



SONORAN CORRIDOR STUDY

Draft Tier 1 Environmental Impact Statement

Chapter 2: Alternatives Considered

October 2020 | P9101 01P
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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


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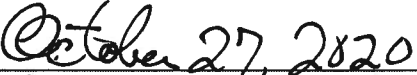
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US ENVIRONMENTAL PROTECTION AGENCY

ARIZONA GAME AND FISH DEPARTMENT


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Date of Approval



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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

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, 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 (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

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- Appendix C Population Data for the Sonoran Corridor Study Area**
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2 ALTERNATIVES CONSIDERED

An alternatives analysis is a required component of the overall NEPA process. FHWA and ADOT completed a CSR¹ for the Sonoran Corridor Study that documents the corridor alternatives development and screening process and summarizes the outcomes of this phase. The CSR assesses a comprehensive set of corridor alternatives through an evaluation screening process that uses a combination of topographical, environmental, and engineering information, as well as public, agency, and tribal input.

2.1 Alternatives Development

Using input from the public, agencies, tribes, and technical tools, many alternatives were identified and considered before narrowing the number to a Comprehensive Set of 32 corridors. This chapter describes the development and evaluation of the alternatives that led to the Reasonable Range of Corridor Alternatives advanced for further analysis in this Draft Tier 1 EIS.

2.1.1 Other Studies and Reports Consulted

Transportation studies and reports were completed or are underway for the study area prior to this assessment, and their results are considered in the development of the Sonoran Corridor alternatives. Among the studies, reports, and documents consulted for this Draft Tier 1 EIS are

- ***Pima County Sonoran Corridor Study (2015)***—Past and current regional transportation planning efforts in Pima County have studied a major transportation facility in the area south of TUS, between I-19 and I-10, termed the Sonoran Corridor.² These previous studies and others identified a need for a transportation system that would accommodate future growth and strengthen the growing economy of southern Arizona by improving the connection between Mexico and the US states of Arizona, New Mexico, and Texas.
- ***Pima Association of Governments Regionally Significant Corridors Study (2014)***—Completed in 2014, is a technical assessment of existing, planned, and proposed major transportation corridors in and around the PAG region that intend to address broad regional objectives, such as improving access to employment, commercial centers, and residential areas; improving mobility for cross-town travel while reducing congestion and travel time on major roadways; enhancing transit, bicycle, and pedestrian facilities throughout the region to provide greater mobility choices; and minimizing impacts to environmentally sensitive areas.
- ***2045 Regional Mobility and Accessibility Plan (2016)***—PAG is federally required to conduct a continuing, cooperative, and comprehensive planning process in developing an RMAP. The RMAP allows the cities, towns, and residents of the region to coordinate in prioritizing investments to

¹ The Corridor Selection Report is available on ADOT's Sonoran Corridor project website at <https://www.azdot.gov/planning/transportation-studies/sonoran-corridor-tier-1-environmental-impact-statement/overview>.

² Pima County, Sonoran Corridor Alternatives Analysis, 2013; Pima Association of Governments [PAG], Regionally Significant Corridors Study, 2014; Pima County, Sonoran Corridor Economic and Revenue Impact Analysis, 2015

provide a seamless and interconnected regional transportation system. Transportation projects receiving federal or state funds are required to be consistent with the RMAP.

- **Old Vail Connection Road Study (2011)**—The purpose of this study was twofold: (1) to determine what transportation improvements would be needed to accommodate future growth and development of the major industrial facilities located south of TUS, and (2) to consider longer-term roadway and transit improvements that would improve access to TUS and associated airport property planned for future development. Specifically, the study analyzed the effects of closing Hughes Access Road/Alvernon Way to non-industrial traffic and recommended alternative roadway improvements that would be needed to accommodate the closure.
- **Sahuarita East Conceptual Area Plan (SECAP) (2015)**—The SECAP is a long-range planning and visioning process that looked at approximately 40 square miles east of the current Town of Sahuarita boundaries. The plan includes conceptual land use maps as well as policies to help achieve the vision. SECAP is a subset of the General Plan but will also have its own area plan. The plan is a component of *Aspire 2035: Sahuarita's General Plan*, adopted in 2015.
- **Sahuarita Farms Specific Plan (2015)**—This plan outlines master planning and regulatory standards that will guide a comprehensive, mixed-use, master-planned community for the property. The Farmer's Investment Company property includes approximately 7,000 acres, approximately 5,645 of which are within the Town of Sahuarita and included in this Specific Plan.

2.1.2 Scoping and Technical Recommendations

- **Agency and Public Input**—Agencies and the public proposed corridors to consider in the Sonoran Corridor analysis. Proposed corridors were collected from previous studies completed or actions taken by the legislative authorities within the jurisdictions and public input. The study completed by Pima County in 2015 and the extensive information gathered regarding the Sonoran Corridor provided a basis for including those corridors in the study area. A resolution by the Town of Sahuarita Town Council to place the corridor on the El Toro Road alignment served to justify its inclusion in the original Comprehensive Set of Corridors. Similarly, discussion about the Duval Mine Road location by the Town of Sahuarita provided a basis for assessing its viability as a potential corridor terminus. Input from members of the public solicited at the Public Scoping Meetings also yielded corridors that were included in the original Comprehensive Set.
- **Tribal Input**—There was ongoing communication with the SXD of the TON and the Nation itself, as well as the San Xavier Allottee Association and affected enterprise organizations (i.e., Tohono O'odham Economic Development Authority and the Tohono O'odham Gaming Enterprise) to ensure SXD expectations for participation were met and the alternatives identified not only address transportation needs in the study area but minimize any potential adverse environmental consequences within Tribal Lands.
- **Technical Analysis**—A computer-based model called Quantm was used to generate multiple corridors from which to identify effective choices for analysis. The model allows for expeditious identification of possible corridors. It accounts for critical inputs, design expectations, and areas of

avoidance that generate many corridor options very quickly. The results of the Quantm application were evaluated and verified before inclusion in the analysis.

2.1.3 Modal Alternatives and Public Facilities Considered

Alternative modes (e.g., rail, bicycle, utilities) were considered in developing the alternatives. For freight movement, Pima County has discussed the possibility of a rail connection between the Nogales Branch and the Sunset Route of UPRR as an improved and shorter link between current rail activity coming from or going to Mexico and the Port of Tucson. This rail connection would also reduce the impact of train activity in South Tucson by reducing the number of trains using that section of the Nogales Branch, which still retains many at-grade crossings. That could also open an opportunity for passenger rail travel between TUS and Tucson and Phoenix as contemplated in ADOT's 2015 Passenger Rail Corridor Study Tier 1 EIS³.

Although there is an interest in a rail connection that would provide a system linkage for freight and passenger movement, there will continue to be a need to improve the transportation network within the study area to accommodate future travel demand from projected population and employment growth. However, rail within the corridor will not be precluded as part of this tiered study.

The sparsely populated study area could not be effectively served by public transportation until there is sufficient growth to accommodate the level of demand appropriate for such services. While limited transit service can be provided to carry smaller demand, it will require an expanded roadway network that would include the Sonoran Corridor. On its own, public transportation does not effectively meet the Need and Purpose because it would not provide a system linkage that would effectively move freight through the study area to reduce commercial travel time and cost. As conditions change, demand for public transportation may grow, which would need to be addressed at that time.

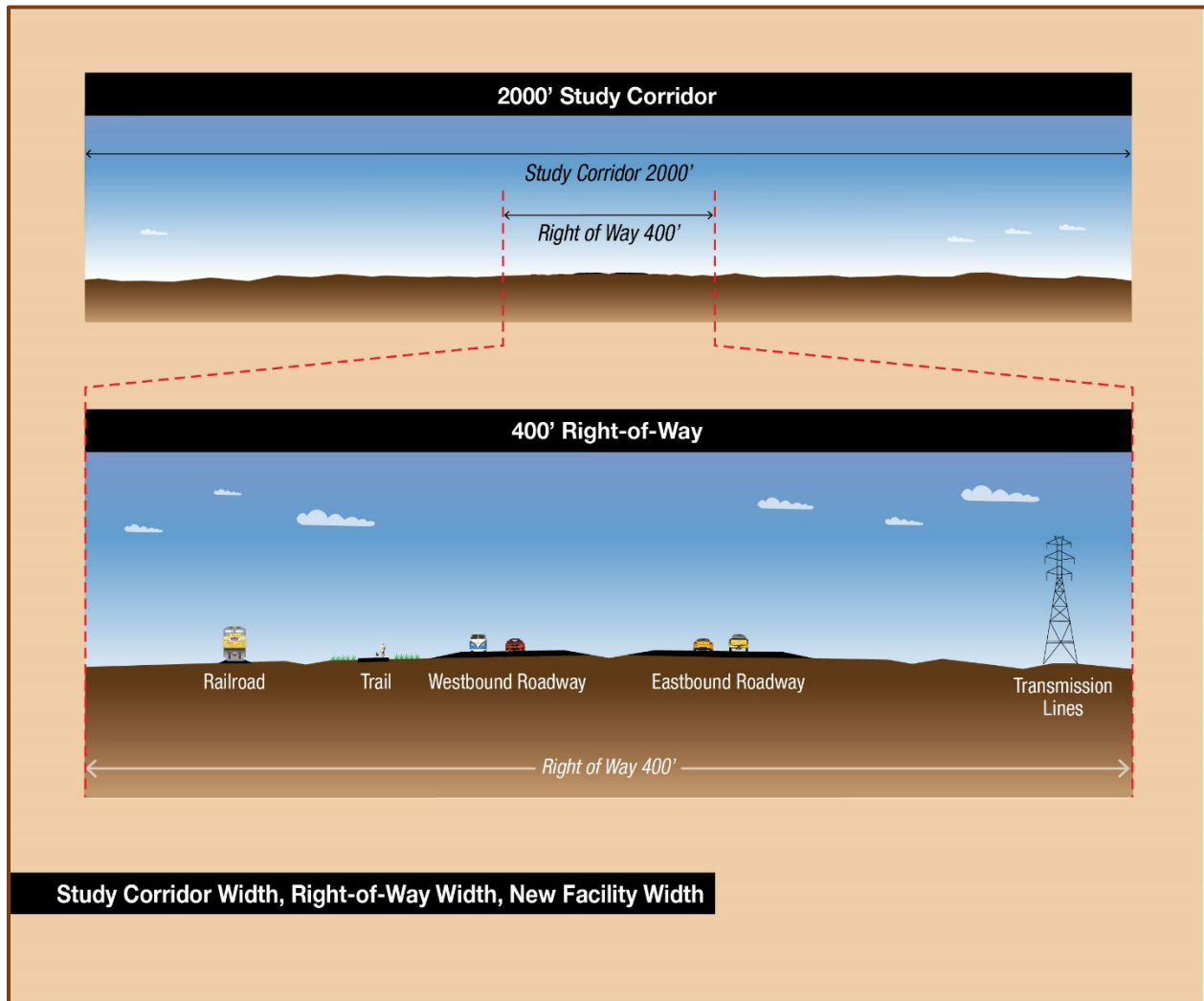
Other modes, such as bicycle and pedestrian linkages, are not able to address the Need and Purpose because future travel demand would not be accommodated, a system linkage for commercial and commuter mobility would not be provided, and forecasted 2045 congestion would mostly still exist in the study area. All transportation networks must provide for these modal options, but they will serve a complementary role to the primary transportation function of the corridor.

Like bicycle and pedestrian linkages, utility corridors would not be able to address the Need and Purpose of the study. However, utility corridors can coincide with transportation infrastructure; therefore, utility corridors would not be precluded in the future. These will need to be evaluated as to the best way to collocate facilities in a future alignment study to avoid the potential for conflicts and minimize service challenges for both transportation and utility operators and users. Figure 2-1 shows possible uses for an engineered 400-foot-wide Tier 2 alignment right-of-way within the 2,000-foot-wide Tier 1 corridor studied in this EIS.

In conclusion, a new freeway facility has the best potential to meet the Need and Purpose of the study. While these other alternative modes may not meet the Need and Purpose, their potential contributions in the future are recognized so they will not be precluded as part of this analysis.

