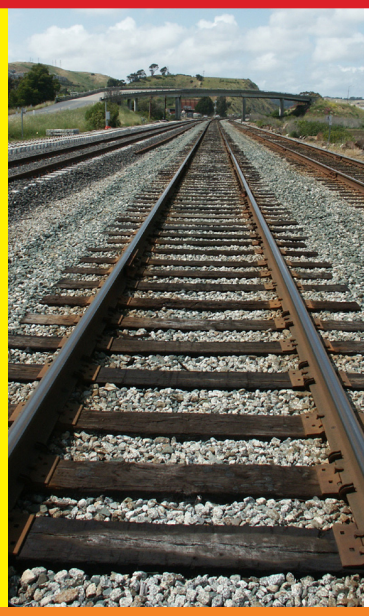

2010 Statewide Rail Framework Study

Arizona Department of Transportation

http://www.bqaz.gov

FINAL REPORT

March 2010

Acknowledgments

The Statewide Transportation Planning Framework Program was made possible by the cooperative efforts of the following individuals and organizations who contributed significantly to the successful completion of the project:

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Abbreviations

AA	Alternatives Analysis
AAR	Assocation of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACC	Arizona Corporation Commission
ADEQ	Arizona Department of Environmental Quality
ADOC	Arizona Department of Commerce
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AEC	Area of Environmental Constraint
ARRA	American Recovery and Reinvestment Act of 2009
ASLD	Arizona State Land Department
AWC	Arizona Wilderness Coalition
AZ	Arizona
AZGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BNSF	BNSF Railway
BOR	Bureau of Reclamation
bqAZ	Building a Quality Arizona
BRAC	Base Realignment and Closure Commission
CA	California
CAAG	Central Arizona Association of Governments
CFR	Code of Federal Regulations
CHSRA	California High Speed Rail Authority
CN	Canadian National Railway
CO	Colorado
COG	Council of Government
CRIT	Colorado River Indian Tribes
CTC	Centralized Traffic Control
CWA	Clean Water Act
CSX	CSX Transportation
DC	District of Columbia
DCR	Design Concept Report
DES	Department of Economic Security
DOD	Department of Defense
DHS	Department of Homeland Security
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Environmental Overview
EPA	Environmental Protection Agency
ESA	Endangered Species Act
Ferromex	Ferrocarril Mexicano
FHSRA	Florida High Speed Rail Authority
FHWA	Federal Highway Administration
FMPO	Flagstaff Metropolitan Planning Organization
FRA	Federal Railroad Administration
FRIIP	Freight Railroad Infrastructure Improvement Program
FRPP	Freight Rail Preservation Program
FTA	Federal Transit Administration
FTZ	Foreign Trade Zone
FY	Fiscal Year
GRIC	Gila River Indian Community
HSIPR	High-Speed Intercity Passenger Rail Program
HSR	High-Speed Rail
I	Interstate
ICR	Intercity Rail
ITD	Intermodal Transportation Division
MAG	Maricopa Association of Governments
Maglev	Magnetically Levitated Trains
METRO	Valley Metro Rail
MPD	Multimodal Planning Division
mph	miles per hour
MPO	Metropolitan Planning Organization
MRCOG	Mid-Region Council of Governments
MSA	Metropolitan Statistical Area
NACOG	Northern Arizona Council of Governments
NAFTA	North American Free Trade Agreement
NCDOT	North Carolina Department of Transportation
NCRR	North Carolina Railroad
NEPA	National Environmental Policy Act
NM	New Mexico
NMDOT	New Mexico Department of Transportation
NPS	National Park Service
NRPC	National Railroad Passenger Corporation
NV	Nevada
PAG	Pima Association of Governments
PFE	Pacific Fruit Express
POLA/POLB	Port of Los Angeles/Port of Long Beach
PPP	Public/Private Partnership
PRIIA	Passenger Rail Investment and Improvement Act of 2008
PTC	Positive Train Control
RFP	Request for Proposal

Abbreviations

RMRA	Rocky Mountain Rail Authority
ROD	Record of Decision
ROW	Right-of-way
RPTA	Regional Public Transportation Authority
RRIF	Railroad Rehabilitation and Improvement Financing Program
RSIA	Rail Safety Improvement Act
RTA	Regional Transportation Authority
RTAT	Rail Technical Advisory Team
RTP	Regional Transportation Plan
S4PRC	States for Passenger Rail Coalition
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SCT	Secretaria de Comunicaciones y Transportes
SIDUR	Secretaria de Infraestructura y Desarrollo Urbano
SR	State Route
STB	State Transportation Board
TEU	Twenty-foot Equivalent Unit
TGV	Train à Grande Vitesse (high-speed train)
TNC	The Nature Conservancy
TOD	Transit-Oriented Development
TX	Texas
UP	Union Pacific Railroad
U.S.	United States
USACE	United States Army Corp of Engineers
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WHSRA	Western High-Speed Rail Alliance

Glossary of Terms

Alternatives Analysis: Following the results of transit systems planning, project planning focuses on a specific transportation need (or set of needs) in a corridor or subarea, identifies alternative actions to meet these needs, and generates the information necessary to select a preferred project for implementation. These activities are often collectively called "alternatives analysis" and address such issues as mobility provided, costs, benefits, environmental and community impacts, and financial feasibility.

Amtrak: Trade name of the National Railroad Passenger Corporation (NRPC), established in 1971 to take over intercity rail passenger service from private railroads that no longer wished to provide such service.

Blocking: Building a train so that all the cars are shipped from the same origin to the same destination, without being split up or stored en route.

Class I railroad: As defined by the Association of American Railroads (AAR), a railroad with an operating revenue exceeding $319.3 million per year. The U.S. has seven such railroads, including BNSF Railway (BNSF) and Union Pacific Railroad (UP). The other railroad classes are II and III.

Class II railroad: These railroads are considered by the AAR as "Regional Railroads" and are typically at least 350 miles in length with more than $40 million in annual revenues.

Class III railroad: These railroads are defined as having annual operating revenues of less than $20 million or are switching/terminal railroads. Class III railroads are typically local short line railroads, serving a very small number of towns or industries. Many Class III railroads were once branch lines of larger railroads that were spun off, or portions of mainlines that had been abandoned.

Classification yard: A railroad yard used to separate railroad cars on to one of several tracks. Cars are first taken to a track, called a lead or a drill, and then sent through a series of switches, called a ladder, to the classification tracks. Larger yards tend to put the lead on an artificial hill, called a hump, so that gravity may propel the cars through the ladder.

Commuter rail: Passenger rail service that operates within a metropolitan area—also called metropolitan rail, regional rail or suburban rail—or between two nearby metropolitan areas (e.g., San Francisco and San Jose). It most often connects a central city with its suburbs, and typically operates on track that is part of the general railroad system.

Deep-water port: Has more than one definition; perhaps the most pertinent is a port capable of accommodating the largest ships that can pass through the Panama Canal.

Environmental Assessment (EA): If a federal undertaking cannot be categorically excluded from detailed environmental analysis, the federal agency prepares a written EA to determine whether the undertaking would significantly affect the environment. If the answer is no, the agency issues a finding of no significant impact. If yes, a more detailed environmental impact statement (EIS) evaluating the proposed action and its alternatives is prepared. A federal agency may choose to prepare an EIS without having to first prepare an EA.

Environmental Impact Statement (EIS): Section 102 of the National Environmental Policy Act (NEPA) requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. All federal agencies are to prepare detailed statements assessing the environmental impact of, and alternatives to, major federal actions significantly affecting the environment. Such a statement is called an EIS.

Flyover: A grade-separated crossing of two transportation facilities, where one line is physically elevated over the other. Also called an underpass or overpass.

Freight village: According to the Federal Highway Administration (FHWA), facilities that offer multimodal options, intermodal transfer, logistics services, and many freight options. Characteristics include a cluster of freight-related businesses in a secure perimeter, single management, master planning, proximity to cities, high-quality settings, and support services.

High-speed rail (HSR): A mode that provides frequent passenger service between major population centers typically 100 to 600 miles apart, routinely achieves operating speeds of 110 mph or more, and may use shared tracks if equipped with positive train control technology. According to the Federal Railroad Administration (FRA),

Glossary of Terms

"service. . . is time-competitive with air and/or automobile travel in a given intercity corridor." Top speeds of 150 mph or more generally require completely grade-separated tracks and dedicated right-of-way. The FRA defines three levels of high-speed rail: express (with top speeds of at least 150 mph), regional (with top speeds of 110 to 150), and emerging (with typical speeds of 90 to 110).

Inland port: An inland intermodal terminal directly connected by road or rail to a seaport, and operating as a center for the transshipment of sea cargo to inland destinations. In addition to its role in cargo transshipment, it may contain facilities for storage and consolidation of goods, maintenance for road or rail cargo carriers, customs clearance services, and foreign trade zones.

Intercity rail (conventional): Refers to rail passenger service connecting cities approximately 100 miles or more apart. In the U.S., top speeds may range from 79 mph to approximately 90 mph. It generally operates on track shared with freight trains, commuter rail or both.

Intermodal: Refers to the movement of freight by more than one mode of transportation. The railroad industry applies the term to container and trailer on flat car transportation only.

Mainline: The principal track that connects two points; it usually has sidings, spurs, and yards at a number of locations to serve train meets and customers and to hold freight cars.

Megapolitan region: An area of the U.S. that:

- Combines at least two existing metropolitan areas
- Totals more than 10 million projected residents by 2040
- Derives from contiguous metropolitan areas
- Occupies a roughly similar physical environment throughout
- Links metropolitan centers through major transportation infrastructure
- Eleven megapolitan regions designated in U.S. by the Regional Plan Association in 2006

Metropolitan area (formally, Metropolitan Statistical Area or MSA): An area that contains at least one urbanized area of 50,000 or more inhabitants. An MSA "central county" has at least 50 percent of its population residing in urban areas of 10,000 or more population, or contains 5,000 or more people living in a single urban area of at least 10,000. An MSA "outlying county" has at least 25 percent of its employed residents working in the central county or counties of the MSA, or has at least 25 percent of its employment accounted for by workers who reside in the central county or counties.

Overhead freight: Freight received from one railroad to be moved by a second railroad for delivery to a third, for example, double-stack containers received by I&M Rail Link at Kansas City to be forwarded to Chicago for delivery to CSX Transportation.

Panamax: Refers to large ships that currently do not fit through the Panama Canal (carrying over 5,000 twenty-foot equivalent units [TEUs]), until completion of the canal's lock expansion project which will accommodate cargo capacity up to 13,000 TEUs.

Positive Train Control (PTC): Refers to technology that can prevent train-to-train collisions, overspeed derailments, and casualties or injuries to roadway workers operating within their limits of authority as a result of unauthorized incursion by a train. PTC can also prevent train movements through a switch left in the wrong position. PTC systems vary widely in complexity and sophistication, based on their level of automation, the system architecture, the wayside system on which they are based (e.g., non-signaled, block signal, cab signal), and the degree of train control they can assume. The federal Rail Safety Improvement Act of 2008 mandates the widespread installation of PTC systems by December 2015. As of March 2009, eleven PTC projects involving nine railroads were in varying stages of development and implementation.

Quiet zone: A segment of track, typically in an urbanized area, in which an agreement between local government and the railroad prohibits the latter from sounding train whistles or horns, at least during specified hours. In return, the local jurisdiction may pay for and install additional safety measures, such as grade-separated road crossings or four-quadrant gates.

Section 130: An FHWA-administered program that provides funding to states for use in highway-rail grade crossing

Glossary of Terms

safety projects.

Section 403(b): As part of the National Railroad Passenger Service Act of 1970, federal Amtrak legislation allows under Section 403(b) for a state or states to apply to Amtrak to establish rail service within their state(s) if they agree to pay at least 45 percent of the first year operating costs and 65 percent in the years there after.

Section 4(f): As part of the Department of Transportation Act of 1966 (49 USC § 303), Section 4(f) prevents the US Department of Transportation, including FHWA, from approving a project that requires the "use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national state, or local significance… or any land from an historic site that is either listed, or eligible for listing, on the National Register of Historic Places (NRHP) under Criterion A, B, or C unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm… resulting from the use" (49 USC § 303). Only federally funded transportation projects are subject to this requirement.

Short line railroad: As defined by the Association of American Railroads, short lines consist of (1) line-haul railroads operating less than 350 miles of road and earning less than $40 million of annual operating revenue, and (2) switching and terminal railroads, which are either jointly owned by two railroads for the purpose of transferring cars between railroads, or operate solely within a facility or group of facilities (e.g., port, industrial park). Short line railroads can also be classified as either Class II or Class III railroads.

Switch: As a noun, refers to track equipment that allows cars to move, or cross over, from one track to another. The verb refers to shuffling or moving rail cars, usually within a yard (also called marshaling).

Trackage rights: An agreement between two railroads whereby one buys the right to run its trains on the tracks of the other.

Train spot: To switch a freight car to a specific location, usually for loading or unloading.

TRANSEARCH: A database developed to aid organizations in identifying freight market opportunities and evaluating infrastructure needs. For domestic freight, TRANSEARCH provides historic and forecast freight traffic flows by commodity and transportation mode, (e.g. truck, rail, air, water, and intermodal).

Transit-oriented development (TOD): A specialized case of mixed-use, moderate- to high-density development that is located within walking distance of a fixed guideway transit stop. The proximity to fixed guideway transit allows for reduced parking requirements; the mixed-use aspect encourages a reduced demand for trips by bringing housing, jobs, community facilities, and goods and services close together so that the need for travel beyond the immediate vicinity is less than in typical developments. TOD developments typically emphasize walkable streetscapes, moderate- to high-density housing, office, and supporting retail, focused public spaces, and integrated design that offer the ambience of traditional neighborhoods.

Transloading: The transfer of a shipment from one mode of transportation to another. According to one source, "transloading" has become specialized to mean non-containerized freight transportation using more than one mode. This source uses "intermodal" to refer to "multimodal one-container transportation," and "transloading" to refer to "multimodal non-containerized movement."

Wye: A triangular shaped arrangement of railway tracks with a switch at each corner. In mainline railroads, this is used at a railway junction, where two railways join, or cross over. It can also be used as a stub for turning railway equipment. By performing the railway equivalent of a three-point turn, the direction of a locomotive or railway vehicle can be reversed.

Yard: A system of tracks, other than main tracks and sidings, used for making up trains, storing cars or other purposes.

Table of Contents

Table of Contents

Table of Contents

Table of Contents

List of Figures

List of Tables

1.0 Introduction

Arizona is one of the nation's fastest-growing states. As a response to the growing demand for transportation infrastructure, the Arizona State Transportation Board (STB) allocated resources for a statewide collaborative planning process called "Building a Quality Arizona, or bqAZ" to quantify transportation needs statewide and identify the full range of options to address those needs.

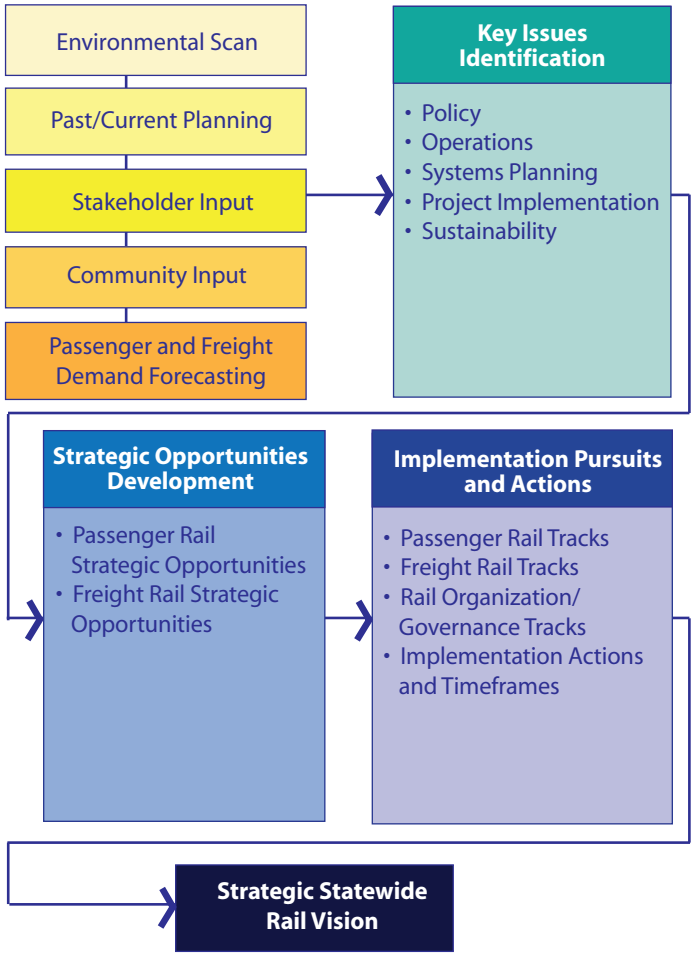
The bqAZ process brought together regional transportation planning entities, transit organizations, tribal governments, land management agencies, conservation groups, business and community leaders, the Governor's office, the Arizona Department of Transportation (ADOT), and local/regional leaders from across the state to develop a Statewide Transportation Planning Framework that includes transportation alternatives and integrates them with land use, environment, and economic planning and development.

A series of Regional Framework Studies were key inputs into the Statewide Transportation Planning Framework. As one of the Framework Studies, the Statewide Rail Framework Study has formulated a rail development program and investment strategy for the State of Arizona that leads to a healthy and sustainable multimodal transportation system for the movement of people and goods. The objectives for the project include:

- Stimulate responsible statewide economic growth
- Maximize the use of existing rail infrastructure through strategic investments that facilitate efficient movement of people and goods
- Complement other existing and planned transportation systems (highway and transit)
- Help address global and regional economic, climate, environmental and energy issues
- Explore potential partnerships with the railroad companies that are mutually beneficial
- Explore and identify potential roles for ADOT to play in advancing rail statewide

The project included a thorough public outreach process, addressing rail transportation needs across Arizona, and considered existing conditions and estimated future needs for both freight rail and passenger rail, with the latter including potential high-speed, intercity and commuter service. These efforts were followed by an identification of key issues and development of strategic opportunities. To meet identified needs for improvements to the existing rail system, recommended implementation pursuits and specific action items have been specified, which include modifications to existing rail systems or the establishment of new facilities and services. This report summarizes project phases and pertinent findings and recommendations (Figure 1).

Figure 1 Statewide Rail Framework Study Process



1.1 Coping with Continued Growth in Arizona and the Sun Corridor Megapolitan Region

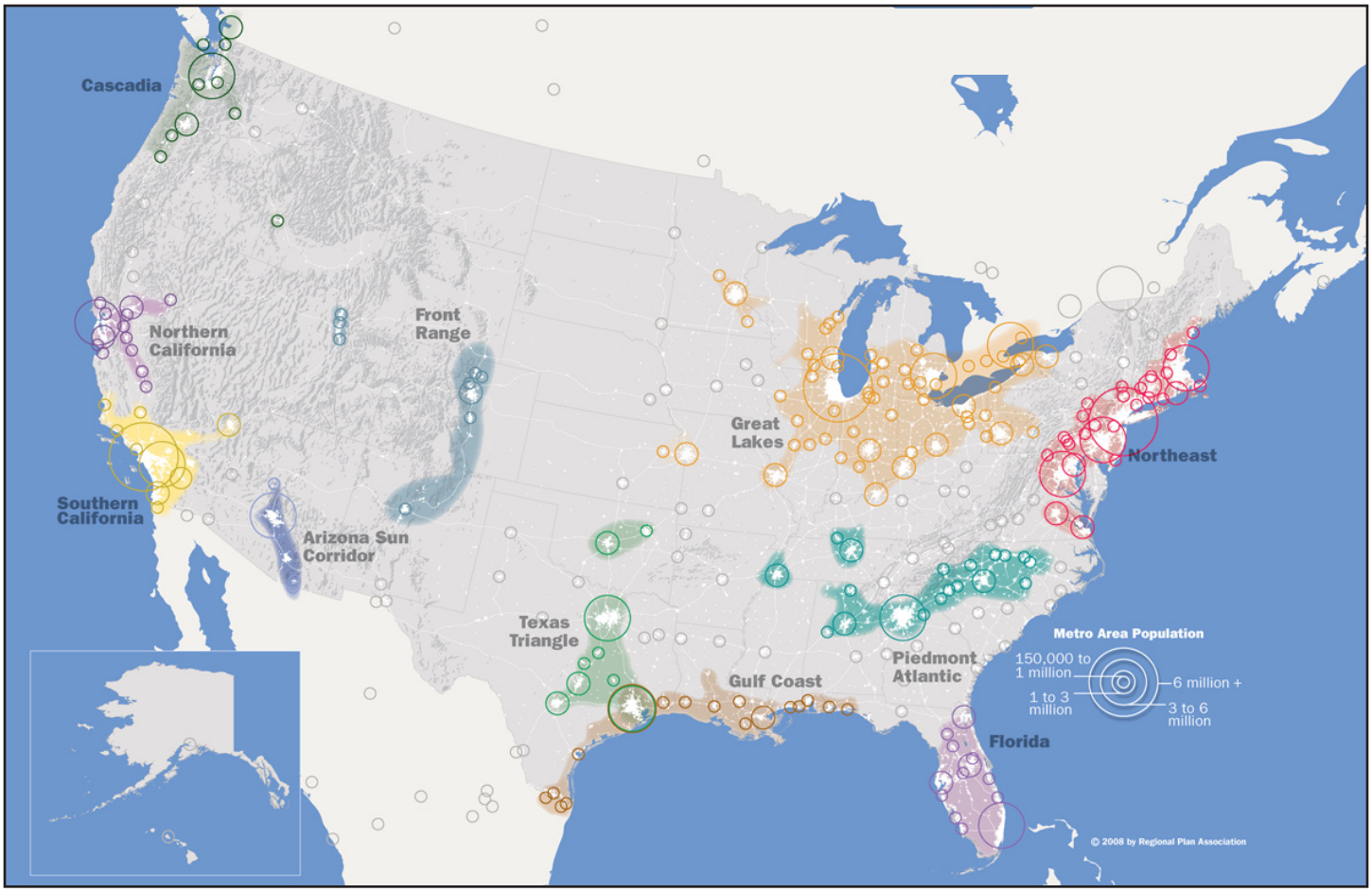
The population of both Phoenix and Tucson is expected to grow more than 50 percent over the next 20 years. By 2050, both population and employment in Arizona are projected to more than double from their 2005 levels. This growth will lead to increased transportation demand for both passengers and goods that will create unprecedented traffic congestion if the current transportation system is merely maintained. Arizona cannot address future congestion by continuing to rely almost exclusively on roadways to move people and goods in the future.

