



# SONORAN CORRIDOR STUDY

## Draft Tier 1 Environmental Impact Statement

### *Chapter 5: Preferred Alternative*

October 2020 | P9101 01P  
Federal Aid No. 410-A(BFI)



U.S. Department of Transportation  
Federal Highway  
Administration

# ADOT



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**Sonoran Corridor**

**Pima County, Arizona**

**Draft Tier 1 Environmental Impact Statement**

**Project No. P9101 01P / Federal Aid No. 410-A(BFI)  
Submitted pursuant to 42 U.S.C. § 4332(2)(c), 49 U.S.C. § 303, and 33 U.S.C. § 1251**

*By the*

**FEDERAL HIGHWAY ADMINISTRATION**

*and*

**ARIZONA DEPARTMENT OF TRANSPORTATION**

*With the following Cooperating Agencies*


**FEDERAL AVIATION ADMINISTRATION**


**US ARMY CORPS OF ENGINEERS**

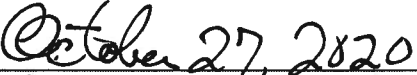
**US BUREAU OF RECLAMATION**


**US ENVIRONMENTAL PROTECTION AGENCY**

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## ABSTRACT

This Draft Tier 1 Environmental Impact Statement (Draft Tier 1 EIS) evaluates alternatives for the Sonoran Corridor located in Pima County, Arizona. The purpose of this study for the Sonoran Corridor is to identify a high-priority, high-capacity, access-controlled transportation corridor south of the Tucson International Airport that will improve access to high growth areas and existing activities; improve future traffic levels of service by reducing congestion levels anticipated by 2045; and provide a system linkage for regional, interstate, and international mobility needed for the study area. The Draft Tier 1 EIS evaluates a Reasonable Range of Corridors, which includes three corridor alternatives and the No-Build Alternative to characterize the potential effects of each on the social, economic, and natural environment. The No-Build Alternative represents the existing transportation system, with committed improvement projects that are programmed for funding.

The objective of this Draft Tier 1 EIS is to provide sufficient information for the public, agencies, and Tribes to comment on the overall analysis used to identify the Preferred Alternative for the Sonoran Corridor. Based on the analysis presented in this Draft Tier 1 EIS, Corridor Alternative 7 has been identified as the Preferred Alternative. After consideration of public and stakeholder input received during the Draft Tier 1 EIS public comment period, the Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) will identify a Selected Alternative in the Final Tier 1 EIS. The Record of Decision (ROD) will describe the basis for the decision, and provide strategies to avoid or minimize environmental impacts.

The FHWA will issue a single document that consists of the Final Tier 1 EIS and ROD pursuant to 49 U.S.C. 304a(b) and 23 U.S.C. 139(n)(2) unless FHWA determines that statutory criteria or practicability considerations preclude issuance of such a combined document. Should a corridor alternative be selected, further project design would take place, allowing more specific analysis of potential environmental impacts to be documented through a Tier 2 NEPA study.

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## Draft Tier 1 EIS Public Comment Period

ADOT, in conjunction with the FHWA, have made the Draft Tier 1 EIS available for public review and comment. The Draft Tier 1 EIS was published in the Federal Register on November 6, 2020. Submit your comments on the Sonoran Corridor Draft Tier 1 EIS during the public review and comment period: November 6, 2020 through January 8, 2021. All comments received during the comment period will be documented and responded to in a combined Final Tier 1 EIS/ROD. All comment methods listed below are considered equal. After reading the Draft Tier 1 EIS, please provide specific written or spoken comments on its contents.

Comments can be provided in the following manner:

- During the public hearing or virtual public engagement event
- Online: <https://azdot.gov/planning/transportation-studies/sonoran-corridor-tier-1-environmental-impact-statement/documents>
- Phone: 1.855.712.8530 (bilingual)
- Mail: Sonoran Corridor Tier 1 EIS Study Team  
c/o Joanna Bradley  
1221 S. Second Avenue, MD T100  
Tucson, AZ 85713
- Email: [Projects@azdot.gov](mailto:Projects@azdot.gov)

The Draft Tier 1 EIS is available at <https://azdot.gov/planning/transportation-studies/sonoran-corridor-tier-1-environmental-impact-statement/documents>, and for review only and at no charge at the following locations:

### Repositories for the Public Review of the Draft Tier 1 EIS

- ADOT Southcentral District Office, 1221 S. Second Ave., Tucson, AZ 85713, by appointment only between 8 a.m. and 5 p.m. weekdays. Call 520.235.3494 to make an appointment. Call at least 48 hours in advance to view the document. Only one person at a time will be granted access to the document. Please wear a mask and gloves to your appointment.
- Sahuarita Town Hall, Clerk's Office, 375 W. Sahuarita Way, Sahuarita, AZ, 520.822.8801 between 8 a.m. and 5 p.m. weekdays.
- Joyner-Green Valley Library, 601 N. La Canada Dr., Green Valley, AZ, 85614, 520.594.5295.
- Joel D. Valdez Main Library, 101 N. Stone Ave., Tucson AZ, 85701, 520.594.5564.

### Vendor Locations for Purchase of the Draft Tier 1 EIS

- Hard copy versions of the Draft Tier 1 EIS are available for purchase and pick up at The UPS Store, 2004 E. Irvington Road, Tucson, AZ 85714, 520.889.0077. Contact the store for cost and details.
- A hard copy version can be ordered online at [www.FedEx.com](http://www.FedEx.com), with delivery at requestor's expense.

## Public Hearing and Virtual Public Engagement events on the Draft Tier 1 EIS

A Public Hearing will be held to provide project information and accept formal comments on the Draft Tier 1 EIS. Date and location of the Public Hearing is provided below. Because of public health concerns and government requirements, attendance will be limited to provide for adequate social distancing. Participants must pre-register to reserve time to attend the Public Hearing in person. Please sign up at <https://tinyurl.com/SonCor> or call (520) 327-6077 (bilingual) to reserve a time slot to attend the Public Hearing event.

- **PUBLIC HEARING**

- **Tuesday, December 1, 2020, 5p.m.–8 p.m.**  
DoubleTree Suites – Tucson International Airport  
Ballroom Royale  
7051 South Tucson Boulevard  
Tucson, AZ 85756

In addition, you can participate in the Virtual Public Engagement event either online or by phone. The Virtual Public Engagement event supplements the Public Hearing, and it provides another opportunity for you to give official, recorded comments on the Draft Tier 1 EIS. To participate in the Virtual Public Engagement event, click on the online access link or call the phone access number provided below.

- **VIRTUAL PUBLIC ENGAGEMENT EVENT**

**Thursday, December 3, 2020, 5p.m. – 8p.m.**

- **Online Access:** [bit.ly/SCEIS2020](https://bit.ly/SCEIS2020) ( or you can use the full webex link: <https://meetings.webex.com/meetings/onstage/g.php?MTID=e755bc109da6c91bac638939e717a2837> )
  - Meeting Number (Access code): 146 242 8979
  - Event Password: SCEIS2020
- **Phone Access:** 1 (408) 418-9388
  - Meeting Number (Access code): 146 242 8979



## Table of Contents

<b>A</b>	<b>Acronyms and Initialisms.....</b>	<b>A-1</b>
<b>ES</b>	<b>Executive Summary .....</b>	<b>S-1</b>
	ES.1 Project Background .....	S-1
	ES.2 Scope of this Draft Tier 1 EIS.....	S-1
	ES.3 Study Area.....	S-5
	ES.4 Need for the Proposed Facility .....	S-5
	ES.5 Purpose of the Proposed Facility .....	S-7
	ES.6 Corridor Alternatives Considered .....	S-7
	ES.6.1 Corridor Alternatives Connection Points .....	S-8
	ES.6.2 Corridors Eliminated from Further Consideration.....	S-12
	ES.6.3 Reasonable Range of Corridor Alternatives Evaluated in the Tier 1 EIS.....	S-13
	ES.6.4 No-Build Alternative .....	S-19
	ES.7 Summary of Key Environmental Factors.....	S-21
	ES.8 Agency, Tribal, and Public Coordination and Outreach .....	S-22
	ES.8.1 Agency Coordination Opportunities .....	S-22
	ES.8.2 Public Outreach.....	S-23
	ES.8.3 Tribal Outreach .....	S-23
	ES.8.4 Key Outreach and Coordination Milestones.....	S-24
	ES.8.5 Scoping.....	S-25
	ES.8.6 Cooperating and Participating Agencies.....	S-28
	ES.8.7 Continuing Coordination and Outreach.....	S-28
	ES.9 How Effectively Does Each Alternative Meet the Need and Purpose? .....	S-30
	ES.9.1 Population and Employment Growth .....	S-30
	ES.9.2 Congestion Reduction.....	S-30
	ES.9.3 System Linkages Associated with Regional, Interstate and International Mobility.....	S-30
	ES.10 Differentiating and Mitigating Potential Environmental Impacts .....	S-32
	ES.11 Preferred Alternative Identified.....	S-34
	ES.12 Next Steps .....	S-35
<b>1</b>	<b>Need and Purpose .....</b>	<b>1-1</b>
	1.1 Introduction .....	1-1
	1.2 Project Development Status .....	1-5
	1.3 Study Area and Context .....	1-7
	1.3.1 Multimodal Characteristics.....	1-7
	1.3.2 Utilities .....	1-8
	1.3.3 Technology.....	1-9

