



# Interstate 10/Interstate 17 Corridor Master Plan

March 28, 2018



# **Interstate 10/Interstate 17 Corridor Master Plan**

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Phoenix, Arizona 85003  
MAG Contract #585

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**March 28, 2018**

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This report was funded in part through grant(s) from the Federal Highway Administration and/or Federal Transit Administration. The content of this report reflects the views and opinions of the author(s), who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily state or reflect the official views or policies of the U.S. Department of Transportation, the Arizona Department of Transportation or any other state or federal agency. This report does not constitute a standard, specification or regulation.

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## Introduction

The Maricopa Association of Governments (MAG), in partnership with the Federal Highway Administration (FHWA) and the Arizona Department of Transportation (ADOT), developed the Interstate 10/Interstate 17 Corridor Master Plan to provide a long-term vision for the central 31-mile “spine” of the regional freeway network in metropolitan Phoenix, Arizona. The Corridor Master Plan effort became known as the Spine study. Begun in 2014, the Corridor Master Plan effort concluded in 2017 with the MAG Regional Council’s acceptance of a broad program consisting of more than 50 future projects. This program includes freeway main line and traffic interchange expansion and modernization, public transportation improvements, and bicycle/pedestrian enhancements.

*The Interstate 10/Interstate 17 Corridor Master Plan is a long-term vision for the central 31-mile “spine” of the regional freeway network in metropolitan Phoenix.*

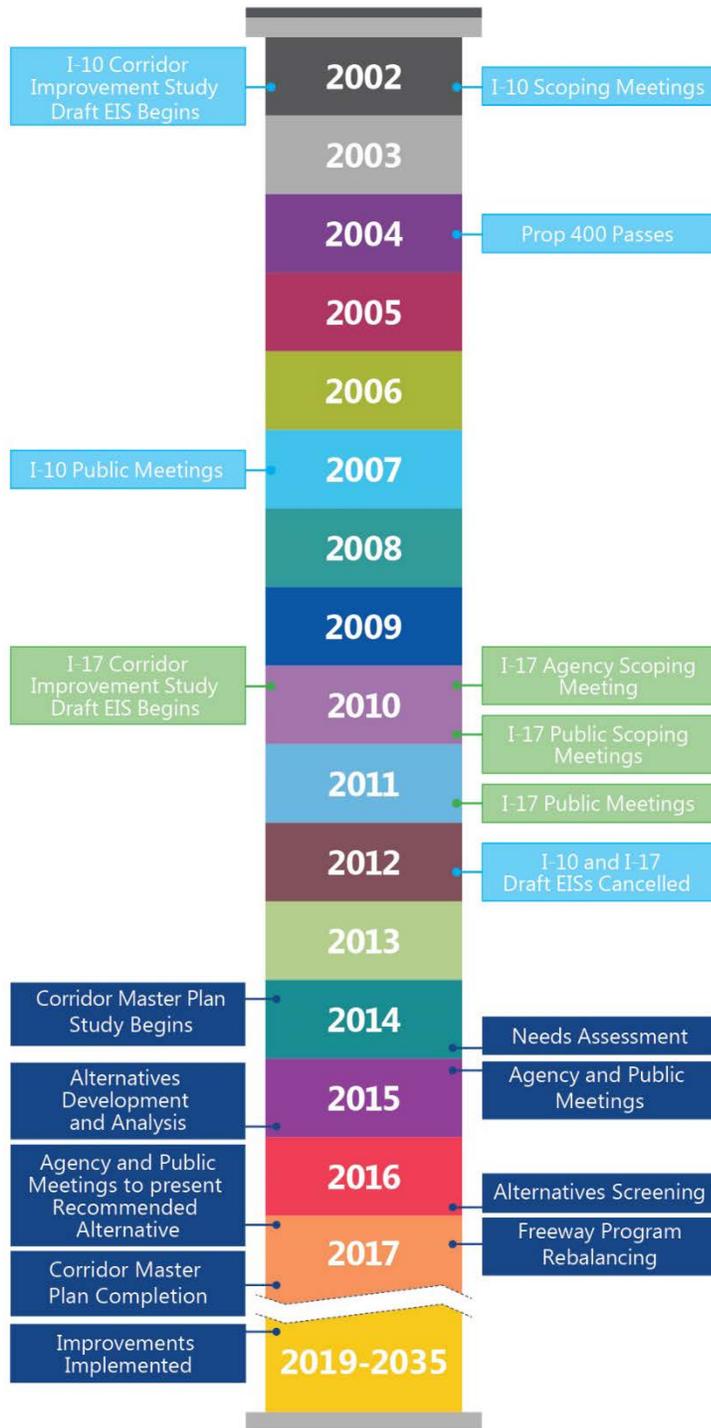
## Background

Starting in 2002, ADOT and FHWA developed corridor planning studies in the form of design concept reports and environmental impact statement (EIS) studies as part of the I-10 Corridor Improvement Study and I-17 Corridor Improvement Study. These studies considered ways to meet future travel demand on both I-10 and I-17 in the Phoenix area. Primary recommendations from these EISs focused on adding lanes to the freeway main lines to meet level of service (LOS) targets identified by ADOT in its *Roadway Design Guide*.

Because the EIS studies pointed toward adding general capacity with as many as six additional lanes on certain freeway segments, program funding in MAG’s Regional Freeway and Highway Program (RFHP) did not support the proposed improvements. Additionally, political concerns were raised by MAG Regional Council members about the need to add significant capacity on I-10 or I-17, and they encouraged another study to identify other options for meeting future travel demand. ADOT and MAG agreed to rescind the studies in October 2012 after determining that separate studies may not result in the best overall plan and that many of the studies’ recommendations were not prudent. FHWA accepted this decision. The knowledge gained from the EIS studies, coupled with subsequent analyses, identified several near-term improvements that could be carried forward and implemented by ADOT immediately through a separate but parallel effort with the Spine study. Although the EIS studies were cancelled, much of the planning, engineering and environmental information from those studies was folded into this Corridor Master Plan.

The timeline in Figure 1 provides a guide to the planning studies developed for both Interstates in the corridor. Planning in this corridor began in 2002 and has culminated in the development of this Corridor Master Plan. The study’s recommendations were accepted by the MAG Regional Council in May 2017, with all projects incorporated into the MAG *Regional Transportation Plan* (RTP).

**Figure 1.** Timeline for project development in the I-10 and I-17 corridors in metropolitan Phoenix



Study documentation is contained in two companion reports to this Corridor Master Plan and the associated Planning and Environmental Linkages document (in Appendix A). A corridor-wide *Needs Assessment Report* describes the existing conditions along I-10, I-17 and the adjacent arterial street network, providing a basis for the study’s recommendations. The report is dated June 1, 2016, and

discusses environmental factors, travel demand and traffic operations, roadway infrastructure, transit service, bicycle and pedestrian infrastructure, safety, technology/Intelligent Transportation System facilities, commerce and economic development factors, agency and public feedback, and the Spine study's need and purpose statement.

The second report, the *Alternatives Screening Technical Report*, summarizes the work undertaken to develop the Corridor Master Plan and its recommendations. The report, dated September 12, 2017, covers initial corridor concepts, the screening process, agency and public involvement, the recommended alternative, technology considerations and an implementation strategy. Both documents are available at [spine.azmag.gov](http://spine.azmag.gov).

### **Project Management and Guiding Principles**

Five partner groups led the study development process for the Corridor Master Plan. MAG, ADOT and FHWA collaboratively identified membership in these groups, which include:

- Charter Partners:** consisting of elected officials and executive-level leadership from MAG; ADOT; FHWA; Valley Metro; Arizona Department of Public Safety; the Cities of Chandler, Phoenix and Tempe; and the Town of Guadalupe (Figure 2). This group met during the study's early stages to set the overall partnering charter for developing the study, and members were briefed at key milestones in the study process.

**Figure 2.** Founding Charter Partners members at study kickoff in early 2014



From left to right: Councilwoman Shana Ellis, Tempe, Valley Metro Board of Directors Chair; Col. Robert Halliday, Director, Arizona Department of Public Safety; Karla Petty, Administrator, FHWA – Arizona Division; Jennifer Toth, State Engineer, ADOT; Mayor Rebecca Jimenez, Guadalupe; Mayor Scott Smith, Mesa, Chair, MAG; Mayor Mark Mitchell, Tempe; Bob Hazlett, Project Manager, MAG; Mayor Lana Mook, El Mirage, Valley Metro Board of Directors; Mayor Greg Stanton, Phoenix; Dennis Smith, Executive Director, MAG; Mayor Jay Tibshraeny, Chandler; Eric Anderson, Transportation Director, MAG; Councilman Jack Sellers, Chandler, Arizona State Transportation Board.

- **Management Partners:** consisting of senior management from MAG, ADOT and FHWA. This group was the core management team and met weekly to monthly depending on the level of material under consideration in the study development process. This group was responsible for the day-to-day delivery of the study and contributed key decisions during the alternatives development process.
- **Planning Partners:** consisting of management and technical staff from MAG member agencies, designated Native American communities, MAG, ADOT, FHWA and Valley Metro. This group met periodically to receive updates and notification of key study events, and to provide review and comment on specific study actions.
- **Alternatives Evaluation Partners:** consisting of the Management Partners and senior representatives from MAG member agencies affected by actions in the corridor. This group oversaw the alternatives screening process and was involved with major decisions during this process.
- **Agency Partners:** consisting of representatives from other agencies with study interests, including but not limited to, the U.S. Army Corps of Engineers, Federal Aviation Administration, Federal Transit Administration and Flood Control District of Maricopa County (FCDMC). These members were able to participate during the public outreach events and, in some cases, were briefed individually on certain study elements.

In addition to these five partner groups, the MAG Regional Council, MAG Transportation Policy Committee, MAG Management Committee and MAG Transportation Review Committee oversaw the study’s development. Outside of MAG, the Arizona State Transportation Board; City Council committees with the Cities of Chandler, Phoenix and Tempe; and the Town of Guadalupe provided comments on the study at key milestones.

The Transportation Policy Committee at MAG took the lead in directing the study’s goals and objectives and providing periodic feedback on the findings, alternatives and final recommendations. Established by the MAG Regional Council in 2002, and further codified in state statute, this committee consists of 23 representatives that includes 17 representatives from the MAG Regional Council and 6 representatives from the private sector. The Transportation Policy Committee advises the MAG Regional Council on all transportation policy decisions and is responsible for initiating studies and programs consistent with the current MAG RTP.

*MAG’s Transportation Policy Committee took the lead in directing the Spine study’s goals and objectives. Members represent local governments and the private sector.*

In the early phases, the Transportation Policy Committee provided guidance in setting forth the study’s guiding principles for developing the study alternatives. These principles were identified after receiving the first round of agency and public feedback in February and March 2015. Figure 3 summarizes the committee’s recommendations from April 2015.

**Figure 3.** Guiding principles



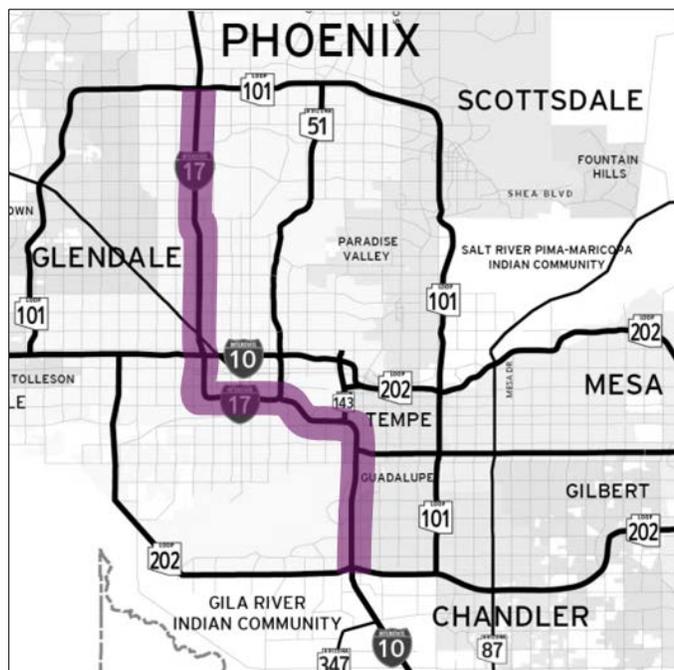
## Corridor Description

As depicted in Figure 4, the 31-mile corridor has been nicknamed the “Spine” because it serves as the backbone for the regional freeway system in the metropolitan Phoenix area. In fact, the corridor accommodates about 40 percent of all daily freeway traffic in the region.

The I-10 portion of the corridor begins at its southern junction with I-17, known as the Split interchange, and ends at its junction with State Route 202 Loop (Loop 202), commonly referred to as the Pecos Stack. This portion of I-10 passes through Phoenix, Tempe, Guadalupe and Chandler.

The remainder of the corridor is I-17, starting at its southern junction with I-10 and extending north to its junction with State Route 101 Loop (Loop 101), commonly referred to as the North Stack. All of the study’s I-17 segment is located entirely in Phoenix.

**Figure 4.** Spine corridor location in center of the metropolitan Phoenix area



## Infrastructure Condition

**Interchanges.** The Spine corridor has 37 points of access. I-10 has 4 system traffic interchanges (1 shared with I-17), 8 full service traffic interchanges where movements are allowed in all directions, and 1 partial service traffic interchange. I-17 has 3 system traffic interchanges (2 shared with I-10), 16 full service traffic interchanges, 4 partial service traffic interchanges and 2 groups of isolated service ramps. I-17 also has a frontage road system between 16th Street and Utopia Road north of Union Hills Drive. The frontage roads provide access to properties in Phoenix adjacent to I-17.

**A system traffic interchange**

*connects two or more freeway facilities.*

**A service traffic interchange**

*connects a freeway with an arterial street.*

**Pavement.** Pavement makes up a large part of any roadway network's infrastructure. In the study area, both I-10 and I-17 are paved with Portland cement concrete pavement and covered with an asphalt rubber asphaltic concrete friction course (quiet pavement) overlay. Arterials in the study area are all paved with asphaltic pavement, except within the ADOT control-of-access limits, where the arterials are paved in concrete. Generally, the design life is 30 years and 10 years for concrete and asphalt pavement, respectively. The I-17 concrete pavement between 16th Street and Peoria Avenue is over 50 years old. The pavement for all roadways in the study area will be beyond its design life by 2040.

**Bridges.** Numerous bridges are located in the Spine corridor, making bridges a vital component of the Corridor Master Plan's roadway infrastructure and a significant budget item when considering life cycle costs. A total of 148 bridges and reinforced concrete boxes exist in the corridor. Current conditions for these bridges, as defined by FHWA's *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, identifies 86 bridges in good condition, 60 in fair condition and 2 in poor condition. MAG's RFHP has identified improvement projects to mitigate the 2 bridges in poor condition.

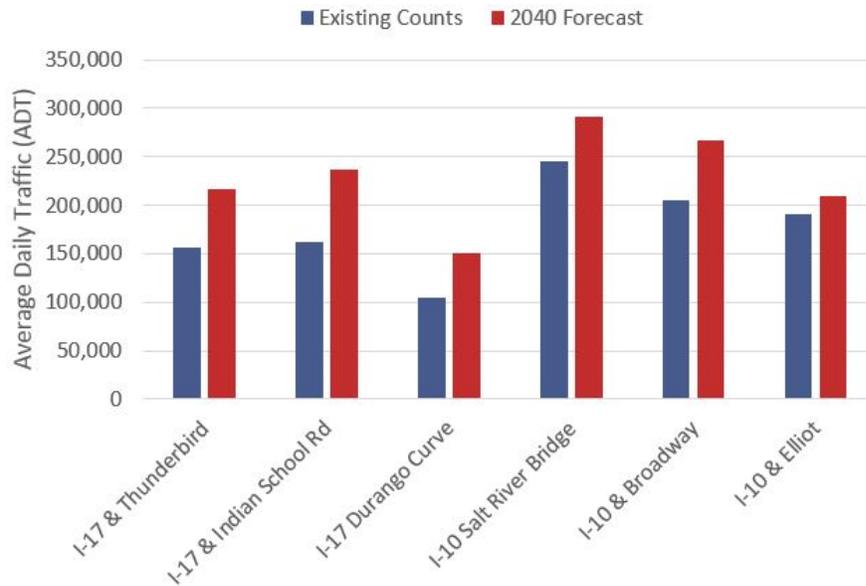
**Pump Stations.** A network of 26 pump stations is maintained by ADOT and the Cities of Phoenix and Tempe to keep the corridor drained during monsoon storms commonly seen in the metropolitan area during the summer. Many ADOT pump facilities date back to the opening of the corridor in the 1950s and 1960s. Recently, the microburst nature of several monsoon storms has caused flooding in the undercrossing portions of the corridor along I-17 between the I-10 Stack and Loop 101 North Stack interchanges. These storms have forced closures of the freeway main line and several arterial undercrossings, resulting in periodic travel delays for freeway users.

**Arterial Streets.** During development of the Corridor Master Plan, 25 arterial streets were identified as corridors of interest for study purposes. Generally, the arterials are within approximately 1 mile on either side of both Interstates. These roadways crossing the corridor were studied, and it was concluded that the arterials, particularly along I-17, are pinch points in the region's east-to-west transportation system. These pinch points cause Interstate and arterial intersections to break down during peak operating periods and affect main line operations on both Interstates. Traffic on the arterial streets is also disrupted, and is a key reason for several of the traffic interchange upgrades in the corridor.

## Existing and Future Travel Demand

The Spine corridor has a minimum of three general purpose travel lanes in each direction. High-occupancy vehicle (HOV) lanes are provided along the entire segment of I-10, and on I-17 between Indian School Road and the Loop 101 North Stack traffic interchange. As depicted in Figure 5, existing daily traffic volumes ranges from 100,000 to 250,000 vehicles per day. By 2040, the horizon year for the Corridor Master Plan, traffic volumes will grow to 150,000 to 300,000 vehicles per day.

**Figure 5.** Travel demand forecast for spot locations in the corridor



Source: MAG travel demand modeling data. Note: This ADT increase takes into account the future opening of the Loop 202 (South Mountain Freeway).

Increased travel in the corridor will result from anticipated growth in population and employment between now and 2040. Table 1 summarizes this growth for the MAG region.

**Table 1.** Population and socioeconomic forecasts for the metropolitan Phoenix area

Socioeconomic indicator	2014	2040	Percentage change
Employment (excluding work-at-home and construction)	1,594,752	2,665,466	67
Population	4,277,650	6,625,516	55
Dwelling units	1,708,755	2,421,543	42
Occupied dwelling units (resident households)	1,470,829	2,265,740	54

Source: MAG data

Segments of the Spine corridor are presently congested during the morning and evening peak periods. Figure 6 shows estimated travel times for the uncongested, current and forecast 2040 no-build scenarios. In most cases, travel times along the corridor are often double or triple the travel time as compared with making the trip without congestion.

As travel times increase, the duration of congestion along I-10 and I-17 increases as well. The Spine corridor has a finite capacity. As travel demand on the corridor increases, the phenomenon known as “peak spreading” appears, where congestion cannot be contained to the traditional peak periods of the morning and evening commute. Given this demand, congestion will spread to other times of the day, and in some portions of the corridor will extend to more than 12 hours. Figure 7 illustrates this expectation.

### Public Transportation

Transit service in the corridor includes commuter buses, vanpools, light rail transit, demand response service and the Phoenix Sky Harbor Sky Train. Valley Metro and the Cities of Chandler, Phoenix and Tempe currently provide public transportation services in the corridor. In addition to these agencies, planning for transit investments, including support infrastructure, is coordinated with MAG and ADOT. Current public transportation ridership represents less than 5 percent of the trips in the corridor. Table 2 summarizes current average weekday transit mode share.

**Table 2.** Transit mode shares at locations in the corridor

Corridor location	Commuter bus daily ridership	Commuter bus one-way ridership	Morning peak total travelers <sup>a</sup>	Evening peak total travelers <sup>b</sup>	Morning peak transit mode share (%)	Evening peak transit mode share (%)
I-10 at Broadway Curve and State Route 143	2,204	1,102	22,448	45,413	4.9	2.4
I-10, Baseline Road to Elliot Road	502	251	17,269	33,637	1.5	0.7
I-17, Indian School Road to Camelback Road	1,693	847	25,764	37,377	3.3	2.3
I-17, Grant Street to Adams Street	1,693	847	22,143	24,896	3.8	3.4

Sources: MAG 2013 annual average daily traffic counts, Valley Metro 2015 *Valley Metro Regional Transit Performance Report*

<sup>a</sup> The morning peak period is from 6 a.m. to 9 a.m.

<sup>b</sup> The evening peak period is from 2 p.m. to 6 p.m.

**Figure 6.** Spine study area travel time comparison for 2014 and 2040 conditions

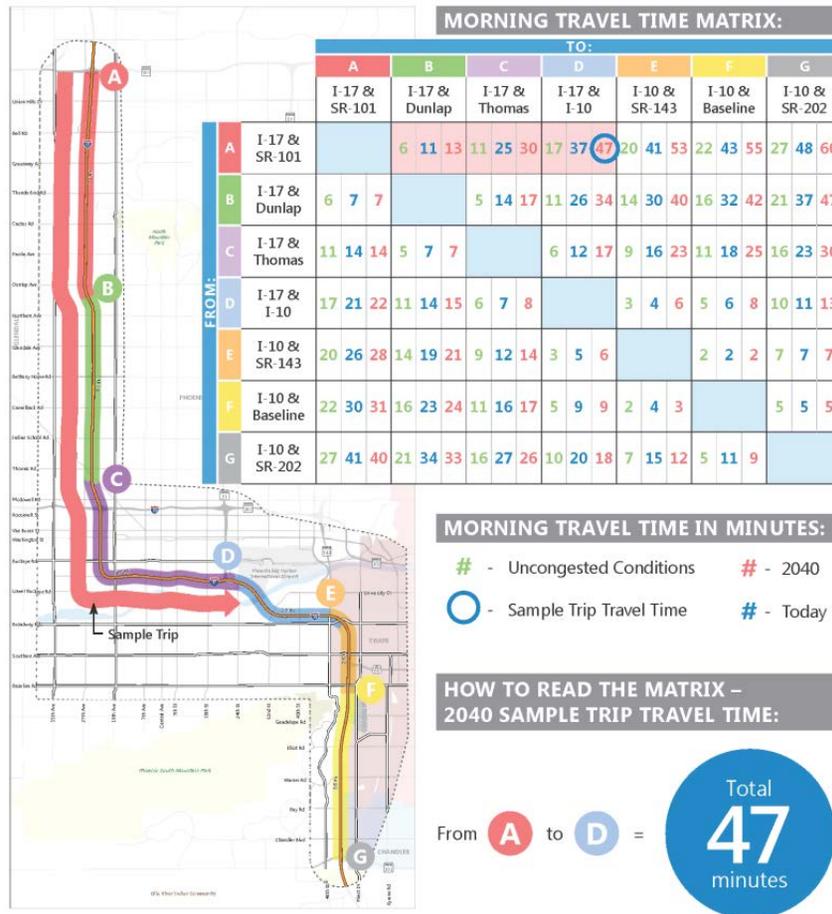
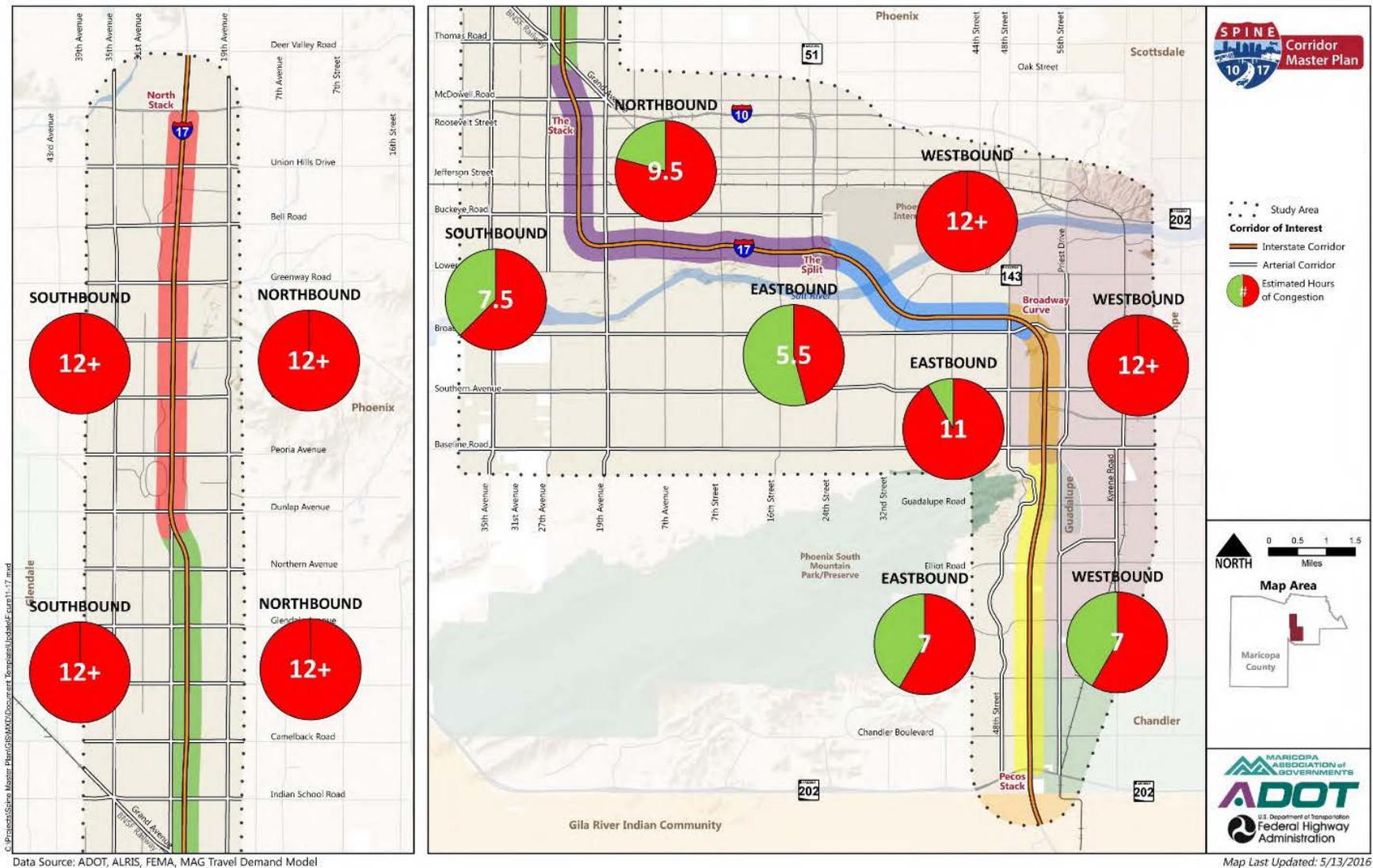


Figure 7. Estimated duration of congestion for the 2040 no-build condition



## ***Bicycle and Pedestrian Facilities***

The study area has 290 miles of bicycle facilities, which generally consist of bicycle lanes, bicycle routes and multiuse paths. According to American Community Survey 5-year estimates (2009 to 2013), the percentage of commuters walking and bicycling to work in Maricopa County is 1.6 percent and 0.8 percent, respectively. Additionally, the Valley Metro *On-Board Survey Report* indicates that 4.6 percent of people using the public transportation system accessed it by bicycling, while 87.2 percent accessed it by walking. An analysis of the census block groups in the study area revealed that commuters in these locations walk and bicycle to work at greater rates than the Maricopa County average. Figure 8 illustrates the locations of pedestrian paths, bikeways and multiuse paths.

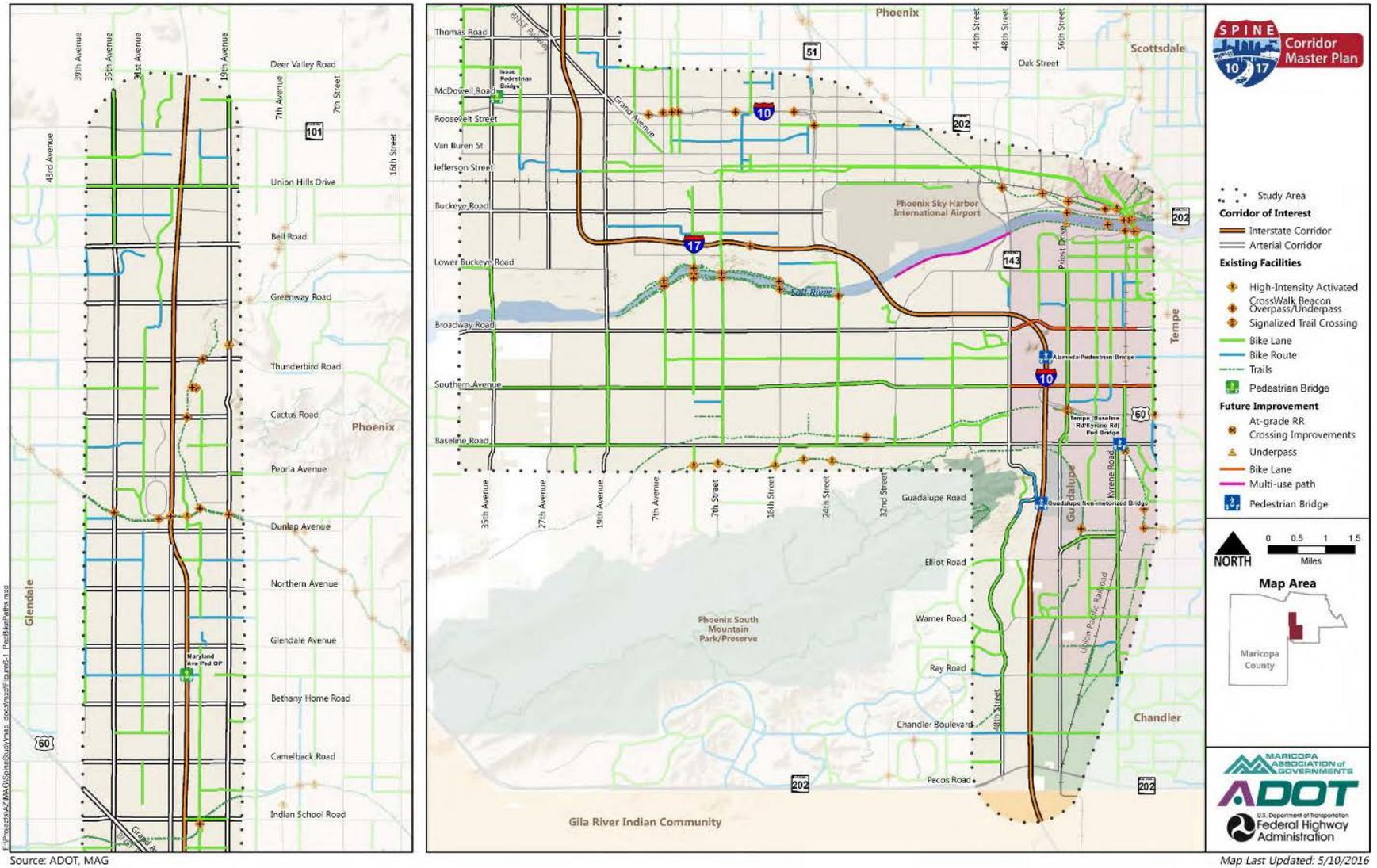
## ***Safety***

Twenty-six percent of the region's crashes happened in the study area, as well as 22 percent of the region's fatalities. Just over 91,000 crashes occurred in the study area between 2009 and 2013, with over 350 fatalities. Historically, on average, one person dies every 5 days in the Corridor Master Plan study area because of a traffic crash. Of note, I-17 from the I-10 Stack to the Loop 101 North Stack has been identified as a safety hotspot for the Interstate corridor—experiencing high to moderate ratings in most crash categories. This segment represents some of the earliest freeway construction in Arizona and does not meet current design standards that could minimize the potential for crashes.

During development of this Corridor Master Plan, the network was analyzed for crash potential specifically related to bicycle, pedestrian and public transportation. Because bicycles and pedestrians are prohibited from using the Interstates, most incidents in the study area involving these modes occurred on the arterial streets crossing over or under I-17 between I-10 and Loop 101. Most incidents involving public transportation were identified along Thomas Road, the region's highest transit demand corridor.

At the time of the study, wrong-way driver crashes were not specifically isolated during the examination of available crash data. However, because public awareness has increased regarding this issue, the final Corridor Master Plan includes technology recommendations to help minimize the potential for crashes, including wrong-way driver detection. As of the writing of this document, ADOT is installing a pilot program for advanced wrong-way driver detection along the entering and exiting ramps to the service traffic interchanges along I-17. This technology will aid in early recognition of wrong-way drivers to inform law enforcement and corridor users. These technologies are consistent with Corridor Master Plan recommendations.

Figure 8. Pedestrian paths, bikeways and multiuse paths



Source: MAG, Cities of Chandler, Phoenix and Tempe data

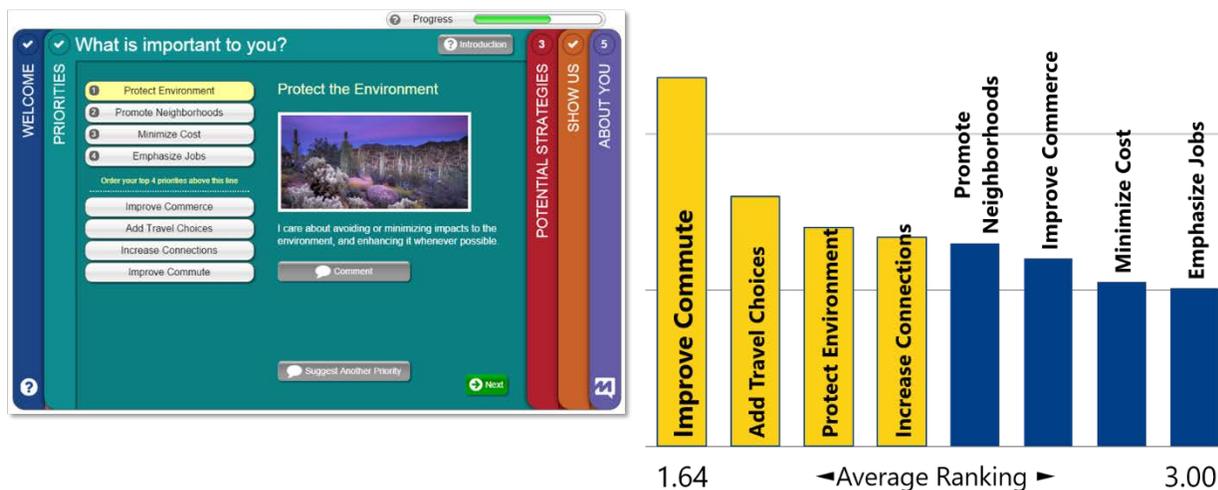
## Public Comment

In February and March 2015, the study’s first round of public outreach events was conducted to receive comments and suggestions for improving travel in the Spine corridor. Three public information meetings were conducted at locations along I-10 and I-17 with a total of 68 attendees. In addition, an online survey tool was offered, using the MetroQuest platform. A 45-day survey period was provided for online public feedback, resulting in 1,742 completed surveys. It should be noted that these surveys were filtered for responses by metropolitan Phoenix area residents only. The following discussion summarizes the responses received during the comment period.

More than 60 percent of the respondents were classified as a commuter along I-10 and/or I-17, with 81 percent using the corridor at least once a week. Over 80 percent of the responding users drive their personal vehicle, with a little under 6 percent using public transportation. These statistics are consistent with the empirical user and count data collected for the Corridor Master Plan.

Respondents indicated strong support, 93 percent, for building something to meet the corridor’s future travel demand. When asked what that infrastructure should do, the respondents were asked to weigh eight different responses. Most responded that it should improve the commute, followed by adding travel choices, as shown in Figure 9.

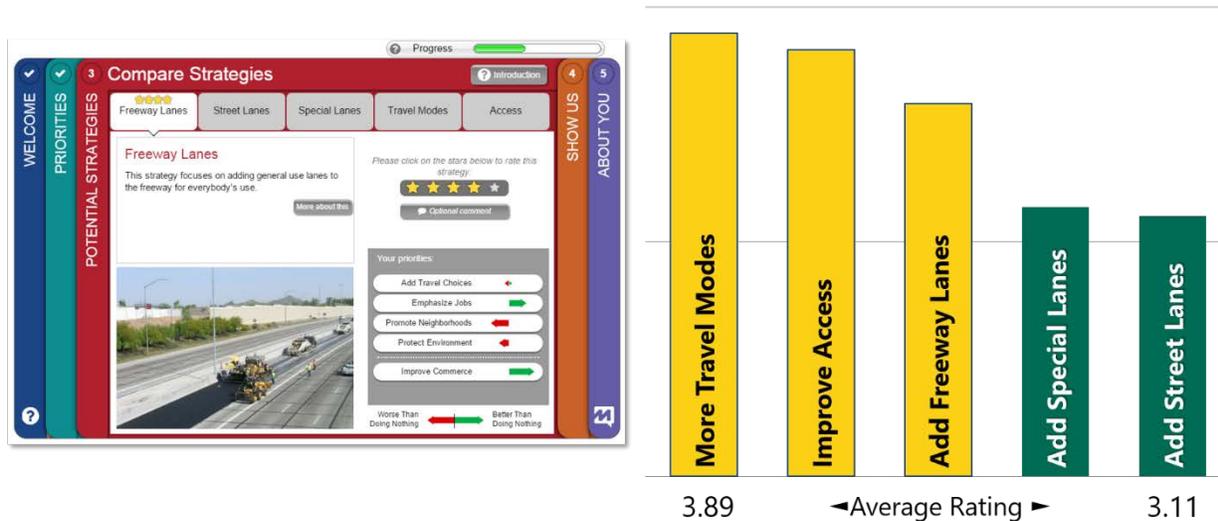
**Figure 9.** Ranking of priorities from 2015 public meetings



Source: Study data

When asked what these improvements should look like, respondents were asked to rank different improvement options. As shown in Figure 10, the highest-ranked strategy was to add travel modes, followed by improving access to the corridor.

**Figure 10.** Priority for strategies in the corridor from 2015 public meetings



Source: Study data

Respondents were also asked to use electronic “push pins” on the study area map to note their perceptions for locations of traffic congestion, safety issues, public transportation needs, bicycle/pedestrian opportunities and areas for improving shared ride access. The results are shown in “heat maps” in the study’s *Needs Assessment Report*, and closely resemble empirical data collected for the study.

## Need and Purpose for the Proposed Action

I-10 and I-17 are major transportation facilities through Arizona, Maricopa County and within the metropolitan Phoenix area. Much of the two Interstates within this corridor were completed in the 1970s and 1980s with no major upgrades to either roadway, even as metropolitan Phoenix has grown rapidly since the first segment of I-17 was opened as State Route 69 in 1957. Both Interstates are critical to the effective and reliable movement of people, goods and services throughout the region. Given that the corridor is so heavily traveled, it acts as the backbone, or “spine,” of the regional transportation system. Inefficient performance of these two Interstates would greatly and adversely affect the operation of the region’s entire transportation network.

This study’s need and purpose statement was thoughtfully developed and chronicled in the *Needs Assessment Report*, in Chapter 11. Highlights of the information used to develop this statement were presented in the *Needs Assessment Report*. Figure 11 summarizes the need and purpose statement, which was presented at the first public meeting for review and comment.

**Figure 11.** Project need and purpose as presented to the public in 2015

## Purpose



The purpose of the Spine Study is to identify and budget for a project, or series of projects, that would address the transportation needs of the corridor.

## Need



I-10 and I-17 are at capacity during rush hour and are unable to handle future traffic levels.



I-10 and I-17 experience lengthy periods of congestion. The lengths of congestion, both in time and distance, are projected to worsen over time.



Travel times on the two freeways will worsen as the average travel speeds decrease.



Projected growth will continue to put stress on the two freeways.



Degradation of the two freeways will adversely affect the operations of HOV and transit modes like freeway bus rapid transit, express buses, and local bus routes.



Aging infrastructure of the two freeways could limit economic growth opportunities in the region.



Timely and efficient delivery of freight is vital to the region's economic health.



Poor operations on I-10 and I-17 adversely affect local streets, especially at intersections.

## Issues for Developing the Corridor Master Plan Alternatives

From the *Needs Assessment Report* and the need and purpose statement, alternatives development began by addressing the following six key issues in the Spine corridor as significant needs:

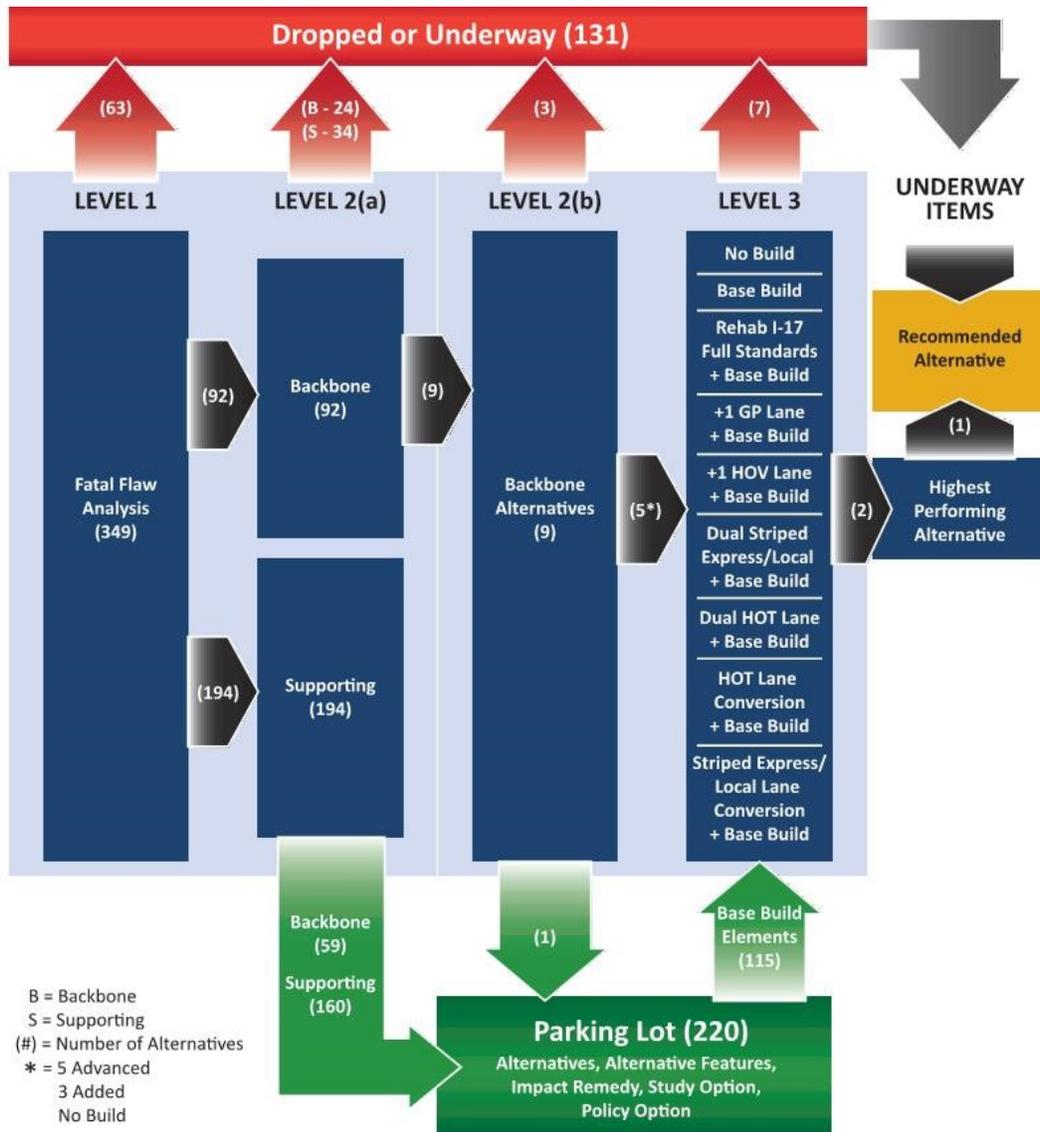
1. **Aging Infrastructure:** Although the majority of the corridor's infrastructure is presently in relatively good condition, structures, pavement and drainage were identified as top concerns. Because portions of the corridor first opened to traffic in the 1950s, by the Corridor Master Plan's 2040 horizon, most of the I-10 and I-17 infrastructure will be out of date and in need of modernization to meet twenty-first century design standards for safety and longevity.
2. **Four Light Rail Crossings of I-17:** As Valley Metro expands the metropolitan light rail system, the four locations for crossing I-17 at Central Avenue and Van Buren Street, potentially along Camelback Road, and along the Mountain View Road alignment near Metrocenter demonstrate the need for construction coordination. Alternatives developed in these areas considered strategies to minimize delay for both the freeway and transit construction in close coordination with ADOT and Valley Metro.
3. **Planning for Bicycles and Pedestrians:** Phoenix, Chandler and Tempe have complete streets initiatives to emphasize that local streets should be available for all transportation modes. This matter was further endorsed by numerous comments made by members of the public noting their concern that both I-10 and I-17 represent a barrier to bicycle and pedestrian movements.
4. **Technology:** Self-driving (autonomous) cars have begun operating in the Valley. As the Corridor Master Plan alternatives were developed, technology's expanding role was considered for increasing peak period capacity and potentially minimizing the need for considerable expansion.
5. **Constrained Corridor:** Development exists along many of parts of I-10 and especially I-17 and is simply too close to the freeway main line—generally constraining widening potential. A significant percentage of development along the corridor is commercial and represents a considerable portion of the metropolitan area's employment and economic activity.
6. **Increasing Travel Demand:** Between now and 2040, travel demand will continue to increase in the corridor, not only for cars and public transportation, but also for the corridor's freight (goods and services movement) demands. Additional capacity is needed along both Interstates.