The new concept of "megapolitan areas" has been developed to describe the expansion and merging of metropolitan regions through the second half of the 20th century, as their boundaries blur – creating a new scale of urban geography. A megapolitan region can loosely be described as a conglomeration of two or more intertwined metropolitan areas with a combined population of five million or more. Megapolitan areas are characterized by interlocking economic systems, shared natural resources and ecosystems, and common transportation systems.

The Arizona Sun Corridor is one of eleven nationally-defined megapolitan areas (Figure 2). Greater Phoenix and greater Tucson are its principal metropolitan areas, although the megapolitan area is defined as stretching from north of Phoenix (Prescott and central Yavapai County) to south of Tucson (Nogales and Sierra Vista). In 2005, the entire area had a population of five million people; the projected 2050 population is more than ten million. Table 1 lists population and employment projections for the core of the Sun Corridor Megapolitan area.

As continued population growth place increasing pressure on this system, there is greater need to coordinate planning and policy decisions throughout the Sun Corridor. Connecting its cities with each other, the rest of Arizona and other states (including Sonora, Mexico) will require a comprehensive, multimodal transportation system to foster continuing economic growth and a high quality of life.

Figure 2 United States Megapolitan Areas



Source: Regional Plan Association, 2009.

Table 1 Population and Employment Projections for the Sun Corridor

County	2005 Population	2050 Population	2005 Employment	2050 Employment
Maricopa	3,681,000	7,133,000	1,748,000	3,594,000
Pima	925,000	1,964,000	399,000	752,000
Pinal	274,000	2,200,000	45,000	1,044,000
Three-county total	***4,880,000***	***11,297,000***	***2,192,000***	***5,390,000***
State of Arizona	**6,086,000**	**14,552,000**	**2,591,000**	**6,699,000**

Sources: Statewide Travel Demand Model, HDR, 2008; Morrison Institute report "Megapolitan: Arizona's Sun Corridor", 2008; MAG, 2009.

1.2 The Case for Statewide Freight and Passenger System Development

Developing rail as an alternative transportation mode for both freight and passenger service is advantageous for the state. From a freight perspective, Arizona could benefit from diversion of truck traffic to rail to free up highway capacity for passenger cars, reduce air pollution, conserve energy, and enhance traffic safety. According to the *Arizona Multimodal Freight Analysis Study* (ADOT, 2008), 56 percent of the 2005 truck freight tonnage in Arizona was merely passing through the state. Approximately 36 percent of all twenty-foot equivalent unit (TEU) containers nationally leave the ports of Los Angeles and Long Beach (POLA/POLB) and move east through Arizona. Through truck traffic produces little direct economic benefit for the state, yet demands the state's resources to build and maintain interstate and other highways. Furthermore, Arizona is impacted by emissions from tens of thousands of trucks traveling through the state daily. Carried by rail, freight does not drain the state's limited transportation funds, creates less pollution and greenhouse gases per ton mile, and uses less energy per ton mile. With freight rail, the responsibility for infrastructure falls primarily to the private parties – railroads, and ultimately their customers.

Passenger rail provides an alternative mode of travel for the state's residents, and allows the opportunity to focus growth in more sustainable development patterns throughout the Sun Corridor. Like freight rail, passenger rail can supplement highway capacity, enhance traffic safety, and reduce air pollution by minimizing peak-hour traveling vehicles. The state can begin to take advantage of new and expanded financial opportunities for passenger rail coming from the federal government. Commuter rail, conventional intercity rail, and ultimately high-speed rail may all have roles to play in Arizona's multimodal transportation framework.

1.3 Expected Benefits of Rail to the State

Expanding rail transportation can greatly enhance the state's transportation network. Rail offers a highly sustainable form of transportation. It is not only an environmentally friendly and resource-sensitive method of moving goods and people; it also provides opportunities for economic growth and development. The following benefits that can be realized by implementation of the Statewide Rail Framework Study are organized around the guiding principles set forth in the vision statement of the Statewide Transportation Planning Framework.

Improve Mobility and Accessibility

- Both passenger and rail freight service can help relieve future roadway traffic congestion or at least reduce the growth in congestion.
- Preserved rail rights-of-way will be available for new rail service, other forms of transit, or recreational use.
- Building new rail lines and bypasses around urban areas can open up existing lines for passenger service, providing an alternative transportation choice.
- Rail improvements in urban areas can reduce delays due to train movements at roadway grade crossings.
- Intercity and suburban rail passenger service will improve mobility for those who lack personal vehicles or do not drive.
- Rail provides an alternative route in case of emergency highway closure.
- Passenger rail is safer than highway travel.

Support Economic Growth

- Improved rail freight service on either Class I routes or short lines can attract new industries or encourage expansion of existing ones, thereby providing jobs and revenue for Arizona.
- Improvement of Amtrak service, and the availability of new passenger train service, will benefit the tourism

industry on which Arizona is highly dependent.

- Since freight railroads are privately-owned, they may improve rail infrastructure and services at their own expense if it is profitable to do so, removing this cost from the state, yet allowing the state to take advantage of economic development along improved rail lines.
- Development of inland ports, which is dependent on good access to rail freight service, will enable Arizona to realize economic benefits from rail traffic that would otherwise simply pass through the state.
- The future development of certain Mexican deep-water ports may give Arizona new opportunities to capture economic value from rail traffic crossing into the U.S. Such opportunities might include development of inland ports, warehousing, and shipping and distribution centers along mainlines, particularly at junctions of branch lines to Mexico. In addition to transshipment activities, inland ports often attract industrial manufacturing facilities to locate in close proximity, therby accessing multiple transportation modes for inbound raw materials or product components and outbound finished products shipping.
- Short line railroads serve routes and markets that would not be profitable for Class I railroads, allowing additional economic development opportunities.
- Effective rail passenger service will strenghten the linkage between jobs and people and help attract employers offering living wage jobs, and skilled workers looking for convenience and amenities.
- New rail corridors may attract employment to developing/redeveloping areas that seek a more balanced jobs/housing ratio and an improved quality of life.
- Passenger rail corridors can increase the competitive advantage of the Sun Corridor by both creating and connecting vibrant communities and economic activity areas. In addition, research has shown thta passenger rail connections are a major asset in attracting business development.
- Improved rail freight service would increase the competitiveness of Arizona in its position on the CANAMEX corridor.

Promote a Sustainable Development Pattern

- Development of inland ports, freight villages, and industrial parks near rail freight facilities would concentrate economic activity, thereby supporting more sustainable development patterns.
- Rail passenger stations can help stimulate transit-oriented development and a more sustainable land use mix within their influence areas.
- Many rail improvements directly benefit public safety, which is important in sustaining human lives and avoiding the social cost of injuries and property damage. Such improvements include grade crossing improvements, grade separations, flyovers, and rerouting of through freight traffic (including hazardous materials) away from dense urban areas.
- Relocation of urban rail yards to outlying or rural areas can benefit not only the railroad, but also the community by opening prime sites to urban redevelopment, infill, and mixed-use development.

Consideration of Arizona's Environment and Natural Resources

- Shipment of freight by rail produces less air pollution and greenhouse gases per ton-mile than shipment by truck, improving air quality.
- Rail transport of freight uses less energy per ton-mile than truck transport.
- New rail lines may have a smaller physical footprint than new highways, reducing the degree of environmental impact of construction and maintenance.
- Reuse or intensified use of existing rail corridors causes fewer environmental impacts than constructing new transportation corridors.

1.4 ADOT's Role in Rail Planning

ADOT's current role in rail planning is focused on helping retain or improve rail service in partnership with private railroads and local governments. ADOT has four employees assigned to rail issues, including such responsibilities as:

- Coordination with cities, towns, counties, COGs, MPOs, and tribal governments regarding ADOT rail planning and program development
- Liaison with the Federal Railroad Administration (FRA) and FTA on federal coordination of state rail funding, systems, corridor planning, and program development
- Liaison with U.S. border states, Sonora, Mexico, and special interest groups on rail planning, funding, and program development
- Coordination with other state agencies on rail-related issues
- Administration of the state railroad grant process
- Technical development of passenger rail corridor planning
- Project management and administration of state rail planning projects
- Management of the Section 130 program, which funds improvement to at-grade railroad crossings
- Oversight of the state grade crossing inventory and coordination with the FRA
- Coordination between railroads and other government agencies

2.0 Coordination and Collaboration

A variety of public outreach techniques were used to gather information relative to the Statewide Rail Framework Study and keep the general public and stakeholders informed of project activities and status updates. Six major types of community and stakeholder involvement were employed in the course of this study, as follows:

1) **Rail Technical Advisory Team (RTAT) Meetings**: The RTAT was a multidisciplinary team representing rail-related interests and provided technical input and review as the long-term direction for rail was formulated for Arizona. The RTAT provided input for each major task and had an opportunity to review each work product. Members of the RTAT included representatives of statewide agencies, regional and local agencies, federal agencies, railroads, rail interest groups, trade and economic development organizations, and major freight users.

2) **Focus Group Meetings**: Two focus groups were held in both southern and northern Arizona to gain additional input related to the project's key issues. These meetings provided another method to garner public input from various stakeholders across the state. Groups that received invitations included environmental organizations, economic development organizations, cities, towns, counties, COGs/MPOs, Class I railroads, short line railroads, and railroad special interest groups.

3) **Stakeholder Meetings**: A series of stakeholder meetings were conducted to gain more in-depth information from particular groups or agencies. Examples of stakeholders included Class I railroads, short line railroads, trucking companies, and state agencies.

4) **Public Meetings**: Three public meetings were held throughout the state to present the final recommendations of the Statewide Transportation Planning Framework Program. These were conducted in an open house style, allowing participants to view a series of displays explaining the recommendation components, as well as relating these recommendations in greater context. Public opinion was solicited.

5) **Online Survey**: An online survey was distributed via e-mail to gain additional input from stakeholders that could not be interviewed personally. These surveys were distributed in four groups: private transportation-related companies, economic development agencies, local or regional governments, and state or federal agencies, and achieved an approximate 30 percent response rate (160 responses out of 560 questionnaires distributed).

5) **Border State Consultations**: Meetings were conducted with each bordering state to coordinate transportation planning efforts, including rail, as a larger part of the Statewide Transportation Planning Framework program. Border state meetings involved state departments of transportation (DOTs) from California, Nevada, Utah, New Mexico, and Sonora, Mexico; the last included the federal Secretaria de Comunicaciones y Transporte (SCT) and Junta de Caminos of Mexico. Presentations were also made at various project milestones to the Transportation, Infrastructure, and Ports Committee of the Arizona-Mexico Commission.

In addition to all the specific outreach events listed above, as the Statewide Transportation Planning Framework system alternatives were presented to numerous stakeholders in the summer of 2009, a rail component was included within each presentation, noting preliminary findings of the Statewide Rail Framework Study, including key issues, strategic opportunities, and implementation recommendations, and comments were solicited.

For a full description of events and issues raised, refer to *Technical Report #1: Summary of Key Issues and Background Data*.

3.0 Existing Conditions Review

The following section provides a broad overview of the background conditions related to railroads in the state, including an overview of Arizona railroads, existing and potential rail passenger service, expected rail network growth, grade crossing analysis, and the environmental context. For a full report of existing conditions and a review of related studies, refer to *Technical Report #1: Summary of Key Issues and Background Data*.

3.1 Overview of Arizona Railroads

3.1.1 Existing Railroads and Operational Status

There are over 1,800 linear miles of existing railroad right-of-way in Arizona. The largest carriers are Union Pacific Railroad (UP) (390 miles) and BNSF Railway (BNSF) (691 miles) railroads (Figure 3). The UP's mainline Sunset Route traverses the southern portion of the state in an east-west direction. This line carries large amounts of freight between cities on the Pacific Ocean and major rail hubs in the Midwest and Texas. UP is improving this line into a high-capacity route (double-tracked throughout Arizona), which will increase its use in the future. Freight and transshipment destinations along the UP Sunset Route include Yuma and Tucson. The UP also operates a branch route that runs north to Phoenix from Picacho, and another that runs south to Nogales from Tucson. The Nogales Branch connects to Ferrocarril Mexicano (Ferromex) in Mexico, heavily used for accessing numerous auto assembly plants and industries in Hermosillo, from which many manufactured cars are shipped to the U.S.

The BNSF also has a major east-west mainline that supports train traffic carrying many types of freight. This route, the Transcon, operates approximately 120 trains per day over its double-tracked (in Arizona) 2,200 mile route from Los Angeles to Chicago. Like the UP, the BNSF has a major branch route that serves Phoenix, carrying automobiles and various industrial products. The line comes from the south, near Williams where it branches off the Transcon.

Mainline railroads offer a variety of freight services. BNSF has three yards in the Phoenix region: Mobest Yard, Desert Lift, and El Mirage Auto Distribution Yard; and one in Kingman at the Kingman Airport/Industrial Park. UP has two facilities in Phoenix (Harrison Street Yard and a satellite yard in Buckeye); one facility in Tucson (PFE Tucson); and a yard in Nogales. Development of yards at Camp Navajo in Flagstaff (BNSF) and Red Rock in Picacho (UP) is currently under consideration.

Numerous short line railroads also exist in the state. Short line operations exist in part to cost-effectively maintain rail operations to existing customers and industries that the Class 1 railroads no longer wish to serve. The short line railroads in Arizona primarily serve the mining industry, provide switching operations in support of the Class I systems, and act as feeder lines to those systems. Nationwide, short line services are growing because they can maintain profitability on lines that are marginal to the Class I carriers.

Figure 4 illustrates the operational status of Arizona's existing railroads. A few railroad lines and segments are currently out of service, including the Tucson, Cornelia and Gila Bend Railroad, Magma Arizona Railroad, San Manuel Arizona Railroad, the UP line from Arlington to Wellton, and Yuma Valley Railway.

3.1.2 Existing and Potential Passenger Service

Passenger rail service in Arizona is limited to Amtrak and tourist railway services. Amtrak has two routes that travel on freight mainlines through Arizona (Figure 5). Amtrak uses the BNSF Transcon mainline in northern Arizona and the UP Sunset Route in southern Arizona. Three tourist railroads exist in Arizona: the Grand Canyon Railway, the Verde Canyon Railroad, and the seasonal Copper Spike service of the Arizona Eastern Railway. These railroads provide excursions or service to and from one destination point.

Numerous intercity and commuter rail passenger corridors have been studied in Arizona (Figure 5). Constructing a passenger rail line between Phoenix and Tucson would serve the greatest demand, even though many hurdles exist before