1.4	Identification of Need and Purpose .....	1-9
1.4.1	Need for the Proposed Transportation Facility .....	1-9
1.5	Purpose of Proposed Transportation Facility .....	1-25
1.6	Other Benefits or Desirable Outcomes .....	1-26
1.6.1	Conformance with Local, Regional, and State Plans .....	1-26
1.6.2	Support the Protection of Environmental Resources in Accordance with Applicable Regulations and Policies .....	1-26
1.6.3	Limit Freight Traffic on Low-Volume Routes .....	1-27
1.6.4	Provide the Opportunity for Multimodal and Utility Use Where Appropriate, Should Needs Arise .....	1-27
<b>2</b>	<b>Alternatives Considered .....</b>	<b>2-1</b>
2.1	Alternatives Development .....	2-1
2.1.1	Other Studies and Reports Consulted .....	2-1
2.1.2	Scoping and Technical Recommendations .....	2-2
2.1.3	Modal Alternatives and Public Facilities Considered .....	2-3
2.2	Corridor Connection Points as a Basis for Alternative Refinement .....	2-5
2.2.1	Interstate 19 Connection Points .....	2-5
2.2.2	Interstate 10 Connection Points .....	2-7
2.3	Comprehensive Set of Corridors .....	2-7
2.3.1	Refinement and Optimization Process .....	2-9
2.4	Evaluation Process .....	2-12
2.4.1	Alternatives Screening .....	2-12
2.4.2	Corridors Eliminated from Further Consideration .....	2-14
2.5	Reasonable Range of Corridor Alternatives .....	2-15
2.5.1	Shift of Corridor Alternatives to Avoid Use of Section 4(f) Resources .....	2-17
2.6	Comparison of Reasonable Range of Corridor Alternatives .....	2-26
2.6.1	Corridor Characteristics .....	2-26
2.6.2	Serve Population and Employment Growth .....	2-26
2.6.3	Reduce Traffic Congestion .....	2-32
2.6.4	Improve System Linkages .....	2-34
2.7	Further Detailed Analysis .....	2-36

<b>3</b>	<b>Existing Conditions and Potential Environmental Consequences .....</b>	<b>3-1</b>
3.1	Corridor Alternatives.....	3-2
3.2	Land Use and Jurisdiction .....	3-4
3.2.1	Regulatory Setting.....	3-4
3.2.2	Methodology.....	3-6
3.2.3	Affected Environment.....	3-6
3.2.4	Environmental Consequences .....	3-14
3.2.5	Available Mitigation Measures .....	3-20
3.2.6	Conclusion.....	3-21
3.3	Socioeconomic Conditions, Displacements/Relocations .....	3-22
3.3.1	Regulatory Framework .....	3-22
3.3.2	Methodology.....	3-22
3.3.3	Affected Environment.....	3-23
3.3.4	Environmental Consequences .....	3-30
3.3.5	Available Mitigation Measures .....	3-36
3.3.6	Conclusion.....	3-36
3.4	Environmental Justice, Title VI, and Other Nondiscrimination Statutes .....	3-37
3.4.1	Regulatory Framework .....	3-37
3.4.2	Methodology.....	3-39
3.4.3	Affected Environment.....	3-41
3.4.4	Environmental Consequences .....	3-48
3.4.5	Available Mitigation Measures .....	3-52
3.4.6	Conclusion.....	3-52
3.5	Economic Resources .....	3-53
3.5.1	Affected Environment.....	3-53
3.5.2	Environmental Consequences .....	3-57
3.5.3	Conclusion.....	3-61
3.6	Cultural Resources .....	3-62
3.6.1	Regulatory Framework .....	3-62
3.6.2	Methodology.....	3-65
3.6.3	Affected Environment.....	3-69
3.6.4	Environmental Consequences .....	3-77
3.6.5	Available Mitigation Measures .....	3-81
3.6.6	Conclusion.....	3-82
3.7	Section 4(f) Resources.....	3-84
3.7.1	Regulatory Framework .....	3-85
3.7.2	Section 4(f) Use Definitions .....	3-85
3.7.3	Section 4(f) “Use” Approvals .....	3-86
3.7.4	Section 4(f) Evaluations for Tiered Projects.....	3-88
3.7.5	Methodology.....	3-88
3.7.6	Affected Environment.....	3-89

3.7.7	Environmental Consequences .....	3-89
3.7.8	Available Mitigation Measures .....	3-96
3.7.9	Conclusion.....	3-96
3.8	Section 6(f) Resources.....	3-97
3.8.1	Regulatory Framework .....	3-97
3.8.2	Affected Environment.....	3-97
3.8.3	Conclusion.....	3-97
3.9	Air Quality .....	3-98
3.9.1	Regulatory Framework .....	3-98
3.9.2	Methodology.....	3-105
3.9.3	Affected Environment.....	3-105
3.9.4	Environmental Consequences .....	3-109
3.9.5	Available Mitigation Measures .....	3-111
3.9.6	Conclusion.....	3-112
3.10	Noise and Vibration .....	3-113
3.10.1	Noise Impact Assessment .....	3-113
3.10.2	Vibration Impact Assessment .....	3-123
3.11	Hazardous Materials .....	3-125
3.11.1	Introduction .....	3-125
3.11.2	Regulatory Framework .....	3-125
3.11.3	Methodology.....	3-125
3.11.4	Affected Environment.....	3-129
3.11.5	Environmental Consequences .....	3-131
3.11.6	Available Mitigation Measures .....	3-132
3.11.7	Conclusion.....	3-132
3.12	Geology, Topography, Soils, and Prime and Unique Farmland .....	3-133
3.12.1	Introduction .....	3-133
3.12.2	Regulatory Framework .....	3-133
3.12.3	Methodology.....	3-134
3.12.4	Affected Environment.....	3-135
3.12.5	Environmental Consequences .....	3-137
3.12.6	Available Mitigation Measures .....	3-139
3.12.7	Conclusion.....	3-139
3.13	Biological Resources.....	3-140
3.13.1	Vegetation and Wildlife .....	3-140
3.13.2	Threatened and Endangered Species .....	3-153
3.13.3	Arizona Species of Greatest Conservation Need .....	3-165
3.13.4	Wildlife Connectivity .....	3-176

3.14	Water Resources .....	3-183
3.14.1	Waters of the US .....	3-183
3.14.2	Water Quality .....	3-195
3.14.3	Flood Hazard Evaluation and Floodplain Mitigation .....	3-204
3.15	Visual and Aesthetic Scenic Resources .....	3-210
3.15.1	Regulatory Framework .....	3-210
3.15.2	Methodology .....	3-210
3.15.3	Affected Environment .....	3-210
3.15.4	Environmental Consequences .....	3-212
3.15.5	Available Mitigation Measures .....	3-213
3.15.6	Conclusion .....	3-213
3.16	Utilities and Railroads .....	3-214
3.16.1	Existing Conditions .....	3-214
3.16.2	Environmental Consequences .....	3-216
3.17	Energy .....	3-218
3.17.1	Regulatory Context .....	3-218
3.17.2	Methodology .....	3-218
3.17.3	Affected Environment .....	3-218
3.17.4	Environmental Consequences .....	3-219
3.17.5	Potential Avoidance, Minimization, and Mitigation Strategies .....	3-219
3.17.6	Subsequent Tier 2 Analysis .....	3-219
3.17.7	Conclusion .....	3-220
3.18	Construction Impacts .....	3-221
3.18.1	Methodology .....	3-221
3.18.2	Environmental Consequences .....	3-221
3.18.3	Conclusion .....	3-225
3.19	Unavoidable Adverse Impacts .....	3-226
3.19.1	Methodology .....	3-226
3.19.2	Potential Impacted Resources .....	3-226
3.19.3	Potential Mitigation Strategies .....	3-227
3.19.4	Future Tier 2 Analysis .....	3-227
3.19.5	Conclusion .....	3-227
3.20	Indirect and Cumulative Effects .....	3-228
3.20.1	Regulatory Context .....	3-228
3.20.2	Methodology .....	3-228
3.20.3	Affected Environment: Previous Actions, Existing Conditions, and Reasonably Foreseeable Future Actions .....	3-234
3.20.4	Environmental Consequences .....	3-237
3.20.5	Summary .....	3-246
3.20.6	Mitigation Strategies .....	3-246
3.20.7	Conclusion/Future Tier 2 Analysis .....	3-246



<b>4</b>	<b>Coordination and Outreach .....</b>	<b>4-1</b>
4.1	Interagency Coordination .....	4-1
4.1.1	Regulatory Requirements .....	4-1
4.1.2	Agency Designations/Roles and Responsibilities.....	4-2
4.1.3	Agency Coordination Opportunities .....	4-6
4.2	Public Outreach.....	4-7
4.2.1	Regulatory Requirements .....	4-7
4.2.2	Outreach Communication Tools and Techniques.....	4-8
4.2.3	Title VI and other Nondiscrimination Statutes .....	4-8
4.3	Key Outreach and Coordination Milestones.....	4-10
4.3.1	Scoping.....	4-12
4.3.2	Corridor Selection Process—Refined and Optimized Set of Corridors .....	4-15
4.4	Tribal Coordination .....	4-17
4.4.1	Allottee Preference Outreach for Alternative 1 .....	4-18
4.5	Resolutions and Letters .....	4-18
4.6	Draft Tier 1 EIS Public Review Period.....	4-19
<b>5</b>	<b>Preferred Alternative .....</b>	<b>5-1</b>
5.1	Comparison of Corridor Alternatives .....	5-1
5.1.1	Meeting the Need and Purpose.....	5-1
5.1.2	Differentiating Environmental Effects and Substantive Differences .....	5-3
5.1.3	Impact Avoidance, Minimization, and Mitigation .....	5-6
5.2	Preferred Alternative .....	5-6
5.3	Implementation and Phasing .....	5-12
5.4	Funding and Financing Considerations .....	5-12
5.5	Next Steps .....	5-13
5.5.1	Solicit Input on Draft Tier 1 EIS .....	5-13
5.5.2	Evaluate Public Feedback, Identify the Selected Alternative, and Publish Final Tier 1 EIS/ROD .....	5-13
5.5.3	Tier 2 Studies.....	5-14
5.5.4	Future Corridor Opportunities.....	5-14
<b>R</b>	<b>References .....</b>	<b>R-1</b>
<b>G</b>	<b>Glossary .....</b>	<b>G-1</b>
<b>P</b>	<b>List of Preparers .....</b>	<b>P-1</b>