## Alternatives Development

After the Corridor Master Plan's *Needs Assessment Report* was developed, a 2-day workshop was held in June 2015 to develop concepts that addressed issues identified in the corridor. The workshop was attended by personnel from MAG; ADOT; FHWA; the Cities of Chandler, Phoenix and Tempe; Valley Metro; Arizona Department of Public Safety and transportation and mobility experts from the consultant study team.

The workshop generated 349 unique ideas and strategies that were carried forward into the alternatives screening process. Figure 12 illustrates how these ideas were evaluated and formed into the study's recommendations.

**Figure 12.** Alternatives development process

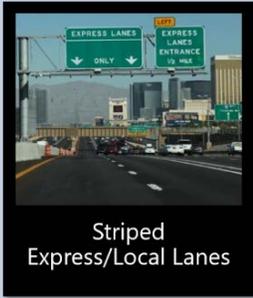


Source: Study data

After an initial fatal-flaw screening (Level 1), the remaining strategies were grouped as either “backbone” or “supporting” to distinguish between ideas that applied corridor-wide or that targeted specific locations. In this second level of screening, 194 ideas were classified as supporting strategies to be considered in developing the corridor recommendations. The remaining 92 backbone ideas received two screening passes to refine and identify the best backbone alternatives for the study. The Level 2(a) screening focused on the ability to implement a strategy. The Level 2(b) screening focused on practicability, agency support, alternative adaptability and programming flexibility.

Only five alternatives were advanced for further study into the Level 3 screening as backbone alternatives that addressed the study objectives for the entire 31-mile corridor. Three additional alternatives were added to the original five backbone alternatives to adequately address the range of potential alternatives for the corridor. Finally, the Level 3 screening included a no build and base build scenario for comparison purposes, resulting in a total of nine alternatives:

Alternative	Description	Illustration
<p>Alternative 1A No-Build</p>	<p>The base scenario from which the performance of the alternative scenarios was measured. In this scenario, no improvements were assumed for I-10 or I-17 beyond those presently programmed between State Route 143 and the Loop 202 Pecos Stack.</p>	 <p>"No-Build"</p>
<p>Alternative 1B Base Build</p>	<p>A scenario incorporating various component improvements for construction regardless of overall improvement to the corridor. Examples of these components include geometry modifications to the most-congested service traffic interchanges; numerous bicycle/pedestrian improvements identified in Phoenix, Chandler and Tempe plans; accommodation for four light rail transit crossings; and technology enhancements for freeways, arterials, driver/traveler/jurisdictional information and connected/autonomous vehicle facilitation.</p>	 <p>"Base Build"</p>
<p>Alternative 2 I-17 Reconstruction</p>	<p>Because this segment of the Spine corridor represents the earliest freeway construction in Arizona, this scenario proposed reconstructing pavement, bridges, interchanges and drainage structures to current design standards specified by ADOT and FHWA. No added capacity is assumed for this alternative. Improvements noted for Alternative 1B are included in this scenario.</p>	 <p>I-17 Reconstruction</p>
<p>Alternative 3A Add General Purpose Lanes</p>	<p>In addition to the improvements noted for Alternative 1B, one additional general purpose lane would be constructed in each direction for the entire 31-mile corridor.</p>	 <p>Add General Purpose Lanes</p>
<p>Alternative 3B Add HOV Lanes</p>	<p>Because many similarities to Alternative 3A exist, where one additional lane would be constructed in each direction for the length of the corridor, this alternative proposes a managed lane approach such that the additional lane is used as an HOV lane. This would result in two HOV lanes in each direction for the majority of the corridor. The improvements noted for Alternative 1B are also included in this scenario.</p>	 <p>Add HOV Lanes</p>

Alternative	Description	Illustration
<p>Alternative 3C Dual Express/ Local Lanes</p>	<p>Like Alternatives 3A and 3B, one additional lane is proposed in each direction through the corridor. However, the inside HOV (lane 1) and left general purpose (lane 2) lanes would be restriped so that movement between the lanes is restricted to designated ingress and egress points. This concept has been applied along Interstate 15 in Las Vegas. This alternative would allow for greater travel time reliability for longer-haul trips through the corridor. The improvements noted for Alternative 1B are also included in this scenario.</p>	 <p>Striped Express/Local Lanes</p>
<p>Alternative 3D Dual Congestion Priced Managed Lanes</p>	<p>Identical in overall width to Alternative 3B, this concept builds upon the discovery process identified by the MAG Managed Lanes Network Development Strategy, in which the existing HOV lane and the added lane would become congestion priced lanes. This scenario considers the potential for pricing in the corridor as a means for achieving travel time reliability. The improvements noted for Alternative 1B are also included in this scenario.</p>	 <p>Priced Managed Lanes</p>
<p>Alternative 4 Express/Local Lanes</p>	<p>In this alternative, no capacity is added. However, the inside HOV (lane 1) and left general purpose (lane 2) lanes would be restriped so that movement between the lanes is restricted to designated ingress and egress points. This concept has been applied along Interstate 15 in Las Vegas. This alternative allows for greater travel time reliability for longer-haul trips throughout the corridor. The improvements noted for Alternative 1B are also included in this scenario.</p>	 <p>Striped Express/Local Lanes</p>
<p>Alternative 5 Congestion Priced Managed Lanes</p>	<p>Building on the discovery process identified by the MAG Managed Lanes Network Development Strategy, this scenario considers the potential for pricing in the corridor as a means for travel time reliability. The improvements noted for Alternative 1B are also included in this scenario.</p>	 <p>Priced Managed Lanes</p>

## Highest Performing Alternatives

The Level 3 screening included both quantitative and qualitative analyses to screen the nine alternatives (eight build and no build). Based on the screening process, the study team identified the two highest performing alternatives (HPAs). The two HPAs were new alternatives that used the most desirable components of the original nine alternatives described above. In addition, various supporting alternatives, identified in Level 2(a), were incorporated into these HPAs to improve corridor performance at specific locations.

The results of the Level 3 screening demonstrated that the best build alternative was the expansion of managed lane capacity that included an HOV lane or HOT lane system. The study team determined the additional lanes would be the best means of providing optimal system continuity throughout the Spine corridor. It was recommended that a managed lane system be advanced from Level 3 and that two configurations of the managed lane system, HPA1 and HPA2, be evaluated in the Level 4 screening process. The Level 4 screening process evaluated HPA1 and HPA2 to determine which configuration would best meet the long-term needs of the Spine corridor.

Key features of HPA1 included:

- Add one general purpose lane from Ray Road to Baseline Road on I-10.
- Add a second managed lane between US-60 and the Split on I-10.
- Reconstruct and modernize I-17; add a single managed lane and auxiliary lanes between the Split and the Stack on I-17.
- Add a second managed lane between Grand Avenue and the North Stack; reconstruct portions of I-17 as needed.
- Add direct HOV (DHOV) connections at a future Galveston DHOV traffic interchange, the State Route 143 (SR-143) traffic interchange, Sky Harbor Circle North on I-10, the Split, Grand Avenue and the North Stack.
- Add collector-distributor roads between the Elliot Road traffic interchange and the SR-143 traffic interchange along I-10.
- Reconfigure and modernize interchanges at I-10/Baseline Road, I-10/Broadway Road/SR-143, I-17/Jefferson/Adams, I-17/Indian School Road, I-17/Camelback Road, I-17/Glendale Avenue, I-17/Northern Avenue, I-17/Thunderbird Road and I-17/Bell Road.
- Accommodate light rail crossings of I-17 at Central Avenue, Van Buren Street, Camelback Road and Mountain View Road.
- Implement bicycle and pedestrian improvements at 20 locations along the corridor; include nine new dedicated bicycle and pedestrian structures over the Interstates.

HPA2 is identical to HPA1, except for the following differences:

- On I-10 between US-60 and the Split, one additional general purpose lane would be added in addition to the additional managed lane noted above. The resulting freeway section would be two managed lanes, six general purpose lanes and one auxiliary lane in each direction.

- The DHOV ramps at I-10/Sky Harbor Circle North are not included, and are instead replaced with DHOV ramps at I-17/7th Street.
- The ramps on I-17 between 16th and 7th Streets and between 7th Avenue and 19th Avenues are reversed to improve ramp grades and to move weaving from the main line to the frontage roads.

At this point in the screening process, the Management Partners agreed that the study team had identified two feasible build alternatives that represented an appropriate response to the numerous needs of the corridor. The Level 4 screening consisted of the same criteria as Level 3: infrastructure, safety, operations and cost. However, environmental impacts were also analyzed in the Level 4 screening. This environmental assessment focused on quantitative impacts to the priority resources identified in the *Needs Assessment Report* and on impacts to both commercial and residential properties. This evaluation concluded that the environmental impacts between the two feasible HPAs were similar, were relatively minor given the context of the corridor need, and did not screen out either alternative. As a result, no critical environmental concerns are anticipated regardless of which alternative may be selected.

## Corridor Master Plan Recommended Alternative

The results of the Level 4 screening process led the Management Partners and Alternatives Evaluation Partners to select a variation of HPA2 as the draft recommended alternative. The additional general purpose lane between US-60 and the I-10/I-17 Split and the reversed ramp configuration between the I-10/I-17 Split and the Durango Curve provided additional benefit and value, such that the Alternatives Evaluation Partners decided it was worth the additional cost. Traffic models showed that the DHOV at Sky Harbor Circle North did not attract the anticipated demand, so it was removed from the recommended alternative and was replaced with the DHOV at 7th Street on I-17 to and from the east, with median provisions to expand its DHOV access to and from the west in the future.

The Charter Partners approved the draft recommended alternative for agency and public review in December 2016. After the Spine study team conducted the public involvement and outreach program for review, comment and feedback on the draft recommended alternative during January and February 2017, it finalized the recommended alternative in March and April 2017 with three notable revisions to the draft recommended alternative to address the comments received. These revisions added the I-17/Glendale Avenue three-level diamond traffic interchange and a bicycle/pedestrian bridge over I-10 at the Knox Road alignment to the recommendation and eliminated the Osborn Road bicycle and pedestrian bridge over I-17. The final recommendation was adopted into the draft 2040 RTP, contingent on a new finding of air quality conformity, on May 24, 2017, by the MAG Regional Council.

Generally, the recommended alternative is defined as an expanded managed lane system, combined with numerous localized improvements along the Spine corridor. Generally, this means that the current managed lanes (HOV lanes) would be expanded with a second HOV lane in segments where HOV lanes currently exist, new HOV lanes would be added where none exist today, and DHOV ramps would be added to connect and terminate this expanded system. Operational flexibility regarding how these managed lanes could be used to address the uncertainty of future needs is a key advantage of this recommendation. In addition to the managed lane elements, some additional general purpose widening is proposed, most notably on I-10 between the I-17 Split and US-60 and between US-60 and Ray Road. Localized improvements would target deficient interchanges, weaving sections, bicycle and pedestrian crossings, traffic interchange upgrades and arterial capacity gaps.

Appendix B contains exhibits depicting plan sheets and lane line diagrams for one possible design interpretation of the intent of the recommended alternative.

Approximately 50 specific improvements have been identified for both Interstates and are presented on the following pages of this summary. All features are numbered and color-coded to represent traffic interchange modifications, transit improvements, bicycle and pedestrian improvements, and lane and ramp improvements. The features are presented by Interstate route, followed by tables describing the proposal for each improvement of the Corridor Master Plan recommendation.

### ***Interstate 17 Recommendations***

I-17, Arizona's first freeway, opened in 1957, prior to the establishment of the Interstate highway system. Given its age and constrained right of way, significant expansion of the freeway would be difficult. With this history in mind, the overall recommendation for I-17 is to modernize the freeway main line to improve safety and to expand I-17 with managed capacity to enhance travel time reliability for public transportation and shared-ride trips. Figure 13 summarizes the I-17 improvements, with a detailed explanation of each improvement listed in subsequent pages.

### ***Interstate 10 Recommendations***

This I-10 segment has the highest traffic volumes in the MAG region. Most delays are attributed to weaving movements between US-60 and SR-143 and between SR-143 and I-17, prompting heavy congestion to the south during morning commutes, and to the west from I-17 in the evening. The overall recommendation for I-10 is to add lanes and improve the traffic interchanges near the Broadway Curve to eliminate weaving movements. Figure 14 summarizes the improvements for I-10, with a detailed explanation of each improvement listed in subsequent pages.

Figure 13. I-17 recommendations

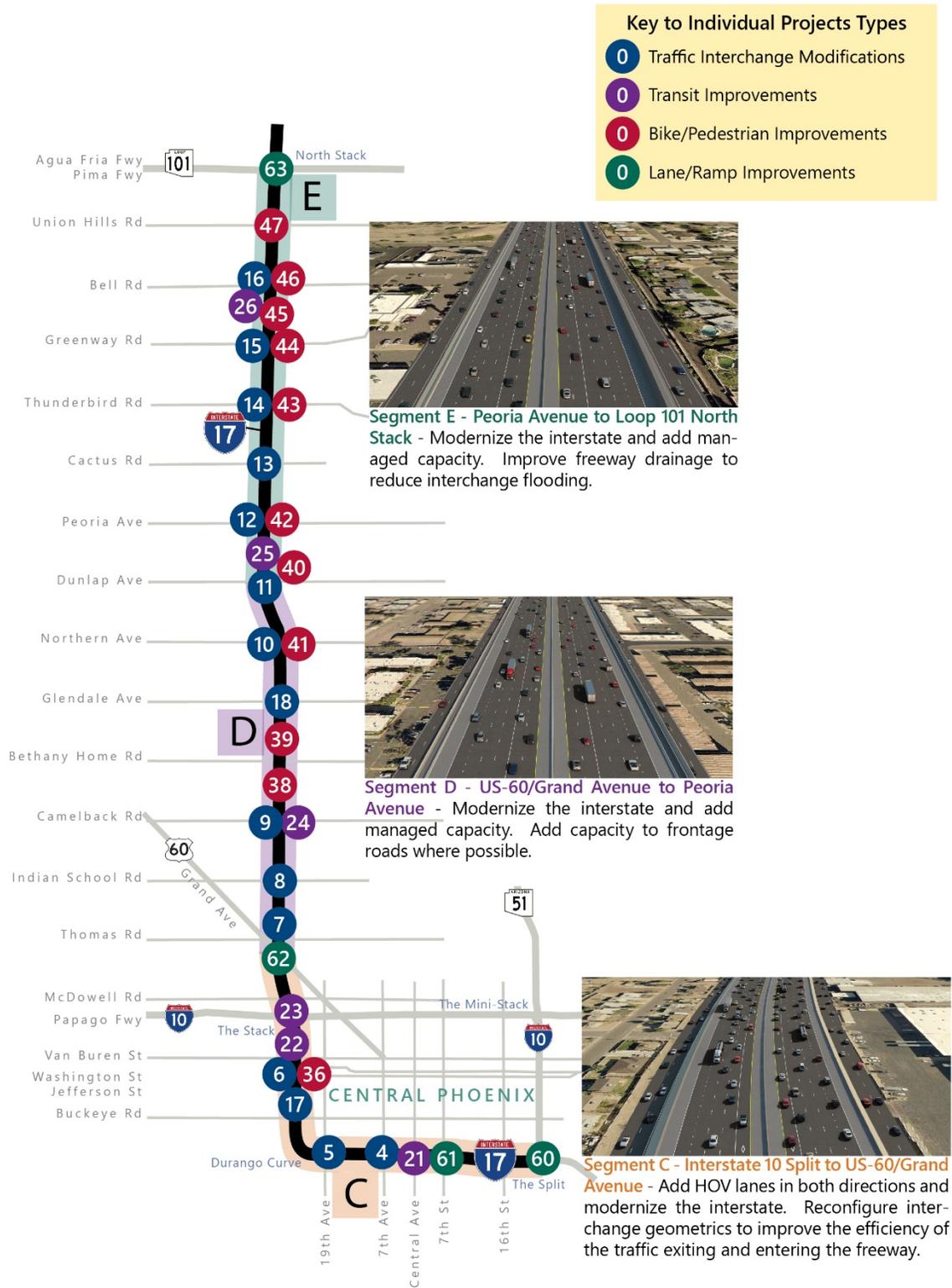
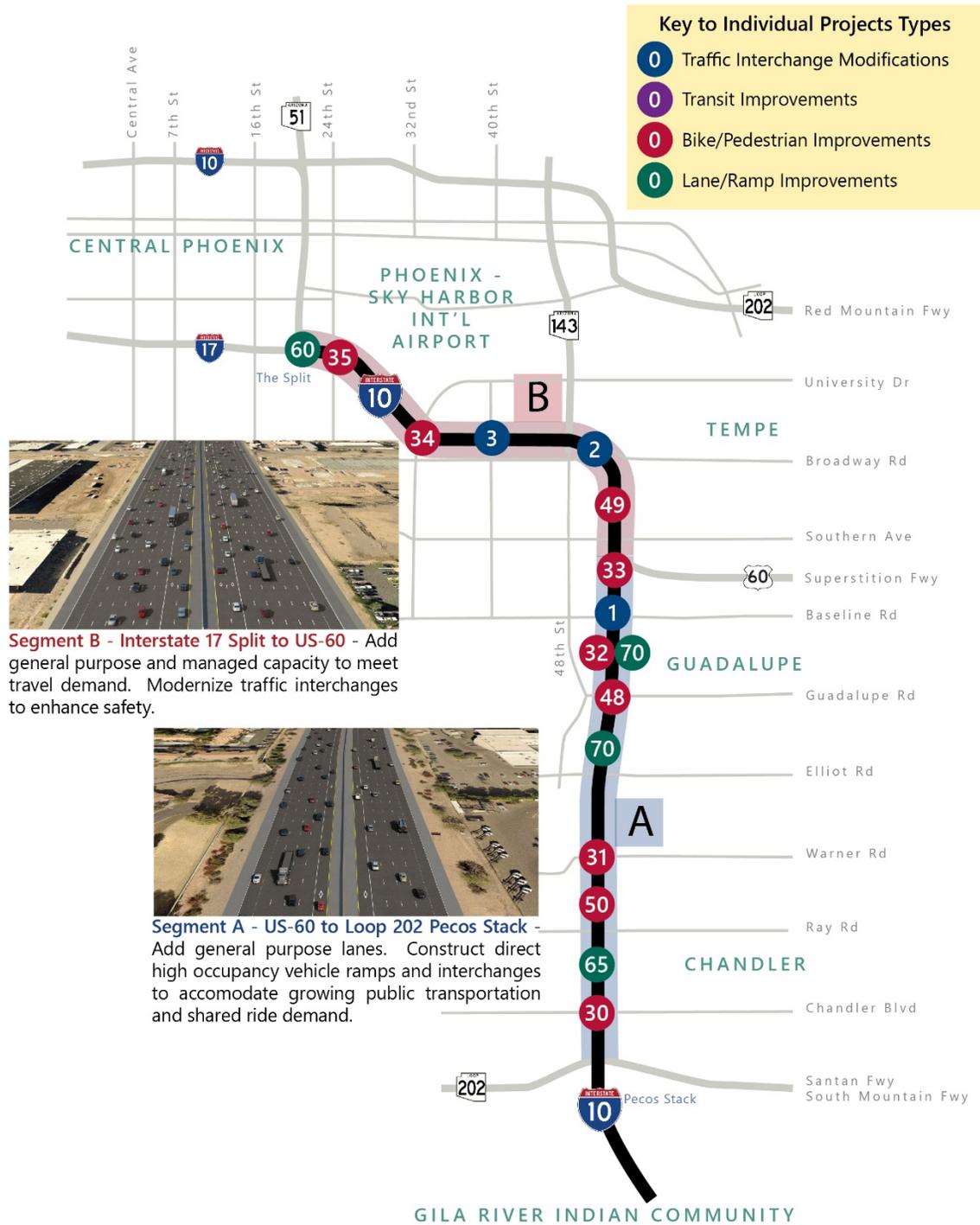


Figure 14. I-10 recommendations



## Freeway Main Line Improvements

The following describes the major freeway segment improvements from north to south. These overall improvements represent the modernization and main line expansion recommended for I-10 and I-17.

### Freeway Main Line Improvements

Segment		Recommendation
I-10	A	US-60/Superstition Freeway to Loop 202/Santan-South Mountain Freeways (at the Pecos Stack interchange) – Add one general purpose lane in each direction and enhance one service traffic interchange (project 1). Develop collector-distributor lanes between Elliot and Baseline Roads (project 70). Construct a new DHOV interchange at Galveston Road (project 65).
I-10	B	I-17/Black Canyon Freeway (at the Split interchange) to US-60/Superstition Freeway – Add one HOV lane and one or two (depending on location) general purpose lanes in each direction. Incorporate current design standards that will modernize existing service traffic interchanges (projects 1 and 3) to improve safety and efficiency. Reconstruct SR-143/Broadway Road/48th Street system traffic interchange to enhance capacity (project 2).
I-17	C	I-10/Papago Freeway (at the Stack interchange) to US-60/Grand Avenue – Add one HOV lane in each direction. Incorporate current design standards that will modernize the Interstate main line and existing traffic interchanges (projects 4, 5, 6, 17) to improve safety and efficiency.
I-17	D	US-60/Grand Avenue to Peoria Avenue – Reconstruct I-17 pavement and add a second managed lane in each direction. Incorporate current design standards that will modernize the Interstate main line and existing traffic interchanges (projects 7, 8, 9, 10, 11) to improve safety and efficiency.
I-17	E	Peoria Avenue to Loop 101/Agua Fria-Pima Freeways (at the North Stack interchange) – Add a second managed lane in each direction. Incorporate current design standards that will modernize the Interstate main line and existing traffic interchanges (projects 12, 13, 14, 15, 16, 18) to improve safety and efficiency.

## Traffic Interchange Modifications

An important finding from this study's *Needs Assessment Report* was an understanding of the access that is presently provided to and from I-10 and I-17. Part of this understanding included noting that more traffic was crossing the I-17 corridor north of the Stack interchange than was actually using the I-17 corridor on a daily basis. The following 18 improvements, identified in blue on Figures 13 and 14, were identified to meet this and other needs to improve access and reliability for traffic during peak demand periods.

### Traffic Interchange Modifications

No.	Traffic Interchange Modifications
1	I-10/Baseline Road Interchange Improvements – Reconfigure traffic interchange to improve safety and capacity. An alternative interchange configuration that will be considered is the diverging diamond interchange.
2	I-10/SR-143/Broadway Road Interchange Improvements – Focus a high level of investment at this location to improve interchange safety and efficiency between I-10 and SR-143 by reconfiguring interchange(s), reconstructing bridges and adding a dedicated HOV ramp from SR-143 to I-10. The Broadway Road interchange will also be upgraded as part of the SR-143 interchange reconstruction. Collector-Distributor roadways will also be built between US-60 and SR-143.
3	I-10/40th Street Interchange Improvements – Upgrade traffic interchange to improve safety and efficiency and to accommodate the I-10 main line widening through the interchange.
4	I-17/7th Avenue Interchange Improvements – Upgrade traffic interchange with additional arterial street lanes on 7th Avenue and other operational upgrades.
5	I-17/19th Avenue Interchange Improvements – Upgrade traffic interchange with additional arterial street lanes on 19th Avenue and other operational upgrades.
6	I-17/Jefferson/Adams Interchange Improvements – Reconfigure traffic interchanges to improve safety and efficiency as well as to incorporate bicycle and pedestrian improvements.
7	I-17/Thomas Road Interchange Improvements – Upgrade traffic interchange and complete other operational improvements to increase safety and capacity.
8	I-17/Indian School Road Interchange Improvements – Reconfigure into a high-capacity traffic interchange to better accommodate large east-to-west arterial movements on Indian School Road and to improve bicycle and pedestrian safety. A three-level platform diamond interchange is one possible solution for this location.
9	I-17/Camelback Road Interchange Improvements – Reconfigure into a high-capacity traffic interchange to better accommodate large east-to-west arterial movements and light rail transit on Camelback Road and to improve bicycle and pedestrian safety. A three-level platform diamond interchange is one possible solution for this location.
10	I-17/Northern Avenue Interchange Improvements – Reconfigure into a high-capacity traffic interchange to better accommodate large east-to-west arterial movements on Northern Avenue and to improve bicycle and pedestrian safety. A three-level platform diamond interchange is one possible solution for this location.
11	I-17/Dunlap Road Interchange Improvements – Upgrade traffic interchange and accommodate other operational improvements to increase safety and capacity.
12	I-17/Peoria Avenue Interchange Improvements – Upgrade traffic interchange and complete other operational improvements to increase safety and capacity and to incorporate bicycle and pedestrian improvements. This improvement would include an upgrade to the drainage system to reduce the likelihood of flooding on Peoria Avenue under I-17.

## Traffic Interchange Modifications

No.	Traffic Interchange Modifications
13	I-17/Cactus Road Interchange Improvements – Upgrade traffic interchange and accommodate other operational improvements to increase safety and capacity. This improvement would include an upgrade to the drainage system to reduce the likelihood of flooding on Cactus Road under I-17.
14	I-17/Thunderbird Road Interchange Improvements – Reconfigure into a high-capacity traffic interchange to better accommodate large east-to-west arterial movements on Thunderbird Road and other operational improvements to increase safety, capacity and incorporate bicycle and pedestrian improvements. A three-level platform diamond interchange is one possible solution for this location. This improvement would include an upgrade to the drainage system to reduce the likelihood of flooding on Thunderbird Road under I-17.
15	I-17/Greenway Road Interchange Improvements – Upgrade traffic interchange as well as complete other operational improvements to increase safety and capacity. This improvement would include an upgrade to the drainage system to reduce the likelihood of flooding on Greenway Road under I-17.
16	I-17/Bell Road Interchange Improvements – Reconfigure into a high-capacity traffic interchange to better accommodate large east-to-west arterial movements on Bell Road. A three-level platform diamond interchange is one possible solution for this location. This improvement would also expand the highly utilized existing park-and-ride lot in the southwestern corner of the interchange.
17	I-17/Grant Street Interchange Elimination – Eliminate this low-volume traffic interchange to improve corridor safety and to accommodate the interchange improvements at Jefferson and Adams.
18	I-17/Glendale Ave Interchange Improvements – Reconfigure into a high-capacity interchange to better accommodate large east-to-west arterial improvements on Glendale Avenue, and other operational improvements to increase safety and capacity and to incorporate bicycle and pedestrian movements. A three-level platform diamond interchange is one possible solution for this location.

## Transit Improvements

Consistent public feedback noted the need to add travel choices in the Spine corridor. The Corridor Master Plan recommended alternative includes the following six transit improvements, illustrated in purple on Figures 13 and 14, as infrastructure recommendations for enhancing and encouraging future public transportation service opportunities.

### Transit Improvements

No.	Transit Improvements
21	I-17/Central Avenue Light Rail Transit Crossing – Reconstruct I-17 over Central Avenue and accommodate light rail transit on Central Avenue.
22	I-17/Van Buren Street Light Rail Transit Crossing – Reconstruct the Van Buren Street bridge over I-17 and accommodate light rail transit on Van Buren Street over I-17 to accommodate the Jefferson/Adams traffic interchange reconfiguration.
23	I-10/I-17 Direct Access Bus Ramp at the Stack Interchange – Construct ramps from the median of I-10 west of the Stack, routed south along the southbound frontage road along I-17 to Van Buren Street. Ramps would be constructed to accommodate future light rail transit (as part of the planned Capitol/I-10 West Light Rail Extension Phase II) and, when complete, would discontinue bus access on these ramps. Southbound frontage road would be closed to vehicular traffic between McDowell Road and Van Buren Street.
24	I-17/Camelback Road Light Rail Transit Crossing – Accommodate light rail transit crossing of I-17 in conjunction with the I-17 interchange reconstruction.
25	I-17/Mountain View Light Rail Transit Crossing – Accommodate a dedicated light rail transit crossing of I-17 near Metrocenter.
26	Bell Road Park-and-Ride Expansion – Expand the existing over-capacity park-and-ride lot in conjunction with the I-17 and Bell Road traffic interchange reconfiguration.

## Bicycle and Pedestrian Improvements

As with transit improvements, bicycle and pedestrian improvement projects have been recommended to further expand choices in the Spine corridor. The following 20 improvements, depicted in red on Figures 13 and 14, have been identified for expanding active transportation opportunities. All recommendations are consistent with bicycle and pedestrian planning efforts by MAG member agencies Chandler, Phoenix and Tempe. The exception is that Phoenix’s bicycle and pedestrian planning efforts include a proposed bicycle and pedestrian crossing over I-17 at Osborn Road. While initially included in the recommended alternative, it was removed after the adjacent neighborhood expressed considerable opposition. The City of Phoenix will study this location further if it wishes to advance that concept.

### Bicycle and Pedestrian Improvements

No.	Bicycle and Pedestrian Improvements
30	Bicycle/Pedestrian Bridge over I-10 at Chandler Boulevard – Construct bicycle and pedestrian bridge over the freeway. Subsequent design is needed to determine whether the bicycle/pedestrian bridge would cross over the ramps as well.
31	I-10/Warner Road Interchange Upgrades – Upgrade traffic interchange to improve safety and efficiency and to incorporate bicycle and pedestrian improvements as outlined in Tempe’s 2015 <i>Transportation Master Plan</i> .
32	Bicycle/Pedestrian Bridge over I-10 at Highline Canal – Construct bicycle and pedestrian bridge over freeway and ramps to connect Phoenix, Tempe and Guadalupe trails and to offer a safe bicycle alternative to traveling through the Baseline Road interchange.
33	Bicycle/Pedestrian Bridge over I-10, ramps and collector-distributor roadways at Western Canal – Construct bicycle and pedestrian bridge over freeway as outlined in Tempe’s 2015 <i>Transportation Master Plan</i> to connect with Phoenix 2014 <i>Comprehensive Bicycle Master Plan</i> efforts.
34	I-10/32nd Street Interchange Upgrades – Upgrade traffic interchange to improve safety and efficiency and to incorporate bicycle and pedestrian improvements as outlined in Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
35	I-10/24th Street Interchange Upgrades – Upgrade traffic interchange to improve safety and efficiency and to incorporate bicycle and pedestrian improvements as outlined in Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
36	I-17/Jefferson/Adams Interchange Upgrades – Upgrade traffic interchange to improve safety and efficiency and to incorporate bicycle and pedestrian improvements as outlined in Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
38	Bicycle/Pedestrian Bridge over I-17 at Missouri Avenue – Construct bicycle and pedestrian bridge over freeway and frontage roads as outlined in Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
39	Bicycle/Pedestrian Bridge over I-17 at Maryland Avenue – Maintain the existing bicycle/pedestrian bridge over I-17 and frontage roads, or replace it if affected by the proposed freeway improvements.
40	Bicycle/Pedestrian Crossing under I-17 at the Arizona Canal – Maintain the existing bicycle/pedestrian crossing under I-17 and the frontage roads and ramps, or replace it if affected by the proposed freeway improvements.
41	I-17/Northern Avenue Interchange Upgrades – Enhance existing traffic interchange to improve bicycle and pedestrian safety. Integrate into the interchange reconstruction.
42	I-17/Peoria Avenue Interchange Upgrades – Enhance existing traffic interchange to improve bicycle and pedestrian safety. Integrate into the interchange reconstruction.

## Bicycle and Pedestrian Improvements

No.	Bicycle and Pedestrian Improvements
43	I-17/Thunderbird Road Interchange Upgrades – Integrate into the interchange reconstruction (project 14); consists of enhancements for improving bicycle and pedestrian safety and connectivity consistent with Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
44	I-17/Greenway Road Interchange Upgrades – Enhance existing traffic interchange to improve safety and connectivity consistent with Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
45	Bicycle/Pedestrian Bridge over I-17 and the frontage roads at Paradise Lane/Grandview – Construct bicycle and pedestrian bridge over freeway as outlined in Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
46	I-17/Bell Road Interchange Upgrades – Integrate into the interchange reconstruction (project 18); consists of enhancements for improving bicycle and pedestrian safety and connectivity consistent with Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
47	I-17/Union Hills Drive Interchange Upgrades – Enhance existing traffic interchange to improve bicycle and pedestrian safety and connectivity consistent with Phoenix’s 2014 <i>Comprehensive Bicycle Master Plan</i> .
48	Bicycle/Pedestrian Bridge over I-10 at Guadalupe – Construct bicycle and pedestrian bridge over freeway.
49	Bicycle/Pedestrian Bridge over I-10, ramps and collector-distributor roads at Alameda – Construct bicycle and pedestrian bridge over freeway consistent with Tempe’s 2015 <i>Transportation Master Plan</i> .
50	Bicycle/Pedestrian Bridge crossing I-10 at Knox Road – Construct bicycle and pedestrian crossing as recommended by City of Tempe to support the BIKEiT Seat Route identified in the City’s 2015 <i>Transportation Master Plan</i> .

## Specific Lane and Ramp Improvements

Weaving traffic between the HOV and general purpose lanes along the I-10 and I-17 freeway main lines causes delays for both types of traffic and impedes main line flow, especially during peak periods. Similarly, north-to-south travel near Guadalupe is difficult between the many activity centers along I-10 between Baseline and Elliot Roads. The six improvements noted in green on Figures 13 and 14 are spot recommendations at key locations along the corridor to improve accessibility and minimize weaving traffic movements along the freeway main line.

### Specific Lane and Ramp Improvements

No.	Specific Lane and Ramp Improvements
60	I-10/I-17 Split Traffic Interchange DHOV Connection – Construct DHOV connection between I-17 on the west and I-10 on the east at the Split. This connection represents the western end of the second managed lane being proposed on I-10 to the southeast of this location.
61	I-17 DHOV Ramps – Construct DHOV ramps in the median of I-17 to and from the east at 7th Street (with provisions for ramps to and from the west as well). These proposed ramps would provide an access into downtown Phoenix for express buses coming from the southeastern part of the Valley, but would be accessible to all HOV traffic as well.
62	I-17 DHOV Ramps – Construct DHOV ramps in the median of I-17 at US-60/Grand Avenue/Thomas Road to and from the north. This would represent the southern end of the second managed lane being proposed on I-17 to the north of this location. The objective of this proposed ramp would be to provide access into downtown Phoenix and the Central Avenue core for express buses coming from the northern part of the Valley, but would be accessible to all HOV traffic as well. This would alleviate HOV weaving that occurs at the southern end of the existing HOV lanes today on I-17.
63	I-17 and Loop 101 (Agua Fria Freeway) DHOV Connection – Construct DHOV connection between I-17 on the south and Loop 101 (Agua Fria Freeway) on the west. This would represent the northern end of the second managed lane being proposed on I-17 to the south of this location.
65	I-10 and Galveston Road DHOV Ramp – Construct DHOV ramps from Galveston Road to I-10 to and from the north. Galveston Road would be built over I-10, connecting 50th Street to 54th Street.
70	I-10 Collector-Distributor Road System, Elliot Road to Baseline Road – Extend the existing barrier-separated collector-distributor lanes between US-60 and Baseline Road south from Baseline Road to Elliot Road. These barrier-separated roadways adjacent to the freeway would move lane changing (or “weaves”) away from the high-speed freeway traffic, thus improving safety and operations and providing roadway options between Elliot and Baseline Roads where suitable arterial redundancy does not exist.

## Effectiveness of the Corridor Master Plan Recommendation

In the Corridor Master Plan's *Alternatives Screening Technical Report*, the final Level 4 screening analysis is provided on pages 4-92 to 4-97. As noted in the previous discussion, the recommended alternative was selected by the Management Partners and the Alternatives Evaluation Partners. Key performance criteria of the recommended alternative include:

- Modest performance improvements throughout the corridor occur between the base build and the recommended alternative.
- Additional general purpose lane on I-10 between the I-17 Split and US-60 provides lane balance and performs best for this segment.
- Congestion duration generally improves, with 33 percent fewer hours of delay during an average weekday in 2040.
- Travel in HOV lanes has greater reliability over existing conditions.
- A reversed ramp geometry, although entailing greater costs, has better sight distance and ramp placement to improve safety along I-17 between the I-10 Split and the Durango Curve.
- Managed lane system provides flexibility for alternative uses should future conditions warrant a change in how they are operated.

The recommended alternative was also cited for meeting priorities recognized by the Transportation Policy Committee and noted in public feedback in developing the study. These priorities include:

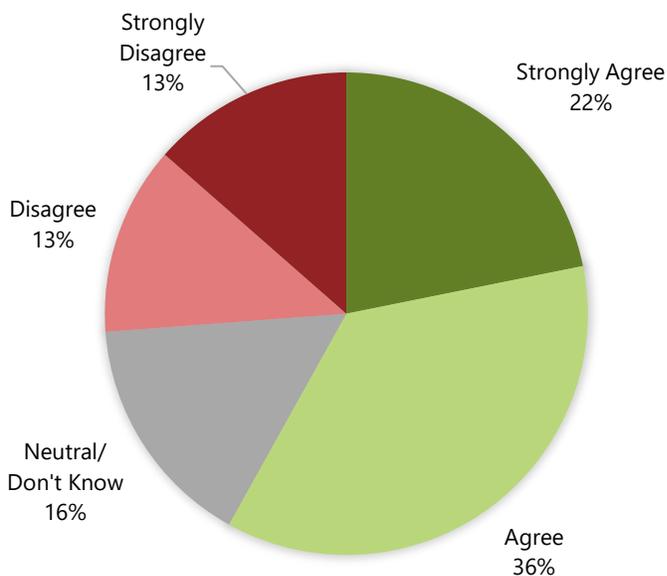
- **Improves Commute:** enhances safety and manages congestion by modernizing the Interstates and by expanding managed capacity (HOV lanes) throughout and general purpose lanes in certain segments, and improves traffic interchange operations, safety and capacity—all combined to enhance travel time reliability.
- **Add Travel Choices:** adds managed capacity and DHOV traffic interchanges to improve travel time reliability for transit and shared rides, as well as enhancing 20 bicycle and pedestrian crossings, including 9 new structures, in the corridor to allow for greater active transportation mobility.
- **Protects the Environment:** respects the existing right of way footprint by minimizing right of way acquisitions wherever possible, addresses flooding issues along I-17 and incorporates congestion management technology to improve traffic flow.
- **Increases Connections and Promotes Neighborhoods:** upgrades and modernizes 24 of the 31 traffic interchanges to enhance corridor accessibility, provides more DHOV and bicycle and pedestrian improvements, and respects the existing right of way footprint wherever possible.
- **Improves Commerce, Minimizes Cost and Emphasizes Jobs:** modernizes the corridor to improve truck safety using features such as flatter ramp grades and wider shoulders, improves technology to better communicate travel conditions and cost-effectively improve efficiency on the existing freeway, includes forward-thinking advancements with possible provisions for autonomous vehicles, and modernizes the facilities to preserve the corridor for future generations.

## Agency and Public Feedback on the Recommended Alternative

In January and February 2017, agency and public feedback was sought and received on the Corridor Master Plan recommended alternative. Letters were distributed to 218 agency representatives with interests in the I-10 and I-17 corridor describing the recommended alternative and the project’s need and purpose. Public feedback was sought through an online survey tool with an interactive map viewer that was open for 38 days, and through four open house information meetings held at three locations throughout the corridor. At the conclusion of the public comment period, 496 comments were received from the online survey, a similar hard-copy form and through other contacts (calls, emails, etc.).

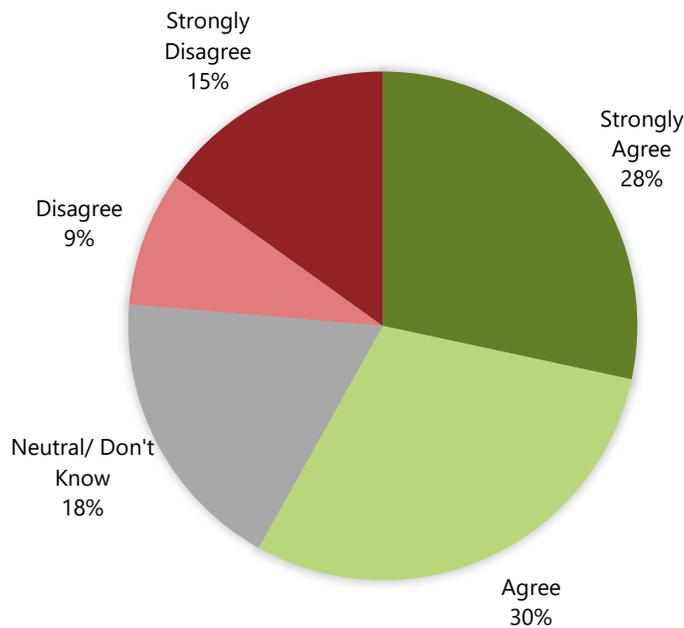
From the survey, the initial question was to comment on the overall recommendation of adding managed lane capacity throughout the corridor. This question noted how the adding of this type of capacity results in two managed lanes along the I-10 segment between I-17 and US-60, and along I-17 between the I-10 Stack and Loop 101 North Stack interchanges. Responses are shown in Figure 15 and were generally favorable.

**Figure 15.** Public response on acceptance of the recommended alternative



In another question, respondents were asked their opinion about acquiring additional property in the corridor for expanding freeways. Although the question was asked in a corridor-width context, the study Management Partners were concerned about the potential widening along I-17 between the I-10 Stack and Loop 101 North Stack interchanges. The responses are shown in Figure 16 and were generally favorable.

**Figure 16.** Public response on acquiring new right of way to construct recommended alternative



Other general feedback from the online and public meetings is summarized in the following nine key themes. These themes are discussed in Chapter 5 of the *Alternatives Screening Technical Report* and reference the ultimate implementation of this study's recommendations and other regional transportation planning efforts in metropolitan Phoenix.

- **Improvement Focus:** Some respondents asked that funding be used primarily for highway improvements, whereas others asked that public transportation, bicycle and pedestrian improvements be prioritized.
- **Flooding Infrastructure:** Several respondents noted a need for flood management infrastructure, citing recent failures in the system during monsoon storms in 2016.
- **Noise Walls:** Respondents noted a need for additional trees and sound barriers along the highway system.
- **Enforcement:** Respondents stated concerns regarding the perceived lack of enforcement of traffic laws, speed limits and HOV regulations.
- **Highway Widening:** Several respondents stated concerns about expanding the system with more managed capacity instead of adding lanes for general purpose traffic, suggesting immediate congestion relief may not materialize. Some respondents also requested no additional HOV lanes in the corridor at all.
- **Light Rail:** Several respondents asked for additional light rail lines in the corridor.
- **Pedestrian Bridges:** Many respondents reiterated opposition to providing bicycle and pedestrian crossings, and in particular over I-17 at the Osborn Road alignment.

- **Project Timeline:** Respondents noted the need for swift action in delivering the Corridor Master Plan improvements with future technology in mind. Concerns were also raised about construction timing and impacts.
- **Public Involvement:** Respondents thanked the study team for the opportunity to attend public meetings and asked for continuing involvement opportunities. Suggestions were provided to consider attending neighborhood meetings as a better way to respond to resident concerns.