³ <https://azdot.gov/planning/transportation-programs/state-rail-plan/passenger-rail-study-tucson-phoenix>

Figure 2-1. Corridor Width for Tier 1 Study and Possible Uses in Tier 2 Right-of-Way



2.2 Corridor Connection Points as a Basis for Alternative Refinement

Connection points (Figure 2-2) or logical termini must also be capable of handling the operation and design requirements of the Interstate Highway System, including access to local activities that could be affected by the placement of a future interchange. Connection points must be located where they can contribute to the function of both the new corridor and the existing Interstate routes while preserving the performance of the rest of the network. An interchange where two freeways intersect, such as the interchange of I-10 and I-19 near downtown Tucson, is known as a system interchange. It typically requires a 2-mile separation from any adjacent service interchanges (i.e., between a freeway and a local road), according to ADOT's Roadway Design Guidelines (RDG).

2.2.1 Interstate 19 Connection Points

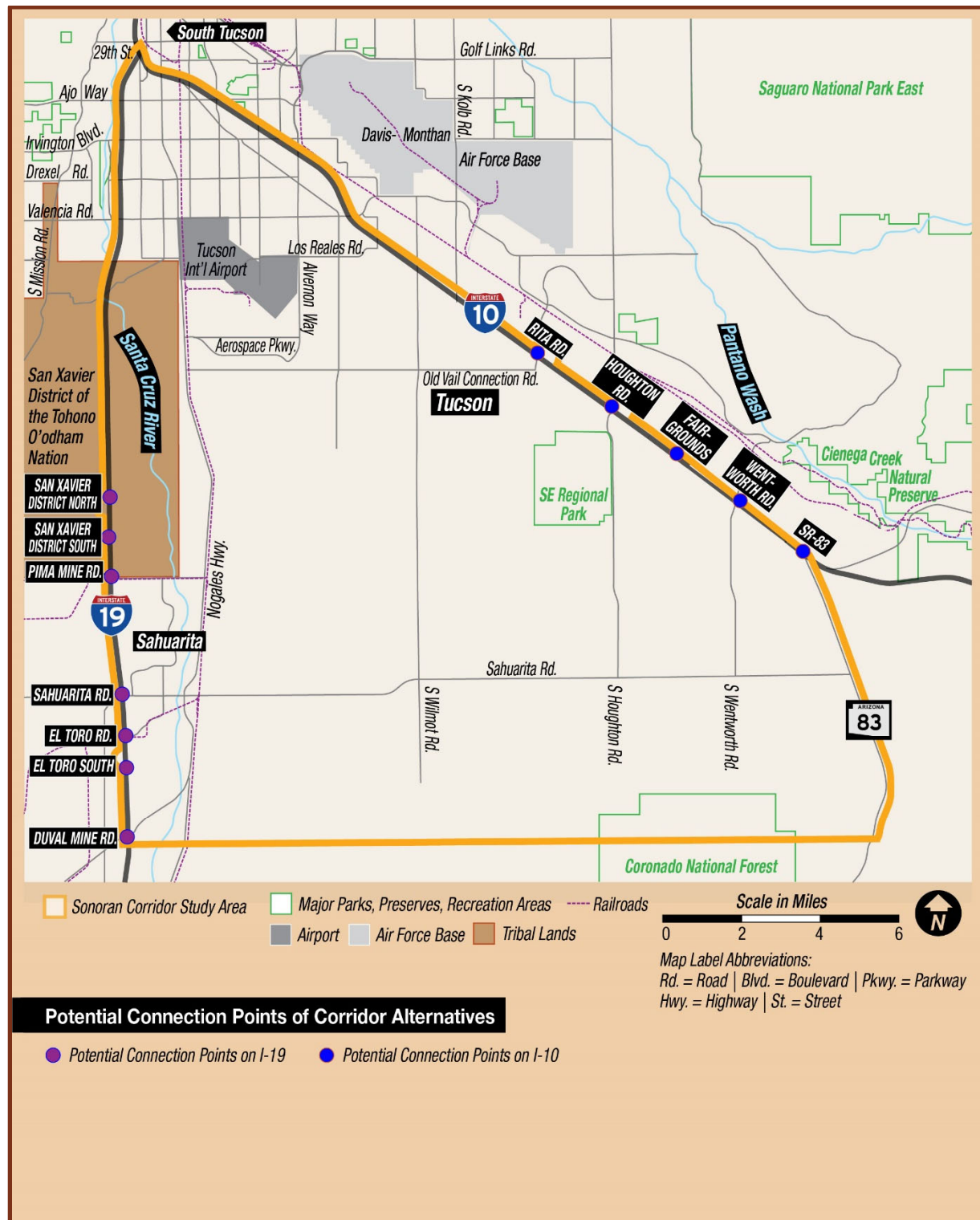
Along I-19, seven locations were considered based on the various sources of information from Scoping, prior studies, and an evaluation of other opportunities along the freeway. These points extend from Duval Mine Road to two miles north of Pima Mine Road on the SXD. Among them are:

- Duval Mine Road
- El Toro Road South⁴—a location midway between Sahuarita Road and Duval Mine Road
- El Toro Road⁴
- Sahuarita Road
- Pima Mine Road
- SXD South⁴ a location about 1 mile north of Pima Mine Road and Desert Diamond Casino
- SXD North⁴ a location approximately 2 miles north of Pima Mine Road

Prior studies (see Section 2.1.1) have identified a location on the SXD as a potential future connection point on I-19. Two new locations on the SXD are considered in this analysis as well as a new location at El Toro Road and south of El Toro Road in Sahuarita. Other connection points considered were at interchange locations at Duval Mine Road, Sahuarita Road, and Pima Mine Road subject to system interchange separation standards.

⁴ Indicates a traffic interchange with the Interstate Highway does not currently exist at that location.

Figure 2-2. Connection Points Considered in Developing Corridor Alternatives



2.2.2 Interstate 10 Connection Points

On I-10, four existing service interchanges and one new connection point were Identified extending from Rita Road in the north to SR 83 in the south. All these locations comply with Interstate highway design and operations requirements. A new location between Wentworth Road and Houghton Road, referred to in this study as the Fairgrounds connection point, was also evaluated. The I-10 connection points considered in the analysis:

- Rita Road
- Houghton Road
- Fairgrounds⁵
- Wentworth Road
- SR 83

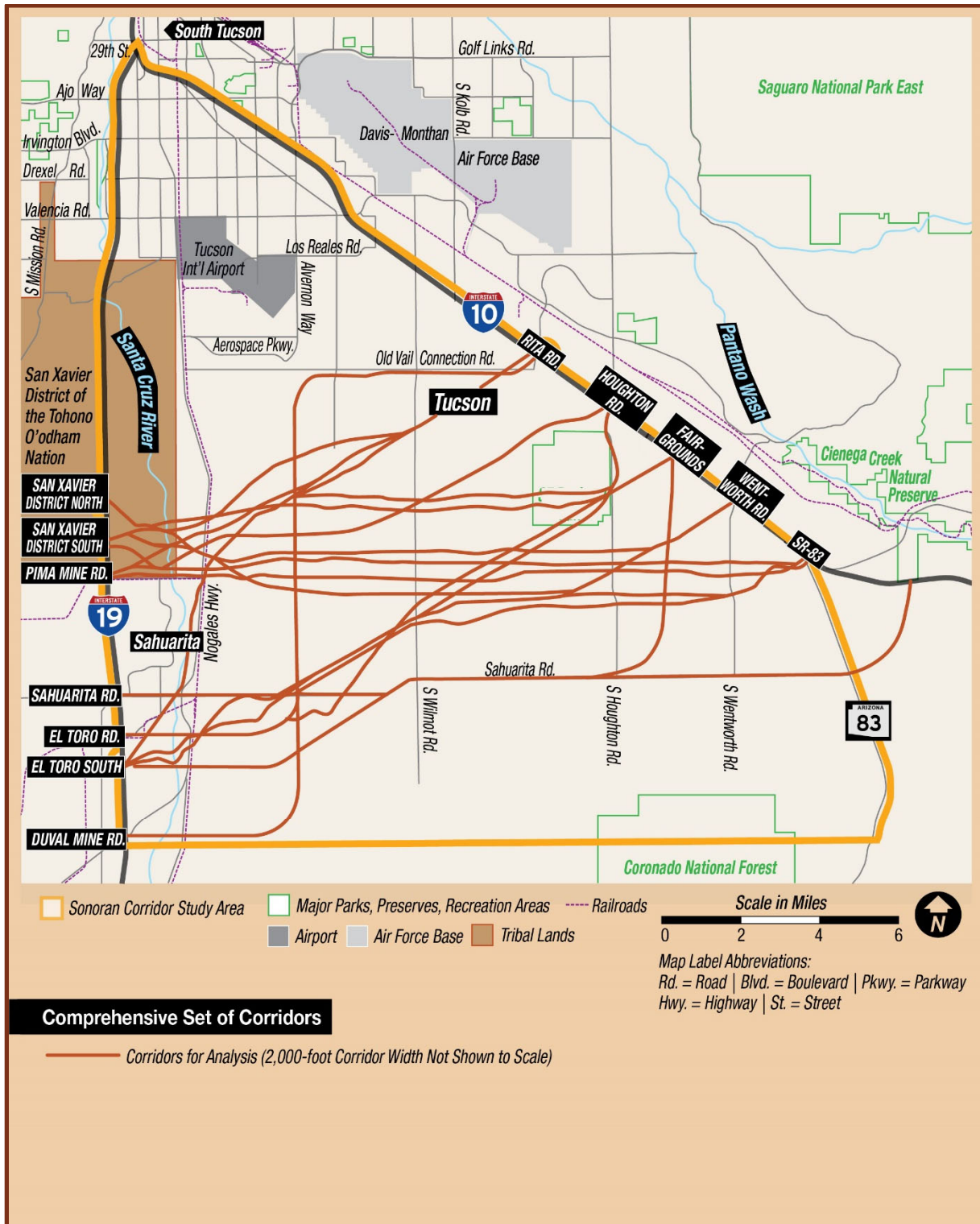
Rita Road has been identified as a possible connection point in prior studies. The other locations are at existing freeway interchanges at Houghton Road, Wentworth Road, and SR 83, farther southeast along the freeway. The potential of a Fairgrounds interchange between Houghton Road and SR 83 was added to provide an additional connection choice. These connection elements provide a critical consideration in the identification and investigation of potential corridors to be examined in the Sonoran Corridor study.

2.3 Comprehensive Set of Corridors

Based on identified I-19 and I-10 connection points and corridor alternatives proposed during the Scoping process by the public and agencies, previous studies, and corridor alternatives developed using the Quantm model, the project team formed a Comprehensive Set of Corridor Alternatives. The 32 corridor alternatives that comprised the Comprehensive Set of Corridor Alternatives are shown on Figure 2-3.

⁵ Indicates the Interstate Highway does not currently have a traffic interchange at that location

Figure 2-3. Comprehensive Set of Corridor Alternatives



2.3.1 Refinement and Optimization Process

The 32 corridors in the Comprehensive Set of Corridor Alternatives was reduced to a more manageable ten corridors through a Refinement step that incorporated engineering criteria and local access impacts at proposed Interstate connection points. The viability of the connections to the existing Interstate system (connection points) is an essential element of the Sonoran Corridor alternatives evaluated in detail in the CSR. The Refinement step advanced a Refined Set of Corridor Alternatives.

The fundamental considerations in developing the Refined Set of Corridor Alternatives were based on:

- **Severe local mobility impact caused by location of the corridor connection points at I-10 or I-19—**Introducing a system interchange at an existing service interchange has significant implications for how local access dependent on that interchange would be maintained. Local traffic can sometimes be rerouted to avoid the new system interchange but, in many cases, the effect on existing travel would be severe enough to constitute a serious negative impact to local circulation. In some cases, the presence of a system interchange could also have a major effect on the viability of the established local community if the new roadway impedes the community's primary functions. This can include the impact on institutions, such as local government offices and facilities, schools, places of worship, critical access to residential or employment centers, etc., and inability to effectively replace local connections to destinations that depend on the existing interchange for access.
- **Adherence to ADOT interchange separation distance per RDG—**ADOT RDG sets forth guidance for the placement of interchanges on the freeway system. In the case of system interchanges, a separation of 2 miles from neighboring service interchanges is recommended for safe and efficient operation. Many of the proposed termini along I-19 did not meet that guideline and could pose challenges for operational effectiveness and safety since they do not comply with current design requirements. Following the interchange analysis, the remaining connection points and the input from agencies and the public in the study area contributed to the Refined List of Corridor Alternatives shown on Figure 2-4. Among the remaining corridors, one of the Scoping comments identified Sahuarita Road as a possible corridor. This option was modified to follow a route consistent with the final set of corridor termini described in Section 2.1.2, Scoping and Technical Recommendations as Sahuarita Road does not intersect I-10 within the study area.