## **Appendices**

<b>Appendix A</b>	<b>Traffic Level of Service Comparison of Alternatives</b>
<b>Appendix B</b>	<b>Cost Estimate Comparison of Alternatives</b>
<b>Appendix C</b>	<b>Population Data for the Sonoran Corridor Study Area</b>
<b>Appendix D</b>	<b>Section 106 Consultation</b>
<b>Appendix E</b>	<b>Draft Programmatic Agreement</b>
<b>Appendix F</b>	<b>Section 4(f) Resources within the Sonoran Corridor Study Area</b>
<b>Appendix G</b>	<b>Hazardous Materials Search Record</b>
<b>Appendix H</b>	<b>San Xavier District Allottee Letters</b>

## Tables

Table ES-1.	Corridor Alternatives Eliminated from Further Consideration .....	S-12
Table ES-2.	Agency and Outreach Coordination Points.....	S-24
Table ES-3.	Measures in Meeting the Sonoran Corridor Need and Purpose .....	S-31
Table ES-4.	Comparison of Alternatives and Project Effects <sup>1</sup> within the 2000-foot Corridor .....	S-33
Table 1-1.	Population Growth in the PAG Region and Sonoran Corridor Study Area, 2015 to 2045 .....	1-10
Table 1-2.	Employment Growth in the PAG Region and Sonoran Corridor Study Area, 2015 to 2045 RMAP and Sonoran Corridor Study Technical Advisory Committee Scenarios .....	1-15
Table 1-3.	Average Weekday Traffic, Volume /Capacity Ratio, and Level of Service, 2016 and 2045 .....	1-20
Table 1-4.	Need and Purpose Measures.....	1-26
Table 2-1.	Corridor Evaluation Results from Corridor Selection Report.....	2-13
Table 2-2.	Listing of Key Study Area Planned Projects in 2045 RMAP.....	2-24
Table 2-3.	Corridor Length and Lane-Miles .....	2-26
Table 2-4.	Comparison of How Corridors Serve Growth in Population and Employment .....	2-31
Table 2-5.	Comparison of Corridor Alternatives' Access to Identified Activity Centers.....	2-31
Table 2-6.	Comparison of Volume-to-Capacity Congestion Reduction Performance of Corridor Alternatives .....	2-32
Table 2-7.	Study Area Volume-to-Capacity Ratios Comparison of Corridor Alternatives and No-Build Alternative .....	2-32
Table 2-8.	Summary Comparison of System Linkages Performance of Corridor Alternatives .....	2-34
Table 2-9.	Travel Time between El Toro South and Fairgrounds (in minutes) and Travel Speeds on Sonoran Corridor (in miles/hour) as a Measure of System Linkage Performance .....	2-35
Table 2-10.	2045 Vehicle Miles Traveled and Vehicle Hours Traveled.....	2-35
Table 3-1.	Corridor Segments by Alternative .....	3-2
Table 3-2.	Potential Land Management (Owned or Maintained by) Conversion Impacts by Corridor Alternative (in acres) .....	3-15
Table 3-3.	Potential Land Management (by Jurisdiction) Conversion Impacts by Corridor Alternative (in acres).....	3-15
Table 3-4.	Potential Existing Land Use Conversion Impacts by Corridor Alternative (in acres) .....	3-16
Table 3-5.	Potential Planned Land Use Conversion Impacts by Corridor Alternative (in acres).....	3-16
Table 3-6.	General Socioeconomic Composition of Communities within the Study Area .....	3-24
Table 3-7.	Other Nondiscrimination Statutes.....	3-39
Table 3-8.	Languages other than English Spoken in the Study Area .....	3-46

Table 3-9.	Minority Populations within Corridor Alternative 1 .....	3-49
Table 3-10.	Low-Income, LEP and EJ Indicator Populations within Corridor Alternative 1 .....	3-49
Table 3-11.	Minority Populations within Corridor Alternative 7 .....	3-50
Table 3-12.	Low-Income, LEP, and EJ Indicator Populations within Corridor Alternative 7 .....	3-50
Table 3-13.	Minority Populations within Corridor Alternative 8A.....	3-51
Table 3-14.	Low-Income, LEP and EJ Indicator Populations within Corridor Alternative 8A.....	3-51
Table 3-15.	Arizona Merchandise Exports to Mexico by Industry (millions of dollars) .....	3-56
Table 3-16.	Economic Impact, 2026–2045—Corridor Alternative 1.....	3-58
Table 3-17.	Economic Impact, 2026–2045—Corridor Alternative 7.....	3-59
Table 3-18.	Economic Impact, 2026-2045—Corridor Alternative 8A .....	3-60
Table 3-19.	Cultural Resource Laws, Regulations, Executive Orders, and Other Authorities .....	3-64
Table 3-20.	Data Sources for Archaeological Survey and Site Records .....	3-68
Table 3-21.	Meetings with Tribes .....	3-69
Table 3-22.	Estimated Total Archaeological Resources per Corridor Alternative .....	3-70
Table 3-23.	Known Archaeological Sites per Corridor Alternative by Type.....	3-71
Table 3-24.	National Register Eligibility of Archaeological Sites and Historic Structures.....	3-73
Table 3-25.	Estimated Total Historic Buildings, Trails, and Landscapes and Recommended Eligibility by Corridor Alternative .....	3-76
Table 3-26.	Potential for Impacts on Archaeological Sites and Historic Structures along the Corridor Alternatives .....	3-80
Table 3-27.	Summary of the Potential Impacts on Cultural Resources .....	3-82
Table 3-28.	Public parks, recreation area, historic sites or wildlife and waterfowl refuge Section 4(f) Resources Within the Study Corridor .....	3-91
Table 3-29.	National Ambient Air Quality Standards for Criteria Pollutants .....	3-99
Table 3-30.	Noise Abatement Criteria.....	3-115
Table 3-31.	Existing Ambient Noise Monitoring Data.....	3-117
Table 3-32.	Noise Receivers along Study Area .....	3-118
Table 3-33.	Summary of Predicted Future Traffic Noise Levels .....	3-121
Table 3-34.	Hazardous Materials Regulations .....	3-126
Table 3-35.	Regulated Sites by Segment/Corridor .....	3-129
Table 3-36.	Regulated Findings by Corridor Alternative.....	3-130
Table 3-37.	Applicable General Vegetation and Wildlife Regulations.....	3-140
Table 3-38.	Biotic Community Acreage .....	3-142
Table 3-39.	USGS LANDFIRE Land and Vegetation Cover Acreage .....	3-145
Table 3-40.	Applicable Threatened and Endangered Species Regulations.....	3-153
Table 3-41.	ESA-Protected Species and Habitat .....	3-155
Table 3-42.	Potentially Suitable Pima Pineapple Cactus Habitat Acreage.....	3-157

Table 3-43.	Potentially Suitable Sonoran Desert Tortoise Habitat Acreage .....	3-160
Table 3-44.	Applicable Arizona Species of Greatest Conservation Need Regulations .....	3-165
Table 3-45.	Species of Greatest Conservation Need and BLM-sensitive Species .....	3-167
Table 3-46.	Movement Areas by Corridor Alternative .....	3-179
Table 3-47.	Potential Waters of the US by Corridor Segment .....	3-188
Table 3-48.	Potential Waters of the US Classified as Wetlands by Corridor Segment .....	3-190
Table 3-49.	Potential Waters of the US Classified as Wetlands by Corridor Segment .....	3-191
Table 3-50.	Potential Waters of the US by Corridor Alternative .....	3-191
Table 3-51.	Tier 2 Section 404 Permitting Scenarios .....	3-195
Table 3-52.	Wells and Groundwater Depth by Corridor Alternative .....	3-200
Table 3-53.	Daily Fuel Consumption, 2045 .....	3-219
Table 3-54.	Short-term Construction Impacts .....	3-222
Table 3-55.	Previous Actions Affecting the Study Area .....	3-234
Table 3-56.	Proposed and Funded Roadway Improvements within the Study Area.....	3-235
Table 3-57.	Unfunded Future Projects in Study Area .....	3-236
Table 3-58.	Future Non-Transportation Projects.....	3-237
Table 3-59.	Potential Indirect Effects of the Sonoran Corridor .....	3-238
Table 3-60.	Cumulative Effects Summary .....	3-244
Table 4-1.	Agency Roles and Responsibilities .....	4-3
Table 4-2.	Invited Cooperating Agencies .....	4-4
Table 4-3.	Invited Participating Agencies .....	4-5
Table 4-4.	Agency and Outreach Coordination Points.....	4-10
Table 5-1.	Need and Purpose Measures.....	5-2
Table 5-2.	Comparison of Alternatives and Project Effects <sup>1</sup> within the 2000-foot Corridor .....	5-4
Table 5-3.	Potential Mitigation Strategies .....	5-7