Only positive feedback was received from agency representatives during the comment period. Continuing coordination was maintained with MAG member agencies in the corridor that included presentations with the Transportation Commissions in Chandler and Tempe, and the Transportation and Infrastructure subcommittee of the Phoenix City Council. Consultation letters noting their understanding and concurrence with the Corridor Master Plan recommendations were received from the City Managers for Chandler, Phoenix and Tempe prior to the MAG Regional Council acceptance in May 2017.

MAG, ADOT and FHWA established a public involvement effort encompassing numerous outreach activities and technologies to reach stakeholders and members of the public in the region. At the conclusion of the study, the study team collected approximately 2,500 completed surveys, emails and comments on developing the Corridor Master Plan recommendation. Experiences generated by the study will be applied during implementation of the recommended alternative and other subsequent public outreach activities administered by the implementing agencies.

## Corridor Master Plan Recommendation Concept Plans

The study has produced a set of concept plans for the Corridor Master Plan recommended alternative, which can be found in Chapter 6 of the study's *Alternatives Screening Technical Report*. The concept plans represent one possible interpretation of intent of the recommendations. It is important to note that other interpretations are possible because further engineering, environmental analysis and public outreach are needed to refine the four overall segment recommendations, as well as the nearly 50 individual traffic interchange, public transportation, bicycle and pedestrian, and specific lane and ramp improvements. The concept was prepared so that a project, or group of projects, could be defined to develop costs, schedules and implementation opportunities within the MAG RTP.

Appendix B includes exhibits depicting plan sheets and lane line diagrams for one possible design interpretation of the intent of the recommended alternative.

## Programming and Implementation

In 2012, the MAG Regional Council programmed a combined \$1.47 billion in the RFHP for improving infrastructure along I-10 and I-17. No specific improvements were identified for the corridor as this study, the Interstate 10/Interstate 17 Corridor Master Plan, was initiated to determine the need and scope. At the conclusion of this study, the overall cost opinion for implementing all recommended elements is approximately \$2.82 billion. This cost covers the total capital improvements only (independent of funding sources) and does not include operations and maintenance funding.

Starting in 2016, as the Corridor Master Plan was under development, the overall RFHP was reviewed for revenues and expenditures. In its initial findings, MAG noted that approximately \$640 million in surplus funding may be realized in the RFHP because of increasing sales tax revenues and an aggressive cost-risk analysis/practical design initiative program undertaken by MAG and ADOT for delivering future projects. As the rebalancing discussions by the Transportation Policy Committee progressed through 2016 and into 2017, the surplus increased to approximately \$1.5 billion for the RFHP through the sunset of the Proposition 400 sales tax in 2025.

As a result of the surplus, in April 2017, the MAG Regional Council agreed to add \$1.25 billion worth of funded projects back into the RFHP, creating a “rebalanced” program of 37 projects region wide for implementation by 2028 to meet travel demand in the MAG region. Of these 37 projects, 10 of these came directly from this Corridor Master Plan recommendation for the I-10 and I-17 corridor. Table 3 summarizes these 10 rebalanced and funded I-10 and I-17 projects, the programmed costs and estimated construction start dates.

**Table 3.** RFHP funded projects from the I-10/I-17 Corridor Master Plan recommended alternative

RTP map ID <sup>a</sup>	Project	Lead agency	Supporting agencies	I-10 and I-17 key map ID elements <sup>c</sup> (see Figures 13 and 14)	Programmed cost	Construction start date
15	I-17: Arizona Canal Diversion Channel to Greenway drainage improvements	ADOT	—	Drainage portions of 12, 13, 14, 15	\$30,000,000	January 2019
9	I-17/Central Avenue bridge replacement	ADOT	Valley Metro	21	\$23,500,000	May 2019
11	I-17/Indian School Road traffic interchange	ADOT	City of Phoenix	8	\$59,450,000	January 2020
4, 5, 6	I-10: Split to Loop 202 (includes all of the I-10 Spine recommendation except for those noted in Table 4) <sup>b</sup>	ADOT	Cities of Phoenix and Tempe	Freeway widening portions of A and B, 2, 3, 32, 33, 34, 35, 48, 49	\$525,500,000	May 2021
12	I-17/Camelback Road traffic interchange	ADOT	City of Phoenix, Valley Metro	9, 24	\$68,600,000	July 2021
14	I-17/Northern Avenue traffic interchange	ADOT	City of Phoenix	10	\$66,850,000	January 2024
10	I-17: Split to 19th Avenue <sup>b</sup>	ADOT	—	4, 5, and portions of C	\$217,350,000	January 2024
13	I-17/Glendale Avenue traffic interchange	ADOT	City of Phoenix	18	\$75,000,000	January 2025
16	I-17/Thunderbird Road traffic interchange	ADOT	City of Phoenix	Interchange portion of 14, 43	\$113,650,000	July 2026
17	I-17/Bell Road traffic interchange	ADOT	City of Phoenix, Valley Metro	16, 26, 46	\$96,350,000	July 2026
<b>Total</b>					<b>\$1,276,250,000</b>	

<sup>a</sup> "RTP map ID" refers to this funded project's identifier in the MAG RFHP.

<sup>b</sup> Indicates those projects that construct major portions or key elements of the expanded managed lane infrastructure.

<sup>c</sup> If only a portion of the Spine key map project ID is part of the project list, it is noted as a "portion of" the project.

Table 4 lists those projects identified from the Corridor Master Plan recommendation that are not funded in the current RFHP but are expected to be funded when future funding becomes available. The total cost of these unfunded projects, based on the project cost opinions developed for this study, is \$1,545,364,000. These project descriptions and limits are subject to change to match funding constraints, timing priorities, National Environmental Policy Act guidance or alternative delivery packaging. For programming, project dependencies are noted in the last column.

**Table 4.** Unfunded projects from the I-10/I-17 Corridor Master Plan recommended alternative

Project	Lead agency	Supporting agencies	I-10 and I-17 key map ID elements <sup>a</sup> (see Figures 13 and 14)	Project cost opinion	Schedule dependencies
I-10/Chandler Boulevard traffic interchange bicycle and pedestrian upgrades	ADOT	Cities of Phoenix and Chandler	30	\$6,091,000	None
I-10: Galveston Road DHOV traffic interchange	ADOT	Cities of Phoenix and Chandler	65	\$46,539,000	None, except may not want to construct until local park-and-rides are open.
I-10: Knox Road bicycle and pedestrian bridge	ADOT	Cities of Phoenix and Tempe	50	\$7,219,000	None
I-10/Warner Road traffic interchange	ADOT	Cities of Phoenix and Tempe	31	\$11,536,000	None
I-10: Baseline to Elliot collector-distributor roads	ADOT	—	70	\$98,989,000	None
I-10/Baseline Road traffic interchange	ADOT	City of Tempe	1	\$25,940,000	Ideally, traffic interchange would be done after the I-10: Baseline to Elliot collector-distributor roads are open.
Split traffic interchange DHOV connector <sup>b</sup>	ADOT	City of Phoenix	60	\$102,159,000	Project should be completed just before or along with the I-17 inner loop HOV lanes opening.

**Table 4.** Unfunded projects from the I-10/I-17 Corridor Master Plan recommended alternative

Project	Lead agency	Supporting agencies	I-10 and I-17 key map ID elements <sup>a</sup> (see Figures 13 and 14)	Project cost opinion	Schedule dependencies
I-17: 19th Avenue to Indian School Road (includes I-17/7th Street east side DHOV ramps) <sup>b</sup>	ADOT	City of Phoenix, Valley Metro	Portions of C and D, 6, 7, 17, 22, 23, 36, 61	\$376,338,000	None – project connects with the existing HOV lanes on I-17. Ideally, it would be completed prior to the FCDMC project to address floodplain issue in the area.
I-17: Indian School Road to Dunlap Road traffic interchange (includes the I-17/Grand Avenue DHOV connector) <sup>b</sup>	ADOT	City of Phoenix	Portion of D, 11, 38, 39, 41, 62	\$421,132,000	None
I-17: Dunlap Road traffic interchange to Loop 101 traffic interchange (excluding the I-17/ Loop 101 DHOV connector) <sup>b</sup>	ADOT	City of Phoenix, Valley Metro	E and portions of D; interchange portions of 12, 13; and 15, 25, 40, 42, 44, 45, 47	\$310,234,000	Completed during or after the completion of the I-17: Stack to Dunlap Road traffic interchange segment.
I-17/Loop 101 traffic interchange North Stack DHOV connector <sup>b</sup>	ADOT	City of Phoenix	63	\$139,187,000	Completed during or after the completion of the I-17: Dunlap Road traffic interchange to Loop 101 traffic interchange segment.
<b>Total</b>				<b>\$1,545,364,000</b>	

<sup>a</sup> If only a portion of the Spine key map project ID is part of the project list, it is noted as a “portion of” the project.

<sup>b</sup> Indicates those projects that construct major portions or key elements of the expanded managed lane infrastructure.

The projects and their limits listed in Tables 3 and 4 above have been defined for programming purposes only. While consideration was given to defining projects with independent utility, local termini and avoidance of improper National Environmental Policy Act segmentation, it is understood that these project limits may need to be adjusted as subsequent environmental analysis is conducted, especially to properly consider the significance of connected or cumulative impacts.

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# Appendix A. Planning and Environmental Linkages

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## Appendix B. Recommended Alternative Plan Sheets and Lane Line Diagrams

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## Interstate 10/Interstate 17 Corridor Master Plan (FY 2014)

# Planning and Environmental Linkages Questionnaire and Checklist

March 2018



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## Planning and Environmental Linkages Questionnaire and Checklist

### Interstate 10/Interstate 17 Corridor Master Plan (FY 2014)

#### BACKGROUND

The Maricopa Association of Governments (MAG), in partnership with the Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT), launched the Spine study to develop a Corridor Master Plan for the Interstate 10 (I-10) and Interstate 17 (I-17) corridor. This corridor is referred to as the “Spine” because it serves as the backbone for transportation in the Phoenix metropolitan area. This corridor handles more than 40 percent of all daily Interstate traffic in the region.

The Spine study follows the Planning and Environmental Linkages (PEL) process developed by FHWA and adopted by ADOT to more directly link the National Environmental Policy Act (NEPA) process for the project(s) that ultimately become part of the Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP) based on the results of this study. The Spine study also complies with new regulations at 23 Code of Federal Regulations (CFR) § 450.212 concerning linking planning studies to NEPA. The PEL process allows the following types of long-range planning and environmental analysis to inform the preparation of subsequent NEPA documents:

- Project purpose and need, including planning goals
- Public and stakeholder issues
- Agency issues (federal, state, local and tribal)
- Description of the existing environmental setting
- Identification of general travel modes
- Identification of a reasonable range of alternatives
- Preliminary screening of alternatives and elimination of unreasonable alternatives
- Recommendations for future projects

Effective, conceptual-level transportation planning studies that follow the PEL process provide opportunities both to identify important issues of concern early and to build agency, stakeholder and public understanding of the Spine study. Such early, integrated planning is not driven solely by regulatory requirements and the quest for more efficient and effective processes, although those are desirable results. Transportation and environmental professionals—as well as those in metropolitan planning organizations, state and federal resource agencies, and nongovernmental organizations—are finding that early collaboration helps achieve broader transportation and environmental stewardship goals through better decisions regarding programs, planning and projects.

This document has been developed based on the PEL Questionnaire and Checklist adopted by ADOT dated February 2012 to provide guidance, particularly to transportation planners and NEPA specialists, regarding how to most effectively link the transportation planning and NEPA processes. By considering the questions and issues raised in this questionnaire, transportation planners will become more aware of potential gaps in the Spine study, better understand the needs of future users of the study and be reminded of the benefits of wider and/or deeper collaboration with agencies, the public and other stakeholders. NEPA specialists assume a new role in the transportation planning process: becoming involved in the early awareness and identification of

environmental issues in the Spine Corridor study area before the NEPA process officially begins for specific projects included as part of the Spine study's recommended alternative.

The PEL questionnaire and checklist prepared for the Spine study have been used as tools to guide proper documentation and selection of information gathered during the planning process that can later be made available for input, review and possible incorporation by reference during a future NEPA project development process for future projects that result from the Spine study. Completion of this questionnaire and checklist will support the PEL process and serve dual objectives:<sup>1</sup>

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

Important issues considered when conducting a transportation planning study that links to a future NEPA process include:<sup>2</sup>

- Identifying the appropriate level of environmental analysis for the study
- Identifying and using environmental criteria during the alternatives screening process to determine whether they would influence or differentiate among alternatives
- Identifying the appropriate level of agency, stakeholder and public involvement
- Defining unique study concurrence points for seeking agreement from relevant resource agencies, stakeholders and members of the public
- Developing a process to ensure that the study will be recognized as valid within the NEPA process
- Identifying when to involve resource agencies in the study, and to what extent they influence decision making

These issues have been considered throughout the Spine study process. Users of this PEL Questionnaire and Checklist reviewed the document and its requirements at the beginning of the study to become familiar with local and general issues that were identified or became evident during the Spine study. The Questionnaire for Transportation Planners is composed of two parts: one completed by transportation planners at the beginning of the study and one completed at the end. The Checklist for Environmental Planners in Part 3 is used by NEPA specialists throughout the study and finalized when the study is nearly complete.

This document is a companion to the Spine Corridor Master Plan report and documents how the study meets the requirements of 23 CFR § 450.318 (Subpart C: Metropolitan Transportation Planning and Programming). The key Spine study documents used as part of the PEL process included the following:

- *Interstate 10/Interstate 17 Corridor Master Plan, Needs Assessment Report*, June 2016

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<sup>1</sup> Objectives are based on FHWA's online document: "Case Studies: Colorado: Colorado Department of Transportation: Tools and Techniques to Implement PEL" ([www.environment.fhwa.dot.gov/integ/case\\_colorado2.asp](http://www.environment.fhwa.dot.gov/integ/case_colorado2.asp)), accessed October 24, 2011.

<sup>2</sup> Further guidance is available in FHWA's "Guidance on Using Corridor and Subarea Planning to Inform NEPA," dated April 5, 2011, available online ([www.environment.fhwa.dot.gov/integ/corridor\\_nepa\\_guidance.pdf](http://www.environment.fhwa.dot.gov/integ/corridor_nepa_guidance.pdf)).

- *Interstate 10/Interstate 17 Corridor Master Plan, Alternatives Screening Technical Report, September 2017*

Each report is available for review on the Spine project website: [spine.azmag.gov](http://spine.azmag.gov)

(<http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan>).

The flowchart below outlines the major inputs, decision points and outcomes that occur during implementation of a transportation planning study using the PEL process that has been adhered to on the Spine study.

	Transportation Planners	Both	Environmental Planners
<b>PEL Launch</b>	Review Part 1 and Part 2 of questionnaire Complete Part 1 of questionnaire	Become familiar with local and general issues  Modify study scope to include or deepen analysis of specific resources or environmental issues	Review checklist  Advocate inclusion of resources and issues  Seek resource agency assistance in changing study scope
<b>Analysis and Comment</b>	Define, clarify, analyze, and screen modes, corridors, and alternatives (including no-action alternative)  Involve relevant stakeholders, agencies, and public in comments and reviews to ensure later acceptability and defensibility in NEPA	Become familiar with local and general issues  Modify study scope to include or deepen analysis of specific resources or environmental issues	Continue to advocate addressing collection and analysis of data pertinent to effective application in NEPA process
<b>PEL Completion</b>	Complete Part 2 of questionnaire	Include questionnaire and checklist in appendix to study  Document relevant findings for use in later NEPA documents	Complete checklist (Part 3)



**Beginning of NEPA Process**

Environmental planners review completed PEL questionnaire and checklist and confirm that study recommendations and analyses can support the anticipated NEPA process(es) and document type(s), including, if applicable, incorporation into the content of a Notice of Intent

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Note: Part 1 of the PEL questionnaire was completed at the beginning of the study during the *Needs Assessment Report* finalized June 1, 2016, and reflects what was true and known at that time.

## Questionnaire for Transportation Planners – Part 1

This part of the questionnaire should be completed by transportation planners at the beginning of the transportation planning study. Please note that planners should also review the second part of the questionnaire to understand what additional issues will need to be considered and documented as the study progresses.

Project identification			
<i>What is the name of the study? What cities and region does it cover? What major streets are covered? For corridor studies, what are the intended termini?</i>			
<p><b>Study Name:</b> Interstate 10 (I-10)/Interstate 17 (I-17) Corridor Master Plan (otherwise known as the Spine Study)</p> <p><b>Study Area:</b> The corridor begins at the I-10/State Route 202 Loop (SR-202L) Pecos Stack in the south part of Phoenix, extends north/west on I-10 to the I-10/I-17 Split, then north on I-17 to the I-17/SR-101L North Stack. The total length of the corridor is 35 miles and the initial corridor study width is approximately one and one-half miles on each side of the defined freeway corridor, but may expand during the study depending on early study findings. The study area covers Chandler, Guadalupe, Tempe and Phoenix. The Spine Corridor has many existing capacity and operational constraints that hinder performance for traffic that ranges in volume from 90,000 to 262,000 vehicles per day.</p> <p><b>Major Streets:</b> I-10, I-17, SR-202L, SR-101L, State Route 143 (SR-143), 48<sup>th</sup> Street, 56<sup>th</sup> Street/Priest Drive, Kyrene Road, crossing arterial streets (McDowell Road, Thomas Road, Indian School Road, Camelback Road, Bethany Home Road, Glendale Avenue, Northern Avenue, Dunlap Avenue, Peoria Avenue, Cactus Road, Thunderbird Road, Greenway Road, Bell Road and Union Hills Drive), Baseline Road, US-60, Southern Avenue, Broadway Road, Buckeye Road, 19th Avenue, 27th Avenue, 35th Avenue.</p> <p><b>Intended Termini:</b> Currently the intended termini are the I-10/SR-202L Pecos Stack at the southern end of the study area and the I-17/SR-101L North Stack at the northern end.</p>			
<i>Who is the study sponsor?</i>			
The study sponsors are the Maricopa Association of Governments (MAG) in association with the Arizona Department of Transportation (ADOT), Federal Highway Administration (FHWA).			
<i>Briefly describe the study and its purpose.</i>			
<p>MAG, ADOT, and FHWA have entered into a partnership for establishing a Corridor Master Plan for planning, determining, and implementing Regional Transportation Plan improvements to I-10 and I-17, parallel arterial streets, and Interstate traffic interchanges in the Phoenix Metropolitan area. This project's management partners recognize the corridor under study as "the Spine;" as this project is a combination of both interstates serving as the entire regional freeway system's backbone. The operational effects of I-10 and I-17 has the ability to affect many other freeway corridors feeding the Spine corridor as well as other components of the Phoenix Metro Area arterial street system.</p> <p>The purpose of the I-10/I-17 Spine Corridor Master Plan is to provide guidance in establishing a project or group of projects to incorporate into the MAG Regional Transportation Plan that will meet a regional vision for I-10 and I-17 through 2040. Included in this outcome will be a planning-level estimate of costs, potential environmental clearance needs, central mitigation and implementation strategy, determination of engineering and operational acceptance for changes in interstate highway access, and timing for project construction.</p>			
<i>Who are the primary study team members (include name, title, organization name, and contact information)?</i>			
Team Member	Title and Department	Organization and Department	Contact Information
Bob Hazlett	Senior Engineering Manager	MAG Transportation Planning and Programming	602.452.5026, bhazlett@azmag.gov
Eric Anderson	Transportation Director	MAG Transportation Planning and Programming	602.254.6300, eanderson@azmag.gov
Brent Cain	Deputy State Engineer	ADOT State Engineer's Office Urban Operations,	602.712.8274, BCain@azdot.gov
Steve Beasley	Transportation Manager	ADOT Urban Project Management	602.712.4368, SBeasley@azdot.gov
Michael Kies	Assistant Director	ADOT Multimodal Planning Division (MPD))	602.712.8140, 602.712.4574, Mkies@azdot.gov
Paul O'Brien	Group Manager	ADOT Environmental Planning Group	602.712.8669 PObrien@azdot.gov
Daniel Gabiou	Transportation Planning Program Manager	ADOT Systems and Regional Planning	602.712.7025 DGabiou@azdot.gov

Team Member	Title and Department	Organization and Department	Contact Information
Aryan Lirange	Senior Urban Engineer	FHWA Project Delivery Team	602-382-8973 aryan.lirange@dot.gov
Ed Stillings	Senior Transportation Planner	FHWA Planning, Environment, Air Quality, Realty and Civil Rights (PEARC) Team	602-382-8966 ed.stillings@dot.gov
Alan Hansen	Team Leader	FHWA Planning, Environment, Air Quality, Realty and Civil Rights (PEARC) Team	602-382-8964, alan.hansen@dot.gov
Rebecca Yedlin	Environmental Coordinator	FHWA Planning, Environment, Air Quality, Realty and Civil Rights (PEARC) Team	602-382-8979, rebecca.yedlin@dot.gov
<i>Does the team include advisory groups such as a technical advisory committee, steering committee, or other? If so, include roster(s) as attachment(s).</i>			
<p>Charter Partners – The Charter Partners have been established to provide oversight on policy matters related to decisions in developing the project. Elected officials from the cities of Chandler, Tempe, Phoenix and the Town of Guadalupe, as well as representation from MAG, ADOT, FHWA, Department of Public Safety, Regional Public Transportation Authority (RPTA) and Valley Metro Rail (VMR), are part of this group. These partners have signed a formal Project Charter summarizing project goals. Quarterly meetings are envisioned for the Charter Partners for presentation, review and comment.</p> <p>Management Partners – For day-to-day project delivery, ADOT and FHWA representatives support MAG’s project manager as Management Partners. These partners’ primary responsibilities are ensuring schedule compliance, providing guidance on delivering the scope of the study, providing direction to the consultant team, reviewing documents and work products, and ensuring adequate resource availability from their respective agencies. This project’s Management Partners began meeting in April 2013 and have engaged an Operating Principles agreement to oversee project development. These partners plan to continue to meet monthly for the project duration.</p> <p>Planning Partners – These partners provide technical oversight of the project’s key deliverables. Planning Partners representatives include management and technical staffing from the cities of Chandler, Tempe, Phoenix, the Town of Guadalupe, MAG, ADOT, FHWA, RPTA and VMR. The cities provide representatives from their city manager, aviation, streets, and transit departments, as appropriate. Monthly meetings are anticipated for the Planning Partners.</p> <p>Agency Partners – As project recommendations could affect the Valley’s transportation future, a second technical advisory team is envisioned to meet as needed to provide collaboration, early coordination, and recommendations needed for plan implementation. Representatives of these partners may include, but are not be limited to, U.S. Army Corps of Engineers, Federal Aviation Administration, Federal Transit Administration, Western Area Power Administration, Flood Control District of Maricopa County, neighboring MAG member agencies (e.g., cities of Glendale and Mesa, Maricopa County, Gila River Indian Community (GRIC)), other City of Phoenix departments (e.g., Community and Economic Development, Planning and Development, and Public Works), and other agencies identified during the study process.</p> <p>In addition to this project’s formal Partner groups, the Consultant team will provide coordination with a fifth group: the project’s Stakeholders. There are various affected groups, individuals, and interests throughout the 35-mile corridor with mutual and diverse interests in the project’s outcome. Groups include, but are not limited to, Phoenix Village Planning committees, trucking and freight providers, private transportation providers, service organizations, homeowner associations, land developers, and the general public. Regular and consistent coordination with these stakeholders is an important project outcome.</p>			
<i>Have previous transportation planning studies been conducted for this region? If so, provide a brief chronology, including the years the studies were completed. Provide contact names and locations of the studies and study websites.</i>			
<p>Yes, previous transportation planning studies have been conducted for this region.</p> <ul style="list-style-type: none"> <li>• Central Phoenix Transportation Framework Study (CPHX) Completed 2013 Study Area: Loop 101 (West and North), Loop 202 (North and East), GRIC (South) Bob Hazlett, Senior Engineering Manager, MAG Transportation Planning and Programming, 602-452-5026, bhazlett@azmag.gov <a href="http://www.bqaz.org/phxPapers.asp?mS=m14">http://www.bqaz.org/phxPapers.asp?mS=m14</a></li> <li>• Southeast Corridor Major Investment Study Completed 2012 Study Area: I-10 Papago Freeway/SR 202L Red Mountain Freeway (North), SR-101L Price Freeway (East), GRIC (South), SR-101L Price Freeway (East) Bob Hazlett, Senior Engineering Manager, MAG Transportation Planning and Programming, 602-452-5026, bhazlett@azmag.gov <a href="https://www.azmag.gov/Projects/Project.asp?CMSID=4236">https://www.azmag.gov/Projects/Project.asp?CMSID=4236</a></li> <li>• Managed Lanes Network Development Strategy Report Completed 2012 (Phase I) Study Area: Phoenix Metropolitan Area Regional Freeway System</li> </ul>			

Bob Hazlett, Senior Engineering Manager, MAG Transportation Planning and Programming, 602-452-5026, bhazlett@azmag.gov  
<http://www.azmag.gov/Projects/Project.asp?CMSID=1041&CMSID2=4190>

- Regional Transit Framework Study  
 Completed 2010  
 Study Area: MAG Region  
 Kevin Wallace, Transit Program Manager, MAG Transportation Planning and Programming, 602-254-6300, kwallace@azmag.gov  
<http://www.bqaz.org/frameFinalReport.asp?mS=m12>
- Freight Transportation Framework Study  
 Completed in 2012  
 Study Area: Sun Corridor – MAG, Central Arizona Governments, Pima Association of Governments  
 Tim Strow, Freight Coordinator, MAG Transportation Planning and Programming, 602-254-6300, tstrow@azmag.gov  
<http://www.bqaz.org/freightstudy.asp>
- Sustainable Transportation and Land Use Integration Study  
 Completed 2013  
 Study Area: MAG Region  
 Eileen Yazzie, Transit Coordinator, MAG Transportation Planning and Programming, 602-452-5058, eyazzie@azmag.gov  
<http://www.bqaz.org/freightstudy.asp>
- I-10 Corridor Improvement Study and Draft Environmental Impact Statement/Section 4(f) Evaluation  
 Discontinued  
 Study Area: I-10, SR-51 Piestewa Freeway/SR-202L Red Mountain Freeway to SR-202L Santan Freeway  
 ADOT Urban Project Management  
 Website discontinued (available through ADOT Information Data Warehouse or project team)
- I-17/Black Canyon Freeway Corridor Study and Draft Environmental Impact Statement/Section 4(f) Evaluation  
 Discontinued  
 Study Area: I-17, I-10 Split to SR-101L Agua Fria/Pima Freeway  
 ADOT Urban Project Management  
 Website discontinued (available through ADOT Information Data Warehouse or project team)

*What current or near-future planning (or other) studies in the vicinity are underway or will be undertaken? What is the relationship of this study to those studies? Provide contact names and locations of the studies and study websites.*

**Study Name:** South Mountain Freeway (SR-202L), I-10 (Papago Freeway) to I-10 (Maricopa Freeway) Final Environmental Impact Statement and Section 4(f) Evaluation

**Project Contact:** Carmelo Acevedo, ADOT Urban Project Management, 602-712-7559, CAcevedo@azdot.gov  
<http://www.azdot.gov/SouthMountainFreeway>

**Project Overview:** Over the past 40 years, Phoenix-area population, housing, and employment experienced some of the fastest growth in the nation. MAG projections indicate Maricopa County's population will add an average 1 million people per decade from 2005 to 2035. A major transportation facility (the South Mountain Freeway) has been included in the region's adopted transportation planning documents since 1985 and remains in the current Regional Transportation Plan (RTP). At the beginning of the Environmental Impact Statement (EIS) process, the need for a major transportation facility in the southwest portion of the Phoenix metropolitan area in Maricopa County (study area) was reexamined to determine whether it was still needed. Using state-of-the-practice methods and tools, the analysis conducted for the EIS revealed that a major transportation facility is needed to address socioeconomic factors, regional transportation demand, and existing and projected transportation system capacity deficiencies.

**Relationship to Spine Corridor Master Plan:** The proposed South Mountain termini intersect the proposed Spine Corridor southern termini at the I-10/SR-202L Pecos Stack and the I-10 Maricopa Freeway west of the Spine Corridor study area. The loop formed by the South Mountain freeway will complete the SR 202L system and support the regional vision for I-10 under the Master Plan.

**Study Name:** Arizona Passenger Rail Study: Tucson to Phoenix

**Project Contact:** Thor Anderson, ADOT Multimodal Planning Division (MPD) Planning and Environmental Linkages (PEL), 602-712-4574, TAnderson@azdot.gov  
<https://www.azdot.gov/planning/CurrentStudies/PassengerRail/overview>

**Project Overview:** ADOT has been working closely with the Federal Transit Administration, the Federal Railroad Administration, and local governments and planning organizations in Maricopa, Pinal and Pima counties to determine which routes would move forward for further study. ADOT continues to study the feasibility of a passenger rail line between Phoenix and Tucson and has narrowed the list of alternatives. ADOT is studying several alternatives, including the Orange Alternative, which would serve the East Valley and share part of its alignment with the planned North-South Freeway Corridor; the Yellow Alternative, also serving the East Valley but sharing right of way with Union Pacific Railroad, and the no-action alternative. Current action alternatives would run along I-10 south of Eloy to Tucson.

**Relationship to Spine Corridor Master Plan:** The proposed Arizona Passenger Rail Study parallels I-10 through Downtown Phoenix and the "heart" of the Spine Master Plan study area. This segment of the passenger line would provide opportunities to explore multimodal transportation in the

development of alternatives.

**Study Name:** Arizona Key Commerce Corridor Study

**Project Contact:** Thor Anderson, ADOT Multimodal Planning Division (MPD) Planning and Environmental Linkages (PEL), 602-712-4574, TAnderson@azdot.gov  
<https://www.azdot.gov/planning/CurrentStudies/key-commerce-corridors>

**Project Overview:** ADOT MPD has identified corridors throughout the state where improvements to the transportation infrastructure support the greatest potential commercial and economic benefits. These "Key Commerce Corridors" represent a strategic statewide approach to leverage infrastructure improvements to enhance Arizona's competitive economic position. These corridors can support the creation of high-value, export focused jobs, increasing the state's high value overall economic growth and resulting in increased revenues for both state and local governments.

**Relationship to Spine Corridor Master Plan:** Among the corridors identified are the I-17 Phoenix to Flagstaff and I-10 California to Phoenix. Development of transportation alternatives for the I-17 and I-10 segments of the Spine Corridor will dovetail with the goals of the Arizona Key Commerce Corridor Study.

**Study Name:** South Central Corridor Study

**Project Contact:** Sonya Pastor La Sota, Valley Metro, Community Outreach Coordinator, 602-744-5584  
[http://www.valleymetro.org/projects\\_and\\_planning/project\\_detail/south\\_central#sthash.b0yE9Lpo.dpuf](http://www.valleymetro.org/projects_and_planning/project_detail/south_central#sthash.b0yE9Lpo.dpuf)

**Project Overview:** Valley Metro has initiated a 24-month Alternatives Analysis (AA) study of the South Central Phoenix Corridor. An AA evaluates several high-capacity transit options, including light rail, bus rapid transit and modern streetcar, to determine which transit mode and route serves this community best. It is the start of the federal process to eventually apply for funding.

**Relationship to Spine Corridor Master Plan:** The South Central Corridor study area is bound by 7th Avenue on the west, 7th Street on the east, Baseline Road on the south, and Washington Street on the north. The northern portion of the study area crosses I-17 within the Spine Master Plan study area. This study ties into the Spine Master Plan as well as the Arizona Passenger Rail Study.

**Study Name:** Northeast Transit Corridor and West Phoenix/Central Glendale Transit Corridor Studies

**Project Contact:** info@valleymetro.org, 602 262-7433  
[http://www.valleymetro.org/images/uploads/agency\\_transitresearch/Future\\_Transit\\_Corridors\\_Brochure\\_\\_August\\_2014.pdf](http://www.valleymetro.org/images/uploads/agency_transitresearch/Future_Transit_Corridors_Brochure__August_2014.pdf)

**Project Overview:** The Northeast Transit Corridor Study encompasses a 12-mile study area running northeast towards Paradise Valley Mall; this transit corridor is scheduled to open in 2034. The West Phoenix/Central Glendale Transit Corridor Study encompasses a 5-mile study area running northwest into downtown Glendale; this transit corridor is scheduled to open in 2026. The transit mode and route for each study is to be determined.

**Relationship to Spine Corridor Master Plan:** These study corridors, as proposed, would branch off the existing VMR line in the central Phoenix urban core and provide a linkage to the Spine Master Plan Corridor.

**Study objectives**

What are your desired outcomes for this study? (Mark all that apply.)

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Stakeholder identification                                 | <input checked="" type="checkbox"/> Scheduling of infrastructure improvements over short-, mid-, and long-range time frames |
| <input checked="" type="checkbox"/> Stakeholder roles/responsibilities definition              | <input checked="" type="checkbox"/> Environmental impacts   |
| <input checked="" type="checkbox"/> Travel study area definition                               | <input type="checkbox"/> Mitigation identification  |
| <input checked="" type="checkbox"/> Performance measures development                           | <input type="checkbox"/> Don't know   |
| <input checked="" type="checkbox"/> Development of purpose and need goals and other objectives | <input type="checkbox"/> Other _____  |
| <input checked="" type="checkbox"/> Alternative evaluation and screening                       |   |
| <input checked="" type="checkbox"/> Alternative travel modes definition                        |   |

*Have system improvements and additions that address your transportation need been identified in a fiscally constrained regional transportation plan?*

In general, yes; however, the project proposes to address transportation needs in a systemic manner through establishing corridor operating principles that align with livable communities initiatives in the study area. Although the study purpose includes identifying projects for incorporation into the RTP, some of the projects that are developed through this process may not be specifically listed within the RTP.

<i>Will a purpose and need statement<sup>3</sup> be prepared as part of this effort? If so, what steps will need to be taken during the NEPA process to make this a project-level purpose and need statement?</i>
Yes, the purpose and need (P/N) will provide an overview of the context of the corridor's contribution to addressing transportation needs within the Master Plan area. Additional P/N to define the transportation problem at the project level will be by individual project with reference to the Master Plan P/N.
<b>Establishment of organizational relationships</b>
<i>Is a partnering agreement in place? If so, who are signatories (for example, affected agencies, stakeholders, organizations)? Attach the partnering agreement(s).</i>
A partnering agreement signed by the Charter Partners is in place (attached). In addition, the Management Partners have entered into an operating agreement.
<i>What are the key coordination points in the decision-making process?</i>
The study team will coordinate with appropriate stakeholders and potentially affected parties at the following milestones and/or project phases. Some of these coordination points will occur concurrently.  Task 1) Project Initiation to ensure that Project Management Plan, Public Involvement Plan, and Decision Process Memo are accounted for. Task 2) Establish Baseline and Future Conditions, complete Environmental Overview (Attachment 1) and report on those to establish Goals and Objectives. Task 3) Draft Purpose and Need and Establish Comprehensive Set of Alternatives and Screening Approach. Task 4) Identify Reasonable Alternatives. Task 5) Screen/Evaluate Alternatives. Task 6) Submit Draft Master Plan. Task 7) Submit Final Master Plan.
<b>Planning assumptions and analytical methods</b>
<i>Is the time horizon of the study sufficiently long to consider long-term (20 years or more from completion of the study) effects of potential scenarios?</i>
Yes. The study time horizon is Year 2040
<i>What method will be used for forecasting traffic volumes (for example, traffic modeling or growth projections)? What are the sources of data being used? Has USDOT validated their use?</i>
Data from the suspended I-17 and I-10 EIS projects serves in establishing an overview. Corridor Future Conditions will be based upon 2040 socio-economic data adopted by the MAG Regional Council in June 2013. MAG will provide travel demand, microsimulation model, and Regional Transportation Plan data in order for the team to examine demand and microsimulation forecasts and identify potential safety issues resulting from greater travel demand throughout the study area. Yes, USDOT has validated the use of this information.
<i>Will the study use FHWA's Guide on the Consistent Application of Traffic Analysis Tools and Methods<sup>4</sup>? If not, why not? How will traffic volumes from the travel demand model be incorporated, if necessary, into finer-scale applications such as a corridor study?</i>
The study will account for FHWA guidance and utilize socioeconomic data from MAG member general plans, average vehicle trip data and projections for the MAG region, the distribution of travel modes used by travelers in the MAG region, estimates of existing transportation infrastructure capacity for regional travel, projected capacity of RTP-planned infrastructure improvements, and projected capacity of County, city and private developer street improvements. The study will also consider alternative means to measure network performance – more associated with network reliability, safety, and dependability – as well as metrics accounting for the movement of people and goods and not necessarily in terms of vehicles.
<i>Do the travel demand models base their projections on differentiations between vehicles?</i>
Yes
<b>Data, information, and tools</b>
<i>Is there a centralized database or website that all State resource agencies may use to share resource data during the study?</i>
At this time there is no such database or website.

<sup>3</sup> For an explanation of purpose and need in environmental documents, please see the Federal Highway Administration's (FHWA's) "NEPA and Transportation Decisionmaking: The Importance of Purpose and Need in Environmental Documents," <[Purpose and Need](#)>. This website provides links to five additional resources and guidance from FHWA that should be helpful in understanding the relationship between goals and objectives in transportation planning studies and purpose and need statements of NEPA documents.

<sup>4</sup> FHWA November 2011 publication: <[Traffic Analysis Tools and Methods](#)>

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## Questionnaire for Transportation Planners – Part 2

This part of the questionnaire should be completed by transportation planners at the end of the transportation planning study. This completed document should become an appendix to the study's final report to document how the study meets the requirements of 23 Code of Federal Regulations § 450.212 or § 450.318.

### Purpose and need for this study

*How did the study process define and clarify corridor-level or subarea-level goals (if applicable) that influenced modal infrastructure improvements and/or the range of reasonable alternatives?*

The purpose of the Interstate 10 (I-10)/Interstate 17 (I-17) Corridor Master Plan (Spine study) was to develop an improvement and implementation strategy to manage future travel demand, operations and congestion in the I-10 and I-17 corridor. The primary outcome of the Spine study is a detailed strategy to undertake the planning, NEPA compliance, permitting, design and construction of specific projects that were approved by MAG as part of the Spine corridor recommended alternative in the I-10 and I-17 corridor through 2040.

The Spine study effort analyzed various long-term strategies to improve traffic mobility, operations and safety in the corridor. The study evaluated a full range of transportation modes and concepts to identify the best multimodal system solutions. These long-term improvements are envisioned as a combination of traditional freeway and interchange solutions, new technology and the increased use of transit and other transportation modes, including bicycle and pedestrian. Study recommendations will be programmed in the MAG RTP and TIP.

The first phase of the Spine study involved preparing the *Needs Assessment Report (NAR)*, June 2016. The NAR documents the existing conditions and issues in the Spine corridor. The NAR was used extensively to inform the alternatives identification, screening and selection process. The following factors were selected for the evaluation of existing conditions based on meetings held by the Management Partners, with input and consultation from the Planning Partners and Agency Partners:

- Environmental conditions
- Travel demand and traffic operations
- Roadway infrastructure
- Transit service
- Bicycle and pedestrian infrastructure
- Safety
- Technology/Intelligent Transportation Systems (ITS) and system management facilities
- Commerce and economic development
- Agency and public involvement and feedback
- Need and purpose for the Spine study

The *Alternatives Screening Technical Report (ASTR)*, September 2017, documents the second phase of the Spine study. The ASTR describes how the study team identified, screened and selected ideas and strategies that would eventually become discreet Spine improvement projects. Once approved by the Management Partners with input from the Planning Partners, Agency Partners and the public, they became the Spine recommended alternative. The Management Partners adhered to the following Moving Ahead for Progress in the 21st Century Act (MAP-21) performance-based criteria and goals during the alternatives screening process to achieve an optimal performance- and outcome-based transportation program for the Spine improvement program:

- Safety
- Infrastructure condition
- Congestion reduction
- System reliability and resiliency
- Environmental sustainability
- Freight movement and economic vitality
- Reduced project delivery delays

The key Spine study components discussed in the ASTR include:

- Two-day Alternatives Development Workshop held by the Management Partners and key stakeholders to discuss issues in the Spine study area and to identify ideas and potential solutions to carry forward to the alternatives screening process, with 349 unique ideas, concepts, and strategies developed
- Alternatives screening that included a four-level process, including environmental-related factors, under the supervision of the Management Partners, with input from the Alternatives Evaluation Partners
- Spine corridor recommended alternative selected after general consensus by the Management Partners and Alternatives Evaluation Partners
- Public and agency involvement and feedback on the recommended alternative

Purpose and need for this study
<ul style="list-style-type: none"> <li>▪ Selection of the recommended alternative by the Management Partners and Alternatives Evaluation Partners, described as an expanded managed lane system on I-10 and I-17 combined with numerous local improvements to the Interstates, arterial streets and Interstate traffic interchanges in the Spine corridor</li> <li>▪ Adoption of the recommended alternative into the RTP by the MAG Regional Council on May 24, 2017</li> </ul> <p>Individual NEPA actions for each project included in the recommended alternative will identify and evaluate potential impacts specific to each project-level environmental study area.</p>
<p><i>What were the key steps and coordination points in the decision-making process? Who were the decision-makers and who else participated in those key steps?</i></p>
<p>Five study partner groups participated in the Spine study decision-making process, along with the general public. Group membership was determined by the three primary partner agencies: MAG, ADOT and FHWA.</p> <p><b>Charter Partners:</b> Elected officials and executive-level representatives from MAG, ADOT, FHWA, Valley Metro and the affected cities and towns. This group met several times over the course of the study to receive status updates and to provide input on direction or key decisions as necessary or as requested.</p> <p><b>Management Partners:</b> Senior management from MAG, ADOT and FHWA. This group was the core management team for the study and met anywhere from weekly (at the beginning of the study) to monthly during the alternatives screening process. This group directed the day-to-day work on the study and contributed to key decisions during the alternatives screening process.</p> <p><b>Planning Partners:</b> Management and technical staff from the cities and town and their respective departments, designated Tribes, MAG, ADOT, FHWA and Valley Metro. This group met periodically over the course of the study to receive status updates and to provide input.</p> <p><b>Alternatives Evaluation Partners:</b> Management Partners, the Cities and Valley Metro. This group met numerous times to oversee the alternatives development, screening and selection process and was involved with major decisions and direction during this process.</p> <p><b>Agency Partners:</b> Representatives from other agencies and Tribal governments who had expressed an interest in the study during the agency partner information meeting. These agencies met individually with the Spine study team periodically over the course of the study to receive status updates, or meetings were held in conjunction with other partner meetings.</p> <p>A complete listing of all the Spine study partners may be reviewed in the <i>Establishment of organizational relationships – tribes and agencies</i> section in Part 2.</p> <p><b>Public:</b> Members of the general public with an interest in the study were provided opportunities to provide input at three public meetings during the preparation of the NAR during February and March 2015 and at four public meetings during preparation of the ASTR during January 2017, along with numerous other forms of public outreach activities conducted by the Spine study team. The public also had the opportunity to provide input through the Spine study website: spine.azmag.gov (<a href="http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan">http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan</a>).</p> <p>Key Spine study milestones involved the following:</p> <ul style="list-style-type: none"> <li>▪ Transportation Policy Committee (TPC) advises, and Regional Council approves, the Spine study process commencement (November 2012)</li> <li>▪ Spine study kickoff (March 2014)</li> <li>▪ NAR preparation begins (April 2014)</li> <li>▪ Agency partner information meeting (February 2015)</li> <li>▪ Public information meetings (three) and outreach activities (February and March 2015)</li> <li>▪ Draft NAR (June 2015)</li> <li>▪ ASTR preparation begins (June 2015)</li> <li>▪ Alternatives Development Workshop (June 2015)</li> <li>▪ Final NAR approved by MAG (June 2016)</li> <li>▪ Agency and public involvement meetings (four) and outreach activities (January and February 2017)</li> <li>▪ Selection and adoption of the Spine recommended alternative by MAG Regional Council (May 2017) <ul style="list-style-type: none"> <li>○ A total of 17 presentations were given to the various MAG committees (TPC, TRC and MC) and Regional Council between February 2014 and May 2017. Four of those presentations occurred during the NAR phase of the study (February 2014 to June 2015), while 13 of those presentations occurred during the ASTR phase of the study (July 2015 to May 2017).</li> </ul> </li> <li>▪ Draft ASTR (June 2017)</li> <li>▪ Final ASTR approved by MAG (September 2017)</li> <li>▪ Draft Spine study PEL (December 2017)</li> <li>▪ Draft Corridor Master Plan (December 2017)</li> <li>▪ Final Corridor Master Plan (this document)</li> <li>▪ Final Spine study PEL signed by ADOT and FHWA and approved by MAG (this document)</li> </ul>

## Purpose and need for this study

*How should this study information be presented in future NEPA document(s), if applicable? Are relevant findings documented in a format and at a level of detail that will facilitate reference to and/or inclusion in subsequent NEPA document(s)?<sup>5</sup>*

A key objective of the Spine study was to ensure that data and information on the natural, cultural, socioeconomic and built environment be included as an important element of the prepared study materials. In addition to using this information to screen Spine alternatives, this information was documented in a format and at a level of detail to begin future NEPA actions for individual projects selected as part of the recommended alternative for the Spine Corridor Master Plan. Data and information for use in future NEPA actions for the Spine recommended alternative are included in the following Spine study documentation:

### **NAR, June 2016**

- Executive Summary
- Chapter 1 – Introduction and Background
- Chapter 2 – Environmental Factors
- Chapter 3 – Travel and Traffic Operations Factors
- Chapter 4 – Roadway Infrastructure
- Chapter 5 – Transit Service
- Chapter 6 – Bicycle and Pedestrian Infrastructure
- Chapter 7 – Safety
- Chapter 8 – Technology/ITS and System Management Facilities
- Chapter 9 – Commerce and Economic Development Factors
- Chapter 10 – Agency and Public Feedback
- Chapter 11 – Need and Purpose for the Proposed Action

### *Appendices*

- Appendix A – Potential Hazardous Materials Locations
- Appendix B – Potential Section 4(f) Resources
- Appendix C – Potential Cultural Resource Sites
- Appendix D – PEL Questionnaire and Checklist (Part 1)
- Appendix E – Detailed Outline Analysis
- Appendix F – Detailed Bridge Information
- Appendix G – Detailed Pump Station Information
- Appendix H – Phoenix Sky Harbor International Airport – Airspace Analysis
- Appendix I – Intersection Crash Rate
- Appendix J – Agency and Public Involvement Summary Report
- Appendix K – Summary of Spine Corridor Intersections
- Appendix L – NAR Comments Summary Report

### **ASTR, September 2017**

- Chapter 1 – Executive Summary
- Chapter 2 – Introduction and Background
- Chapter 3 – Initial Corridor Concepts
- Chapter 4 – Screening Process
- Chapter 5 – Agency and Public Involvement
- Chapter 6 – Recommended Alternative
- Chapter 7 – Technology Considerations
- Chapter 8 – Implementation Strategy, Cost Opinions, and Planning and Environmental Linkages

### *Appendices*

- Appendix A – Alternatives Development Workshop Presentation
- Appendix B – Limited Access Dual HOV Whitepaper
- Appendix C – Agency and Public Involvement
- Appendix D – Cost Risk and Value Planning Workshops
- Appendix E – Crash Diagrams
- Appendix F – Concept Diagrams and Plan Sheets
- Appendix G – Cost Opinions

<sup>5</sup> For an explanation of the types of documents needed under the NEPA process and the nature of the content of those documents, please see “NEPA Documentation: Improving the Quality of Environmental Documents,” <[Documentation](#)>.