The first result of the Refinement step was ten Corridor Alternatives. These alternatives were optimized to follow existing and future designated transportation links in regional or local plans, where possible. The intent was to ensure the proposed corridors effectively support the future transportation network in the study area. The objectives of the optimization step were to position the corridor to serve as the primary feature in the development of a future transportation network and to ensure a logical integration of arterial roadways into the system as growth occurs. The Preliminary Refined and Optimized Set of Corridor Alternatives shown on Figure 2-4 was reviewed by the public and agencies in a public meeting on September 26, 2018. The meeting led to the addition of two new alternatives: Alternatives 2A and 8A. These were modifications of Alternatives 2 and 8 that followed a revised path along Alvernon Way rather than Wilnot Road, and connected to I-10 at Houghton Road. The Final 12 Refined and Optimized Set of Corridor Alternatives are shown in Figure 2-5.

Figure 2-4. Preliminary Refined and Optimized Set of Corridor Alternatives

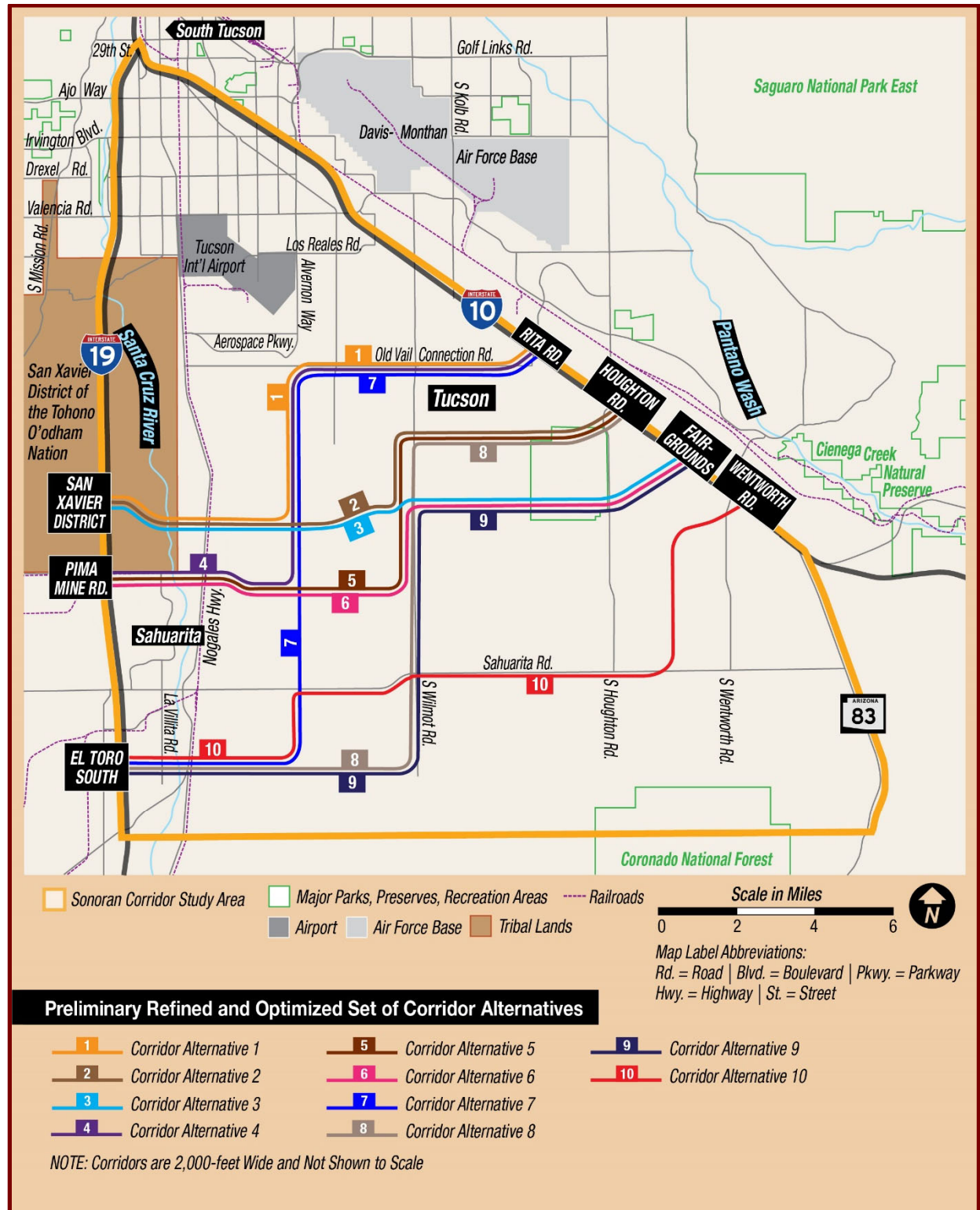
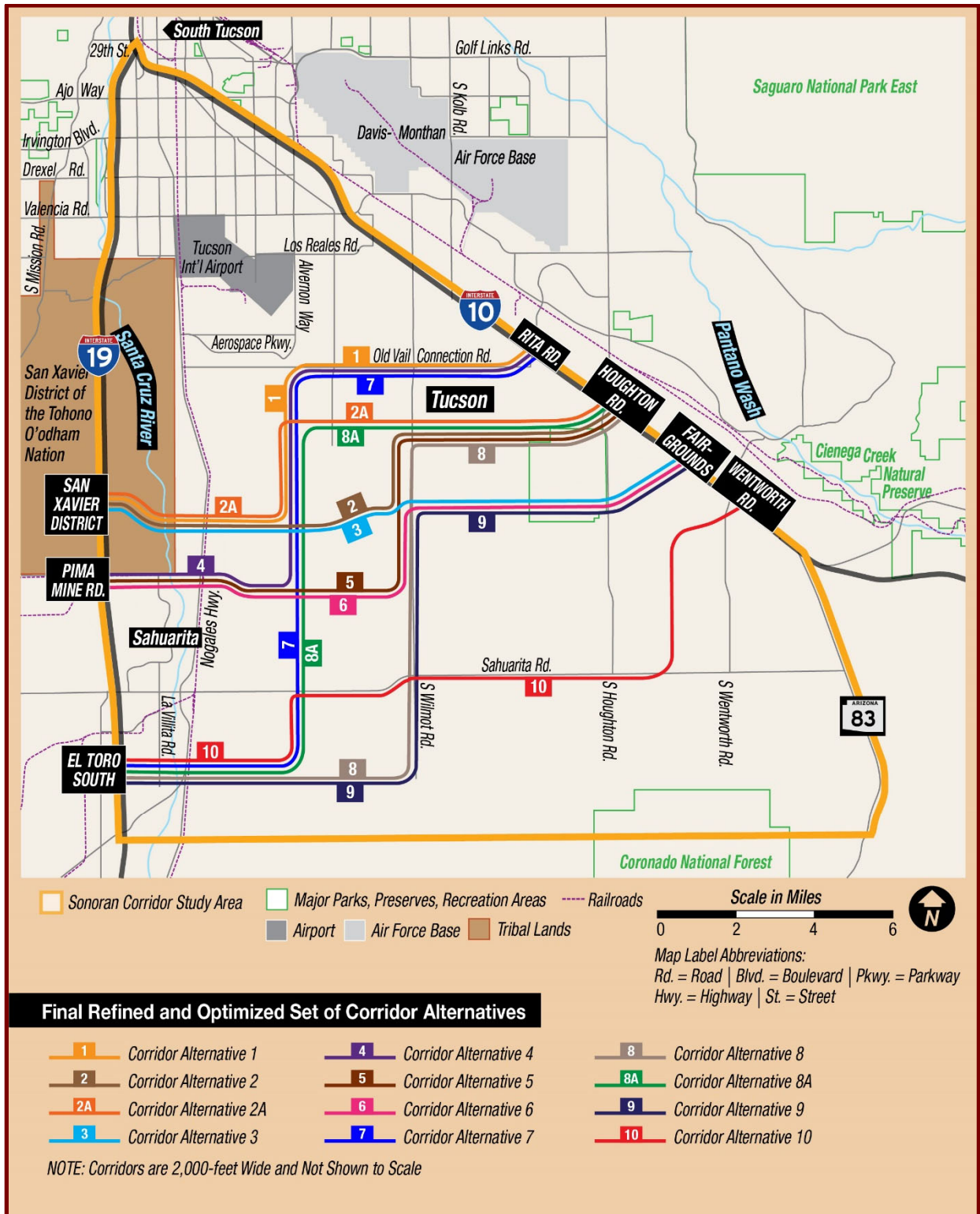


Figure 2-5 Final Set of Refined and Optimized Corridor Alternatives



2.4 Evaluation Process⁶

2.4.1 Alternatives Screening





















































































The final set of twelve Refined and Optimized Corridor Alternatives shown in Figure 2-5 was screened using a series of 23 separate criteria in six categories selected to gage each corridor's ability to meet the Need and Purpose for the project. The evaluation methodology was presented to the public and agencies (including the Cooperating and Participating Agencies) to ensure a broad understanding of the process and incorporate their input into the corridor selection process. The evaluation categories include the following:

- **Anticipated Growth**—The alternative's ability to support planned or anticipated local development and serve existing and proposed activity centers in and near the study area. This category responds to the Need and Purpose objective of accommodating future travel demand due to the forecasted growth.
- **Mobility**—Contribution of the alternative to improving passenger and freight travel in the corridor. The criteria in this category address mobility for corridor residents, employees, visitors, manufacturers, growers, shippers, etc., consistent with the stated Need and Purpose objective to reduce congestion and improve the LOS projected for 2045.
- **System Linkages**—The alternative's ability to address the Need and Purpose objective for reducing travel times and cost by measuring the proximity of the corridor alternative to major destinations planned between the two Interstates.
- **Economic Benefit**—Contribution of the corridor alternative to provide improved access to activity centers and jobs and fostering retention and expansion of commercial and industrial activity in the corridor through its strategic placement.
- **Environment**—Effect of a corridor alternative on the natural, built, and social environment, including the effect on sensitive species or habitats, cultural resources, and disadvantaged populations. This category constitutes an underlying precept of good planning, designed to measure the contribution of the alternative to reducing overall energy consumption (e.g., decreasing overall vehicle times, easing congestion, using less fuel), improving air quality, minimizing the effect on sensitive resources, etc.
- **Implementation Feasibility**—Relative ease of implementation based on property acquisition, number and complexity of structures, construction challenges, public support, and negotiations associated with constructing the transportation facility.

A summary of the results of the analysis from the CSR are presented in Table 2-1.

⁶ The evaluation methodology is described in detail in the *Corridor Evaluation Methodology Report* (August 2018), which can be found on ADOT's project website, <https://www.azdot.gov/docs/default-source/planning/sonoran-corridor-tier-1-eis-evaluation-methodology.pdf?sfvrsn=2>.

Table 2-1. Corridor Evaluation Results from Corridor Selection Report⁷

CATEGORY		ALT 1	ALT 2	ALT 2A	ALT 3	ALT 4	ALT 5	ALT 6	ALT 7	ALT 8	ALT 8A	ALT 9	ALT 10
G - Growth and Community Acceptance	Category Score												
M – Mobility	Category Score												
SL – System Linkages	Category Score												
EB - Economic Benefits	Category Score												
E – Environmental	Category Score												
IF - Implementation Feasibility	Category Score												
Total Corridor Rating	Total Score												

Note: The “Harvey Ball” comparison technique was used to convey performance under each category, whether determined quantitatively or qualitatively. The more completely the ball is filled in, the higher the performance of the alternative in that evaluation category.