Figure 3 Existing Arizona Railroads

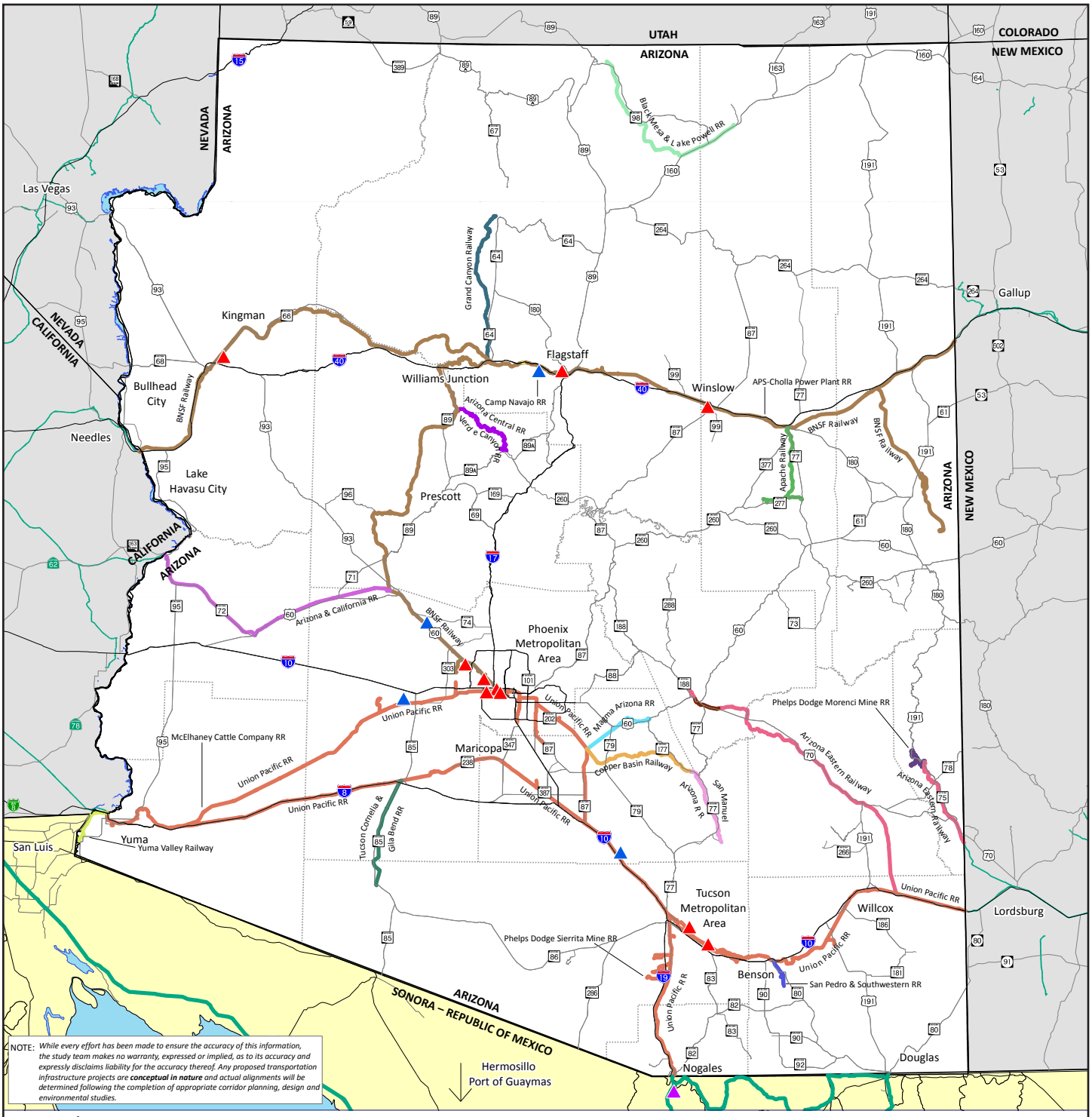


Figure 4 Operational Status of Arizona Railroads

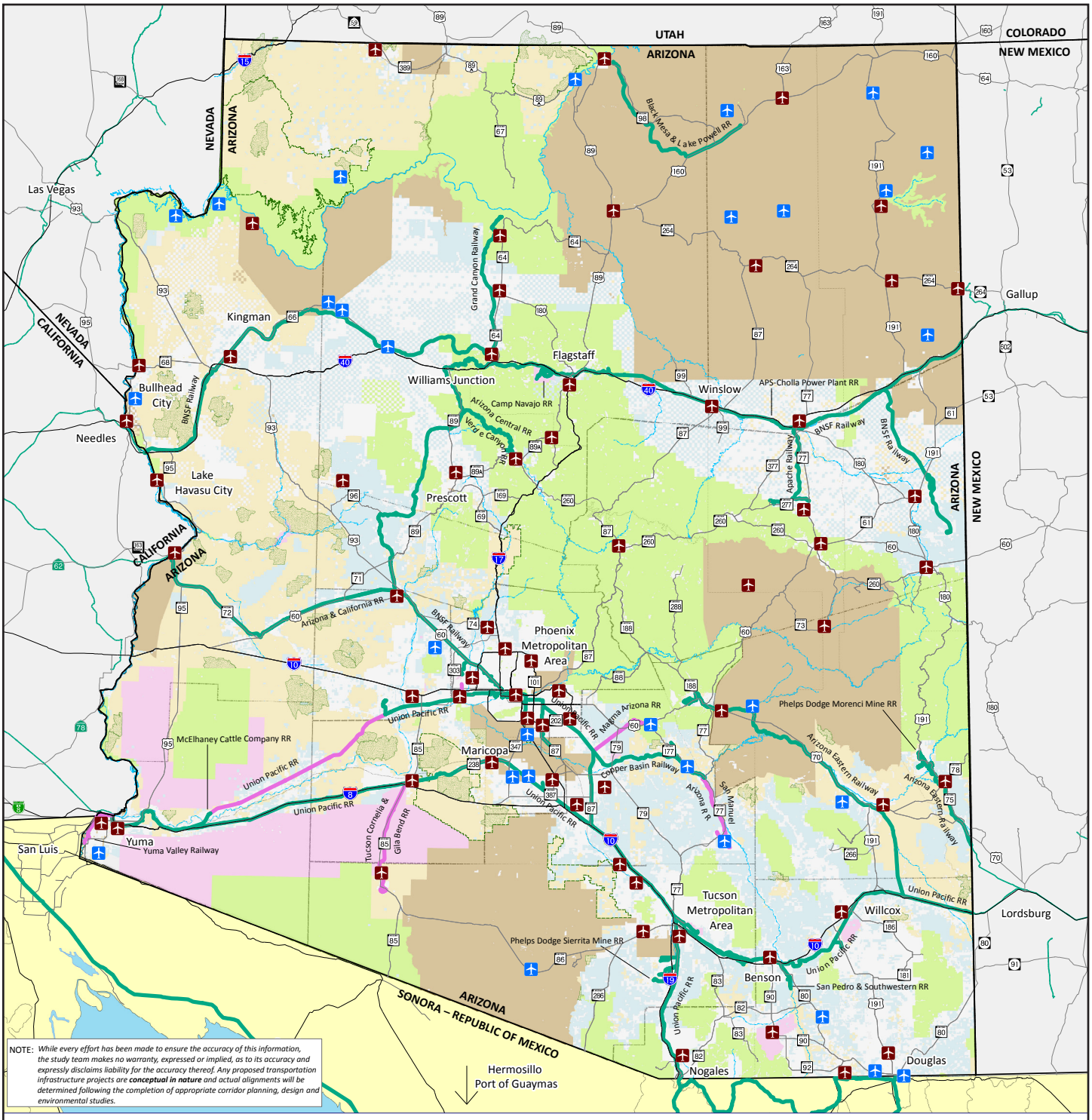
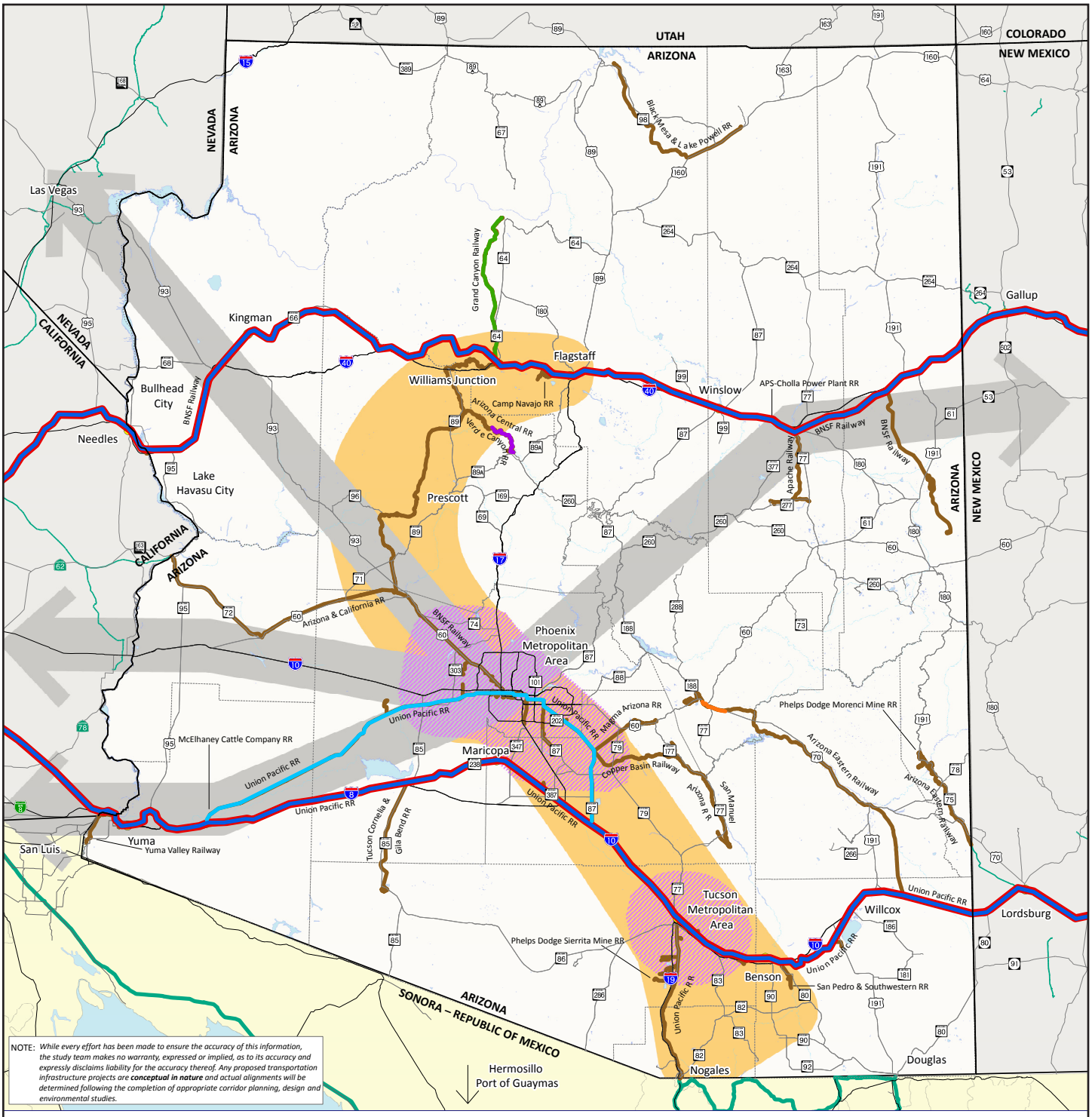


Figure 5 Existing and Potential Passenger Rail Options



implementation could begin, such as securing a funding source and potentially developing an agreement with UP for shared use of its corridors. The Maricopa Association of Governments (MAG) has developed a C*ommuter Rail Strategic Plan* for a regional commuter rail system that could use UP and BNSF routes in Maricopa County and northwestern Pinal County, and is currently defining more specific routes and developing an implementation plan. The Pima Association of Governments (PAG) is currently conducting their *High-Capacity Transit Study* to define a plan for high-capacity transit services in the Tucson region. Potential routes in Pima County include existing UP rights-of-way. Besides commuter rail serving metropolitan Phoenix and Tucson, Figure 5 illustrates additional regional economic development areas which, as potential future employment centers, could eventually be served by intercity rail.

High-speed rail corridors could someday connect Phoenix with Los Angeles, San Diego, Las Vegas, and the Front Range Megapolitan region. These corridors are designated by a wide swath, in which an actual alignment could be designated in the future, after appropriate planning, design, and environmental studies are complete and approved.

3.2 Rail Network Growth

3.2.1 Freight Rail Growth

The relationship between the trucking and the rail industries has been a story of evolving common interests as the economic challenges presented by rising fuel costs force a merging of the systems. Major motor carriers describe themselves as "mode-neutral," because they employ in their operations any form of transportation (i.e. truck, rail, air) that can effectively meet the service and cost requirements of their customers, however biases exist between which mode is faster or more efficient. The rule of thumb that rail is not competitive on runs shorter than 500 miles begins to fade as diesel costs to the trucking industries rise to the level experienced in the summer of 2008. For economic and competitive reasons, partnerships are formed between the rail and trucking industries to transport merchandise as efficiently as possible. The rail industries have advantages with increasing distance, while the trucking industry typically delivers the shipment to its final destination. More than 50 percent of the rail traffic in Arizona passes through the state on the way to out-of-state destinations. As the number of trucks on the crowded highway system grows, Arizona will increasingly benefit by using the more environmentally friendly and economically efficient method of combining rail and truck activities.

Increased freight rail investment creates both opportunities and challenges. The challenges include inconveniences to the general public (e.g., traffic congestion at grade crossings, air pollution, noise), while the opportunities are based on safety and economic drivers.

The UP and BNSF railroads wish to modernize their facilities in Arizona for the benefit of freight movements. UP has plans for a new classification yard near Red Rock, along the Sunset Route southeast of Picacho. The BNSF is exploring a similar facility northwest of Phoenix. Both of these facilities might drive other commercial ventures nearby, such as industrial park development. The Class I railroads understand that Arizona has a limited number of sites that meet their strategic needs. As an example, improved classification yards require flat terrain three to six miles long, adjacent to mainline services and strategically located to serve short line and branch line needs. The two Class I railroads will also need improved intermodal facilities in a growing economy. Both the Class I carriers and the short lines are interested in a growing industrial and customer base, and both have growing concerns over safety-related issues, including grade crossings and trespassing.

3.2.2 Passenger Rail Growth

Looking to the future, the state and regional agencies have expressed a desire to explore the possibility of both commuter rail and intercity rail. The relationships between modes of transportation will have to expand to create such a possibility. Policy decisions will be critical in creating a mutually advantageous situation for Arizona citizens, where a key issue is the control of property that could be used for either commuter or intercity rail. The decision to make property resources available to other modes of transportation will be vital.

Without strategic and comprehensive system planning, policy, and investment commitments, passenger rail programs in Arizona will not succeed. When high-speed and other passenger corridors are identified, the associated relationships with other transportation corridors will change. Similarly, relationships will be necessary to address land use, population growth, economic development, and regional planning requirements. For example, policies should be in place to begin setting aside right-of-way or restricting development in planned corridors to avoid land acquisition and takings issues in the future.

Intercity rail routes have undergone some high-level conceptual studies between the Tucson and Phoenix metropolitan areas, but will require close relationships

and continued interaction with Class I railroads, especially UP. Commuter rail programs in the MAG and PAG regions also depend on a relationship with the Class I railroads. Both intercity and commuter rail concepts have reached a stage of discussion that is centered upon freight business needs, safety, limited capacity, and other basic differences. Conclusion to any negotiations cannot occur until funding becomes available for passenger rail development.

3.3 Grade Crossing Analysis

The Project Team conducted a grade crossing analysis, based on Federal Railroad Administration (FRA) data. As a part of the FRA's duties, it maintains an extensive database, keeping track of all at-grade and grade-separated crossings in the U.S. As required by 49 Code of Federal Regulations (CFR) 225, all incidents must be reported to the FRA. In 49 CFR 225, an accident or incident is defined as:

> *…any impact between railroad on-track equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle or pedestrian at a highway-rail grade crossing, or any collision, derailment, fire, explosion, act of God, or other event involving operation of railroad on-track equipment (standing or moving) that results in reportable damages greater than the current reporting threshold ($6,700 in 2007) to railroad on-track equipment, signals, track, track structures, and roadbed.*

According to the FRA database, Arizona has 1,058 public at-grade crossings. Of these public crossings, 341 have had incidents recorded since 1973. These crossings have averaged approximately 3.1 incidents per crossing during the 36 years that the FRA has kept records.

Table 2 provides a summary of grade crossing incidents in Arizona for the duration of FRA's record keeping.

Table 2 Grade Crossing Incident Summary, 1973-2008

Railroad Route	Length (miles)	No. of Grade Crossings	Total Incidents	No. of Fatalities	No. of Injuries
BNSF	390	244	342	48	109
UP	691	509	212	28	107
Other*	719	302	514	42	132

*Includes all short line railroads
Source: Source: FRA database, 1973-2008.

One corridor that has a large number of grade crossing incidents is the BNSF Transcon in northern Arizona. This can be attributed to a heavily used rail corridor in close proximity to community centers, placing large numbers of automobiles across the tracks. Trains in this corridor generally move at high speeds, which prevent them from stopping quickly. Another corridor with many grade crossing incidents is the UP's Sunset route. Many trains in this corridor move at high speeds, which prevent them from stopping quickly. Most of these incidents take place in the densely populated areas of Yuma and Tucson, though there are also relatively high numbers in Maricopa, Casa Grande, and Benson.

The Phoenix metropolitan area is an area with many grade crossing incidents off the Class I mainlines. Hundreds of incidents have occurred in this area over the past 36 years, most of which were not fatal. The high rate can be attributed to increased volumes of road traffic, and the large number of grade crossings. The small number of fatalities may be due to lower train speeds.

ADOT and the Arizona Corporation Commission (ACC), in cooperation with FRA and Federal Highway Administration (FHWA), are continually working to curb incidents. FHWA's Section 130 money is being used to improve the crossings with the highest incidents. Due to limited resources, Arizona must continue to prioritize at-grade railroad crossings where safety can benefit most from improvements.

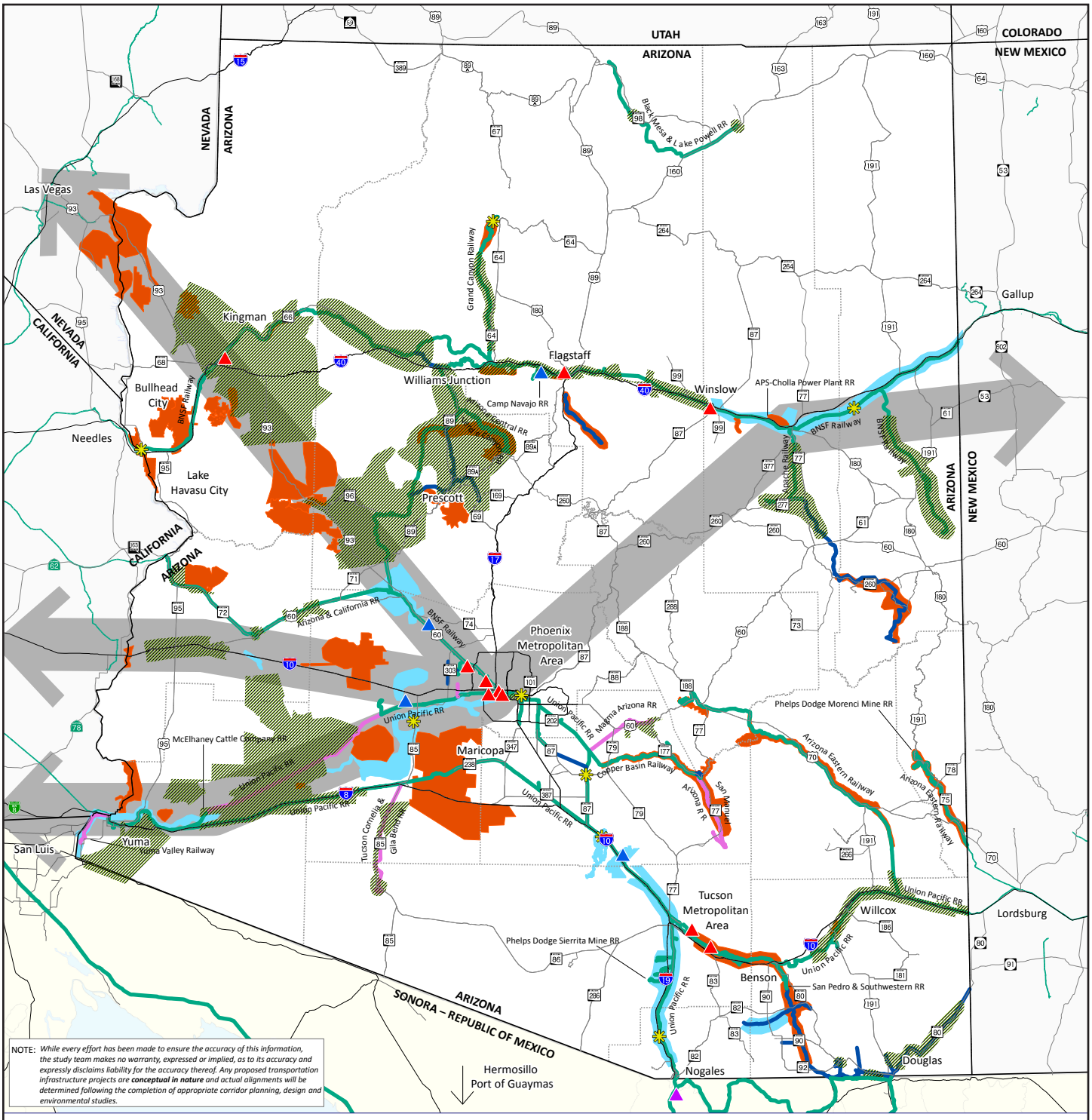
3.4 Environmental Context

The Project Team conducted an analysis of Areas of Environmental Constraints (AECs) to better discuss environmental issues related to existing and proposed rail improvements in Arizona. This analysis utilized information on the existing and potential rail infrastructure in the state overlaid with natural resource data from several agencies and organizations.

Potential impacts to natural resources were based on a scan of environmental conditions along existing and potential future rail corridors. Each of the rail corridors was assessed for the presence of an AEC within one-half mile of existing railroad lines, or within a potential new rail corridor, depending on the size of the proposed corridor. Like any new transportation corridor, the impact of a new rail corridor on the environment is generally greater than expansion or improvement to an existing corridor.

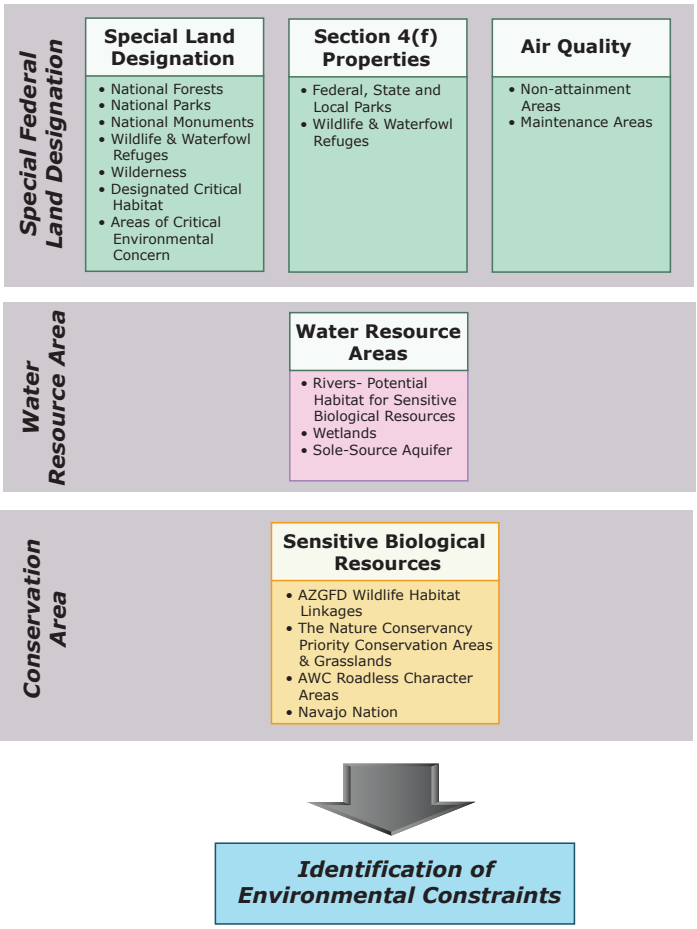
The AECs were categorized into three categories: 1) special federal land designations, 2) water resource areas, and 3) conservation areas (sensitive biological resources). The portions of the corridors that pass through environmentally

Figure 6 Areas of Environmental Constraints



sensitive areas are identified as AECs in Figure 6. The process for identifying such areas is illustrated in Figure 7. A summary of the AEC categories follows.

Figure 7 Identification of Environmental Constraints



1) **Areas with special federal designations**. This category consists of areas designated as critical habitat under the federal Endangered Species Act (ESA) and the following federally-managed lands.