Purpose and need for this study
<ul style="list-style-type: none"> <li>Appendix H – Alternative Interchange Concepts and Future Provisions for SR-30</li> </ul>
<p><i>Were the study's findings and recommendations documented in such a way as to facilitate an FHWA or Federal Transit Administration decision regarding acceptability for application in the NEPA process? Does the study have logical points where decisions were made and where concurrence from resource or regulatory agencies, stakeholders, and the public was sought? If so, provide a list of those points.</i></p>
<p>As noted previously regarding the key decision makers for the Spine study, FHWA was one of the three sponsoring agencies, along with MAG and ADOT, that formed a partnership to undertake the Spine study and establish a Spine Corridor Master Plan to improve I-10 and I-17, key arterial streets and Interstate traffic interchanges in the study area. FHWA was a key member of the Management Partners throughout the study, and every decision point in the study was made by the Management Partners. In addition, FHWA served as a Charter Partner to provide oversight on policy matters related to Spine study decision making and was a member of the Alternatives Evaluation Partners to provide technical oversight to the study's alternatives screening process and the agency and public involvement process. Ed Stillings and Aryan Lirange, both from the FHWA Arizona Office, were the designated Spine study Management Partners representatives to ensure that the Spine study's findings and recommendations were documented to properly apply to future NEPA processes. In addition, Karla Petty, the FHWA Arizona Division Administrator, participated in the Charter Partners group throughout the study duration.</p> <p>Key steps and coordination points in the decision-making process were previously discussed in this questionnaire, identifying Spine study milestones and key decision makers and their roles in the study. One of the five partner groups established for the Spine study was the Agency Partners, which included representatives from public agencies with a stated interest in the study. An Agency Partner Information Meeting was held on February 23, 2015, to obtain agency input regarding issues, needs and concerns early in the Spine study process for inclusion in the NAR. Follow-up coordination with the Agency Partners involved project status updates, along with their attendance at other partner meetings. The Management Partners did not seek formal concurrence on the major Spine study decisions with the Agency Partners during the study, but did solicit feedback about concerns they may have. Only minor comments and suggestions were received. Formal agency concurrence will be sought when each individual project that is part of the Spine recommended alternative becomes a discrete NEPA action.</p> <p>The public and other stakeholders were provided the opportunity to give input and feedback on the Spine study at two key decision-making points. Three public information meetings were held to seek public and stakeholder input during the preparation of the NAR and four agency and public involvement meetings were held during the preparation of the ASTR. Agency and public participation, input and feedback is documented in Chapter 10 (Agency and Public Feedback) and Appendix J (Agency and Public Involvement Summary Report) of the NAR and in Chapter 5 (Agency and Public Involvement) and Appendix C (Agency and Public Involvement) of the ASTR. All feedback was considered, and applied, as applicable, to the final recommended alternative definition.</p>

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
<p>Note: Additional tribal, agency, government (state, regional, county or local) and other stakeholder comments may be reviewed in the Agency Information Meeting Summary Report in Appendix J (Agency and Public Involvement Report) of the NAR on the MAG website at: <a href="http://www.azmag.gov">spine.azmag.gov</a> (<a href="http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan">http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan</a>).</p>			
<b>Tribal</b>			
Gila River Indian Community	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4 and 20, 2017 (Four Southern Tribes Resources Working Group presentation to the four tribes listed in this table)	Planning Partner	Request to keep tribe updated and submit cultural resources documents for review. The proposed project area is within ancestral lands. No follow up occurred, however, as no cultural documents were prepared as part of the Spine study.

<b>Establishment of organizational relationships – tribes and agencies</b>			
<b>Tribe or agency</b>	<b>Date(s) contacted</b>	<b>Describe level of participation</b>	<b>Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.</b>
Salt River Pima-Maricopa Indian Community	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Planning Partner	No major concerns identified at this stage
Tohono O'odham Nation	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Planning Partner	No major concerns identified at this stage
Ak-Chin Indian Community	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Planning Partner	No major concerns identified at this stage
Other Native American Communities	None	None	No outreach done to other Native American communities other than those represented by the Four Southern Tribes.
<b><i>Federal</i></b>			
FHWA	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Charter, Management, and Alternatives Evaluation Partner	Actively involved at every decision point (at multiple levels within FHWA), and reviewed and commented on all documentation generated by the Spine study.

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
U.S. Bureau of Indian Affairs	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Bureau of Land Management	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017	Agency Partner	No major concerns identified at this stage
U.S. Bureau of Reclamation	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017	Agency Partner	No major concerns identified at this stage
National Park Service	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017	Agency Partner	No major concerns identified at this stage
Natural Resources Conservation Service (NRCS)	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	NRCS may have comments under the Farmland Protection Policy Act. Attached form CPA-106 can be used to inform NRCS about corridor alternatives. Agency cannot comment until alternatives are known.

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
U.S. Army Corps of Engineers	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Environmental Protection Agency	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Department of Housing and Urban Development	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Department of Interior	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	National Historic Lands: Pueblo Grande Ruin and Irrigation Sites National Historic Landmark are within the study area. Please minimize any potential impacts to the site per Section 106 of the National Historic Preservation Act.  Land and Water Conservation Fund and Urban Park and Recreation Recovery: Nuestro Park, Acacia Park, South Mountain Park/Preserve, Encanto Park and Verde Park are assisted properties to which specific regulations apply.

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
U.S. Fish and Wildlife Service	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Department of Homeland Security	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Federal Aviation Administration	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting) Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	Ensure Advisory Circulars are referenced and utilized when near airport environment. Links to circulars, publications and a proposal portal provided. Airport Layout Plan (ALP) attached to email. Respondent suggested coordination with City of Phoenix on updates to the ALP. Coordination occurred with FAA in the vicinity of the I-10/I-17 Split interchange relative to the PHX south runway airspace issues. No major concerns were expressed with the recommended alternative features in this area.
Federal Transit Administration	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Western Area Power Administration	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Federal Railroad Administration	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Federal Emergency Management Agency	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
U.S. Department of Agriculture	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
<b>State</b>			
Arizona Department of Transportation	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Charter, Management, and Alternatives Evaluation Partner	Actively involved at every decision point (at multiple levels within ADOT), and reviewed and commented on all documentation generated by the Spine study.
Arizona Transportation Board – District 1	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Attorney General – Transportation Division	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Department of Public Safety	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Charter and Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Arizona Department of Homeland Security	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Department of Environmental Quality	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Game and Fish Department	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Department of Water Resources	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Arizona State Land Department	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Arizona Department of Administration	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	I-10 West Light Rail Extension might have large impact. Study additional alternative modes such as: regional transportation options, commuter rail, light rail extensions, street cars, etc.
Arizona State Parks Department – State Historic Preservation Office (SHPO)	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
County			
Maricopa County Department of Transportation	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Flood Control District of Maricopa County	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Maricopa County Parks and Recreation Department	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Maricopa County Planning and Development Department	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
Maricopa County Sheriff's Office	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Maricopa County Administration Office	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting) Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
<b>Local</b>			
City of Phoenix	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting) Alternatives review: November 18 and December 2, 2016 (City of Phoenix staff member presentation) January 4, 2017 (public meeting invitation letter) February 14, 2017 (City of Phoenix Transportation and Infrastructure Committee presentation)	Planning and Alternatives Evaluation Partner	<ol style="list-style-type: none"> <li>1. Transportation Dept.: Many of the signalized arterials have older signalized technology with limited capabilities that are inherent to active traffic management strategies.</li> <li>2. Adjacent neighborhoods and flood control. Study Integrated Corridor Management/ITS and consolidated drainage facilities.</li> <li>3. Aviation Dept.: The Aviation Department has several planned projects in the Study Area. The airport roadways and nearby State Route 143/I-10 traffic interchange are congested. Airport officials are concerned as traffic increases, cut through traffic will further congest the airport. Several regulations, statutes and circulars cited may be relevant to the study. Sky Train Stage 2 map provided.</li> <li>4. Historic Preservation Dept.: Noted that most information/survey activity of historic properties has been concentrated along I-10 through central Phoenix. Recently, ADOT commissioned a study of potentially eligible historic properties along I-17 from the 10/17 split, around the Durango curve, north to Loop 101. Moving forward, staff directed that a thorough historical resource survey be completed within the area of potential effects.</li> </ol>
City of Tempe	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting) Alternatives review: November 17, 2016 (City of Tempe staff member presentation) January 4, 2017 (public meeting invitation letter) January 10, 2017 (City of Tempe Transportation Committee presentation)	Planning and Alternatives Evaluation Partner	No major concerns identified at this stage

<b>Establishment of organizational relationships – tribes and agencies</b>			
<b>Tribe or agency</b>	<b>Date(s) contacted</b>	<b>Describe level of participation</b>	<b>Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.</b>
City of Chandler	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: November 17, 2016 (City of Chandler staff member presentation) January 4, 2017 (public meeting invitation letter)	Planning and Alternatives Evaluation Partner	No major concerns identified at this stage
Town of Guadalupe	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: November 14, 2016 (Town of Guadalupe staff member presentation) January 4, 2017 (public meeting invitation letter)	Planning and Alternatives Evaluation Partner	No major concerns identified at this stage
Neighboring MAG member agencies: Cities of Glendale, Mesa, Tolleson, Scottsdale, Paradise Valley, Avondale and Peoria	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Agency Partner	No major concerns identified at this stage
<b>Regional agencies</b>			
Maricopa Association of Governments (MAG)	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Charter, Management, and Alternatives Evaluation Partner	Managed the study. Actively involved at every decision point (at multiple levels within MAG), and reviewed and commented on all documentation generated by the Spine study.

Establishment of organizational relationships – tribes and agencies			
Tribe or agency	Date(s) contacted	Describe level of participation	Describe the agency's primary concerns and the steps needed to coordinate with the agency during NEPA scoping.
Valley Metro Regional Public Transportation Authority (Valley Metro)	Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) February 23, 2015 (agency meeting)  Alternatives review: January 4, 2017 (public meeting invitation letter)	Charter, Planning, and Alternatives Evaluation Partner	No major concerns identified at this stage

Establishment of organizational relationships – stakeholders and members of the public			
Public and stakeholders	Date(s) contacted	Describe level of participation	Describe the primary concerns expressed by members of the public and stakeholders.
<b>Public</b>			
Members of the public (Public meeting participation also included the tribes; federal, state and local agencies; state, regional, county and local governments; and other stakeholders involved in the Spine study.)	Needs assessment: <ul style="list-style-type: none"> <li>▪ Three public information meetings (February 25 and 26 and March 4, 2015)</li> </ul>	Needs assessment: <ul style="list-style-type: none"> <li>▪ Public feedback (online survey, website, email, public meeting, mail) during the 30-day comment period around the public meetings</li> </ul>	Needs assessment phase public feedback on Spine corridor priorities ranking: <ul style="list-style-type: none"> <li>▪ Improve commute</li> <li>▪ Add travel choices</li> <li>▪ Protect the environment</li> <li>▪ Increase connections</li> <li>▪ Promote neighborhoods</li> <li>▪ Improve commerce</li> <li>▪ Minimize cost</li> <li>▪ Emphasize jobs</li> </ul>
Members of the public (Public meeting participation also included the tribes; federal, state and local agencies; state, regional, county and local governments; and other stakeholders involved in the Spine study.)	Alternatives evaluation: <ul style="list-style-type: none"> <li>▪ Three public information meetings (January 24, 25, and 26, 2017)</li> </ul>	Alternatives review: <ul style="list-style-type: none"> <li>▪ Public feedback (website, email, public meeting, mail) during the 30-day comment period around the public meetings</li> </ul>	Alternatives review phase public feedback on recommended Spine corridor improvements: <ul style="list-style-type: none"> <li>▪ Managed lanes strategy</li> <li>▪ Designated entry points</li> <li>▪ Property acquisition</li> </ul>

Establishment of organizational relationships – stakeholders and members of the public			
Public and stakeholders	Date(s) contacted	Describe level of participation	Describe the primary concerns expressed by members of the public and stakeholders.
<b>Other Stakeholders</b>			
<p><b>Utilities</b></p> <ul style="list-style-type: none"> <li>▪ Arizona Public Service</li> <li>▪ Central Arizona Project</li> <li>▪ CenturyLink</li> <li>▪ Cox Communications</li> <li>▪ Salt River Project</li> <li>▪ Southwest Gas</li> </ul> <p><b>School Districts</b></p> <ul style="list-style-type: none"> <li>▪ Alhambra Unified School District</li> <li>▪ Chandler Unified School District</li> <li>▪ Glendale High School</li> <li>▪ Kyrene School District</li> <li>▪ Murphy Elementary School District</li> <li>▪ Phoenix Elementary School District</li> <li>▪ Phoenix Union High School</li> <li>▪ Roosevelt Elementary School District</li> <li>▪ Tempe Elementary School District</li> <li>▪ Tempe Union High School District</li> <li>▪ Washington Elementary School District</li> </ul> <p><b>Medical Facilities</b></p> <ul style="list-style-type: none"> <li>▪ Chandler Regional Medical Center</li> <li>▪ John C. Lincoln Hospital Deer Valley</li> <li>▪ Tempe St. Luke's Hospital</li> </ul> <p><b>Other Organizations</b></p> <ul style="list-style-type: none"> <li>▪ Center for Biological Diversity (CBD)</li> <li>▪ Local Initiative Support Corporation Phoenix</li> <li>▪ Sky Island Alliance (SIA)</li> <li>▪ Sierra Club</li> <li>▪ Sustainable Communities Collaborative</li> </ul> <p><b>Venues</b></p> <ul style="list-style-type: none"> <li>▪ Martin Luther King, Jr. March and Festival</li> <li>▪ African American Conference on Disabilities</li> </ul>	<p>Needs assessment: January 30, 2015 (agency meeting invitation and public meeting invitation letter) (utilities, CBD, Sierra Club and SIA)</p> <p>February 23, 2015 (agency meeting) (utilities, CBD, Sierra Club and SIA)</p> <p>Alternatives review: January 4, 2017 (public meeting invitation letter) (utilities, school districts, medical facilities, other organizations)</p> <p>January 16, 2017 (Martin Luther King, Jr. March and Festival)</p> <p>February 17, 2017 (African American Conference on Disabilities)</p>	<p>Other interested stakeholders</p>	<p>No major concerns identified at this stage</p>

Planning assumptions and analytical methods
<i>Did the study provide regional development and growth assumptions and analyses? If so, what were the sources of the demographic and employment trends and forecasts?</i>
<p>The Spine study included regional development and growth data for the greater Phoenix metropolitan area as compared with the Spine study area. These data compared existing conditions with the Spine study planning horizon year of 2040 for both build and no-build alternatives. The following were the primary sources of demographic and employment data, trends and forecasts:</p> <ul style="list-style-type: none"> <li>▪ U.S. Census Bureau – American Community Survey (2012)</li> <li>▪ Arizona Department of Administration (2012)</li> <li>▪ MAG demographic, employment and land use data (2014, 2015, and 2016)</li> <li>▪ <i>City of Chandler Transportation Master Plan (2009) and General Plan (2008)</i></li> <li>▪ <i>City of Phoenix General Plan (2015), Transportation Master Plan 2050 (2015) and Sky Harbor Layout Plan (2011)</i></li> <li>▪ <i>City of Tempe General Plan (2015), Transportation Master Plan (2015)</i></li> <li>▪ <i>Town of Guadalupe General Plan (1992)</i></li> </ul>
<i>What were the future-year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs, and network expansion?</i>
<p>Future-year policy and the data assumptions used in the transportation planning process for the Spine study were generated by MAG, the municipal planning organization for the area. In accordance with federal law, MAG is the governing authority for transportation policy and data in Maricopa County. Governed by its Regional Council and various committees, it the responsibility of MAG to develop the population and other socioeconomic datasets used in the development of the RTP to demonstrate consistency in the transportation planning process for all programs, projects and documentation. All regional socioeconomic datasets and projections developed by MAG must be consistent with USDOT federal transportation planning and air quality conformity regulations required under the Clean Air Act (CAA). These data and information must be approved by the MAG Regional Council prior to its release for use.</p> <p>MAG developed policy and planning elements for the planning horizon year of 2040 used in the transportation planning process by the Management Partners to conduct the Spine study. They were specific to the Spine corridor to address travel demands from projected growth and distribution of population, housing and employment from increased economic development, transportation costs and Spine network expansion. They were also specific to the development of the purpose and need statement in the form of fundamental questions about Spine system elements that formed the basis of the study. These elements were based on FHWA guidance to define "transportation problem(s)" warranting remedial action, as follows:</p> <p><b>Capacity and Demand:</b> Is the capacity of the existing facilities inadequate for the present and projected traffic?</p> <p><b>System Linkage:</b> Do the facilities serve as a "connecting link" to an overall system, or as an integral part of an integrated transportation system?</p> <p><b>Social Demands and Economic Development:</b> If the condition of the facilities in question continues to degrade and they are unable to fulfill their intended purpose, would social and economic characteristics of the surrounding region be adversely affected?</p> <p><b>Roadway Deficiencies:</b> Are improvements necessary to correct existing roadway deficiencies because of substandard design or aging infrastructure? How would the proposed action improve them?</p> <p>The Spine study's planning elements and purpose and need statement are explained in detail in Chapter 11 (Need and Purpose for the Proposed Action) of the NAR.</p>

*Were the planning elements/assumptions and the corridor vision/purpose and need statement consistent with each other and with the long-range transportation plan? Are the assumptions still valid?*

The planning elements for Spine study were specific to the Spine corridor purpose and need statement and meant to be fully consistent with each other. The overarching purpose of the Spine Corridor Master Plan is to identify and budget for long-term preferred solutions to meet the needs of the transportation challenges facing I-10, I-17, key arterial streets and Interstate traffic interchanges to function within a regional transportation system in the Spine corridor. The preferred solutions would include actions to:

- Improve capacity for future multimodal travel demand generated by projected population and employment growth
- Improve regional traffic flow and mobility through the corridor by reducing travel times and duration of congestion
- Reduce congestion on the local arterial street network and Interstate traffic interchanges and retain local access
- Improve the Spine transportation system to more efficiently accommodate regional and Interstate movement of people and goods
- Improve mobility in the corridor to be safer and more reliable
- Improve and support economic vitality by providing efficient and convenient access to businesses and activity centers in the corridor
- Improve system linkages and multimodal connections in the corridor
- Meet regional goals and objectives, as well as satisfy voter expectations and mandates

The Spine study's planning elements and purpose and need statement are explained in detail in Chapter 11 (Need and Purpose for the Proposed Action) of the NAR and were used extensively to develop the Spine recommended alternative, as described in Chapter 4 (Screening Process) of the ASTR. One of the primary purposes of the Spine Corridor Master Plan is to establish a project or group of projects to incorporate into the MAG RTP that will meet the long-term regional vision for the Spine corridor through 2040.

The Spine study's planning elements and purpose and need statement are still valid.

### **Data, information, and tools**

*Are the relevant data used in the study available in a compatible format that is readily usable? Are they available through a centralized web portal?*

The relevant data, information, mapping and graphics used to evaluate the needs of the Spine corridor, generate potential ideas to address those needs, evaluate and screen those ideas and guide the decision-making process to determine the recommended alternative have been documented in the NAR and ASTR. Both of these documents, complete with appendices, are available in pdf format on the MAG website at: [spine.azmag.gov](http://www.azmag.gov) (<http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan>).

*Are the completeness and quality of the data consistent with the quality (not scale or detail) of inputs needed for a NEPA project-level analysis<sup>6</sup>?*

With guidance and approval from the Management Partners (MAG, ADOT and FHWA), the Spine study analysis was developed to a level of completeness and quality sufficient for a planning-level study to appropriately differentiate each alternative considered so that decisions could be made with confidence from the Management Partners. This was underscored by the adoption of the Spine recommended alternative into the RTP by the MAG Regional Council on May 24, 2017, as noted above in Part 2. This is also documented extensively in the NAR and the ASTR.

Ultimately, it was concluded that all alternatives advanced to the Level 3 and Level 4 screening were similar in nature regarding the level of impact on the natural, cultural and built environments throughout the study area with minimal differentiation regarding impacts. As a result, a thorough NEPA project-level analysis will need to be prepared for each of the identified projects, but impacts are expected to be minimal relative to the scope of the study. The potential areas of impact that were identified in the environmental analysis as critical environmental elements in Chapter 2 (Environmental Factors) of the NAR were the following:

- Air quality
- Hazardous materials
- Section 4(f) and Section 6(f) resources
- Land use, ownership and jurisdiction
- Socioeconomics
- Title VI and environmental justice populations
- Cultural resources

Existing conditions data were collected in each of these categories based on older NEPA studies in the corridor, database research, windshield surveys and readily available geographic information system data sources.

Surface water, wetlands and floodplains were also discussed in Chapter 2, but were not considered a critical environmental element. For each of the environmental assessment areas, the analysis consisted of describing existing conditions in the Spine study area based on secondary data review, defining any regulatory or permitting requirements, identifying data gaps, specifying environmental concerns and making recommendations for NEPA impact analysis requirements for future Spine projects. Additionally, a key factor that was evaluated in the environmental analysis was the potential for project alternatives to result in significant adverse effects on a given resource in the Spine study area's urban setting. This was carried forward as part of the alternatives identification, screening and selection process in the ASTR.

Other potential NEPA subject areas were considered as not critical for detailed analysis in Chapter 2. A more detailed discussion of each NEPA

<sup>6</sup> For an explanation of the types of information needed to evaluate impacts in environmental documents, please see FHWA's "NEPA and Transportation Decisionmaking: Impacts," <[Analysis of Impacts](#)>. This website provides links to six additional resources and guidance that should be helpful in understanding the types of impacts that need to be assessed, their context, and their intensity.

<p>resource or impact area as they relate to the Spine study can be reviewed in the <i>Checklist for Environmental Planners – Part 3</i> of this PEL document.</p>
<p><i>Are the data used in the study regularly updated and augmented? If regularly updated, provide schedule and accessibility information.</i></p>
<p>The environmental, land use and socioeconomic data specifically for the Spine study or study area will not be regularly updated. As noted previously in this PEL document, the purpose of the Spine Corridor Master Plan was to develop an improvement and implementation strategy to manage travel demand, operations and congestion in the I-10 and I-17 corridors. The primary outcome of the Spine study is a detailed strategy to undertake the planning, NEPA compliance, permitting, design and construction of specific projects that were approved by MAG as part of the recommended alternative in the I-10 and I-17 corridors through 2040. Further, given the long-range nature of the Spine study and as time passes, individual NEPA actions undertaken at various points in time for each project will need to analyze and evaluate the specific environmental study area in more detail, along with revising and updating existing conditions source data, regulatory requirements and impact methodologies for each NEPA resource and impact area as necessary. The data in the Spine study should be used primarily as a reference during the initial NEPA issue definition phase for each Spine project.</p> <p>The data used to prepare the environmental assessments for the Spine study are revised and updated on a regular basis by MAG, ADOT, resource agencies and other organizations that maintain such databases and repositories. MAG updates socioeconomic and traffic network data used for the Spine study operational analysis on a periodic basis in response to changing conditions in the economy, growth, land use, and related factors. Other agencies and organizations update data and information based on their specific mission needs and requirements. Such data would be used to prepare NEPA documentation for each future Spine project at the time each one is implemented, as determined by MAG, ADOT, and FHWA.</p>
<p><i>Have the environmental data been mapped at scales that facilitate comparison of effects across different resources and at sufficient resolution to guide initial NEPA issue definition? If not, what data collection and/or manipulation would likely be needed for application to the NEPA scoping process?</i></p>
<p>As discussed in the response to the question above regarding completeness and quality of the data, this includes the mapping that was prepared as part of the environmental analysis for the Spine study. Mapping was prepared for the seven critical environmental elements and water resources discussed in Chapter 2 (Environmental Factors) of the NAR in the Spine study area at a resolution and level of detail to be used as a reference during the initial NEPA issue definition phase for each Spine project. New or revised mapping for applicable NEPA environmental study areas would be needed for individual Spine projects, as discussed in the response to the question above regarding updating and augmenting data.</p>

Examine the Checklist for Environmental Planners, at the back of this document, for more detail about potential impacts that could be mapped. Below is an abbreviated list of resources that could occur in the study area and may be knowable at this time and at the study's various analytical scales:

Resource or issue	Is the resource or issue present in the area?	Would any future transportation policies or projects involve the issue? Would there be impacts on the resource?	Resource or issue	Is the resource or issue present in the area?	Would any future transportation policies or projects involve the issue? Would there be impacts on the resource?
Sensitive biological resources	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Section 4(f) <sup>7</sup> wildlife and/or waterfowl refuge, historic site, recreational site, park	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Wildlife corridors	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Section 6(f) <sup>8</sup> resource	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Wetland areas	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Existing development	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Riparian areas	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Planned development	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
100-year floodplain	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Title VI/ Environmental justice populations <sup>9</sup>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Prime or unique farmland or farmland of statewide or local importance	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Utilities	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Visual resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Hazardous materials	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Designated scenic road/byway	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Sensitive noise receivers <sup>10</sup>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Archaeological resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Air quality	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable
Historical resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Other (list) Salt River; waters of the U.S. per Section 404/401 of Clean Water Act	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable

<sup>7</sup> Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S. Code § 303, as amended); see <[Section 4\(f\)](#)>.

<sup>8</sup> Section 6(f) of the Land and Water Conservation Fund Act

<sup>9</sup> refers to Title VI of the 1964 Civil Rights Act and 1994 Executive Order 12898 on environmental justice

<sup>10</sup> under FHWA's Noise Abatement Criterion B: picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals

<p><i>Did the study incorporate models of, for example, species/habitat locations (predictive range maps), future land use, population dynamics, stormwater runoff, or travel demand? What models were used? Did the study adequately document what models were used, who was responsible for their use, and how they were used (with respect to, for example, calibration, replicability, contingencies, and exogenous factors)?</i></p>
<p>The travel demand and traffic operations analysis relied on available ADOT Freeway Management System data and outputs from the MAG travel demand model for existing 2014 conditions and forecast 2040 conditions. The MAG population and socioeconomic datasets and forecasts, which are rigorously vetted and tested on a frequent basis, are key components that drive the travel demand and air quality conformity models for the region. Forecast 2040 travel demand networks were created by the study team based on the base 2040 MAG network for each of the alternatives in the Level 3 and Level 4 screening, including the no-build, to reflect the description of the alternatives. The existing and no-build conditions travel demand analysis can be reviewed in Chapter 3 (Travel Demand and Traffic Operations Factors) in the NAR. For the build alternatives, the travel demand analyses can be found in Chapter 4 (Screening Process) in the ASTR. The Management Partners were responsible for the use, outputs and verification of the travel demand model.</p> <p>The environmental documentation in the NAR did not require the specific incorporation of data modeling to meet the needs of the analysis, findings and recommendations at that level of study. It relied on existing resource, built environment, land use and socioeconomic data from a variety of sources that were not altered for this study. The sources of the data, information and mapping used in the analysis were reviewed and approved by the Management Partners as being the best available during the review periods for the environmental documentation.</p>
<p><i>In scoping, conducting, and documenting the planning study, participants have come across documents and leads from agency staff and other sources that the environmental planners may be able to use in conducting their studies. List any applicable memoranda of understanding, cost-share arrangements, programmatic agreements, or technical studies that are underway but whose findings are not yet published, etc.</i></p>
<p>In general, no such applicable documents, memoranda of understanding, programmatic agreements or technical studies were identified during the preparation of the environmental analysis for the Spine study that environmental planners could use in conducting their studies, as described above. When conducting a NEPA action for a future Spine project, environmental planners would use Chapter 2 (Environmental Factors) of the NAR as a reference and use the same or similar data sources used to prepare the environmental analysis, including any documentation noted above prepared subsequent to the completion of the Spine Corridor Master Plan. The identification or availability of such documentation would be determined during the initial NEPA issue definition and data gathering phase for each Spine project.</p> <p>There are two possible exceptions. First, the City of Phoenix passed a transportation funding initiative during the course of the Spine study called Transportation 2050 (T2050). As of the final publication of the Spine reports, many elements of T2050 were still undefined and not yet published. However, every effort was taken to coordinate with the City of Phoenix to incorporate what T2050 elements were known into the recommended alternative. Second, the Spine corridor includes four planned Valley Metro light rail crossings of the freeway. The Spine study included a significant coordination effort with Valley Metro for each of these crossings, and the recommended alternative reflects the best joint solution for both the freeway and the light rail facility in each case. However, because all of the light rail crossings are still being studied or designed, coordination will need to continue at each. Additionally, there could be opportunities for cost-share arrangements at each location, but these were not defined as part of the Spine study.</p>
<p><b>Development of alternatives</b></p>
<p><i>Were resource agencies, stakeholders, and members of the public engaged in the process of identifying, evaluating, and screening out modes, corridors, a range of alternatives,<sup>11</sup> or a preferred alternative (if one was identified—the latter two refer to corridor plans)? If so, how? Did these groups review the recommendation of a preferred mode(s), corridor(s), range of alternatives (including the no-build alternative), or an alternative? Were the participation and inputs of these groups at a level acceptable for use in purpose and need statements or alternatives development sections in NEPA documents? If not, why not?</i></p>
<p>Public agencies, tribes, stakeholders and members of the public were provided numerous opportunities to review and provide input and feedback to the Spine study team on recommended improvements in the form of potential future projects that made up the draft Spine recommended alternative. From January 4 to February 17, 2017, the Spine study team held four stakeholder and public information meetings, attended various community and media events to educate and engage members of the community, and solicited comments through a variety of media, including the opportunity to provide input through the Spine study website at: spine.azmag.gov (<a href="http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan">http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan</a>). During the comment period noted above, the Agency Partners had the opportunity to review and comment on the recommended alternative, but no comments were received from them on the recommended alternative.</p> <p>After the conclusion of the comment period on the proposed Spine recommended alternative in February 2017, the Spine study team reviewed and analyzed the input, feedback and suggestions from comments received. The Spine study team concluded that an expanded managed lane system on I-10 and I-17, combined with numerous localized improvements in the Spine corridor, should be the Spine corridor recommended alternative. Generally, this means that the current managed lanes (high-occupancy vehicle [HOV] lanes) would be expanded with a second HOV lane in segments where HOV lanes currently exist, new HOV lanes would be added where none exist under existing conditions, and new direct HOV (DHOV) ramps would be added to connect and terminate this expanded system. Operational flexibility regarding how these managed lanes could be used to address the uncertainty of future needs is a key advantage of this recommendation. Localized improvements would target deficient interchanges, weaving sections, bicycle and pedestrian crossings, traffic interchange upgrades and arterial capacity gaps. It is important to note that four changes were made to the draft recommended alternative before it was finalized to specifically incorporate comments received from the agencies and the public during this comment period. Specifically, this included adding a high-capacity interchange upgrade to I-17 and Glendale Avenue, eliminating</p>

<sup>11</sup> For an explanation of the development of alternatives in environmental documents, please see FHWA's "NEPA and Transportation Decisionmaking: Development and Evaluation of Alternatives," <[Alternatives](#)>.

<p>the I-17/Osborn Road bicycle and pedestrian bridge (because of significant public objections to this crossing), eliminating the DHOV ramp feature at I-10/Sky Harbor Circle North, and adding a bicycle and pedestrian crossing to I-10 near the projected Knox Road alignment.</p> <p>The Spine study agency and public participation program was a vital component of the alternatives development process for the Spine recommended alternative, along with the preparation of the purpose and need statement. It is important to note that a draft purpose and need statement was initially prepared during the early stages of the NAR. It was finalized and approved after the results of the agency and public meetings and outreach activities during February and March 2015 were analyzed and incorporated into the report. The purpose and need statement for the Spine study became the criteria by which the Spine corridor alternatives were identified, screened and selected for the Spine recommended alternative. Both the Spine purpose and need for the proposed action and the Spine recommended alternative were, therefore, very much informed by the Spine corridor public involvement program and are at a level acceptable for use and reference for the preparation of NEPA actions for future individual Spine projects.</p> <p>The public involvement and outreach process was documented in detail as important components of the ASTR, which was finalized and approved in September 2017. Agency, tribe, stakeholder and public participation, input and feedback are documented in Chapter 5 (Agency and Public Involvement) and Appendix C (Agency and Public Involvement) of the ASTR.</p>
<p><i>Describe the process of outreach to resource agencies, the public, and other stakeholders. Describe the documentation of this process and of the responses to their comments. Is this documentation adequate in breadth and detail for use in NEPA documents?</i></p>
<p>Public and resource agencies, tribes, stakeholders and members of the public with an interest in the Spine study were engaged to a significant degree during the preparation of both the NAR and the ASTR. The agency and public involvement process undertaken for the Spine study was one of the primary objectives of the Spine study team. Although the public involvement and outreach input and feedback the Spine study team was seeking during the needs assessment and alternative review process was specific to each study phase, the public outreach process undertaken by the Spine study team was primarily the same in its basic approach.</p> <p><b>Needs Assessment Public Involvement Phase</b></p> <p>The public involvement activities undertaken by the study team during the needs assessment phase of the Spine study consisted of an agency partner information meeting held on February 23, 2015, to obtain agency input regarding the identification of issues, needs, concerns and ideas early in the Spine study process for inclusion in the NAR. An <i>Agency Information Meeting Summary</i> was prepared and provided to each agency attendee. Members of the public were provided opportunities to provide input at three public meetings during February and March of 2015. The public also had the ability to provide input and feedback on the needs assessment phase of the Spine study through the review of Spine study reports, data, information, mapping, news releases and project updates on the Spine study website at: spine.azmag.gov (<a href="http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan">http://www.azmag.gov/Programs/Transportation/Freeways-and-Highways/I-10-I-17-Spine-Corridor-Master-Plan</a>). Another key approach used to obtain public input on the identification of needs in the Spine corridor to help determine a future multimodal transportation improvement program was the use of an online survey tool known as MetroQuest. It gave users the ability to provide the study team with input on Spine corridor priorities, potential modal improvement strategies, how the public currently accesses and uses the Spine, how the Spine could be improved and other comments about the Spine corridor. Other media outreach components included invitation and scoping letters to agency representatives, online comment form, email and hardcopy comment forms, local media relations, newspaper display notices, e-newsletters, social media, public meeting information banners and an interactive map viewer.</p> <p>The results of the agency and public input and feedback on the needs of the Spine Corridor to develop a long-term Spine improvement program were incorporated into the NAR and used with the other Spine needs assessment criteria in the report to prepare the purpose and need statement. The public involvement and outreach process was documented in detail as an important component of the NAR, which was finalized and approved by the Spine study team in June 2016. Agency, tribe, stakeholder and public participation, input and feedback are documented in Chapter 10 (Agency and Public Feedback) and in Appendix J (Draft Agency and Public Involvement Summary Report) of the NAR. This outreach effort mainly focused on collecting existing condition information and what levels of future engagement was requested from the public and resource agencies. Several thousand comments were received on a wide range of topics including freeway and transit operational concerns, safety issues and bicycle and pedestrian issues, to name just a few. Resource agency feedback was limited, primarily because they felt the corridor was already built out and heavily disturbed. FAA, however, was interested in continued coordination throughout the study relative specifically to the I-10/I-17 Split interchange and any modifications there that may affect the Sky Harbor International Airport airside operations.</p> <p><b>Recommended Alternative Review Public Involvement Phase</b></p> <p>The public involvement and outreach activities undertaken by the study team during the alternatives development phase are described in the <i>Development of Alternatives</i> question above regarding how agencies, tribes, stakeholders and the general public were involved in the review of the draft Spine recommended alternative. Note also that many of the agency and public involvement and outreach methods described above for the needs assessment phase were used during the alternatives phase. Specific to the FAA concerns raised during the needs assessment phase of the study, the study team did specifically reach out to FAA to follow up and present the draft recommended alternative. FAA had no objections to the recommended alternative design features.</p> <p>The documentation prepared for the Spine public involvement program is more than adequate in breadth and detail for use and reference for the preparation of NEPA actions for future individual Spine projects.</p>
<p><i>If the study was a corridor study, describe the range of alternatives considered (if any), screening process, and screening criteria. Include what types of alternatives were considered (including the no-build alternative) and how the screening criteria were selected. Was a preferred alternative selected as best addressing the identified transportation issue? Are alternatives' locations and design features specified?</i></p>
<p>One of the primary objectives of the Spine Corridor Master Plan is to identify, screen and select measures to improve long-term traffic operations, accessibility and safety in the existing Spine corridor of I-10 and I-17, along with existing key arterial streets and Interstate traffic interchanges. At the conclusion of the NAR, it was clear to the Spine study team that without major improvement to the Spine corridor, the metropolitan Phoenix transportation system would suffer and continue to greatly deteriorate in the foreseeable future. The Spine study team then began the next phase of the study to identify long-term improvements to the Spine corridor by developing concepts, ideas and strategies to address the issues, needs and deficiencies identified in the NAR. The Spine study team set out to accomplish this task through the use of an alternatives identification, evaluation, screening and selection process. Alternatives to improve travel and reduce travel times in the future year of 2040 focused on improving the existing</p>

Spine corridor infrastructure and adding new, modernized improvement measures and additional modes of transportation. The Spine alternatives development process for the ASTR was undertaken by the Spine study team as follows:

#### Spine Corridor Alternatives Identification and Development Workshop

A 2-day workshop was first conducted to identify and develop ideas, concepts and strategies that addressed the issues, needs and deficiencies identified within the 31-mile Spine corridor. MAG hosted the Alternatives Development Workshop on June 22 and 23, 2016. It was attended by personnel from MAG, ADOT, FHWA, City of Phoenix, City of Tempe, City of Chandler, Valley Metro, the Arizona Department of Public Safety and transportation and mobility experts from the Spine study team. The workshop generated over 349 unique improvement ideas, concepts and strategies that were carried forward into the alternatives screening process. Once compiled, the Alternatives Evaluation Partners, made up of the Management Partners and Planning Partners—the Cities of Phoenix, Tempe, and Chandler and Valley Metro—was created to assist with the screening process and to achieve consensus so that the recommended alternative emerging from the Spine study would achieve the full support of the key stakeholders. Appendix A (Alternatives Development Workshop Presentation) to the ASTR provides the workshop presentation.

#### Alternatives Evaluation and Screening Process

The alternatives that emerged from the Alternatives Development Workshop went through a four-level screening process, discussed in detail in Chapter 4 (Screening Process) in the ASTR. This screening process was done by the study team under the supervision of the Management Partners, with input from the Alternatives Evaluation Partners. The Charter Partners were updated at major milestones during the process. One of the important requirements for the Spine study team was organizing the alternatives and developing the methodology and progression of screening the alternatives. The alternatives generated from the Alternative Development Workshop were separated into two main categories: backbone and supporting. *Backbone alternatives* involved solutions that addressed the entire Spine corridor and addressed issues or recommended improvements on a corridor-wide basis. *Supporting alternatives* affected other Spine components that included specific segments, traffic interchanges, other transportation modes and other Spine corridor system components.

The backbone category was subdivided into five subcategories:

- Highway capacity
- New routes
- New transit
- System traffic interchanges
- Technology

The supporting category was subdivided into seven subcategories:

- Arterial streets
- Bicycle/pedestrian
- Policy
- Service traffic interchanges
- Travel demand management/transportation system management
- Transit enhancements
- Weave sections

The alternative screening and selection process was developed based on four levels of evaluation and screening:

Level 1 – Fatal flaw and qualitative screening (349 alternatives)

Level 2 – Two-phase quantitative screening of backbone and supporting alternatives:

Level 2A – Optimization, expand/modernize, performance and sustainability criteria (286 alternatives)

Level 2B – Implementation criteria (9 backbone alternatives)

Level 3 – Qualitative and quantitative screening of backbone alternatives with supporting alternative elements

Environmental, operations, engineering, safety and commerce/economic development criteria (5 backbone/base build alternatives)

Level 4 – Qualitative and quantitative hybrid alternative screening criteria (2 alternatives)

#### Level 1 Screening

The Level 1 screening of the 349 unique ideas, concepts and strategies identified during the Alternatives Development Workshop was a fatal flaw analysis based primarily on a qualitative screening to quickly eliminate the alternatives that did not meet the elements of the purpose and need of the Spine study (The specific elements of the Spine study purpose and need statement are itemized in the *Planning Assumptions and analytical methods* section above in Part 2, regarding the question regarding whether the planning elements of the Spine study were consistent with the purpose and need statement.). When necessary, a minimal amount of quantitative analysis was completed for alternatives where qualitative analysis alone would not suffice to determine whether a proposed alternative met the purpose and need for the Spine study. (See Section 4.2, Level 1 Screening, in Chapter 4, Screening Process, in the ASTR).

#### Level 2 Screening

Of the initial 349 alternatives from the Alternatives Development Workshop, 286 alternatives passed the Level 1 fatal flaw screening: 92 were categorized as backbone alternatives and 194 as supporting alternatives.

#### Level 2A Screening

In the first stage of the Level 2 screening, noted as the Level 2A screening process, backbone and supporting alternatives were qualitatively and

quantitatively analyzed based on the following criteria. These criteria were selected based on several discussions with the Management Partners and Alternatives Evaluation Partners.