## Figures

Figure ES-1.	Tier 1 and Tier 2 Environmental Analyses .....	S-3
Figure ES-2.	Cross-section of Corridor Width and Possible Future Right-of-Way Uses.....	S-4
Figure ES-3.	Project Study Area .....	S-6
Figure ES-4.	Corridor Connection Points .....	S-9
Figure ES-5.	Comprehensive Set of Corridor Alternatives.....	S-10
Figure ES-6.	Final Refined and Optimized Set of Corridor Alternatives.....	S-11
Figure ES-7.	Reasonable Range of Corridor Alternatives.....	S-14
Figure ES-8.	Corridor Alternative 1 .....	S-15
Figure ES-9.	Corridor Alternative 7 .....	S-16
Figure ES-10.	Corridor Alternative 8A.....	S-18
Figure ES-11.	No-Build Alternative .....	S-20
Figure ES-12.	Tier 1 EIS Decision Steps .....	S-29
Figure ES-13.	Preferred Alternative .....	S-34
Figure 1-1.	State Map.....	1-2
Figure 1-2.	Sonoran Corridor Study Area Jurisdictions .....	1-3
Figure 1-3.	Sonoran Corridor Study Area Land Ownership.....	1-4
Figure 1-4.	Tier 1 and Tier 2 Environmental Analyses .....	1-6
Figure 1-5.	Population Densities in the Tucson Metropolitan Region, 2015 and 2045.....	1-11
Figure 1-6.	Employment Densities in the Tucson Metropolitan Region, 2015 and 2045.....	1-13
Figure 1-7.	Major Employment Centers in the Sonoran Corridor Study Area .....	1-16
Figure 1-8.	Activity Centers Accessibility Need in the Sonoran Corridor Study Area .....	1-17
Figure 1-9.	Proposed Future I-10 Airport Access Routes.....	1-18
Figure 1-10.	Levels of Service (LOS) .....	1-19
Figure 1-11.	2045 Levels of Service on Study Area Roadway Network Based on PAG's RMAP.....	1-22
Figure 1-12.	Distribution of Truck Trips from Nogales to I-10 .....	1-24
Figure 2-1.	Corridor Width for Tier 1 Study and Possible Uses in Tier 2 Right-of-Way .....	2-4
Figure 2-2.	Connection Points Considered in Developing Corridor Alternatives.....	2-6
Figure 2-3.	Comprehensive Set of Corridor Alternatives.....	2-8
Figure 2-4.	Preliminary Refined and Optimized Set of Corridor Alternatives.....	2-10
Figure 2-5.	Final Set of Refined and Optimized Corridor Alternatives.....	2-11
Figure 2-6.	Preliminary Reasonable Range of Corridor Alternatives .....	2-16
Figure 2-7.	Reasonable Range of Corridor Alternatives (including the No-Build Alternative) .....	2-18
Figure 2-8.	Corridor Alternative 1 .....	2-20
Figure 2-9.	Corridor Alternative 7 .....	2-21
Figure 2-10.	Corridor Alternative 8A.....	2-23

Figure 2-11.	No-Build Alternative (2016 Adopted RMAP with 2045 Multimodal Roadway Projects) .....	2-25
Figure 2-12.	Corridor Alternatives with Population Growth Projections.....	2-27
Figure 2-13.	Corridor Alternatives with Employment Growth Projections.....	2-29
Figure 2-14.	No-Build Network Segments Used to Compare LOS as a Congestion Measure .....	2-33
Figure 3-1.	Corridor Analysis Segments .....	3-3
Figure 3-2.	Study Area Jurisdictions .....	3-5
Figure 3-3.	Current Land Use .....	3-8
Figure 3-4.	Planned Land Use.....	3-10
Figure 3-5.	Specific Land Use Plans .....	3-11
Figure 3-6.	Land Management in the Study Area .....	3-13
Figure 3-7.	Population Densities in the Sonoran Corridor Study Area, 2015 and 2045 .....	3-25
Figure 3-8.	Employment Densities in the Tucson Metropolitan Region, 2005 and 2045 .....	3-27
Figure 3-9.	Study Area Affected Communities.....	3-29
Figure 3-10.	Community Facilities within the Study Area.....	3-31
Figure 3-11.	Residential and Commercial Properties within and Adjacent to the Corridor Alternatives .....	3-32
Figure 3-12.	Census Block Groups within the Study Area.....	3-42
Figure 3-13.	Generalized Distribution of Minorities by Block Group.....	3-43
Figure 3-14.	Generalized Distribution of Low-Income Individuals by Block Group .....	3-45
Figure 3-15.	Generalized Distribution of Limited-English Proficiency Individuals by Block Group .....	3-47
Figure 3-16.	Real GDP Growth Rate Trends, 2002-2017 .....	3-54
Figure 3-17.	Industry Shares of GDP, 2016 .....	3-55
Figure 3-18.	Tucson Employment Shares by Industry, 2018.....	3-55
Figure 3-19.	Impact of Corridor Alternative 1 on Tucson MSA Employment .....	3-57
Figure 3-20.	Impact of Corridor Alternative 7 on Tucson MSA Employment .....	3-58
Figure 3-21.	Impact of Corridor Alternative 8A on Tucson MSA Employment .....	3-59
Figure 3-22.	Tucson MSA Job Growth Under the No-Build Alternative.....	3-60
Figure 3-23.	Historic Buildings, Trails, and Landscapes in the Study Corridor.....	3-74
Figure 3-24.	Section 4(f) Resources within or adjacent to the Study Corridor .....	3-93
Figure 3-25.	FHWA Predicted National MSAT Trends 2010–2050 for Vehicles on Roadways .....	3-101
Figure 3-26.	Air Quality in the Study Area .....	3-106
Figure 3-27.	Annual Statewide Highway Emissions of Carbon Monoxide .....	3-107
Figure 3-28.	Annual Statewide Highway Emissions of Oxides of Nitrogen and Volatile Organic Compounds.....	3-108
Figure 3-29.	Annual Statewide Highway Emissions of Particulate Matter .....	3-108

Figure 3-30.	FHWA PM <sub>10</sub> Emissions Factors by Speed for Light-Duty Vehicles and Trucks, 2018 ...	3-109
Figure 3-31.	Common Outdoor and Indoor Noise Levels .....	3-114
Figure 3-32.	Noise Sensitive Land Uses within Study Area .....	3-119
Figure 3-33.	Prime and Unique Farmland in the Corridor Alternatives .....	3-136
Figure 3-34.	Biotic Communities .....	3-143
Figure 3-35.	USGS LANDFIRE Land and Vegetation Cover .....	3-146
Figure 3-36.	Potentially Suitable Sonoran Desert Tortoise Habitat .....	3-159
Figure 3-37.	Critical Habitat within the Study Area .....	3-161
Figure 3-38.	Wildlife Movement Corridors .....	3-178
Figure 3-39.	Potential Waters of the US .....	3-187
Figure 3-40.	Potential Wetlands .....	3-189
Figure 3-41.	Groundwater Resources .....	3-201
Figure 3-42.	Mapped Floodplains and Lee Moore Wash Basin .....	3-207
Figure 3-43.	Visual and Aesthetic Scenic Resources in and around the Study Area .....	3-211
Figure 3-44.	Existing and Planned Utilities within the Study Area .....	3-215
Figure 3-45.	Growth Areas and Corridor Alternative 1 Area of Influence .....	3-230
Figure 3-46.	Growth Areas and Corridor Alternative 7 Area of Influence .....	3-231
Figure 3-47.	Growth Areas and Corridor Alternative 8A Area of Influence .....	3-232
Figure 5-1.	Tier 1 EIS Decision Steps .....	5-1
Figure 5-2.	Preferred Corridor Alternative 7 .....	5-11

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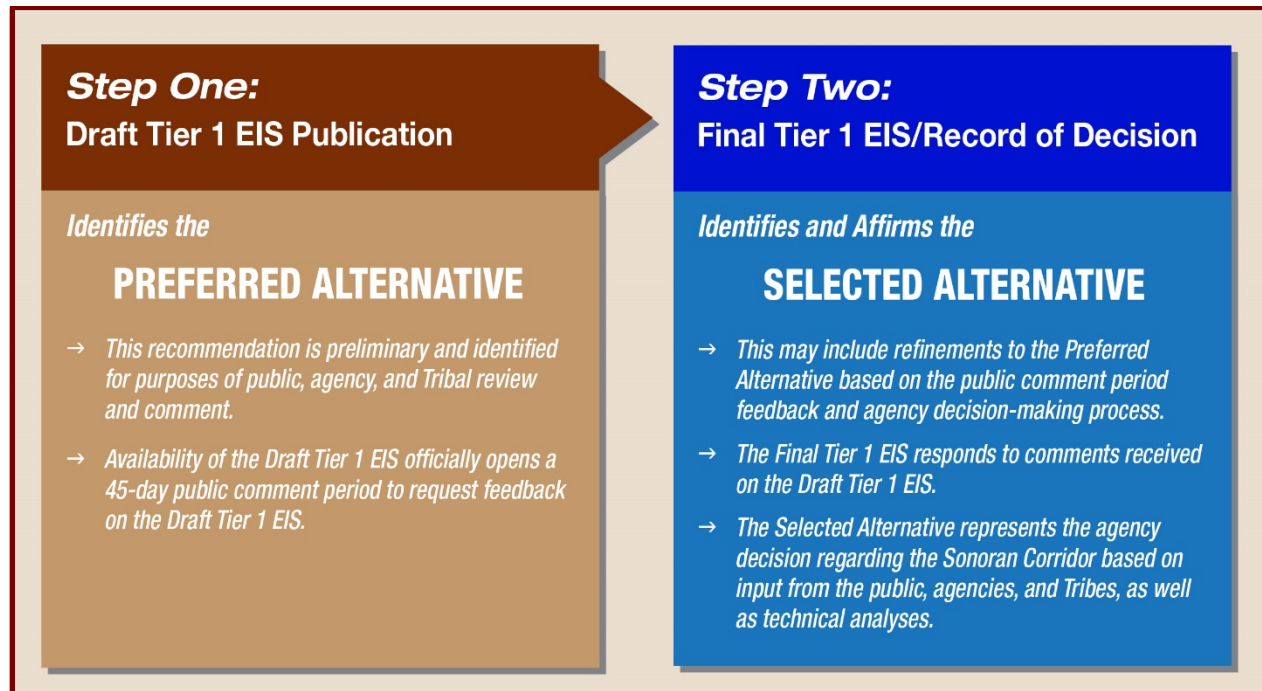
## 5 PREFERRED ALTERNATIVE

FHWA and ADOT evaluated three corridor alternatives and a No-Build Alternative to determine a Preferred Alternative for the Sonoran Corridor study by considering the following:

- How effectively does each alternative meet the Sonoran Corridor Need and Purpose?
- What are the differentiating and substantive impacts?
- Can the impacts be avoided, minimized, or mitigated?