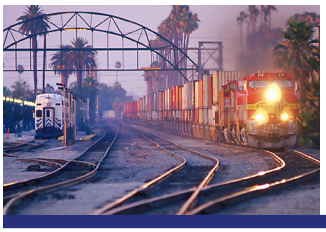
   - National Monuments
   - Wildlife and Waterfowl Refuges
   - Wilderness Areas
   - National Forests
   - National Parks
   - Areas of Critical Environmental Concern

2) **Water resource areas**. Riparian and wetland areas are frequently habitat areas for sensitive biological resources, including federal and state special status species. These areas are protected by the Clean Water Act (CWA), and projects within these areas would require coordination with the U.S. Army Corps of Engineers (USACE). Sole source aquifers are also included in this category. These are underground water sources that supply at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. Federally funded projects within these areas require review by the U.S. Environmental Protection Agency (EPA).

3) **Sensitive biological resource areas**. This category consists of areas that are not afforded formal regulatory protection, but warrant special consideration. This includes the priority conservation areas and priority grasslands identified by The Nature Conservancy (TNC), wildlands and roadless areas identified by the Arizona Wilderness Coalition (AWC). This category also includes the wildlife movement corridors identified by the Arizona Wildlife Linkage Assessment, conducted by ADOT, Arizona Game and Fish Department (AZGFD), FHWA, U.S. Forest Service (USFS), Bureau of Land Management (BLM), the Wildlands Project, Northern Arizona University, and others.

The categories are not mutually exclusive; some areas fit into multiple categories. In those cases the AEC was placed in a category according to the order they are presented in above. For example, if an AEC includes both critical habitat for a federally listed species and a priority conservation area, it is shown as a Category 1 AEC (areas afforded federal protection).

A table and map with more specific details about each AEC are presented in *Technical Report #1: Summary of Key Issues and Background Data*.



4.0 Economic Analysis of Rail Demand Forecasts

The Project Team conducted an economic analysis on freight and passenger rail demand for this study. The Statewide Rail Framework Study can enhance the business climate in Arizona on two fronts. Passenger rail, by increasing modal choice, can improve mobility and provide value to future real estate development in proximity to stations, creating transit-oriented development opportunities. Freight rail can provide an important boost to economic development through value-added activities that may include manufacturing, distribution, warehousing, and transloading of products shipped by rail. The focus of the analysis was to link rail freight to economic development by considering the existing conditions and estimated future needs for freight rail, as well as determining a rail freight development program and investment strategy for Arizona to promote the development of a healthy, multimodal transportation system for people and goods.

4.1 Passenger Rail Demand Forecasts

Passenger rail demand forecasts from previous rail plans were studied to understand existing passenger rail demand forecasts completed for proposed services in Arizona, including high-speed, intercity, and commuter rail services. For each corridor analyzed, ridership forecasts, and general service characteristics (where available) were compiled, including travel time, frequency, fares, and markets served. In order to develop ridership estimates for corridors without existing forecasts, a high-level analysis approach was developed based on observed ridership, corridor population, corridor length, and service frequency associated with existing rail passenger corridor services. Pertinent information relative to the development of passenger rail strategic opportunities is presented in Section 5.0.

4.2 Freight Rail Demand Forecasts

Freight rail demand forecasts to 2050 were developed in order to screen commodities and identify those with value-added opportunities. Most of the freight rail in Arizona is through movements. Recent data shows slightly more than 100,000,000 tons as through movements, compared to 28,000,000 inbound tons and about 3,000,000 outbound tons. From a transportation systems perspective, the magnitude of through rail freight is associated with a number of benefits.

Each through train removes 200 to 280 trucks from Arizona roads, which generates the following benefits:

- Congestion mitigation, and resulting improved air quality
- Incident reduction
- Costs saving for highway investment, operations, and maintenance
- Fuel-efficiency when comparing ton-mile fuel usage between trains and trucks, and resulting improved air quality
- Cost savings on a ton-mile basis for shippers.

While these benefits are significant, rail freight that "comes to rest" in Arizona presents the greatest opportunities for the state, including a number of value-added activities that create investment opportunities through development of inland ports, intermodal/logistics facilities, warehousing or distribution centers, or other facilities to accommodate freight from west coast deep-water ports.

Arizona has the opportunity to develop inland ports and associated warehouse/distribution facilities to help address some of the capacity constraint issues at the west coast deep-water ports, handle freight from ports in Mexico, and serve the growing Sun Corridor Megapolitan. In addition to generating national benefits for increasing capacity at the west coast deep-water ports, the construction and operation of the inland port and warehouse/distribution facilities would create economic impacts measured as employment and earnings in Arizona. The extent of the economic impacts would change over time. The initial impacts are due to the direct expenditures associated with constructing and purchasing services for the inland port and warehouse/distribution facilities. After this initial construction, economic impacts would be generated from the direct operation of the intermodal rail and warehouse/distribution facilities. Specific strategies to take advantage of these opportunities are presented in Section 5.0.

Refer to *Technical Report #2: Economic Analysis of Rail Freight and Passenger Rail Demand Forecasts* for a more full detailed summary of both passenger and freight economic analyses and forecasts.

5.0 Passenger Rail Strategic Opportunities

A series of future strategic opportunities were developed that include recommended programs of action that may consist of modifications to existing systems or the establishment of new facilities and services. All of the strategic opportunities presented in this report are organized in a parallel manner, including pertinent background information, strategic opportunity components, potential stakeholders, risks associated with pursuing the opportunity, estimated costs, relationship to key issues, and the interrelationship to other strategic opportunities.

A series of passenger rail strategic opportunities have been developed for Arizona. The high-speed rail (HSR) system is envisioned to link the Sun Corridor Megapolitan region with other Southwestern state regional activity centers (e.g. Los Angeles, Las Vegas). The intercity rail (ICR) system is envisioned to serve as the backbone for the Sun Corridor Megapolitan and complement all other transit and rail systems throughout the state in the years 2030 and 2050. This type of rail transportation will be critical to providing adequate connectivity between activity centers, thereby allowing for the efficient movement of people throughout the state and providing the appropriate framework for future economic development. These modes of transportation have been the subject of many discussions within the current administration. President Obama has taken specific steps, including allocation of $13 billion to fund these types of systems across the U.S.

In addition to HSR and ICR, commuter rail initiatives have been previously studied in the state by others, and currently both MAG and PAG are undergoing or have recently completed specific studies intended to further evaluate the feasibility of commuter rail in their respective regions. The Project Team has been closely coordinating with both MAG and PAG to ensure consistency between recommendations.

The passenger rail strategic opportunities presented in this section include:

- High-speed interstate passenger rail
- Phoenix/Tucson intercity rail
- Megapolitan extensions of the Phoenix/Tucson intercity rail corridor
- Enhancement of intercity rail passenger service
- Incorporation of MAG and PAG commuter rail planning

5.1 High-Speed Interstate Passenger Rail

5.1.1 Introduction

Arizona could benefit from becoming part of a Southwestern high-speed rail system and eventually linking into the national high-speed rail network.

Four potential HSR corridors between Arizona and bordering states have been identified. These corridors would link Phoenix/Tucson with Los Angeles, Las Vegas, San Diego, and Albuquerque/Denver. These cities are within the 100- to 600-mile range in which HSR is competitive with other transportation modes such as highway and air travel. Such a network would provide significant public benefits, especially increased mobility via a more sustainable transportation mode, consistent with the guiding principles of the Statewide Transportation Planning Framework.

This strategic opportunity provides Arizona the following:

- Provides an additional option for regional Southwest travel, relieving airports and highways.
- Provides an additional mode choice for long-distance travel.
- Reinforces the megapolitan region as a key economic activity center at the national level.
- Becomes part of the national high-speed rail network.
- Improves the economic competitiveness of the state by helping to attract jobs, skilled workers, and visitors.

5.1.2 Background

A. National Context

Implementing HSR in strategic corridors has become a major priority of the federal government, the State of California and other regions of the country.

Recognized Advantages of HSR

The FRA considers that passenger rail can provide significant

public benefits as a safe and cost-effective transportation mode that contributes to economic development, energy efficiency, environmental quality, and smart growth. The mobility advantages of HSR include:

- As a travel mode, HSR can be competitive with short-haul flights in time, cost, and on-time performance. Weather delays are not as significant for rail as they are for air travel. Rail can provide direct access to central business districts and other economic activity centers in contrast with commercial airports which are often located away from urban centers.
- HSR is competitive with long-distance highway travel in time and cost, especially in congested corridors. The safety of rail compared with highway travel is also a major advantage.

Federal Priority

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established grant and planning programs for HSR and conventional ICR. HSR programs in the legislation targeted ten corridors and regional networks designated by the U.S. Department of Transportation (USDOT) as future HSR corridors (Figure 8).

The American Recovery and Reinvestment Act of 2009 (ARRA) makes a significant $8 billion initial investment in HSR, helping jump-start activities in the designated corridors. ARRA provides the first funding appropriations for the grant programs in PRIIA, but suspends some of its requirements for matching funds and state planning in order to expedite projects, consistent with its economic stimulus objectives. In April 2009, FRA released its Vision for High-Speed Rail in America, which lays out the need, vision, and implementation steps for the HSR program in ARRA. Interim guidance for this program, which is termed the High-Speed Intercity Passenger Rail (HSIPR) Program, was released in June 2009.

The national strategy has a tiered approach, identifying Express, Regional, and Emerging HSR corridors, as well as Conventional Rail corridors with potential for future HSR service. The FRA defines these as follows:

- **HSR-Express:** Destinations 200-600 miles apart, frequent service, top speeds over 150 mph, few stops, dedicated right-of-way and grade-separated guideway (or trackage).
- **HSR-Regional:** Destinations 100–500 miles apart, relatively frequent service, top speeds of 110-150 mph,

Figure 8 National High-Speed Rail Map

Source: FRA 2009.

some intermediate stops, may have some shared right-of-way and grade-separated guideway.

- **Emerging HSR:** Potential for future implementation as a full HSR corridor, destinations 100–500 miles apart, top speeds of 90-110 mph, grade crossings are fully protected with latest safety measures.
- **Conventional Rail:** ICR corridor with potential for further conventional rail development and market expansion, at least 100 miles in length, at least one daily round-trip, top speeds of 79-90 mph.

ARRA has four funding tracks for HSR and ICR:

- **Track 1:** Ready-to-go rail projects of independent utility (100 percent federal funding).
- **Track 2:** Corridor programs (100 percent federal funding).
- **Track 3:** Planning (up to 50 percent federal funding match).
- **Track 4:** Ready-to-go rail projects (up to 50 percent federal funding match, more streamlined approval process).

Although some funding programs within these tracks are restricted to projects in federally designated HSR corridors, there are programs that will consider other ICR and potential future HSR corridors. ADOT submitted pre-applications for two passenger rail projects in July 2009 (enhancement of Amtrak services; additional funding for Phoenix-Tucson ICR) and were declined, however completion of the Arizona State Rail Plan will begin to set a precedence of rail planning in the state of Arizona and will better position ADOT to chase future federal funding tied to HSR/ICR planning.

Federal Programs after ARRA

The Obama administration's 2010 budget proposal contains $1 billion in annual funding for HSR over the following five years. It is likely that the HSR programs will be guided by the next surface transportation program reauthorization legislation. The current legislation, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005 (SAFETEA-LU) was due to expire at the end of September 2009, but Congress enacted a temporary extension of SAFETEA-LU. Thus, no new surface transportation legislation will be adopted until at least 2010. Initial legislative proposals for reauthorization include major HSR components, however.

USDOT Designated Future HSR Corridors

Several states, such as California and Florida, have advanced HSR planning programs. Regional corridors and networks, such as the Midwestern Regional Rail Initiative and the Southeast High Speed Rail Corridor, involve multiple states and corridors. Table 3 lists the federally designated HSR corridors, their governance bodies and major cities. Figure 8 illustrates the FRA map of federally-designated high-speed rail corridors in the U.S.

B. Southwest Context

Current Plans

With the exception of the Las Vegas to Los Angeles link, the FRA list of designated HSR corridors does not include any that connect Southwestern cities such as Phoenix or Denver. The major cities in Arizona, California, Nevada, and other neighboring states are well situated to be part of a future HSR network due to their large sizes and suitable distances (200–500 miles apart). Some of the designated HSR corridors in other states connect cities much smaller than Phoenix.

The federally-designated Las Vegas-Los Angeles HSR corridor may provide an opportunity for a linkage to Arizona. Nevada has been studying various ideas for a HSR link between Las Vegas to Los Angeles for a couple of decades, and U.S. Senate Majority Leader Harry Reid has been a strong advocate for HSR programs. Two proposals of different technologies are currently competing for political support, including a high speed magnetic levitation ("maglev") train from Anaheim, California to Las Vegas, and the "DesertXpress" HSR line from Victorville, CA to Las Vegas, using conventional electric or diesel-electric HSR technology. The 2028 Nevada Statewide Transportation Plan, adopted in September 2008, does not specifically endorse either proposal; instead, it simply states that the state strategy is to "seek ways to improve rail passenger service in the Las Vegas-Southern California rail corridor." In July 2009, California and Nevada agreed to extend the California High-Speed Rail system from Southern California to Las Vegas – federally designating this corridor.

Other Intermountain West states are separately exploring the idea of HSR corridors to neighboring states, but no firm proposals have been announced.

Western High-Speed Rail Alliance

Metropolitan planning organizations (MPOs) in Las Vegas, Phoenix, Reno, Salt Lake City, and elsewhere have formed an alliance to explore HSR opportunities in the Intermountain West and Southwest. MAG, within the Phoenix metropolitan area, has joined the Western High-Speed Rail Alliance (WHSRA). PAG, within the Tucson metropolitan area, has been approached by WHSRA, and additional MPOs in

Table 3 USDOT Designated High-Speed Rail Corridors

Corridor	Governance Body/Leadership	Major Cities
California	California High-Speed Rail Authority	San Francisco, San Jose, Oakland, Sacramento, Fresno, Bakersfield, Los Angeles, Anaheim, San Diego, Las Vegas
Florida	Florida High Speed Rail Authority	Tampa, Orlando, Miami
Pacific Northwest	Pacific Northwest Rail Corridor Plan, jointly sponsored by FRA, Amtrak, the States of Washington and Oregon, and the Province of British Columbia	Vancouver (British Columbia), Seattle, Portland, Eugene
Chicago Hub Network	Midwest Regional Rail Initiative (collaborative initiative of FRA and the states of Indiana, Illinois, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio and Wisconsin)	Chicago (hub), Milwaukee, Minneapolis, Springfield (Illinois), St. Louis, Kansas City, Kalamazoo, Detroit, Toledo, Cleveland, Indianapolis, Louisville, Cincinnati, Columbus, and other cities not on federally designated HSR corridors
Southeast	Collaborative initiative of the Virginia Department of Rail and Public Transportation, North Carolina DOT-Rail Division, Georgia DOT Division of Planning and Programming, South Carolina DOT Mass Transit Division, FHWA, FRA and Amtrak	Washington DC, Richmond, Hampton Roads, Raleigh, Durham, Greensboro, Charlotte, Greenville (South Carolina), Atlanta, Macon (Georgia), Columbia (South Carolina), Savannah, Jacksonville
South Central	Collaborative initiative of Texas High-Speed Rail Authority, Texas DOT, and Texas TGV Corporation	Dallas/Ft. Worth (hub), Austin, San Antonio, Oklahoma City, Tulsa, Texarkana, Little Rock
Northern New England	Collaborative initiative of Vermont Agency of Transportation-Rail Division, Massachusetts DOT, and New Hampshire DOT	Boston (hub), Springfield (Massachussetts), New Haven, Albany, Portland, Montreal
Empire	New York State High Speed Rail Task Force, with collaboration of Amtrak, State of New York Metropolitan Transportation Authority, Canadian Pacific Railway, CSX and the New York State DOT	New York City, Albany, Utica, Syracuse, Rochester, Buffalo
Keystone	Collaborative initiative of FRA, Amtrak, New York City Keystone Service, Southeastern Pennsylvania Transportation Authority, Pennsylvania DOT, the Broadway Limited and Norfolk Southern	Philadelphia, Harrisburg, Pittsburgh
Gulf Coast	Southern High-Speed Rail Authority, comprised of Louisiana, Mississippi and Alabama	New Orleans (hub), Biloxi, Mobile, Meridian, Birmingham, Atlanta, Houston

Source: Source: FRA, "High-Speed Rail Corridor Descriptions" 2009.

other states may join as well (e.g., Mid-Regional Council of Governments [MRCOG] in Albuquerque). The alliance has expressed an interest in exploring the feasibility of HSR in the Phoenix-Tucson, Phoenix/Tucson-Los Angeles, and Phoenix/Tucson-Las Vegas corridors as part of a broader HSR network linking the existing Sun Corridor, Front Range, and Southern California megapolitan areas with the Las Vegas metropolitan area.

National Organizations

Nationally, the States for Passenger Rail Coalition (S4PRC) is an umbrella group of state DOTs seeking federal support for passenger rail activities. Currently there is no organization specifically for the Southwest/Intermountain West composed of DOTs and other state-level government organizations. The American High Speed Rail Alliance, was created to unify all advocacy efforts that promote a comprehensive national high-speed rail effort (e.g., transportation, energy, etc.).

Other Southwestern Rail Organizations

A series of other rail organizations exist to promote education of stakeholders and the public on the importance of passenger rail as a multimodal option. Within the Southwest, these include the Southwest Rail Corridor Coalition and Arizona Rail Passenger Association. Both organizations include public and private partners and strive to promote passenger rail as a feasible future for Arizona.

C. HSR Ridership Projections

Ridership estimates for several conceptual interstate HSR corridors were developed. The potential market for an ICR corridor is based on the population size within 25 miles of hypothetical station locations. Table 4 shows the estimated 2008 and projected 2050 population for three of the potential HSR corridors: Phoenix/Tucson to Los Angeles, Las Vegas, and San Diego.

Table 4 Interstate Rail Corridor Population Projections

Corridor	2008 Population (000)	2050 Population		
		Low (000)	Baseline (000)	High (000)
Phoenix/ Tucson to Los Angeles	16,374	22,775	27,621	32,582
Phoenix/ Tucson to Las Vegas	5,598	10,758	12,503	14,299
Phoenix/ Tucson to San Diego*	6,152	9,835	11,407	13,014

*Phoenix–San Diego estimates represent the increment above Phoenix-Yuma ridership projections from the 2007 Response to Executive Order – Market Assessment

Source: Arizona DES, Moody's Economy.com, and AECOM analysis, 2008.

Based on the potential market size, ridership was projected assuming a daily service frequency ranging from six to twelve daily round trips (Table 5). The Phoenix/Tucson to Los Angeles corridor has by far the highest projected ridership in 2050.

Table 5 Interstate Rail Corridor Ridership Projections

Corridor	General Distance	Service Frequency	2050 Annual Ridership
Phoenix/Tucson to Los Angeles	426 miles	6 to 12 daily round trips	1,800,000 to 4,400,000
Phoenix/Tucson to Las Vegas	335 miles	6 to 12 daily round trips	950,000 to 1,900,000
Phoenix/Tucson to San Diego*	332 miles	6 to 12 daily round trips	300,000 to 600,000

*Phoenix–San Diego estimates represent the increment above Phoenix-Yuma ridership projections from the 2007 Response to Executive Order – Market Assessment

Source: AECOM analysis, 2008.

5.1.3 Proposed Strategic Opportunity

There are several conceptual interstate HSR corridors that the State of Arizona could explore. In some corridors, it may be possible to establish conventional ICR along existing rail lines as an interim step towards HSR. In others, it may be more feasible to directly pursue implementation of HSR on completely new alignments. Figure 9 illustrates these corridors.