- Optimize – use what is available before making any major physical improvement by engaging technology and practical design criteria
- Expand/modernize – upgrade the transportation system to address the growth in trips and congestion beyond what existing system optimization can provide
- Performance – focus on meeting the demand for trips between the I-10/I-17 travel markets and system reliability for all travel modes and choices
- Sustainability – propose improvements that protect, improve, enhance or restore the natural and built environment, emphasize energy efficiency and minimize life cycle costs

After additional review and analysis by the Spine study team and approval by the Charter and Management Partners, an additional 35 supporting alternatives were added after the Alternatives Development Workshop—totaling 229—and evaluated as part of the Level 2A screening process. Each alternative was rated using a 5-point scoring system, with 1 the worst performing and 5 representing the best performing. This system was based on how each alternative performed when compared with the above criteria against the no-build alternative.

The backbone and supporting alternatives were then placed into one of the following recommendation categories to provide definition to help the study team further refine and classify the alternatives in subsequent screening stages:

- Alternative – Backbone or core alternative concept involving the overall Spine corridor
- Alternative Feature – Supporting alternative element, concept or improvement that could be added or considered in conjunction with a backbone/core alternative(s)
- Impact Remedy – Supporting alternative element, concept or improvement that could be considered to offset impacts in conjunction with a backbone/core alternative(s)
- Policy Option – Supporting alternative element, concept or improvement that could be considered based on an agency policy change or legislative solution in conjunction with a backbone/core alternative(s)
- Study Option – Supporting alternative element, concept or improvement that could be considered based on further study in conjunction with a backbone/core alternative(s)
- Underway – Projects that are already being implemented in the Spine corridor and are exempt from future consideration
- Parking Lot – Supporting alternative element, concept or improvement classified as an alternative feature, impact remedy, policy option or study option. Supporting alternatives in the parking lot categories would not receive any further analysis in Level 2B screening but would be evaluated as potential elements, concepts or improvements in conjunction with the selected backbone alternatives during the Level 3 screening process
- Drop – Supporting alternative element, concept or improvement recommended for elimination and dismissed from further consideration

Of the 92 corridor-wide backbone alternatives, the study team determined that nine met the Level 2A screening criteria to be evaluated in the second stage of the Level 2 screening, noted as the Level 2B screening process. The 229 supporting alternatives evaluated during the Level 2A screening process were categorized as an Alternative Feature (34), Impact Remedy (68), Policy Option (47), Study Option (10), or Underway (8). The supporting alternatives in these categories were placed in the parking lot to be evaluated during the Level 3 screening process with the backbone alternatives selected after Level 2B screening was completed. A total of 61 supporting alternatives were dropped from further consideration after Level 2A screening was completed, leaving a total of 168 that could potentially be included for use as an improvement project in support of a backbone alternative(s). (See Section 4.3, Level 2 Screening, and Section 4.3.1, Level 2A Screening, in Chapter 4, Screening Process, in the ASTR.)

### Level 2B Screening

The Level 2B screening process focused on the how well each of the nine backbone alternative could be implemented based on the following criteria, which were selected by the Management Partners and Alternatives Evaluation Partners:

- Practicability/feasibility
- Alternative adaptability
- Municipality and agency support
- Programming flexibility

Each alternative was also rated using the 5-point scoring system similar to that used for the Level 2A screening. The backbone alternatives selected for further screening received high implementation criteria scores, met the Spine study's purpose and need and were determined to improve future travel demand, corridor capacity, safety and system operability. The study team determined that the following five backbone alternatives would advance to the Level 3 screening process, along with two additional alternatives added and approved by the Charter and Management Partners:

- Rehabilitate, rebuild, and modernize I-17 to full Interstate standards
- Add new general purpose lanes in each direction on I-10 and I-17
- Add new HOV lanes in each direction on I-10 and I-17
- Convert the existing HOV lanes into high-occupancy toll (HOT) lanes on I-10 and I-17
- Convert the existing HOV lanes into striped express and local lanes on I-10 and I-17
- ✓ Convert the existing HOV lanes to HOT or express/local lanes on I-10 and I-17 (added after Level 2B screening)
- ✓ Add a second HOT or express/local lanes on I-10 and I-17 (added after Level 2B screening)

(See Section 4.3, Level 2 Screening, and Section 4.3.2, Level 2B Screening, in Chapter 4, Screening Process, in the ASTR.)

### Level 3 Screening

The Level 3 screening process was conducted by the Spine study team in a multicomponent analysis. The Spine study team first developed an existing conditions baseline No-Build Alternative and a Base Build Alternative consisting of supporting alternatives that were added as part of the

evaluation and screening of the seven backbone alternatives selected for further evaluation and screening after the Level 2B screening discussed above. Each backbone alternative was added to the Base Build Alternative then screened against each other and the No-Build Alternative.

#### *No-Build Alternative*

The No-Build Alternative consisted of Spine corridor conditions considered as baseline through 2040 that include existing Spine corridor roadway maintenance activities; ADOT near-term roadway improvement projects in the Spine corridor that were approved for design and construction (which, by the end of the Spine study, had been reduced to none); the Cities of Chandler, Tempe, and Phoenix short-term transportation capital improvement programs for roadways they manage; and four planned Valley Metro light rail transit lines: South Central, Phoenix West, Northwest Extension and Glendale Downtown light rail transit lines. In addition, it was assumed that the Loop 202 South Mountain Freeway would be open to traffic.

#### *Base Build Alternative*

The Base Build Alternative was created by the Management Partners and the Alternatives Evaluation Partners and approved by the Charter Partners. It consisted of only the supporting alternatives selected from the Level 2A screening process. They were selected as projects focusing on long-term accessibility, transit, technology, weaving movement, service interchange improvements and bicycle and pedestrian improvements that would best meet the needs of the Spine corridor when included with any of the seven backbone alternatives selected for Level 3 screening. Prior to conducting the Level 3 screening, three elements of the Base Build Alternative required additional, separate analysis: I-10 and I-17/arterial street service interchanges, I-10 and I-17 weaving analysis and regional east-to-west arterial street network, primarily in the I-17 section of the Spine corridor.

The service interchange analysis was based on safety, operations and engineering assessments at the 37 Spine corridor interchanges with I-10 and I-17. Improvement recommendations ranged from complete interchange reconstruction to minor infrastructure replacement and arterial street capacity upgrades. The service interchanges that demonstrated the most need were added to the Base Build Alternative and included Baseline and Broadway Roads on I-10. For I-17, they included the service interchanges at 19th Avenue, Jefferson and Adam Streets, Thomas Road, Indian School Road, Camelback Road, Northern Avenue, Dunlap Road, Peoria Avenue, Cactus Road, Thunderbird Road, Greenway Road and Bell Road.

The weaving segments on I-10 and I-17 had to be analyzed to determine which segments should be included as improvements in the Base Build Alternative. Each segment was screened on the basis of existing infrastructure and operations. The study team concluded that, in general, operational and safety problems did not coexist within the same segments. Two weave improvements were added to the Base Build Alternative based on the analysis and included dual-lane exit ramp conversions where necessary and the Elliot Road to Baseline Road weave segment on I-10.

After screening the service interchanges and Interstate weave segments, the study team analyzed and screened the arterial street network that intersects with I-17 to determine which arterials would best promote regional east-to-west and west-to-east travel and accessibility across I-17, because the street system in this area of the Spine corridor demonstrated significant connectivity in these directions. Crossing I-17 in an east-to-west or west-to-east direction on arterial streets that intersect with I-17 during peak traffic periods (but not accessing I-17) was identified as a significant deficiency. Existing conditions include significant peak hour congestion, poor level of service (LOS) and increased travel times at these intersections. The analysis and screening process involved identifying specific regional arterial street infrastructure deficiencies that needed to be addressed, including additional arterial lanes across I-17, lane discontinuities between 35th and 19th Avenues, service interchanges not matching projected traffic volumes, the absence of bicycle and pedestrian facilities and other supporting alternatives that demonstrated a regional improvement need. Regional arterial streets added to the Base Build Alternative included Indian School Road, Camelback Road, Northern Avenue, Thunderbird Road, and Bell Road as candidates for upgrades and improvements to best facilitate east-to-west travel in the Spine corridor.

A detailed list of all of the project elements included in the Base Build Alternative is provided on pages 4-72 and 4-73 in the ASTR.

#### **Level 3 Screening Process**

The Spine study team conducted the Level 3 screening for the seven backbone alternatives with the Base Build Alternative and the No-Build Alternative based on the following screening criteria developed by the Management Partners and the Alternatives Evaluation Partners:

- **Infrastructure Analysis:** Five percent design plans were prepared for each alternative to quantitatively analyze whether each alternative conformed to the MAG 2040 travel demand model and met future design standards and to determine the extent of old infrastructure replacement requirements, potential right of way (ROW) acquisition needs and preliminary improvement costs.
- **Safety Analysis:** Qualitative analysis of Spine corridor safety factors based on ADOT Crash Modification Factors for corridor profile studies for each alternative.
- **Public Priorities:** The evaluation of each alternative based on how each scored against the eight prioritized Spine corridor improvement strategies ranked by the public during the public involvement and outreach program conducted during the Spine study's needs assessment phase.
- **Traffic Operations Analysis:** Quantitative analysis of a variety of measures of effectiveness of each alternative regarding traffic operations in the Spine corridor. The measures of effectiveness analyzed and screened included general purpose and HOV lane travel times, general purpose and HOV lane volume-to-capacity ratios, person trips, freeway duration of congestion, vehicle miles traveled (VMT) and percent congested VMT, vehicle hours traveled (VHT), percent congested VHT and travel speed.

At the conclusion of the Level 3 screening process, it was determined that a single Level 3 alternative did not meet all of the needs within the overall Spine corridor. The Management Partners and Alternatives Evaluation Partners determined that an additional Level 4 screening process be conducted, which was approved by the Charter Partners.

(See Section 4.4, Level 3 Screening, in Chapter 4, Screening Process, in the ASTR.)

#### **Level 4 Screening**

The results of the Level 3 screening demonstrated that the best build alternative was the expansion of managed lane capacity that included a HOV lane or HOT lane system. The study team determined the additional lanes would be the best means of providing optimal system continuity throughout the Spine corridor. It was recommended that a managed lane system be advanced from Level 3 and that two configurations of the managed lane system, called the Highest Performing Alternative (HPA), be evaluated in the Level 4 screening process. The Level 4 screening process evaluated the two hybrid options of the managed lane system—known as HPA1 and HPA2—to determine which configuration would best meet the long-term needs of the Spine corridor.

Key features of HPA1 included:

- Adding one general purpose lane from Ray Road to Baseline Road on I-10
- Adding a second managed lane between US-60 and the Split on I-10
- Reconstructing I-17, adding a single managed lane and auxiliary lanes between the Split and the Stack on I-17
- Adding a second managed lane between Grand Avenue and the North Stack, reconstructing portions of I-17 as needed
- Adding DHOV connections at a future Galveston DHOV traffic interchange, the SR-143 traffic interchange, Sky Harbor Circle North on I-10, the Split, Grand Avenue and the North Stack
- Adding collector-distributor roads between the Elliot Road traffic interchange and the SR-143 traffic interchange along I-10
- Reconfiguring interchanges at I-10/Baseline Road, I-10/Broadway Road/SR-143, I-17/Jefferson/Adams, I-17/Indian School Road, I-17/Camelback Road, I-17/Glendale Avenue, I-17/Northern Avenue, I-17/Thunderbird Road and I-17/Bell Road
- Accommodating light rail crossings of I-17 at Central Avenue, Van Buren Road, Camelback Road and Mountain View Road
- Implementing numerous bicycle and pedestrian improvements, including several new dedicated bicycle and pedestrian structures over the Interstate

HPA2 is identical to HPA1, except for the following differences:

- On I-10 between US-60 and the Split, one additional general purpose lane would be added in addition to the additional managed lane noted above. The resulting freeway section would be two managed lanes, six general purpose lanes and one auxiliary lane in each direction.
- The DHOV ramps at I-10/Sky Harbor Circle North are not included, and are instead replaced with DHOV ramps at I-17/7th Street.
- The ramps on I-17 between 16th and 7th Streets and between 7th Avenue and 19th Avenues are reversed to improve ramp grades and to move weaving from the main line to the frontage roads.

The Level 4 screening consisted of the same criteria as Level 3: infrastructure, safety, operations and cost. Environmental impacts were also analyzed in the Level 4 screening. Like the other screening levels, the Management Partners and the Alternatives Evaluation Partners decided on the criteria to be used for this screening.

At this point in the screening process, the Management Partners agreed that the study team had identified two feasible build alternatives that represented an appropriate response to the numerous needs of the corridor. However, before a draft recommended alternative would be selected, the Management Partners agreed that an environmental impacts analysis of the HPA alternatives would be performed. This assessment focused on the quantitative impacts to the priority resources identified in the NAR *and on impacts* to both commercial and residential properties. These impacts were quantified by overlaying the new ROW shapes for HPA1 and HPA2 on the priority resource layers and the commercial and residential property layers in a geographic information system and calculating the area/number of impacts. This evaluation concluded that the environmental impacts between the two feasible alternatives were similar, were relatively minor given the context of the corridor need and did not screen out either alternative. As a result, no critical environmental concerns are anticipated regardless of which alternative may be selected.

The results of the Level 4 screening process led the Management Partners and Alternatives Evaluation Partners to select a variation of HPA2 as the draft recommended alternative. The additional general purpose lane between US-60 and the I-10/I-17 Split and the reversed ramp configuration between the I-10/I-17 Split and the Durango Curve provided additional benefit and value, such that the Alternatives Evaluation Partners decided it was worth the additional cost. Traffic models showed that the DHOV at North Sky Harbor Circle did not attract the anticipated demand, so it was removed from the recommended alternative and was replaced with the DHOV at 7th Street on I-17.

(See Section 4.5, Level 4 Screening, in Chapter 4, Screening Process, in the ASTR.)

The Charter Partners approved the draft recommended alternative for agency and public review in December 2016. After the Spine study team conducted the public involvement and outreach program for review, comment and feedback on the draft recommended alternative during January and February 2017, they finalized the recommended alternative in March and April 2017 with the changes noted in the questions above to address the comments received. Finally, the MAG Regional Council adopted the Spine Corridor Master Plan recommended alternative into the RTP on May 24, 2017.

*Also regarding whether the study was a corridor study, for alternatives that were screened out, summarize the reasons for their rejection. Are defensible, credible rationale articulated for their being screened out? Did the study team take into account legal standards<sup>12</sup> needed in the NEPA process for such decisions? Did the study team have adequate information for screening out the alternatives?*

The primary reason why alternatives were screened out and dismissed from further consideration during the four rigorous phases of the Spine corridor evaluation and screening process is that they did not meet or address the purpose and need statement specified in the NAR or did not perform well in the scoring relative to other alternatives. Each screening level specifically stated and provided credible rationale and justification for their dismissal based on the purpose and need, along with detailed design, engineering, environmental and agency and public input considerations. Chapter 4 of the ASTR clearly states, for each alternative, why it was either advanced or dropped through the screening process.

The Management Partners group, which included ADOT and FHWA, incorporated the legal standards required by NEPA and Council on Environmental Quality regulations regarding the identification, evaluation, screening, dismissal and selection of the alternatives for the Spine corridor. When NEPA processes are undertaken as the Spine corridor recommended alternative is implemented, the purpose and need statement, the needs assessment and the alternatives screening process will be reviewed and referenced as a key first step in the preparation of initial NEPA documentation for individual Spine improvement projects.

The Spine study team gathered, organized and evaluated a significant amount of data and information that was more than adequate to support the

<sup>12</sup> 23 Code of Federal Regulations (CFR) § 771.123(c), 23 CFR § 771.111(d), 40 CFR § 1502.14(a), 40 CFR § 1502.14(b) and (d), 23 CFR § 771.125(a)(1); see FHWA Technical Advisory T 6640.8A, October 30, 1987, <[FHWA Technical Advisory T 6640.8A](#)>.

<p>Spine corridor alternative screening process. The screening process drew heavily from the needs required to provide long-term improvements in the Spine corridor identified in the NAR. The process also was very much informed by the agency and public involvement and outreach program the Spine study team conducted during both the needs assessment and alternatives evaluation and screening process.</p>
<p><i>What issues, if any, remain unresolved with the public, stakeholders, and/or resource agencies?</i></p>
<p>The following issues will need to be addressed by the Charter, Management, and Planning Partners as long-term improvements are undertaken for the Spine Corridor:</p> <ul style="list-style-type: none"> <li>▪ <b>I-17/Osborn Road Bicycle and Pedestrian Crossing:</b> The Spine study recommendation originally had this as part of the draft recommended alternative, consistent with the City of Phoenix <i>Bicycle Master Plan</i>. However, after the public comment period, the residents east of I-17 in this area strongly opposed this recommendation, citing the potential for crime to enter the area from the west side (I-17 currently acts as a barrier between the neighborhoods on the east and west sides of Osborn Road). This was clearly a hot button issue and the recommendation was removed from the Spine study. The City of Phoenix, however, still retains this crossing in its bicycle master plan. The Spine study partners agreed that it was not a major issue that would adversely affect the recommended alternative, and Phoenix will need to resolve this with the residents as it implements the bicycle master plan.</li> <li>▪ <b>Future I-17/SR-30 Interchange:</b> The SR 30 project was initially identified as part of the MAG Central Phoenix Transportation Framework Study and subsequently adopted in the RTP by MAG as a major amendment on September 27, 2017. The Spine study generally acknowledges that this connection will happen at some point in the future, but uncertainty exists regarding how and where the connection would be made. An SR-30 corridor study will be undertaken in the future by ADOT to determine the location and design of this future SR-30 roadway and interchange with I-17. It is anticipated that the SR-30 project would result in impacts to I-17 and surrounding area, and those impacts could affect or change the specific project or projects of the Spine corridor recommended alternative where SR-30 would connect with I-17. Any changes would require additional coordination with MAG, ADOT, FHWA and City of Phoenix (which is where the I-17/SR-30 interchange would likely be located). Appendix H of the ASTR illustrates some possible considerations for this interchange location and layout.</li> <li>▪ <b>NEPA Compliance for the Recommended Alternative:</b> ADOT's Environmental Planning section and FHWA's Arizona Division Office must be consulted to determine the level of NEPA analysis and documentation required to implement the Spine study's Recommended Alternative.</li> <li>▪ <b>Section 4(f) Analysis Still Required:</b> Section 4(f) evaluations were not completed as part of this PEL process and, therefore, completion of such evaluations will be required during the NEPA process for the individual projects. During this more detailed study, avoidance of Section 4(f) resources would be the priority, followed by evaluation of any uses of these resources. It is likely that mitigation for these resource impacts would be required and would be determined on a project-by-project basis.</li> <li>▪ <b>Managed Lane Operations:</b> The Spine study's recommended alternative offers flexibility regarding how the managed lanes will be operated initially and in the future. Initially, they are expected to be built as high occupancy managed lanes (HOV), but other types of operations could be added in the future depending on the need (operations, funding, etc.), including but not limited to price managed lanes and autonomous/connected vehicle integration. The FAST Act includes a number of provisions that modify federal requirements related to HOV facilities and the tolling of highways. ADOT should review the following statutory citations prior to completing NEPA studies: FAST Act § 1411; SAFETEA-LU § 1604(c); TEA-21 § 1216(b); 23 U.S.C. 129 and 166; and any others that may be applicable at the time.</li> </ul>
<p><b>Formally joining PEL with the NEPA process</b></p>
<p><i>Lead federal agencies proposing a project that will undergo the NEPA process will want to most effectively leverage the transportation planning study's efforts and results. How could a Notice of Intent (for an environmental impact statement<sup>13</sup>) refer to the study's findings with respect to preliminary purpose and need and/or the range of alternatives to be studied?</i></p>
<p>40 § 1502.21, incorporation by reference.</p> <p>"Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data, which is itself not available for review and comment, shall not be incorporated by reference."</p> <p>The purpose and need for the master plan could be incorporated by reference to support the specific purpose and need for a given project and/or used as screening criteria regarding consistency with established criteria for the corridor's purpose and need.</p>
<p><i>Could a Notice of Intent in the NEPA process clearly state that the lead federal agency or agencies will use analyses from prior, specific planning studies that are referenced in the transportation planning study final report? Does the report provide the name and source of the planning studies and explain where the studies are publicly available? If not, how could such relevant information come to the environmental planners' attention and be made available to them in a timely way?</i></p>
<p>Yes, and the report would provide the source of the planning studies and how to gain access to them.</p>
<p><i>List how the study's proposed transportation system would support adopted land use plans and growth objectives.</i></p>
<p>The basic MAG socioeconomic and land use model is based on locally adopted land use plans and growth objectives of each municipality in the MAG region. As such, the MAG travel demand information used in the Spine study indirectly supports the adopted land use plans and growth objectives for each city.</p>

<sup>13</sup> While Notices of Intent are required by some federal agencies for environmental assessments, they are optional for FHWA. Please see "3.3.2 Using the Notice of Intent to Link Planning and NEPA," in *Guidance on Using Corridor and Subarea Planning to Inform NEPA* (Federal Highway Administration, April 5, 2011), <[Notice of Intent](#)>.

*What modifications are needed in the goals and objectives as defined in the transportation study process to increase their efficient and timely application in the NEPA process?*

Recognition that the purpose and need for specific projects will require elaboration but will be supported by the goals and objectives.

*Jurisdictional delineations of waters of the United States frequently change. Housing and commercial developments can alter landscapes dramatically and can be constructed quickly. Noise and air quality regulations can change relatively rapidly. Resource agencies frequently alter habitat delineations to protect sensitive species. Will the study data's currency, relevance, and quality still be acceptable to agencies, stakeholders, and members of the public for use in the NEPA process? If not, what will be done to rectify this problem? Who will be responsible for any needed updating?*

Acceptance of past data is not at the discretion of agencies randomly. What constitutes updates is based on obligatory reevaluation of past processes and documents: have conditions changed on the ground and on the network, have demographics and growth rates altered, has the project changed, are there new regulatory requirements or state-of-the-practice analyses/methods/models, have regulatory conditions changed? Resource mapping will be reevaluated at the beginning of each NEPA process.

It is understood that existing conditions and regulations change continuously, but in a heavily developed corridor, it is not expected that existing conditions will change dramatically over the time period when the recommended features of the Spine study are implemented. Regulatory changes are outside the control of this study. Regulatory changes could hinder the project, or could help. Overall, the range of reasonable alternatives considered were comprehensive and the conclusions reached by the Spine study are not expected to change significantly because of regulatory changes in an existing corridor.

**Other issues**

*Are there any other issues a future NEPA study team should be aware of (mark all that apply)? In the space below the check boxes, explain the nature and location of any issue(s) checked.*

<input type="checkbox"/> Public and/or stakeholders have expressed specific concerns	<input checked="" type="checkbox"/> Contact information for stakeholders
<input checked="" type="checkbox"/> Utility problems	<input type="checkbox"/> Special or unique resources in the area
<input checked="" type="checkbox"/> Access or right-of-way issues	<input type="checkbox"/> Federal regulations that are undergoing initial promulgation or revision
<input checked="" type="checkbox"/> Encroachments into right-of-way	<input type="checkbox"/> Other _____
<input checked="" type="checkbox"/> Need to engage—and be perceived as engaging—specific landowners, citizens, citizen groups, or other stakeholders	

**Utility problems** – It is reasonable to expect that the recommended alternative would affect utilities, given the level of urbanization in the Spine study area. Generally, utility issues have not been addressed with the Spine study, but utility impacts should not pose a threat to the integrity of the recommendation. Potential impacts on utilities will be evaluated as part of NEPA actions undertaken for individual projects for the Spine recommended alternative.

**Access or ROW issues and encroachments into ROW** – New ROW would be required along the corridor in specific areas. In addition, access points, specifically along the I-17 frontage roads and along several of the cross roads, would likely be altered with the proposed improvements. All of these ROW and access issues, including utility easements, would need to be coordinated further with the next level of project development.

**Targeted engagement** – Given the length of the corridor and the intense development, it is reasonable to expect that special targeted engagement will be required with stakeholders, landowners, etc. along the corridor as the projects advance. Two examples include Grand Canyon University and Arizona Mills mall.

**Stakeholder contact information** – The Spine study has collected some contact information from groups or participants in the public process, but given the size of the project area and the number of people affected by the recommendation, an expanded list will be needed for future studies.

**Concurrence**

By signature, we concur that the transportation planning document meets or exceeds the following criteria in terms of acceptability for application in NEPA projects:

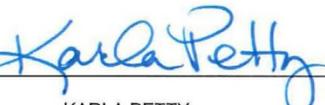
- Public involvement (outreach and level of participation)
- Stakeholder involvement (outreach and level of participation)
- Resource agencies' involvement and participation
- Documentation of the above efforts
- Applicability of the general findings and conclusions for use, by reference, in NEPA documents

Approved by:  Date: 3/23/18

DALLAS HAMMIT  
State Engineer  
Arizona Department of Transportation

Approved by:  Date: 3/23/18

GREG BYERS  
Director  
Multimodal Planning Division, Arizona Department of Transportation

Approved by:  Date: 3/28/18

KARLA PETTY  
Division Administrator  
Federal Highway Administration

Approved by:  Date: 03/05/18

DENNIS W. SMITH  
Executive Director  
Maricopa Association of Governments

### Checklist for Environmental Planners – Part 3

By completing this checklist, environmental planners will be able to systematically evaluate the transportation planning study with regard to environmental resources and issues. It provides a framework for future NEPA studies by identifying those resources and issues that have already been evaluated, and those that have not. The role of environmental planners during the study's various stages is laid out in the flowchart on page 3. This role includes timely advocacy for resources and issues that will later be integral to NEPA processes.

As part of the ADOT PEL process for the Spine study, a baseline environmental review was conducted for each of the resource areas in this environmental checklist. Existing conditions data were collected in each of these categories based on older NEPA studies in the corridor, database and website research, windshield surveys, and readily available geographic information system (GIS) data sources. Ultimately, 7 of these resources were deemed to be critical resources that would be most relevant to the evaluation of impacts for projects featured in the Spine corridor Recommended Alternative. The other 16 resources were deemed to be not applicable or minor to negligible factors in the corridor. This baseline environmental review is documented in Chapter 2 of the NAR, approved by MAG in June 2016. The initial Spine corridor study area extended approximately 1.5 miles on each side of I-10 and I-17. The width of the study area was scaled to include a number of key east-to-west and north-to-south arterial streets that either intersect with the two Interstates or play an important corridor role in parallel traffic flow. The Spine corridor study area is described in more detail in Chapter 1 of the NAR.

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
<i>Natural environment</i>				
Sensitive biological resources	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Biological resources were reviewed based on older NEPA studies conducted in the corridor and on readily available current data sources. Biological resources throughout the Spine study area are generally diminished. The exception is at the I-10 and Salt River crossing and within the Tempe Drain adjacent to I-10 between the Salt River and 32nd Street. All alternatives considered cross the Salt River with similar impacts, and all would have little to no impacts on the Tempe Drain. As a result, biological resources are not a resource that would influence future project decisions emerging from the recommended alternative to a substantial degree. Individual NEPA actions for each project implemented as part of the Spine recommended alternative will need to supplement the biology data with current and site-specific data to assess potential impacts on any biological resources identified in each project-level study area based on ADOT, FHWA, U.S. Fish and Wildlife Service and Arizona Game and Fish Department policies, procedures, analysis, mitigation and any required agency coordination and consultation.

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Wildlife corridors	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Wildlife corridors in the Spine study area were reviewed based on older NEPA studies conducted in the corridor, and they are not a major area of concern. The study area is primarily a fracture zone—an area of reduced permeability between wildlife habitat areas. Existing roads, bridges, canals, urban areas, railroads or other built development limit or prevent significant wildlife movement, or threaten to do so in the foreseeable future in the study area. Wildlife corridors are not a resource that would influence future project decisions emerging from the recommended alternative to a substantial degree.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will confirm the presence or absence of wildlife corridors using the best available information at the time of that individual NEPA action and will assess potential impacts on any wildlife corridors identified in each project-level study area based on ADOT, FHWA, federal and state policies, procedures, analysis, mitigation and any required agency coordination efforts.</p>
Invasive species	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Invasive species were not reviewed as part of the Spine study. These data will need to be generated for each individual NEPA action undertaken for each project that is part of the recommended alternative. Standard ADOT mitigation measures would be evaluated and applied.</p>
Wetland areas	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Wetlands are present in the Spine study area based on past NEPA work done in the corridor. The wetlands are most likely associated with the Salt River, which has experienced disturbance from urbanization. Other wetlands, such as the Tempe Drain, are human-induced. Although potential impacts from individual future NEPA actions resulting from the Spine recommended alternative in the area of the Salt River and the Tempe Drain could vary, wetlands are not a resource that would influence future project decisions under the recommended alternative to a substantial degree.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will supplement these planning data with field reviews and will assess potential impacts on wetlands identified in each project-level study area based on ADOT, FHWA, federal and state policies, procedures, analysis, mitigation and any required agency coordination efforts.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Riparian areas	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Riparian areas in the Spine study area were not specifically studied but, if they exist, would likely be associated with the Salt River, which has experienced disturbance from urbanization. The riparian area of the Salt River within the Spine study area is known as the Rio Salado Oeste area. Although potential impacts from individual future NEPA actions produced by the Spine study in the area of the Salt River could vary, riparian areas are not a resource that would influence future project decisions under the recommended alternative to a substantial degree.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts on riparian areas identified in each project-level study area based on ADOT, FHWA, federal and state policies, procedures, analysis, mitigation and any required agency coordination efforts.</p>
100-year floodplain	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>100-year flood zones were identified by reviewing Federal Emergency Management Agency (FEMA) mapping. They are located in the Spine study area, the most significant of which are associated with the Salt River (which has experienced disturbance from urbanization), the Tempe Drain east of I-10 northbound between University Drive and the Salt River at the I-10 bridge, and on both sides of I-17 at the Durango Curve. Figure 2-6 of the NAR illustrates this information.</p> <p>Individual NEPA projects conducted as part of the recommended alternative will confirm whether the planning-level data are still up to date and will assess potential impacts on these and other 100-year floodplains in each project-level study area based on ADOT, FHWA, FEMA, and other federal, state and local policies, procedures, analysis, mitigation and coordination with the proper floodplain management officials.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Clean Water Act Sections 404/401 waters of the United States	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>The Salt River, protected by the Clean Water Act, has experienced disturbance from urbanization but is classified as a navigable water of the United States and is subject to the regulatory requirements of the Act. It flows from east to west and is located in the central sector of the Spine study area. The potential area of impact for an improvement project that is part of the recommended alternative is where the existing I-10 bridge crosses the river just east of the I-10/I-17 Split interchange.</p> <p>The individual NEPA action for the project that involves the I-10 bridge widening over the Salt River for the Spine improvement program will confirm the limits of the jurisdictional area and assess potential impacts to this water of the United States and any others that may be identified in each project-level study area based on ADOT, FHWA, U.S. Army Corps of Engineers and other federal and state policies, procedures, analysis, mitigation and coordination and consultation requirements.</p>
Prime or unique farmland	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	There is no existing agricultural land in the Spine study area. The study area is fully urbanized.
Farmland of statewide or local importance	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	There is no existing agricultural land in the Spine study area. The study area is fully urbanized.
Sole-source aquifers	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	No sole source aquifers are present in the Spine study area, based on a review of U.S. Environmental Protection Agency (EPA) drinking water sources in the region.
Wild and scenic rivers	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	No wild and scenic rivers are located in the Spine study area.
Visual resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>The Spine study area is a very urbanized area that exhibits many types of land uses and visual landscapes, but no visual resources of major importance have been identified. Potential visual resources in the Spine corridor were evaluated based on a review of aerial mapping, GIS data, city general plans and windshield surveys.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will map views and viewsheds and assess potential impacts on visual resources in each project-level study area based on ADOT, FHWA, state or local policies, procedures, analysis and mitigation requirements.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Designated scenic road/byway	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	There are no designated scenic roadways or byways in the Spine study area.
<b>Cultural resources</b>				
Archaeological resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	176 previously recorded archeological sites and numerous other prehistoric resources were identified in the Spine study area based on a records search on the AZSITE and National Register of Historic Places (NRHP) websites, and based on GIS data from a number of websites. Individual NEPA actions for each project conducted as part of the Spine recommended alternative will conduct a field review, determine whether any resources are eligible for inclusion on the National Register, and assess potential impacts on archeological sites and other prehistoric features in each project-level study area based on ADOT, FHWA, Section 106 and SHPO policies, procedures, analysis, mitigation and agency coordination and consultation requirements.
Historical resources	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	Over 300 historic properties were identified in the Spine study area based on a records search on the AZSITE, NRHP and AZ Bridge Inventory websites, and based on GIS data from a number of websites. These properties included roads, bridges, railroads, canals, cemeteries, districts, buildings and other structural resources. Individual NEPA actions for each project conducted as part of the Spine recommended alternative will first identify all eligible historic properties and then assess potential impacts on historic properties in each project-level study area based on ADOT, FHWA, Section 106 and SHPO policies, procedures, analysis, mitigation and agency coordination and consultation requirements. Because NRHP-eligible historic resources can be afforded protection under Section 4(f), potential uses will be evaluated for each project.
<b>Section 4(f) and Section 6(f) resources</b>				
Section 4(f) wildlife and/or waterfowl refuge	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Not applicable	No Section 4(f) wildlife or waterfowl refuges are located in the Spine study area.

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Section 4(f) historic site	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>210 historic sites, including districts, buildings, cemeteries and linear structures potentially subject to Section 4(f) evaluation and impact assessment were identified based on a historic criteria analysis of sites listed or eligible for the NRHP within a 1-mile radius of the Spine study area.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will identify and map eligible properties and assess potential impacts on historic sites in each project-level study area to determine whether they meet Section 4(f) historic protection criteria based on ADOT and FHWA policies, procedures, analysis, mitigation and agency and property ownership coordination and consultation requirements. Section 4(f) evaluations will be required on a project-by-project basis.</p>
Section 4(f) recreational site	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>47 publicly owned recreation sites and 259 public schools with recreation areas are located in the Spine study area that are potentially subject to Section 4(f) evaluation and impact assessments. These areas include athletic fields, trails, recreation centers, stadiums, swimming pools and golf courses. These sites were identified based on a review of aerial mapping, GIS data, recreation area and public school websites, city general plans and windshield surveys.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will confirm location boundaries and the significance of each of these sites and will assess potential impacts on recreational areas in each project-level environmental study area to determine whether they meet Section 4(f) recreation site protection criteria based on ADOT and FHWA policies, procedures, analysis, mitigation and agency and property ownership coordination and consultation requirements. Section 4(f) evaluations will be required on a project-by-project basis.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Section 4(f) park	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	145 publicly owned parks are located in the Spine study area that could be potentially subject to Section 4(f) evaluation and impact assessment. Public parks in the Spine corridor were identified based on a review of aerial mapping, GIS data, recreation area and public school websites, city general plans and windshield surveys. Individual NEPA actions for each project conducted as part of the Spine recommended alternative will confirm locations, boundaries and significance of existing and future parks and assess potential impacts on publicly owned parks in each project-level study area to determine whether they meet Section 4(f) park protection criteria based on ADOT and FHWA policies, procedures, analysis, mitigation and agency and property ownership coordination and consultation requirements. Section 4(f) evaluations will be required on a project-by-project basis.
Section 6(f) resource	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	21 Section 6(f) sites are located in the Spine study area. The identification and location of these sites were based on a review of the Land and Water Conservation Fund (LWCF) database. Individual NEPA actions for each project conducted as part of the Spine recommended alternative will confirm site locations and boundaries and assess potential impacts on Section 6(f)-funded resources in each project-level study area based on ADOT, FHWA and National Park Service LWCF policies, procedures, analysis, mitigation and agency and property ownership coordination and consultation requirements. Mitigation measures for Section 6(f) properties include in-kind replacement property.
<b>Human environment</b>				
Existing development	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	The Spine study area is approximately 133 square miles and includes sections of the cities of Chandler, Tempe, and Phoenix, along with the town of Guadalupe and individual sections of unincorporated Maricopa County. Existing land development in the study area is primarily urban and suburban with few vacant or undeveloped parcels. The primary land use types in order of magnitude from largest to smallest are residential, industrial, commercial and transportation, totaling approximately 85,000 acres. Land use data and information in the Spine study area were obtained by the analysis of GIS data, general plans and website information. Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts on existing areas of development in each project-level study area based on ADOT, FHWA, state and local policies, procedures, analysis, mitigation and property ownership coordination requirements.

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Planned development	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>As noted in the "Existing development" row above, the vast majority of the Spine study area is developed. Future development would consist of infill development within already developed areas, or redevelopment of existing development for higher-value uses. Plans for future development are governed by general plans prepared and adopted by each of the cities in the study area as well plans prepared by other entities, such as the Sky Harbor Airport Master Plan.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts on future planned development in each project-level study area based on ADOT, FHWA, state and local planning and land use policies, procedures, analysis, mitigation and property ownership coordination requirements.</p>
Displacements	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>The size and scope of the improvements being considered for I-10, I-17, key arterial streets and Interstate traffic interchanges in the Spine study area would likely require the acquisition of additional property for new ROW for long-term transportation use. Although the plan is to stay within existing ROW to the fullest extent possible for each project conducted as part of the recommended alternative, the planned improvements would result in the displacement and relocation of homes, businesses, and other property uses given the highly developed nature of the study area.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts related to the displacement of homes, businesses and other properties in each project-level study area based on ADOT, FHWA, and state property acquisition and relocation policies, procedures, analysis, mitigation and property owner coordination requirements. The owners of acquired ROW for projects conducted as part of the Spine recommended alternative would be compensated at fair market value in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Public Law 91-646; 49 CFR Part 24). In addition, Arizona House Bill 2114, signed into law on April 15, 2014, further broadens the benefits provided to property owners who would be displaced.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Access restriction	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>I-10 and I-17 will continue to be fully access-controlled and managed in accordance with current and future Interstate highway policies and guidelines as administered by FHWA. The arterial streets and Interstate traffic interchanges that are part of the Spine study have much less restriction given their inherent purpose of providing access to residences, businesses, and the many other land uses in the study area. The primary purpose of the Spine study, as presented in the recommended alternative, is to improve and manage future traffic demand, safety and access in the study area in a long-term manner. Maintaining or enhancing access control along the Interstate and near the interchanges is a major part of the solution to achieve these project objectives.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts of existing and proposed restrictions and management of vehicular, bicycle and pedestrian access in each project-level study area based on ADOT, FHWA, state and local policies, procedures, analysis, mitigation and coordination requirements.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Neighborhood continuity	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Residential development accounts for approximately 40 percent of the land use in the Spine study area and is located throughout the corridor. In the southern section, the highest densities are in Phoenix adjacent to and west of I-10. In the central section, the highest densities are in south Phoenix south of I-17 and the Salt River along the arterial streets. The northern section includes the highest residential densities in the study area on both the eastern and western sides of I-17. Many of the newer residential areas in the study area have been developed in a planned manner to create positive community continuity, character and cohesion within defined neighborhood or community boundaries in conjunction with the current location of the Interstate. However, many of the neighborhoods on both sides of I-17 north of the Stack interchange predate the Interstate, and were split into two neighborhoods when the Interstate was built. The Spine study recommended alternative will not worsen or aggravate this separation but will, in fact, construct several bicycle and pedestrian crossings over I-17 to help reconnect neighborhoods that want to be reconnected.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts on individual neighborhoods, communities and community continuity and cohesion in each project-level study area based on ADOT, FHWA, state and local policies, procedures, analysis, mitigation and local community involvement, coordination and input requirements.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Community cohesion	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Some of the neighborhoods and communities in the Spine study area exhibit strong community cohesion and individual character. Examples in the study area that exhibit such cohesion include the town of Guadalupe and the Ahwatukee area in the southern section and several neighborhoods along I-17 north of the Stack including the Encanto and Alhambra areas. Phoenix residential areas have been planned and developed based on the concept of urban villages. Of the 15 urban villages in Phoenix, 8 are partially located in the study area. Each village has a neighborhood association, and the City maintains an office and community center in each village. Each association conducts a monthly meeting to discuss community issues and activities as a means to develop and maintain a strong sense of community cohesion.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will assess potential impacts on individual neighborhoods and communities and community cohesion in each project-level study area based on ADOT, FHWA, state and local policies, procedures, analysis, mitigation and local community involvement, coordination, input and feedback.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Title VI/Environmental justice populations	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Census data used to prepare the <i>Environmental Baseline Report</i> indicate that populations protected under Title VI of the Civil Rights Act and Executive Order 12898 for Environmental Justice are located throughout the Spine study area. Minority populations (e.g., Hispanic, non-Caucasian, or both) represent approximately 63% of the total population in the study area, which is higher than the cities of Chandler (38%), Tempe (38%) and Phoenix (53%) and Maricopa County (41%). The highest concentrations of minority populations in the study area are in central and southern Phoenix and the town of Guadalupe. The Spine study team conducted some targeted outreach to these protected populations by attending community events during both of the public comment periods. This is discussed in Section 10.2.3 in the NAR, and in Section 5.3 of the ASTR.</p> <p>Individual NEPA actions for each project conducted as part of the Spine recommended alternative will confirm census data, identify community facilities of concern for protected populations and assess potential impacts and benefits on all protected populations in each project-level study area based on ADOT and FHWA policies, procedures, analysis, mitigation and local community involvement, coordination, input and feedback to meet the requirements of Title VI and Executive Order 12898. This includes a determination regarding whether or not adverse effects would occur in a disproportionate manner to minority or low-income populations at a high level of impact.</p>
<b>Physical environment</b>				
Utilities	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Utilities are located throughout the highly urbanized Spine study area.</p> <p>Individual NEPA actions conducted as part of the Spine recommended alternative will assess potential impacts on utilities in each project-level study area based on ADOT and FHWA policies, procedures, analysis, mitigation and utility ownership coordination and potential relocation requirements.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Hazardous materials	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>The Spine study area contains nearly 11,000 acres of land used for industrial purposes and 10,000 acres of commercial uses in this very urbanized area. Given this amount of land, a substantial number of sites containing, generating, using, managing, storing, disposing of or contaminated by hazardous materials was identified in the Spine study area, totaling approximately 6,600. These sites were identified based on a review of EPA and Arizona Department of Environmental Quality databases and study area reconnaissance.</p> <p>Individual NEPA projects conducted as part of the Spine recommended alternative will assess potential impacts on or from sites containing hazardous materials in each project-level study area based on ADOT, FHWA, federal, state and local policies, procedures, analysis, mitigation and coordination with the proper hazardous waste management officials.</p>
Sensitive noise receivers	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>Existing land uses sensitive to traffic noise are located in the Spine study area. Ambient noise levels are considered typical of the urban and suburban environment in the study area. The study area contains over 33,000 acres of residential land use, along with many other sites that would also be considered sensitive receptors to traffic noise, including hospitals and other medical facilities, parks, recreational centers, schools, churches, retirement facilities or other institutions.</p> <p>Individual NEPA projects conducted as part of the Spine recommended alternative will monitor existing traffic noise levels and model future traffic noise to assess potential traffic noise impacts on sensitive receptors in each project-level study area based on the ADOT Noise Abatement Criteria (NAC) and other applicable FHWA, state and local policies, procedures, analysis, mitigation and coordination requirements.</p>

Checklist for environmental planners

Resource or issue	Is the resource or issue present in the area?	Are impacts to the resource or issue involvement possible?	Can potential impacts be mitigated?	Discuss the level of review and method of review for this resource or issue and provide the name and location of any study or other information cited in the planning document where it is described in detail. Describe how the planning data may need to be supplemented during NEPA.
Air quality	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<p>The Spine study area is located in Maricopa County, which is designated by EPA to be in nonattainment of ozone and particulate matter (PM<sub>10</sub>), which are National Ambient Air Quality Standards (NAAQS) criteria pollutants. The county is also designated as a maintenance area for carbon monoxide. Existing air quality data were obtained from monitoring stations located in and near the Spine study area.</p> <p>Individual NEPA projects conducted as part of the Spine recommended alternative will obtain the most current air quality data and model future traffic design year air emissions to assess potential air quality impacts in each project-level environmental study area based on ADOT, FHWA, EPA, state and local policies, procedures, analysis, mitigation and coordination requirements.</p> <p>To meet air quality conformity requirements, individual projects of the Spine recommended alternative will need to be approved and listed on a fiscally constrained RTP and TIP that has been found to conform to Arizona's State Implementation Plan—the state's air quality management plan required by the Clean Air Act—for each NAAQS pollutant of concern.</p> <p>Specific air quality impact assessment requirements identified in the Environmental Baseline Report include conducting a PM<sub>10</sub> hot-spot analysis for Spine projects determined to be of localized air quality concern for criteria pollutants and a mobile source air toxics (MSAT) Category 3 analysis for future Spine projects that would result in a high potential for MSAT effects through the generation of 150,000 vehicles per day or more by the 2040 design year and that would be located near populated areas.</p>
Other (list)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> Not applicable	

<p><b>Identification of potential environmental mitigation activities</b></p>
<p><i>Could the transportation planning process be integrated with other planning activities, such as land use or resource management plans? If so, could this integrated planning effort be used to develop a more strategic approach to environmental mitigation measures?</i></p>
<p>The transportation planning process for the Spine study included a number of other transportation planning activities and studies identified in Part 1 of this questionnaire that had a potential relationship to the Spine Corridor Master Plan, including public transit plans developed by Valley Metro and airport improvement plans by Sky Harbor International Airport. In addition, the Spine study included the integration of general plan element and land use planning efforts by the municipalities in the study area—the Cities of Chandler, Tempe, and Phoenix and the Town of Guadalupe. As a result, the Spine study includes bicycle and pedestrian improvements as part of the individual projects that make up the recommended alternative. From an environmental standpoint, an important result of this integrated effort is that a more strategic approach to the identification of effective mitigation measures in a multimodal framework can be implemented for each project that is featured in the recommended alternative of the Spine Corridor Master Plan.</p>
<p><i>With respect to potential environmental mitigation opportunities at the PEL level, who should ADOT consult with among federal, State, and local agencies and tribes and how formally and frequently should such consultation be undertaken?</i></p>
<p>Agencies that ADOT will need to consult and coordinate with and how often will vary for each project identified in the Spine study recommendation. In general, the following agencies will be involved:                      FHWA, MAG, City of Phoenix, City of Tempe, City of Chandler, Town of Guadalupe, Valley Metro, FTA, FAA, Sky Harbor International Airport, U.S. Army Corps of Engineers, EPA, U.S. Fish and Wildlife Service, Arizona Game and Fish Department, SHPO, Four Southern Tribes, BNSF Railroad, Union Pacific Railroad, Flood Control District of Maricopa County, FEMA, numerous utility companies, Salt River Project and other irrigation districts.</p>
<p><i>Off-site and compensatory mitigation areas are often creatively negotiated to advance multiagency objectives or multiple objectives within one agency. Who determined what specific geographic areas or types of areas were appropriate for environmental mitigation activities? How were these determinations made?</i></p>
<p>Off-site and compensatory mitigation have not been addressed as part of the Spine study recommendation. Future NEPA actions for individual projects included as part of the recommended alternative will likely not require off-site and compensatory mitigation because most mitigation can be addressed in the corridor or by other means.</p>
<p><i>To address potential impacts on the human environment, what mitigation measures or activities were considered and how were they developed and documented?</i></p>
<p>Generally, specific mitigation plans were not considered during the PEL process for the Spine Corridor Master Plan. They will be evaluated, developed and approved as part of individual NEPA actions in the designated environmental study area for each project included as part of the recommended alternative for the Spine Corridor Master Plan. Certain common mitigations will be included with future Spine study projects including, but not limited to, new or replaced noise barriers that comply with ADOT’s NAC; aesthetic treatments; water quality management; drainage and stormwater management; hazardous waste management (as required); invasive species control and management; cultural resource preservation, recovery, consultation and documentation (as required); the relocation of homes, businesses and other properties (as required); and utility coordination and relocation (as required).</p>

Prepared by: Maricopa Association of Governments Date: March 28, 2018

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# **Attachment 1. Spine Study Partnering Charter Agreement**

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# Partnering Charter

## Interstate 10/Interstate 17 Corridor Master Plan

### Maricopa Association of Governments

As elected and appointed officials responsible for the safe and efficient movement of goods and people, we the undersigned commit, individually and as a team, to successfully study our project through open, honest, timely and active communication, mutual respect, trust and cooperation at all levels. We will plan our work proactively, coordinate with each other, and be flexible. As individuals and as one team we will remain focused to ensure that issues are resolved in a timely and professional manner and ensure that consideration is given to each partner’s goals. The extent of our success will be measured by our ability to achieve the following:

- Cooperatively create an overall vision for the Interstate 10/Interstate 17 Corridor that embraces its important function as our region’s transportation “central nervous system.”
- Strive for a balance between regional, state, and national mobility and economic needs on this significant high capacity, multimodal corridor while recognizing the unique character of different sections of the corridor and the communities it passes through.
- In accordance with each partner’s lawful roles and responsibilities, cooperatively define an operational character for the Interstate 10/Interstate 17 Corridor that enhances economic development, maintains accessibility to adjacent land uses, and improves traffic operations to maximize safety, reliability and quality of life.
- Work together to provide the affected stakeholders, and all interested parties with information about the study and opportunity to contribute to the study's outcome and recommendations.
- Create an implementation master plan that reflects the importance of the Interstate 10/Interstate 17 Corridor that all parties can agree to, and, as sufficient revenues are available, construct, operate, and maintain as a Regional priority.