⁷ The full Corridor Selection Report can be found on ADOT’s project website at <https://www.azdot.gov/docs/default-source/planning/sonoran-corridor-tier-1-eis-evaluation-methodology.pdf?sfvrsn=2>

2.4.2 Corridors Eliminated from Further Consideration

The following is a discussion of each of the eliminated corridor alternatives and the rationale behind their elimination, which is reflected in Table 2-1. Each corridor alternative is identified by its alternative number and its connection points at I-19 and I-10:

- **Alternative 2: SXD to Houghton Road (Wilmot option)**— This corridor alternative does not effectively meet the Need and Purpose. This corridor alternative is farther removed from TUS and its surrounding areas, and it does not provide service the Town of Sahuarita. These are the areas where much of the projected growth in the study area will occur. In addition, corridor alternatives with a north-south segment along Alvernon Way have potentially fewer pronounced environmental effects compared to those corridor alternatives with a north-south Wilmot Road alignment.
- **Alternative 2A: SXD to Houghton Road (Alvernon option)**— Although placing the north-south segment along Alvernon Way avoids some of the drainage course environmental challenges of a Wilmot Road route, this corridor alternative fails to reach critical activity centers of the study area. Similar to Alternative 2, this corridor alternative was eliminated because it does not effectively meet the Need and Purpose as it is farther removed from much of the projected growth in the study area.
- **Alternative 3: SXD to Fairgrounds**—Geographically, this corridor offers a relatively direct connection between the two Interstates. However, because of its location, this corridor alternative does not service growth plans and activity centers to the north or south and therefore does not effectively meet the Need and Purpose of the study.
- **Alternative 4: Pima Mine Road to Rita Road**—Based on the analysis completed, this alternative effectively meets the Need and Purpose, but it is duplicative of recommended Alternative 7 and has the potential to result in more severe impacts. More broadly, the corridor alternatives that connect to I-19 at Pima Mine Road have the potential to impact many residences compared to other corridor alternatives by creating significant local access challenges that would have to be addressed. While access to the ASARCO Mission Mine could be maintained even with a system interchange on I-19 at this location, access to the residential areas south of Pima Mine Road would be eliminated and would need to be reestablished with a grade-separated system of roadways. Also, this corridor alternative has the potential to result in more residential displacements compared to the recommended alternatives. Access to the existing Desert Diamond Casino would also need to be completely reconfigured to comply with Interstate design standards and afford a functional entry to the facility.
- **Alternative 5: Pima Mine Road to Houghton Road**—This alternative is duplicative of recommended Alternative 8A but has the potential to result in more severe impacts. It meets the Need and Purpose because it provides service to the Town of Sahuarita, but the numerous local access, environmental, and residential displacement issues that are described in Alternative 4 challenge its viability compared to the recommended alternatives.
- **Alternative 6: Pima Mine Road to Fairgrounds**—This alternative suffers from the same local access, environmental, and residential displacement issues faced by Alternatives 4 and 5. Furthermore, it does not effectively meet the Need and Purpose because its connection point at the Fairgrounds

location on I-10 pulls it farther from servicing growth plans and activity centers in or adjacent to the study area to the north.

- **Alternative 8: El Toro South to Houghton Road (Wilmot option)**—This corridor is duplicative of the recommended Alternative 8A but may result in severe impacts because of the drainage course environmental challenges along Wilmot Road. Placing the north-south segment along the Alvernon Way route avoids those issues. Identified Reasonable Range of Corridor Alternatives 1, 7, and 8A all have a north-south alignment along Alvernon Way.
- **Alternative 9: El Toro South to Fairgrounds**—The Fairgrounds connection at I-10 is free of obstacles and meets the necessary requirements of Interstate design but, like Alternative 3, it does not meet the Need and Purpose because it is farther from growth areas and activity centers to the north that could be served by a future corridor.
- **Alternative 10: El Toro South to Wentworth Road**—This is the southernmost corridor alternative in the study area. It does not meet the Need and Purpose because of its inability to afford better access to growth areas and existing activity centers to the north. Also, its southerly location presents potential impacts to more housing (existing and proposed) and more ecologically sensitive locations related to washes and drainage features in the area.

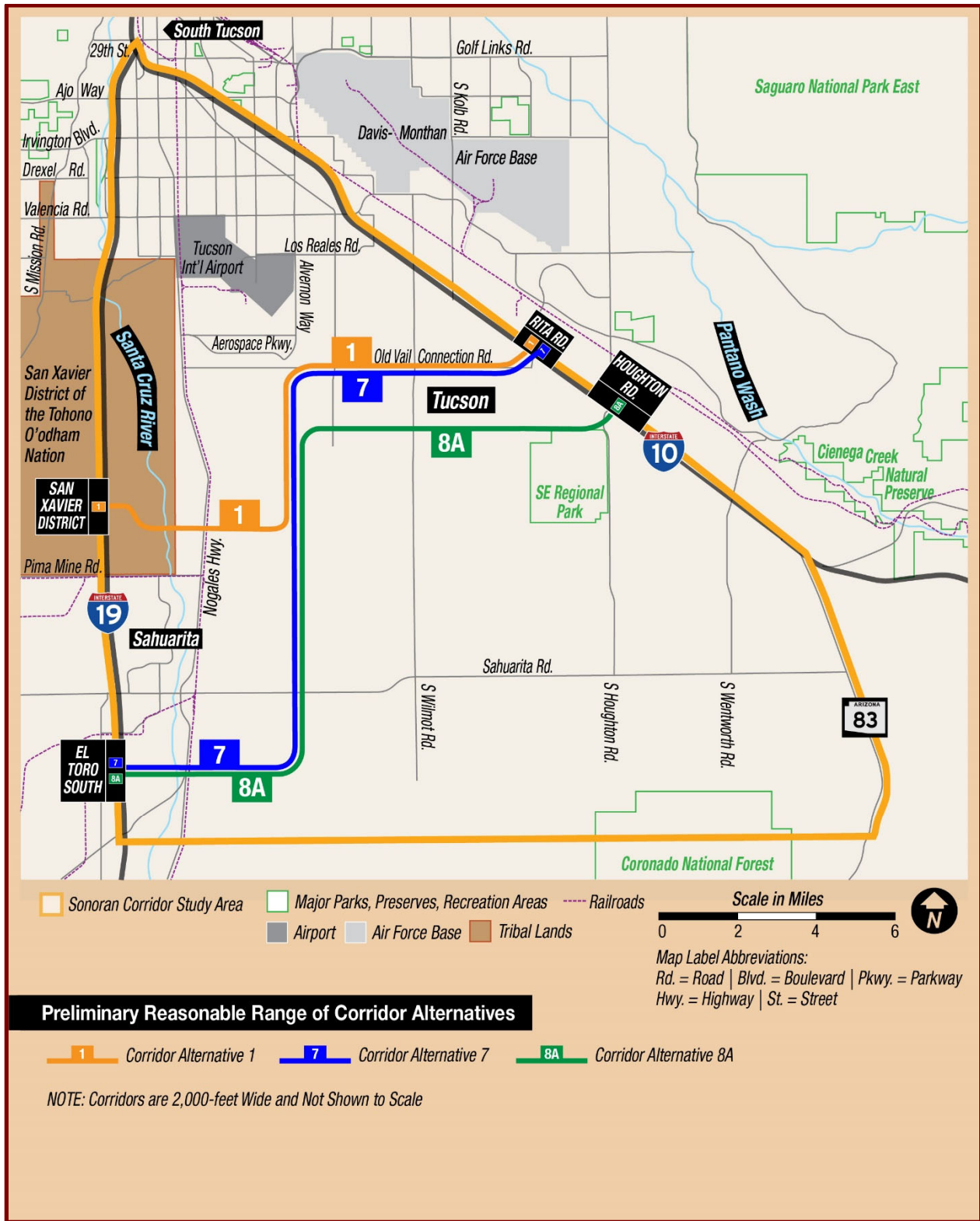
2.5 Reasonable Range of Corridor Alternatives

The analyses completed in the CSR made clear that corridors that connect farther north with I-10 (i.e., Rita and Houghton Roads) met the Need and Purpose, and those corridors that connect farther southeast on I-10 (i.e., Fairgrounds and Wentworth Roads) do not. Similarly, some corridor alternatives that connected further south with I-19 (i.e., Pima Mine Road and El Toro South) effectively met the Need and Purpose because of their ability to provide service to a broader community of travel needs with service to growth areas in the Town of Sahuarita. However, one alternative with a northern connection with I-19 at SXD was carried recommended for further analysis because although it does not service the Town of Sahuarita, it effectively met the Need and Purpose because of its ability to provide direct access to TUS and its surrounding areas. Moreover, it provided another viable option to evaluate because the corridors with a connection point with I-19 at Pima Mine Road were all eliminated because of the potential local access, environmental, and residential displacement issues that were described in Section 2.4.2.

In conclusion, three corridor alternatives were recommended for further analysis in this Draft Tier 1 EIS. Along with being the highest performing, these corridor alternatives represent the best set of options for further analysis since they span the most optimal geographical area for meeting the project's purpose and performance objectives, have amongst the lowest relative impacts, and provide comparable but distinct opportunities for further impact mitigation. They reflect the Reasonable Range of Corridor Alternatives in this Draft Tier 1 EIS that are shown in Figure 2-6, which includes the following:

- **Alternative 1:** SXD (based on the SXD North connection point) to Rita Road
- **Alternative 7:** El Toro South to Rita Road
- **Alternative 8A:** El Toro South to Houghton Road via Alvernon Way

Figure 2-6. Preliminary Reasonable Range of Corridor Alternatives



2.5.1 Shift of Corridor Alternatives to Avoid Use of Section 4(f) Resources

Regarding Section 4(f) of the Department of Transportation Act of 1966 (Section 4(f)), while Section 4(f) use determinations and approvals are not being made at this point in the study, FHWA is not relieved from its responsibility to consider, in the Tier 1 analysis, alternatives that avoid the use of Section 4(f) properties. After Section 4(f) properties were identified, ADOT and FHWA assessed whether each corridor alternative had the potential to incorporate land from each Section 4(f) property, and then considered three ways to avoid or minimize the likelihood of having a Section 4(f) use during Tier 2. One of these three ways consisted of shifting the 2,000-foot-wide Tier 1 corridor away from the Section 4(f) property.

