFR Part 303[c]).

3) The use would not affect the features, activities, or attributes which qualify the property for Section 4(f) consideration, and the Federal Highway Administration has made a determination that the Section 4(f) use is *de minimis* (see below)."

A "use" of a Section 4(f) resource, as defined in 23 CFR Part 774 occurs when:

1) Land is permanently incorporated into a transportation facility;

2) There is a temporary occupancy of land that is adverse in terms of the statute's preservationist purposes. A temporary occupancy of a Section 4(f) property may be necessary to provide staging or access areas. Temporary occupancy is not a Section 4(f) use if all of the following conditions exist:

   a) The land use is of short duration (defined as less than the time needed for the construction of the project)

   b) There is no change in ownership of the land

   c) The scope of the work must be minor

   d) There are no temporary or permanent adverse changes to the activities, features, or attributes of the property

   e) The land must be fully restored to a condition at least as good as prior to the project

   f) There must be documented agreement from the official(s) with jurisdiction over the property with the above conditions

3) There is a constructive use of the land. A constructive use of a Section 4(f) resource (23 CFR 774.15) 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. For example, a constructive use can occur when:

   a) The projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a resource protected by Section 4(f);

   b) The proximity of the proposed project substantially impairs aesthetic features or attributes 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 the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally

significant historical building, or substantially detracts from the setting of a park or historic site which derives its value in substantial part because of its setting; and/or,

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

Use of a Section 4(f) property that is generally minor in nature may be determined to be *de minimis*. A *de minimis* impact is one that, after taking into account avoidance, minimization, mitigation, and enhancement measures, results in no adverse effect to the activities, features, or attributes that qualify a park, recreation area, or refuge for protection under Section 4(f). For historic properties, a *de minimis* impact is one that results in a determination of "no adverse effect" or "no historic properties affected" under Section 106 of the NHPA. A *de minimis* impact determination requires agency coordination with the officials having jurisdiction over the Section 4(f) resource and opportunities for public involvement. A *de minimis* impact determination may not be made when the proposed action constitutes a constructive use.

IV.F.2. Coordination and Consultation

Section 4(f) requires coordination with Officials with Jurisdiction (OWJ) during the Section 4(f) evaluation. Past similar projects in the study area have a long history of consultation, but project-specific coordination affecting the Section 4(f) includes several agencies and stakeholders. Historic Section 4(f) properties and impacts are identified in consultation with SHPO, tribes, and consulting parties. Consultation regarding this process is provided in Appendix A of this Draft EA.

Non-historic Section 4(f) properties and potential impacts were coordinated with the City of Tempe Parks and Recreation Department and City of Phoenix Parks and Recreation Department.

IV.F.3. Existing Conditions

The study area for Section 4(f) properties is illustrated in **Figure IV-8** and **Figure IV-9**. Note that the Section 106 evaluation for historic properties included an APE for indirect impacts (called proximity impacts under constructive use), illustrated in **Figure IV-9**.

Non-Historic Section 4(f) Properties

There are no publicly owned wildlife refuges in the study area. **Table IV-12** and **Figure IV-8** present all Section 4(f) protected parks and recreation areas in the study area.

Table IV-12. Section 4(f)-Protected Parks and Recreation Areas within Study Area

Map ID No.	Name	Owner	Description
1	Salt River Shore Trail	City of Phoenix	2.3-mile bike trail adjacent to the Salt River.
2	Okemah Park	City of Phoenix	Approximately ½-acre open parcel with no amenities and limited shade.
3	Oddfellows-Peterson Park	City of Tempe	Approximately 2.9-acre park owned by the City of Tempe, including Peterson House Museum. Amenities include parking and playground, with shade trees.
4	Western Canal Multi-Use Path	City of Tempe	Bike and pedestrian facility east of I-10, south of US 60, paralleling Western Canal. Improved path ends at a bridge over the canal, just west of Priest Drive. The 2015 Transportation Master Plan and 2018 Bike Map show it planned across I-10.
5	Highline Lateral Canal Multi-Use Path	City of Tempe	The path is a 10-foot-wide concrete path, currently under construction. The existing path ends at Avenida del Yaqui, east of I-10, but the 2015 Transportation Master Plan and 2018 Bike Map show it planned across I-10.
6	Todd Stottlemyre Field	City of Guadalupe	Youth baseball field with pedestrian paths and parking.
7	Guadalupe Plaza	City of Guadalupe	Open space with facilities for baseball. Also hosts ceremonial events. Adjacent to Our Lady of Guadalupe Church and El Templo Yaqui.
8	South Mountain Park	City of Phoenix	16,000-acre park with multi-use trails and other facilities.
9	Sun Circle Trail and Maricopa Trail	City of Guadalupe	Multi-use path, including equestrian in parts, adjacent to Calle Guadalupe. Single trail with two names in Guadalupe and Tempe. Currently crosses I-10.
10	Mountain Vista Park	City of Phoenix	Large park with baseball, basketball and volleyball amenities, with playgrounds, pedestrian paths, and parking.
11	Pecos Park	City of Phoenix	Large regional park that features a skate park, swimming pool, dog park and several athletic fields

Figure IV-8. Non-Historic Section 4(f) Properties within the Study Area

Historic 4(f) Sites

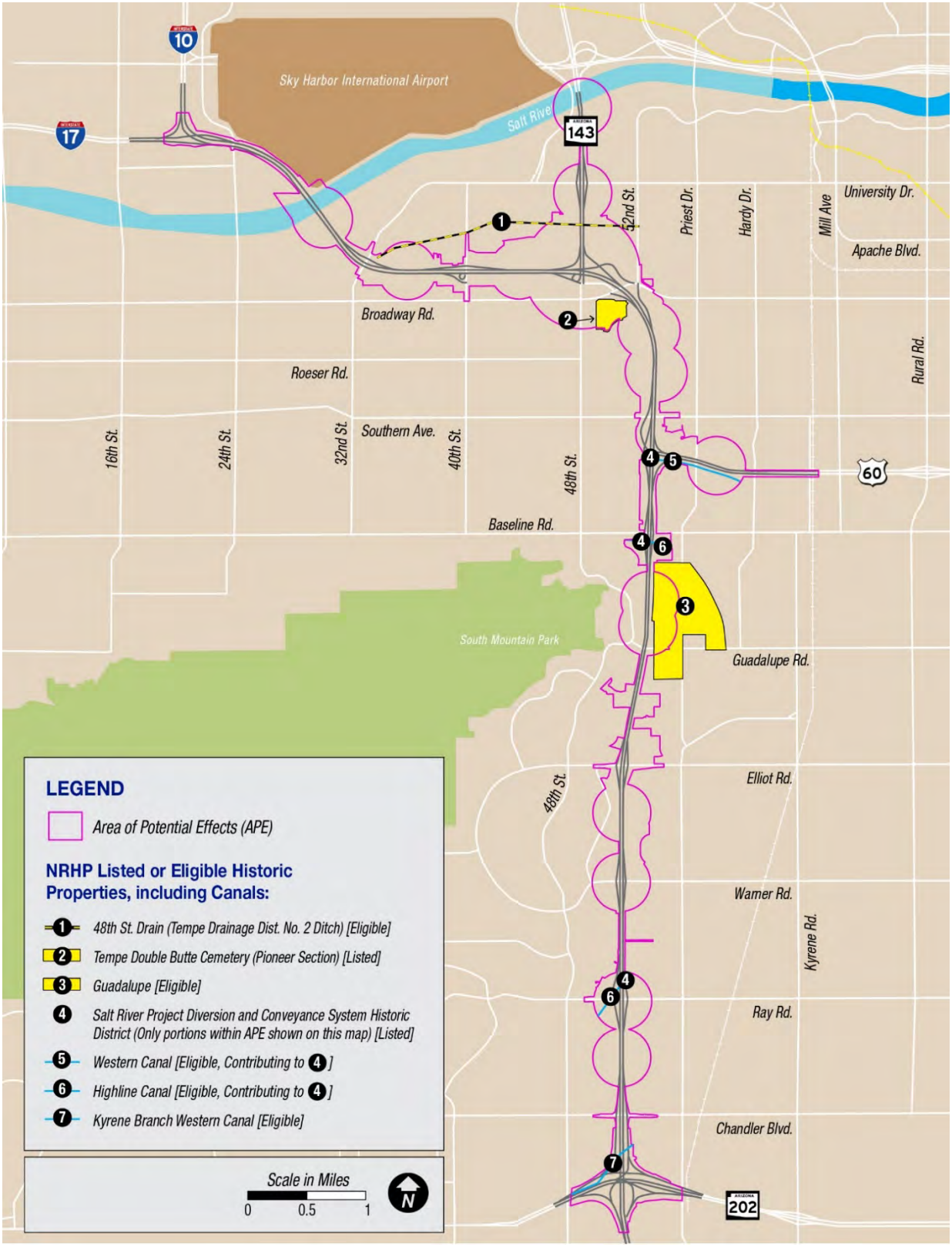
The historic Section 4(f) properties have been identified based on the Section 106 consultation process and are listed in **Table IV-13** and illustrated in **Figure IV-9**. Note that there are two NRHP-eligible archaeological sites in the study area (see Section IV.E.1.). Although eligible for the NRHP, these sites do not warrant preservation in place and they are eligible primarily under Criterion D of 36 CFR 60.4 for the scientific data they provide. Therefore, pursuant to 23 CFR 774.13(b), they fall under the exception for archaeological sites.

Table IV-13. Section 4(f)-Protected Historic Sites within Study Area

Map ID No.	Name	Location	NRHP Criteria
1	48th Street Drain (Tempe Drainage District No. 2 Ditch)	Between approximately E. University Drive, Phoenix, and 52nd Street, Tempe	A, C
2	Tempe Double Butte Cemetery (Pioneer Section)	5202 E. Broadway Road	A, Criteria Consideration D
3	Guadalupe	Town of Guadalupe	A, C, D
4	Salt River Project Diversion and Conveyance System Historic District	Maricopa County	A
5	Western Canal	I-10/Superstition Freeway	A
6	Highline Canal	I-10/Baseline Road and I-10/E. Ray Road	A
7	Kyrene Branch Western Canal	I-10/Santan Freeway	A
N/A	Bat's Home*	Within APE	A, D

*Due to confidentiality requirements Bat's Home is not mapped.

Figure IV-9. Historic Section 4(f) Properties within APE



IV.F.4. Environmental Consequences

Preferred Alternative

The Preferred Alternative would avoid most Section 4(f) non-historic and historic sites. Noise and visual impacts at Section 4(f) properties are minimal and would not substantially impair the protected activities, features, or attributes that qualify the resources for protection under Section 4(f). Therefore, no constructive use at any Section 4(f) property would occur. The following sections discuss the impacts that would result from the Preferred Alternative.

Non-Historic Section 4(f) Properties

Table IV-14 lists the impacts to all non-historic Section 4(f) properties in the study area and provides ADOT's Section 4(f) determination. ADOT has reviewed each non-historic Section 4(f) property and determined that noise, visual, and other proximity impacts identified in 23 CFR 774.15 would not be so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

Table IV-14. Non-Historic Section 4(f) Determinations

Map ID No.	Name	Impact	Determination
1	Salt River Shore Trail	None	No use. No direct impact or substantial impairment from proximity impacts.
2	Okemah Park	None	No use. No direct impact or substantial impairment from proximity impacts.
3	Oddfellows-Peterson Park	None	No use. No direct impact or substantial impairment from proximity impacts.
4	Western Canal Multi-Use Path	None	No use. No direct impact or substantial impairment from proximity impacts.
5	Highline Lateral Canal Multi-Use Path	Building a trail extension to the west	Exempt per 23 CFR 774.13(g)
6	Todd Stottlemyre Field	None	No use. No direct impact or substantial impairment from proximity impacts.
7	Guadalupe Plaza	None	No use. No direct impact or substantial impairment from proximity impacts.
8	South Mountain Park	None	No use. No direct impact or substantial impairment from proximity impacts.
9	Sun Circle Trail and Maricopa Trail	Adding ADA ramps, widening bridge, upgrading path	Exempt per 23 CFR 774.13(f)3
10	Mountain Vista Park	Providing sidewalk to connect to trail system	Exempt per 23 CFR 774.13(g)
11	Pecos Park	None	No use. No direct impact or substantial impairment from proximity impacts.

HIGHLINE LATERAL CANAL MULTI-USE PATH

The Preferred Alternative would provide an extension of the existing trail east of I-10, across the freeway, eventually providing access to Mountain Vista Park on the west side of the freeway (**Figure IV-10**). Connecting the trail across the freeway would create pedestrian and bicycle access to Mountain Vista Park and improve bike and pedestrian circulation in the area. Both results enhance the trail's recreational purpose. There may be temporary construction impacts at the existing trail while the extension is built, but it would not impact the public's ability to use the existing trail during construction.

23 CFR 774.13(g) provides the following exception in these cases:

> "The Administration has identified various exceptions to the requirement for Section 4(f) approval. These exceptions include, but are not limited to:
>
> (g) Transportation enhancement activities, transportation alternatives projects, and mitigation activities, where:
>
> (1) The use of the Section 4(f) property is solely for the purpose of preserving or enhancing an activity, feature, or attribute that qualifies the property for Section 4(f) protection; and
>
> (2) The official(s) with jurisdiction over the Section 4(f) resource agrees in writing to paragraph (g)(1) of this section."

The only impact would be the temporary construction impact incurred purely to improve the trail's recreational purpose by enhancing connections to Mountain Vista Park. The OWJ in this case is the City of Tempe Parks and Recreation Department, which concurred with 23 CFR 774.13(g)(1) in a letter dated June 5, 2019. Concurrence is documented in Appendix A.

SUN CIRCLE TRAIL AND MARICOPA TRAIL

This trail currently crosses I-10 on a pedestrian bridge. The Preferred Alternative would provide a number of improvements to enhance the recreational purpose of the trail (**Figure IV-11**). These include:

- Improve ADA-compliant curb ramps at South Pointe Parkway on the west and Calle Sahuaro on the east
- Improve gravel path to concrete where necessary
- Widen bridge over I-10 to accommodate the improved trail

A detour would be provided during construction to maintain bicycle and pedestrian circulation in the area. The detour would be determined in final design; however, it would use exiting paths.

Figure IV-10. Impacts to Highline Canal Multi-Use Path (Preferred Alternative)

Figure IV-11. Impacts at Sun Circle Trail and Maricopa Trail (Preferred Alternative)

23 CFR 774.13 provides the following exception in these cases:

> "The Administration has identified various exceptions to the requirement for Section 4(f) approval. These exceptions include, but are not limited to:
>
> (f) Certain trails, paths, bikeways, and sidewalks, in the following circumstances:
>
> (3)Trails, paths, bikeways, and sidewalks that occupy a transportation facility right-of-way without limitation to any specific location within that right-of-way, so long as the continuity of the trail, path, bikeway, or sidewalk is maintained"

Because impacts to this trail are entirely within a transportation facility ROW, this exception applies, and it does not require OWJ concurrence or Section 4(f) approval.

MOUNTAIN VISTA PARK

The Preferred Alternative would create an extension of the Highline Lateral Canal Multi-Use Path across the freeway into the park. The pedestrian bridge would stay entirely in ADOT ROW and would connect to the park via sidewalk (**Figure IV-12**). The sidewalk would cross into park ROW and connect to the existing sidewalk adjacent to a parking lot. There would be no impact to parking. The ROW use in the park would equal approximately 1,700 square feet for the new sidewalk. This would enhance access to the park and improve bike and pedestrian connectivity in the area. There would be temporary construction impacts in the park's parking lot and surrounding area.

As outlined on page 77, 23 CFR 774.13(g) is applied because the only use of the park would come from the new sidewalk, which would be installed purely to improve connectivity to the bike and pedestrian trail network in the area. The official with jurisdiction in this case is the City of Phoenix Parks and Recreation Department, which concurred with 23 CFR 774.13(g)(1) in a letter dated July 1, 2019. Concurrence is documented in Appendix A.

Figure IV-12. Impacts at Mountain Vista Park (Preferred Alternative)

Historic Section 4(f) Properties

Table IV-15 presents all historic properties that are protected under Section 4(f) along with Section 106 Effects and Section 4(f) determinations. Eight historic Section 4(f) properties including a TCP are in the study area (Section 106 APE), there is no use by the Preferred Alternative for any of these properties.

Table IV-15. Historic Impacts and Section 4(f) Determinations

Map ID No.	Name	Section 106 Effect	Section 4(f) Determination
1	48th Street Drain (Tempe Drainage District No. 2 Ditch)	No adverse effect. On the drain's west end, project work occurs on riprap segments outside of the drain's historic property boundary. On the drain's east end, project work includes relocation of an existing culvert where it will continue to empty into the drain.	No use
2	Tempe Double Butte Cemetery (Pioneer Section)	No effect. Project activities are outside of the property boundary and limited to areas nearest to noncontributing features or existing roadway features.	No use
3	Guadalupe Historic District	No adverse effect. No project work is anticipated outside of existing ROW in the vicinity of Guadalupe, no buildings will be directly affected by project work, and new project elements occur in areas where there is no integrity of setting outside of the historic property boundary.	No use
4	Salt River Project Diversion and Conveyance System Historic District	No adverse effect. Project work occurs in areas where I-10 currently spans the historic district's main canals and the canals enter culverts beneath the freeway. The canals no longer retain integrity of setting.	No use
5	Western Canal	No adverse effect. Project work occurs in areas where I-10 currently spans the canal and the canal enters a culvert beneath the freeway. The canal no longer retains integrity of setting.	No use
6	Highline Canal	No adverse effect. Project work occurs in areas where I-10 currently spans the canal and the canal enters a culvert beneath the freeway. The canal no longer retains integrity of setting. A pedestrian path would extend east from I-10 to the Highline Canal where it would connect with an existing path located parallel to the canal.	No use
7	Kyrene Branch Western Canal	No adverse effect. Project work occurs at the surface in an area where the Kyrene Branch Western Canal is entirely subterranean.	No use
N/A	Bat's Home	No adverse effect. No direct impacts would occur to this property.	No use

The Arizona SHPO provided concurrence with all Section 106 effects assessments on August 9, 2019. A copy of the consultation letter and SHPO's concurrence is available in Appendix A. The

Preferred Alternative would not use any historic Section 4(f) resource. The Preferred Alternative would require temporary construction easements along 48th Street Drain (Tempe Drainage District No. 2 Ditch) and for relocation of a manhole within the Guadalupe Historic District. These temporary construction easements along 48th Street Drain (Tempe Drainage District No. 2 Ditch) and the Guadalupe Historic District would be an exception under Section 4(f) of the Transportation Act of 1966, as amended, because the following conditions would be met:

- The land use would be of short duration, less than the duration of the project as a whole
- There would be no change in ownership of the land
- The scope of the work would be minor
- There would be no temporary or permanent adverse changes to the activities, features, or attributes of the property
- The land would be fully restored to a condition at least as good as prior to the project

No-Build Alternative

Under the No-Build Alternative, the project would not be built, so there would be no use to Section 4(f) properties, nor would there be any enhancement of recreational facilities.