This proposed strategic opportunity consists of the following strategies:

A. Pursue Phoenix/Tucson intercity rail corridor as the foundation for future HSR
B. Become an active partner with the Western High-Speed Rail Alliance, and with other passenger rail organizations with a regional perspective, to:

- Study feasibility of a high-speed rail corridor from Phoenix/Tucson to Las Vegas
- Study feasibility of a high-speed rail corridor from Phoenix/Tucson to Los Angeles
- Study feasibility of a high-speed rail corridor from Phoenix/Tucson to San Diego
- Study feasibility of a high-speed rail corridor from Phoenix/Tucson to the Front Range Megapolitan Region (Albuquerque/Denver)

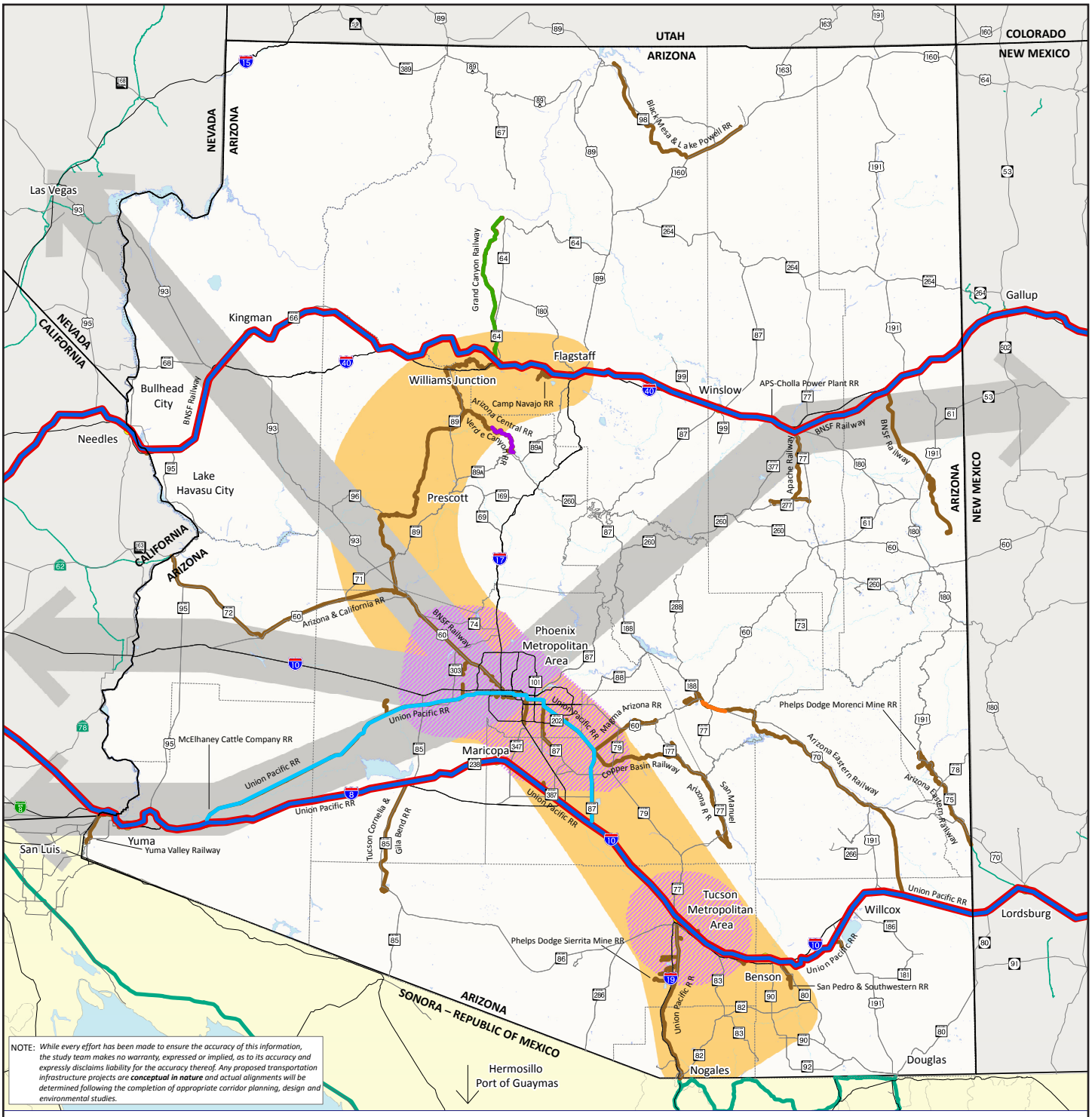
A. Pursue Phoenix/Tucson Intercity Rail Corridor as the Foundation for Future HSR

Interstate ICR/HSR concepts can build on the Phoenix/Tucson corridor (Section 5.2), which is a priority rail improvement for the state. Initial planning studies for this corridor have already been conducted by ADOT (*High Speed Passenger Rail Strategic Plan*, 2007 and *Arizona High Speed Rail Feasibility Study*, 1998), and ADOT has secured partial funding for an Alternatives Analysis/environmentally compliant review of passenger rail options therein. Future interstate ICR/HSR services would likely share rail stations, track sections, and possibly equipment with intrastate services. Thus, planning for intrastate passenger rail should recognize longer-term expansion into bordering states.

B. Become an Active Partner with the Western High-Speed Rail Alliance, and with other Passenger Rail Organizations with a Regional Perspective

The WHSRA and other regional and national passenger rail organizations have begun to explore HSR opportunities in the Intermountain West and Southwest. Four preliminary

Figure 9 Existing and Potential Passenger Rail Options



corridors identified in Arizona include connections from Phoenix/Tucson to Las Vegas, Los Angeles, San Diego, and the Front Range Megapolitan (Albuquerque/Denver). ADOT, or a rail organization with a state perspective, should collaborate with such organizations to secure funding for feasibility planning.

Study Feasibility of a High-Speed Rail Corridor from Phoenix/Tucson to Las Vegas

The WHSRA has proposed an HSR corridor between Las Vegas and the Sun Corridor Megapolitan area. Las Vegas would provide HSR connections to California and possibly other western cities such as Salt Lake City and Denver. No rail service currently directly links the Phoenix/Tucson to Las Vegas corridor. Planned highway improvements in this corridor, which include an "interstate level" freeway often referred to as I-11 from Phoenix to Las Vegas, generally following the US 93 corridor and using the new Hoover Dam Bypass bridge currently under construction, provide an opportunity to coordinate design and reservation of right-of-way for a new railroad.

Location

- Endpoints: Phoenix/Tucson and Las Vegas
- Connecting HSR Service: Las Vegas to Los Angeles (under study), Las Vegas to Salt Lake City (proposed)

Distance

- Approximately 300 miles (5.5 hours driving time at posted speed limits with no delays)

Mid-route Areas Served

- Wickenburg (connection to BNSF Peavine Line)
- Kingman, AZ (connection to BNSF mainline)
- Lake Mead National Recreation Area
- Henderson, NV and southeastern Las Vegas metropolitan area

Existing Transportation Routes

- The UP serves Phoenix and Las Vegas through a circuitous route through California. The BNSF Peavine Line runs from central Phoenix northwest to Wickenburg before turning to the northeast. BNSF does not serve the Las Vegas market, however.
- Highway corridors along this general route include US 60 and US 93.

Issues

- ADOT, at the urging of key business and community leaders, and in partnership with Nevada officials, is considering upgrading US 60 and US 93 to create a new direct freeway connection between Phoenix and Las Vegas, and potentially requesting interstate designation for this corridor. There may be opportunities to coordinate rail and highway planning along segments of the corridor, especially in reserving right-of-way along the freeway for a future ICR/HSR facility.
- The rail corridor would require a new bridge crossing of the Colorado River.
- BLM and Arizona State Trust lands cover much of northwest Arizona. There are also National Park Service lands near the Nevada border.
- Critical habitat areas have been designated near Wickenburg. Other areas along the corridor are likely to have sensitive natural areas of concern.

Study Feasibility of a High-Speed Rail Corridor from Phoenix/Tucson to Los Angeles

The Los Angeles metropolitan area is the second most populous in the United States. Daily travel between Arizona and the Los Angeles region is heavy. Phoenix Sky Harbor International Airport currently has over 110 weekday departures to the airports in the Los Angeles metropolitan area (Los Angeles International, John Wayne/Orange County, Ontario, Bob Hope/Burbank, and Long Beach). Interstate highway travel between the two metropolitan areas is also significant. Existing Amtrak Sunset Limited/Texas Eagle service is geared toward long-distance, multistate tourist travel and serves only a tiny fraction of this travel, with slow speeds and unreliable travel times. Furthermore, it does not serve the Phoenix metropolitan area and captures few of its potential passengers. Although no specific HSR routes have been proposed between the two cities, there is a transportation rationale for an ICR/HSR connection between the two largest metropolitan areas in the Southwest.

Location

- Endpoints: Phoenix/Tucson and Los Angeles
- Connecting HSR Service: California North-South HSR corridor, with service to San Diego, Central Valley, and Sacramento (under study)

Distance

- Approximately 375 miles (5.5-6.5 hours driving time at posted speed limits with no delays)

Mid-route Areas Served

- Hassayampa Valley, Colorado River Valley (Blythe, CA); Palm Springs, San Bernardino, and eastern Los Angeles metropolitan area

Existing Transportation Routes

- The UP Sunset Route connects Yuma, Maricopa, and

Tucson with the Los Angeles Basin. The line is largely single-tracked within Arizona, with a major double-tracking project on hold due to the 2009 economic recession, and is a very busy freight corridor. It accommodates limited Amtrak service: one train in each direction, three days per week.
- The UP Wellton Branch formerly provided direct rail access into Phoenix from the west. Most of it has been out of service since 1996 because of costly maintenance needs.
- The Arizona and California Railroad extends west from Wickenburg into Southern California at Cadiz. It connects with the BNSF Peavine Line in Wickenburg, which provides access into the Phoenix metropolitan area from the northwest.
- I-10 provides a direct highway connection between Phoenix and Los Angeles. ADOT is currently expanding its capacity in Maricopa County, to serve the suburban area west of Phoenix, and plans to continue to do in the Hassayampa Valley as urban development pushes further west.

Issues
- Los Angeles would provide a link to the greater California HSR network.
- The Statewide Transportation Planning Framework program recommends expanding I-10 to a minimum of least three lanes in each direction. California does not have programmed plans to improve I-10 in the eastern part of the state; however, it is studying truck-only lanes associated with Intelligent Transportation Systems technology potentially on I-40 and I-10.
- Congestion at Los Angeles area airports.
- BLM and Arizona State Trust lands, Yuma Proving Grounds, Colorado River Indian Tribes (CRIT) between Phoenix and California border.
- Sensitive habitat and wilderness areas in La Paz County, Arizona.
- Joshua Tree National Park and other Mojave Desert public lands in California.

Study Feasibility of a High-Speed Rail Corridor from Phoenix/Tucson to San Diego

Another potential HSR link between Arizona and California has been identified to San Diego. Although the San Diego metropolitan area is not as large a destination as Los Angeles, it is about the same size as greater Phoenix and much larger than Las Vegas.

Location
- Endpoints: Phoenix/Tucson and San Diego
- Connecting HSR Service: San Diego to Los Angeles (under study)

Distance
- Approximately 325 miles (5.5 hours driving time at posted speed limits with no delays)

Mid-route Areas Served
- Hassayampa Valley, Hidden Valley, Yuma, Calexico, CA, El Centro, CA, and the eastern San Diego metropolitan area

Existing Transportation Routes
- UP Sunset Route is a direct route from Tucson to Yuma but then turns northwest to access the Los Angeles basin.
- The only direct railway between Yuma and San Diego is the San Diego and Arizona Eastern Railway, a circuitous freight route that dips into Mexico and no longer exists in its entirety.
- UP Wellton Branch formerly provided direct rail access into Phoenix from the west. If reopened, this line would provide a direct route toward Yuma out of central Phoenix.
- I-8 provides a direct connection between Maricopa, the Hidden Valley, Yuma, and San Diego.
- SR 85 is a vital link between the Phoenix metropolitan area and I-8, and is being upgraded to freeway design standards.

Issues
- The mountainous terrain and sensitive habitat areas east of San Diego could pose challenges to establishing a new rail corridor in this area.
- The I-8 corridor has some narrow stretches of private land along it, but it is mostly bordered by the Yuma Proving Ground to the north and the Barry M. Goldwater Air Force Range to the south. The Sonoran Desert National Monument, BLM and State Trust lands are also in this area of the state.
- Future expansion of I-8 to a minimum of three lanes in each direction has been discussed in the Statewide Transportation Planning Framework program. However, the I-8 corridor is less of a mobility or economic development priority for California's Corridors of the Future Program than the I-10 and I-15 corridors.
- San Diego International Airport is a single-runway airport that has limited capacity and closes late at night because of noise restrictions.
- Coordination with Indian Communities along this corridor would be required.

Study Feasibility of a High-Speed Rail Corridor from Phoenix/Tucson to the Front Range Megapolitan (Albuquerque/Denver)

The WHSRA will explore possible connections between Arizona, New Mexico, Utah, and Colorado. Although there currently is not a high volume of travel between the Sun Corridor and Albuquerque (six daily flights from Phoenix), this corridor would also provide a potential connection to the Colorado Front Range megapolitan area. Currently, there is significant travel demand from Arizona to Denver and Colorado Springs, as evidenced by the number of flights from Phoenix and Tucson.

Location

- Endpoints: Phoenix/Tucson and Albuquerque
- Connecting HSR Service: Albuquerque to Denver (potential; not under study)

Distance

- Approximately 450 miles from Phoenix to Albuquerque (6.5 hours driving time at posted speed limits with no delays)
- Approximately 900 miles from Phoenix to Denver (13 hours driving time at posted speed limits with no delays)

Mid-route Areas Served

- Northern route from Arizona to Albuquerque: Flagstaff, Winslow, Holbrook, AZ, Gallup, NM
- Alternative northern route from Arizona to Albuquerque: Phoenix to Winslow, Holbrook, AZ, Gallup, NM
- Southern route from Arizona to Albuquerque: Tucson, Las Cruces, NM, Truth or Consequences, NM, and the I-25 corridor north to Albuquerque
- Albuquerque to Denver: Santa Fe, Trinidad, CO, Pueblo, CO, Colorado Springs, and the Denver metropolitan area

Existing Transportation Routes

- BNSF Peavine from Phoenix to Flagstaff
- BNSF Transcon from Flagstaff to Albuquerque
- UP Sunset Route from Tucson to Deming, NM and El Paso
- Existing BNSF railway from Belen, NM to Trinidad, CO (mostly owned by the State of New Mexico)
- Existing railway (includes both UP and BNSF segments) from Trinidad, CO to Denver
- I-17, I-40, US 60, I-25, others
- State Routes 87, 260, and 377

Issues

- No direct rail route to Albuquerque.
- Difficult terrain between Albuquerque and Denver (Sangre de Cristo and Front Ranges, Raton Pass) would require a more circuitous route and some steep grades.
- Relatively little airport congestion.
- Travel demand from the Sun Corridor area to Albuquerque may be too small.
- Public lands along possible corridors include various BLM, Arizona State Trust lands, U.S. Forest Service, National Park Service, Navajo Nation, and other tribal lands.

5.1.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- Arizona State Land Department (ASLD)
- AZGFD
- Arizona Department of Environmental Quality (ADEQ)
- MAG
- PAG
- Other MPOs and COGs
- Municipal, county, tribal, and regional governments, as impacted

B. Interstate Context

- FRA
- FHWA
- Surface Transportation Board
- BLM
- Bureau of Reclamation (BOR)
- National Park Service (NPS)
- Department of Defense (DOD)
- U.S. Department of Homeland Security (DHS)
- Amtrak
- UP Railroad
- BNSF Railway
- Arizona and California Railroad
- Municipal, regional, and state governments in neighboring states

5.1.5 Risks of Pursuing Strategic Opportunity

A. Risks of Inaction

The risks of not investing in HSR/ICR include lost economic opportunity in the mid- to long-term. Arizona could miss an opportunity to be part of regional/national network, or at the least the current wave of federal funding and policy

priority for HSR. Although HSR in Arizona is not among the top FRA-identified priorities, an active commitment to planning and implementation of HSR/ICR will work to reduce the long-term risk of inaction.

B. Risks of HSR

An additional risk is the opportunity cost of investing in HSR/ICR in place of other Arizona priorities. There is no recent state track record in ICR; existing Amtrak ICR routes serve a niche travel market and do not provide an indication of the expected market for new ICR/HSR in the state. Targeted market and economic analyses should be conducted to gauge and mitigate this risk.

C. Risks of Dealing with Multiple Governmental Entities

Interstate coordination to implement HSR corridors involves needed actions by bordering states that are out of the control of the State of Arizona. Significant investment in interstate corridor planning or preservation could be wasted if the neighboring state decides to move its portion of the route or postpones the project. Planning will need coordination with other states, and interstate projects will need formal agreements to be implemented.

Public and tribal lands controlled by various entities along the corridors could make needed right-of-way acquisition uncertain, increasing costs and timeframes for project implementation. Alternative and less desirable corridors may be required. On the other hand, the potential for enhanced development of State Trust lands, and the potential to serve tribal economic activity centers (as already identified by a number of Native American communities) must also be explored. Sensitive natural habitats and endangered/threatened species are present in many parts of the state and may pose uncertainty for costs, timeframes and corridor feasibility. A broad-based planning approach that involves all stakeholders in a proactive manner can help mitigate these risks.

5.1.6 Estimated Costs

A. Construction Costs

Construction costs for HSR/ICR fall into two categories:

- Upgrades to existing freight and passenger rail corridors. Examples include Virginia (Richmond to Hampton Roads) HSR planning and Florida HSR planning.
- Construction of new HSR/ICR right-of-way. Examples include Florida and Texas HSR planning.

In some corridor segments, it may be possible to use existing right-of-way and track for upgraded ICR services (speeds up to 110 mph) from Arizona to bordering states, but in other segments, new construction and right-of-way acquisition will be required, especially for express HSR.

Upgrading Existing Intercity Railways

Some examples of the cost of upgrading existing passenger rail corridors, either to improve ICR service or to implement HSR service include the following:

- **Improving Conventional ICR:** The Pacific Northwest Corridor has an existing 466-mile ICR corridor between Eugene, Oregon and Vancouver, British Columbia. Between 1994 and 2007, Washington and Oregon invested $700 million (or approximately $1.5 million per mile) in the corridor to improve speeds and add capacity for commuter service and intercity Amtrak service. Upgrading the existing Charlotte to Richmond passenger line to achieve speeds of 95-100 mph and cut travel time by 50 percent is estimated to cost $2.5 million per mile.
- **Achieving HSR:** Upgrading the Chicago to Minneapolis/St. Paul corridor, an existing 417-mile passenger rail corridor and currently an eight-hour Amtrak journey, to provide HSR service is estimated to cost $1.5 billion (or approximately $3.5 million per mile).

New HSR Construction

Some examples of construction costs from abroad and estimated construction costs for proposed U.S. HSR corridors include the following:

- **Completed European Corridors:** Per mile construction costs (2008 dollars) for recently constructed European corridors range from $37 to $53 million. Total project construction costs range from several billion to over twenty billion dollars depending on the length of the project. The recently constructed corridor between Madrid and Figueres, Spain, a 468-mile corridor comparable to the distance between Phoenix and Albuquerque, cost $18.2 billion or $39 million per mile.
- **Planned U.S. Corridors:** Estimated per mile construction costs for proposed HSR corridors range from $22 million (Victorville, CA to Las Vegas) to $63-65 million (California Phase 1 HSR network). Special technologies such as maglev can raise costs significantly.

B. Other Costs

There are various other costs that will need to be considered for both HSR and conventional ICR. These include:

- **Right-of-way acquisition/lease:** HSR generally requires separate track due to its operating and safety requirements, even if there is spare capacity on existing track used by freight or other passenger services. Even conventional ICR may need additional parallel track in congested freight corridors to achieve schedule reliability and higher operating speeds. In many cases, freight railroads may be unwilling to accommodate additional passenger service on heavily used tracks. As noted above, land tenure in the potential interstate HSR corridors varies greatly and involves various private entities, as well as public entities that have different restrictions on access.
- **Access rights and operating agreements with host railroads:** Conventional ICR and emerging HSR corridors may use existing freight routes if the railroad agrees. The costs vary greatly depending on issues specific to the railroad, such as types of compensation, existing and future capacity, and liability. Negotiations for shared use can become complex and challenging. As an operator, Amtrak enjoys some advantages because of its congressional charter in its ability to access freight corridors and the types of costs it must pay to the host railroad. As passenger rail speeds increase, the speed differential with freight traffic also increases, reducing potential capacity along the line. Thus, higher operating speeds on existing tracks may be expensive or impossible to negotiate with host railroads.
- **Rolling stock:** New equipment will be required for new routes. HSR requires more expensive equipment, especially locomotives. Costs vary depending on the propulsion technology.
- **Operating and maintenance:** These costs are offset by operating revenue to varying degrees, but can require public operating subsidies, especially if ridership is less than anticipated. In some systems like Japan, operation is contracted to a private entity and may involve associated arrangements for design, construction and lease of track rights by public and private entities.

5.1.7 Relationship to Other Strategic Opportunities

Phoenix/Tucson intercity rail

As described above, ICR/HSR connections to other states would likely build on this initial corridor and share some facilities with it. Establishing initial ICR service between Phoenix and Tucson would also help Arizona build its institutional capacity for rail planning and demonstrate its commitment to creating a future HSR hub in Phoenix.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor

The rail segment between Phoenix and Wickenburg is a potential route for a new ICR corridor between Phoenix and Las Vegas. It may also be a possible route for new HSR to Los Angeles. Wickenburg may become an important junction for various rail corridors. In the longer term, a passenger rail connection between Phoenix and Flagstaff would open additional possibilities, such as a connection to Albuquerque along the BNSF Transcon mainline.