The Preferred Alternative represents the preliminary findings of the Sonoran Corridor study based on the environmental analysis, agency and Tribal coordination, and public involvement to date. As shown on Figure 5-1, the Preferred Alternative is presented for public review and comment as part of the Draft Tier 1 EIS. The subsequent Final Tier 1 EIS/ROD will consider input received and will affirm or modify the Preferred Alternative in identifying a Selected Alternative.

**Figure 5-1. Tier 1 EIS Decision Steps**



### 5.1 Comparison of Corridor Alternatives

#### 5.1.1 Meeting the Need and Purpose

Measures were used as a basis of comparison among the three corridor alternatives and No-Build Alternative to determine how effectively they met the identified Need and Purpose in the study. The result of this evaluation is summarized and presented in Table 5-1 below.



**Table 5-1. Need and Purpose Measures**

NEED AND PURPOSE	METRICS	NO-BUILD ALTERNATIVE	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
<b>Serve Population and Employment Growth</b>					
<p><b>Need:</b> High-growth areas and existing activity centers need access to an improved transportation network.</p> <p><b>Purpose:</b> Provide a high-priority, high-capacity transportation corridor to serve population/employment growth and existing and new employment centers.</p>	<ul style="list-style-type: none"> <li>Provides access to planned growth areas, and serves identified employment centers in the study area</li> <li>Total distance to 27 identified activity centers linked in and near the study area from (CSR)</li> </ul>	<ul style="list-style-type: none"> <li>Does not serve growth area and identified employment centers in the study area.</li> <li>Does not improve access to activity centers</li> </ul>	<ul style="list-style-type: none"> <li>Provides direct access to the areas of greatest growth and the northerly portion of the study area. Directly serves employment at or near the TUS area and I-10</li> <li>76.75 miles<sup>1</sup> - Improves access to activities in the northerly portions of study area</li> </ul>	<ul style="list-style-type: none"> <li>Provides direct access to greatest growth in the northerly portion of the study area and Sahuarita.</li> <li>Directly serves employment centers at or near TUS and I-10</li> <li>66.59 miles<sup>1</sup> - Improves access to activities in the northerly portions of study area and within Sahuarita</li> </ul>	<ul style="list-style-type: none"> <li>Provides direct access to areas of greatest growth in the Town of Sahuarita. Does not directly serve employment centers at and near TUS and I-10.</li> <li>75.62 miles<sup>1</sup> - Improves access to activities in study area mainly within Sahuarita</li> </ul>
<b>Reduce Traffic Congestion</b>					
<p><b>Need:</b> Improve forecast capacity shortages in the study area.</p> <p><b>Purpose:</b> Improve 2045 LOS (V/C) to reduce congestion in study area by 2045.</p>	<ul style="list-style-type: none"> <li>Changes to overall 2045 LOS (V/C) within study area</li> </ul>	<ul style="list-style-type: none"> <li>Does not reduce congestion</li> </ul>	<ul style="list-style-type: none"> <li>Reduces V/C by 5.4% compared to No Build</li> </ul>	<ul style="list-style-type: none"> <li>Reduces V/C by 12.2% compared to No Build</li> </ul>	<ul style="list-style-type: none"> <li>Reduces V/C by 13.8% compared to No Build</li> </ul>
<b>Improve System Linkages</b>					
<p><b>Need:</b> Lack of system linkages south of TUS inhibits efficient regional interstate and international mobility in the study area</p> <p><b>Purpose:</b> A high-priority, high-capacity transportation corridor linking I-19 and I-10 south of TUS to improve regional, interstate, and international travel mobility</p>	<ul style="list-style-type: none"> <li>Change in travel times in and near study area</li> <li>Change in 2045 VMT and VHT compared to No-Build</li> </ul>	<ul style="list-style-type: none"> <li>Does not reduce travel times or affect VMT/VHT</li> </ul>	<ul style="list-style-type: none"> <li>Reduces travel time by 15.9 minutes compared to No Build</li> <li>Increases VMT and reduces VHT in study area.</li> </ul>	<ul style="list-style-type: none"> <li>Reduces travel time by 16.6 minutes compared to No Build</li> <li>Increases VMT and reduces VHT</li> </ul>	<ul style="list-style-type: none"> <li>Travel time 17.8 minutes shorter than No Build</li> <li>Increases VMT and reduces VHT</li> </ul>

<sup>1</sup> Shorter distance means better connection to centers

LOS = level of service; V/C = Volume to Capacity ratio; CSR = Corridor Selection Report; VMT = vehicle miles traveled; VHT = vehicle hours traveled; TUS = Tucson International Airport; min = minutes

#### 5.1.1.1 Population and Employment Growth

A major factor considered for the Sonoran Corridor study is the anticipated growth planned for the study area. Substantial additional employment is proposed in the currently unincorporated Pima County and in the City of Tucson and the Town of Sahuarita. Within the 2045 timeframe of this study, the growth is most pronounced near TUS and along I-10 and to the immediate east of I-19 in the Town of Sahuarita where substantial development is proposed (See Section 1.5.1.1 and Figures 1-4 and 1-5). Further activity would happen along the major roadway arteries in the study area over time (i.e., Sahuarita, Wilmot, Houghton Roads). Growth is expected to notably tax the limited transportation network currently available or the No-Build Alternative which is reflected in the 2045 RMAP and which includes widenings of portions of I-10 and I-19 as well as other arterials in the study area. The ability of the transportation network to serve the increase in population and employment would be greatly enhanced by the additional capacity and geographic coverage of the Sonoran Corridor.

The Sonoran Corridor would substantially enhance access to existing and future activities in the area where growth of population and employment forecasts are identified in the local jurisdictions' plans. The many existing and future activity centers providing employment, shopping, institutional services, education, etc., within the study area would benefit from the Sonoran Corridor in organizing and streamlining transportation movements in the study area to serve the local and regional communities.

#### 5.1.1.2 Congestion Reduction

The corridor alternatives all improve upon the congestion levels of the No-Build Alternative and improve the LOS for 2045 over that of the No-Build Alternative.

#### 5.1.1.3 System Linkages

Just as importantly, adding a system linkage south of the TUS to the existing transportation system in the study area improves in all cases, which is particularly important for commercial freight activity as imports and exports from and to Mexico grow over time. Though the changes are small, the improved access to centers and increase in the amount of travel, coupled with the reduction in the time traveled within the study area, indicates that the addition of the Sonoran Corridor enhances international, interstate, and regional mobility.

### 5.1.2 Differentiating Environmental Effects and Substantive Differences

As detailed in the previous section, each corridor alternative performs differently in relation to the metrics used to evaluate how effectively they met the study's need and purpose. In determining a Preferred Alternative for this Draft Tier 1 EIS, the next layer of evaluation considers potential environmental effects of each alternative as described in Chapter 3, Affected Environment and Environmental Consequences, and identifies the substantive differences among the corridor alternatives. This section is organized based on the key decision points that emerged from the EIS analysis. Each subsection below details the identified impacts and beneficial effects considered in identifying the Preferred Alternative. A summary of the effects is provided in Table 5-2.

**Table 5-2. Comparison of Alternatives and Project Effects<sup>1</sup> within the 2000-foot Corridor**

RESOURCE TOPIC	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
Travel Time compared to No-Build Alternative	15.9 minutes shorter	16.6 minutes shorter	17.8 minutes shorter
V/C compared to No-Build	5.4% reduction	12.2% reduction	13.8% reduction
System Linkages	Provides direct access to activities near TUS and I-10	Provides direct access to most activities near TUS, I-10 and the Town of Sahuarita	Is farther from activities near TUS and I-10, but serves Town of Sahuarita
Land Use and Jurisdiction	912 acres non-residential 2,365 acres residential	2,770 acres non-residential 2,384 acres residential	2,553 acres non-residential 2,733 acres residential
Socioeconomic Conditions	5 residences were identified within the corridor	54 residential units were identified within the corridor.	Approximately 100 residential units identified in the corridor
Environmental Justice and Title VI	65.32% minority 12.60%_ low income	54.03% minority 17.72% low income	42.59% minority 10.24% low income
Economic Resources (Total output by REMI <sup>2</sup> model)	\$1,849 million	\$2,725 million	\$3,041 million
Section 4(f) Resources	The Juan Bautista de Anza National Historical Trail crosses all corridor alternatives		
Section 6(f) Resources	No 6(f) properties present at this time		
Air Quality	42% travel time decrease; least potential to result in localized violations of CO	43% travel time decrease	46% travel time decrease has greatest improvement in AQ; greatest potential for violations of CO due to corridor length
Noise and Vibration	Predicted noise levels 57-64 dBA	Predicted noise levels 57-78 dBA; two residential areas impacted	Predicted noise levels 57-78 dBA; three residential areas impacted
Hazardous Materials	40 total sites include 3 Superfund	42 total sites include 3 Superfund	11 total sites
Geology, Soils, and Farmland	No impacts to farmland	232 acres of active farmland	232 acres of active farmland
Biological Resources	167 acres riparian area; 85 acres high-value Sonoran Desert tortoise habitat; least effect to wildlife movement corridors	218 acres riparian area; 50 acres Sonoran Desert tortoise habitat	201 acres riparian area; 21 acres Sonoran Desert tortoise habitat. Most detrimental habitat fragmentation and wildlife movement
Water Resources	72,185' ephemeral washes; 53 acres potential wetlands Does not meet practicability considerations associated with Section 404(b)(1) of the CWA	211,811' ephemeral washes; 9 acres potential wetlands Has an ability to meet all considerations associated with Section 404(b)(1) of the CWA	220,569' ephemeral washes; No potential wetlands Has an ability to meet all considerations associated with Section 404(b)(1) of the CWA
Water Quality	22 wells; 146 acres FEMA floodplain	41 wells; 241 acres FEMA floodplain	43 wells; 241 acres FEMA floodplain
Cultural Resources	37 known cultural sites	28 known cultural sites	30 known cultural sites

<sup>1</sup> Note: all figures in Table 5-2 are for a 2000'-wide corridor and are used as a basis of comparison in this Tier 1 EIS. The effects shown in the table will be refined during Tier 2 studies within a more constrained approximately 400' right-of-way alignment and will likely be less.