**Partnering Charter**  
**Interstate 10/Interstate 17 Corridor Master Plan**  
**Maricopa Association of Governments**

Mayor Scott Smith  
 Chair, Maricopa Association of Governments

Councilmember Shana Ellis  
 Chair, Valley Metro Rail Board of Directors

Mayor Lana Mook  
 Member, RPTA Board of Directors

Mayor Jay Tibshraeny  
 City of Chandler

Mayor Rebecca Jimenez  
 Town of Guadalupe

Mayor Greg Stanton  
 City of Phoenix

Mayor Mark Mitchell  
 City of Tempe

Jack Sellers  
 Member, State Transportation Board

Karla Petty  
 Division Administrator,  
 Federal Highway Administration

Robert Halliday  
 Director, Arizona Department of Public Safety

John Halikowski  
 Director, Arizona Department of Transportation

Dennis Smith  
 Executive Director, Maricopa Association of Governments

Stephen R. Banta  
 Chief Executive Officer, Valley Metro

## Appendix B. Recommended Alternative Plan Sheets and Lane Line Diagrams

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Figure 6-1. Recommended Alternative, Sheet 1 of 26 (I-10 Segment: SR-202L/Pecos Stack to US-60)

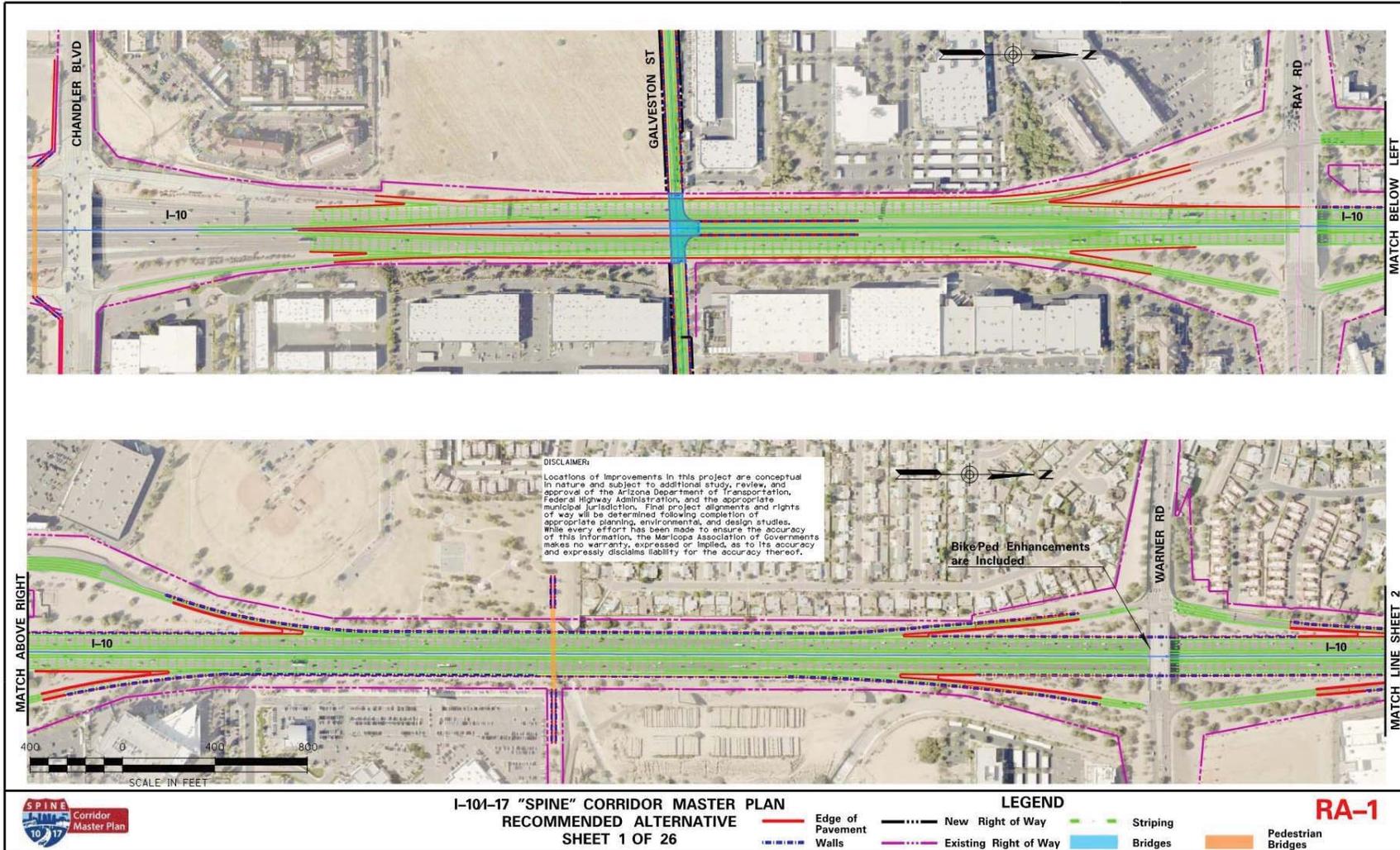


Figure 6-2. Recommended Alternative, Sheet 2 of 26 (I-10 Segment: SR-202L/Pecos Stack to US-60)

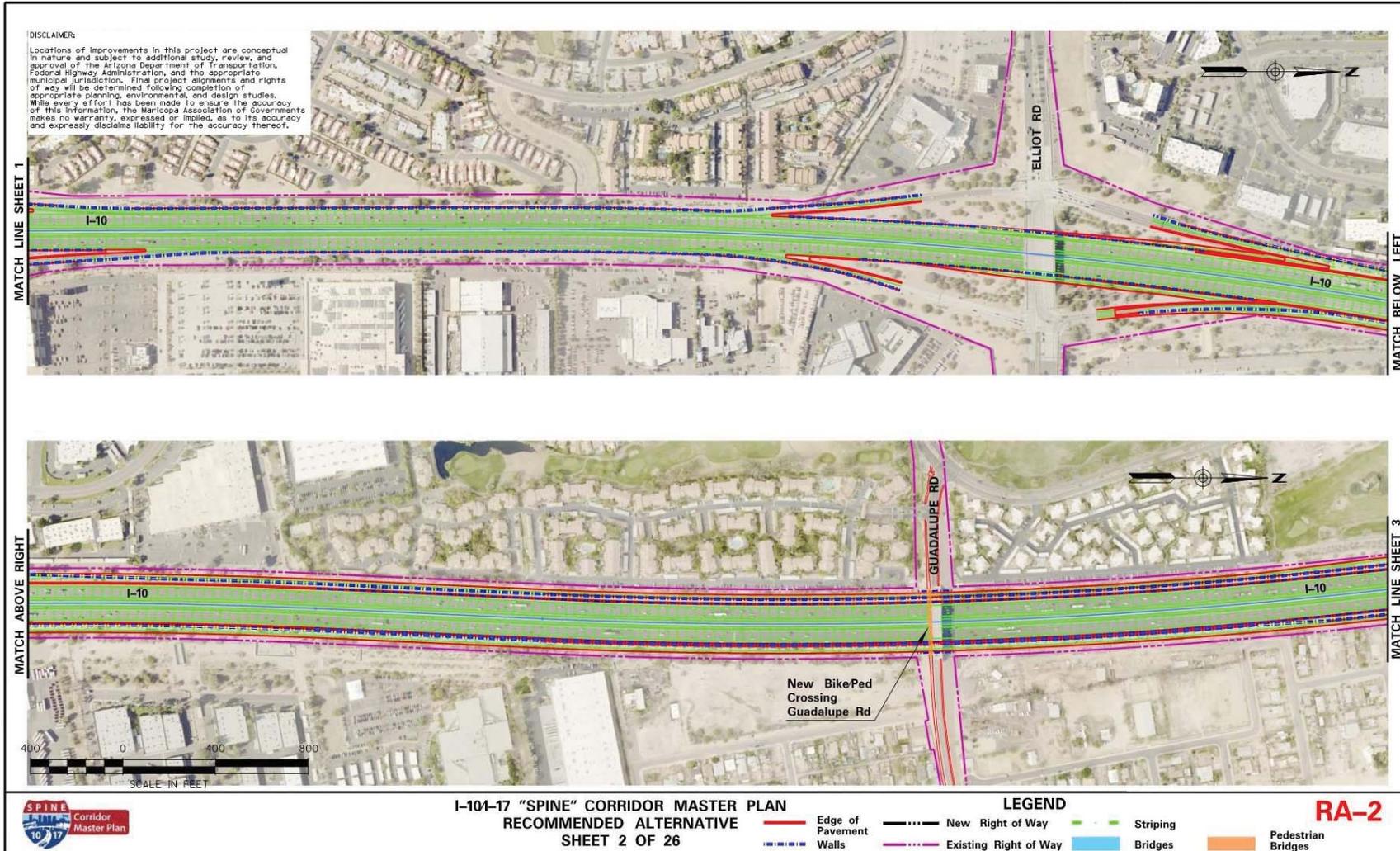


Figure 6-3. Recommended Alternative, Sheet 3 of 26 (I-10 Segment: SR-202L/Pecos Stack to US-60)

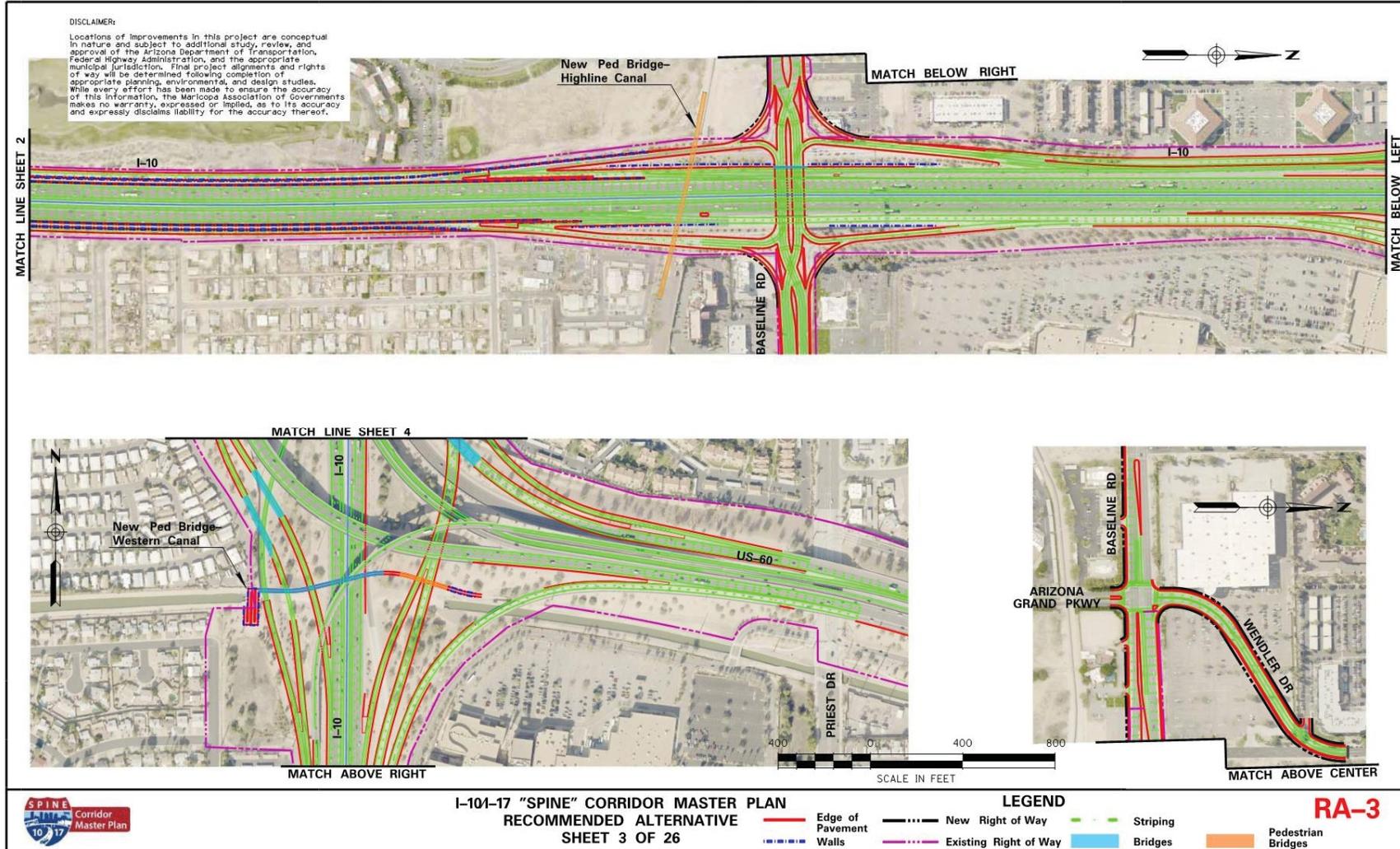


Figure 6-4. Recommended Alternative, Sheet 4 of 26 (I-10 Segment: US-60 to SR-143)

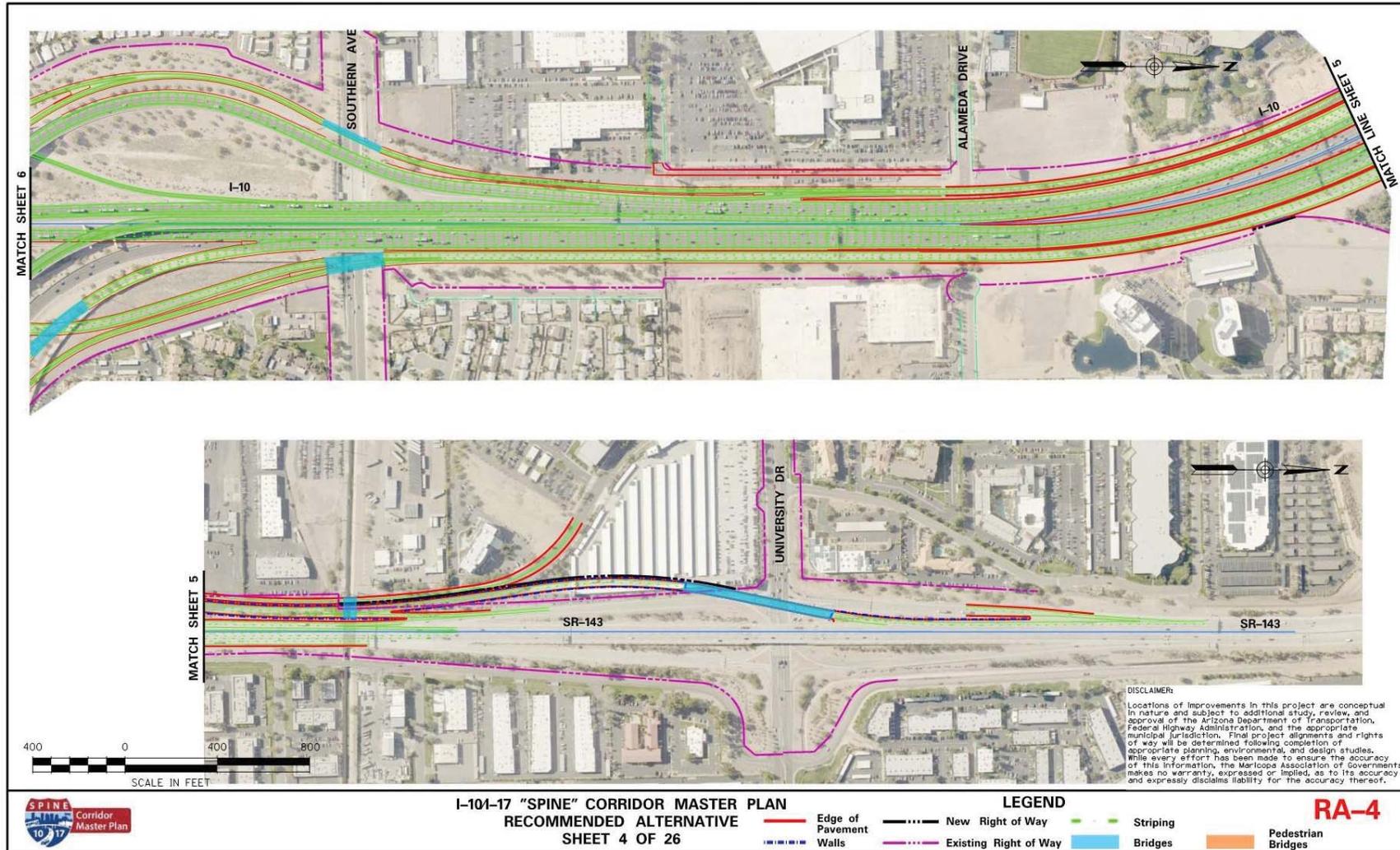


Figure 6-5. Recommended Alternative, Sheet 5 of 26 (I-10 Segment: US-60 to SR-143)

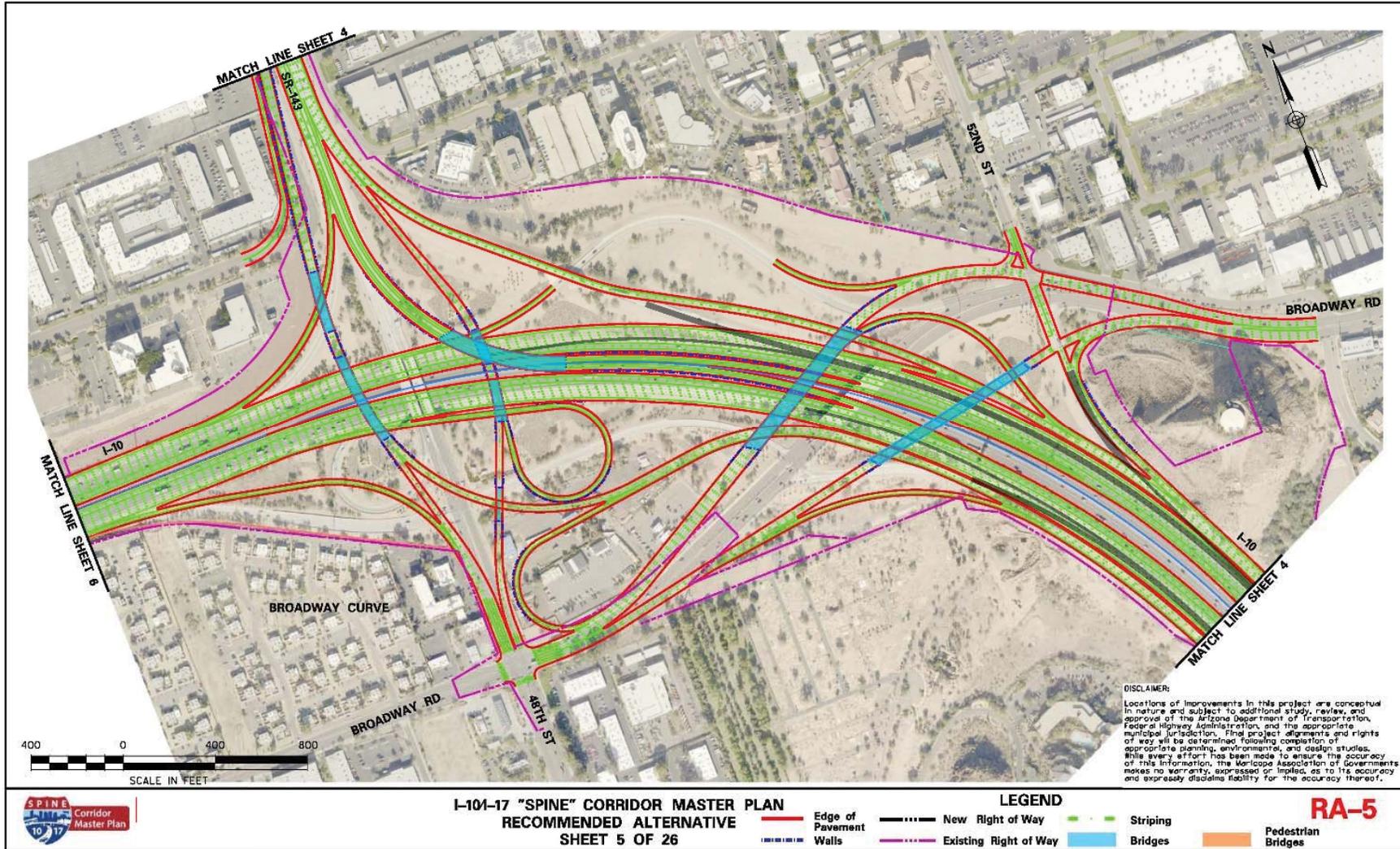


Figure 6-6. Recommended Alternative, Sheet 6 of 26 (I-10 Segment: SR-143 to I-17 Split)

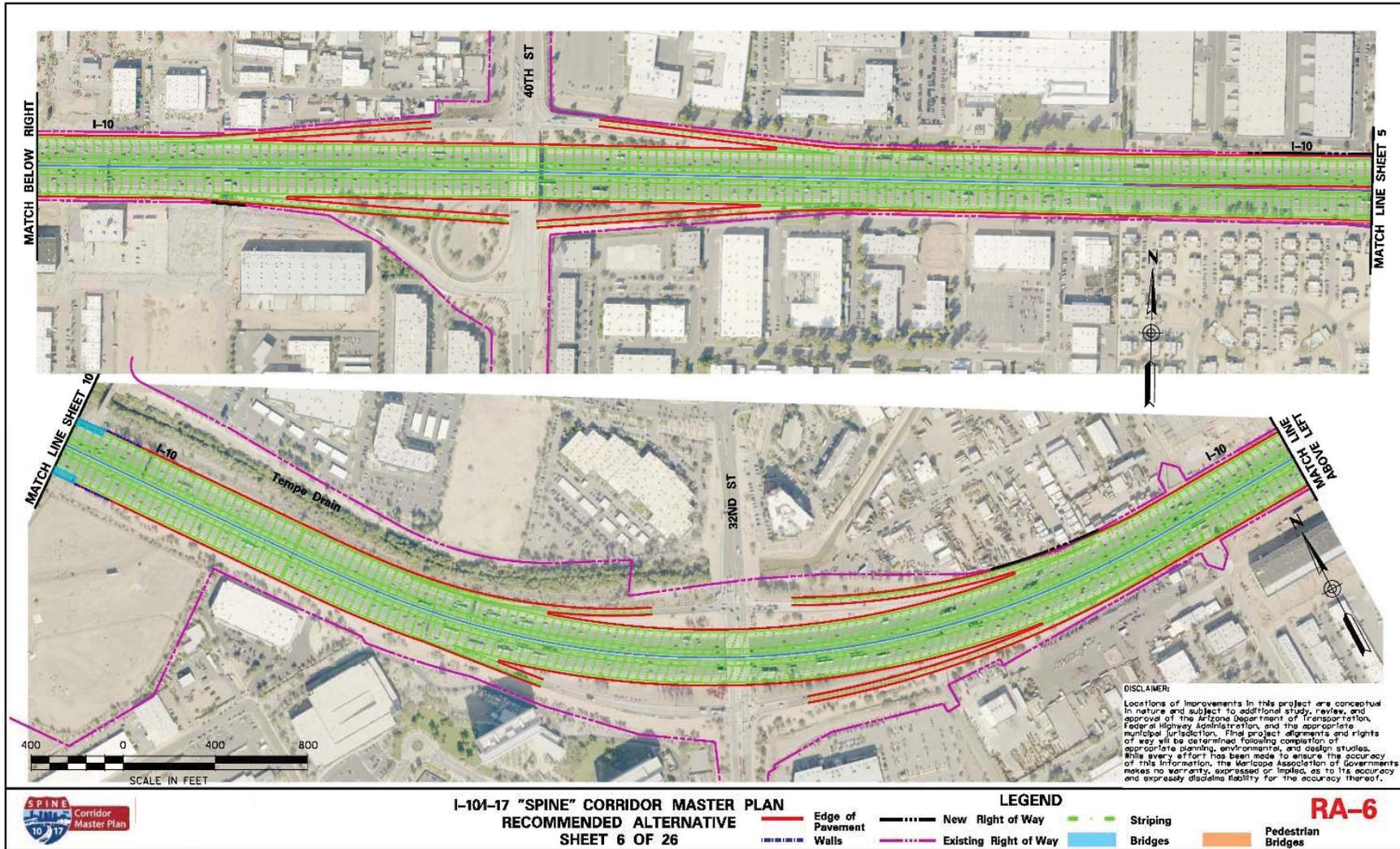


Figure 6-7. Recommended Alternative, Sheet 7 of 26 (I-10 Segment: SR-143 to I-17 Split)

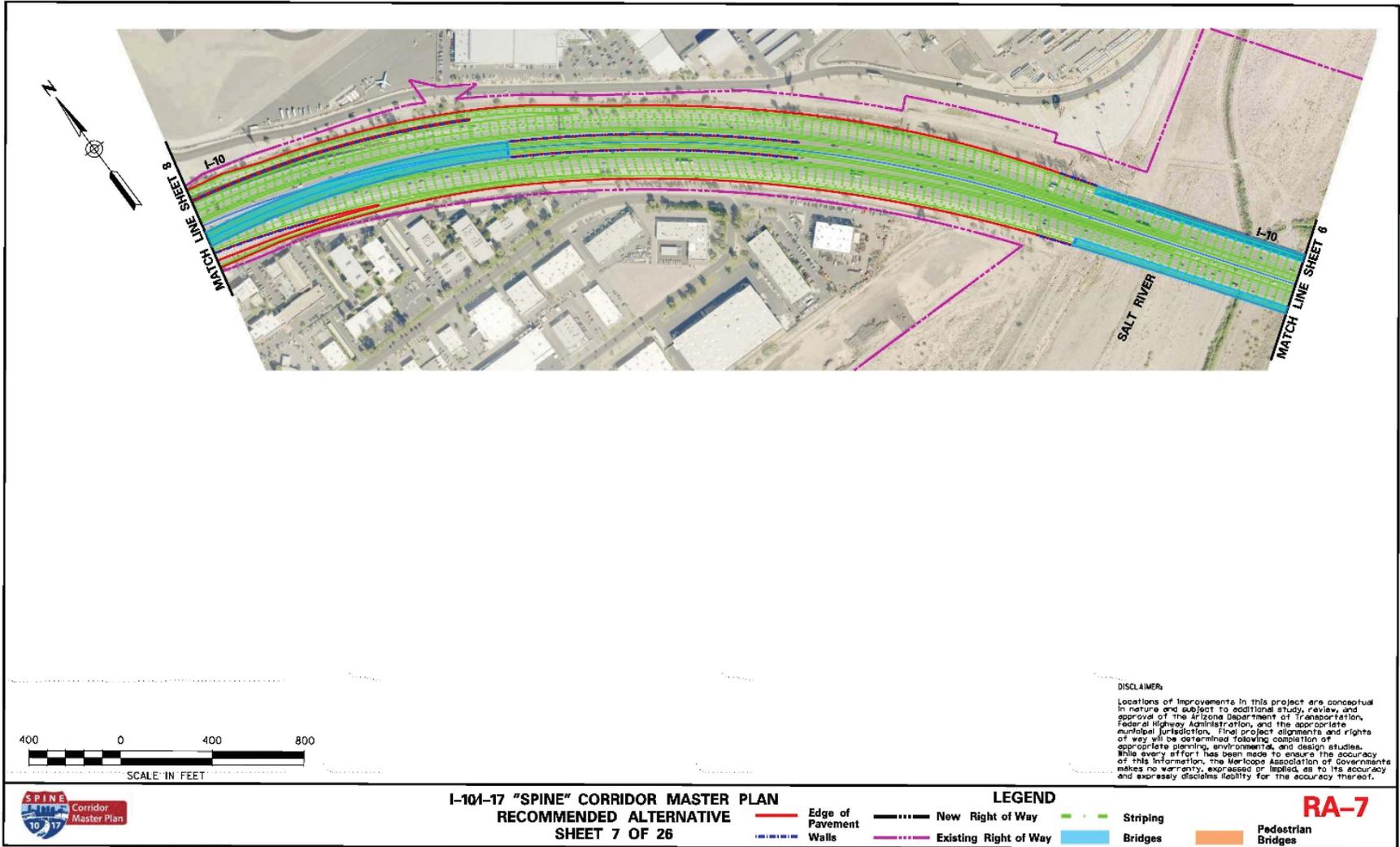


Figure 6-8. Recommended Alternative, Sheet 8 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

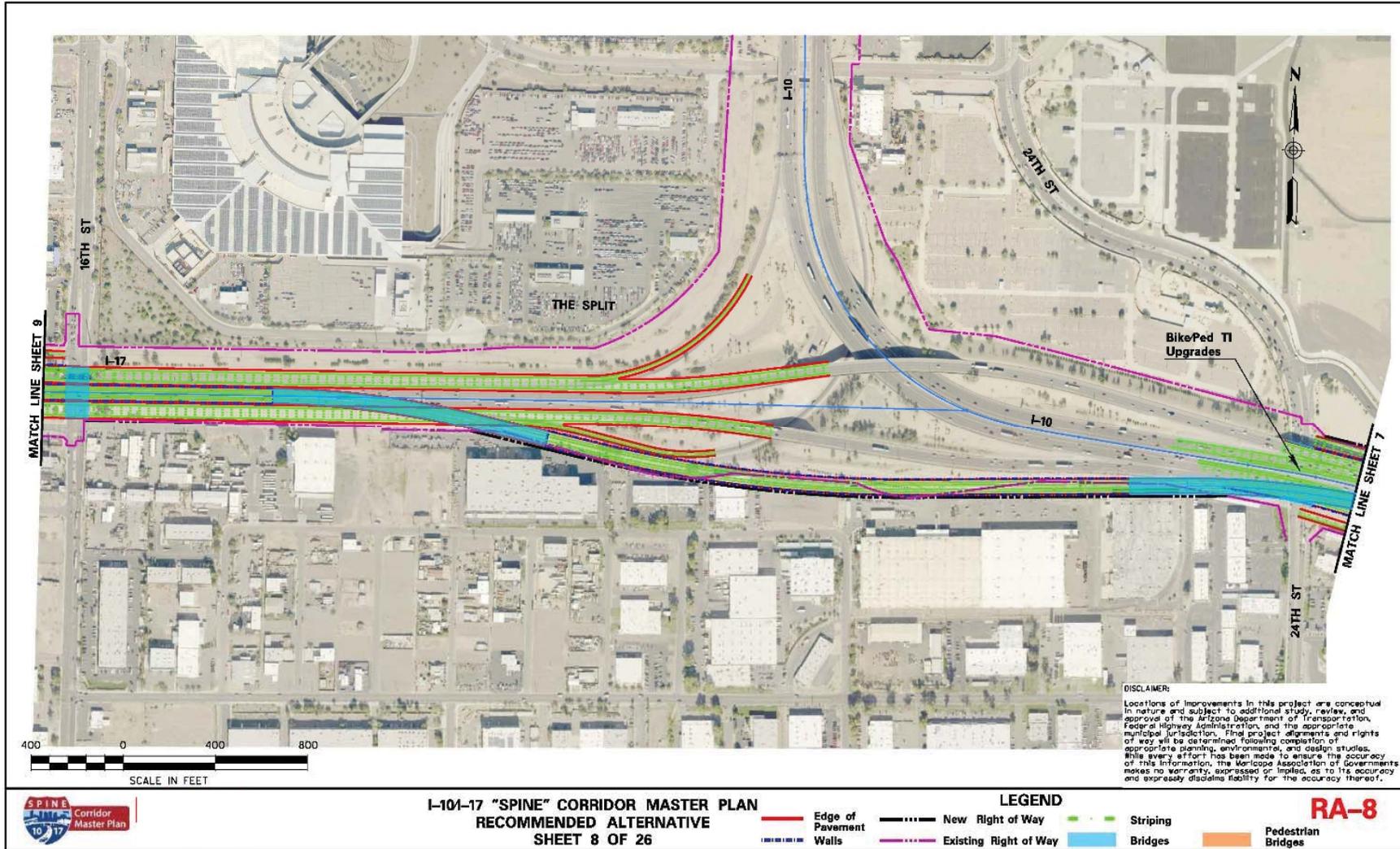


Figure 6-9. Recommended Alternative, Sheet 9 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

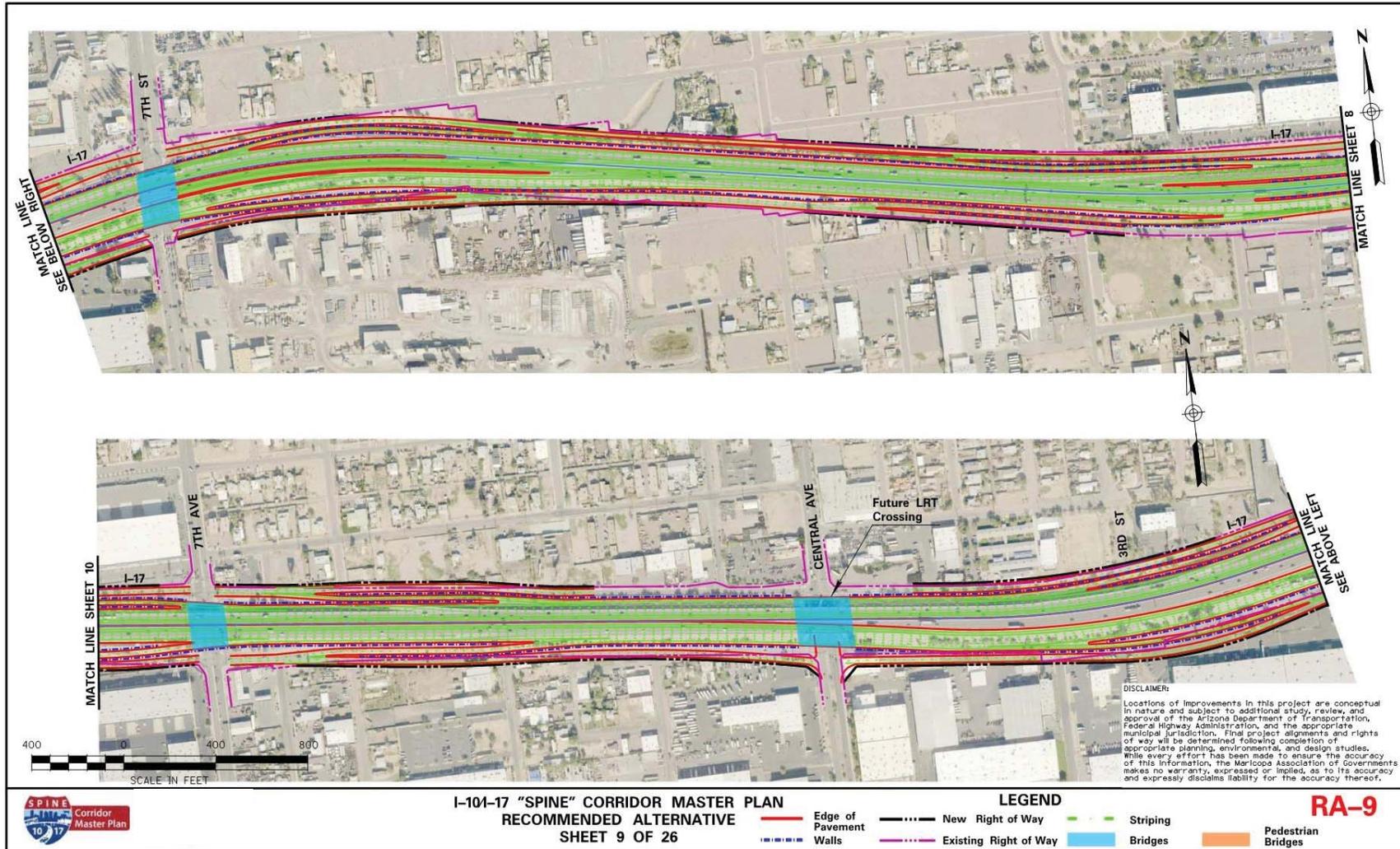


Figure 6-10. Recommended Alternative, Sheet 10 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

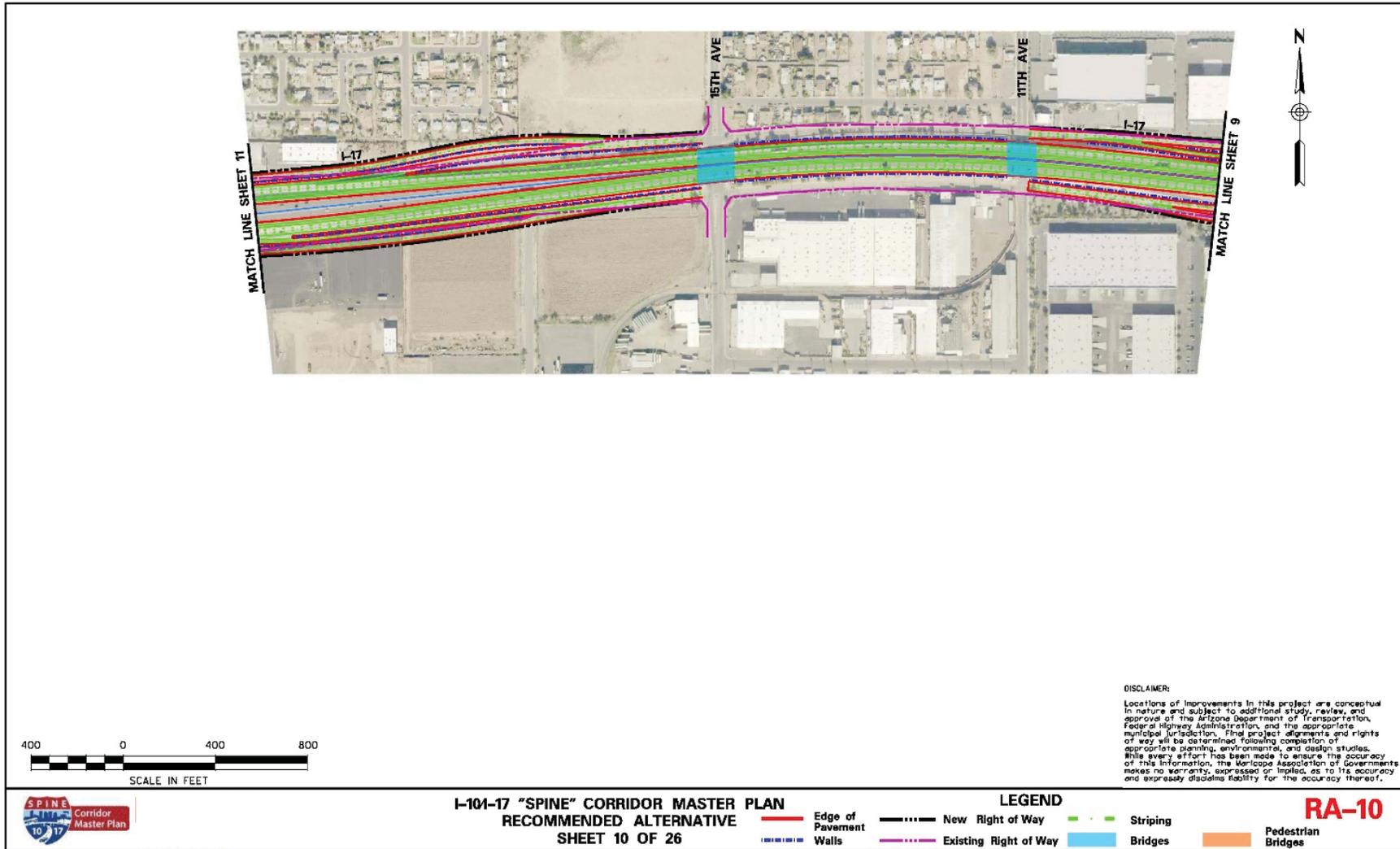


Figure 6-11. Recommended Alternative, Sheet 11 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