IV.F.5. Environmental Commitments and/or Mitigation Measures

No mitigation is necessary for Section 4(f) impacts because there would be no use of historic properties, and non-historic properties would either have no use or would qualify for exceptions. Potential impacts to historic properties would be mitigated through the Section 106 process, provided in Section IV.E, Cultural Resources of this Draft EA.

IV.F.6. Conclusion

Eleven non-historic Section 4(f) properties and seven historic Section 4(f) properties are in the study area. None of the non-historic properties are subject to Section 4(f) approval, as eight of them are entirely avoided and three qualify for an exception under 23 CFR 774.13. None of the historic properties are subject to Section 4(f) approval since they are all entirely avoided.

IV.G. Traffic and Transportation

The existing mainline of I-10 in the study area is an 8- to 10-lane facility with HOV and auxiliary lanes Based on 2018 travel demand model data provided by MAG, it serves up to 337,000 vehicles per day. Traffic demand is causing the I-10 corridor and adjacent local arterial street system to become increasingly congested during the morning and evening peak travel periods. Future traffic volume projections from the MAG and other studies indicate that congestion will continue to worsen, causing further travel delays and increased travel times for those using the I-10 corridor. Improvements to the I-10 corridor are necessary to increase the freeway capacity and help alleviate increased levels of traffic congestion on all the transportation system in the study area.

IV.G.1. Traffic Volumes

Existing, 2040 No-Build Alternative, and 2040 Preferred Alternative traffic volumes for the I-10 mainline was provided by the MAG from its travel demand model and are presented in **Table IV-16**. The MAG travel demand model includes the planned roadway network, population, and employment forecast to estimate future traffic volumes in the study area. The modeled 2040 No-Build Alternative and 2040 Preferred Alternative traffic volumes in the study area consider the impacts from all the planned roadway network improvements within the region as identified in the MAG Regional Transportation Plan. This includes the new SR 202L South Mountain Freeway which will provide travelers an alternative to using I-10 for through trips between the East and West Valleys.

Table IV-16. Existing and Future Traffic Volumes (weekday)

I-10 Segments		24-Hour Volume					
		Westbound			Eastbound		
From	To	2018	2040 No-Build	2040 Preferred	2018	2040 No-Build	2040 Preferred
I-17 Split	32nd Street	158,110	170,980	187,977	147,510	159,409	175,351
32nd Street	40th Street	152,498	161,734	183,317	139,377	146,707	166,350
40th Street	48th Street/ SR 143	152,072	159,445	185,097	141,168	145,621	165,045
48th Street/ SR 143	Broadway Road	166,290	121,137	162,260	138,827	140,815	161,767
Broadway Road	US 60	178,406	177,063	162,260	158,788	161,286	185,774
US 60	Baseline Road	102,262	97,138	70,398	102,629	102,131	121,326
Baseline Road	Elliot Road	129,564	129,765	134,352	121,122	121,552	122,557
Elliot Road	Warner Road	116,553	115,598	125,415	108,919	108,351	118,595
Warner Road	Ray Road	108,323	109,008	119,291	100,921	102,273	112,119

Source: MAG Travel Demand Model

IV.G.2. Operations Analysis

Synchro 9, Highway Capacity Software (HCS) and VISSIM 9 traffic modeling software were used for the I-10 corridor traffic analysis for the 2018 Existing, 2040 No-Build Alternative, and 2040 Preferred Alternative scenarios. The I-10 freeway network was evaluated in HCS and VISSIM using current and proposed roadway geometry and traffic volume inputs for the entire freeway network. HCS provided a LOS for each link within the freeway system and allows for consistent comparison of the project scenarios. VISSIM is a more detailed model that provides additional measures of effectiveness for each link within the system, including ramps and collector distributors, and allows the roadway engineers to further refine the design of the 2040 Preferred Alternative. The vehicle density and speed outputs from VISSIM were used to determine a LOS based on the Highway Capacity Manual (see **Table II-2** for LOS designations).

ADOT's Roadway Design Guidelines indicate that LOS D or better is acceptable for this type of urban environment. Locations experiencing LOS E or F were evaluated on a case-by-case basis with ADOT personnel to determine what changes, if any, could improve operations.

2018 Existing Conditions

Using existing freeway and intersection geometry, traffic volumes, and signal timing, the 2018 existing conditions LOS and delay were developed for each intersection and segment of I-10. The results of this analysis are summarized in **Table IV-17**.

Table IV-17. Study Area LOS (2018 Existing Conditions)

I-10 Segments		AM		PM	
From	To	WB	EB	WB	EB
I-17 Split	32nd Street	E	D	D	F
32nd Street	40th Street	F	E	E	F
40th Street	48th Street/SR 143	F	E	F	F
48th Street/SR 143	Broadway Road	F	C	D	F
Broadway Road	US 60	F	D	D	F
US 60	Baseline Road	E	C	D	E
Baseline Road	Elliot Road	F	C	E	F
Elliot Road	Warner Road	F	D	F	F
Warner Road	Ray Road	F	C	F	F

Existing traffic demand is causing the I-10 corridor and adjacent local arterial street system to fail during the morning and evening peak travel periods. Future traffic volume projections indicate the congestion will continue to worsen, causing further travel delays and increased travel times for those using the I-10 corridor.

2040 Preferred Alternative

Using 2040 Preferred Alternative freeway and intersection geometry, traffic volumes, and signal timing, the LOS and delay were developed for each intersection and segment of I-10. The results of the analysis are summarized in **Table IV-18**.

Table IV-18. Study Area LOS (2040 Preferred Alternative)

I-10 Segments		AM		PM	
From	To	WB	EB	WB	EB
I-17 Split	32nd Street	D	C	E	C
32nd Street	40th Street	D	D	F	D
40th Street	48th Street/SR 143	C	F	C	E
48th Street/SR 143	Broadway Road	D	C	D	D
Broadway Road	US 60	C	D	C	E
US 60	Baseline Road	D	C	C	D
Baseline Road	Elliot Road	F	C	E	D
Elliot Road	Warner Road	F	D	F	F
Warner Road	Ray Road	F	C	E	F

The 2040 Preferred Alternative would improve transportation conditions on I-10 in the study area by increasing capacity and providing better system linkages. The Preferred Alternative meets the project purpose and need by maintaining the current functionality and mobility of the I-10 corridor, providing regional mobility and access for economic centers, and accommodating current and planned system linkages for bus services using I-10.

No-Build Alternative

Using 2040 No-Build freeway traffic volumes, and signal timing, the No-Build Alternative LOS and delay were developed for each segment of I-10. The results of this analysis are summarized in **Table IV-19**.

The No-Build Alternative does not address the mobility and operational issues identified in the study area. Traffic operations would remain challenged, and congestion would become more prominent, particularly in the peak periods.

Table IV-19. Study Area LOS (2040 No-Build Alternative)

I-10 Segments		AM		PM	
From	To	WB	EB	WB	EB
I-17 Split	32nd Street	D	E	E	F
32nd Street	40th Street	E	F	F	F
40th Street	48th Street/SR 143	F	F	F	F
48th Street/SR 143	Broadway Road	E	C	D	E
Broadway Road	US 60	F	D	D	F
US 60	Baseline Road	D	C	D	E
Baseline Road	Elliot Road	F	D	E	F
Elliot Road	Warner Road	F	D	F	F
Warner Road	Ray Road	F	D	F	F

IV.G.3. Traffic Impacts During Construction

It is expected that construction of the Preferred Alternative would take approximately three to four years. Construction would likely cause temporary traffic delays and temporarily make it more difficult to access areas within and adjacent to the study area.

The anticipated impacts to traffic resulting in congestion would continue until construction is complete. A construction staging plan which outlines where and when construction activities take place and the location of construction equipment storage would be developed during final design and would further assess potential traffic congestion problems that could arise due to construction. The staging plan would attempt to balance the need for property access with minimizing the total duration of construction. Traffic control measures would be used in accordance with the Manual on Uniform Traffic Control Devices.

Construction activities under the Preferred Alternative would result in some traffic disruption on I-10 and temporary bridge closures during off-peak travel times. Construction could also affect local arterial streets in the study area. In addition to temporary traffic disruptions (closures and detours), construction traffic would be noticeable on area roadways and could occasionally contribute to localized congestion.

IV.G.4. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Temporary Traffic Control Design Guidelines and ADOT's Standard Specifications for Road and Bridge Construction.

IV.G.5. Conclusion

The study area has been the subject of numerous studies, indicating existing and future traffic issues. The Preferred Alternative would increase corridor capacity through addition of General-Purpose lanes, HOV lanes and a C-D system. Comparison of Build and No Build data indicates the Preferred Alternative improves freeway LOS in most segments, and that most segments will operate at LOS D or better in 2040.

IV.H. Air Quality

The Clean Air Act Amendments of 1990 (CAAA) direct the U.S. Environmental Protection Agency (EPA) to implement environmental policies and regulations that ensure acceptable levels of air quality. NAAQS have been established for six major air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). These standards are summarized in **Table IV-20**. "Primary" standards have been established to protect the public health; "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

- Cause or contribute to any new violation of any National Ambient Air Quality Standards (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

Under the CAAA, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the Transportation Equity Act for the 21st Century (TEA-21), and Moving Ahead for Progress in the 21st Century Act (MAP-21), proposed transportation projects must be derived from a long-range transportation plan (LRP) or regional transportation plan (RTP) that conforms with the state air quality plans as outlined in the state implementation plan (SIP). The SIP sets forth the state's strategies for achieving air quality standards. EPA's Transportation Conformity Rule requires conformity determinations from proposed transportation plans, programs, and projects before they are approved, accepted, funded, or adopted. Federal activities may not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment.

IV.H.1. Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the CAAA of 1990, whereby Congress mandated that EPA regulate 188 air toxics, also known as hazardous air pollutants. EPA has assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (http://www.epa.gov/iris/). Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects.

Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Table IV-20. National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb (2)	Annual Mean
Ozone (O_3)		Primary and Secondary	8-hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table

Abbreviations: ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: 1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and 2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national- and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (https://www.epa.gov/national-air-toxics-assessment). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these to be the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease mobile source air toxic (MSAT) emissions through cleaner fuels and cleaner engines. FHWA estimates that even if vehicle miles traveled (VMT) increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same period (EPA 2016).

IV.H.2. Greenhouse Gases

Anthropogenic (human-caused) greenhouse gas (GHG) emissions contribute to climate change. Carbon dioxide (CO_2) makes up the largest component of these GHG emissions. Other prominent transportation-related GHGs include methane (CH_4) and nitrous oxide (N_2O).

To date, no national standards or thresholds have been established regarding GHG emissions. However, a considerable body of scientific literature exists addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, and EPA and other federal agencies.

IV.H.3. Existing Conditions

In cooperation with EPA and other governmental agencies, the Maricopa County Air Quality Department operates air quality monitoring sites and a mobile air monitoring program to measure criteria pollutants. **Table IV-21** presents the last three years of available monitoring data gathered at the monitoring stations closest to the study area.

EPA designates areas that to meet the NAAQS for a particular pollutant as nonattainment areas. Control measures are put in place to attempt attainment of the standard. Once the monitoring data in a nonattainment area show several years of concentrations meeting the standard, the area may be re-designated as an attainment area with a maintenance plan, which is commonly called a maintenance area. The intent of the maintenance area is to ensure that the area continues to meet the standard.

The study area lies in an area that is designated as being in nonattainment of the NAAQS for O_3 and a separate area designated as nonattainment for PM_{10}. It also lies in an area that is designated as a maintenance area for CO.

Table IV-21. Ambient Air Quality Monitor Data

Pollutant		Monitor Location	Monitor Value	2015	2016	2017
Carbon Monoxide (CO) [ppm]	1-Hour	1919 W Fairmont Dr. Tempe, AZ	Maximum	1.9	2.0	2.0
			2nd Maximum	1.9	2.0	2.0
			# of Exceedances	0	0	0
	8-Hour	1919 W Fairmont Dr. Tempe, AZ	Maximum	1.6	1.7	1.7
			2nd Maximum	1.4	1.6	1.6
			# of Exceedances	0	0	0
Particulate Matter [µg/m3]	PM_{10}	1645 E Roosevelt St Phoenix, AZ	Maximum 24-Hour	114	106	126
			Second Maximum	85	102	106
			# of Exceedances	0	0	0
	$PM_{2.5}$	1919 W Fairmont Dr. Tempe, AZ	24-Hour 98th Percentile	17.0	17.0	21.0
			Mean Annual	7.9	7.9	8.1
Ozone (O3) [ppm]	8-Hour	1645 E Roosevelt St Phoenix, AZ	First Highest	0.075	0.072	0.077
			Second Highest	0.075	0.071	0.076
			Third Highest	0.074	0.071	0.075
			Fourth Highest	0.071	0.070	0.071
			# of Days Standard Exceeded	5	3	8
Nitrogen Dioxide (NO2) [ppb]		1645 E Roosevelt St Phoenix, AZ	1-Hour Maximum	63	62	66
			1-Hour Second Maximum	62	62	65
			98th Percentile	59	59	62
			Annual Mean	17.85	17.34	18.24
Sulfur Dioxide (SO2) [ppb]		1645 E Roosevelt St Phoenix, AZ	1-Hour Maximum	9.0	8.0	9.0
			24-Hour Maximum	3.4	3.0	4.3
			# of Days Standard Exceeded	0	0	0

Sources: EPA AirData, https://www.epa.gov/outdoor-air-quality-data

Abbreviations: ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter

IV.H.4. Environmental Consequences

To determine whether a proposed project would cause a violation of the NAAQS, air pollution in localized areas must be assessed for elevated concentrations known as hot-spots. The NAAQS pollutants of primary concern in the study area are CO, PM_{10}, and O_3. CO and PM_{10} are impacted both at the project level and regional level, and O_3 is only qualitatively addressed at the regional level. MSAT and GHG are evaluated at the regional level by comparing overall emissions among the alternatives.

Carbon Monoxide

CO hot-spots are most likely to be a concern where traffic is very congested and moving slowly, such as at congested, high-volume intersections. Three locations in the study area were modeled

that would have the highest traffic volumes and most congestion of the study area signalized intersections. Maximum 1- and 8-hour CO concentrations are shown in **Table IV-22** and **Table IV-23**. The CO levels estimated by the model are the maximum concentrations that could be expected to occur at each air quality receptor site analyzed. This assumes simultaneous occurrence of several worst-case conditions: peak-hour traffic conditions, conservative vehicular operating conditions, low wind speed, low atmospheric temperature, neutral atmospheric conditions, and maximizing wind direction.

Table IV-22. Predicted Worst-Case One-Hour CO Concentrations (ppm)

Intersection	2018		2040			
	Existing		No-Build Alternative		Preferred Alternative	
	AM	PM	AM	PM	AM	PM
Baseline Road and I-10	3.2	3.2	2.3	2.4	2.4	2.3
Elliot Road and I-10	2.8	3.0	2.4	2.4	2.3	2.5
Broadway Road and I-10 WB/52nd Street	2.8	3.2	2.2	2.4	2.3	2.2
1-hour CO standard	35	35	35	35	35	35

Concentrations = modeled results + 1-hour CO background
1-hour CO background = 2.0 ppm

Abbreviations: AM = morning; PM = evening; ppm = parts per million

Table IV-23. Predicted Worst-Case Eight-Hour CO Concentrations (ppm)

Intersection	2018		2040			
	Existing		No-Build Alternative		Preferred Alternative	
	AM	PM	AM	PM	AM	PM
Baseline Road and I-10	2.54	2.54	1.91	1.98	1.98	1.91
Elliot Road and I-10	2.26	2.40	1.98	1.98	1.91	2.05
Broadway Road and I-10 WB/52nd Street	2.26	2.54	1.84	1.98	1.91	1.84
8-hour CO standard	9	9	9	9	9	9

Concentrations = (modeled results x persistence factor [0.7]) + 8-hour CO background
8-hour CO background = 1.7 ppm

Abbreviations: AM = morning; PM = evening; ppm = parts per million

Based on the values presented in **Table IV-22** and **Table IV-23**, the Preferred Alternative is not predicted to cause a violation of the NAAQS for any of the analysis years.

Particulate Matter

Project types in 40 CFR 93.123(b) requiring a quantitative analysis of local particulate emissions (hot-spots) in non-attainment or maintenance areas include:

- New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles

- Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that would change to LOS D, E, or F because of an increase in traffic volumes from a significant number of diesel vehicles related to the project
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location
- Projects in or affecting locations, areas, or categories of sites that are identified in the PM_{10} or $PM_{2.5}$ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation

The Preferred Alternative would not meet the criteria to be considered a Project of Air Quality Concern; therefore, a quantitative analysis is not required, and the project would not be expected to cause a violation of the NAAQS.

Mobile Source Air Toxics

A quantitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. FHWA's Updated Interim Guidance on Air Toxic Analysis in NEPA Documents (FHWA 2016) groups projects into the following tier categories:

i. No analysis for projects without potential for meaningful MSAT effects
ii. Qualitative analysis for projects with low potential MSAT effects
iii. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects

Based on FHWA's recommended tiering approach, the Preferred Alternative would fall within the Tier 3 approach (i.e., for projects with a high potential for MSAT effects). In accordance with FHWA's recommendation, EPA's MOVES2014b was used to calculate annual MSAT pollutant emissions for the No-Build Alternative and the Preferred Alternative.

The results of this analysis for the existing conditions (2018) and design year (2040) are shown in **Table IV-24**. In the design year, regional MSAT emission burdens would be substantially lower under both No-Build and Preferred Alternative conditions when compared to existing MSAT burdens. Preferred Alternative MSAT emissions would be 0 percent to 3 percent lower than No-Build emissions in the year 2040.

Table IV-24. Predicted MSAT Emissions, 2040 (tons/year)

Pollutant	Existing 2018	2040 No-Build Alternative		2040 Preferred Alternative		
		Value	% Change from Existing	Value	% Change from Existing	% Change from No-Build
MSAT Study Area Annual VMT	2,070,158,477	2,210,136,442	7%	2,188,673,958	6%	-1%
1,3-Butadiene	29.60	7.845	-73%	7.844	-73%	0%
Acetaldehyde	84.95	25.39	-70%	25.29	-70%	0%
Acrolein	5.05	1.52	-70%	1.50	-70%	-1%
Benzene	201.76	51.84	-74%	51.81	-74%	0%
Diesel Particulate Matter	52.96	6.21	-88%	6.01	-89%	-3%
Ethylbenzene	92.77	20.41	-78%	20.40	-78%	0%
Formaldehyde	68.34	17.41	-75%	17.09	-75%	-2%
Naphthalene	11.98	3.12	-74%	3.10	-74%	-1%
Polycyclic Organic Matter	4.21	0.97	-77%	0.97	-77%	0%
Total MSAT	551.61	134.72	-73%	134.00	-73%	-1%

Incomplete or Unavailable Information for Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the CAA and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents* (FHWA 2016). Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts—each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways, to determine the portion of time that people are actually exposed at a specific location, and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

Considerable uncertainties exist associated with the current estimates of toxicity of the various MSAT because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, no national

consensus has been established on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk." (EPA, Diesel Engine Exhaust, Section II.C, https://www.epa.gov/iris/).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than what is deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Greenhouse Gas

The results of this analysis for the existing conditions and design year (2040) are shown in **Table IV-25**. As shown, in the project's design year, GHG emission burdens would be lower under both the No-Build Alternative and Preferred Alternative conditions when compared to existing GHG burdens. The Preferred Alternative GHG emissions would be approximately 3 percent lower than No-Build Alternative emissions in 2040.