Enhancement of intercity rail passenger service

Segments of existing Amtrak routes (which use freight rail tracks) may be used for upgraded ICR or eventually HSR. Incremental improvements to Amtrak may start building an ICR ridership base in the state. Amtrak may also be an operator for new interstate ICR services. Like the Phoenix/Tucson intercity rail strategic opportunity (Section 5.2), a state role in enhancing Amtrak service (through Section 403(b) or some other mechanism) would help Arizona build its institutional capacity for rail planning and demonstrate its commitment to improving the Southwest's rail network. Any significant capital investments in upgrading intercity passenger service should be done as part of long-term strategies to ultimately provide premium ICR/HSR service.

Other Relationships

HSR/ICR is also related to a lesser degree to the following strategic opportunities:

- Incorporation of MAG and PAG commuter rail planning
- BNSF Phoenix metropolitan area system development and operations
- BNSF statewide system development and operations
- UP Tucson metropolitan area system development and operations
- UP statewide system development and operations

5.2 Phoenix/Tucson Intercity Rail

5.2.1 Introduction

Arizona could benefit from developing a unified passenger rail vision for the state, constructing intercity rail in the Sun Corridor Megapolitan region and creating a high-capacity rail corridor that could extend the length of the megapolitan region and lead to the ultimate development of HSR.

National transportation policies are moving to include rail as a high-priority transportation mode. As a result, multimodal projects may have advantages over highway projects when competing for federal funding. The multimodal approach should become the typical process when conducting future transportation planning in Arizona.

This strategic opportunity provides Arizona the following:

- Establishes the base for an integrated transportation system within the Sun Corridor Megapolitan region.
- Provides a multimodal choice.
- Establishes station locations as key economic activity centers and reinforces responsible land use development patterns in both new development and redevelopment areas.
- Provides the foundation for future HSR.

5.2.2 Background

A. Previous Phoenix/Tucson ICR Studies

Over the past two decades, the State of Arizona has conducted a series of studies regarding future passenger rail development in the state. The Arizona State Legislature commissioned a study in 1993 to examine establishing a statewide passenger rail network. In this study, 39 options were evaluated, with four projects recommended for implementation, including an intercity rail corridor between Phoenix and Tucson. After a review of the 1993 study, the Joint Legislative Committee recommended that additional planning work should be conducted to more fully understand the physical and operating characteristics, benefits, and costs of the recommended projects, which resulted in the *Arizona High Speed Rail Feasibility Study* in 1998. While this study was recently updated in 2007 in ADOT's *High Speed Passenger Rail Strategic Plan*, the original alignment and operating assumptions for a corridor between Phoenix and Tucson remained the same.

The resultant conceptual alternatives from these studies included the following:

1) **No Build:** This alternative is the baseline option for comparison purposes. It was a "do-nothing" option consisting of existing conditions in the corridor, plus any major committed and programmed transportation capacity increases, using any mode, as defined by relevant regional and state transportation plans.

2) **Highway Widening (I-10):** This alternative assumed that the forecast travel increase in the Phoenix-Tucson corridor will be handled by widening I-10 into the median, creating an eight-lane cross section by 2020.

3) **Conventional Rail-Minor Upgrade:** This alternative assumed using the existing UP right-of-way between Phoenix and Tucson, with relatively minor improvements to the track and right-of-way (including grade crossing upgrades) to achieve a top train speed of approximately 80 mph. Conventional diesel-electric locomotives pulling a chain of coaches were assumed as a similar train configuration to Amtrak trains. This alternative is 121 miles long, extending from the Central Avenue Station in Phoenix to the Tucson Depot. The major railroad improvements would occur on the Phoenix line between the station in Phoenix and Picacho Junction. At Picacho, this line connects with the UP Sunset Route. An average speed of 62 mph with a total trip time of two hours is expected – deemed not competitive with the automobile.

4) **Conventional Rail-Major Upgrade:** This alternative also assumed using the existing UP railroad right-of-way from Phoenix to Tucson, but with major design and equipment improvements to increase the passenger train speed to a maximum of 125 mph. Conventional overhead electric-powered locomotives pulling a chain of coaches were assumed for this alternative. This alternative included the construction of a new, electrified passenger mainline with passing sidings in the existing UP right-of-way over the 121-mile route. It was envisioned that several existing at-grade crossings would be grade-separated and several minor crossings eliminated.

5) **High Speed Rail-Electric:** This alternative assumed building an exclusive partially or fully elevated track from Phoenix to Tucson with two alignment options: either using the existing UP right-of-way the entire way, or using a combination of the existing UP railroad and I-10 rights-of-way. Maximum train speed is 175 mph. This was determined the preferred alternative, as elaborated upon below.

6) **High Speed Rail-Maglev:** This alternative proposed a magnetic levitation train with a top operating speed of 250 mph; however, the maximum speed between the Phoenix and Mesa/Gilbert stations had to be restricted due to congestion. This train must be elevated, as it runs on a guideway, not a rail. It is also sensitive to dirt and debris, and therefore cannot be close to the ground. Like the high speed rail-electric alternative, alignment options included using UP right-of-way or combined UP and I-10 rights-of-way.

The long-term vision or recommendation from the 1998 study, and confirmed in the 2007 study, was to implement a partially elevated, high-speed rail-electric passenger service on exclusive right-of-way, paralleling the existing UP railroad alignment between Phoenix and Tucson (Alternative #5: High speed Rail-Electric). The proposed initial service would provide five daily trips in each direction. Eight stations were assumed: Downtown Phoenix, Phoenix-Sky Harbor International Airport, Tempe, Mesa/Gilbert, Coolidge, Eloy/Picacho, Orange Grove Road, and Downtown Tucson. Travel time, including stops, would be just under two hours. Initially, minor upgrades to the existing UP railroad using conventional diesel-electric locomotives were suggested to be implemented. Future upgrades would be completed incrementally, including grade separations and higher operating speeds.

Besides the abovementioned studies, a series of other regional planning efforts and discussions among key stakeholders have included suggestions for intercity rail corridors between Phoenix and Tucson. Figure 10 illustrates those above, as well as the other recommendations, including:

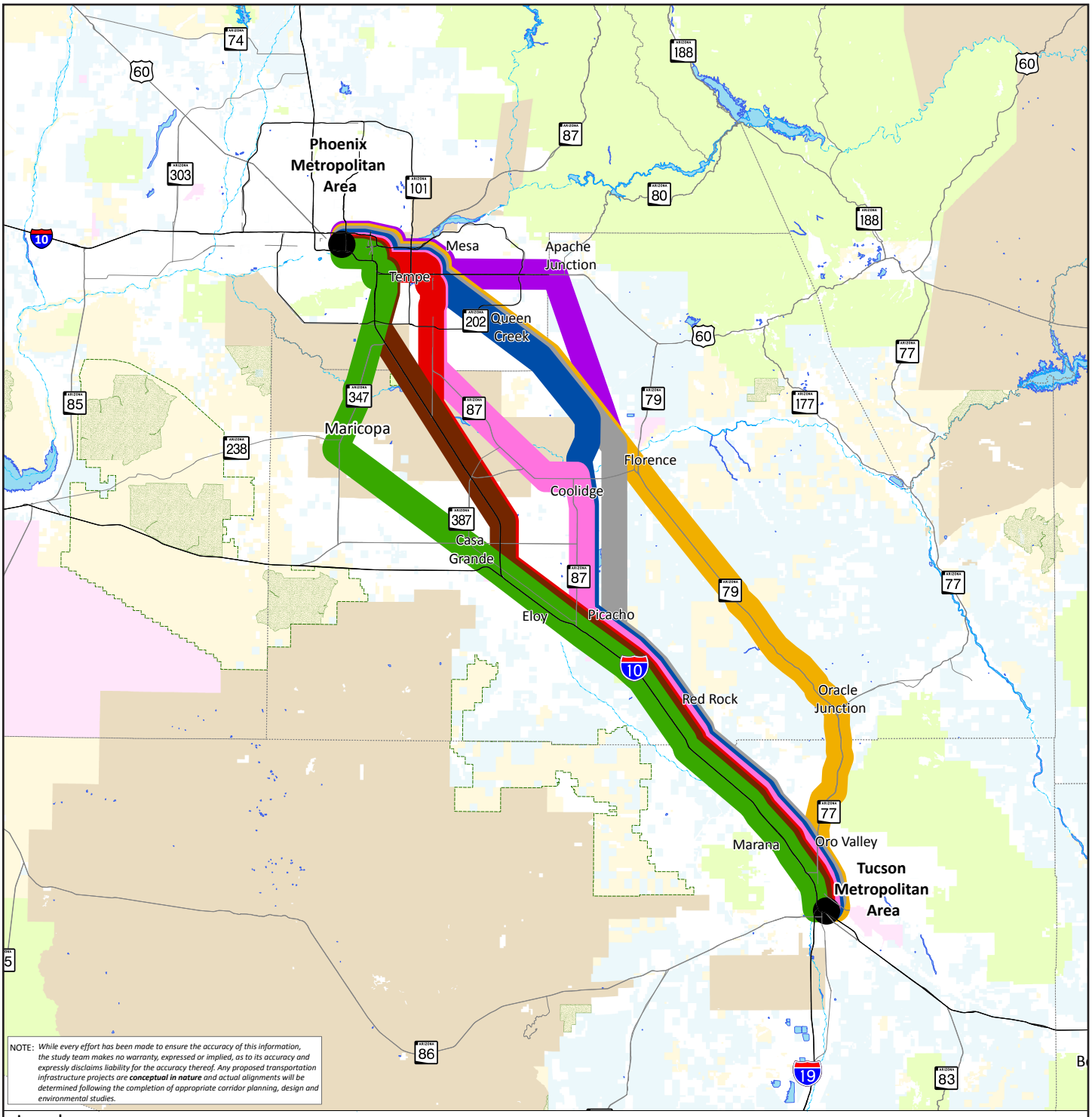
- **Chandler Branch-Interstate 10:** Previous ADOT studies alignment option for the high speed rail-electric and high speed rail-maglev technologies.
- **Tempe Branch-Interstate 10:** Alignment option identified in early high-capacity transit planning in the cities of Tempe and Chandler.
- **Phoenix Subdivision-Interstate 10:** Previous ADOT studies alignment option for the conventional rail-minor upgrade, conventional rail-major upgrade, high speed rail-electric, and high speed rail-maglev technologies.
- **SR 79:** Proposed in a variety of state and regional transportation planning studies.
- **Superstition-Coolidge:** Alignment option proposed as part of the planning process for the Superstition Vistas community, a 275-square mile tract of State Land proposed for master planned community development in northern Pinal County, immediately adjacent to Maricopa County. This corridor could potentially connect with the North-South Corridor alignment.
- **North-South Corridor:** Alignment option proposed in the Pinal County Comprehensive Plan; to be paired as part of a shared use corridor with the proposed Pinal North-South Freeway corridor, which is at the beginning stages of a Design Concept Report (DCR).
- **Chandler Branch-Phoenix Subdivision:** Alignment option proposed to cross the Gila River Indian Community (GRIC).
- **Maricopa SR 347:** Alignment option originally identified as a potential commuter rail extension in the MAG Phase I plan.

B. Future Phoenix/Tucson ICR Study

In 2008, the FRA administered grant programs to plan and improve rail infrastructure, focusing on partnerships with state DOTs. ADOT applied for and received a $1 million grant as part of this program to initiate planning for a passenger connection between Phoenix and Tucson. The State Transportation Board authorized a $1 million match of that grant. These funds will be used to continue to build upon the previous studies regarding intercity rail development between Phoenix and Tucson through "the first phase of a NEPA compliant Alternatives Analysis (AA) and Environmental Impact Statement (EIS) in support of a new Regional Passenger Rail Service." As a "first phase" NEPA project, the EIS can be more accurately categorized as an Environmental Overview (EO) which provides a high-level review of major environmental considerations, and will not yet at this point of time seek to achieve a Record of Decision (ROD). When funding is available, a full EIS will be conducted. The findings of the EIS will determine a preferred alignment, opening up the possibility for such actions as funding acquisition and right-of-way purchase. This study is expected to begin in 2010 and continue for 18 to 24 months.

The extent of environmental impact for intercity rail between Phoenix and Tucson will depend largely upon the current land use of the alignment selected. Generally, potential impact is greatest when land use is substantially changing or unique environmental settings are encountered, and least when it is essentially remaining constant. For instance, a passenger rail route on a new alignment will probably have much more impact on the environment than one on an existing railroad corridor. Rail within interstate right-of-way may have more environmental impact than added rail on an existing rail corridor, but less impact than rail on a completely new transportation corridor. While the previous study alignments focused more on utilizing existing transportation corridors, these will merely be used as reference and potentially as a foundation for alternatives development and in no way will presuppose the AA and EO/EIS which is required to look at every feasible alternative, inlcuding a "no-build" alternative.

Figure 10 Phoenix/Tucson ICR Conceptual Corridor Options



5.2.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following strategies:

A. Conduct AA and EO/EIS to identify, evaluate, and prioritize alternative alignment options for Phoenix/Tucson intercity rail to achieve a preferred corridor
B. Initiate intercity rail corridor as a precursor to high-speed rail

A. Conduct AA and EO/EIS to Identify, Evaluate, and Prioritize Alternative Alignment Options for Phoenix/Tucson Intercity Rail to Achieve a Preferred Corridor

The AA and EO/EIS is anticipated to begin in 2010 and should be carried out to build community consensus for intercity rail and establish a preferred alignment. When funding becomes available to conduct full environmental documentation, the EIS should be conducted and completed. Throughout this process, dialogue should be held with key stakeholders to negotiate agreements that will lead to a mutual and shared understanding of commitments and implications of future implementation of a Phoenix/Tucson intercity rail corridor. These stakeholders can include such entities as host railroads, host communities, and land management agencies to establish a shared vision to plan, build, and operate intercity rail.

Because this planning project seeks to obtain environmental review of a passenger rail corridor before future anticipated high-speed and commuter rail, a broader scope should be applied to the alternatives development and analysis process, setting the stage for a future integrated passenger rail corridor that could include commuter, intercity, and high-speed rail. Because of this, the logical location for terminus station locations for a Phoenix/Tucson intercity rail corridor, and the alignment itself, may not be the same as if evaluated under the purpose of serving multiple modes, such as high-speed and commuter rail. Therefore, system and design implications of interfacing commuter, intercity and high-speed rail in the same corridor should be explored in this study.

For example, MAG is currently studying whether one or more of the three UP East Valley corridors (the Phoenix Subdivision, Chandler Branch, or Tempe Industrial Lead) could be used for future commuter rail. The Commuter Rail System Plan may not reach a conclusion on which corridor best serves the need of the region. Therefore, when studied in conjunction with intercity rail, this decision may be influenced by broader factors that could have an effect on the outcome.

The end goal of the ADOT AA and EO/EIS is to achieve a regionally preferred alignment that would provide the foundation for all future passenger rail modes by determining such factors as central station locations in Phoenix and Tucson that future passenger rail could link into, initiation of negotiations with UP to determine parameters for potential shared use corridors, and physical transportation improvement needs such as minimum bridge clearances, etc.

B. Initiate Intercity Rail Corridor as a Precursor to High-Speed Rail

After selecting the preferred alignment for Phoenix/Tucson intercity rail, the state should execute a plan for its implementation. Shared use agreements with the UP may need to be negotiated; other necessary properties acquired; track, bridges, stations, and other infrastructure constructed; and locomotives and rolling stock procured. The state would also need to contract an operator for the system. With such infrastructure and operations decisions in place, a foundation is established for future interface of passenger modes, specifically high-speed rail.

5.2.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- Arizona State Parks
- MAG
- PAG
- Central Arizona Association of Governments (CAAG)
- Municipal, county, tribal, and regional governments, as impacted
- Tucson International Airport
- Phoenix Sky Harbor Airport
- Phoenix-Mesa Gateway Airport
- METRO and Valley Metro
- Pima County Regional Transportation Authority

B. Interstate Context

- FRA
- FHWA
- UP Railroad
- Amtrak
- BLM

5.2.5 Risks of Pursuing Strategic Opportunity

The risk with expending efforts to plan for passenger rail is never achieving the approvals or financial backing to construct the system. Another risk with construction is that travelers may not change their mode of transportation, causing an intercity rail corridor to be underutilized.

However, not providing passenger rail options poses its own risks. For example, highway congestion will worsen. I-10 is the major travel corridor between Phoenix and Tucson. With increased growth in the Sun Corridor Megapolitan region, congestion will rise, as has been clearly identified in the Statewide Transportation Planning Framework program. Even with planned interstate improvements and construction of a new North-South Freeway and other planned regional transportation improvements, future demand is forecast to exceed provided capacity. Intercity rail provides an alternative mode between these two metropolitan areas, and in doing so, greatly improves the economic attractiveness of the state and the Sun Corridor to businesses and tourists.

5.2.6 Estimated Costs

Infrastructure for a double-tracked passenger line between Phoenix and Tucson is estimated at roughly $1.8 billion, including right-of-way. Seven trainsets of two locomotives and ten bi-level coach cars (each) adds another $0.2 billion, for a total capital cost of $2 billion.

Estimation of operating costs would vary greatly depending on the system and equipment chosen, service levels, and other factors. Accordingly, operating and maintenance costs have not been estimated.

5.2.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail
An intercity rail corridor between Phoenix and Tucson strengthens federal recognition of passenger rail planning and implementation – potentially achieving designation on the FRA HSR map and providing the foundation for a HSR connection to neighboring states.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor
Intercity rail between Phoenix and Tucson could later be expanded to serve the northern and southern extension of the Sun Corridor Megapolitan area by extending northwest toward Prescott and southwest toward Nogales or Sierra Vista.

Enhancement of intercity rail passenger service
Amtrak does not currently serve Phoenix, but with intercity passenger rail between Phoenix and Tucson, Amtrak's Sunset Limited/Texas Eagle customers may be able to access Phoenix without renting a car or making a bus connection.

Incorporation of MAG and PAG commuter rail planning
To provide increased mobility for rail passengers, an intercity rail corridor could link up with the local and regional transit systems in Phoenix, Tucson, and (later) in Pinal County. Greater mobility encourages higher ridership and maximizes the benefits of local, regional, and intercity systems.

UP system development and operations in the Tucson metropolitan area
Various alignment options have been proposed in previous studies regarding a Phoenix to Tucson intercity rail corridor. Some of these options use the UP Sunset Route and Nogales Subdivision right-of-way, in which coordination would be required.

UP statewide system development and operations
Various alternatives for intercity rail between Phoenix and Tucson rely on use of UP track or right-of-way on the Tempe Industrial Lead, Chandler Branch and/or Phoenix Subdivision. If any of these corridors were selected for shared use, negotiations with the railroad would be required.

5.3 Megapolitan Extensions of the Phoenix/Tucson Intercity Rail Corridor

5.3.1 Introduction

Arizona could benefit from developing a unified passenger rail vision for the state, constructing intercity rail in the Sun Corridor by building off the foundation laid in the Phoenix/Tucson segment – creating a high-capacity rail corridor that could lead to HSR.

Expansion of ICR could connect the initial Phoenix/Tucson line to points farther north, such as Prescott and Flagstaff, and farther south, such as Nogales and Sierra Vista. Well positioned intercity rail stations could reinforce existing economic activity centers or become the focus of new economic activity centers.

This strategic opportunity provides Arizona the following:

- Provides the spine for an integrated transportation system in the Sun Corridor, with a potential linkage to the bi-national border.
- Provides a multimodal choice for Arizona residents.
- Establishes station locations as key economic activity centers and reinforces responsible land use development patterns in both new development and redevelopment areas.
- Provides the basis for future high-speed rail.

5.3.2 Background

A. Sun Corridor Growth to the North

Population and employment growth is the driving force behind the increases in travel demand generating the need for new roads and transit service across the state. In order to accurately project these future transportation needs for Arizona, a statewide travel model was created for the Statewide Transportation Planning Framework program to identify transportation deficiencies and test multimodal improvement scenarios. The preparation of this statewide database of socioeconomic projections focused on compiling locally adopted and accepted projections from recent planning studies.

According to these projections, today's population is expected to increase 500 percent in Yavapai County by 2050, forming the bulk of the northern Sun Corridor Megapolitan area with growth of the Prescott area and Chino Valley. Growth in Coconino County is significantly less, due to the high percentage of public lands such as BLM, tribal communities, and environmentally-sensitive or undevelopable lands.

In addition to serving commuters and residents, this northward extension of the Phoenix/Tucson ICR corridor could also support Arizona from a tourist/destination perspective. With a connection to the BNSF Transcon at Williams Junction already in place, a linkage exists to the Grand Canyon Railway, potentially further extending this northern rail corridor to the state's main tourist attraction – the Grand Canyon – potentially allowing visitors to fly into Phoenix and take a train all the way to the canyon, minimizing impact to this natural resource and its surrounding area.

To support this initiative, Grand Canyon National Park attracts over four million visitors every year, with about 90 percent of these visits to the South Rim. Currently, only about five percent of these South Rim visitors take the Grand Canyon Railway from Williams Junction to the park. Although Phoenix is 47 miles closer to the South Rim than Las Vegas, many visitors use Las Vegas as their gateway to the Grand Canyon. The Hoover Dam Bypass, expected to be complete in 2010, will expedite auto trips from Nevada to the South Rim. Extending intercity rail to link with the Grand Canyon Railway provides Arizona an economic boost by enticing visitors to use Phoenix as their gateway to the Grand Canyon instead of Las Vegas.