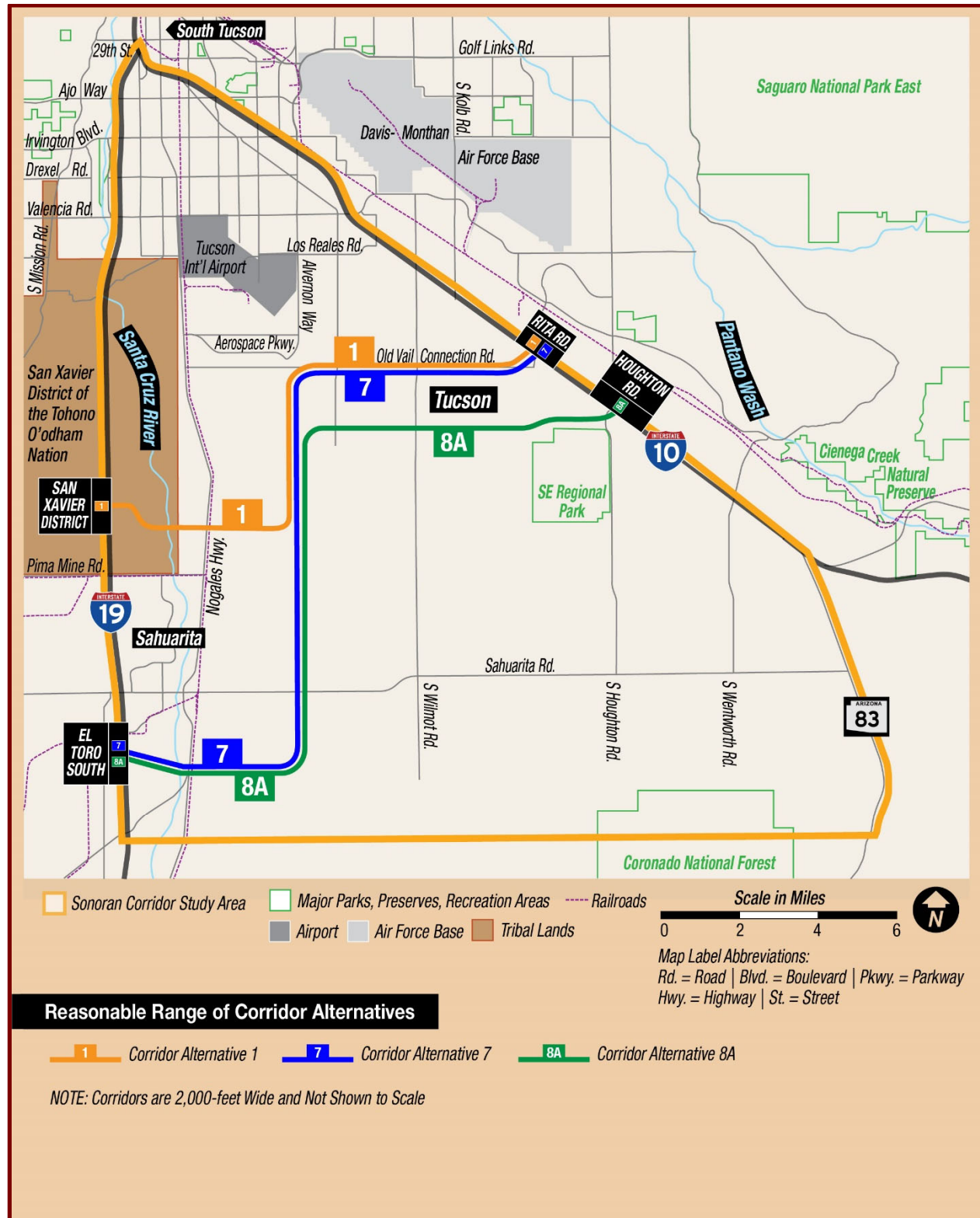
Anamax Park, which is a resource protected under Section 4(f), is located just west of I-19 near the proposed connection point for Alternatives 7 and 8A. With the need to build a system interchange, there was high likelihood of a potential Section 4(f) use of Anamax Park during Tier 2. After considering ways to avoid a potential Section 4(f) use of Anamax Park, the connection point of Corridor Alternatives 7 and 8A to I-19 was moved slightly north to a location just south of El Toro Road. For similar reasons, the easternmost 2 miles of Corridor Alternative 8A were moved 1,000 feet further north of the initial east-west routing to eliminate potential Tier 2 Section 4(f) use of the Southeast Regional Park, which was also identified as a Section 4(f) recreation resource. Section 4(f) is discussed in further detail in Section 3.7, Section 4(f) Resources.

Furthermore, FHWA and ADOT are currently conducting a separate tiered environmental study to identify a potential corridor for I-11 between Nogales and Wickenburg, AZ. Like the Sonoran Corridor, the I-11 Tier 1 EIS is considering 2,000-foot-wide corridor alternatives and a No-Build Alternative. The I-11 Draft Tier 1 EIS was released for public review between April and July 2019 and identified a preferred alternative that connects with I-19 from the west near Sonoran Corridor Alternatives 7 and 8A. In October 2019, FHWA and ADOT decided to move the connection point for Sonoran Corridor Alternatives 7 and 8A along I-19 slightly north to align more closely with the I-11 Tier 1 EIS Preferred Alternative for purposes of efficient planning. The I-11 Tier 1 EIS study is still ongoing and has yet to identify a Selected Alternative. Any decisions made for the I-11 study will not have bearing on which alternative is selected for the Sonoran Corridor study. In conclusion, moving the connection point for Corridor Alternatives 7 and 8A not only avoids a potential Tier 2 Section 4(f) use of Anamax Park, but it also provides a common connection point with any future westerly corridor development if either Corridor Alternative 7 or 8A is chosen.

The revised corridor routings are shown in Figure 2-7.

The description of each of the corridor alternatives recommended for further consideration, along with the No-Build Alternative, follows. Each corridor alternative is identified by its number and its connection points at I-19 and I-10.

Figure 2-7. Reasonable Range of Corridor Alternatives (including the No-Build Alternative)



Corridor Alternative 1: SXD to Rita Road (Figure 2-8)— Starting from the west at the SXD on I-19, it connects the major employment centers near TUS with I-10 at Rita Road, where several other major employment centers are located. The concept of Corridor Alternative 1 came from a 2015 Pima County Sonoran Corridor study and was developed in early coordination with the TON Tribal Historic Preservation Officer (THPO) to minimize future impacts to sensitive cultural resources within SXD lands.

It is closest to many activity centers within or adjacent to the study area and is relatively short compared to the other alternatives, which reduces travel distance and time in the movement of goods between Southern Arizona and points east. More broadly, this alternative improves the LOS for all vehicles on existing roadways in the study area. Corridor Alternative 1 also provides more direct access to TUS. A consideration with this corridor alternative is its location within the SXD, where many sensitive cultural resource locations will need to be evaluated for preservation, potentially limiting options for the corridor in this Draft Tier 1 EIS, and location of a specific alignment in Tier 2 studies, if selected.

Another consideration is that the westernmost segment of Corridor Alternative 1 crosses allotted lands of the SXD. To address this, 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. In addition to the frequent communication⁸, the project team undertook a survey of potentially affected allottees and invited them to various meetings to determine their willingness and interest in further studying a possible future Sonoran Corridor on their lands. The process used was akin to the analysis of BIA ROW approvals for infrastructure projects on Tribal lands. It measured support or opposition based on land ownership percentage of each affected parcel. The results collected are discussed more in Chapter 5.

Corridor Alternative 7: El Toro South to Rita Road (Figure 2-9)— This alternative has similarities to Alternative 1 except it begins in the west further south along I-19 in Sahuarita, near El Toro Road. It also travels north along the Alvernon Way alignment and follows Old Vail Connection Road to I-10, where it connects at Rita Road. It improves service to the future growth areas and existing activity centers, which is evident in the higher travel forecast numbers, and improves LOS on existing roadways in the Study Area. In addition to being close to growth areas and activity centers in the northern portion of the study area like Alternative 1, it serves the growing Town of Sahuarita and attempts to avoid major environmentally sensitive resources. It provides an alternative for passenger traffic going to TUS and for truck traffic, which would benefit from a shorter east-west connection between I-19 and I-10 that reduces travel time and cost. The interchange at Rita Road requires that local access be preserved, but the existing local access needs are to the north and east of I-10. No significant obstacles are present to prevent building a modified system interchange to the southwest of I-10 to accommodate freeway-to-freeway travel while retaining access to the local area. Also, El Toro South was identified as a favorable interchange location because it has the potential to address the Town of Sahuarita's desire for a corridor connection within the town limits.

⁸ Summary of the coordination with the SXD, TON and San Xavier Allottee Association is presented in Chapter 4 – Coordination and Outreach

Figure 2-8. Corridor Alternative 1

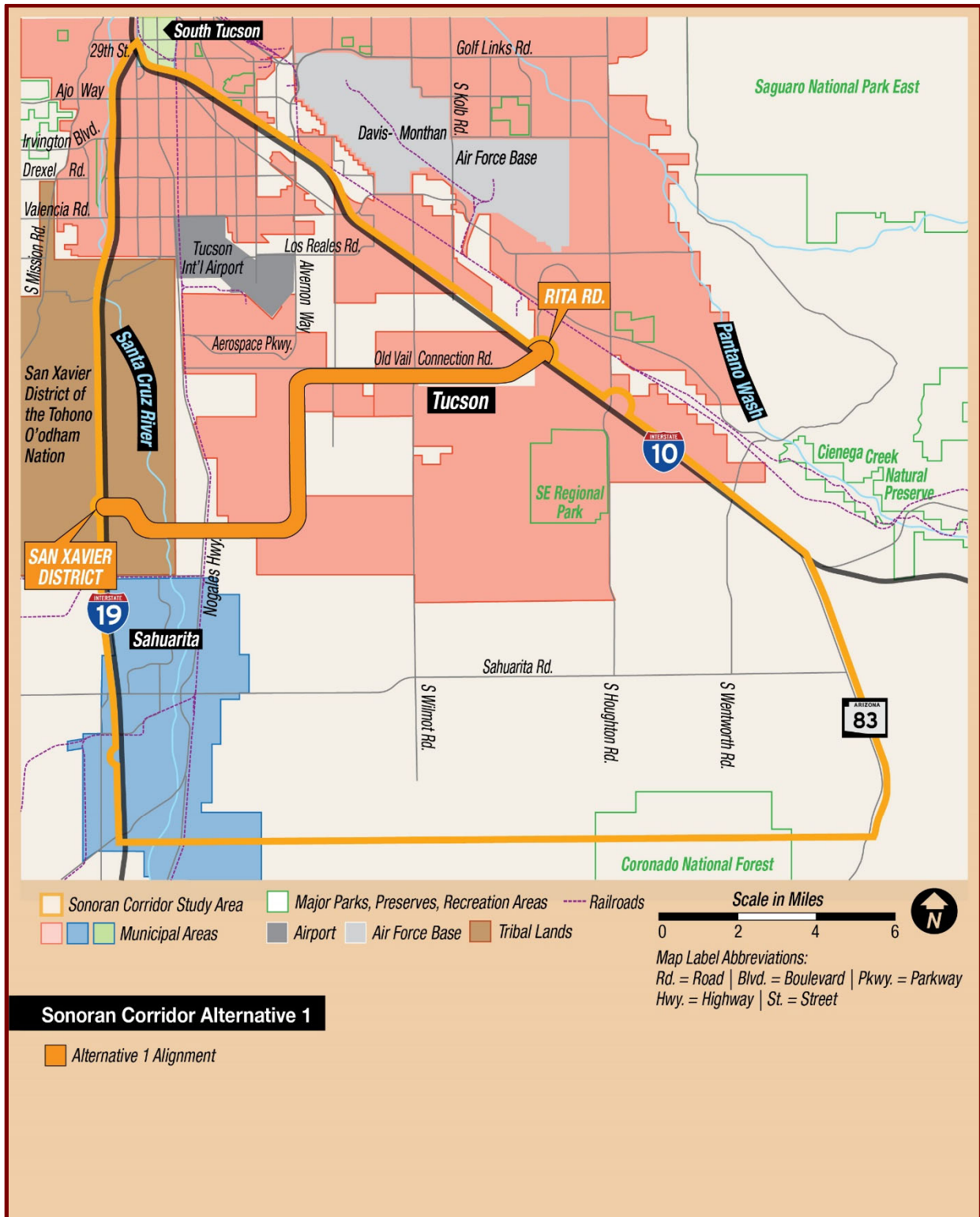
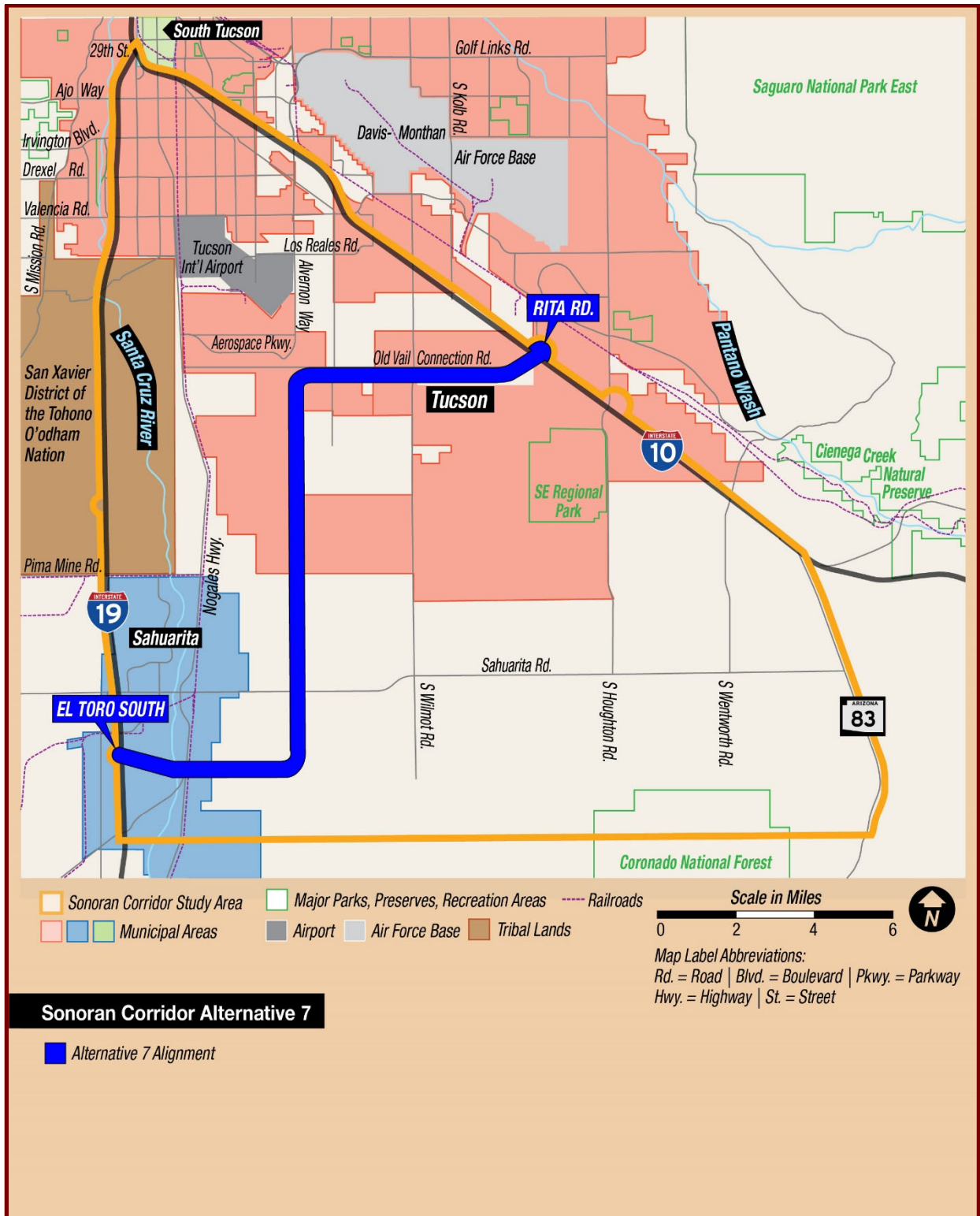