Table IV-25. Predicted GHG Emissions (tons/year)

Pollutant	Existing 2018	2040 No-Build Alternative		2040 Preferred Alternative		
		Value	% Change from Existing	Value	% Change from Existing	% Change from No-Build
MSAT Study Area Annual VMT	2,070,158,477	2,210,136,442	7%	2,188,673,958	6%	-1%
CO_2e	1,876,505	1,434,673	-24%	1,395,626	-26%	-3%

Abbreviations: GHG = greenhouse gas; MSAT = Mobile Source Air Toxics; VMT = vehicle miles traveled; CO_2e = carbon dioxide equivalent (a standard unit describing different GHG in common terms for measuring carbon footprints

Construction

Construction-related effects are short in duration and include increases in particulate matter in the form of fugitive dust (from ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials), as well as exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles. Dust emissions typically occur during dry weather, periods of maximum demolition, construction activities, or high wind conditions. Any construction-related effects would be a localized condition that would end with the completion of construction. Construction activities would last less than five years at any individual site; therefore, a quantitative construction emissions analysis is not required to demonstrate conformity.

IV.H.5. Transportation Conformity

The project has met conformity requirements because it is included in conforming regional plans, and it is not expected to cause or contribute to an exceedance of the NAAQS.

The project is included in the region's RTP and the 2018-2022 FY TIP, both of which have been found to meet the CO, PM_{10}, and ozone conformity tests as identified by federal conformity regulations. Therefore, the project has met the requirement of being included in the regional plans, which have been found to conform to the SIP.

A project-level conformity determination was performed by conducting a CO hotspot analysis on affected intersections in the project vicinity. Based on modeling, intersections in the project vicinity currently do not exceed the CO NAAQS and affected intersections would not create any new exceedances of the CO NAAQS. The interagency consultation process was used to determine the CO modeling methodology.

A PM_{10} project-level hotspot analysis is not required for the project because it is not a project of air quality concern. The interagency consultation process was used to establish concurrence that the project is not a project of air quality concern.

IV.H.6. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Air Quality Guidebook and ADOT's Standard Specifications for Road and Bridge Construction.

IV.H.7. Conclusion

The Preferred Alternative would not be expected to cause a new violation or contribution to an existing violation of the NAAQS. The Preferred Alternative would meet all transportation conformity requirements because it is included in conforming regional plans, and it is not expected to cause or contribute to an exceedance of the NAAQS.

IV.I. Noise

Sound is the sensation produced by stimulation of the hearing organs produced by continuous and regular vibrations of a longitudinal pressure wave that travels through an elastic medium (e.g., air, water, metal, wood) and can be heard when they reach a person's or animal's ear. When sound travels through air, the atmospheric pressure wave variations occur periodically. Sound travels in air at a speed of approximately 1,087 feet per second at sea level at a temperature of 32°F. *Noise* is usually defined as "any unwanted sound," and consists of sounds that are perceived as interfering with communication, work, rest, and recreation. It is characterized as a non-harmonious or discordant group of sounds.

The most commonly used noise descriptor in traffic noise analysis is the equivalent sound level (L_{eq}). L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that occurs during the same period. The 1-hour A-weighted equivalent sound level [$L_{Aeq(h)}$] is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise criteria used by ADOT.

Traffic noise is a combination of the noises produced by vehicle engines, exhaust, and tires. The source of highway traffic comes from vehicles traveling on highways. The noise level at the *Source* depends on pavement type, number of heavy trucks, traffic volumes, and traffic speeds. The predominant noise sources in vehicles at speeds less than 30 miles per hour (mph) are engine and exhaust. At speeds greater than 30 mph, tire noise becomes the dominant noise source.

IV.I.1. Methodology and Current Environment

As required by 23 CFR 772.5, ADOT defines a "Substantial Increase" in noise levels as an increase of 15 A-weighted decibels (dB(A)) in the predicted noise level over the existing noise level. As required by 23 CFR 772.11(e), the point at which the noise levels "approach" the FHWA Noise Abatement Criteria (NAC) (**Table IV-26**) is defined by ADOT as 1 dB(A) for Activity Categories A, B, C, D, and E. There is no noise impact threshold for Category F or Category G locations.

To analyze the traffic noise from the Preferred Alternative, 225 noise receptors were identified within the study area. A total of 28 receptor locations were selected for field noise measurement along the proposed project. Measurements were conducted between 6:00 a.m. and 10:30 a.m. or between 3:30 p.m. and 6:00 p.m. It is recommended by the Arizona Noise Abatement Requirements (NAR) that for validation of FHWA's Traffic Noise Model software, two noise measurements should be taken along the same line perpendicular to the highway, one within 400 feet and the other half the distance from the roadway to the first measurement location. This was done when and where it is possible. If two such measurements were not possible, measurement was conducted where practicable, 10 feet from the property line (nearest to the freeway) and 10 feet away from any buildings. Outdoor use areas closest to the freeway were used as measurement sites at multi-family complexes. The existing noise levels throughout the study area ranged from a low of 55.9 dB(A) L_{Aeq} to a high of 76.5 dB(A) L_{Aeq}.

Table IV-26. FHWA Noise Abatement Criteria

Activity Category	dB(A), Leq_{1h}	Activity Description
A	57 (exterior)	Land 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	67 (exterior)	Residential
C	67 (exterior)	Active sports 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 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio structures, recording studios, schools, and television studios
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in categories A–D or F
F	—	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

Source: FHWA 2011; 23 CFR § 772
Note: The 1-hour equivalent loudness in A-weighted decibels is the logarithmic average of noise over a 1-hour period.

Due to the length and complexity of the project, the study area was divided into four sections to conduct the measurements and the analysis. Specific land uses and the number of the field measurements in the four sections of the study area are described below:

- **I-10 from I-17 to 40th Street** – Land use in this area is mainly office and light industrial, with two hotels (Activity Category E). Sound levels in the area between the I-17 and the Salt River are mainly influenced by the noise from Sky Harbor International Airport. Field measurements were taken at four sites in this portion the study area.
- **I-10 from 40th Street to Fairmont Street** – This area is surrounded mainly by office and light industrial (Activity Category E), with one area of single-family homes (Activity Category B) located on the eastbound side between 43rd Place and 48th Street. The portion of the SR 143 Hohokam Expressway within the project area is mainly office and light industrial land uses. However, there is a motel located on the westbound side and a hotel located on the southbound side south of University Drive (all Activity Category E). Field measurements were taken at four sites in this area.
- **I-10 from Fairmont Street to US 60** – Land use in this section is a mix of single-family residences and apartments (Activity Category B), hotels (Activity Category E), a cemetery (Activity Category C), and office and shopping areas (Activity Category E and F). Nine field

measurements were taken along I-10 in this area. Two field measurements were taken along the US 60.

- **I-10 from US 60 to Ray Road** – The land use in this section is a mix of shopping centers and office parks on the northbound side (Activity Category E and F), and residential (Activity Category B), golf courses, ball parks and shopping centers on the southbound side (Activity Categories C, E, and F). Nine field measurements were taken along this part of I-10.

IV.I.2. Environmental Consequences

The Noise Analysis Technical Report (ADOT 2019) shows specific information for each of the 225 receivers identified in the study area, including the receiver identification and description, predicted noise levels, and noise mitigation considerations. Below is a summary of the modeled existing, No-Build, and Build traffic noise levels:

I-17 to 40th Street

- Existing – 61.6 dB(A) to 77.4 dB(A)
- No-Build Alternative – 61.6 dB(A) to 77.4 dB(A)
- Preferred Alternative – 63.5 dB(A) to 82.5 dB(A)

The modeled noise levels at 8 out of 10 receivers approach or exceed FHWA NAC for Activity Category E, motels and hotels. Therefore, consideration of abatement measures is warranted.

40th Street to Fairmont Street

- Existing – 57.2 dB(A) to 78.8 dB(A)
- No-Build Alternative – 58.0 dB(A) to 78.8 dB(A)
- Preferred Alternative – 60.9 dB(A) to 82.4 dB(A)

The modeled noise levels at 28 out of 62 receivers approach or exceed FHWA NAC for Activity Category B/C, for residences, and 11 receivers approach or exceed FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

Fairmont Street to US 60

- Existing – 57.6 dB(A) to 79.6 dB(A)
- No-Build Alternative – 57.6 dB(A) to 79.6 dB(A)
- Preferred Alternative – 58.7 dB(A) to 83.4 dB(A)

The modeled noise levels at 47 out of 125 receivers approach or exceed FHWA NAC for Activity Category B/C, residences, and 2 receivers approach or exceed the FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

US 60 to Ray Road

- Existing – 49.7 dB(A) to 80.1 dB(A)
- No-Build Alternative – 49.7 dB(A) to 80.1 dB(A)
- Preferred Alternative – 54.5 dB(A) to 81.5 dB(A)

The modeled noise levels at 104 out of 226 receivers approach or exceed FHWA NAC for Activity Category B/C, residences, and 8 receivers approach or exceed the FHWA NAC for Activity Category E, hotels/motels/offices. Therefore, consideration of abatement measures is warranted.

IV.I.3. Noise Abatement

ADOT considers abatement measures as mitigation for receivers predicted to be impacted by traffic noise associated with a proposed transportation improvement project. For a mitigation measure such as a noise barrier to be proposed for the project, it must meet criteria for being both feasible and reasonable.

Pursuant to 23 CFR 772.13(d)(1), the initial considerations for each potential abatement measure are both the engineering and acoustic factors that determine whether it is possible to design and construct.

Per Chapter 5.1 of ADOT NAR, engineering feasibility factors are:

- Safety, barrier height, curvature, and breaks in barriers
- Topography, drainage, utilities
- Maintenance requirements, access to adjacent properties
- Overall project purpose

Per Chapter 5.2 of ADOT NAR, for a noise abatement measure to be acoustically feasible, ADOT requires achievement of at least a 5 dB(A) highway traffic noise reduction at 50 percent of impacted receptors. In some instances, the noise level at a location may be affected by an alternate noise source, such as other roadways/streets, railroads, industrial facilities, and airplane flight paths. In such locations, noise abatement for the proposed transportation project may not be acoustically feasible since a substantial overall noise reduction cannot be achieved due to other noise sources.

Per Chapter 6 of ADOT NAR, three reasonableness factors, or “tests,” must collectively be achieved for a noise abatement measure to be deemed reasonable:

- Viewpoints or preferences of property owners and residents
- Noise reduction design goal
- Cost-effectiveness

Noise barriers should be designed to reduce projected unmitigated noise levels by at least 7 dB(A) for benefited receptors *closest to the transportation facility*. To be considered reasonable, at least half of the benefited receptors in the first row would need to achieve this level of noise

reduction. The maximum reasonable cost of abatement is $49,000 per benefited receptor (cost-per-benefited-receptor) with barrier costs calculated at $35 per square foot, $85 per square foot if constructed on a structure. The cost of removing any previously built walls, drainage, and other similar construction work is included in the cost assessment.

A noise barrier analysis was conducted using the Traffic Noise Model to abate the noise impacts and achieve at least 5-decibel or higher noise reductions. Possible noise barriers (which could include berms) may be located at the freeway shoulder, ROW line, or on the top of slopes (as the case may be), whichever would provide maximum noise reduction and be more desirable for other considerations, such as freeway expansion and maintenance. If more than one barrier location (alignment) was possible and appeared feasible, all such locations were studied, modeled, and presented in the report with the same level of detail and accuracy.

Preferred Alternative

Seventeen barriers were evaluated to reduce the noise impacts of the Preferred Alternative. However, after performing the feasible and reasonableness analysis, ten of them did not meet the threshold. Based on the analysis, seven barriers are recommended as a mitigation measure benefiting 413 impacted receptors. These noise barriers are 14 feet to 18 feet high and are labeled NB-1 through NB-7. The proposed noise barrier summary is shown in **Table IV-27**. **Figure IV-13** shows the two existing noise barriers that are proposed to remain in place and seven new proposed noise barriers. For more details on the evaluated noise barriers and the analysis performed, refer to *The Noise Analysis Technical Report* (ADOT 2019).

No-Build Alternative

Under the No-Build Alternative, the freeway capacity and operational improvements would not be constructed. FHWA regulations and ADOT requirements only provide for noise mitigation in "Type I" construction projects, which add a transportation facility on a new alignment, increase the capacity of an existing transportation facility, or result in substantial vertical or horizontal alterations. Consequently, under the No-Build Alternative, noise mitigation measures would not be provided for any of the receivers.

Construction Noise and Vibration

Construction noise is intermittent and depends on the type of operation, location, and function of the equipment, and the equipment usage cycle. The noise level from construction equipment decreases with distance from the source. Pile driving, demolition activity, blasting, and crack-and-seal operations are sources of vibration, which can also be a source of discomfort for individuals who live or work close to these activities. A general assessment of construction noise is warranted for projects in an early assessment stage when the equipment roster and schedule are undefined and only a rough estimate of construction noise levels is practical. Quantitative Construction Noise Assessments include a description of the planned construction methods and any basic measures that have been identified to reduce the potential impact, such as temporary earthen berm or a barrier, prohibiting the noisiest construction activities during the nighttime once the project's construction plans are defined in greater detail during the final engineering phase.

Table IV-27. Recommended Noise Abatement Barrier Summary

Noise Barrier ID	Project Study Area Subsection	Barrier Height (ft)	Barrier Length (ft)	Area of Barrier (ft^2)	Total Barrier Cost[1]	Number of Benefited Receptors	Cost-Per-Benefited-Receptor	Cost Reasonable (Y/N) [2]
NB-1	40th Street to Fairmont Street	18	1,340	24,120	$844,200	82	$10,295	Y
NB-2	Fairmont Street to US 60	16	900	14,400	$504,000	16	$36,000	Y
NB-3	Fairmont Street to US 60	14	1592	22,288	$780,080	41	$19,026	Y
NB-4	Fairmont Street to US 60	18	2018	36,324	$1,271,340	95	$13,382	Y
NB-5	Fairmont Street to US 60	16	1,205	21,690	$759,150	57	$13,318	Y
NB-6	US 60 to Ray Road	16	2,804	44,864	$1,570,240	97	$16,188	Y
NB-7	US 60 to Ray Road	14	1,395	19,530	$683,550	25	$27,3420	Y

[1] Total cost of the noise barrier is based on the unit cost of $35/$85 per square foot for off/on structure placement of noise barriers.

[2] Based on a cost of $49,000 per benefited receptor.

Figure IV-13. Existing and Proposed Noise Barriers

IV.I.4. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's 2017 Noise Abatement Requirements, ADOT's Standard Specifications for Road and Bridge Construction, and local jurisdiction noise ordinances.

Contractor Responsibilities

- Where feasible, the noise barriers required as mitigation measures would be constructed as early as possible in the construction phasing to shield adjacent properties from construction-related noise.

IV.I.5. Conclusion

The Preferred Alternative results in noise impacts to the land uses adjacent to the project, to mitigate the impacts, eight barriers were recommended to be constructed as part of the project. **Table IV-27** summarizes the recommended noise mitigation/barriers in accordance with the ADOT NAR. The noise barrier locations would be subject to adjustment during final design to accommodate features not contemplated in this preliminary noise analysis.

IV.J. Utilities

Utilities are facilities that transmit or distribute various commodities such as electrical power, irrigation, communications, sewer, water, reclaimed water, natural gas, and petroleum. They can be private, public, or cooperatively owned.

IV.J.1. Existing Conditions

Utility designation was completed in 2008 as part of the I-10 Near Term Improvements DCR and is the basis of evaluating potential utility owners and conflicts. **Table IV-28** lists the utility type, owner, and description of facility within the study area.

Table IV-28. Existing Utilities Within the Proposed Construction Limits

Utility Type	Owner	Description
Electrical Power	Salt River Project (SRP)	69 kilovolt (kV) sub-transmission, 12kV and secondary power services
	Arizona Public Service	230 kV transmission
Irrigation	SRP	Canals and irrigation infrastructure
Communications (Fiber Optics and Cable)	CenturyLink Communications	Fiber optics and cable
	AT&T	Fiber optics
	Cox Communications	Fiber optics and cable TV
	Zayo Group	Fiber optics and cable TV
	SRP	Fiber optics
Sewer, Water, and Reclaimed Water	City of Phoenix	Water and sewer
	City of Tempe	Water and sewer
Natural Gas and Petroleum	Southwest Gas	High pressure and distribution
	Kinder Morgan	High pressure
	Air Products	Nitrogen

The following is a summary of the existing utilities within the proposed construction limits:

- 24th Street to 48th Street – The existing utilities between 24th Street and 48th Street generally cross I-10 at the cross roads. These crossings include SRP Power (transmission and distribution); SRP Irrigation; City of Phoenix Water and Sewer; Southwest Gas; and multiple fiber companies. Major power crossings include: SRP Power 69kV with 12kV underbuild east of 32nd Street; SRP Power 69kV with 12kV underbuild at 36th Street; and Arizona Public Service 230kV and SRP Power 69kV with 12kV underbuild west of 48th Street. The proposed construction limits were extended west of 24th Street to allow for potential signage and ITS facilities; however, this utility scan only includes areas where widening is anticipated.
- 48th Street – Broadway Road to University – The existing utilities along 48th Street and the SR 143 alignment from Broadway Road to University include paralleling the roadway and several crossings. The utilities include SRP Power (transmission and distribution); SRP

Irrigation; City of Tempe Water and Sewer; Southwest Gas; Air Products; and multiple fiber companies. Major power crossings include: SRP Power double circuit of 69kV with a double circuit of 12kV at the Tempe Drain. SRP Irrigation has a lateral running along 48th Street and terminates at the Tempe Drain.

- 48th Street to Alameda Drive – There are limited private utilities along the project corridor between 48th Street and Alameda Drive.
- Alameda Drive to Southern – Several utilities cross the I-10 at Alameda, including City of Tempe water and sewer and several fiber optic and communications utilities. From Alameda Drive to Southern Avenue, existing utilities parallel I-10 on both the east and west side. The west side utility corridor includes City of Tempe water and sewer, SRP Irrigation, and Southwest Gas. The east side utility corridor includes Southwest Gas and fiber optic and communications utilities.
- Southern Avenue to Western Canal – There are limited private utilities along the project corridor between Southern Avenue and US 60. Existing utilities adjacent to the Galleria Palms were relocated under a separate project.
- Western Canal to Ray Road – The existing utilities between the Western Canal and Ray Road generally run parallel to I-10 and include some crossings. The existing utilities within this segment include SRP Power (transmission and distribution); SRP Irrigation; City of Tempe Water and Sewer; Southwest Gas; El Paso Natural Gas; and multiple fiber companies. Major power crossings include: SRP Power double circuit 69kV south of the I-10/US 60 system TI; SRP Power double circuit 230kV at Highline Canal; SRP Power 69kV with 12kV at Calle Cerritos; and SRP Power 69kV with 12kV one-half mile south of Guadalupe Road. Major SRP irrigation crossings include Western Canal and Highline Canal with additional laterals that cross I-10. The proposed construction limits were extended south of Ray Road to allow for potential signage and ITS facilities; however, this utility scan only includes areas where widening is anticipated.