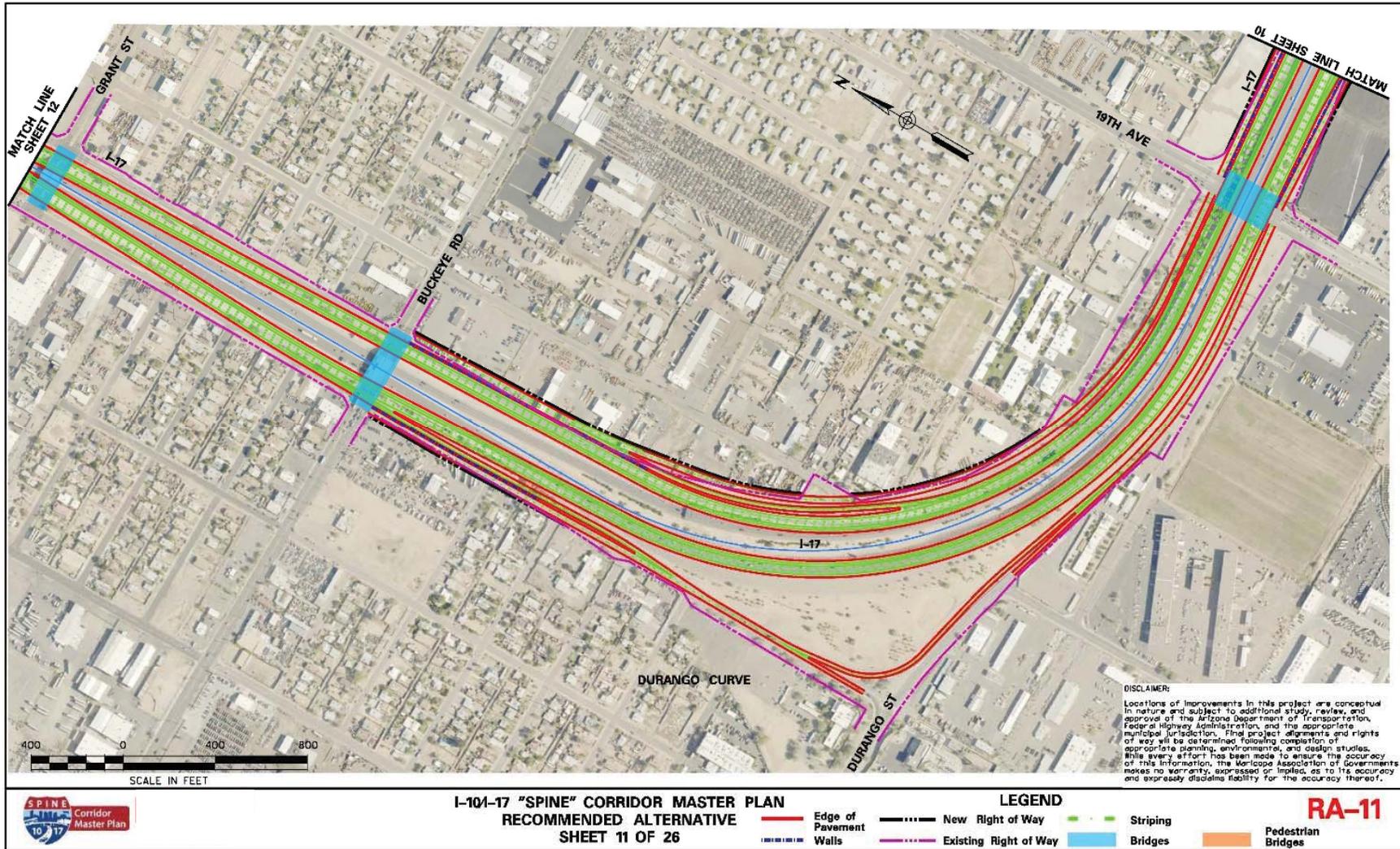


Figure 6-12. Recommended Alternative, Sheet 12 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

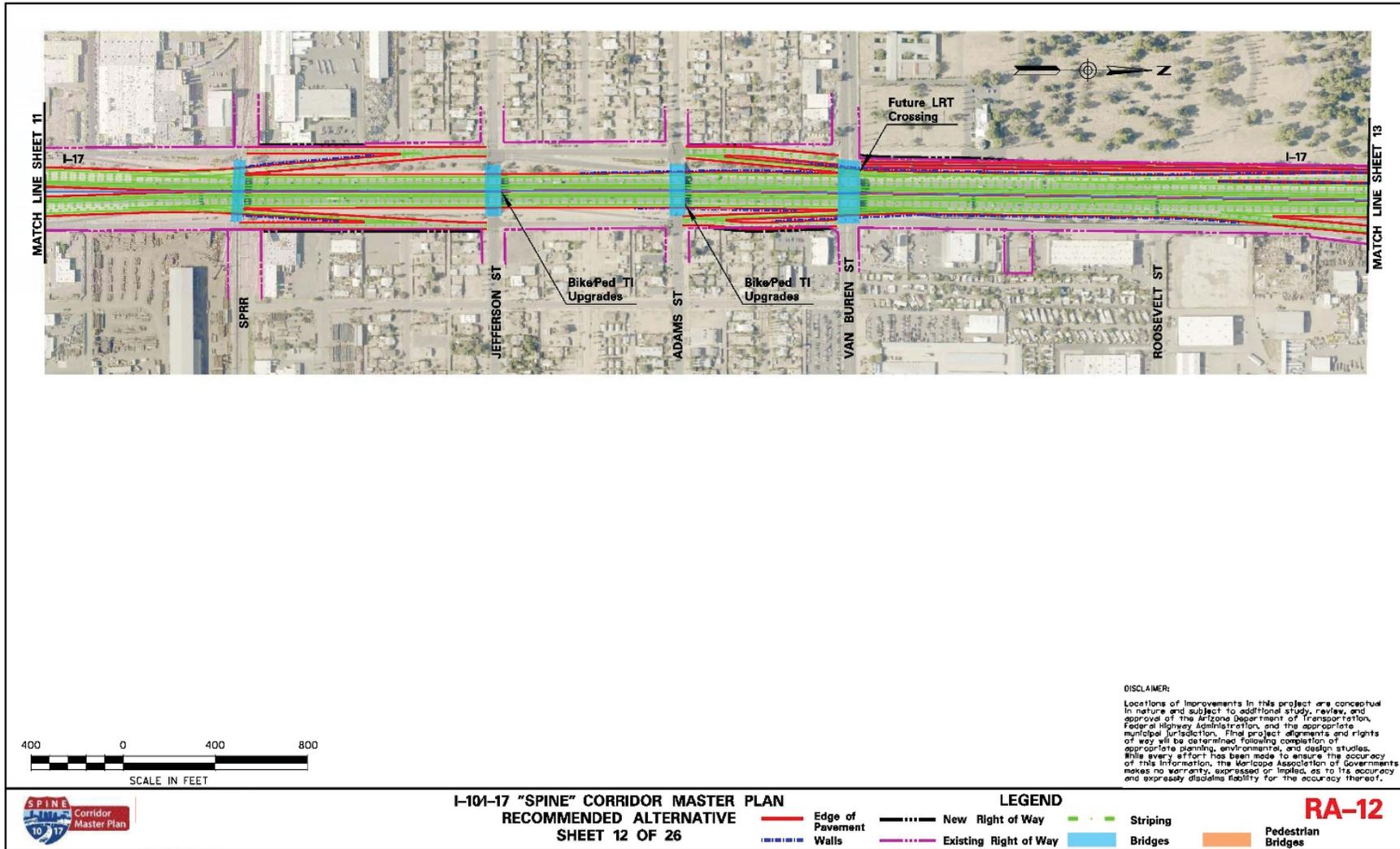


Figure 6-13. Recommended Alternative, Sheet 13 of 26 (I-17 Segment: I-10 Split to I-10 Stack)

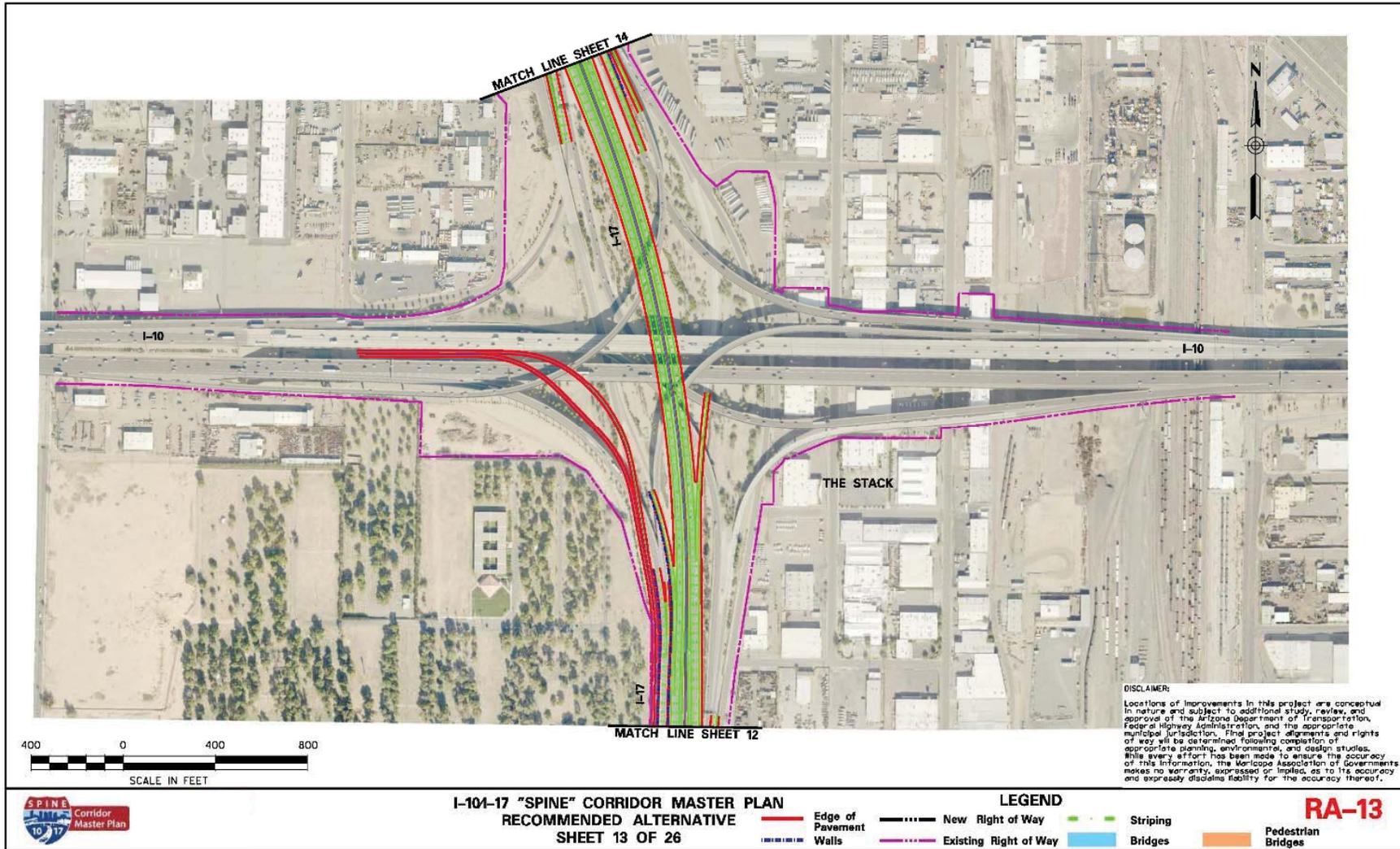


Figure 6-15. Recommended Alternative, Sheet 14 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

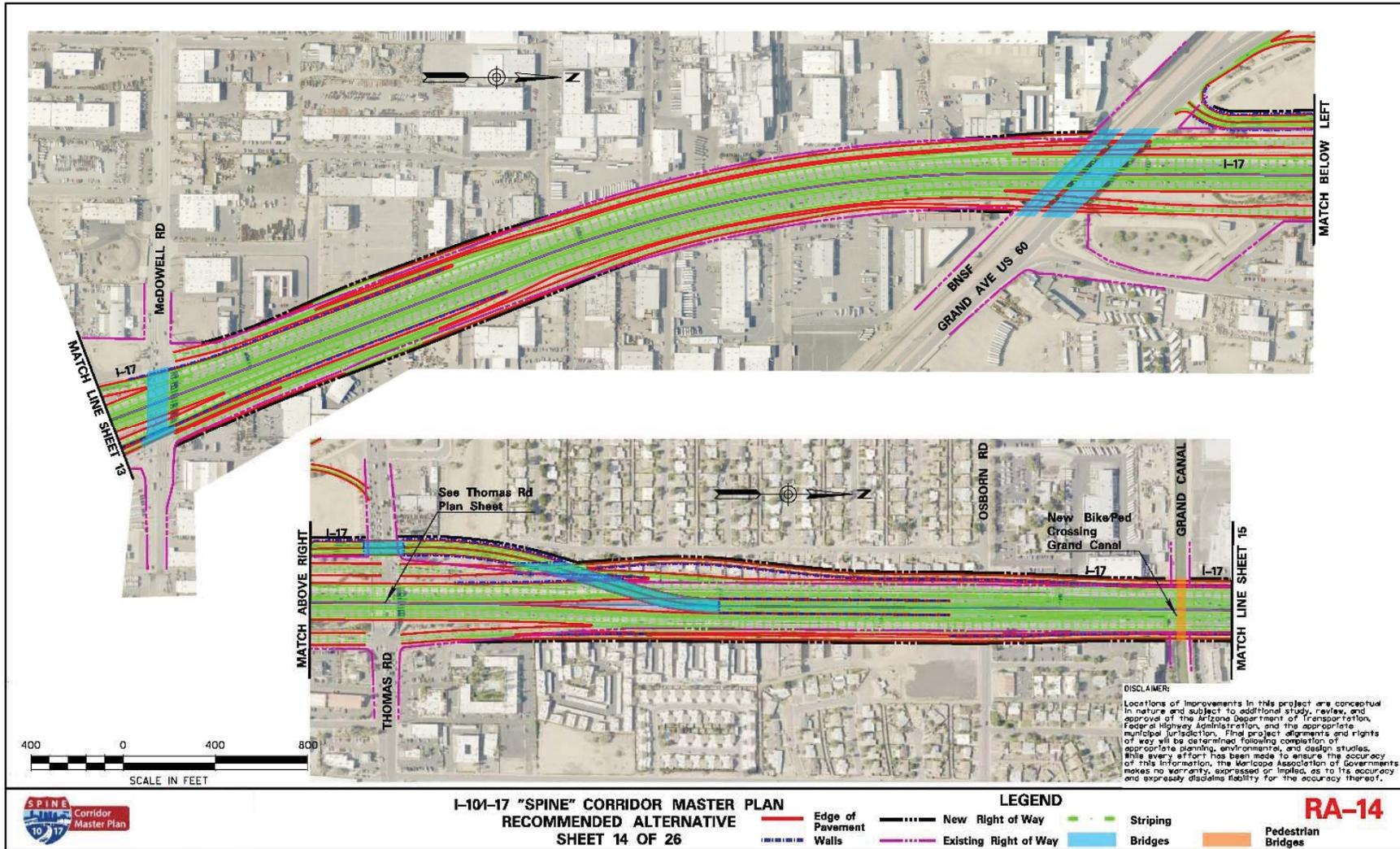


Figure 6-16. Recommended Alternative, Sheet 15 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

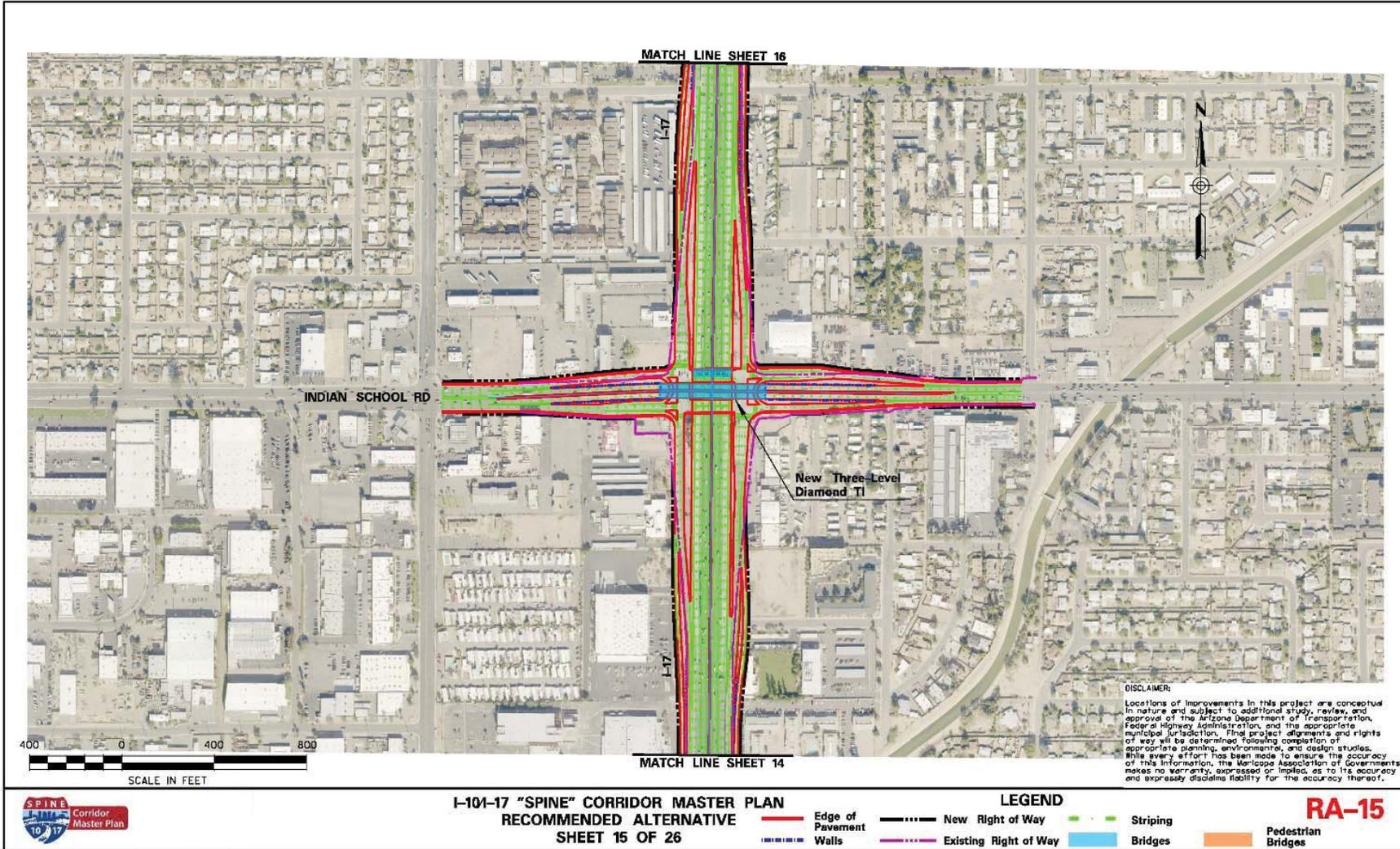


Figure 6-17. Recommended Alternative, Sheet 16 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

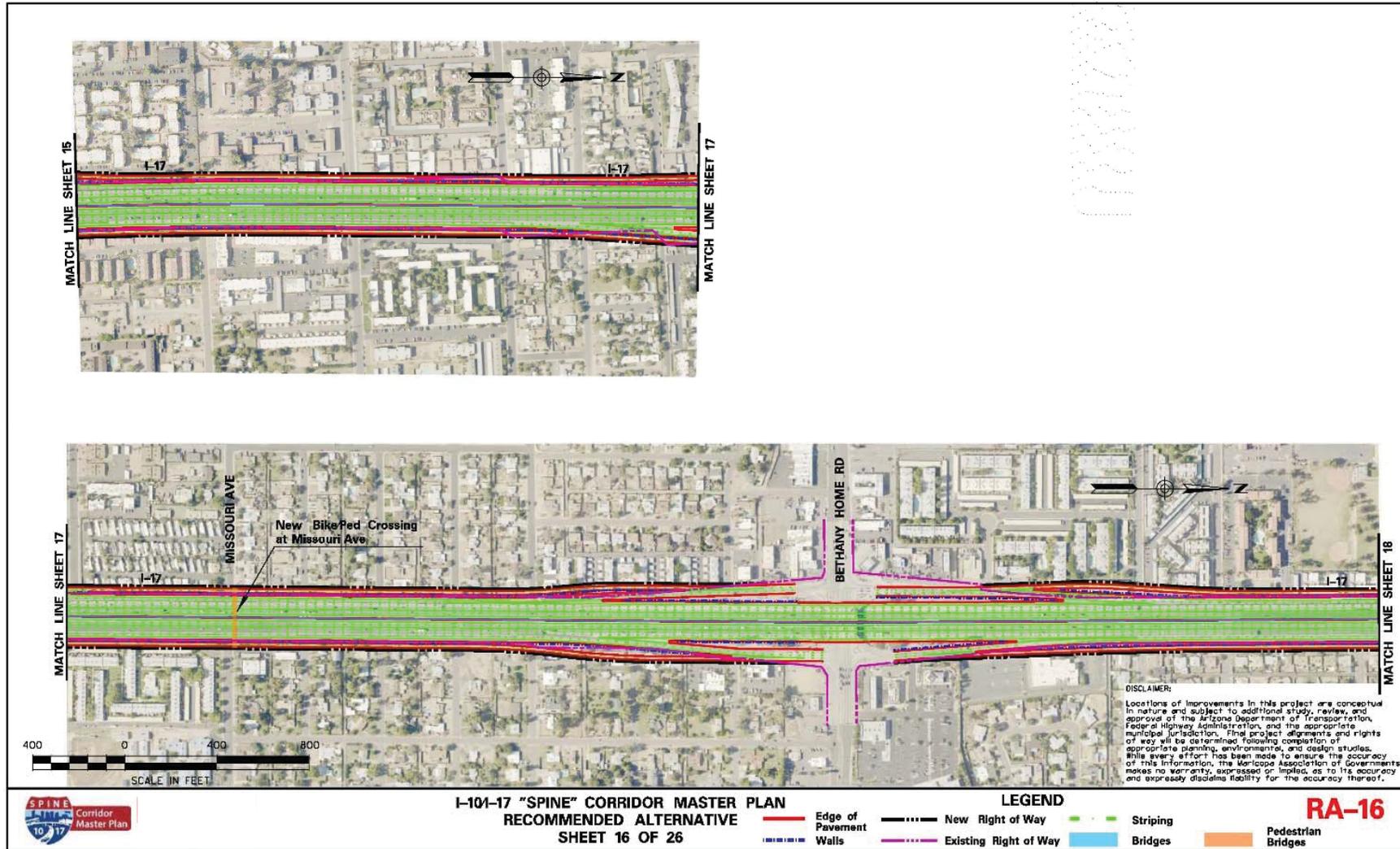


Figure 6-18. Recommended Alternative, Sheet 17 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

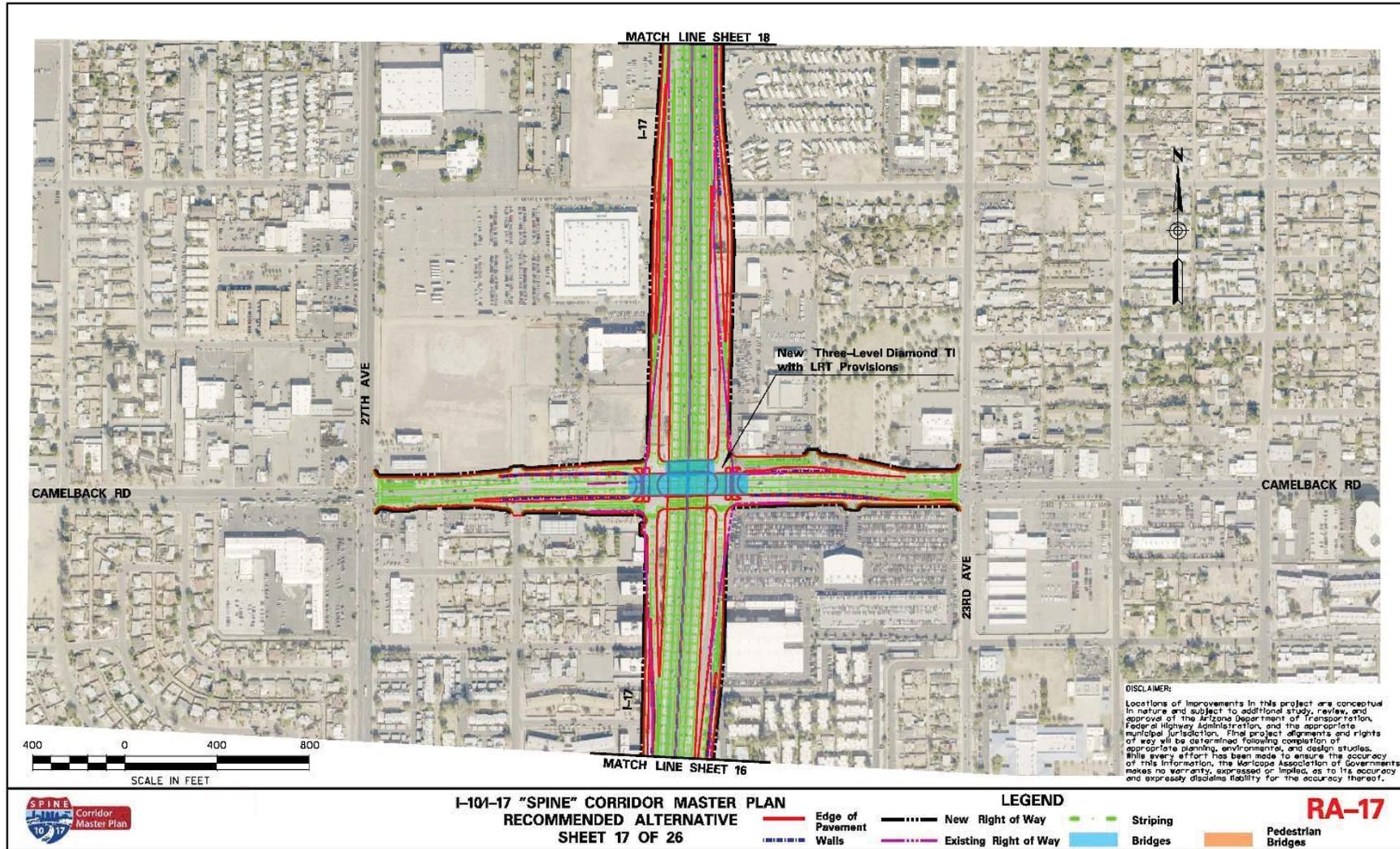


Figure 6-19. Recommended Alternative, Sheet 18 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

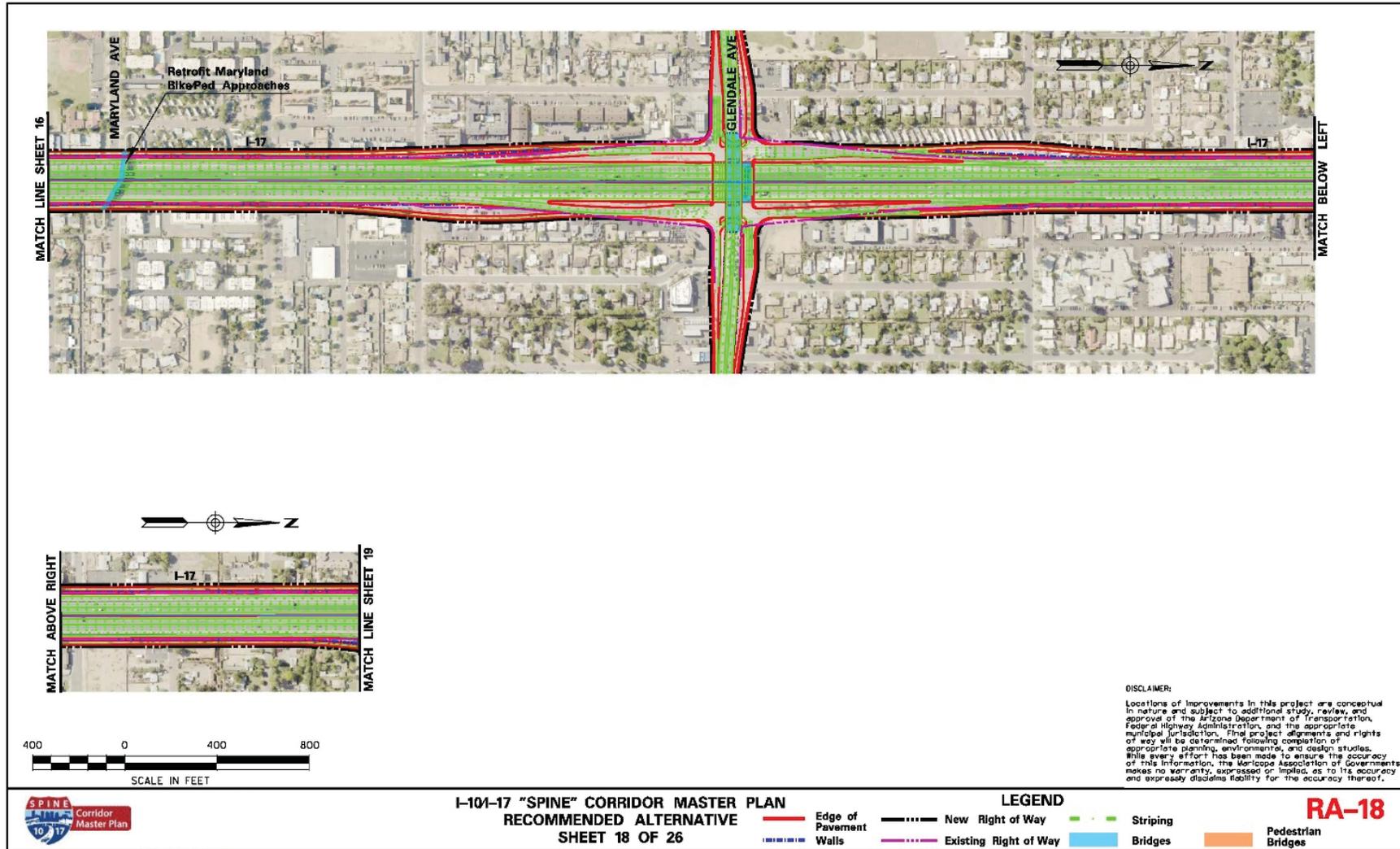


Figure 6-20. Recommended Alternative, Sheet 19 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

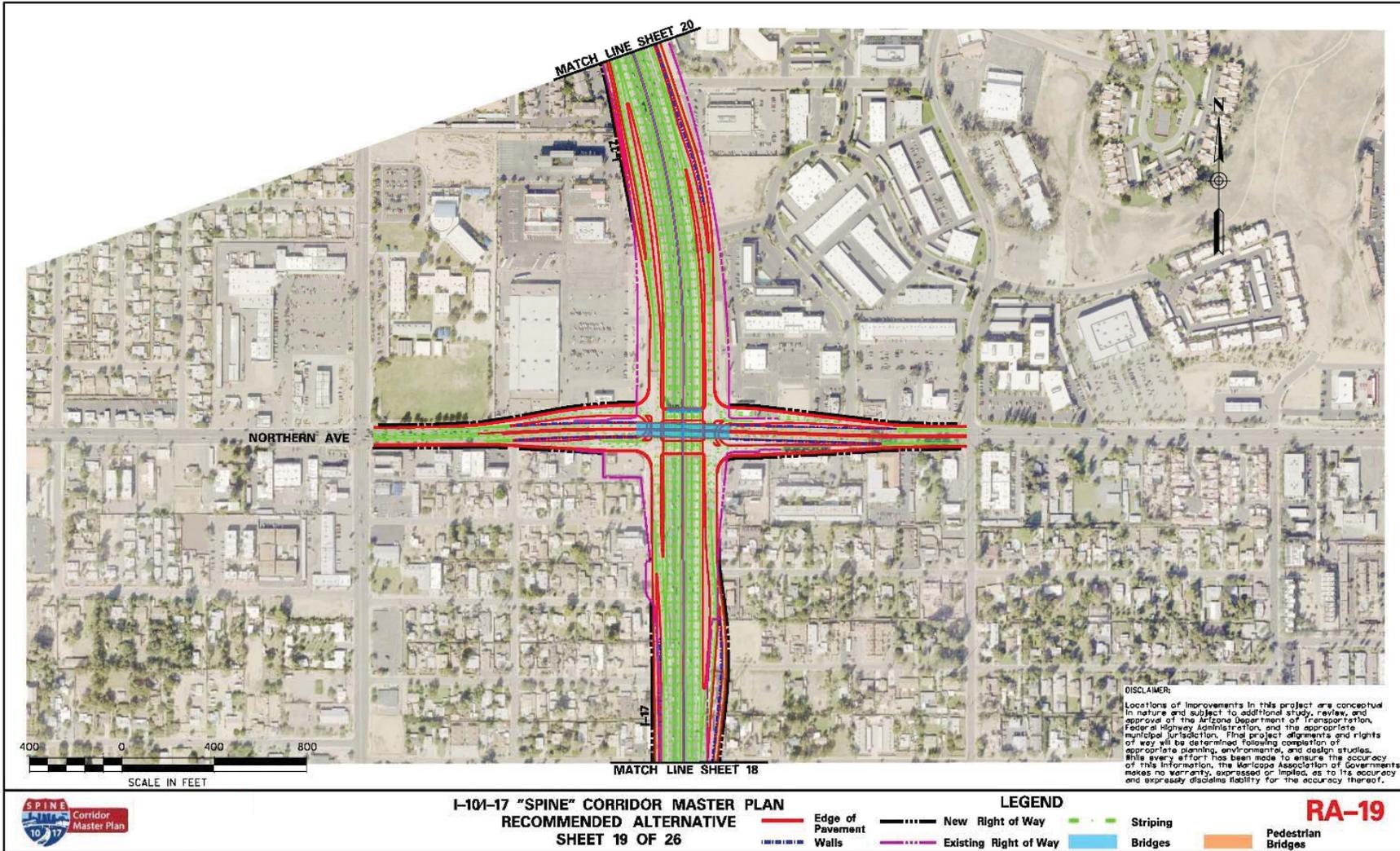


Figure 6-21. Recommended Alternative, Sheet 20 of 26 (I-17 Segment: I-10 Stack to Dunlap Avenue)

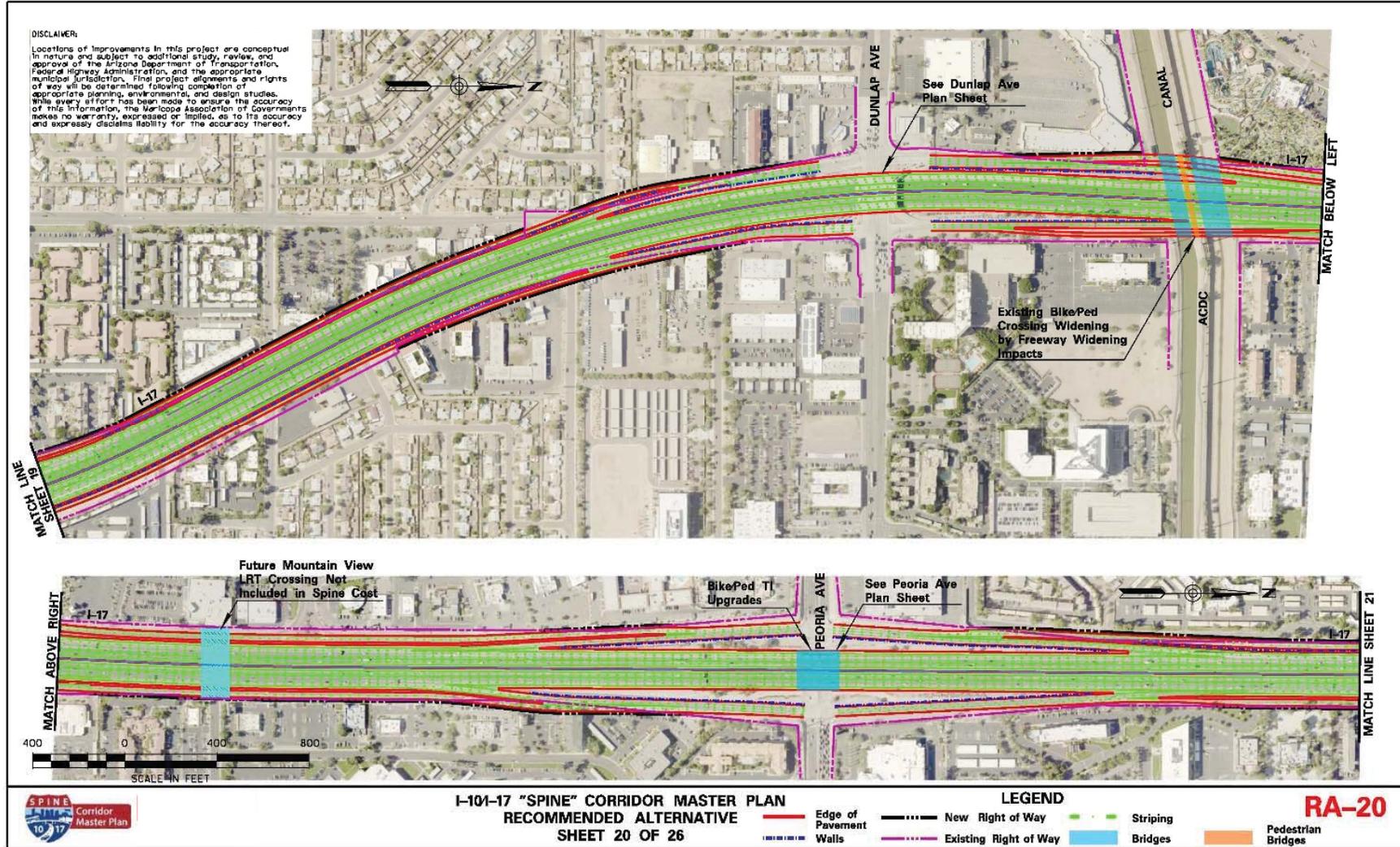


Figure 6-22. Recommended Alternative, Sheet 21 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

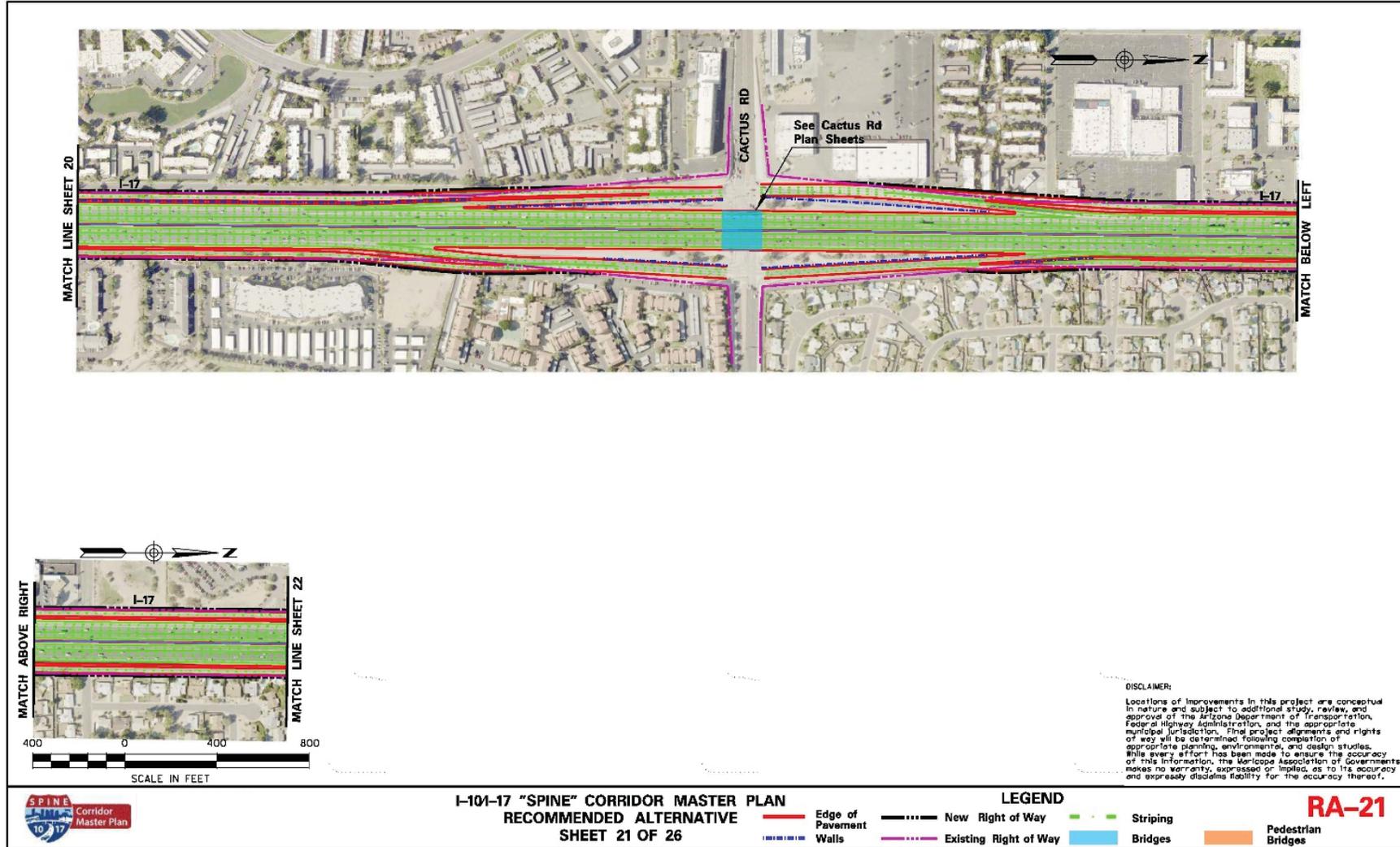


Figure 6-23. Recommended Alternative, Sheet 22 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