Figure 2-9. Corridor Alternative 7



Corridor Alternative 8A: El Toro South to Houghton Road (Alvernon Way option) (Figure 2-10)—This alternative is a modified version of Alternative 8 that resulted from discussions with members of the public at the September 26, 2018, public meeting to improve the performance of Alternative 8. The alternative is discussed in the CSR and the Public Meeting summary⁹. The difference is the north-south segment that follows a route along the Alvernon Way alignment. Although there is currently no paved roadway for much of the Alvernon Way segment, which requires some greenfield development, this corridor avoids some of the environmental challenges of the Wilmot Road corridor with regard to drainage courses. The connection to I-10 at Houghton Road moves the corridor away from some of the key activities located further north on Old Vail Connection Road but provides an alternative to the Rita Road location of the other two alternatives. Like Corridor Alternative 7, this corridor alternative is recommended for further evaluation because it effectively meets the Need and Purpose by servicing high growth areas, such as the Town of Sahuarita, and other major activities located in the northerly reaches of the Study Area, offering an efficient alternative that enhances freight and passenger mobility; and improving LOS on existing roadways in the Study Area. The corridor alternative is the longest of the three and requires considerations for the design of the I-10 system interchange at Houghton Road but, as noted, can be resolved with modifications to the existing roadway network.

No-Build Alternative—The definition of a No-Build Alternative reflects the transportation network and growth in the absence of the Sonoran Corridor and was a primary factor in how the analysis was conducted. For purposes of this Draft Tier 1 EIS, the 2045 RMAP multimodal roadway network that was adopted in 2016 by PAG will serve as the No-Build Alternative and was used as the base case against which effects of the corridor alternatives were measured.

For its size, few major improvements are identified within the study area. Table 2-2 and Figure 2-11 show the major improvements to the network included in the No-Build Alternative. The major changes are improvements to I-10 East between I-19 and Kolb Road and I-19 between I-10 and San Xavier Road. One major new roadway that is reflected in the plan is the link between Aerospace Parkway and I-10 along Old Vail Connection Road, which could be part of a future Sonoran Corridor. Other important improvements in the study area include widening of Wilmot Road, Houghton Road, and Sahuarita Road. Some of the improvements identified in the plan are shown as reserve or illustrative projects, but few other existing roadways are planned for widening or extension to enhance the limited network that currently exists in the study area.

⁹ CSR and Public Meeting Summaries are available on the Sonoran Corridor Study website, <https://azdot.gov/planning/transportation-studies/sonoran-corridor-tier-1-environmental-impact-statement/documents>.

Figure 2-10. Corridor Alternative 8A

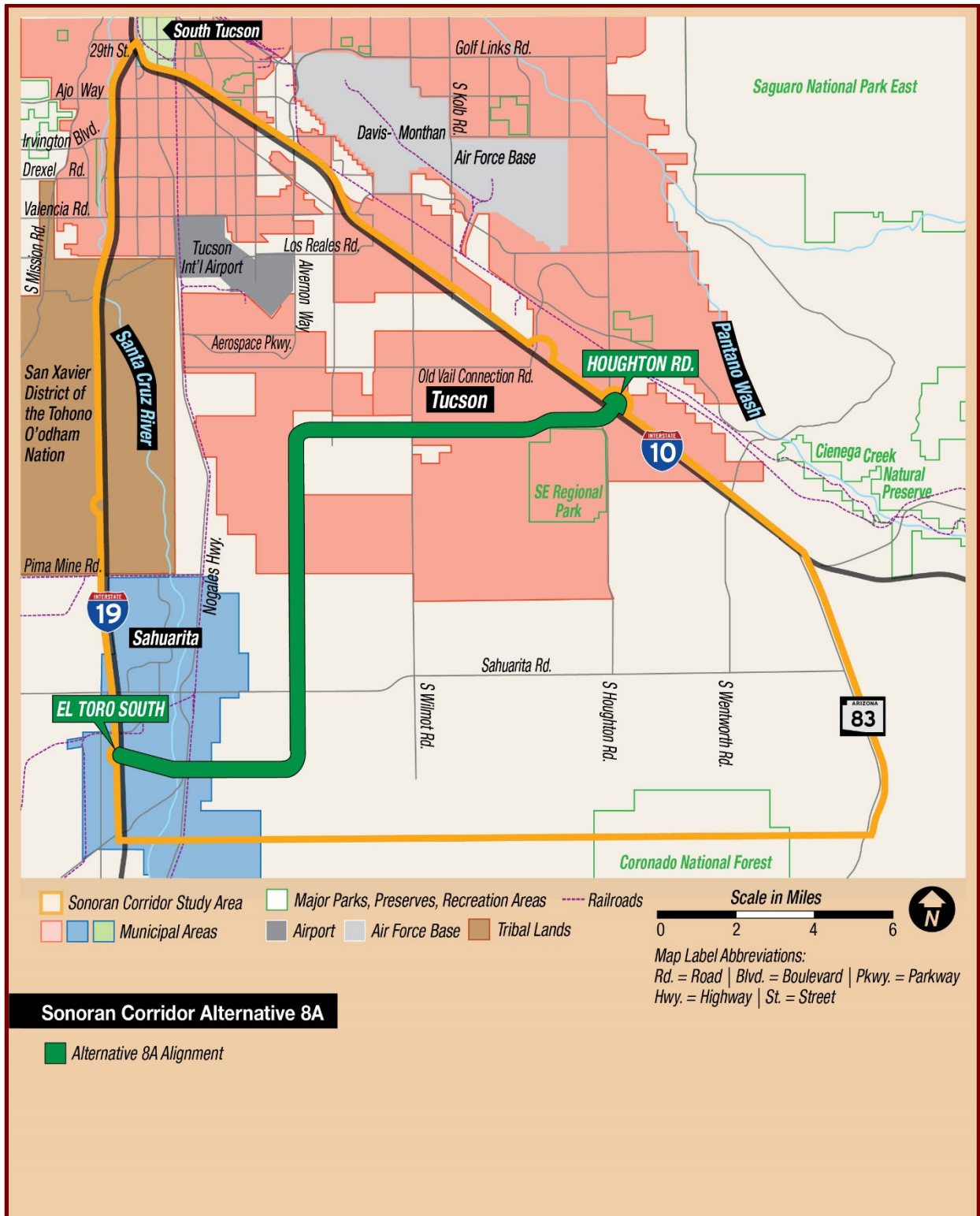
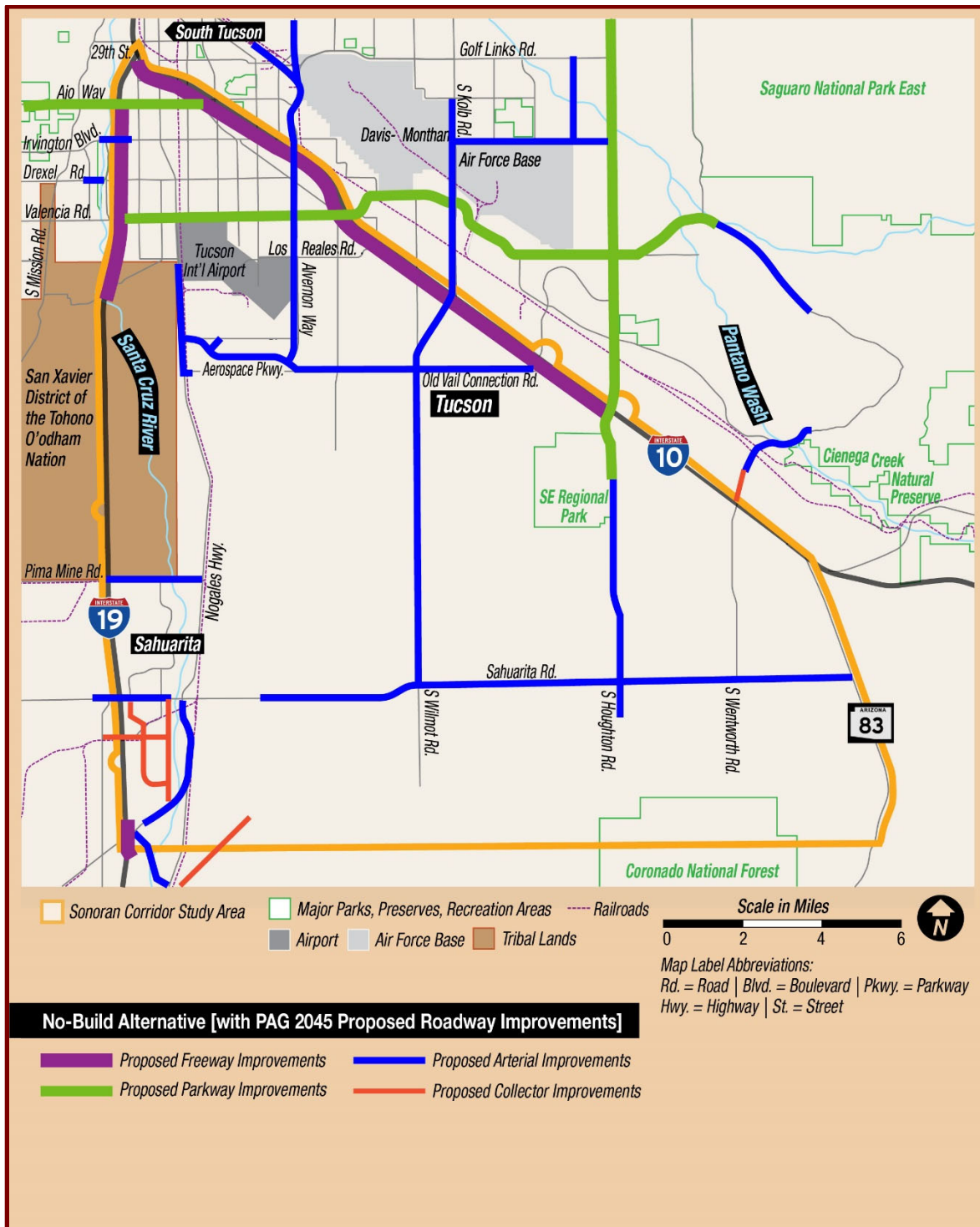


Table 2-2. Listing of Key Study Area Planned Projects in 2045 RMAP

FREEWAY	SEGMENT	PROJECT DESCRIPTION
I-10	I-19 to Kolb Road	Widen to 6 or 8 lanes and reconstruct interchanges
I-19	I-10 to San Xavier Road	Widen to 6 lanes and rebuild interchanges and bridges
Houghton Road	Camino del Toro to Dawn Road	Reconstruct 2-lane road
Houghton Road	Dawn Road to I-10	Widen to 4 and 6 lanes divided with sidewalks and bike lanes
Nogales Highway	Calle Verde to Sahuarita Road	Widen to 4 lanes with bike lanes
Nogales Highway	Old Vail Connection Road to Los Reales	Widen to 6 lanes with sidewalks and bike lanes
Old Vail Connection Road	Alvernon Way to Rita Road	Construct new 2-lane roadway (possible Sonoran Corridor)
Sahuarita Road	La Canada Road to La Villita Road	Widen to six lanes with bike lanes and sidewalks
Sahuarita Road	Country Club to SR 83	Rebuild 2 lanes with bike lanes and sidewalks
Wilmot Road	Pima Mine Road to I-10	Widen to 4 lanes with bike lanes
Wilmot Road	Sahuarita Road to 6 miles north	New 2-lane road including bike lanes

Figure 2-11. No-Build Alternative (2016 Adopted RMAP with 2045 Multimodal Roadway Projects)



Source: Pima Association of Governments

2.6 Comparison of Reasonable Range of Corridor Alternatives

The three corridor alternatives and the No-Build Alternative are presented in a comparison matrix to help assess their anticipated transportation performance and how well they perform against each other in meeting the Need and Purpose expectations for the study. While all the corridor alternatives are shown as independent corridors, some sections overlap, for which the environmental effects of a new freeway within the corridor would be the same.