<sup>2</sup> Regional Economic Models, Inc. (REMI) is an econometric input-output model used to forecast the effect of a change (i.e., Sonoran Corridor) on the regional economy of Pima County.

#### 5.1.2.1 Corridor Alternative 1

From a transportation perspective, Corridor Alternative 1 performs well regarding travel time reduction, but serves a smaller amount of areas of growth in the study area and has a lower benefit to congestion reduction and economic output when compared to other corridor alternatives. Corridor Alternative 1 is the shortest of the corridor alternatives evaluated in the Draft Tier 1 EIS. As such, it offers the potential of reduced impacts based solely on its length. While none of the corridor alternatives are likely to cause major adverse effects to land uses along the corridor, in general, Corridor Alternative 1 impacts less land. At the same time, it has a potentially higher effect on minority and low-income populations and has a high likelihood to adversely affect very sensitive cultural resources in surveyed areas within tribal lands.

TON leadership has submitted a letter in support of further study of the corridor with the caveat that affected allottees must be included in the discussion and participate in the final decision about retaining Alternative 1 as a viable option. ADOT and FHWA have been in ongoing and frequent contact with SxD, TON, the Allottee Association, and the affected allottees who own property in the proposed Corridor Alternative 1. About 10% of affected allottees responded to the survey. Information collected from affected allottees to date suggests a lack of critical support for Alternative 1. This played a role in identifying the Preferred Alternative. The project team will use the comments collected during the public review and comment period of the Draft Tier 1 EIS to inform the Selected Alternative.

#### 5.1.2.2 Corridor Alternative 7

Corridor Alternative 7 provides the greatest benefit from a travel perspective and performs well on economic benefit to the area. It has generally more pronounced effects than Corridor Alternative 1 in some environmental resource areas, but it also serves a larger portion of the study area by providing direct access to planned growth areas in Sahuarita while also serving the important growth areas near TUS and I-10. Corridor Alternative 7 best meets the need and purpose of the study though it is longer than Corridor Alternative 1. The Town of Sahuarita has approved a resolution that prefers an alternative that supports their local plans.

#### 5.1.2.3 Corridor Alternative 8A

Corridor Alternative 8A has similar characteristics to Corridor Alternative 7, but it impacts more homes and does not provide direct benefit to critical growth areas near TUS. Corridor Alternative 8A is likely to carry the highest cost because it is the longest option and, in general, has the highest environmental effects among the three corridor alternatives.

### 5.1.3 Impact Avoidance, Minimization, and Mitigation

During the alternatives development and screening process, the corridor alternatives were identified with the intent of avoiding major environmental impacts, including minority and low-income populations, archeological, historic, and natural/wildlife areas. This Draft Tier 1 EIS includes a detailed analysis of the beneficial and adverse effects of the Sonoran Corridor on a wide variety of environmental resources. Section 5.1, Comparison of Corridor Alternatives, provides a high-level summary of the key differentiating and substantive environmental impacts of each corridor alternative. These factors contributed to the identification of the Preferred Alternative.

All the corridor alternatives affect some sensitive resource areas. Throughout Chapter 3, Affected Environment and Environmental Consequences, strategies are recommended that could be implemented in the development of the Sonoran Corridor that would avoid, minimize, or mitigate adverse effects. The mitigation strategy discussion for this Draft Tier 1 EIS focuses on planning-level efforts. This section compiles the strategies that apply to the Preferred Alternative. As the Sonoran Corridor moves forward, Tier 2 studies would identify project-level mitigation measures, including those necessary to minimize the short-term and temporary effects of construction activities.

Table 5-3 (Potential Mitigation Strategies) summarizes the general effects of the proposed corridor in the various resource areas and outlines possible mitigation strategies that could be implemented to address each type of resource. While this is not an exhaustive list, it provides an indication of the types of mitigation that should be considered in a future Tier 2 analysis. Subsequent Tier 2 studies for benefits or adverse impacts will be conducted for all impacted resources such as economic resources, parklands and Section 4(f) resources, air quality, socioeconomic conditions, displacements/relocations, noise and vibration, visual and aesthetics, etc.

## 5.2 Preferred Alternative

After comparing and weighing the benefits and impacts of the three corridor alternatives and the No-Build alternative, FHWA and ADOT have identified Alternative 7 as the Preferred Alternative. The Selected Alternative for the Sonoran Corridor Tier 1 study will be identified in the combined Final Tier 1 EIS/ROD after the public review and comment period of the Draft Tier 1 EIS.

FHWA and ADOT identified Alternative 7 (shown on Figure 5-2) as the Preferred Alternative because it effectively meets the Sonoran Corridor need and purpose while minimizing the potential for adverse impacts. Based on the analysis completed and the input from the public and agencies, all the alternatives have generally comparable effects, but in terms of the specific elements of the Need and Purpose statement, Alternative 7 is the most effective at balancing congestion reduction, accessibility and growth questions of the need and purpose with the environmental impacts of building a transportation corridor in the study area.



**Table 5-3. Potential Mitigation Strategies**

RESOURCE AREA	IMPACT IDENTIFICATION	POTENTIAL TIER 2 MITIGATION STRATEGIES
<b>Transportation</b>	Beneficial effects on the transportation system have been identified, and no mitigation strategies are proposed for this Tier 1 level analysis.	Tier 2 studies would address more specific considerations, such as continued coordination with local and county transportation agencies and development of a traffic management plan and the effects.
<b>Land Use</b>	Participate in coordination with local government entities as appropriate to minimize the potential for land use conflicts.	Tier 2 studies would address more specific mitigation considerations, such as the acquisition of properties and conversion of land to transportation uses.
<b>Socioeconomic Conditions, Displacements/ Relocations</b>	Socioeconomic impacts of the preferred alignment were identified at the corridor level.	During Tier 2 analyses, impacts should be avoided or mitigated through the design of the alignment minimize disruption to community features or resources; planning and locating new facilities outside of the selected alignment; building structures such as pedestrian overpasses to maintain any existing neighborhood connections; or modifying existing facilities to maintain access and function. If during the Tier 2 analysis it is found that displacements are unavoidable, all displacements would occur in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.
<b>Environmental Justice and Title VI</b>	<p>Throughout the Tier 1 EIS process, FHWA and ADOT engaged in public participation efforts with the general public. Prior to the release of this Draft Tier 1 EIS, three rounds of focused public engagement were held during the scoping and corridor selection study phases to facilitate public understanding of the study process, key milestones, and decision points. In addition to public engagement efforts, the Project Team has continuously accepted input from the public via mail, e-mail, and a bilingual telephone hotline. . The Project team provided Spanish translated project material and had the ability to translate in other languages upon request.</p> <p>The Tier 1 EIS only identifies areas with high concentration of minority and low-income populations. Specific information needed to make disproportionate high and adverse effect determinations was not available.</p>	Tier 2 studies would address more specific mitigation considerations, such as placing the alignment to avoid and minimize impacts to communities, consideration of features such as pedestrian overpasses to maintain neighborhood connections, and continued characterization of community demographics in order to more comprehensively identify environmental justice populations. Also, specific community impact assessments to identify adverse effects or benefits on a particular minority or low-income population will to be conducted during Tier 2

**Table 5-3. Potential Mitigation Strategies(continued)**

RESOURCE AREA	IMPACT IDENTIFICATION	POTENTIAL TIER 2 MITIGATION STRATEGIES
<b>Economic Resources</b>	Effects identified at the regional level include economic influence of a major construction project and the effects of the associated induced activity.	Tier 2 studies would address more specific impacts and mitigation considerations, including use of an updated travel demand model with current population and employment projections, addressing the spacing and number of interchanges, and a more detailed analysis of the impacts to businesses, including loss or improvement of access.
<b>Section 4(f) Resources</b>	Preferred alternative tries to avoid Section 4(f) properties where they were identified. An inventory of known Section 4(f) resources is listed in Tables 3-19 and 3-20. Corridors have been shifted to avoid Anamax Park and the County Fairgrounds recreational features.	As set forth in 23 CFR 774.7(e)(1), FHWA would complete a Final Section 4(f) Evaluation during future Tier 2 studies. At that time, FHWA would focus on making final determinations of use, assessing avoidance and least harm as warranted, and identifying specific measures to minimize harm. The results of the detailed Tier 2 cultural resources studies and surveys would be assessed to determine if any additional Section 4(f) properties are present.
<b>Cultural Resources</b>	The stipulations of the current draft PA (see Appendix E) address specific requirements for further studies of cultural resources, which would occur during Tier 2. FHWA is continuing to work with the Section 106 consulting parties and would execute the PA prior to issuing a ROD for the Tier 1 EIS process.	FHWA will execute a Programmatic Agreement (PA) pursuant to Section 106 of NHPA to stipulate procedures for assessing effects of Tier 2 projects on properties listed in or eligible for the NRHP. The PA would stipulate procedures for developing and implementing measures to avoid or minimize adverse effects or mitigate any unavoidable adverse effects as each Tier 2 project is planned.
<b>Air Quality</b>	Tier 1 findings at the corridor level show pollutant reduction from reduced travel times, effect of corridor length, and recognize the need to minimize the effects of creating hot spots such as the placement of interchanges in receptor-sensitive areas	Tier 2 studies would include project-level air quality analyses and address more specific mitigation considerations, including methods to minimize the impact of construction activities on air quality.
<b>Noise and Vibration</b>	Undeveloped lands within the study area have been identified with predicted noise levels and categorized based on zoning and are documented in this Draft Tier 1 EIS. This information is available to local and regional jurisdictions for their use in planning for noise-compatible land uses and buffer areas in the vicinity of the study area.	Tier 2 studies would address more specific mitigation considerations, such as a traffic noise impact and abatement analysis based upon the alignment and design of the Sonoran Corridor. Mitigation measures considered during Tier 2 studies include noise walls, earthen berms, acquisition of a buffer zone, traffic management measures, and refinement of the horizontal and/or vertical alignment.