IV.J.2. Environmental Consequences

Preferred Alternative

The Preferred Alternative has potential horizontal and vertical conflicts with existing utilities. These impacts are summarized as follows:

- SRP overhead power
  - 12kV at 38th Street
  - 12kV east of 40th Street
  - 69kV and 12kV west of 48th Street
  - Double circuit 69kV and 12kV at Tempe Drain
  - 12kV at Broadway Road and 48th Street
  - 12kV at Alameda
  - Double circuit 69kV at I-10/US 60 System TI

- SRP underground power
- SRP Irrigation
  - 30-inch reinforced concrete pipe west of 32nd Street
  - 30-inch reinforced concrete pipe west of 40th Street
  - 48th Street Laterals
  - 24-inch rubber gasketed reinforced concrete pipe from Fairmont to Southern Western Canal

The following facilities would be impacted throughout the project limits. Pothole information obtained during final design would be required to confirm conflicts.

- City water and sewer
- Communications and fiber optic lines
- Natural gas, petroleum products, and nitrogen products

Utility corridors along 48th Street, Alameda and Diablo Way would be impacted by the project. ADOT would coordinate with the appropriate utility companies during design and construction regarding impacts, adjustments, and any service disruptions. The ADOT Utility Section would further investigate utility involvement to coordinate the need for relocation and the accommodation of utilities with the proposed construction.

No-Build Alternative

The No-Build Alternative would not affect existing utilities because no freeway widening or reconstruction would occur.

IV.J.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Standard Specifications for Road and Bridge Construction.

IV.J.4. Conclusion

The Preferred Alternative would have utility impacts throughout the corridor, including SRP overhead and underground power, SRP Irrigation, City water/sewer, private gas, and private fiber optics and communications. ADOT would coordinate with the appropriate utility companies during design and construction regarding impacts, adjustments, and any service disruptions. The ADOT Utility Section would further investigate utility involvement to coordinate the need for relocation and the accommodation of utilities with the proposed construction.

IV.K. Visual Resources

A visual resources analysis studies the relationship between viewers and their visual surroundings and their reactions to changes in those surroundings. FHWA published a guidance to perform a visual impact analysis in 2015 that sets forth guidelines to analyze impacts of the project on the surrounding visual environment. A Visual Impact Assessment Memorandum was prepared for this project following the *Guidelines for Visual Impact Assessment for Highway Projects* (FHWA 2015). The assessment of aesthetic impacts of Preferred Alternative is grounded in federal law, policy, and agency regulations. NEPA (42 USC §§ 4331–4332) requires the federal government to use all practicable means to assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings [Section 101(b)(2)].

The visual impacts of the Preferred Alternative are qualitatively evaluated based on expected changes in visual quality, an assessment of the overall change in visual character, and the projected sensitivity of the viewers to changes in the visual landscape within the study area.

IV.K.1. Existing Conditions

The view is influenced by the position and distance of the viewer. This space is referred to as Distance Zone. The guidelines for the *Visual Impact Assessment of Highway Projects* (FHWA 2015) define the Distance Zone as "the position of the viewer in relationship to the landscape" or visual setting. As the individual viewer moves, the measurement of the Distance Zone changes and these measured distances are known as foreground, middleground, and background (**Table IV-29**).

Table IV-29. Distance Zones

Distance Zone	Measurement
Foreground	0.25–0.5 mile from the viewer
Middleground	Extends from the foreground to 3–5 miles from the viewer
Background	Extends from the middleground to the limit of visibility

To conduct the visual analysis, the study area was divided into three segments (**Figure IV-14**) and analyzed and discussed separately.

Figure IV-14. Visual Impact Assessment Segments

Segment 1

Segment 1 is oriented east-west and is characterized by relatively flat terrain sculpted by the Salt River. Vegetation within this segment is limited to mature native landscaping along the I-10 corridor and the intersecting streets. Excluding where the Salt River floodplain prohibits construction, the land within Segment 1 has substantial industrial and commercial development on the north side that transitions to urban residential to the south.

The foreground and middleground views from the freeway within Segment 1 consist predominantly of industrial and commercial development (**Figure IV-15**). The Salt River floodplain and Sky Harbor Airport frame the north limits of Segment 1 prior to the I-10 and I-17 split. Overhead high-voltage power lines run parallel to the I-10 corridor and cross the freeway where Segment 1 and Segment 2 transition.

Figure IV-15. Segment 1 – Adjacent Industrial and Commercial Development

The background views from driving westbound include the City of Phoenix and City of Tempe skylines, and the peaks of the South Mountain, Piestewa Peak, Estrella, Camelback, and Santan Mountain park preserves. For drivers, the view of the 44th Street alignment and 48th Street ramps is limited because of the south-facing noise barriers located between the only apartment complex in Segment 1 and the I-10 corridor. The various commercial, industrial, and residential development in Segment 1, in addition to the traffic wayfinding, commercial signs, and billboards, are all visible from the freeway at the different Distance Zones.

Segment 2

Segment 2 is characterized by the rocky outcroppings and foothill slopes of the Tempe Buttes that can be seen within the gaps between commercial development (**Figure IV-16**). As with Segment 1, the vegetation within Segment 2 is mature, native landscaping adjacent to the I-10 corridor and arterial streets. There are also large areas of river rock located in low lying areas of loop ramps and drainage basins surrounding the area known as the Broadway Curve. Numerous existing building styles, traffic, and commercial signs and billboards of an urbanized character are visible within this segment.

Figure IV-16. Segment 2 – Tempe Buttes, Existing DMS Signs, Commercial Development

The foreground views from the freeway consist predominantly of commercial and high-rise development, the SR 143 system interchange, and Tempe Diablo Stadium. From the freeway, the Tempe Buttes peak is situated in the middleground along with resorts located on the slopes to the west with views of the freeway.

Segment 3

Segment 3 is oriented north-south and is characterized by residential and retail development patterns and relatively flat terrain with limited, undisturbed native vegetation like Segments 1 and 2 along the freeway and intersecting cross streets (**Figure IV-17**).

Figure IV-17. Segment 3 – Flat Terrain, Suburban Retail Development

Along the north-south alignment, the foreground and middleground views from the freeway consist predominantly of multi-family and single-family developments with associated noise barriers, open spaces, and parks with commercial development. The noise barriers adjacent to the residential areas limit the views of foreground and close middleground elements of the I-10 corridor, except where traffic and commercial signs and billboards appear above the noise barriers. The background and middleground views from the freeway include mixed development,

the roof tops of residential development, traffic wayfinding and commercial signs, and billboards. South Mountain can be viewed to the southwest; the Santan Mountains can be viewed to the southeast; and Camelback Mountain can be viewed to the north.

Summary

Table IV-30 summarizes the existing visual character for foreground, middleground, and background per segment.

Table IV-30. Existing Visual Resources per Segment

Segment	Foreground	Middleground	Background
1	▪ Traffic signs/billboards ▪ Adjacent development ▪ Cross-street bridges	▪ Sky Harbor Airport ▪ Tempe Buttes ▪ SR 143 System Interchange	▪ Camelback Mountain ▪ South Mountain ▪ Phoenix skyline
2	▪ Traffic signs/billboards ▪ Adjacent development ▪ Cross-street bridges ▪ Tempe Buttes ▪ SR 143 system interchange	▪ Sky Harbor Airport ▪ Tempe Skyline	▪ Camelback Mountain ▪ South Mountain ▪ Estrella Mountains ▪ Phoenix skyline
3	▪ Traffic signs/billboards ▪ Adjacent development ▪ US 60 system interchange ▪ Noise barrier walls ▪ Cross-street bridges	▪ Sky Harbor Airport ▪ Tempe Buttes	▪ McDowell Mountains ▪ South Mountain ▪ Santan Mountains

IV.K.2. Environmental Consequences

The Visual Impact Assessment conducted for the Preferred Alternative evaluated changes in the visual character as compared to the No-Build Alternative. The magnitude of these changes is expressed qualitatively using levels of impact, as listed in **Table IV-31.**

Table IV-31. Level of Impact

Level of Impact	Visual Integrity of the Landscape and Visual Character
High	Would be adversely affected in the long-term by the proposed alternative
Moderate	Would noticeably deviate from the existing visual setting
Low-to-Moderate	Would deviate slightly from the existing visual setting
Low	Would deviate very little or not at all from the existing visual setting

Preferred Alternative

The Preferred Alternative preserves much of the existing freeway mainline configuration by widening to the outside of existing pavement and following the existing horizontal and vertical alignments. But the increase in the overall number of lanes results in an increase to the pavement width. Therefore, the existing distance between the freeway and the adjacent land uses would decrease.

Ramp reconfigurations would closely resemble, in most locations, the existing ramps and would tie into exiting crossroads. This pavement widening and ramp changes would present minimal visual changes occurring along the ground plane of the freeway to all but the users. The observers from the freeway would experience and perceive a wider but similar freeway. Areas with specific visual impacts are discussed in more detail in the following sections.

Visual Impact Assessment: Segment 1

Impacts to the freeway's visual quality for the observers to and from the freeway would be Low-to-Moderate for this segment. Lane widening would occur under several cross streets, which would increase structure underpass widths with added retaining walls increasing the visual separation to the existing development. The presence of numerous existing built visual elements in the foreground and middleground views due to the urban setting results in moderately noticeable changes to the visual quality of the area.

Visual Impact Assessment: Segment 2

Visual impacts of the Preferred Alternative in Segment 2 would be Low-to-Moderate. The new SR 143 system interchange, 48th Street bridges, and associated ramps would be elevated with up to three levels of structures and would further bisect an area predominantly comprised of commercial, retail, and resort development. The elevated structures of SR 143 would present a Low-to-Moderate intrusion into the currently urbanized landscape. Observers would notice the elevated structures, but these changes would not dramatically alter the urban character. The proposed elevated portions of SR 143 would alter views to the Tempe Buttes from areas north of the existing freeway.

The freeway would be visible to motorists and residents for a considerable distance; however, due to the existing multistory buildings and billboards visually interrupting views in the middleground and foreground, the visual conditions would not differ substantially from existing conditions.

Visual Impact Assessment: Segment 3

The visual impacts of the Preferred Alternative in Segment 3 would be Low-to-Moderate. The new C-D road bridges at Southern Avenue would result in substantially different views for motorists crossing under the freeway at that location. At the US 60 system interchange, the new and modified ramps and new C-D roads would have a low profile and be mostly covered by the existing fly-over bridges that remain in place. The proposed modifications to noise barriers would further block foreground views from adjacent developments; however, the tall structure of the US 60 West to I-17 West fly-over ramp would present a more extensive change to the skyline by limiting the existing views for motorists on adjacent ramps along the I-10 and US 60. Widening of the Guadalupe Road bridge and a new pedestrian bridge structure connecting the Western Canal to trails would result in a noticeable deviation in the current view for motorists and developments adjacent to the freeway. However, these changes would not alter the urban character of the existing visual quality of these segments.

Visual Impact Assessment: Other Visual Elements

The freeway median within the study area has a concrete barrier between 32 and 42 inches in height and presents minimal visual impact. The existing noise barriers along the ROW and grade-separated areas of freeway within the study area limit the foreground and some middleground views to and from the freeway for most of the study area. The Preferred Alternative would require additional noise barriers and reconstructed noise barriers. Although obstructing some views, these noise barriers would be constructed in accordance to ADOT guidance and would follow the aesthetic guidelines of the freeway and would not introduce new visual impacts.

Throughout the corridor, DMSs would be used for traffic management. The Preferred Alternative includes four existing DMS locations and 14 new DMS locations. Since the DMS boards emit light and are a relatively new technology, each location must be reviewed using KMZ mapping over Google Earth imagery in addition to the field verification of locations within a one-quarter-mile radius of the proposed locations. The evaluation factored in the visual impacts of high-mast lighting, static and dynamic billboards, commercial signage, and freeway overhead traffic signs on residential areas to lower sensitivity to the proposed DMS locations. Commercial and industrial areas were not considered for the sensitive review. All locations had existing visual impacts from signage and freeway lighting and therefore indicated a Low-to-Moderately Low impact on the existing visual character. In the final design of Segment 3, the elevations should be compared to noise barrier heights and reviewed on a case-by-case basis to determine if mitigation is required.

No-Build Alternative

The No-Build Alternative would have no effect on visual resources in the study area.

IV.K.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Standard Specifications for Road and Bridge Construction.

IV.K.4. Conclusion

The Preferred Alternative would introduce Low to Moderate degrees of alteration to the existing visual landscape. The change would result in a contrast between the new infrastructure with the existing forms, lines, colors, and textures; however, the overall visual character of the area would not be affected. **Table IV-32** summarizes the visual impacts of the Preferred Alternative by segment.

Table IV-32. Visual Impacts Summary (Preferred Alternative)

Segment	Low	Moderate	High
1	▪ I-10 pavement widening ▪ Ramp modifications ▪ Traffic/DMS signs	N/A	N/A
2	▪ I-10 pavement widening ▪ Ramp modifications ▪ 48th Street and Broadway road bridge reconstructions ▪ Traffic/DMS signs	▪ SR 143 system interchange ▪ C-D roads and ramps ▪ Noise barriers	N/A
3	▪ I-10 pavement widening ▪ Ramp modifications ▪ Traffic/DMS signs	▪ US 60 West to I-17 West fly-over ramp ▪ Southern Avenue C-D roads ▪ Noise barriers	N/A

IV.L. Drainage and Floodplain Considerations

A floodplain is generally level land subject to periodic flooding from an adjacent body of water. Floodplains are delineated and managed by the Federal Emergency Management Agency (FEMA). FEMA maintains and updates floodplain information through Flood Insurance Rate Maps (FIRMs). Federally funded activities taking place within or otherwise affecting floodplains are regulated under Executive Order 11988, which requires the lead agency to evaluate the activity's or project's potential impacts to floodplains, minimize flood risks to human safety and wellbeing, and restore and preserve floodplain values.

The base flood, also known as the 100-year flood, is a flood that statistically has a 1 percent chance of occurring in any given year. The area that would be inundated by the 100-year flood is called the 100-year floodplain. The regulatory floodway is defined as the channel of a river or other watercourse and the adjacent land areas within a floodplain that must be reserved for discharging the base flood without cumulatively increasing the water surface elevation more than a designated height. Floodplains, including the floodway, are typically regulated by state, county, or local agencies.

Floodplains are typically hydrologically important, environmentally sensitive, and/or ecologically productive areas that perform many natural functions. Therefore, it is important for impacts of permanent construction projects on floodplains to be assessed prior to taking an action as part of the decision-making process.

IV.L.1. Existing Conditions

While FEMA continues to update FIRMs with the best available hydrology and hydraulics information, the floodplains delineated on the most recent FIRMs are considered the effective floodplains. The Preferred Alternative crosses three regulatory watercourses and their effective floodplains: The Salt River, Western Canal, and Highline Canal (**Figure IV-18**). As shown in **Figure IV-18**, the study area is covered by the following effective FIRMs:

- 04013C2220L
- 04013C2240L
- 04013C2705L

The flood hazard zone designations located within the study area include both Zone A and Zone AE. The FEMA designations are as follows:

- Zone A: Areas with a 1 percent annual chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. No base flood elevations are determined. The Western and Highline Canals in the study area include Zone A floodplains.
- Zone AE: Base flood elevations are determined. (AE Zones were designated as A1-A30 Zones on older format FIRMs.) The Salt River is delineated as a Zone AE floodplain.

Figure IV-18. FEMA Flood Hazard Zones in the Study Area

It should be noted that the small segment of regulatory floodplain within the Tempe Drain on FIRM 04013C2220L is no longer valid. This segment of the Tempe Drain was removed from the FEMA regulatory floodplain as a result of a Letter of Map Revision Case Number 15-09-2235P, effective February 10, 2017.

IV.L.2. Environmental Consequences

Preferred Alternative

Construction of the Preferred Alternative could impact these three regulatory watercourses, which might impact the 100-year floodplain.

Regulatory Floodplain Impacts

Salt River – Under the Preferred Alternative, the I-10 bridge over the Salt River would be widened. Based on a preliminary hydraulic analysis, the added infrastructure could increase the water surface elevation of the 100-year floodplain by 0.01 feet (3 millimeters). These impacts of the Preferred Alternative on the Salt River floodplain would be considered minor and negligible. The City of Phoenix is the floodplain administrator of the Salt River floodplain at this location.

Western Canal – The Zone A FEMA floodplain is located along the southern edge of the canal where stormwater runoff ponds along the south bank of the canal. The Preferred Alternative would require grading activities within an existing detention basin located within this floodplain, changing the shape of the floodplain. However, the grading activities would not increase the water surface elevation of this floodplain. The City of Tempe is the floodplain administrator of Western Canal floodplains in the study area.

Highline Canal – The Zone A FEMA floodplain is located along the southern edge of the canal and is created by stormwater runoff ponding along the south bank of the canal. There are no anticipated impacts to the Highline Canal floodplain from the Preferred Alternative. The City of Phoenix is the floodplain administrator of Highline Canal floodplains in the study area.

Other Drainage Impacts

Since the Preferred Alternative would add pavement and reduce infield areas (i.e., the landscaped area between the freeway mainline and ramps), onsite discharges would increase. In order to mitigate the impacts to the receiving waters/outfalls, the Preferred Alternative would include an increase in the capacity of existing detention and retention basins. A detention basin holds runoff for a short period of time and releases flow gradually, while a retention basin holds runoff and disposes of it through infiltration. Both measures would mitigate increases in runoff discharges.

No-Build Alternative

The No-Build Alternative would have no impact on the floodplains in and adjacent to the study area.

IV.L.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Erosion and Pollution Control Manual and ADOT's Standard Specifications for Road and Bridge Construction.

ADOT Design Responsibilities

- Floodplain impacts would be coordinated with the Maricopa County Flood Control District.

ADOT District Responsibility

- The City of Phoenix floodplain manager at 602.262.4960, the City of Tempe floodplain manager at 480.350.2738, and the Flood Control District of Maricopa County floodplain manager at 602.506.1501 would be provided an opportunity to review and comment on the design plans.

IV.L.4. Conclusion

The Preferred Alternative would increase the Salt River floodplain water surface elevation by 0.01 feet and change the shape of the Western Canal floodplain without increasing the water surface elevation. The No-Build Alternative would have no impact on floodplains.

Under the Preferred Alternative, ADOT would prepare the necessary documentation to develop a Conditional Letter of Map Revision and a Letter of Map Revision for the impacted floodplains.

IV.M. Section 404, 401, and 402 of the Clean Water Act and Arizona PDES

The Clean Water Act (CWA) is the primary federal statute governing the discharge of pollutants into jurisdictional Waters of the United States (Waters), which, in Arizona, include perennial and ephemeral watercourses and their tributaries and adjacent wetlands. The principal goal of the CWA is to establish water quality standards to restore and maintain the chemical, physical, and biological integrity of the nation's Waters by preventing point (concentrated output) and nonpoint (widely scattered output) pollution sources.