2.6.1 Corridor Characteristics

The basic physical placement of the future corridors is shown to gauge their overall potential for impact on the affected environment. The corridor length is developed using the centerline length of the corridor, and the number of lane-miles assumes a four-lane facility, as used in travel forecasting. Table 2-3 provides a summary of the major characteristics of the Reasonable Range of Corridor Build Alternatives.

Table 2-3. Corridor Length and Lane-Miles

ALTERNATIVE	LENGTH IN MILES	LANE MILES OF CORRIDOR
No-Build Alternative	0	0
Corridor Alternative 1	16.06	64
Corridor Alternative 7	20.47	82
Corridor Alternative 8A	21.04	84

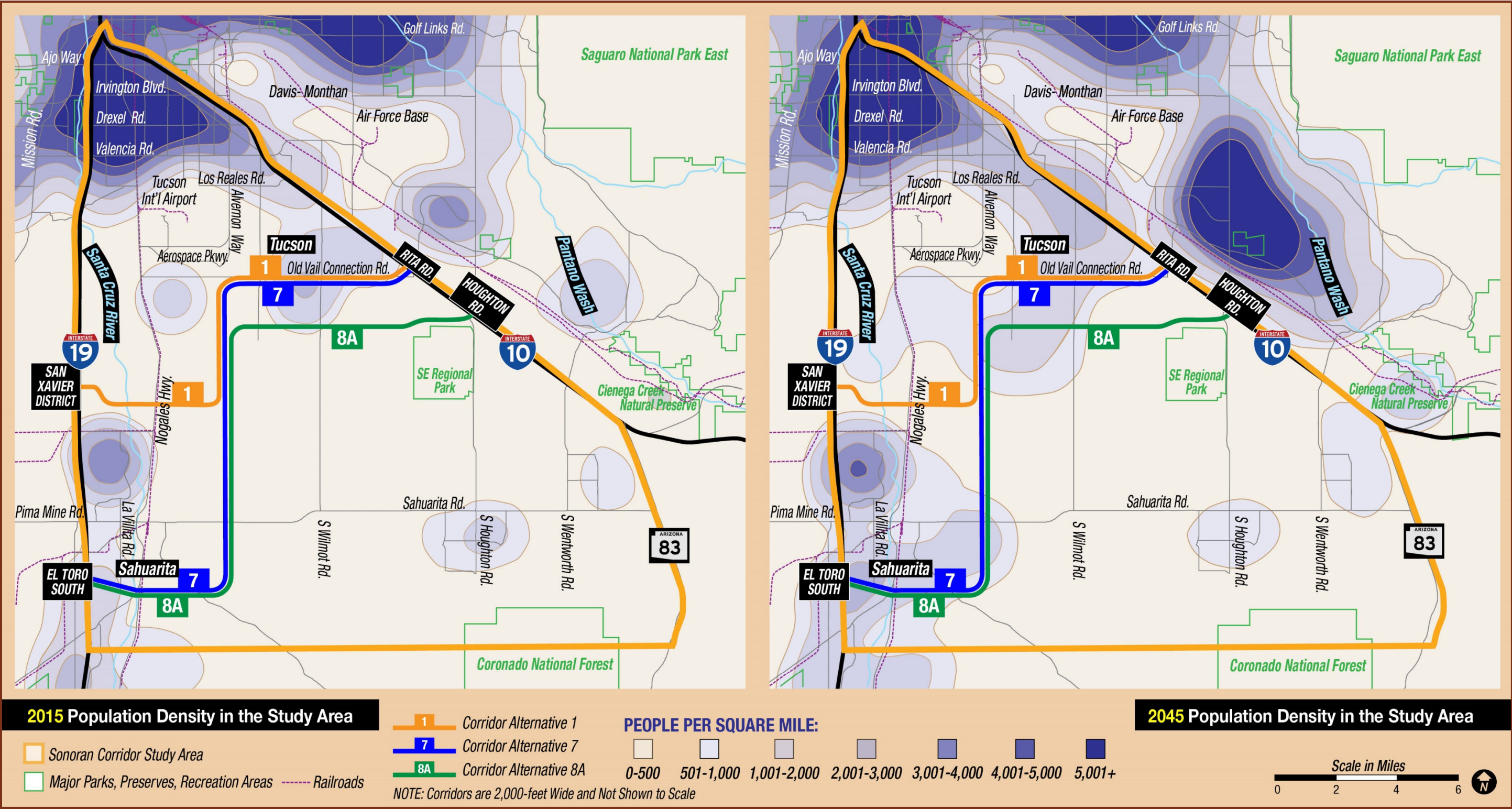
2.6.2 Serve Population and Employment Growth

Growth is a primary consideration of the Need and Purpose of the Sonoran Corridor project. The anticipated growth is addressed through an understanding of where and how much change is expected and the effectiveness of each corridor alternative in serving it.

2.6.2.1 Serving Growth in Population and Employment

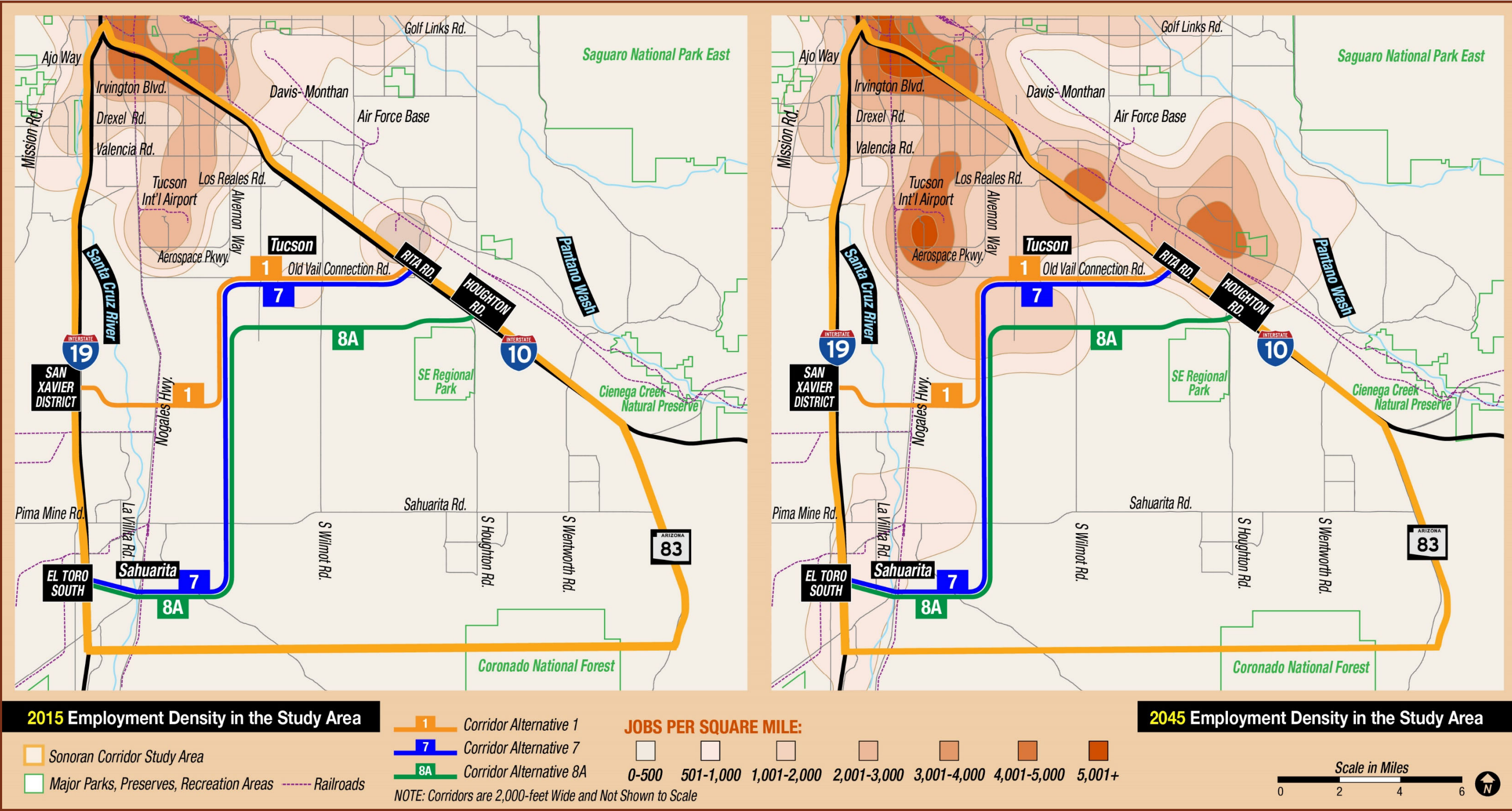
A driving consideration in the Sonoran Corridor is the anticipated growth planned for the study area (see Figure 2-12 and Figure 2-13, which show the corridor alternatives in the context of future growth in the study area, and Table 2-4, Table 1-1, and Table 1-2). There will be moderate growth in the population of the Study Area between now and 2045, largely within the Town of Sahuarita and currently unincorporated parts of Pima County. By contrast, there is substantial additional employment proposed in the same Town of Sahuarita and unincorporated Pima County, as well as in the City of Tucson. As part of that growth there will be several major activity centers that already need or will need direct access to a major transportation facility, ideally within less than two miles. This growth is expected to severely tax the limited transportation network currently available or planned in the 2045 RMAP. The ability of the transportation network to serve the increase in study area population and employment and the expansion or creation of several important activity centers will be greatly enhanced by the additional capacity and geographic coverage of the Sonoran Corridor.

Figure 2-12. Corridor Alternatives with Population Growth Projections



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Figure 2-13. Corridor Alternatives with Employment Growth Projections



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Table 2-4. Comparison of How Corridors Serve Growth in Population and Employment

NEED AND PURPOSE	MEASURE	NO-BUILD ALTERNATIVE	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
Need: Population and Employment Growth: High-growth areas need access to the high-capacity, access-controlled transportation network. Purpose: Provide a high-priority, high-capacity, access-controlled transportation corridor that improves the existing transportation network by affording better access to growth areas and existing activity centers.	<ul style="list-style-type: none"> Provides access to planned growth area Serves identified employment centers in the study area 	Does not serve highest growth portions of the study area	Provides direct access to the areas of growth in the northern portions of the study area	<ul style="list-style-type: none"> Provides direct access to the areas of greatest growth in the study area, including the Town of Sahuarita Directly serves TUS and I-10 growth areas 	<ul style="list-style-type: none"> Provides reasonable access to the areas of growth in the study area, including the Town of Sahuarita Does not directly serve the growth areas near TUS and I-10

2.6.2.2 Total Distance to Identified Activities within and near Study Area

Along with providing access to future high growth areas, having the ability to serve existing activity centers in the study area is important for the Sonoran Corridor. Table 2-5 compares the corridor alternatives' ability to serve many existing and future activity centers providing employment, shopping, institutional services, education, etc., within the study area that will depend on an effective transportation system to successfully serve the local and regional communities.