**Table 5-3. Potential Mitigation Strategies(continued)**

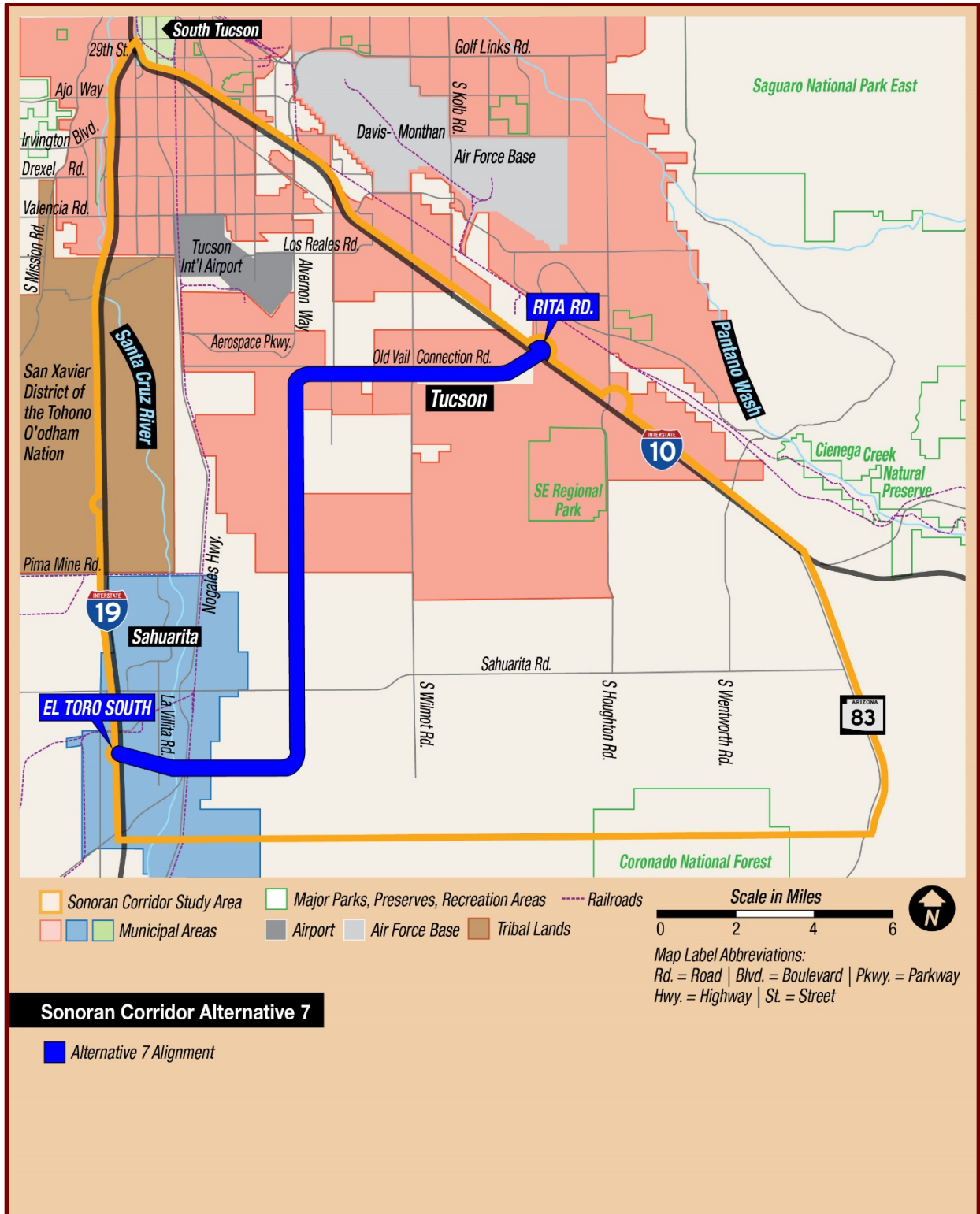
RESOURCE AREA	IMPACT IDENTIFICATION	POTENTIAL TIER 2 MITIGATION STRATEGIES
<b>Hazardous Materials</b>	Known hazardous materials sites and generators within the study area have been identified through regulatory data base searches and are documented in this Draft Tier 1 EIS.	Tier 2 studies would conduct updated searches of regulatory databases to reflect most recent records and address more specific avoidance and mitigation concerns, such as Phase 1 Site Assessments, hazardous materials testing, and development of a health and safety plan during construction.
<b>Geology, Soils, and Prime and Unique Farmlands:</b>	Topography was considered during the alternatives development process to minimize the potential need for cut (excavation) and fill (building up embankments).	Tier 2 studies would include formal coordination with the Natural Resources Conservation Service as part of compliance with the Farmland Protection Policy Act, as appropriate, and address site-specific mitigation measures, such as avoidance of land subsidence areas, earth fissures, slope design, geotechnical considerations, erosion control, and development of a reclamation and revegetation plan.
<b>Biological Resources</b>	Designated Critical Habitats were considered as part of the Tier 1 EIS but no designated critical habitat exist within any of the corridor alternatives to date. The Tier 1 EIS identified designated critical habitat within the Study Area that may guide future design of project alignments.	Preconstruction surveys for listed or sensitive species would occur and avoidance of species or sensitive time periods may be utilized. Additionally, relocation of affected species may be employed  Tier 2 studies would address more specific mitigation considerations, such as biological habitat assessments, species-specific field surveys, vegetation removal, and control of noxious and invasive species during construction. ADOT would conduct a thorough Biological Evaluations to identify Endangered Species Act-listed species and any designated critical habitat, and avoid, minimize, and mitigate impact to any species or designated critical habitat s. ADOT would conduct consultation with the US Fish and Wildlife Service (USFWS), as appropriate. ADOT and stakeholders would identify crossing structures, design features, and supporting mitigation or conservation necessary to facilitate movement of wildlife across roadway barriers.
<b>Water Resources</b>	Alternatives were developed to have a more perpendicular crossing of major watercourses and floodplains. Known wetlands were avoided to the extent possible.	Tier 2 studies would address more specific mitigation considerations, such as designing the future construction footprint to minimize its impact on sensitive water resources to the extent possible, obtain Clean Water Act Section 401, 402, and 404 permits and certifications, as needed, and development of stormwater pollution prevention plans employing best management practices which minimize impacts to water quality.

**Table 5-3. Potential Mitigation Strategies(continued)**

RESOURCE AREA	IMPACT IDENTIFICATION	POTENTIAL TIER 2 MITIGATION STRATEGIES
<b>Visual and Aesthetics</b>	Corridor-level assessment of visual effects is limited to park/recreation areas and natural/scenic landscapes at this stage of analysis. The emphasis is primarily on desert and distant mountain landscape features with manmade elements (e.g., housing, overhead power lines, mining features, etc.) throughout.	Tier 2 studies would address more specific mitigation considerations, such as the minimization of earthwork and grading and development of landscape design plans for visually sensitive areas. ADOT would comply with applicable local and county ordinances related to dark skies and employ best management practices in minimizing the impact of fugitive light on the night sky along the Sonoran Corridor

Note: Each Tier 1 corridor alternative is 2,000 feet wide and the assumed right-of-way for a future facility alignment would be a maximum of 400 feet wide. The use of broad 2,000-foot-wide corridor alternatives in the Tier 1 analysis gives FHWA and ADOT the flexibility to identify and refine the specific roadway alignment within the corridor if a Corridor Alternative is ultimately selected. At that time, development of the specific alignment and more detailed design would provide an opportunity to avoid or minimize impacts to the natural and human environments.

Figure 5-2. Preferred Corridor Alternative 7



## 5.3 Implementation and Phasing

No funding has been identified to construct the Sonoran Corridor. If FHWA and ADOT select a corridor alternative in the Final Tier 1 EIS/ROD, the resulting project would very likely be implemented in segments as funding becomes available. A preliminary phased implementation concept would be included in the Final Tier 1 EIS/ROD.

To advance a segment of a Selected Alternative to Tier 2 analysis, logical termini and independent utility must be demonstrated. Segments of the project that have independent utility are portions of a project that may be constructed without other construction projects or links. They are not dependent upon other segments of the project to demonstrate value to the transportation system and would be considered complete and separate projects. Project segments may be prioritized according to

- Level of effectiveness in addressing need and purpose elements
- Stakeholder collaboration and feedback
- Integration into the current network and addressing areas with the greatest transportation and redundancy needs
- Leveraging current and planned investments
- Availability of funding
- Ability to accommodate the full Sonoran Corridor build configuration by acquiring ROW and preserving access control

In addition, phasing may refer to the type of roadway project or improvement. Initial segments may entail intersection improvements, additional access controls, or construction of a two-lane or four-lane divided roadway that is later upgraded to Interstate standards.

## 5.4 Funding and Financing Considerations

The implementation of the corridor could take advantage of federal, state, or local funding, or tolling or other forms of private-public partnerships.

The federal FAST Act authorizes funding each year for all state highway programs across the nation. That amount is divided among the states and each state's allocation is divided among different regions of the state.

The Transportation Infrastructure Finance and Innovation Act (TIFIA) is also potentially available. TIFIA is a federal credit program, not a grant program, requiring projects to generate their own revenue streams through user charges or other dedicated funding sources. Grant Anticipation Revenue Vehicles Bonds are another type of debt financing instrument that permits an issuer to pledge future federal highway funds to repay investors.



Public-private partnerships assist transportation and other government agencies through collaborative funding and financing techniques that share risks and rewards for infrastructure investments. Many public-private partnership projects apply alternative delivery techniques, such as design-build or construction management at risk strategies to reduce costs and accelerate schedules. Public-private partnership projects may also apply managed lane or toll road methods to provide funding for the project.