Section 404 of the CWA regulates the discharge of earthen fill, concrete, and other construction materials into Waters, and authorizes the U.S. Army Corps of Engineers (Corps) to issue permits regulating the discharge of dredge or fill material into Waters. The limits of Waters are defined through a preliminary or approved jurisdictional delineation (JD) accepted by the Corps. A preliminary JD assumes all drainages in an area are subject to the jurisdiction of the Corps. An approved JD requires that all ephemeral drainages display a significant nexus to the downstream traditional navigable water, which for this project is the Gila River.

The USACE issued a JD for the study area in June 2008 that identified the following jurisdictional Waters:

- Salt River
- Tempe Drain
- 12th Street Ditch
- 16th Street Outfall

The 2008 JD expired in 2013 and the revised scope of work no longer includes work at the 12th Street ditch and 16th Street outfall. Therefore, a reevaluation and delineation of the revised study area was completed in 2018 and 2019. The Corps issued a Preliminary JD in June 2019 for the study area. The Preliminary JD included all potential Waters, including wetlands, within the study area.

The most common types of Section 404 permits for transportation projects are (1) Nationwide Permit 14 (Linear Transportation Projects), which authorizes projects with less than 0.5 acre of permanent loss of Waters with no impacts to special aquatic areas such as wetlands, a pre-construction notification (PCN) is required for Waters impacts that exceed .10 acre or that result in a discharge into special aquatic sites, including wetlands (compensatory mitigation is required for wetland losses that exceed .10 acre) and (2) individual permits, which are required for projects that affect more than 0.5 acre of Waters or cause impacts on jurisdictional wetlands. An individual permit requires mitigation to minimize or offset the impacts to Waters with no net loss of the functions and values of the water resource.

If an individual permit is required, the permit requires that the documentation must describe that the "Least Environmentally Damaging Practicable Alternative" (LEDPA) has not been eliminated from consideration for the project preferred alternative. It is the responsibility of the applicant to demonstrate to the Corps that the LEDPA has not been screened out during the

decision-making process. Therefore, factors such as aquatic resource impacts need to be considered during the alternative screening process.

Section 401 of the CWA requires any applicant requesting a federal permit or license for activities that may result in discharge into Waters to first obtain a Section 401 certification from the state in which the discharge originates. The Section 401 certification verifies that the prospective permits comply with the state's applicable effluent limitations and water quality standards. Federal permits or licenses are not issued until the Section 401 certification is obtained. The Arizona Department of Environmental Quality (ADEQ) is responsible for the Section 401 certification. If a project meets the terms and conditions of a Nationwide Permit and the criteria for conditional Section 401 certification, notification to ADEQ is not required. However, if a project does not meet the criteria for conditional certification, such as projects occurring within 0.25 mile of unique or impaired waters, an individual Section 401 certification application to the ADEQ is required.

Section 402 of the CWA formed the National Discharge Elimination System (NPDES), which regulates pollutant discharges, including stormwater, into Waters. A NPDES permit sets specific discharge limits for point-source pollutants into Waters and outlines special conditions and requirements for a project to reduce impacts on water quality. In 2002, EPA authorized the ADEQ to administer the NPDES program at the state level. The program, called the Arizona Pollutant Discharge Elimination System, issues permits that require a project be designed to protect Waters, and that the Contractor complies with all plans and requirements of the permit during construction.

ADOT owns and operates municipal separate storm sewer systems (MS4) that are regulated under the Arizona Pollution Discharge Elimination System program. Under this program, ADOT has been issued an individual MS4 permit that covers stormwater discharges from ADOT's storm sewer system, specified non-stormwater discharges, and discharges from the maintenance facilities. The individual MS4 Permit conditions are implemented by ADOT in the study area.

The Arizona List of Unique Waters [Arizona Administrative Code R18-11-112 (E)] and the Arizona 2006/2008 Section 303(d) List of Impaired and Not Attaining Waters were reviewed to determine whether any unique or impaired waters are present. This review verified that no 303(d)-listed impaired waters are located within 1 mile of the study area.

IV.M.1. Regulatory Setting

The waters of the United States present within the study area include a natural ephemeral channel, canal, and human induced wetlands. The following regulatory guidance reviews, desktop studies, and field studies were completed to identify Waters within the study area:

- *Regional Supplement to the Corps of Engineers Delineation Manual: Arid West Region* (Version 2.0) (USACE 2008b)
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008a)

- *Corps of Engineers Wetland Delineation Manual* (USACE 1987)
- June 2008 USACE JD completed for the study area
- Wetland and other Waters of the United States field delineation completed in 2018 and 2019
- Review of U.S. Fish and Wildlife Service National Wetland Inventory Mapping
- Review of U.S. Geological Survey 7.5' topographic quadrangles
- Review of study area aerial photographs

IV.M.2. Natural Ephemeral Channel

The Salt River within the study area is an ephemeral channel that receives water from stormwater runoff, effluent discharges from wastewater treatment plants, groundwater withdrawals, and from Tempe Town Lake water releases. Jurisdictional status of an ephemeral channel extends to the OHWM, which is defined as a line on the bank established by fluctuations of water and indicated by physical characteristics. Determining the OHWM on arid western channels is difficult due to the inconsistent volumes and duration of flows that can relocate channels. This often creates braided compound channels with a single low-flow channel. The Salt River would fit in this category as the ephemeral flows create conditions for channel relocation to occur based on the intensity of flows created by precipitation events.

IV.M.3. Canal

The Tempe Drain is a riprap and concrete-lined canal that has a direct connection to the Salt River. Flows in the Tempe Canal are the result of stormwater runoff and the release of treated effluent water. The USACE determined the Tempe Drain is a jurisdictional Water in the 2008 and 2019 USACE JDs completed for the project.

IV.M.4. Human-induced Wetlands

The USACE defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987).

Wetlands present in the study area have developed under atypical conditions. The ephemeral hydrology creates conditions that often do not inundate and saturate soils for a duration that would promote hydrophytic vegetation to become established. In addition, the alluvial soils present in the Salt River are sandy and do not develop the characteristics associated with hydric soils. Therefore, the creation of wetlands in the study area is dependent on stormwater, effluent discharges from wastewater treatment plants, groundwater withdrawals, and water releases from upstream impoundments.

Human-induced wetlands are created by human activities that provide a source of hydrology for hydrophytic vegetation to become established. Without these sources of hydrology, it would be

difficult for wetland vegetation to become established in the arid Arizona climate. Therefore, the wetlands present in the study area would be defined as being human-induced.

IV.M.5. Existing Conditions

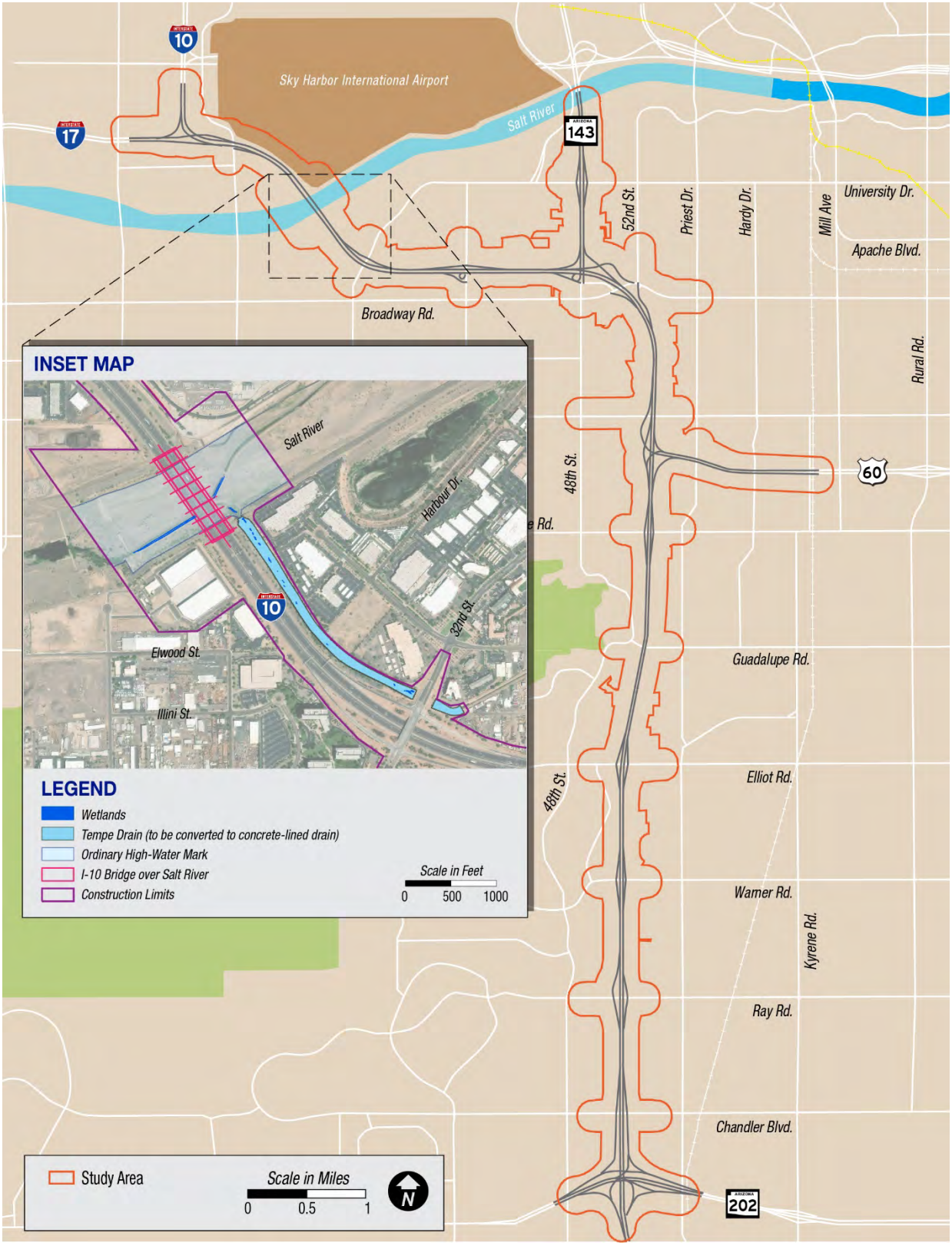
The Salt River is an ephemeral channel that contains small wetland areas supported by the low-flow channel. Tempe Drain is a man-made drainage that is riprap and concrete-lined within the study area. The 3,550 feet of riprap is installed on the segment of the canal starting from its confluence with the Salt River. This segment of the feature supports wetlands because of the presence of hydrology that supports the development of hydrophytic vegetation. The low-flow channel present in the drain supports surface water that flows into the Salt River. **Figure IV-19** shows the location of the Waters in the study area.

IV.M.6. Methodology

The 2018 and 2019 wetland delineation were completed per the 1987 *Corps of Engineers Wetland Delineation Manual* (USACE 1987), 2008 *Regional Supplement to the Corps Wetland Delineation Manual: Arid West Region* (USACE 2008b), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008a). The delineated wetlands were atypical, as they were established because of the urban flows that provide hydrology for the Tempe Drain and the low-flow channel in the Salt River. Wetlands were delineated at three locations within the study area. The locations included two sites along the Salt River and a segment of the Tempe Drain. At each of these locations, the presence of wetlands was determined based on a three-parameter approach that documented the presence of hydrophytic vegetation, hydric soils, and hydrology. Each data point included a soil core sample used to determine the presence of hydric soil indicators. While soils were sampled at each of these sites, they could not be used as a wetland indicator because they were alluvial and did not exhibit hydric indicators. Vegetation was sampled within a 2-meter-radius plot at each location. The plants in each plot were identified in the State of Arizona 2016 Wetland Plant List to determine their wetland indicator status.

The Salt River data collection was completed at two locations along the low-flow channel in the main riverbed. Data collection was initiated at a segment of the low-flow channel that is excavated to convey minor runoff from upstream urban hydrology sources. This data collection site is located from the I-10 bridge downstream to the first grade-control structure. At this location, the low-flow channel is 6 to 8 feet wide and contained surface water at the time the delineation was completed. The channel is lined with common reed (*Phragmites australis*), a facultative wetland plant species. Delineated wetlands at this location occurred as a narrow fringe along both sides of the channel banks. Wetland areas were restricted to the banks and did not extend into the open water in the channel.

Figure IV-19. Waters of the United States within the Study Area



The second Salt River data collection plot was located along the low-flow channel just upstream from the I-10 bridge. An 8-to 10-foot-wide open-water channel is present along this segment of the river. Dominant plants observed on the south bank of the channel included dallisgrass (*Paspalum dilitatum*), an upland plant species, with interspersed knotweed (*Polygonum* sp.), a wetland plant species. A narrow strip of wetlands was mapped at this location along the channel bank. Another small area on the north channel bank was also mapped as wetland.

The Tempe Drain was also surveyed from University Drive north to the discharge point into the Salt River. Along this segment of the feature, the low-flow channel is 16-to-20-feet wide and surface water is present. Small wetland areas occur where riprap is present. These sites are characterized by the presence of wetland plants such as common reed, umbrella sedge (*Fuirena* sp.), and some scattered cattail (*Typha latifolia*). Some of the more developed wetland areas were associated with the culverts where sediment accumulates and provide the conditions necessary for the establishment of hydrophytic vegetation. **Table IV-33** identifies the extent of jurisdictional Waters that were delineated within the study area.

Table IV-33. Waters of the United States Present in the Study Area

Drainage	Waters Type	Acres
Salt River	Open Water	38.94
	Wetland	0.20
Tempe Drain	Open Water	4.70
	Wetland	0.07
Total Open Waters		43.64
Total Wetlands		0.27
Total Waters		43.91

IV.M.7. Environmental Consequences

The following sections discuss the impacts to wetlands and other Waters resulting from the Preferred Alternative, including those effects expected during and after construction. This section addresses direct and indirect impacts to Waters from proposed roadway improvements. Direct impacts include temporary and permanent filling or draining of wetlands and other Waters. These impacts are quantifiable and are presented in acres for the Preferred Alternative. Indirect impacts include impacts to Water from sedimentation, erosion, releases of petroleum products and other pollutant releases, noxious weed invasion, and the loss of wetland vegetation due to bridge shadowing. Except for bridge shadowing, these impacts are not quantifiable.

Direct impacts on wetlands and other Waters were determined by overlaying roadway design and construction disturbance limits for the Preferred Alternative onto the delineated wetlands and other Waters. If any of the roadway design, including installation of concrete or other materials, were placed in wetlands or other Waters, it is considered a direct permanent impact.

Temporary impacts include activities such as construction staging areas, exposure of soil, buffers for construction access, removing vegetation, and other activities that do not result in the permanent loss of wetlands and other Waters.

Preferred Alternative

The Preferred Alternative would result in direct temporary and permanent impacts to Waters. These impacts would be the result of the placement of I-10 bridge piers within the Salt River channel and the installation of the concrete lining within the Tempe Drain.

The placement of the I-10 bridge piers within the Salt River would result in an estimated 0.02 acre of Waters impact. These are the only direct project impacts to the Salt River. No direct impacts to wetlands associated with the Salt River would occur from the Preferred Alternative. Some minor temporary impacts to existing I-10 bridge structure protection would occur during construction. These impacts would be the result of the movement of construction equipment and supplies during the bridge expansion. Impacts to the structure protection would be replaced in-kind and would not result in new disturbances to Waters.

Direct impacts to the Tempe Drain would result from the conversion of the 3,550 feet of riprap lining to a concrete channel. These impacts are estimated to be 0.75 acre of permanent direct impact to Waters where no riprap is currently installed. Direct permanent wetland impacts along the drain estimated to be 0.07 acre. The conversion to a concrete-lined channel would result in the inability of wetlands to be established along the low-flow channel. Temporary impacts would occur to Waters where the riprap is being removed and replaced with concrete lining. The estimated impacts would total 6.51 acres.

Indirect impacts associated with construction of the Preferred Alternative result from an increase in impervious surface that would increase sediment releases to Waters. An increase in impervious surface also results in increased runoff from precipitation that contributes to erosion and transport of pollutants to Waters. Erosion resulting from increased runoff can damage wetlands and stream banks by removing soil and vegetation.

Indirect impacts to wetlands could occur from expansion of the I-10 bridge. The deck would be increased in size and this could shade wetlands that are established under the bridge. Shading can result in loss of wetland plant vigor and can permanently eliminate the presence of vegetation. However, due to the minor expansion of the bridge deck, it is not expected that shading impacts would result in significant impacts to Salt River wetlands. **Table IV-34** summarizes the impacts to Waters.

Table IV-34. Estimated Impacts to the Salt River and Tempe Drain

Drainage	Waters Impacts	Wetland Impacts
Salt River	0.02 acre (permanent)	0
Tempe Drain	0.75 acre (permanent)	0.07 acre (permanent)
	6.51 acres (temporary)	
Total	Permanent: 0.77 acre	0.07 acre
	Temporary: 6.51	

No-Build Alternative

The No-Build Alternative would not affect Waters because no freeway widening or reconstruction would occur.

IV.M.8. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Clean Water Act Section 404/401 Guidance Manual, ADOT's Erosion and Pollution Control Manual, and ADOT's Standard Specifications for Road and Bridge Construction.

ADOT Design Responsibilities

- As part of Section 404 Permit conditions, permanent wetland impacts would be mitigated by compensatory mitigation (in-lieu fees) prior to start of the construction.

Contractor Responsibilities

- As part of Section 404 Permit conditions, permanent wetland impacts would be mitigated by compensatory mitigation (in-lieu fees) prior to the start of construction.

IV.M.9. Conclusion

Impacts associated with the Preferred Alternative include placement of bridge piers and fill into Waters. The preliminary design used for the impact analysis presented in this section indicates that a Section 404 Individual Permit and Section 401 Water Quality Certification would be needed for the project. If an individual permit is required as anticipated, it would require discussion on whether this project's preferred alternative meets the criteria for the LEDPA. Also, since the preliminary design impacts indicate that there will be permanent wetland impacts as a result of this project, compensatory mitigation would be required. As the project progresses into final design, impacts to Waters would be further evaluated to determine final impacts as part of the Section 404 permit process.

IV.N. Biological Resources

This section discusses existing conditions and impacts to biological resources resulting from the project. Biological resources addressed include threatened and endangered species, Arizona special-status species, invasive species, riparian and wetlands, and wildlife and habitats. A biological evaluation (BE) was prepared for the study area in 2015. In 2019, the BE was revised and approved by ADOT. This re-evaluation included another review of U.S. Fish and Wildlife Service (USFWS) and Arizona Game and Fish Department (AGFD) data was completed in 2019 to assess any changes in species listings and status since the 2015 BE was prepared.

IV.N.1. Existing Conditions

The study area is located within the Lower Colorado River Valley Subdivision of the Sonoran Desert scrub biome. Elevations in the study area range from 1,000 to 1,500 feet. Flora commonly present in this biome include creosote bush (*Larrea tridentata*), mesquite (*Prosopis* spp.), paloverde (*Parkinsonia* spp.), saguaro (*Carnegiea gigantea*), and bursage (*Ambrosia* spp.).

The Salt River bisects the northern portion of the study area and is classified as an ephemeral stream along this segment of the river. Salt River flows are dependent on stormwater releases and releases of effluent water. The Salt River floodplain supports wetland and riparian vegetation that is present along the low-flow channel. This vegetation community is dominated by common reed (*Phragmites australis*), with some dense stands of dallisgrass (*Paspalum dilatatum*).