Table 2-5. Comparison of Corridor Alternatives' Access to Identified Activity Centers

NEED AND PURPOSE	MEASURE	NO-BUILD ALTERNATIVE	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
Need: Population and Employment Growth: Access to key activity centers within and near the study area Purpose: Enhance accessibility to existing activities in the study area.	<ul style="list-style-type: none"> Total distance to 27 identified activity centers serviced in and near the study area 	<ul style="list-style-type: none"> The existing transportation network, which has limited ability to reach activity centers, is not improved 	<ul style="list-style-type: none"> 76.75 miles¹⁰ - Provides direct access to activities in the northerly portions of study area. 	<ul style="list-style-type: none"> 66.59 miles¹¹ - Provides direct access to activities in study area, including Sahuarita. 	<ul style="list-style-type: none"> 75.72 miles¹¹ - Provides access to activities in study area, including Sahuarita, but does not directly serve centers at TUS and I 10.

¹⁰ The figures in Table 2-5 indicate the sum of distances from all activity centers to the nearest point on each of the three alternative corridors. Shorter distance means more effective connection to centers.

The introduction of the Sonoran Corridor is designed to improve travel to and through the study area. A purpose of the Sonoran Corridor is to improve the ability to service identified geographic locations that house economic and residential centers. Twenty-seven of those centers were identified in the CSR¹¹. The sum of the distance to the nearest point on the corridor alternative from each activity center was used to understand their ability to service key locations and to measure how effectively the corridor serves the primary travel magnets in and near the study area (See Table 2-5).

2.6.3 Reduce Traffic Congestion

The Sonoran Corridor is also intended to reduce congestion and improve LOS within the study area. The metrics applied measure how the alternatives compare in terms of their effect on travel and how effectively they meet the Need and Purpose.

2.6.3.1 Congestion Reduction—Improve Level of Service

The Need and Purpose identifies the reduction of future congestion as a key criterion in evaluating the effectiveness of the Sonoran Corridor. Table 2-6 summarizes the overall change in LOS for each corridor alternative based on a volume-to-capacity ratio calculation for each alternative study area network. Table 2-7 summarizes the percentage change for the entire study area for each alternative on a link-by-link basis using the segments shown on Figure 2-14. The volume-to-capacity ratios (V/C) by link are presented in the table in Appendix A.

Table 2-6. Comparison of Volume-to-Capacity Congestion Reduction Performance of Corridor Alternatives

NEED AND PURPOSE	MEASURE	NO-BUILD ALTERNATIVE	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
Need: Increased Congestion by 2045: Forecasted capacity shortages in the study area by 2045 Purpose: Provide a high-priority, high-capacity, access-controlled transportation corridor that will improve LOS.	• Change in 2045 LOS within study area	• Does not improve congestion and LOS in the study area by 2045	• Reduces V/C 5.4% compared to No Build	• Reduces V/C 12.2% compared to No Build	• Reduces V/C 13.8% compared to No Build

LOS = level of service, V/C = volume-to-capacity ratio

Table 2-7. Study Area Volume-to-Capacity Ratios Comparison of Corridor Alternatives and No-Build Alternative

ALTERNATIVE	STUDY AREA SEGMENTS V/C	V/C CHANGE	V/C REDUCTION
No-Build Alternative	0.441	N/A	N/A
Corridor Alternative 1	0.417	-0.024	5.4 % ↓
Corridor Alternative 7	0.387	-0.054	12.2% ↓
Corridor Alternative 8A	0.380	-0.061	13.8% ↓

V/C = volume-to-capacity ratio

¹¹ <https://azdot.gov/sites/default/files/2019/08/sonoran-corridor-selection-report.pdf>

Figure 2-14. No-Build Network Segments Used to Compare LOS as a Congestion Measure



The Sonoran Corridor reduces congestion in the study area. Corridor Alternative 8A is the most impactful, reducing V/C by nearly 14 percent. With the added roadway capacity, all corridor alternatives help improve the LOS in the study area. Various individual roadway segments, both freeways and arterials, show improvement in LOS with the addition of the Sonoran Corridor compared to the No-Build alternative despite the increase in demand anticipated from the growth in the area.

2.6.4 Improve System Linkages

System linkages measures how well the proposed corridor can assist in directly and indirectly serving centers within the study area and connecting across geographical distances to identified destinations. Travel distances, changes in travel time and travel speeds, and the amount of travel provide an indication of how the corridor serves the study area. A summary of system linkages performance is in Table 2-8.

Table 2-8. Summary Comparison of System Linkages Performance of Corridor Alternatives

NEED AND PURPOSE	MEASURE	NO-BUILD ALTERNATIVE	CORRIDOR ALTERNATIVE 1	CORRIDOR ALTERNATIVE 7	CORRIDOR ALTERNATIVE 8A
<p>Need: The lack of system linkages south of TUS inhibits efficient regional, interstate, and international mobility in the study area</p> <p>Purpose: Provide a high-priority, high-capacity, access-controlled transportation corridor that provides a link between I-19 and I-10 south of TUS that improves mobility associated with regional, interstate, and international travel</p>	<ul style="list-style-type: none"> • Change in travel times in and near study area • Change in 2045 VMT and VHT compared to No-Build 	<ul style="list-style-type: none"> • Does not reduce travel times • Does not increase VMT and does not reduce VHT in 2045 	<ul style="list-style-type: none"> • Reduces travel time by 15.9 minutes compared to No-Build • Increases VMT and reduces VHT 	<ul style="list-style-type: none"> • Reduces travel time by 16.6 minutes compared to No-Build • Increases VMT and reduces VHT 	<ul style="list-style-type: none"> • Reduces travel time by 17.8 minutes compared to No-Build • Increases VMT and reduces VHT

VHT = vehicle hours traveled, VMT = vehicle miles traveled

2.6.4.1 Travel Time Savings and Travel Speeds

The introduction of the Sonoran Corridor into the study area would provide an alternative path for any trips travelling from northbound to eastbound or from westbound to southbound within or through the study area. Travel times were compared for the corridor alternatives and the No-Build Alternative between two common points (El Toro South connection point at I-19 to the Fairgrounds connection point at I-10) to assess the time benefit of the proposed corridor. Table 2-9 shows the travel time comparison.

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

ALTERNATIVE	TRAVEL TIME	AVERAGE TRAVEL SPEED
No-Build Alternative (via Sahuarita Road)	30.1	40.1
No-Build Alternative (via I-19/I-10)	38.3	56.6
Corridor Alternative 1	22.4	70
Corridor Alternative 7	21.7	71.6
Corridor Alternative 8A	20.5	73.3

2.6.4.2 Vehicle Miles Traveled and Vehicle Hours Traveled

Variation in VMT among the alternatives was used to evaluate how the Sonoran Corridor Alternatives affected travel demand in the study area. Higher system VMT suggests that more vehicles would travel the Sonoran Corridor to take advantage of travel time savings. The VMT results of this analysis are based on the PAG Regional Travel Demand model and on the Arizona Statewide Travel Demand Model and excerpted for the study area. As shown in Table 2-10 for all traffic (i.e., passenger cars and trucks), there would be a small increase (less than 1 percent) in VMT in the study area with any of the corridor alternatives.

Table 2-10. 2045 Vehicle Miles Traveled and Vehicle Hours Traveled

ALTERNATIVE	ALL TRAFFIC VMT	TRUCK TRAFFIC VMT	VHT (ALL TRAFFIC)
No-Build Alternative	10,623,942	1,348,285	276,435
Corridor Alternative 1	10,704,934	1,360,408	274,528
Corridor Alternative 7	10,684,295	1,361,498	274,231
Corridor Alternative 8A	10,677,294	1,360,958	274,000

VMT = vehicle miles traveled, VHT = vehicle hours traveled

VHT decreases, though still by a relatively small amount at less than 1 percent, for all corridor alternatives. This indicates that there is a benefit to using the Sonoran Corridor in terms of travel time compared to relying on the existing system of roadways. When combined with the VMT results, it indicates that though the changes are small, more miles are travelled in a day, but in less time with the Sonoran Corridor than without it. The reduction in travel time afforded by the new corridor shown in Table 2-9 is a measure of the improvement in effectiveness of the transportation system.

As with overall traffic in the study area, truck VMT increases as truck VHT goes down, indicating more truck movements completed in less time compared to the No-Build Alternative. This supports the purpose of improving system connections through the addition of the Sonoran Corridor.

Truck activity in the region is affected by the Sonoran Corridor in that there is a more efficient travel path for north-east and west-south movements. The shorter path reduces travel distance and time compared to existing route choices and may reduce the use of roadways that are not designed for the volume of heavy loads of many large truck operations, such as smaller scenic highways in Southern Arizona. Trucks coming from or going to Nogales or Mexico would be able to avoid travel into downtown Tucson and the I-10/I-19 interchange to reach destinations within or near the study area, or for longer trips to or from points farther east, such as New Mexico or Texas.

2.7 Further Detailed Analysis

Potential mitigation measures or next steps relate to the ability to assess the impact of a fully developed corridor alignment and refine it to more thoroughly understand the social, environmental, and economic effects on the region. For example, in analyzing the economic competitiveness of the proposed corridor alternatives, the underlying assumptions of the project structure and the forecast modeling for the No-Build Alternative and the corridor alternatives are limited to the data developed at a Tier 1 level of analysis. The traffic data provided by the current forecast modeling do not fully capture the effects of a phased construction schedule on user behavior. The incremental benefits of constructing the project in phases defined by Segments of Independent Utility (e.g., a connection between TUS and I-10, which performs effectively in this Draft Tier 1 EIS analysis) will provide a more realistic measure of the economic influence of the corridor on the region over time. By closely evaluating the changes in traffic conditions before and during a phased implementation plan, the baseline traffic conditions in the study area preceding completion of the project can be assessed with greater precision, rather than evaluate the change from the baseline year (2017) to the forecast year (2045). As the effect of the project improvements is considered to be significant for traffic on the highways and local arterial roads in the study area, the higher level of precision in the baseline conditions will improve capture of any net benefits from a new highway facility within one of the corridor alternatives over the No-Build Alternative during the phased construction and after the start of full operations. A high-level analysis of phasing will be provided in the Final Tier 1 EIS/Record of Decision that can provide guidance for the more detailed work for a Tier 2 environmental analysis.

In addition to defining the baseline conditions and effect of phased construction, evaluating the characteristics of the forecasted traffic will provide a better understanding of the mix of users utilizing the proposed facilities and the purpose of travel. The corridor alternatives establish a major connector between the I-19 and I-10 highways to bypass a circuitous route through downtown Tucson while improving connectivity to commercial sites at TUS and within the study area. However, a specific alignment for a future roadway is required to develop more refined impacts, costs, and benefits. With a more fully defined design, evaluating the trip purpose and user characteristics on the proposed corridor would improve the measurement of marginal benefits in time and cost savings over the baseline conditions. This applies especially to the effect of improved connectivity for truck traffic from TUS, the alleviation of congestion during peak travel hours on the I-19 and I-10 highways, and the diversion of traffic from local arterial roads onto the new corridor.

Improved detail in the characteristics of the traffic composition and changes in trip origin and purpose will enable a more precise forecast of crash rates. This additional information will provide an indication of crash potential on local arterial roads, the highways, the Sonoran Corridor, and the interchanges based on VMT.

This will be used to calculate the benefits to users traveling on the new corridor and between other study area facilities because each of these has a variable accident risk for which more detail is needed than can be developed at a Tier 1 level. Additionally, evaluating the magnitude and effect of induced demand in the forecasting model for local and highway traffic will improve understanding of the incremental benefits generated by the facility for users in the study area. By improving the granularity of the traffic data and optimizing the forecast parameters to define the baseline conditions and operational performance, follow-up analysis will improve capture of the effects of the proposed project improvements related to time travel savings, cost savings, and safety benefits.

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