Better Utilizing Investments to Leverage Development Transportation Discretionary Grants Program and the Infrastructure for Rebuilding America Grant Program are competitive grants and use established criteria to select the best possible projects for these programs.

State Infrastructure Banks are infrastructure investment funds that are established and administered by states. State Infrastructure Banks operate in a similar manner to a private bank and can offer loans and credit assistance to public and private sponsors of Title 23 highway construction projects. Loans and credit assistance must be repaid to the State Infrastructure Bank.

## 5.5 Next Steps

Following the release of the Draft Tier 1 EIS, the next steps would include the following.

### 5.5.1 Solicit Input on Draft Tier 1 EIS

Once approved by FHWA, the Draft Tier 1 EIS will be released for a 45-day public review and comment period. The purpose of this Draft Tier 1 EIS is to present the environmental analysis thus far and to solicit input on the Preferred Alternative from agencies, Tribes, and the public. Public hearings will be held during a public review and comment period as well. Comments received on this Draft Tier 1 EIS during the public review and comment period will be considered to determine the Selected Alternative, and a combined Final Tier 1 EIS/ROD will be prepared for the Sonoran Corridor study. Responses to all comments will be documented in the combined Final Tier 1 EIS/ROD.

### 5.5.2 Evaluate Public Feedback, Identify the Selected Alternative, and Publish Final Tier 1 EIS/ROD

After review of the Draft Tier 1 EIS, the next step in the Sonoran Corridor NEPA process is the development of a Final Tier 1 EIS/ROD. After considering and responding to the comments received, FHWA and ADOT will identify a Selected Alternative in the Final Tier 1 EIS/ROD that may affirm or modify the Preferred Alternative.

FHWA intends to issue a combined Final Tier 1 EIS/ROD pursuant to 49 U.S.C. 304a(b) and 23 U.S.C. 139(n)(2) unless FHWA determines that statutory criteria or practicability considerations preclude issuance of such combined document. Issuance of a combined Final Tier 1 EIS/ROD with a Selected Alternative will conclude the Tier 1 EIS study.

### 5.5.3 Tier 2 Studies

If a corridor alternative is selected, it would be further evaluated and refined during future Tier 2 analyses. A preliminary design would be completed to develop the higher level of detail necessary to enable more site-specific environmental analyses and advancement of site-specific mitigation measures. The specific NEPA Class of Action for a logical Tier 2 segment would be defined based on the nature of the project and as determined by ADOT pursuant under either the 326 MOU or the 327 MOU. Continuing coordination with the Tribes, public, and agencies would occur prior to and during Tier 2 project-level analysis. If the No-Build Alternative is selected, there would be no further work on the project.

### 5.5.4 Future Corridor Opportunities

The last few years have seen a breakthrough for emerging transportation technologies, with policy frameworks adopted at both federal and state levels for autonomous vehicles. Emerging technologies can be divided into two categories: (1) technologies that are in advanced stages of development and are likely to be available for mass consumption in the relatively near term (e.g., electric vehicles, autonomous vehicles); and (2) technologies that are in conceptual stages and will need more research and engineering before they become economically viable (e.g., Hyperloop). These emerging technologies could change the operations of transportation systems globally and will require advance thought and preparation to begin integrating the required systems into our existing and new infrastructure projects. This section outlines potential emerging transportation technologies that could eventually be integrated into the design of the Sonoran Corridor. The Draft Tier 1 EIS environmental resource analysis will not evaluate technologies that may use the transportation corridor. However, emerging technology trends, such as autonomous/connected vehicles and truck platooning, may impact traffic volumes, travel times, average speeds, and safety, which could impact the corridor footprint or defer some capacity improvements (e.g., narrower or fewer lanes). Over time, statewide and regional travel demand models would need to be recalibrated to account for these travel trends. For example, if one of these emerging technologies becomes a dominant travel trend before the Sonoran Corridor is constructed, the Tier 2 environmental studies would update the approach and data regarding travel demand modeling and travel patterns.

#### 5.5.4.1 Autonomous/Connected Vehicles

Autonomous vehicles are vehicles that have the capability to operate without active physical control or monitoring by a human operator. They have the capability to make decisions based on information they can gather from the environment around them, either by onboard sensors or other communication devices outside the vehicle. This type of technology is expected to have major implications for safety, convenience, and the planning and design of the physical environment. The National Highway Traffic Safety Administration defines five levels of autonomy for vehicles, where level 0 has no automation and the driver is in complete control. The other levels are described as follows:

- **Levels 1 and 2**—These two levels have driver assist features that can assist with guidance and allow drivers to make better decisions.

- **Level 3**—The vehicle can be in full control for some situations but requires an operator to be able to take control at any time.
- **Levels 4 and 5**—The vehicle is in full control at these levels and can operate with or without occupants.

Currently, consumer vehicles have limited automated technologies integrated into their systems and generally operate at levels 1 and 2. Many manufacturers are testing level 3 technologies that allow the vehicle to be in full control in some circumstances, while an operator is available to take control. TuSimple, a company in Tucson, has been testing Level 4 Class 8 autonomous trucks since 2018 and recently began generating revenue hauling freight for commercial carriers in Arizona (Phoenix Business Journal, 2018).

Many of the near-term goals for autonomous vehicles involve improving the safety of our transportation systems. Manufacturers are developing vehicle systems that include automated technologies to better control speed and vehicle positioning and that also provide drivers with information on their surroundings. Many roadway owners (state departments of transportation) also are investigating improvements to their infrastructure to include devices that can communicate with vehicles to provide better information for driver decisions. This is the case within the study area. Recently investors have committed \$80 million to build Belmont, a new “smart city,” expected to feature accommodations for self-driving cars.

In the long term, autonomous technologies are anticipated to have a much larger impact on safety. The National Highway Traffic Safety Administration conducted a study and found that 94 percent of accidents were caused by human error, where mistakes that drivers made led directly to accidents. The American Automobile Association estimates that autonomous vehicles could reduce accidents by 90 percent and save more than \$190 billion in costs related to vehicle accidents by 2050. This is because vehicles will have more information from the onboard sensors as well as external communication devices that many roadway owners are aiming to install now to enable better and faster informed decisions.

#### 5.5.4.2 Truck Platooning

Truck platooning refers to several trucks equipped with state-of-the-art driving support systems that allow the trucks to safely and closely follow each other. In this “platoon,” the trucks communicate and are driven by smart technology.

Truck platooning, which is a variation of self-driving vehicle technology, adds vehicle-to-vehicle communications to enable Cooperative Adaptive Cruise Control, using the forward-looking radar sensors and electronic actuation of the engine and brakes of the conventional Adaptive Cruise Control system, and adds vehicle-to-vehicle communications (using dedicated short range communications) that enable the implementation of a smoother, closer-following vehicle control system. This system allows trucks to drive safely and smoothly at shorter gaps than they can under conventional manual driving. Potential benefits in efficiency include better utilization of the highway through increased throughput and improved fuel economy (and lower operating costs) due to the aerodynamic effects of closer vehicle spacing. This technology is in advanced stages of development and is being proposed for deployment in

a few years. FHWA is currently investigating the technology, the perception of other road users, and the policy implications of truck platooning.

#### 5.5.4.3 Electric Vehicle Infrastructure

Electric vehicle adoption by consumers has dramatically increased in the last few years, owing to technology advancements and the reduction in the cost of batteries. Forecasts predict an increase in sales of electric vehicles from a record 1.1 million worldwide in 2017 to 11 million in 2025, and then a surge to 30 million in 2030 as they become cheaper to make than internal combustion engine cars. By 2050, 55 percent of all new car sales are predicted to be electric vehicles. Electric vehicle technology is being rapidly adopted in public transportation, with major transit agencies committing to fully electric bus fleets within the next decade.

City governments are already facing the challenge of quickly developing an Electric Vehicle Ecosystem (including facilities for plug-in charging, electric catenary, and other forms of vehicle powering technologies) while partnering with roadway owners, energy utility providers, technology developers, and operators.

FHWA established a national network of alternative fueling and charging infrastructure along national highway system corridors to support expansion of this technology. All Interstate corridors in Arizona (including I-8, I-10, and I-19) are included in this national network of alternative fuel corridors.

#### 5.5.4.4 Electrified Highways

The growth of electric vehicles has been limited by motorists' concerns over vehicle range and charging infrastructure. Roadway inductive charging greatly reduces the need for large-sized batteries by providing a continuous electricity source in the pavement of a roadway. The system sets up an alternating electromagnetic field from which an induction coil on the vehicle harvests power. Technology advancements now make it possible to charge vehicles as they drive along the electric track at highway speeds. Pilot projects along test tracks in France and Israel have tested this technology and found it to be feasible. This technology allows the vehicles' batteries to charge as they drive, making it possible for much smaller and more affordable batteries to suffice. Due to the high cost of installation of the in-road electric infrastructure, this technology makes the most sense along high-traffic routes through a city.

#### 5.5.4.5 Solar Roadways

Solar highways use the surface of the roadway to generate electricity using solar energy. The roadway is made of a transparent concrete on top, solar panels underneath, and an insulation material as the base. The energy generated from solar highways can be used to keep streetlights running, power a snow-melting system, or be fed into the electric utility grid. The solar roadway is prohibitively more expensive (approximately \$75 per square foot) than a regular asphalt roadway (approximately \$5 per square foot) and has, therefore, only been experimentally implemented as pilot projects in China and France.

This technology is under development by USDOT and the power generated could pay for the cost of the solar panels, thereby creating a road that would pay for itself over time. Lights could be added to “paint” the road lines from beneath, lighting up the road for safer nighttime driving and easily allowing changes in striping to respond to construction activities, incidents, or demand-based changes to manage traffic during peak commuting periods. Alternatively, the road could change colors as a warning sign for wildlife crossings or notification of emergency vehicles. As vehicle-to-infrastructure communication evolves, roadways may “speak” to cars to warn of oncoming obstacles, such as crashes or construction zones.

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