The Tempe Drain is the other water feature present in the study area. This canal drains into the Salt River and provides a perennial source of water for the river. A segment of the Tempe Drain supports wetland and riparian vegetation. Predominant flora present in this riparian area include mesquite, Mexican paloverde (*Parkinsonia aculeata*), and oleander (*Nerium oleander*).

The dense urban land use in the study area contains residential development, commercial and office development, and industrial facilities. This land use limits the biological resources that are present in the study area because of the resultant loss of native habitats.

Threatened and Endangered Species

The Endangered Species Act of 1973, as amended (16 U.S.C. §1531-1543) protects threatened and endangered species from actions that jeopardize their continued existence and authorizes the protection of critical habitat these species depend on for maintaining population viability. If a proposed or listed species or critical habitat is located in a proposed study area, a biological assessment is prepared that evaluates the potential impacts to the species and their habitat. If adverse impacts are identified, avoidance and minimization mitigation measures are developed for the project.

The November 2015 BE was prepared for the project to determine potential impacts to Endangered Species Act listed species in the study area. This BE determined that no federally listed species or their habitat are present in the study area. This determination was evaluated in May 2019, and it was determined that the findings presented in the 2015 BE are still valid.

Therefore, the Preferred Alternative would not adversely affect any federally listed species or their habitat.

Table IV-35 identifies the federal-listed species occurring in Maricopa County. This list of candidate threatened, and endangered species is from the 2019 USFWS IPaC database (USFWS 2019).

Table IV-35. Federal-listed Species in Maricopa County

Common Name	Scientific Name	Status	Habitat Requirements	Occurrence in Study Area
BIRDS				
California least tern	*Sterna antillarum browni*	E	Nests on open sandy beaches, sandbars, gravel pits, and exposed flats on rivers, lakes, and reservoirs. Will form nesting colonies where habitat is present. Breeding has been documented in Maricopa County.	No habitat is present in study area. Waterways in the study area do not provide necessary habitat for this species. Wetlands and riparian areas exhibit dense vegetation such as the stands of common reed along the Salt River low-flow channel.
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	Requires dense riparian habitat along streams and rivers. In Arizona, it is found below 8,550 feet in elevation.	No suitable habitat occurs within the study area.
Yellow-billed cuckoo	*Coccyzus americanus*	T	Requires wooded habitat with dense cover and water. In the southwest, it prefers cottonwood and mesquite sites located near water.	No suitable habitat occurs in the study area. There are no woodlands within the study area.
Yuma clapper rail	*Rallus longirostris yumanensis*	E	Species occurs in dense emergent riparian and wetland sites. Wetlands dominated by cattail and/or bulrush are their preferred habitat.	Potential habitat for the species is very limited in the study area. The Salt River wetlands would not be impacted by project activities. Therefore, no adverse impacts to this species would occur from the Preferred Alternative.
MAMMALS				
Sonoran pronghorn	*Antilocapra Americana sonoriensis*	Experimental Population, Non-essential	Species prefers desert washes, arroyos, grassland steppe, and creosote scrub bajadas.	No suitable habitat occurs in the study area.

The AGFD On-line Environmental Tool was reviewed in 2015, and in May 2019 it was used to verify the findings reported in the 2015 BE. The 2019 review did not identify any candidate, threatened, or endangered species within 3 miles of the study area. The only species status change noted since the 2015 query is the removal of the Sonoran pronghorn and Mexican gray wolf as threatened or endangered species occurring within 3 miles of the study area.

Special Status Species

The AGFD On-line Environmental Tool was reviewed in 2019 to identify special-status species that could occur within the study area. Special-status species documented within 3 miles of the study area include the western burrowing owl (*Athene cunicularia hypugaea*), bald eagle (*Haliaeetus leucocephalus*), western red bat (*Lasiurus blossevile*), western yellow bat (*Lasiurus xanthinus*), common chuckwalla (*Sauromalus ater*), Sonoran Desert tortoise (*Gopherus morafkai*), desert pupfish (*Cyprinodon macularius*), and Gila topminnow (*Poeciliopsis occidentalis occidentalis*).

No western burrowing owls or potential burrows were observed during the 2015 surveys conducted in the southern portion of the study area. The project was expanded since that survey was completed to include the I-10 Salt River Bridge. No additional surveys have been completed for this portion of the study area. In correspondence with AGFD dated February 21, 2019, the agency responded that the Salt River area is the only potential habitat for the burrowing owl in the study area. AGFD verified that owls have been documented as recently as 2017 at several locations adjacent to the study area. Therefore, the potential exists for the burrowing owl to occupy the study area. The mitigation section addresses the steps ADOT would implement to protect burrowing owls during construction activities.

A documented bald eagle nest is present near McKellips and Dobson Roads, east of SR 101L near the Salt River. In addition, wintering bald eagles have been observed along the Salt River near Phoenix Sky Harbor International Airport and Tempe Town Lake. Suitable roost trees and foraging habitat are not located near the I-10 Salt River Bridge. Therefore, it is unlikely that bald eagles use the segment of the Salt River in the study area.

Western red bats were observed in a south Tempe neighborhood in 1998. This bat species is associated with riparian areas with large trees such as walnuts, oaks, willows, cottonwoods, and sycamores. They require these large trees for roosting. In summer, they gather in large roosts and are considered a migratory species that hibernate in the southern wintering habitat. The study area does not provide the large over-story trees required by the western red bat for roosting and breeding.

Western yellow bats were observed on the Arizona State University campus in the 1970s and 1980s. This species is associated with palms and desert riparian habitat in the southwestern United States. They require trees for roosting and are non-colonial. The study area does not provide suitable roosting habitat for the western yellow bat.

The Sonoran Desert tortoise is currently a Candidate Conservation Agreement species that was reported to occur in the South Mountain area, which is approximately 2 miles from the project limits. There is no suitable habitat for this species within the project limits.

The desert pupfish and Gila topminnow were identified by AGFD as occurring within 3 miles of the project area because they are present at the Phoenix Zoo and Desert Botanical Garden. These fish species are listed as endangered under the ESA. However, the AGFD has stated that these species should be disregarded because they should have been filtered out of the data with their presence being identified in urban refugia.

The study area provides nesting and roosting habitat for avian species protected under the Migratory Bird Treaty Act. The 2015 biological surveys did not observe any swallow nests in the southern segment of the study area. Since the field review, the study area has been expanded to include the I-10 Salt River Bridge. This bridge has not been surveyed for the presence of swallow nests. No other avian nest surveys have been completed within the study area. The mitigation section provides measures to ensure the taking of migratory bird nests would be avoided during construction.

Protected Plants

The Arizona Native Plant Law protects native plant species such as cacti, paloverde, mesquite, yucca, and other species from activities on state and private lands. No inventory of protected plants has been conducted since 2015 in the study area. The 2015 field review did not observe any native plants in the proposed study area. However, recent field studies have observed mesquite and paloverde within the Tempe Drain that would be rebuilt as part of the Preferred Alternative. Therefore, protected native plants could be impacted by the Preferred Alternative. If it is determined that native plants are present in the Tempe Drain, the ADOT Roadside Development Section would be responsible for notifying the Arizona Department of Agriculture 60 days before the start of construction so they can determine the species composition within the Tempe Drain.

Invasive Species

The field reconnaissance of the project area conducted for the 2015 BE assessed the project area for the presence of invasive species. The project limits were primarily landscaped along the outside of the ROW and between the main through lanes and freeway ramps. Traffic interchange areas and roadside detention ponds had the largest number of volunteer plants and invasive species. The primary plants found in these locations included palo verde (*Parkinsonia* spp.), mesquite (*Prosopis* spp.), desert acacia (*Acacia smalli*), palms (possible Mexican fan palm (*Washingtonia robusta*), and eucalyptus (*Eucalyptus* spp.).

Wildlife and Habitat Connectivity

The *Maricopa County Wildlife Connectivity Assessment* identifies the Salt River within the study area as an important riparian wildlife movement area (AGFD 2012). This corridor includes the Salt River from Saguaro Lake downstream to the Gila River.

The I-10 roadway currently crosses the Salt River and fragments the habitat present within the river floodplain. However, wildlife can still move under the bridge and use the riparian habitat that is present in this segment of the river.

The Salt River floodplain represents the only intact wildlife habitat within the study area. A short segment of the Tempe Drain supports riparian vegetation and wetlands that could be used by avian, reptile, and amphibian species. Larger species such as coyote (*Canis latrans*) and javelina (*Tayassu tajacu*) would be restricted to using the Salt River floodplain. The wetlands and riparian vegetation present along the Salt River low-flow channel would provide habitat for a variety of birds, reptiles, amphibians, and small mammals. It is expected that these species would continue to use the floodplain after the project is complete because only temporary disturbance would occur to this habitat.

Riparian Area and Wetlands

Riparian and wetland areas occur along the Salt River low-flow channel near the I-10 bridge crossing the river. Some open-water habitat is present in the low-flow channel when the ephemeral river has water. The low-flow channel has dense stands of common reed established along the banks bordering the open channel. This area represents the highest value wildlife habitat present within the study area.

The Tempe Drain has a segment of the canal that is not concrete-lined that supports riparian vegetation and small pockets of wetland vegetation. This canal has hydrology that is sourced from stormwater, wastewater, and other urban sources. The habitat present along this segment of the canal is connected to the Salt River low-flow channel. Therefore, wildlife using the Salt River floodplain would potentially use the vegetated portion of the canal in the study area.

IV.N.2. Environmental Consequences

Preferred Alternative

Threatened and Endangered Species

No suitable habitat occurs for candidate, threatened, and endangered species in the study area. Therefore, the Preferred Alternative would have no effect on candidate, threatened, and endangered species.

Special-status Species

The Preferred Alternative would not be likely to adversely affect special-status species. AGFD has identified the Salt River area as having the highest probability for encountering western burrowing owls. Therefore, the potential exists for encountering burrows near the I-10 bridge during construction. If active burrows are present, direct mortality could occur during construction. However, the proposed work at the bridge would be deck expansion and the installation of additional piers that would not result in earthwork on the slopes adjacent to the bridge. Some temporary disturbances are expected during access to the river floodplain to install piers. If any impacts to burrowing owls were to result from bridge expansion, it would occur as equipment is staged and moved into the floodplain for the pier installation. The mitigation

section identifies measures ADOT would implement to protect burrowing owls during construction.

Some potential exists for impacts to migratory birds during construction phase of the project. These impacts would occur from the bridge expansion and removal of vegetation. Mortality of avian species would be associated with the removal or disturbance of nests under the bridge (swallows) and in vegetation that would be cleared within the study area. The mitigation section identifies measures ADOT would implement to avoid impacting migratory birds during construction.

Native Plants

Native plants have been identified in the Tempe Drain and would be removed during work in the canal. ADOT and the Contractor would identify native plant species that would need to be relocated prior to clearing in the canal. The Tempe Drain is the only location within the study area where potential impacts to native plant species have been documented.

Invasive Species

Construction activity has the potential to expose soils and introduce invasive species in the study area. This can occur from construction equipment transporting soils that contain invasive plants and seeds. In addition, the urban built environment contains invasive and ornamental species that can be introduced to the construction area via winds and avian species. ADOT would implement mitigation measures to minimize and avoid the introduction of invasive species to the study area.

Wildlife and Habitat Connectivity

The study area is comprised of extensive urban land uses that provide minor value for wildlife. In addition, I-10 is an existing highway that is a barrier to wildlife movement in the study area. Therefore, the Preferred Alternative would result in minor impacts to wildlife and habitat connectivity.

The Salt River floodplain would not lose the ability to provide a wildlife movement corridor within the study area. The proposed improvements to the I-10 Salt River Bridge would be an expansion of an existing structure that would not impede wildlife movement occurring within the floodplain. It is expected that some wildlife would be displaced during construction near the bridge. However, after construction is completed, displaced wildlife would return to using riparian habitat near the bridge. Therefore, the Preferred Alternative would not result in permanent impacts to wildlife and habitat connectivity in the study area.

Riparian Area and Wetlands

No impacts to Salt River riparian and wetland areas would occur from the Preferred Alternative. However, wetland and riparian areas within the segment of the Tempe Drain that would be converted to concrete lining would be permanently impacted. This area of permanent impact includes the canal from the confluence with the Salt River and upstream approximately 3,550 feet. Section IV.M.7 identifies the wetlands and other Waters of the United States that would be temporarily and permanently impacted in the Salt River and Tempe Drain from the Preferred

Alternative. The loss of vegetation along the Tempe Drain would result in a minor impact to wildlife and would displace avian species that are likely using the vegetation for nesting and foraging.

No-Build Alternative

The No-Build Alternative would not impact biological resources in the study area. The study area is in an urban area that provides minimal habitat for wildlife. It is expected that urbanization of the study area would continue to result in the loss of existing habitat that would displace wildlife using these habitats.

IV.N.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow ADOT's Clean Water Act Section 404/401 Guidance Manual, ADOT's Roadside Vegetation Management Guidelines, and ADOT's Standard Specifications for Road and Bridge Construction, and other applicable laws, regulations, and guidelines.

ADOT District Responsibilities

- If any active bird nest cannot be avoided by vegetation clearing or construction activities, the Engineer would contact the Arizona Department of Transportation Environmental Planning biologist (602.712.7134 or 602.712.7767) to evaluate the situation.

ADOT Roadside Development Responsibilities

- Protected native plants within the project limits would be impacted by this project; therefore, the ADOT Roadside Development Section would determine if the Arizona Department of Agriculture would need to be notified. If so, the ADOT Roadside Development Section would send notification at least 60 calendar days prior to the start of construction.

Contractor Responsibilities

- If vegetation clearing would occur during the migratory bird breeding season (March 1- August 31), the Contractor would avoid any active bird nests. If active nests cannot be avoided, the Contractor would notify the Engineer to evaluate the situation. During the non-breeding season (September 1- February 28) vegetation removal is not subject to this restriction.
- Prior to construction, all personnel who will be on-site, including, but not limited to, contractors, contractor's employees, supervisors, inspectors, and subcontractors, should review the Arizona Department of Transportation Environmental Planning "Western Burrowing Owl Awareness" flier.
- If any burrowing owls or active burrows are identified, the contractor would notify the Engineer immediately. No construction activities would take place within 100 feet of any active burrow.

- If the Engineer in cooperation with the Environmental Planning Biologist determines that burrowing owls cannot be avoided, the contractor would employ a qualified biologist holding a permit from the US Fish and Wildlife Service to relocate burrowing owls from the project area, as appropriate.
- To prevent the introduction of invasive species seeds, all earthmoving and hauling equipment should be washed prior to entering the construction site and the contractor should inspect all construction equipment and remove all attached debris, including plant parts, soil, and mud, prior to the equipment entering the construction site.
- To prevent invasive species seeds from leaving the site, the Contractor would inspect all construction and hauling equipment and remove all debris, including plant parts, soil, and mud, prior to leaving the construction site.

IV.N.4. Conclusion

The Preferred Alternative would result in minor impacts to biological resources in the study area. Impacts associated with conversion of the Tempe Drain riprap to concrete lining would remove wetlands and riparian vegetation that is occupied by avian and small wildlife species. Native plants also occur in this segment of the canal and would need to be relocated prior to initiating land-clearing activities. Overall, other disturbances to biological resources would occur primarily during construction and would result in short-term temporary disturbance to wildlife species in the study area.

Under the No-Build Alternative and Preferred Alternative, urban development would continue to expand in the study area. This development would remove small areas of intact habitat and displace wildlife that use these habitats.

IV.O. Hazardous Materials

Hazardous materials may occur within facilities that (currently or historically) generate, store, or dispose of substances that could be harmful to human health and environment such as asbestos, lead-based paint, heavy metals, dry-cleaning solvents, and petroleum hydrocarbons (gasoline and diesel fuels). Hazardous materials within the study area may pose liability and safety concerns; therefore, the project must be analyzed for potential impacts to hazardous materials and mitigated if encountered.

IV.O.1. Existing Conditions

To evaluate the potential presence of hazardous materials within the proposed construction limits of the project, a Preliminary Initial Site Assessment (PISA) was completed. To perform the PISA, the project team reviewed the following:

- Previous reports
- Current online Google Earth aerial imagery
- ADEQ regulatory file
- Regulatory database search for a one-quarter-mile buffer around the proposed construction limits of the project, the one-quarter-mile buffer was selected as the search radius because of the urban setting of the area and the minimal impacts of the project outside of the existing ROW
- Arizona Department of Water Resources online well registry tool

The database search conducted for the PISA identified one superfund site and the following specific sites within the one-quarter-mile buffer search radius:

- 117 Underground Storage Tanks (UST)
- 61 Leaking Underground Storage Tanks (LUST)
- 91 Resource Conservation Recovering Act (RCRA) sites
- 9 Superfund Enterprise Management System Archive
- 14 drycleaners
- 63 Hazardous Materials Information Resource System
- 10 Arizona Unified Repository for Informational Tracking of the Environment
- 3 Arizona Activity and Use Limitation
- 8 Arizona Voluntary Cleanup Program (AZ VCP)
- 76 spills
- 29 Emergency Release Notification System (ERNS)
- 337 drywells

IV.O.2. Environmental Consequences

Preferred Alternative

Out of all the sites reported within the ¼ mile buffer of the proposed construction limits, the 37 sites listed in **Table IV-36** and shown in **Figure IV-20** are located within the Preferred Alternative's proposed construction limits and could potentially result in hazardous materials concerns.

Table IV-36. Hazardous Material Sites Located within Proposed Construction Limits of the Preferred Alternative

Database Listing	Number of Sites	Additional Information and Potential Hazardous Materials Concern
UST/LUST	4	No open LUST cases within the footprint; however, one open site (Arizona Auto Auction site) is located on the boundary of the proposed construction limit. This site is considered a potential concern based on the lack of a defined contamination boundary and proximity to potential ground disturbance.
RCRA	5	Only two sites are in violation: Cutter Aviation Inc. (2802 Old Tower Road, Phoenix, AZ 85034) and Orbital Industrial Services and Maintenance (4024 E. Broadway Road, Phoenix, AZ 85040) are Conditionally Exempt Small Quantity Generators with current violations. While the risk associated with these sites may be minimal based on their generator status, they are not currently impacted by the Preferred Alternative. They may pose concerns if changes to the design result in acquisition or disturbance based on the current associated violations at the property.
Spills	15	Based on the dates of the incidents (1984-2001) and likely immediate response, these sites do not pose a potential concern.
ERNS	4	Based on the likely immediate response, these sites do not pose a potential concern.
Drywell	9	May pose a potential concern.

Source: Preliminary Initial Site Assessment Technical Report for I-10, I-17 (Split) to SR 202L (Santan) Project (2019)

A more in-depth file review was performed for the identified LUST sites. Arizona Auto Auction located at 3420 S. 48th Street, Phoenix, is just outside of the proposed construction limits and is associated with an open LUST case with soil and groundwater contamination that has not been adequately defined. Additionally, there are two wells on-site that have been contaminated from the LUST(s). Current design does not require any acquisitions at this location but based on the proximity to proposed construction and the lack of sufficient remediation at the site, this site could be a potential concern.