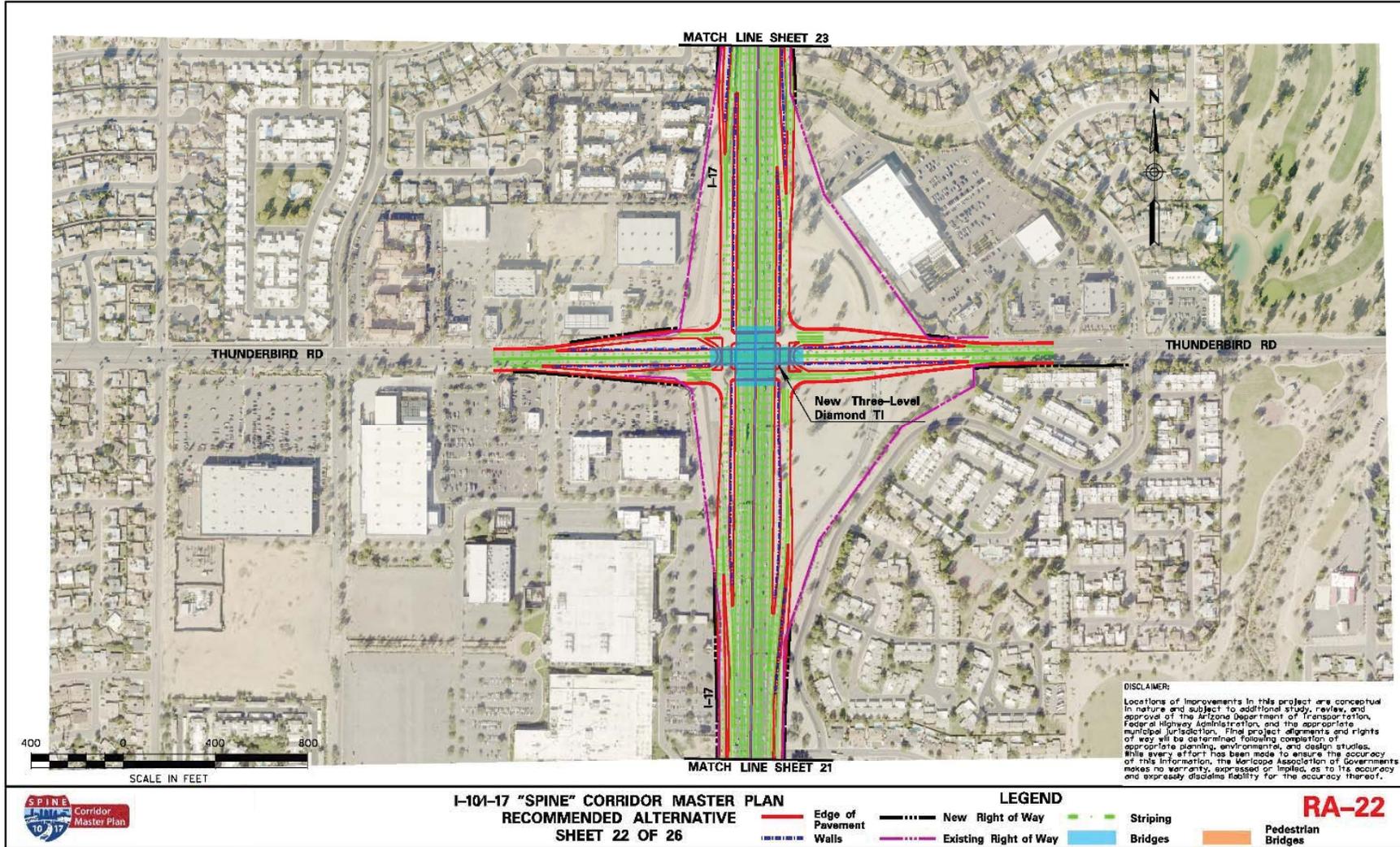


Figure 6-24. Recommended Alternative, Sheet 23 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

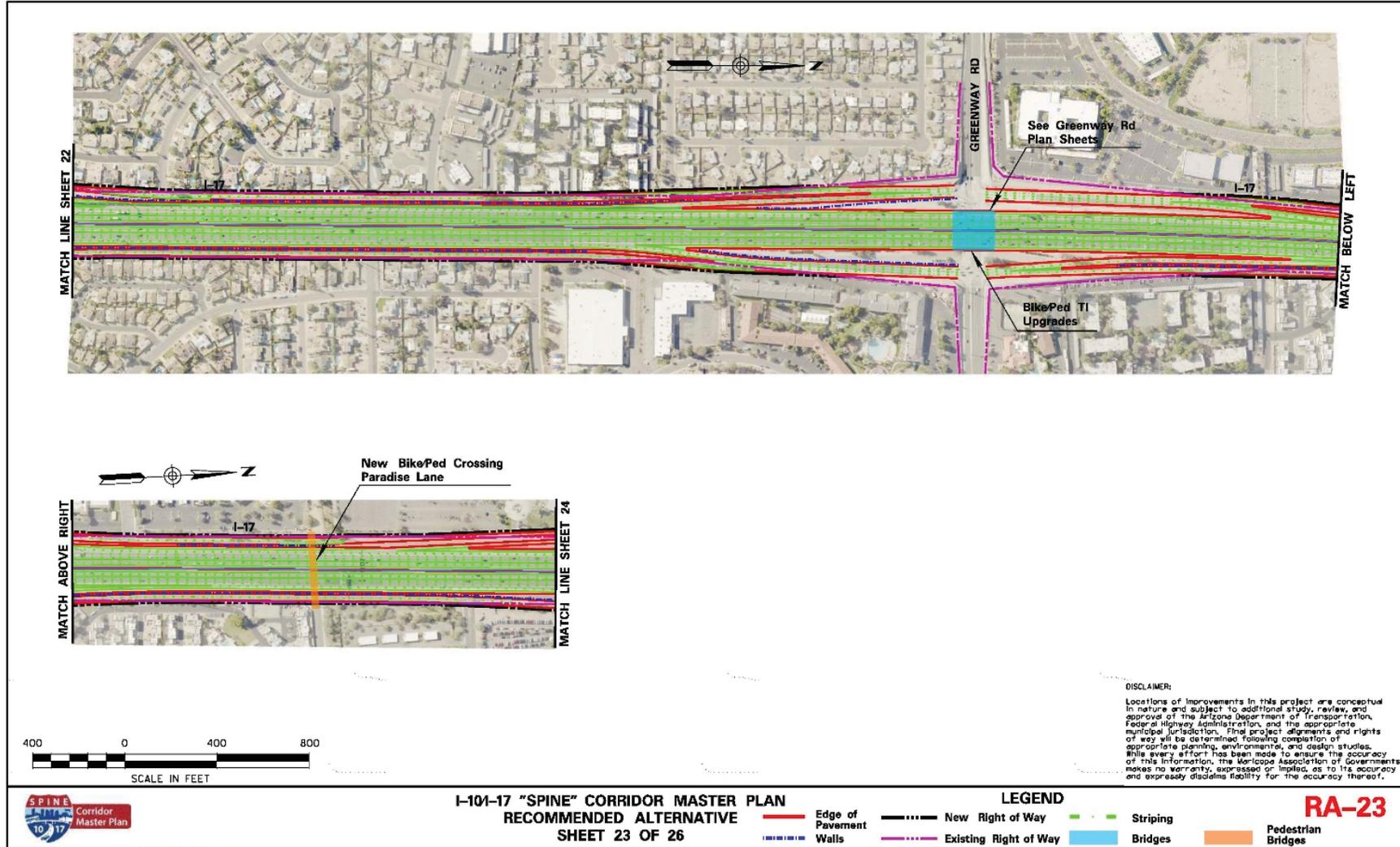


Figure 6-25. Recommended Alternative, Sheet 24 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

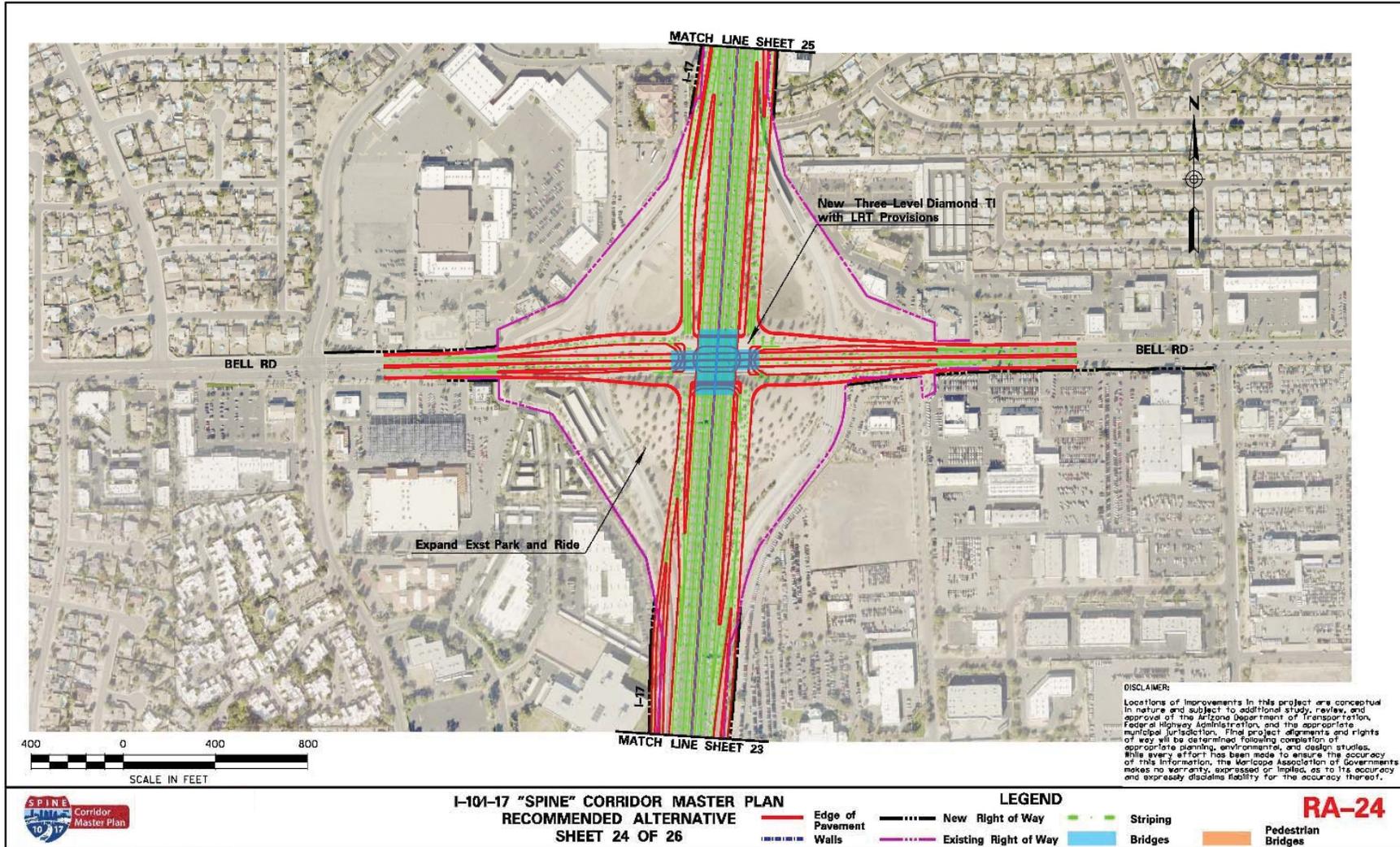


Figure 6-26. Recommended Alternative, Sheet 25 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

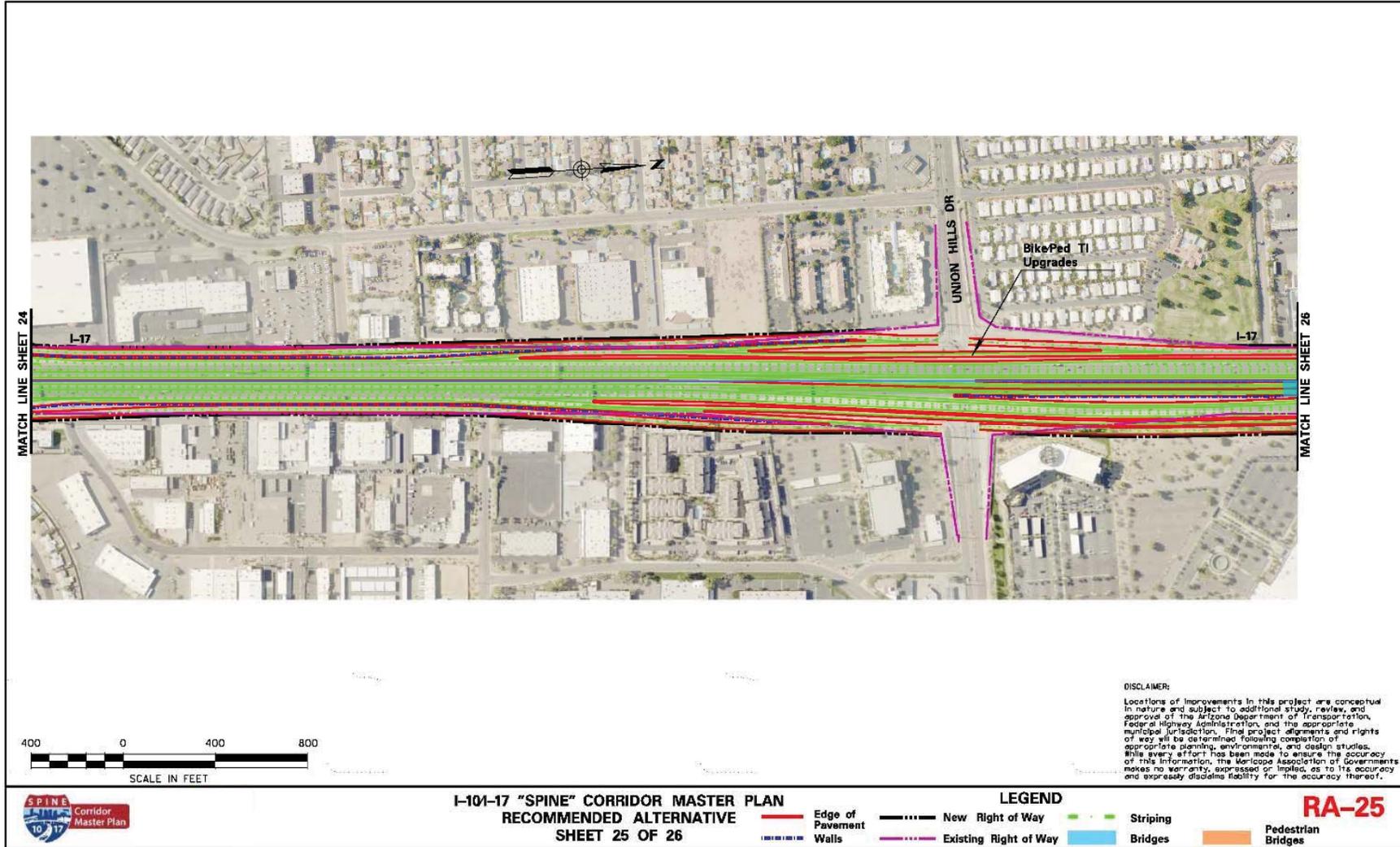


Figure 6-27. Recommended Alternative, Sheet 26 of 26 (I-17 Segment: Dunlap Avenue to SR-101L North Stack)

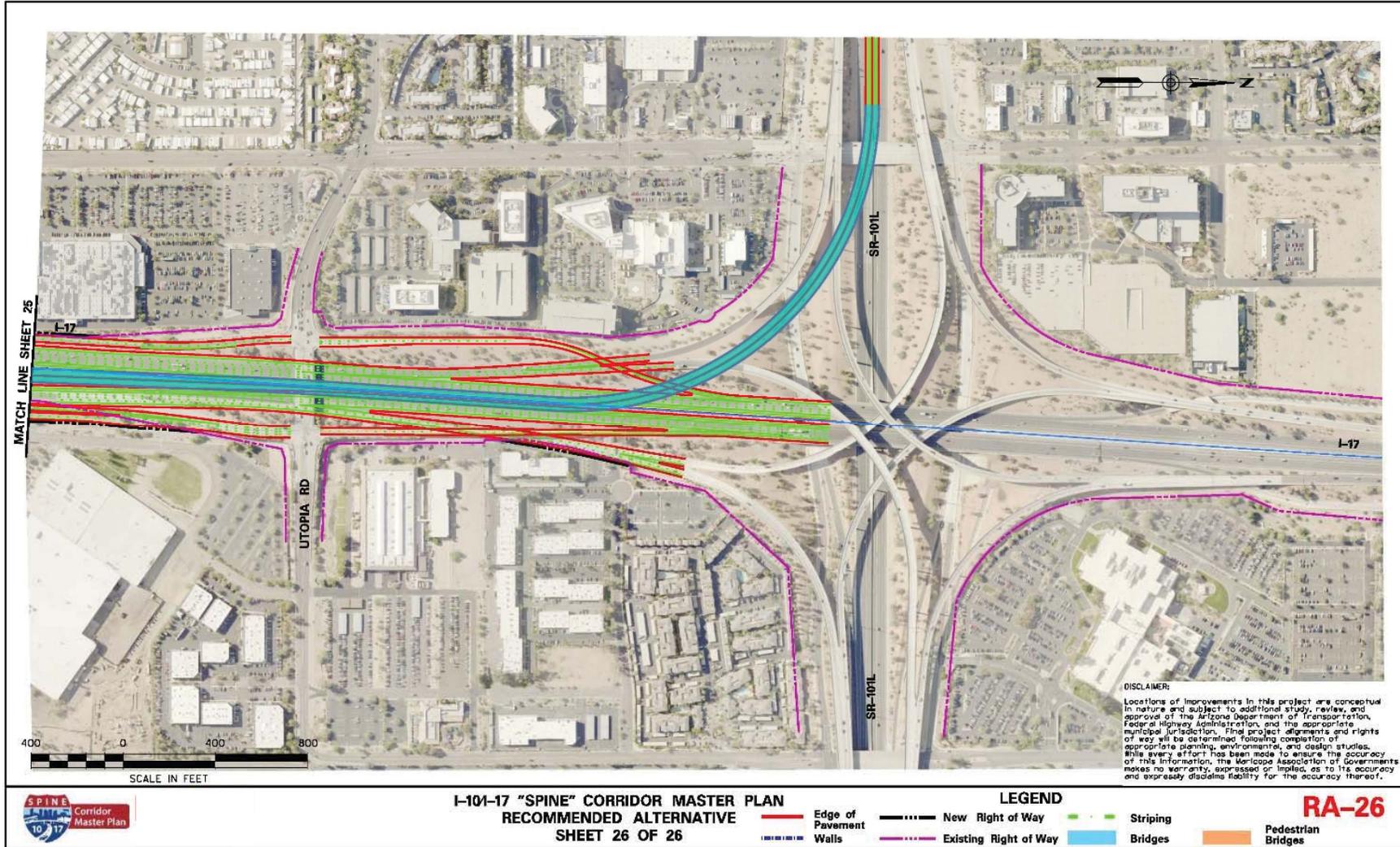


Figure 6-28. Recommended Alternative Lane Line Diagram, Sheet 1 of 7

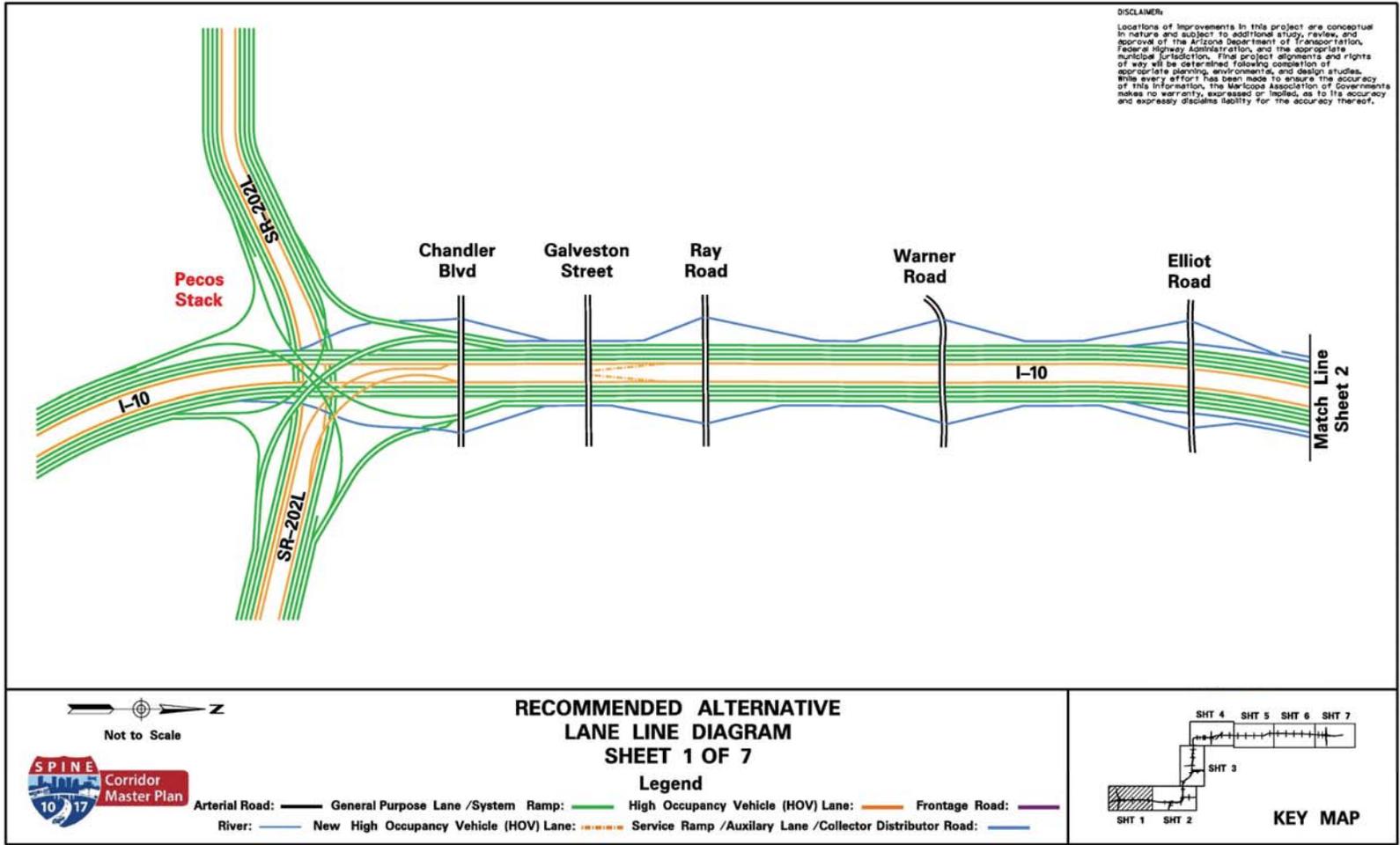


Figure 6-29. Recommended Alternative Lane Line Diagram, Sheet 2 of 7

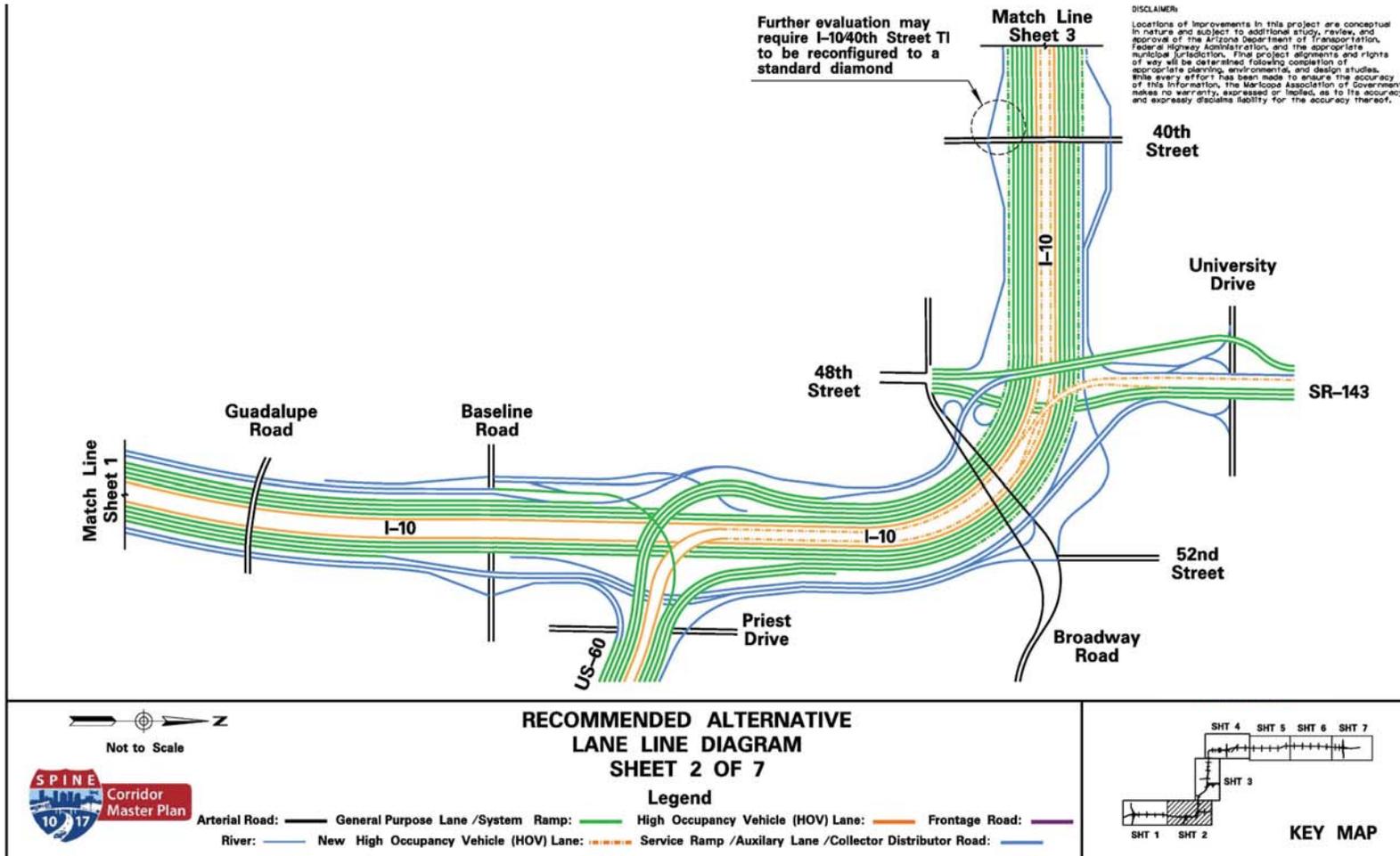


Figure 6-30. Recommended Alternative Lane Line Diagram, Sheet 3 of 7

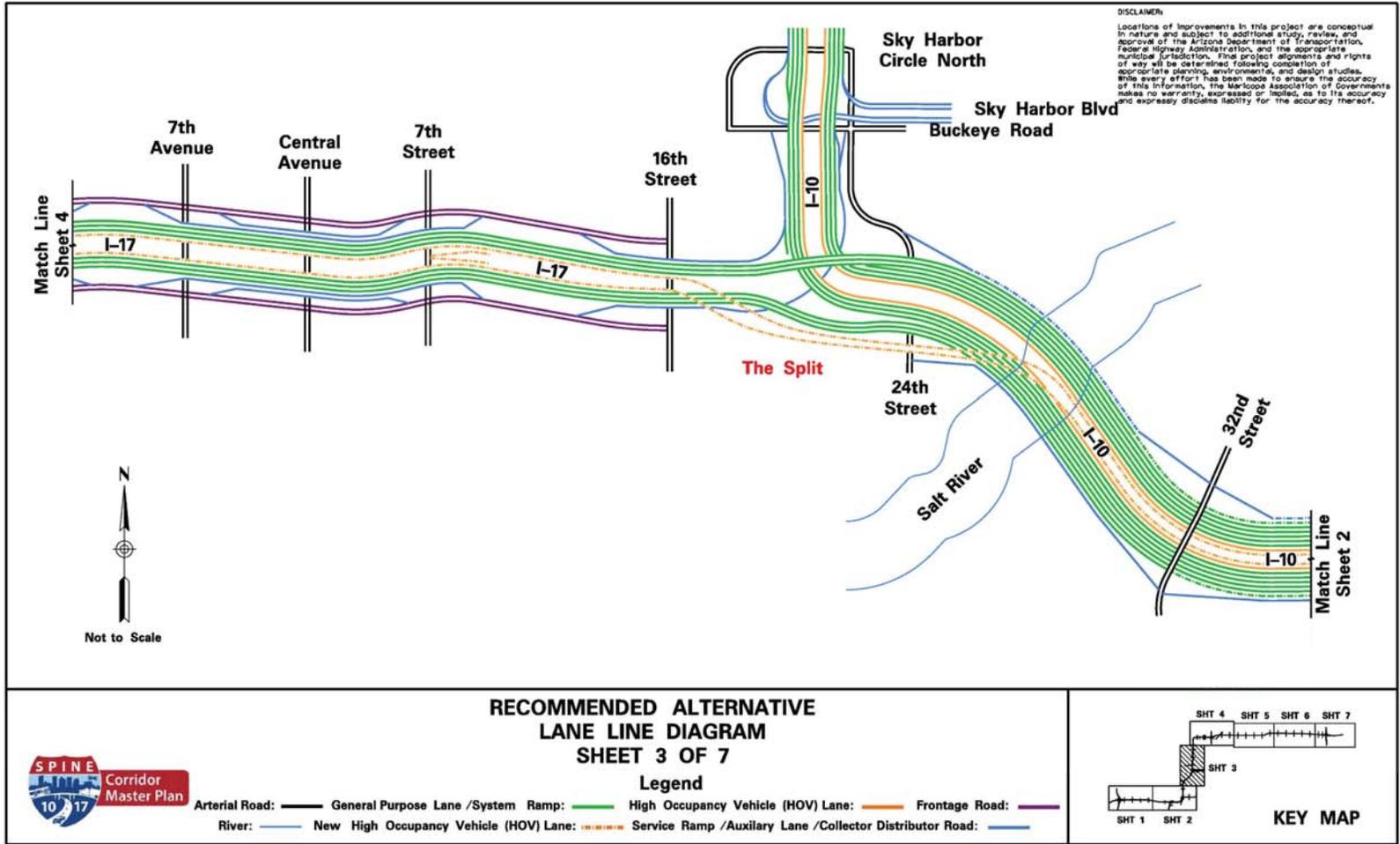


Figure 6-31. Recommended Alternative Lane Line Diagram, Sheet 4 of 7

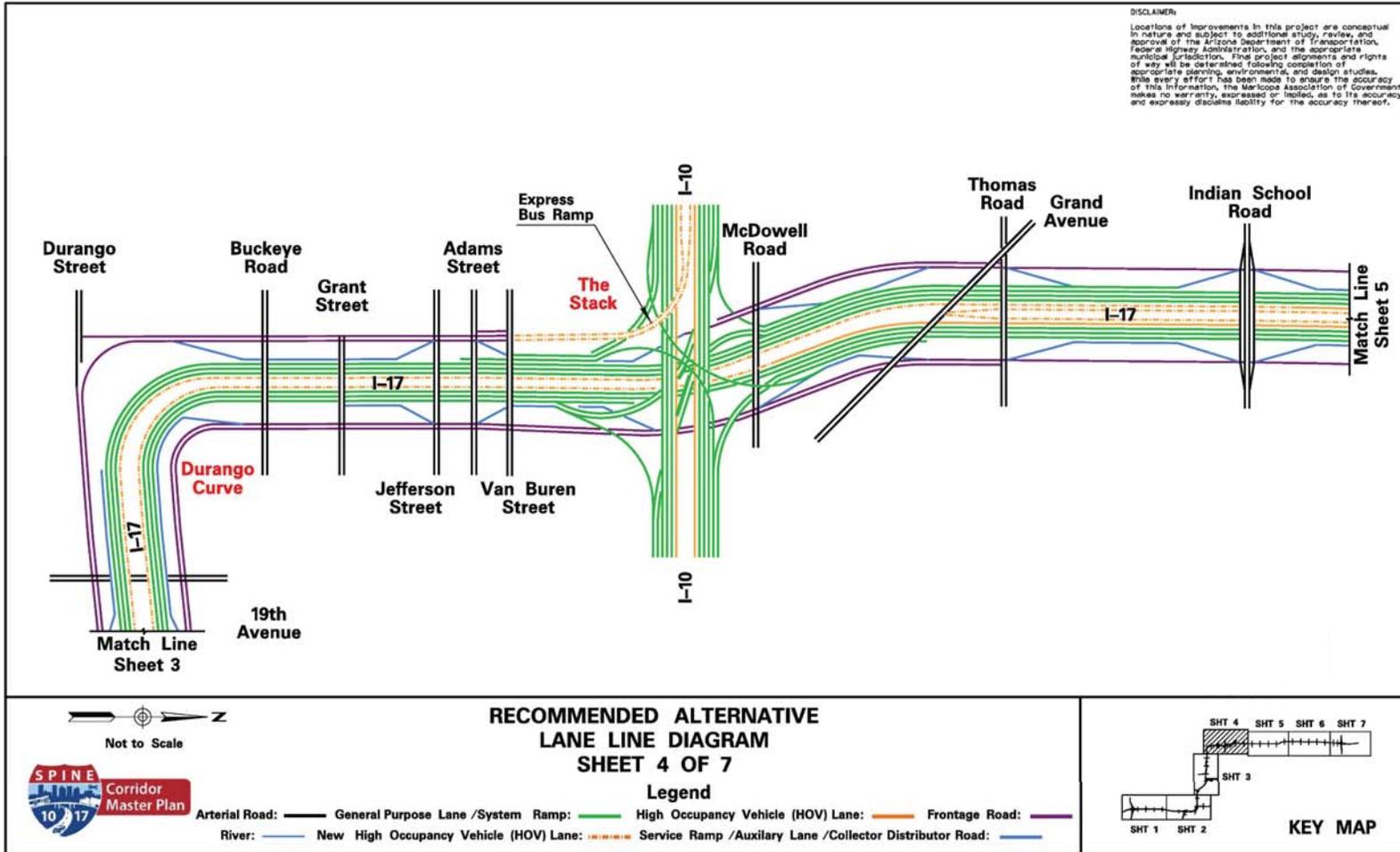


Figure 6-32. Recommended Alternative Lane Line Diagram, Sheet 5 of 7

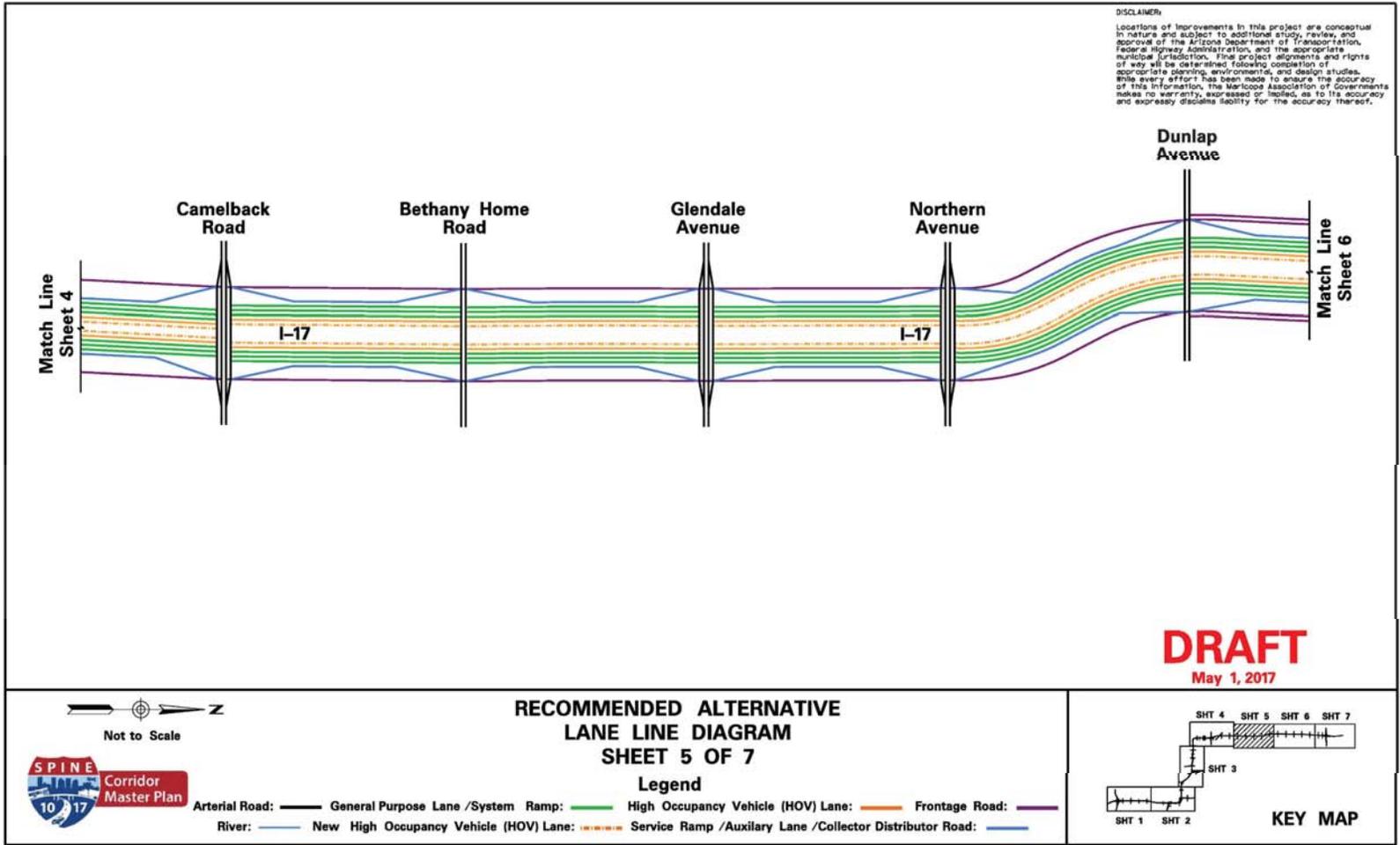


Figure 6-33. Recommended Alternative Lane Line Diagram, Sheet 6 of 7

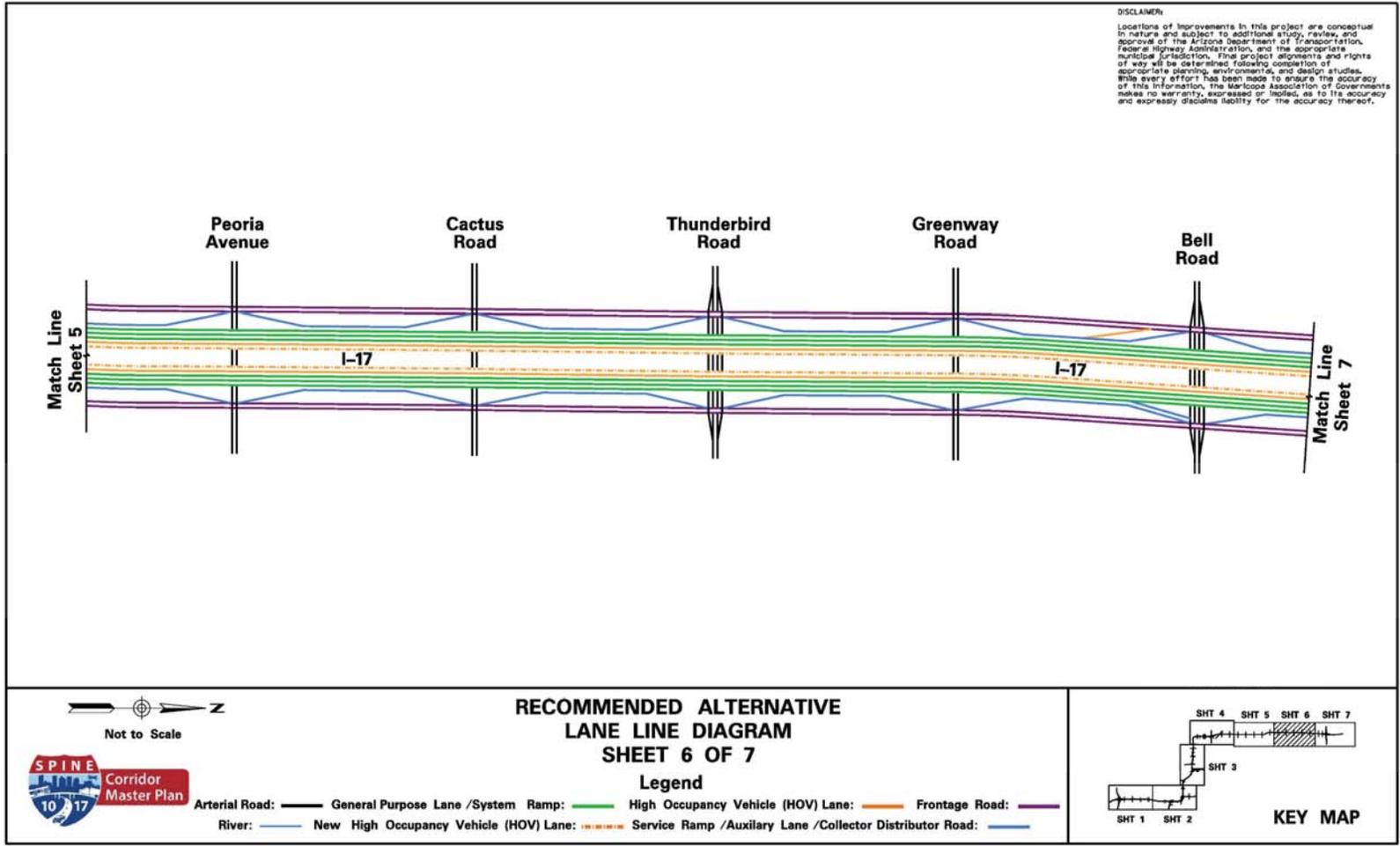
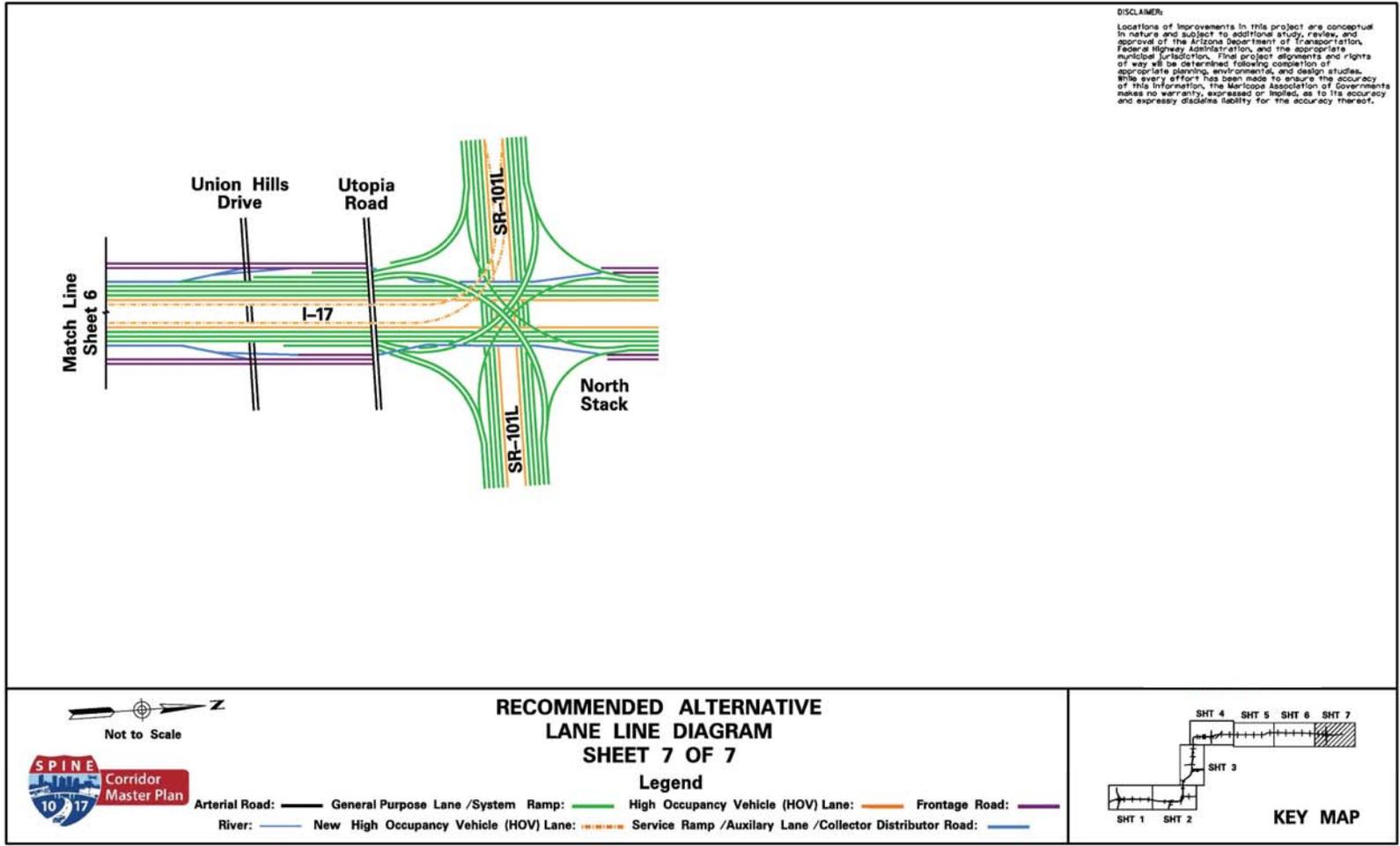


Figure 6-34. Recommended Alternative Lane Line Diagram, Sheet 7 of 7



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