B. Sun Corridor Growth to the South

According to the population projections estimated as part of the Statewide Transportation Planning Framework program, growth between 2005 and 2050 is expected to increase approximately 115 percent in Santa Cruz County and more than 150 percent in Cochise County, with population densities in 2050 of more than 1,500 residents per square mile in the central cities of Nogales and Sierra Vista. Both of these cities are located within 75 miles of Tucson, with limited elevation shifts, making daily travel back and forth to the Tucson metropolitan area easy.

As currently defined, the Sun Corridor Megapolitan region is expected to extend from Nogales to Prescott. Extending the future Phoenix/Tucson ICR corridor south to Nogales provides a multimodal choice within a corridor that is projected to have increasing highway congestion. Numerous buses currently transport riders between Nogales and Tucson every day – providing an existing ridership base for additional transit service.

5.3.3 Proposed Strategic Opportunity

As discussed in Section 5.2, ADOT has recently received FRA grant funding to conduct an AA and EO/EIS on the Phoenix/Tucson ICR corridor. This study will evaluate the feasibility of and determine alternative alignments of ICR between the two metropolitan areas. Upon completion of this study, further studies should be conducted on potential ICR extensions to the north and south to determine corridor feasibility, and then if determined feasible, completion of environmental documentation and preliminary alignment options should be explored.

This proposed strategic opportunity consists of the following strategies:

A. Study feasibility of an ICR extension to the north
B. Study feasibility of an ICR extension to the south and east

A. Study Feasibility of an ICR Extension to the North

As discussed in the background, a future need exists for alternative transportation options in the Sun Corridor. Intercity rail from Phoenix northward can support this growth though a high-capacity transportation spine, allowing residents to quickly travel the lengths of the megapolitan – ideally supported by local transit service at trip end station locations. Work is currently underway in the MAG region to explore commuter rail opportunities – of which potential corridors could interface or share right-of-way with ICR, and soon ADOT will conduct the first level of environmental study to select a preferred alignment for ICR between Phoenix and Tucson. Results of both of these studies help lay the groundwork for a future ICR extension northward.

As part of this strategic opportunity, a feasibility study should be conducted to determine if an ICR extension is viable, and what corridor options are practical – for instance, connecting to Prescott, farther north to Williams Junction, providing an extension to the Grand Canyon Railway, or on to Flagstaff.

The BNSF Phoenix Subdivision, or more commonly referred to as the "Peavine" line, is an active rail line that runs from downtown Phoenix along US 60/Grand Avenue to Wickenburg, and north through the Prescott area and Chino Valley to interchange with the BNSF Transcon east of Williams. While the Peavine would require several upgrades and improvements to accommodate passenger rail, it could potentially serve as the base for future ICR in this region (Figure 11). While this is the only line illustrated on the map, an alternatives analysis will be required to determine the most feasible alignment for this corridor, which may vary from the conceptual extensions illustrated.

Some observations of a northward extension that would need to be further explored in a feasibility study include:

- The Prescott area currently has no rail service, so ICR via the existing Peavine line could access only a "greater Prescott area" that includes the growth anticipated along the Sun Corridor. To serve the cities of Prescott and Prescott Valley, new track would likely need to be constructed. BNSF formerly served this area through the Prescott Branch of the Peavine, but this track has been abandoned and rail removed, with much of the corridor sold.
- Flagstaff is generally landlocked due to surrounding forest lands and topography, and therefore it not likely to expand much in the future, however may increase densities with infill and redevelopment. A feasibility study would help determine the benefit that ICR could provide to this area compared with the costs such a corridor may entail.
- The most apparent means to access Flagstaff from Williams Junction would be along the BNSF Transcon corridor. The feasibility of gaining access to the Transcon, or utilizing its right-of-way for additional track installation would require extensive coordination and negotiations with BNSF.
- The Peavine line has numerous tight curves and steep grades that limit speeds to 25 mph. Curves and grades would need to be improved to make this route attractive to riders.

B. Study Feasibility of an ICR Extension to the South and East

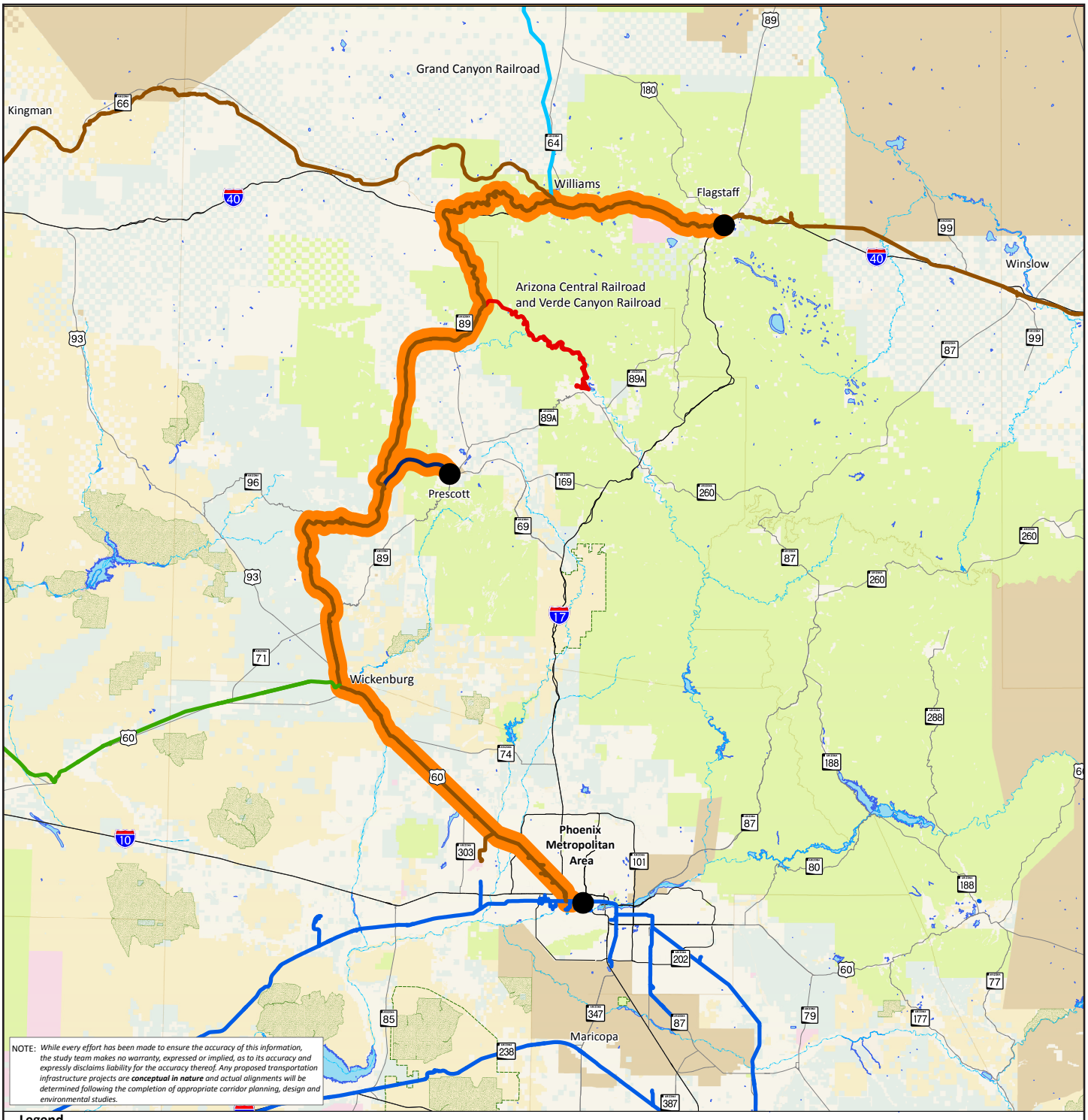
Likewise for this strategic opportunity, a feasibility study should be conducted to determine if an ICR extension south/east is viable, and what corridor options are practical.

Regarding a Nogales connection, the UP Nogales Subdivision currently exists in this corridor and could potentially be sought as a shared use corridor – or at least shared right-of-way. PAG is currently studying this corridor for potential future commuter rail service as well.

As population growth warrants, ICR could potentially be extended southeast to Sierra Vista. A rail connection does not currently exist between Tucson and Sierra Vista, which would require planning for new track; however as highway improvements are conducted in the future, the potential could exist for joint use transportation corridors. A short line railroad, the San Pedro & Southwestern Railroad, ran from Benson to Douglas, skirting Sierra Vista to the east. Currently, trains primarily run between Curtiss and Benson, with the rest of the track in a mostly unusable state. While the track has an approved application for abandonment, this agreement has not yet been consummated, allowing the potential to preserve the right-of-way for future use.

While population growth is anticipated in both Nogales and Sierra Vista based on existing trends, an outside factor that could affect the future of Sierra Vista is Fort Huachuca. This military base currently employs approximately 45 percent of the city's residents. In subsequent rounds of the Department of Defense's Base Realignment and Closure (BRAC) efforts, Fort Huachuca could either close – losing the major employment center for the city, or grow – accommodating military personnel relocated from other base closures. This fluctuating future of the city needs to be examined in an ICR feasibility study.

Figure 11 Potential ICR North Extension



5.3.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ADEQ
- AZGFD
- Arizona Office of Tourism
- Arizona Department of Commerce (ADOC)
- DOD
- Grand Canyon Railway
- San Pedro & Southwestern Railroad
- COGs and MPOs
- Arizona cities, counties and tribes along and near proposed routes

B. Interstate Context

- BNSF Railway
- UP Railroad
- Amtrak
- FRA
- NPS
- U.S. Forest Service

5.3.5 Risks of Pursuing Strategic Opportunity

As with ICR between Phoenix and Tucson, the risk with expending efforts to plan for passenger rail is never achieving the approvals or financial backing to construct the system. Another risk with construction is that travelers may not change their mode of transportation, causing an intercity rail corridor to be underutilized.

However, not providing passenger rail options poses its own risks. For example, both north of Phoenix and south of Tucson, there are few opportunities for alternative route development because of land ownership and topography issues. Therefore, ICR provides another option for travelers to avoid highway congestion. Additionally, an ICR system improves the economic attractiveness of the state and the Sun Corridor to businesses and tourists.

5.3.6 Estimated Costs

Based on the cost estimate presented for a Phoenix/Tucson ICR corridor, infrastructure for a double-tracked passenger line is estimated at roughly $15 million per mile, including right-of-way. Trainsets and coach cars would add additional capital expenditures. Estimation of operating costs would vary greatly depending on the system and equipment chosen, service levels, number of station stops, and other factors. Accordingly, operating and maintenance costs have not been estimated.

5.3.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail
If Phoenix connects with Los Angeles, San Diego and/or Las Vegas via high-speed rail, intercity rail north of Phoenix may allow additional Arizona communities to benefit from a western high-speed rail system. Coupled with Phoenix/Tucson service, intercity rail south and east of Tucson may allow more Arizonans to enjoy convenient rail options for travel to California, Nevada, and elsewhere in the Intermountain West.

Phoenix/Tucson intercity rail
The Phoenix/Tucson intercity rail corridor will provide the foundation for future ICR extensions to the north or south/east.

Incorporation of MAG and PAG commuter rail planning
ICR best serves the public when paired with mobility and accessibility at station locations. Therefore, any ICR service should ensure connections with local transit services wherever possible.

BNSF Phoenix metropolitan area system development and operations
ICR from Phoenix to Prescott may be facilitated through a joint use, purchase, or PPP agreement with the BNSF (and possibly short lines) regarding the Peavine.

BNSF statewide system development and operations
Coordination with BNSF will be required if the ICR corridor interfaces with the Transcon mainline.

UP Tucson metropolitan area system development and operations
The extension of ICR south and east of Tucson could require cooperation between the state and the UP if ICR interfaces with the UP Sunset Route.

UP statewide system development and operations
The extension of ICR south and east of Tucson could require cooperation between the state and the UP if ICR interfaces with the UP Sunset Route or Nogales Subdivision.

Development/expansion of short line railroads
ICR extensions could potentially utilize short line railroad track or out of service right-of-way for such passenger service.

5.4 Enhancement of Intercity Rail Passenger Service

5.4.1 Introduction

Arizona could benefit from encouraging enhanced intercity rail passenger service—currently provided by Amtrak under its federal charter—to better serve the state's travelers and attract visitors to Arizona, as an integral component of the state's long-range rail vision.

Enhancement of existing Amtrak services in Arizona will help provide a foundation for more intercity rail passenger service and eventual HSR along certain corridors. Short-term service and track improvements can help the state fully take advantage of its existing passenger rail assets, and long-term improvements would provide significant public benefits by fostering the creation of a passenger rail network. Investing in enhanced intercity passenger services would provide additional mobility options and attract more riders within the state.

This strategic opportunity provides Arizona the following:

- Provides an alternative mode of transportation for longer-distance interstate travel.
- Establishes station locations as key economic activity centers and reinforces responsible land use development patterns in both new development and redevelopment areas.
- Better uses existing Arizona rail infrastructure for passenger service.
- Provides the foundation for future high-speed rail, intercity rail or commuter rail services.

5.4.2 Background

A. National Context

There is currently a great deal of national attention on HSR, but conventional ICR is also a focus of the federal government and many states. Amtrak currently operates intercity rail services in forty-six states. Besides serving as a first step towards HSR, ICR plays an important role in several areas of the country. The FRA asserts that passenger rail can provide significant public benefits as a safe and cost-effective transportation mode that contributes to economic development, energy efficiency, environmental quality, and smart growth.

State Programs

Many states have programs to support rail improvements that enhance Amtrak services (and the host freight railroads) within their borders. Incremental spot improvements, station renovations, and right-of-way purchases are examples of state-funded projects. States also sponsor new rail passenger services or expansions of existing service along long-distance Amtrak corridors, as well as in corridors that have no long-haul Amtrak service. Amtrak operates these state-supported services, providing intercity travel within the state or between adjacent states. The states provide operating assistance to cover the difference between revenue and operating costs for the expansion of service. Federal legislation in the early 1990s prohibited federal operating subsidies for expansion of Amtrak's level of service, so states have played a growing role in supporting Amtrak services. A successful example of greatly expanded service initiated by states is the Hiawatha service from Chicago to Milwaukee, jointly supported by the states of Wisconsin and Illinois. Table 6 contains a list of Amtrak services that depend on financial support from one or more states, as authorized by Section 403(b) of the federal Rail Passenger Service Act.

Recent Federal Legislation

The Passenger Rail Investment and Improvement Act (PRIIA) of 2008 established federal grant and planning programs for both conventional ICR and HSR. Grant programs included ICR corridor capital assistance, HSR corridor development, and congestion grants. HSR programs in the legislation targeted the ten corridors and regional networks designated by the USDOT as future HSR corridors.

The American Recovery and Reinvestment Act (ARRA) of 2009 makes an $8 billion initial investment in HSR and ICR. Much of the ARRA rail program is restricted to the ten designated HSR corridors, but some elements of ARRA apply to Arizona's passenger rail planning. In April 2009, FRA released its Vision for High-Speed Rail in America document, which lays out the need, vision, and implementation steps for the HSR program in ARRA. Interim guidance for this program, the High-Speed Intercity Passenger Rail (HSIPR) Program, was released in June 2009.

The national HSR strategy has a tiered approach, identifying Express, Regional, and Emerging HSR corridors as well as Conventional Rail corridors with potential for future HSR service. Existing Amtrak services in Arizona do not meet the criteria for consideration as an emerging HSR corridor (defined in the HSR strategic opportunity, Section 5.1). They would fall under the most basic existing service category:

- **Conventional Rail:** ICR corridor with potential for further conventional rail development and market expansion, at least 100 miles in length, at least one daily round-trip, top speeds of 79-90 mph.

Table 6 Amtrak Services with State Operating Support

Service	Route	State(s) Providing Operating Assistance
Adirondack	Montreal - New York (city)	New York
Amtrak Cascades	Vancouver, BC - Eugene	Oregon, Washington
Blue Water	Chicago - Port Huron	Michigan
Capitol Corridor	Auburn - Sacramento - San Jose	California
Carl Sandburg	Chicago – Quincy	Illinois
Carolinian and Piedmont	New York - Raleigh - Charlotte	North Carolina
Downeaster	Portland - Boston	Maine
Ethan Allen Express	New York - Rutland	Vermont
Heartland Flyer	Oklahoma City - Fort Worth	Oklahoma, Texas
Hiawatha	Chicago - Milwaukee	Illinois, Wisconsin
Illini	Chicago - Carbondale	Illinois
Illinois Zephyr	Chicago – Quincy	Illinois
Keystone Service	New York - Harrisburg	Pennsylvania
Lincoln Service	Chicago - St. Louis	Illinois
Missouri River Runner	St. Louis - Kansas City	Missouri
Pacific Surfliner	San Luis Obispo - Los Angeles - San Diego	California
Pere Marquette	Grand Rapids - Chicago	Michigan
Saluki	Chicago - Carbondale	Illinois
San Joaquin	Bakersfield – Oakland	California
Vermonter	Washington, DC - St. Albans	Vermont
Wolverine	Chicago - Detroit - Pontiac	Michigan

Source: Amtrak, associated state DOTs.

In July 2009, ADOT submitted two pre-applications for ARRA's HSIPR Program that would provide potential benefits to Amtrak. The first was an application to reestablish Amtrak rail passenger service through Phoenix by reinstating the UP Wellton Branch. The goal of this application was that revived, daily rail passenger service between Tucson, Phoenix, and Yuma would set a new baseline level of service in Arizona, which could in turn assist in creating an alternative transportation corridor in the region, and potentially establish demand for future high-speed passenger service. Another benefit to this application would be improved freight capacity and infrastructure improvements for UP's mainline to the State Capitol. The second HSIPR application was submitted to fund preliminary engineering work for implementation of enhanced intercity rail passenger service between Phoenix and Tucson.

The current legislation authorizing most surface transportation programs, SAFETEA-LU, expired in September 2009 and has been temporarily extended through February 2010. New federal surface transportation legislation will be forthcoming; initial proposals include major programs for passenger rail.

B. Existing Amtrak Service in Arizona

The two Amtrak lines serving Arizona are the Southwest Chief and combined Sunset Limited/Texas Eagle (Figure 12). Both of these routes primarily serve long-distance tourist travel, with service frequency ranging from one trip per day (Southwest Chief) to three trips per week (Sunset Limited/Texas Eagle).

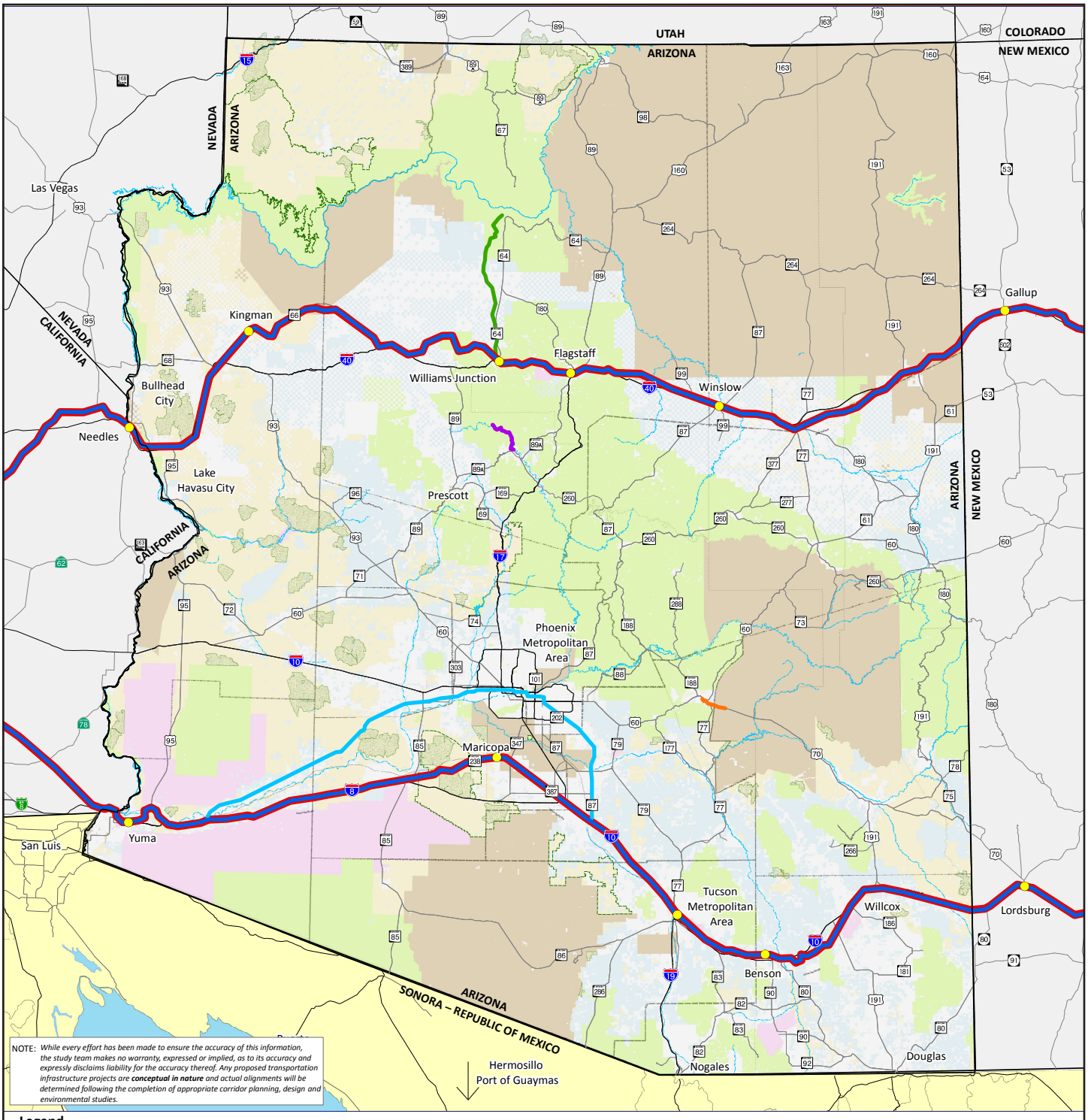
The Arizona Amtrak routes use track owned and operated by freight railroads and do not operate at high speeds. They share track with freight operations and are subject to delays caused by other rail traffic, like most Amtrak services. According to the 2009 Arizona Town Hall summary document, in 2008, 88,305 passengers boarded Amtrak trains in Arizona. Flagstaff had by far the most boardings (39,723), followed by Tucson (14,780), Kingman (10,322), and Williams Junction (8,199). Maricopa, the closest station to the Phoenix metropolitan area, had only 6,393 boardings.