As of January 10, 2019, a LUST case was closed at the Circle K Store #2709 located at 5105 E. Elliot Road, Phoenix, which was identified in a previous PISA completed for the project. The releases were associated with gasoline, and the estimated contamination boundary was located near the southwestern portion of the property. Based on the closed status of the LUST case, this property should not pose a risk to the project.

Figure IV-20. Hazardous Materials Sites within the Preferred Alternative's Proposed Construction Limits

The following is a list of specific locations identified in the PISA with potential for concern if acquisition or disturbance is anticipated; however, no disturbance or acquisitions are anticipated at these locations.

- Orbital Industrial Services and Maintenance (4024 E. Broadway Road, Phoenix) and Cutter Aviation Inc (2802 Old Tower Road, Phoenix) are RCRA Conditionally Exempt Small Quantity Generators with current violations
- At 3002 E. Old Tower Road, Phoenix, AZ 85034 (no associated facility name), there were 46 Hazardous Materials Information Resource System incidents reported. In addition, this location is adjacent to 161st Air National Guard, a Department of Defense Superfund site
- University of Arizona Cotton Center Washing Sump (4201 E. Broadway, Road Phoenix, AZ 85040) is listed with an associated Declaration of Environmental Use Restriction and Voluntary Environmental Mitigation Use Restriction, with remediation completed in 1999 and 2004. However, the Environmental Database Resources listing identifies that the facility withdrew their request to be included in the AZ VCP, and that the site did not want to pursue No Further Action status. Association with the AZ VCP ceased at that point, and no additional information as to the status of the contamination on-site was available
- Stone Net, Inc. (2635 S. 24th Street, Phoenix, AZ 85034) is an active AZ VCP site associated with soil and groundwater contamination consisting of jet fuel, mineral spirits, Stoddard solvent, and chlorinated hydrocarbons.
- The 161st Air National Guard Department of Defense Superfund site currently under investigation for the potential presence of Per- and Polyfluoroalkyl Substances in site soils and groundwater. The field investigation was to commence in 2018.

No-Build Alternative

Under the No-Build Alternative, this project would not be implemented and there would be no effects to hazardous materials.

IV.O.3. Environmental Commitments and/or Mitigation Measures

ADOT and the Contractor should follow the SAF-6.01 Asbestos Management Policy and ADOT's Standard Specifications for Road and Bridge Construction.

IV.O.4. Conclusion

Based on the PISA performed for this project, the Proposed Alternative could affect one LUST site and six other identified sites with potential concerns. These sites are close to the proposed construction limits and would be affected if any potential ground disturbance occurs at any of these locations.

IV.P. Secondary Impacts

ADOT uses the term secondary impacts synonymously with indirect impacts, which are defined by the CEQ regulations as "effects which are caused by the [proposed] action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate…" For this project, an example of an indirect impact could be urban development taking farmland as a result of new access provided by the project.

Actions that may induce secondary (or indirect) impacts are perhaps less obvious than those identified as direct impacts. They are more difficult to quantify, can be additive in nature, or long-term in occurrence and effect. This section identifies the likely, foreseeable secondary impacts that would result from construction of the Preferred Alternative.

IV.P.1. Methodology

FHWA has developed interim guidance on the analysis of secondary and cumulative impacts (FHWA 2003), which supplements the CEQ guidance. Combined, these documents provide the primary basis for analysis. The classification of secondary impacts and cumulative impacts discussed below, in accordance with FHWA guidance, is presented in **Table IV-37**.

Table IV-37. Secondary and Cumulative Impacts Classification

Impact Category	Impact Classification	Description
Type	Neutral, positive, or negative	Compares the final condition of a given resource with its existing condition (assumes that the expected impact occurs); impacts on personal property are considered negative
Severity	Minor, moderate, or substantial	Considers the relative contribution of the proposed action to a given impact
Duration	Temporary or permanent	Assumes "permanent" unless otherwise specified

Source: 2019 ADOT NEPA EA and EIS Guidance

The project Preferred Alternative would have impacts that may create secondary impacts. **Table IV-38** summarizes resources considered in this analysis.

Secondary impacts are reasonably foreseeable consequences of the action but are later in time or farther removed in distance. Secondary impacts "may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR § 1508.8).

Potential secondary impacts are qualitatively discussed and are based on reasonably foreseeable future actions in the project area that are attributable to the construction of the Preferred Alternative. Secondary impacts on resources listed above are considered in this section. Secondary impacts on other resources are not included in the following discussion as they were considered negligible.

Table IV-38. Resources to be considered

Resource	Secondary Impact
Land Ownership, Jurisdiction, and Land Use	Yes
Social and Economic Considerations	Yes
Title VI and Environmental Justice	Yes
Cultural Resources	Yes
Traffic and Transportation	Yes
Air Quality Analysis	Yes
Noise Analysis	Yes
Utilities	No
Visual Resources	Yes
Drainage and Floodplain Considerations	No
Sections 404 and 401 of the Clean Water Act	Yes
Biological Resources	Yes
Hazardous Materials	No

IV.P.2. Environmental Consequences

Land Ownership, Jurisdiction, and Land Use

Improved mobility and access along the corridor may attract commercial and residential development; however, most of the corridor is already developed, with undeveloped land mostly present near Warner Road. Changes in land ownership, jurisdiction, and land use may occur near interchanges, but would only represent minor, neutral, permanent changes within the context of the corridor.

Social and Economic Considerations

Improved mobility and access along the corridor could foster economic development by attracting new business development and more attractive housing options and support social connectivity between neighborhoods and areas within the study area. This would represent a minor, positive, permanent secondary impact. Changes in community character or property values would likely be minor and permanent, although they could be positive, neutral or negative.

Title VI, Environmental Justice

Improved mobility and access along the corridor could also foster economic development in Environmental Justice areas in the study area. This would represent a minor, positive, permanent secondary impact.

Low-income and minority populations are located throughout most of the study area. For that reason, the conclusions for individual resource areas discussed in this section are applicable to low-income and minority populations as well.

Secondary development at interchanges or in the few areas not already developed could cause secondary impacts to low-income and minority populations. Development may attract more traffic, and increase noise and air pollutants, or alter land use. The enhancements to trails and pedestrian features with the Preferred Alternative would have beneficial impacts. Given that most of the area is developed, and changes would be relatively minor, impacts would also be minor, although they could be negative, beneficial or neutral.

Cultural Resources

Historic properties are present outside the immediate study area, and so any development that occurs as a result of induced changes to land use could impact cultural resources. However, the Preferred Alternative expands an existing freeway that is within a highly developed area. It is unlikely to create new growth that would create significant impacts to historic properties Therefore, the Preferred Alternative could result in minor negative secondary impacts to cultural resources.

Traffic and Transportation, Air Quality and Noise

The potential for additional traffic growth in the Study Area resulting from increased secondary development could cause an associated increase in noise and air pollutants. Because much of the study area is developed already, and project planning has accommodated 2040 growth, this may only be a concern in localized, undeveloped areas of the Study Area, such as open areas near Warner Road. Therefore, secondary traffic, air quality and noise impacts would be minor, negative, permanent impacts.

Visual Resources

The Preferred Alternative would result in minor visual impacts from noise walls, signage, DMS, and changes in interchange profiles. However, the entire study area is developed where these kinds of visual features are common and expected. No secondary impacts have been identified for visual resources.

Waters of the U.S.

Development in the study area is altering surface-water features, water supplies, and water quality. This ongoing development, along with the proposed construction and operation of other projects in the area, would be subject to local, state, and federal regulations and permit requirements that would help mitigate these issues. Secondary impacts would be minor, negative and permanent.

Biological Resources

The loss of wetlands could create an indirect impact on the species that rely upon them for habitat. Wetlands in the study area are already very limited and likely do not represent important habitat. The Preferred Alternative would impact 0.07 acres of wetland. Secondary impacts would be minor, negative and permanent.

IV.P.3. Conclusion

On-going growth in population and employment has filled most of the study area with commercial, residential, and industrial developments. Any secondary impacts that occur as a result of the Preferred Alternative would be neutral, or minor negative impacts.

IV.Q. Cumulative Impacts

Cumulative impacts are defined by the CEQ regulations in 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of other projects.

Direct impacts are defined by the CEQ regulations as "effects which are caused by the [proposed] action and occur at the same time and place." For this project, an example of a direct impact would be taking an historic building to accommodate an added lane. Cumulative impacts also include the impacts of "other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions." For this project, an example of a past action in the study area is the construction of the Salt River Project, or Sky Harbor International Airport. An example of reasonably foreseeable future action would be I-10 improvements between SR 202L and SR 387. These reasonably foreseeable future actions are independent of the I-10 project but must be considered in this Draft EA as part of the cumulative impacts analysis. If an action does not adversely affect a particular environmental resource, the action would not contribute to a cumulative impact on that resource.

IV.Q.1. Methodology

The classification of cumulative impacts in accordance with FHWA guidance is the same as the secondary impacts as discussed earlier (**Table IV-37)**.

The project Preferred Alternative would have impacts that may create cumulative impacts. **Table IV-39** summarizes resources considered in this analysis.

Table IV-39. Resources to be Considered

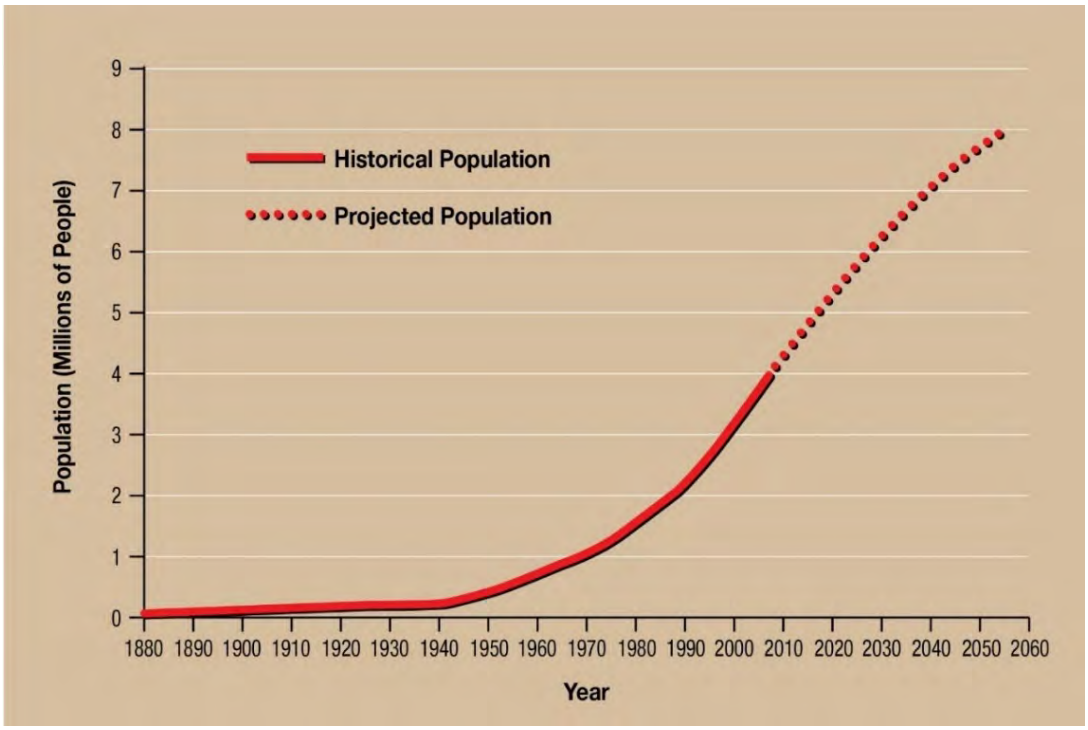
Resource	Direct or Indirect Impact?	Cumulative Impact
Land Ownership, Jurisdiction, and Land Use	Yes	Yes
Social and Economic Considerations	No	Yes
Title VI and Environmental Justice	No	Yes
Cultural Resources	Yes	Yes
Traffic and Transportation	No	No
Air Quality Analysis	No	No
Noise Analysis	Yes	Yes
Utilities	No	No
Visual Resources	Yes	Yes
Drainage and Floodplain Considerations	No	No
Sections 404 and 401 of the Clean Water Act	Yes	Yes
Biological Resources	No	No
Hazardous Materials	No	No

The methodology for determining the cumulative impacts of the project is taken from *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997). The specific analyses of cumulative impacts are provided under the appropriate resource section in the text that follows.

Temporal Boundaries

A cumulative impacts analysis requires identification of temporal and geographic boundaries. For the purposes of this Draft EA, the temporal boundary of analysis is 1950 to 2018. The baseline year chosen to define the past is 1950. This approximates the time that communities within the study area began developing in their current forms. For example, **Figure IV-21** illustrates Maricopa County population growth, a useful indicator of growth and development. Growth accelerates circa 1950. Construction of Sky Harbor International Airport, the major driver in the area's growth, was completed in 1953.

Figure IV-21. Population Growth (Maricopa County)



Source: ASU WaterSim 2016

Geographic Boundaries

The geographic area for the cumulative analysis is the same as the study area as discussed previously. All impacts described are considered long term. Short-term effects, such as construction-related impacts, are assumed to not contribute to long-term cumulative impacts.

For this cumulative impacts' assessment, past, present, and reasonably foreseeable future projects are considered, both transportation and non-transportation in nature. This Draft EA assumes that the local municipalities and county comprehensive and general plans direct the

type of development in the study area. This development would likely occur eventually whether or not the proposed I-10 project is implemented.

Identifying Resources for Study

Resources for cumulative impact analysis are identified through agency and community scoping, and by the project's potential for impact. Resource concerns identified through agency scoping for the project, in February 2019 were limited, as most agencies and communities offered limited concerns. The greatest concern surrounded:

- Base flood elevation levels within a regulatory floodway (FEMA)
- Protect bats under bridges (AGFD)
- Traffic performance (City of Chandler)

Cumulative Impacts Analysis

Cumulative impacts include the direct and indirect impacts of the project together with the impacts of all other anticipated past, present, and reasonably foreseeable future actions in the area, including those of others. This analysis of cumulative impacts concentrates on current and future actions that could contribute to cumulative impacts on the key considerations of Land Ownership, Jurisdiction, and Land Use; Cultural Resources; Noise; Visual Resources; and Waters of the U.S. Past, present, and reasonably foreseeable future actions considered in this analysis are the result of planned/proposed projects developed by ADOT, the cities of Tempe and Phoenix, and the Town of Guadalupe, Maricopa County. No significant private development has been identified in the study area. The study area is only 5 percent vacant; no large development permits have been identified.

Past, Current, and Reasonably Foreseeable Actions

Numerous projects in the past have impacted the study area. Major past actions include:

- Salt River Project created extensive irrigation systems along the Salt River, including many canals within the Study Are.
- Construction of I-10, US-60 and other transportation projects had a significant impact on the nature of development in the area. Past actions in support of I-10 created ROW acquisitions.
- Sky Harbor International Airport was completed in 1953 and impacted development and travel patterns in the Study Area.
- Other commercial and residential developments have created impacts within the Study Area.

Current actions include projects currently in construction. The largest current action with potential to contribute to cumulative impacts is SR202L South Mountain Freeway.

Reasonably foreseeable actions include projects from No-Build Alternative described in Section III.B.4 of this EA and includes projects from the ADOT 2040 STIP and MAG 2040 RTP. Examples of projects with potential to contribute to cumulative impacts include:

- SR-202 (Santan): Gilbert Rd - I-10
- I-17 (Black Canyon Freeway) Near-Term Auxiliary Lane Study
- I-10, SR 202L (Santan) To SR 387
- Baseline Rd Reconstruct Traffic Interchange
- I-10 (Maricopa): Chandler Boulevard Traffic Interchange

IV.Q.2. Environmental Consequences

The Preferred Alternative has minor negative direct impacts to few resource areas. There would be beneficial impacts to transportation, air quality, and bicycle and pedestrian facilities through reduced congestion, reduced emissions, and greater trail connectivity.

Agency scoping identified concerns for bat roosts and floodplains. The respective sections of this Draft EA demonstrate no direct impacts on either. Therefore, the Preferred Alternative would not create a cumulative impact to these resources.

Land Ownership, Jurisdiction, and Land Use

The study area has developed significantly since 1950, including the construction of I-10 itself. The freeway and Sky Harbor International Airport have likely altered land uses since their construction. While there would have been changes in use of specific land areas adjacent to I-10, the study area has remained consistently commercial, residential, and industrial.

The Preferred Alternative would have no significant impact on land use, and only 27 partial ROW acquisitions, with no residential or commercial displacements. I-10 expansion has been planned by MAG, the county, and the surrounding cities and towns since the early 2000s. This project is consistent with the planned I-10 expansion and the City and County land use plans; therefore, there would be no significant impacts to future land use.

ADOT previously acquired six total parcels abutting the highway along with 21 partial acquisitions, in support of general, future planned improvements of I-10. Acquiring these parcels created change in designation to transportation use, and a change in the planning of the immediate area.

In the context of past, current, and reasonably foreseeable actions within the study area and surrounding valley, the Preferred Alternative would have only minor, negative, permanent cumulative impacts to land ownership, jurisdiction, and land use.

Social and Economic Considerations

The study area contains a variety of land uses from multifamily and single-family residential to industrial, commercial, and recreational. The surface street network and bridges across the freeways provide continuity between various land uses and neighborhoods. Construction of the Preferred Alternative would not introduce any new barriers in the urban fabric of the area. Access

to facilities located on one side of the freeway corridor by residents or businesses on the opposite side would remain. Two pedestrian bridges and the addition of a multi-use path to an existing bridge are planned as part of the Preferred Alternative to improve multimodal connectivity. The Preferred Alternative would provide improved mobility on I-10 and the surrounding roadway network.

Services, residential, and commercial development would not be impacted significantly by construction of the Preferred Alternative since most of the improvements would occur within the existing ADOT ROW. There would be no additional residential relocations beyond those taken in the planning stages, and only a few business relocations with the Preferred Alternative, which would not impact the social or economic conditions of the study area. As described previously, ADOT previously acquired six total parcels abutting the highway along with 21 partial acquisitions, in support of general, future improvements of I-10.

In the context of past, current, and reasonably foreseeable actions within the study area and surrounding valley, the Preferred Alternative would have only minor, negative, temporary impacts during construction and minor, beneficial, permanent cumulative impacts to social and economic conditions.

Title VI, Environmental Justice

The census BGs in the study area have a higher percentage of minority, low-income population, and female heads-of-household than the State of Arizona and Maricopa County. Much of the Preferred Alternative's improvements are within ADOT ROW and would not require full acquisition of any residential properties within the area or properties that serve low-income or minority populations. ADOT previously acquired six total parcels abutting the highway along with 21 partial acquisitions, in support of general, future improvements of I-10.

Impacts to residences or businesses within Environmental Justice areas from current or past actions for I-10 could have a cumulative impact, for example by altering socioeconomic relationships between residences and businesses. These impacts represent minor, negative, permanent cumulative impacts.

Most of the study area incorporates low-income and minority populations. Therefore, the following discussions of resource areas are applicable to low-income and minority populations. The Preferred Alternative has limited noise impacts and visual impacts. Impacts would occur within EJ areas but are consistent with the existing urban freeway environment. There would be minor, negative, permanent cumulative impacts.

The Preferred Alternative would generally have beneficial impacts to transportation and air quality within EJ areas, as reduced congestion, fewer emissions and improved access to the interstate would benefit low-income and minority populations. These impacts represent minor, beneficial, permanent cumulative impacts.

Community cohesion, defined by The National Cooperative Highway Research Program Report 533: *Effective Methods for Environmental Justice Assessment* as "satisfaction, safety, camaraderie, support and identity to members of a community" would remain relatively unaffected by the Preferred Alternative. It would not alter the location of, or access to any

gathering places or activity centers that are important to social networks. Thus, there would be a neutral impact on community cohesion.

Cultural Resources

The study area has been home to native populations for millennia and holds many archaeological sites, including prehistoric irrigation canals and ditches. By 1950, much of the study area had been developed, and past projects since 1950 have impacted an unknown number of archaeological sites. Continued development could create additional, but smaller, impacts relative to development since 1950.

Impacts to multiple archaeological sites and prehistoric canals would occur. Although any resulting adverse effects would be mitigated, and other impacts would not be adverse, this represents a moderate, negative permanent cumulative impact to archaeological resources.

Noise

The study area has experienced increased noise pollution since 1950 with the construction of the airport, freeways, and other transportation facilities, as well as industrial development. Past increases would have been significant.

The Preferred Alternative would have only limited noise impacts during operations and temporary impacts during construction, most of which would be mitigated in accordance with ADOT standards for implementing FHWA regulations. Only limited areas would experience a noise impact where mitigation is not reasonable or feasible, as defined by ADOT's Noise Abatement Requirements.

Considering the increase in noise impacts from past, current, and reasonably foreseeable actions, and the limited direct impact of the Preferred Alternative, the Preferred Alternative would only have a minor, negative, permanent cumulative noise impact with moderate secondary beneficial impacts.

Visual Resources

The visual character of the study area has changed significantly over time as well, with continued development. Developments such as the airport and freeway have been permanent since their construction, and the in-filling of 95 percent of all the land in the study area.

This Draft EA concludes the Preferred Alternative would have only minimal visual impact resulting from changes in noise walls, signage, DMS, and interchange profiles. Within the context of past, current, and foreseeable actions, the Preferred Alternative would have only a very minor, negative, permanent cumulative impact on visual resources.

Waters of the U.S.

The natural environment in the study area has changed drastically over time, with rivers and streams being diverted, stabilized, channelized, and piped since the 1950s. Very few wetlands and Waters of the U.S. are present in the study area, with the notable exception of the Salt River and associated features. For example, the Salt River Project has lined, diverted, and piped natural flows in the area for approximately a century.

The Preferred Alternative would have less than an acre of direct impacts to Waters of the U.S., including wetlands. In the context of past, current, and reasonably foreseeable actions, this represents only a minor negative permanent cumulative impact.

Biological Resources

Biological resources have been impacted over time, with the study area study area being almost completely developed. Construction of commercial, residential, and industrial developments and transportation features limited altered and limited almost habitats that existed previously.

The Preferred Alternative would only minor impacts to burrowing owls and would have minor indirect impacts through the removal of 0.07 acres of wetland in the Tempe Drain. In the context of past, current, and reasonably foreseeable actions, this represents only a minor negative permanent cumulative impact.

IV.Q.3. Conclusion

The study area has seen significant development and in-filling since 1950, which has likely had significant impacts on land use, cultural resources, the noise and visual environments, and Waters of the U.S. Moreover, the Preferred Alternative has only limited direct impact to these resources. For these reasons, it would have only minor, negative and permanent cumulative impacts.

V. PUBLIC INVOLVEMENT/PROJECT COORDINATION

As described in Chapter III, Alternatives Analysis, the Preferred Alternative has evolved through a series of multiple transportation improvement studies in the past and has gone through extensive community outreach and stakeholder coordination. All public and stakeholder outreach activities are in accordance to the ADOT Public Involvement Plan that complies with federal nondiscrimination requirements for Title VI, EJ, and LEP, which has been approved by FHWA and complies with all Title VI, EJ, NEPA, and Limited English Proficiency (LEP) requirements. Refer to Section IV.D. Title VI and Environmental Justice for more information on the Title VI, EJ, and LEP analysis. This chapter provides an overview of previous outreach activities, outlines project study coordination activities since initiation of the NEPA process for this study, and summarizes the comments received during public and agency scoping. Due to presence of LEP populations in the area, translation for Spanish, Korean, Chinese, and Vietnamese has been available for all public involvement activities.

Several past transportation improvement studies have examined the stretch of I-10 within the study area for this Draft EA. Two of them, ADOT's *I-10 Corridor Improvement Study* (ADOT 2007) and MAG's *Spine Corridor Study* (MAG 2014), incorporated public outreach in the development, evaluation, and selection of improvement alternatives.

The *I-10 Corridor Improvement Study Draft Environmental Impact Statement* conducted in 2002 included rigorous public and agency coordination, and more than 300 meetings with governmental agencies and the general public. The *Spine Corridor Study* in 2014 then implemented an extensive public involvement program that included public information meetings and a series of in-depth online electronic surveys that yielded 496 public comments in response to questions about transportation improvements for the general area being studied.

A summary report of Agency and Public Involvement in the *Spine Corridor Study* can be accessed on MAG's website. Subsequent public involvement undertaken for the *Spine Corridor Study* in 2017 is outlined in the report accessed through MAG's website.

ADOT typically conducts early coordination for EA projects with federal and state agencies and local governments and holds a public scoping meeting in accordance with 40 CFR 1506.6 and 23 CFR 771.105(c), which require that practitioners "make diligent efforts to involve the public" in the NEPA process. Early agency coordination led to in refining the study area, project purpose and need, and alternatives. It also provided an opportunity to gather information on environmental resources and receive input from resource agencies regarding study expectations and potential mitigation requirements. Following early agency coordination, ADOT held a public scoping and information meeting and invited the stakeholder agencies to participate. The purpose of the meeting was to inform the public, agency representatives, and elected officials about the study and obtain their input on any issues, concerns, and opportunities.

V.A. Agency Scoping

A total of 156 letters were mailed to representatives of the agencies and stakeholder groups identified in **Table V-1** describing the project, providing information about the upcoming public information and scoping meeting, and soliciting comments, questions, and concerns. This letter along with the responses received from the agencies is provided in Appendix A, Agency letters.

Table V-1. Agency Scoping Letter Recipients

Bureau of Land Management	Bureau of Reclamation
Western Area Power Administration	Department of the Interior
National Park Service	U.S. Army Corps of Engineers
U.S. Department of Agriculture	U.S. Environmental Protection Agency
Federal Railroad Administration	U.S. Fish and Wildlife Service
U.S. Department of Homeland Security	U.S. Department of Housing and Urban Development
Natural Resources Conservation Service	U.S. Department of Transportation
U.S. Department of Commerce	National Transportation Safety Board
U.S. Department of Energy	U.S. Geological Survey
Federal Aviation Administration	U.S. Bureau of Indian Affairs
Federal Transit Administration Region 9	Federal Emergency Management Agency
Federal Highway Administration	Arizona Game and Fish Department
Arizona Department of Public Safety	Arizona Department of Homeland Security
Arizona Department of Environmental Quality	Arizona State Land Department
Arizona State Museum	Arizona Department of Water Resources
Attorney General's Office	Arizona State Parks
Arizona Department of Transportation	New Mexico Department of Transportation
Maricopa County	Flood Control District of Maricopa County
Maricopa County Department of Transportation	Maricopa County Recorder and Elections Department
Maricopa County Sheriff's Office	Gila River Indian Community
Salt River Pima-Maricopa Indian Community	Ak-Chin Indian Community
Tohono O'odham Nation	Maricopa Association of Governments
City of Mesa	City of Scottsdale
Town of Paradise Valley	City of Tolleson
Valley Metro	City of Phoenix
City of Tempe	Town of Guadalupe
City of Chandler	Phoenix Sky Harbor International Airport
Wilson Elementary School District	Roosevelt Elementary School District
University of Phoenix	Arizona State University
Northern Arizona University	Phoenix Union High School District
Tempe Elementary School District	Chandler United School District
Kyrene School District	Tempe Union High School District

Table V-1. Agency Scoping Letter Recipients (continued)

Salt River Project	Arizona Public Service
Phoenix Sub-Regional Operating Group	Tempe St. Luke's Medical Center
Chandler Regional Medical Center	Ahwatukee Foothills Village
Central Phoenix Village	Galleria Palms Apartments
Fiesta Village Homeowners' Association	Knoell Garden Villas
South Mountain Coalition of Neighborhoods	Peterson Park Neighborhood Association
Tempe Bicycle Action Group	Tempe Villages Townhomes Homeowners' Association
Phoenix Chamber of Commerce	Tempe Chamber of Commerce
East Valley Hispanic Chamber of Commerce	Chandler Chamber of Commerce
Ahwatukee Foothills Chamber of Commerce	

Comments from agencies and stakeholders received via email, U.S. mail, and telephone are listed in **Table V-2**.

Table V-2. Agency Scoping Comments

Agency	Comment
National Park Service	▪ No comments
Bureau of Land Management	▪ No BLM land in the study area
Arizona State Museum	▪ No comments
Federal Highway Administration Arizona Division	▪ Align NEPA practice with accepted processes
Federal Emergency Management Agency	▪ Construction in a regulatory floodway must comply with 44 CFR §59-65 and not increase base flood elevation levels
Arizona Department of Public Safety	▪ No concerns regarding the project. ▪ Requests diagrams of the existing highways along with proposed changes.
Arizona Game and Fish Department	▪ Protect bats underneath bridges ▪ Comply with Arizona Native Plant Law
City of Phoenix	▪ Requests regular meetings with study team ▪ Review *Sky Harbor Master Plan* and avoid adverse effects ▪ Aviation Dept. concerned about traffic during construction ▪ Conform to FAA airspace requirements ▪ Coordinate with City Public Transit and Valley Metro regarding buses affected by construction ▪ Street Transportation, Planning and Development Services, and Water Services Departments sending Technical Provisions

Table V-2. Agency Scoping Comments (continued)

Agency	Comment
Maricopa County Department of Transportation	▪ No comments
Valley Metro	▪ No apparent effect to bus operations ▪ Inform about construction schedules and activities on the interstate and adjacent arterials having bus routes ▪ Interested in surface street plans that could affect existing stops or routing ▪ Interested in remnant parcels for potential park-and-ride use
U.S. Environmental Protection Agency	▪ Provide link to online document when Draft EA is released ▪ Detailed comments provided on Air Quality, Environmental Justice, Water Resources and Wetlands, Cumulative Impact Analysis, and Growth-Related Impacts
City of Chandler	▪ Evaluate AM peak congestion on WB I-10 from Chandler Blvd. to Ray Rd. Specific improvements mentioned ▪ Provide continuity to existing bike and pedestrian facilities at Chandler Blvd. and Ray Rd. TIs ▪ Adjust FMS/Arterial Traffic Operations. Specific adjustments mentioned ▪ Involve Chandler in coordination of MOT during construction, freeway closures, and detours

V.B. Public Scoping

A public information and scoping meeting was held on Tuesday, February 26, 2019, from 5:30 to 7:30 p.m. to inform the public and agency representatives about the study and obtain their input on any issues, concerns, and opportunities.

To ensure community members knew about the meeting and had an opportunity to participate, ADOT provided notification by:

- Placing advertisements in *The Arizona Republic* Community Section and *La Voz* (Spanish Language) newspapers
- Sending an email notification (e-blast) to more than 7,300 recipients of the project mailing list via ADOT's Gov Delivery system
- Sending a press release to media outlets and securing live "shots" during the public meeting
- Alerting municipal partners Maricopa County, Tempe, Phoenix, Chandler, and Guadalupe via phone, postal service, and email
- Mailing a postcard to 36,610 property owners and occupants in the study area
- Posting meeting information on the I-10 Broadway Curve study webpage: https://www.azdot.gov/I10BroadwayCurve

- Postings on social media via ADOT's Facebook and Twitter accounts, as well as the City of Phoenix's NextDoor account
- Placing flyers in the Town of Guadalupe town center and placing meeting information on the marquee in the center of town for high visibility
- Delivering flyers to major employers along the I-10 corridor, including Tempe Autoplex and Arizona Mills Mall

The meeting was held in the Rio Salado Community College Conference Center at 2323 W. 14th Street in Tempe. The open-house format meeting included a PowerPoint presentation, display boards, aerial maps, a C-D simulation video, a question and answer session, and time before and after the presentation for attendees to speak with project team members one-on-one to ask questions and provide input. The presentation was delivered at 6:00 p.m. reviewing the history of the proposed project, the studies that preceded the current study, the NEPA process, the geographic study area, proposed improvements, and how the public could participate.

More than 150 individuals attended the meeting. General sentiment among attendees was interest in and support of making improvements to I-10 in the Broadway Curve area. Comments received during and after the meeting totaled 146 by way of printed comment forms (14), question cards (22), online survey with the same questions as the printed comment form (60), emails (44), voicemail messages (4), and mailed letters (2).

The majority of comments indicated the need for transportation improvements in and around the project study area, identifying specific locations or problems that commenters felt should be remedied. While many expressed their concurrence with the proposed improvements, a similar number of commenters suggested other improvements to the transportation system.

Detailed comment information is provided in the Public Scoping and Information Meeting Summary Report, which is included in Appendix B to this document.

V.C. Public Engagement Methods

A Public Involvement Plan was developed for the project at the start of the public scoping phase during the schematic concept development. The document contains a project-specific LEP analysis following the 2005 U.S. Department of Transportation-issued *Policy Guidance Concerning Recipient's Responsibilities to Limited English Proficient (LEP) Persons*, a stakeholder analysis, a basic schedule of project milestones, and a description of the tools used to solicit and record public input. The LEP analysis indicated the need for all outreach materials and communications relating to this project to be available in both English and Spanish.

The Public Involvement Plan is a living document that continues to be reviewed for effectiveness and updated as needed. The document is guiding the public outreach and involvement efforts for this project.

ADOT established a project website, https://www.azdot.gov/I10BroadwayCurve, a bilingual Project Information Line - 602.501.5505, and an email address, BroadwayCurve@azdot.gov to

provide the public with continuous access to updated information and an avenue for continued questions and comments throughout the process.

ADOT uses a variety of notification methods to reach as many people as possible. For this project, as described above, these have included bilingual newspaper advertisements, email notifications, press releases, notifying study area municipalities, mass postcard mailings, flyers, and social media invitations, in addition to word of mouth. As the study proceeds, the dedicated website will continue to be updated to provide current study information and documents, as well as collect additional feedback from the public.

V.D. Other Meetings

During the schematic development of the Preferred Alternative, the ADOT design team held meetings with MAG, the cities of Phoenix, Tempe, and Chandler, and the Town of Guadalupe, as well as SRP and other utility companies. ADOT invited the USACE as a cooperating agency on this project to facilitate early coordination, consult on relevant environmental technical studies for potential 404 permitting needs, and provide project information.

ADOT held an Industry Forum on February 13, 2019, for members of the design and construction industry, providing an overview of the study history, potential project improvements, procurement process, and approximate timeline.

ADOT held a Business Forum to share study information and answer questions from representatives of area businesses and major employers in the Phoenix metropolitan region on August 28, 2019. The meeting was well attended and helped to establish open dialogue between ADOT and the business community. Additional presentations were given to area chambers of commerce, including the East Valley Chambers of Commerce Alliance, which represents more than 5,000 local businesses and includes 7 local chambers: Carefree/Cave Creek, Gilbert, Mesa, Queen Creek, Scottsdale, Superstition Region, and Tempe.

V.E. Draft EA Comment Period and Public Hearing

The 30-business-day comment period for the Draft EA will begin on October 4 (the anticipated date of publication) and end on November 18, 2019. The Draft EA will be posted online on the project website: https://www.azdot.gov/I10BroadwayCurve and a copy will be available for review during normal business hours through November 18, 2019, at the following locations:

Burton Barr Central Library
1221 N. Central Ave,
Phoenix, AZ 85004
602-262-4602

Guadalupe Town Hall
9241 S Avenida del Yaqui
Guadalupe, AZ 85283
(Phone number not available)

Mesa Public Library
64 E 1st St
Mesa, AZ 85201
480-644-3100

Ironwood Library
4333 E Chandler Blvd
Phoenix, AZ 85048
602-534-1905

Tempe Public Library
3500 S. Rural Rd
Tempe, AZ 85282
480-350-5557

South Mountain Community Center
212 E Alta Vista Rd
Phoenix, AZ 85042
602-495-0950

Southeast Regional Library
775 N Greenfield Rd
Gilbert, AZ 85234
602-652-3000

Chandler Public Library
22 S. Delaware St
Chandler AZ 85225
480-782-2804

A public hearing will be held during the Draft EA review period on Thursday, October 24, 2019, from 5:30 to 8:30 p.m. at the DoubleTree by Hilton Phoenix-Tempe located at 2100 S. Priest Drive, Tempe, Arizona to provide opportunity for review and comment. The public hearing will be an open house format and will include an informational video in English and Spanish, an interactive visual presentation, and an opportunity to provide oral remarks before a formal study panel. Comment forms and court reporters will also be available to record written and oral comments for the study record from members of the public. Project team members will be on site to address questions and concerns. Printed and visual materials will be available in English and Spanish, and translation in Spanish, Korean, Vietnamese, and Chinese will be available. To ensure proper engagement from all LEP populations, information will be provided to the various chambers of commerce including the Asian Chamber and the Hispanic Chamber. Additionally, invitation flyers will be hand-delivered to low-income areas.

Comments can also be submitted any time during the comment period using any of the following methods:

- Mail to:

  I-10 Broadway Curve Study
  C/O ADOT Community Relations
  1655 W. Jackson Street, MD 126 F
  Phoenix, AZ 85007

- Telephone: 602.501.5505
- Email to: BroadwayCurve@azdot.gov
- Online via: https://www.azdot.gov/I10BroadwayCurve

Agency, tribal, and public comments received by ADOT during the public comment period will be incorporated and considered in the Final EA and FONSI, if applicable, along with ADOT responses to each comment.

Pursuant to Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act (ADA) and other nondiscrimination laws and authorities, ADOT does not discriminate on the basis of race, color, national origin, sex, age, or disability. Persons that require a reasonable accommodation based on language or disability should contact Gaby Kemp at gkemp@azdot.gov or leave a voicemail at 602.501.5505. Requests should be made as early as possible to ensure the State has an opportunity to address the accommodation.

De acuerdo con el título VI de la Ley de Derechos Civiles de 1964 y la Ley de Estadounidenses con Discapacidades (ADA por sus siglas en inglés), el Departamento de Transporte de Arizona (ADOT por sus siglas en inglés) no discrimina por raza, color, nacionalidad, edad, género o discapacidad. Personas que requieren asistencia (dentro de lo razonable) ya sea por el idioma o por discapacidad deben ponerse en contacto con Gaby Kemp al gkemp@azdot.gov (602.501.5501). Las solicitudes deben hacerse lo más pronto posible para asegurar que el equipo encargado del proyecto tenga la oportunidad de hacer los arreglos necesarios.

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