Sunset Limited/Texas Eagle

General characteristics of the route include:

- **Route:** Chicago and New Orleans to Los Angeles via southern Arizona
- **Arizona Stations:** Benson (a flag stop), Tucson, Maricopa, and Yuma
- **Freight Operations:** The route uses the UP Sunset Route in Arizona. Much of the line is single–track, although UP has embarked on a project to double-track the Sunset.
- **Current Schedule:** The current schedule of the Sunset Limited service is less than daily and the hours are not convenient for most short-distance travelers. Overnight

Figure 12 Existing Statewide Passenger Rail Service



trips to Los Angeles or El Paso may be more feasible for some users. Otherwise, the line is mostly used for long-distance tourist travel. Westbound trains pass through Tucson and Maricopa at approximately 11:00 pm and 1:00 am on Tuesday, Thursday, and Saturday nights, and arrive in Los Angeles at 9:40 am the next morning. Eastbound trains pass through Maricopa and Tucson at approximately 10:00 pm and 1:00 am on Sunday, Wednesday, and Friday nights, arriving in El Paso at 8:16 am the next morning. Lack of schedule reliability is a problem because of the single track and heavy UP freight traffic. Significant recovery time is built into the schedule to accommodate these delays, which lengthen travel time across the state even when the service is on time.

Proposed Service Changes

Amtrak is currently studying ways to restructure service along the Sunset Limited that would lead to daily service. One proposal under study is to replace the current Sunset Limited with an improved (daily) Texas Eagle between Chicago and Los Angeles. A separate train from New Orleans would connect with the Eagle in San Antonio.

Other Background

Amtrak provides direct service to downtown Tucson but bypasses the Phoenix metropolitan area. It served Phoenix and Tempe until 1996, when UP suspended service on the Wellton Branch between Wellton and Palo Verde. The 81-mile segment needed significant maintenance and upgrades, for which UP was not prepared to pay. Since 1996, Amtrak has used the Sunset Route through Maricopa, approximately 30 miles south of Phoenix, where it established a new station. UP now serves Phoenix by way of its subdivision on the east side of the metropolitan area. In 1995, the Phoenix and Tempe stations had approximately 35,000 combined passenger boardings on the Sunset Limited, in contrast to the 6,393 boardings at Maricopa in 2008. There is currently no connecting bus or shuttle service from the Maricopa station to the Phoenix area.

Southwest Chief

General characteristics of the route:

- **Route:** Chicago to Los Angeles via northern Arizona
- **Arizona Stations:** Winslow, Flagstaff, Williams Junction, and Kingman
- **Freight Operations:** The line uses the BNSF Railway Transcon route. The line is double–track (and triple-track in some places) across the state.
- **Current Schedule:** The daily schedule of the service is more convenient than the Sunset Limited, although still not ideal for many local travelers. Westbound trains pass through Arizona in the evening (departing Flagstaff at approximately 9:00 pm). Eastbound trains pass through Arizona in the morning (departing Flagstaff at approximately 5:00 am). Its schedule reliability is much better than that of the Sunset Limited, and scheduled travel speeds are higher.

Other Background

The Southwest Chief is a popular tourist route. It connects with the Grand Canyon Railway by way of free shuttle service between Williams Junction and the Grand Canyon Railway station in Williams. The schedules are coordinated to allow convenient connecting service. Motor coaches provide connecting service from the Flagstaff station to Sedona and Phoenix, and from the Kingman station to Las Vegas.

5.4.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following strategies:

A. Pursue general intercity passenger rail improvements
B. Support Sunset Limited/Texas Eagle major capital improvements
C. Support Southwest Chief major capital improvements

A. Pursue General Intercity Passenger Rail Improvements

Improve On-Time Performance of the Sunset Limited/ Texas Eagle

Fixing choke points on the UP Sunset Route by adding passing sidings, signal upgrades or other types of spot improvements is critical for improving the poor schedule reliability of the Sunset Limited/Texas Eagle. Eventually, the entire UP Sunset Route through Arizona should be double-tracked. Other operational policies such as performance incentives and management changes may also play a role in improving on-time performance.

Work to adjust schedules to allow for more convenient departure/arrival times at key Arizona stations

It would be beneficial for the state to encourage Amtrak to consider more convenient departure times for Arizona stations as it makes changes to the Sunset Limited. Improved on-time performance would allow for a reduction in scheduled recovery time along the route, which in turn may allow better arrival/departure times to serve the local market. Reduced recovery times also would allow shorter travel times between Arizona cities. Both the Southwest

Chief and Sunset Limited/Texas Eagle are very long multistate routes, so schedule adjustments would affect other states and they would need to be involved in the process.

Improve Service Frequency

In the short term, the most feasible improvement would be upgrading the Sunset Limited/Texas Eagle to daily service. This change would also give Amtrak the operational benefit of more efficient crew schedules on the route. This could also be achieved without acquisition of new equipment sets. Amtrak is already studying changes to the route that would accomplish this goal.

Expanding service frequency to twice a day on the Southwest Chief or Sunset Limited/Texas Eagle route does not make sense for Amtrak in the near future, given the high cost of providing additional crews and equipment. However, assessing demand for increased service along Arizona route segments should be considered (see the following recommendation).

Evaluate Potential for New Service along Arizona Route Segments

New ICR service in Arizona (see Sections 5.2 and 5.3) could be initiated as Amtrak-operated service supported by the State of Arizona through section 403(b). This model is used in many states. Amtrak has advantages over other passenger rail operators in its access to freight rail corridors and negotiating operating agreements with host railroads, as a result of its original authorizing legislation. If Amtrak is not interested in operating additional service (even with 403(b) subsidies from the state) or is unable to do so at a competitive cost, then Arizona may wish to consider negotiating with other potential service providers. But Amtrak is currently the only provider of true intercity passenger rail in the U.S. outside Alaska, and it enjoys unique statutory privileges that may require federal legislation to overcome.

New service could start with two daily round trips, providing (for example) morning and evening departures. This could be structured as an overlay service that would allow for a single set of equipment. Over time, as ridership grows, service frequency could be increased to multiple daily round trips. Within Arizona, the Phoenix-Tucson corridor is the most feasible for such a service.

Local Seats

Most travel on the existing Arizona Amtrak routes is long-distance. Seat availability for shorter intrastate travel may become limited if ridership increases. Other states have addressed this issue by working with Amtrak to provide a minimum number of local seats for intrastate travel segments. States have provided additional capacity through monetary subsidies or additional coaches. ADOT could assess the availability of tickets for local travel if ridership grows in response to service improvements (daytime and increased service) in the Phoenix/Tucson corridor.

Investigate Major Capital Improvements that Benefit Other Rail Programs

In the short term, spot improvements that address choke points may help to improve on-time performance and track speeds through relatively minor capital investments. In the medium- to long-term, larger capital projects are needed to achieve further and more significant service improvements. Increasing capacity and track speed of the railroad will require improvements such as implementing grade-separated crossings, building parallel track or purchasing right-of-way for exclusive or priority passenger rail use. Completion of UP's double-tracking of the Sunset Route is absolutely essential. Other projects may be justified if a rail corridor is planned for future HSR or new ICR services, or if the improvement would enable a major improvement in the state's freight capacity. The responsibilities and shares of these capital costs would be negotiated among the state, the railroad, Amtrak, and, for certain improvements in urban areas, local governments. As noted above, there are various federal grant programs for capital improvements.

Feeder Bus Service

The Southwest Chief currently has feeder bus service at two stations. There may be opportunities to implement feeder bus service at key stations on the Sunset Limited/Texas Eagle if the route is upgraded to daily service. There also may be opportunities to expand the reach of existing bus connections along the Southwest Chief. As rail passenger services expand across the state, the intercity bus system may be a key component in providing access to stations, both for existing Amtrak services and new ICR services.

B. Support Sunset Limited/Texas Eagle Major Capital Improvements

Reopening the UP Wellton Branch could be investigated to potentially restore service to Phoenix. Providing direct service to the largest metropolitan area in the Intermountain West would be a great asset to the Sunset Limited/Texas Eagle route if Amtrak provides daily service. It may also provide benefits to UP freight service by allowing a direct connection to the Phoenix metropolitan area from the west and relieving capacity along the Sunset Route south of Phoenix. Currently, eastbound UP trains must pass through Picacho and turn northwest to access Phoenix, adding 106

miles to the trip. At the time UP removed the Wellton Branch from service (1996), Amtrak estimated the cost of restoring the line to be $27.5 million. If the state determines that the Wellton Branch is a strategic rail corridor for multiple purposes (especially future HSR or freight linkage to a future deep-water port in Punta Colonet, Baja California, Mexico), it could investigate purchasing the right-of-way, which would allow it to lease the branch to various operators while controlling operations and track specifications.

C. Support Southwest Chief Major Capital Improvements

The State of Arizona could seek opportunities to coordinate long-term improvements by BNSF to its mainline across northern Arizona with passenger rail objectives, such as faster travel times and more daily trips.

5.4.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ADEQ
- AZGFD
- ADOC
- Arizona Office of Tourism
- COGs and MPOs
- Municipal, county, tribal, and regional governments, as impacted
- Arizona Tourism Alliance, state and local Chambers of Commerce
- Grand Canyon Railway
- Arizona Rail Passenger Association
- Local transit operators

B. Interstate Context

- Amtrak
- FRA
- Surface Transportation Board
- UP Railroad
- BNSF Railway
- Barry M. Goldwater Air Force Range (DOD)
- Intercity bus companies

5.4.5 Risks of Pursuing Strategic Opportunity

A. Uncertainty in Future Freight Markets

Improving service will always depend to some degree on freight operations along the lines. The future freight market and possible increased freight operations on mainlines are uncertainties. This risk can be mitigated by reaching advance, long-term agreements with the railroads.

B. Uncertain Passenger Rail Demand in Arizona

Service enhancements may not yield a corresponding ridership increase within Arizona, as many passengers on the existing routes are traveling through the state. A rigorous technical analysis of travel demand should precede any public investment to increase Amtrak service in existing corridors.

C. Risk of Inaction

There is a risk of not playing an active role in enhancing the state's existing rail passenger services. In applying for federal grants in other types of intercity rail (HSR or ICR to be operated by entities other than Amtrak), improving Amtrak services is an immediate opportunity for the State of Arizona to demonstrate an active commitment to passenger rail.

5.4.6 Estimated Costs

A. Capital Costs

Minor Capital Projects – Spot Improvements

Improving on-time performance on the Sunset Limited/ Texas Eagle route will involve removing choke points along the UP Sunset Route. The UP is already planning to address this problem at its own expense by double-tracking its Sunset mainline across southern Arizona.

Specific cost estimates for such improvements can be developed when the scope of improvements are jointly defined by the host railroad, passenger rail operating entity, and other stakeholders.

Major Capital Investments

Several types of major capital investments are associated with longer-term projects aimed at establishing new ICR services as well as providing benefits to existing Amtrak services. These possible investments include:

- **Track Upgrades:** Increasing running speeds along Amtrak routes or accommodating significant increases in freight volumes while maintaining Amtrak service would require more extensive capital investments. These corridor improvements may include building parallel track or implementing grade-separated crossings along an entire segment of railway. The UP double-tracking project would accomplish much of this on the Sunset Limited/Texas Eagle route.

- **Additional Equipment:** Establishing a new Amtrak service would require additional train sets funded by the state.
- **Specific Major Projects:** Various major projects along Amtrak lines may benefit the entire state rail system. Some potential projects include:
  - Purchasing and rehabilitating the Wellton Branch (would require negotiations with UP regarding the terms and costs, or outright purchase).
  - Renovating and expanding Phoenix Union Station for renewed passenger service (Amtrak, commuter rail and new intercity service), or creating a new passenger rail station in the heart of Phoenix.
  - Improvement of passenger facilities at other stations, such as Yuma, which currently has only an outdoor waiting area.

Specific cost estimates for such improvements can be developed when the scope of improvements are jointly defined by the host railroad, passenger rail operating entity, and other stakeholders.

B. Operating Costs

Operating Subsidies

Amtrak requires funding by states under the 403(b) program to operate additional services. States subsidize the gap between passenger fare revenues and operating costs. Any service enhancements or new services would create additional operating costs. Amtrak would be responsible for compensating the railroads for its increased operating costs due to increased passenger rail traffic, and the state would in turn have to subsidize these costs. Expansion of feeder bus services would also require operating subsidies.

5.4.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail

Some existing Amtrak corridors could be used for upgraded ICR or new track for future HSR to neighboring states. Capital investments related to existing Amtrak routes such as station improvements, grade-separated crossings or new parallel track could be done in coordination with planning for upgraded ICR and HSR.

Phoenix/Tucson intercity rail

The restoration of Amtrak service between Phoenix and Tucson would pave the way for more extensive or higher-speed service in this corridor.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor

A rail connection between Phoenix and Flagstaff would help to connect the two existing Amtrak passenger rail corridors in the state. Such a line would further enhance the tourism potential of the Southwest Chief route.

Incorporation of MAG and PAG commuter rail planning

Commuter rail systems would likely share some track with existing Amtrak operations, and there would be potential to share stations and provide convenient connections between the services. Amtrak is also a potential operator of startup commuter rail services.

BNSF statewide system development and operations

Proposed triple-tracking along the BNSF Transcon would increase capacity and benefit the Southwest Chief service. A freight bypass around Flagstaff would further facilitate passenger rail operations in the city and access to the historic downtown depot.

UP Tucson metropolitan area system development and operations

Relocation of freight activities outside Tucson would facilitate passenger rail operations within the city. Double-tracking would also increase capacity on the Sunset Route and benefit the Sunset Limited/Texas Eagle service.

UP statewide system development and operations

Double-tracking and new UP rail yards would increase capacity on the Sunset Route and benefit the Sunset Limited/Texas Eagle service.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley

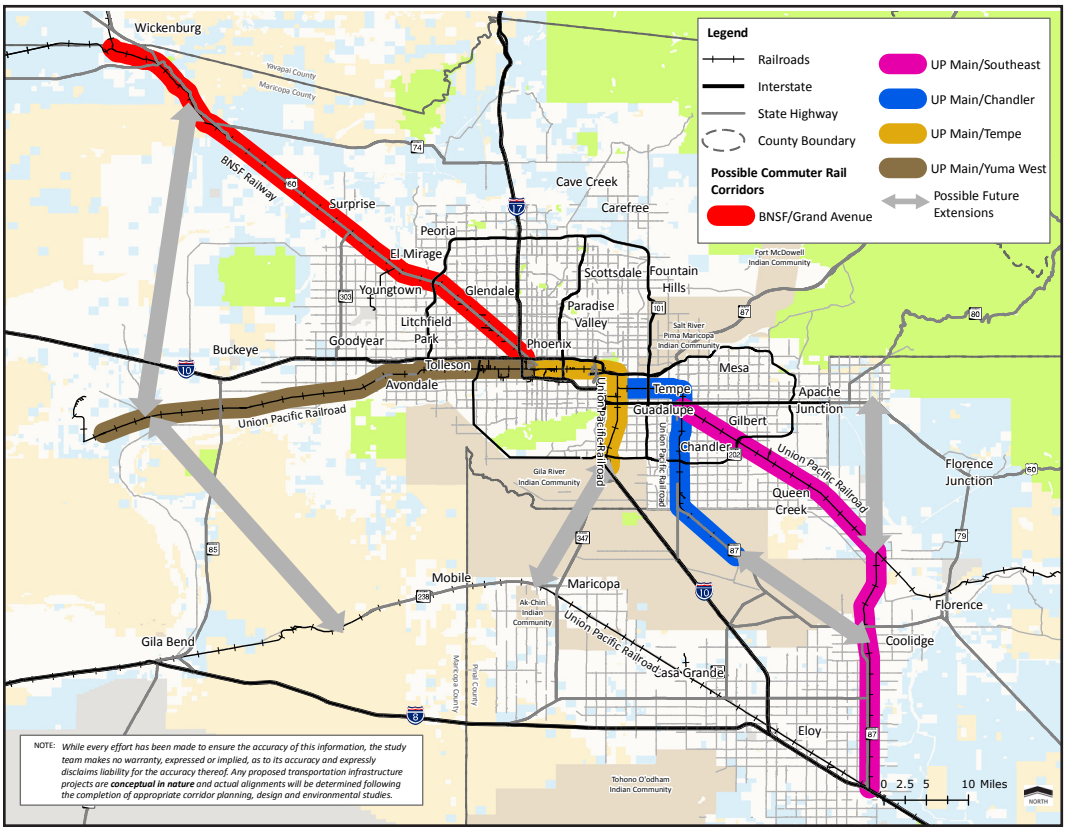
A new rail corridor between the UP Sunset Route and a future UP Buckeye yard could provide an alternative route for Amtrak to access the Phoenix metropolitan area, instead of rehabilitating the Wellton Branch.

5.5 Incorporation of MAG and PAG Commuter Rail Planning

5.5.1 Introduction

Arizona could benefit from developing a unified passenger rail vision for the state, constructing intercity rail in the Sun Corridor by potentially building on the future MAG and PAG commuter rail systems – creating an evolving rail corridor that could lead to high-speed rail in the future. A state rail organization may be responsible for governance and oversight of such a megapolitan system.

Figure 13 Possible MAG Commuter Rail Corridors



MAG has identified a set of potential commuter rail corridors in Maricopa County and a portion of Pinal County, and PAG has done similar work in Pima County. Implementation of the MAG corridors would create a commuter system in Maricopa County, complementing the more localized light rail and bus system. Similarly, a PAG commuter rail system would complement the Tucson modern streetcar and bus system.

This strategic opportunity provides Arizona the following:

- Provides the foundation for an integrated transportation system within the Sun Corridor Megapolitan.
- Provides an additional modal choice for commuters.
- Establishes station locations as key economic activity centers and reinforces responsible land use development patterns in both new development and redevelopment areas.
- Provides the foundation for future intercity rail between Phoenix and Tucson.
- Ensures compatibility between systems to allow for a transition to future intercity rail.

A similar combination of commuter and intercity services exists between San Diego and Los Angeles, which are roughly the same distance apart as Phoenix and Tucson. Metrolink provides commuter rail service south of Los Angeles and Coaster does the same north of San Diego. The two services meet in Oceanside, California. At the same time, Amtrak provides frequent intercity service (Pacific Surfliner) along the entire corridor, making fewer stops and offering shorter travel times than commuter rail.

5.5.2 Background

A. MAG Regional Planning Context

As a metropolitan planning organization, MAG is charged with regional transportation planning in Maricopa County. In an effort to foster a multimodal transportation system, MAG has undertaken several studies in the last few years to determine options for enhancing the long-term economic vitality of the county and the mobility of its citizens. One of these options is a commuter rail system in the MAG region. This was proposed in the MAG *High-Capacity Transit Study*, completed in 2003. That study recommended exploring commuter rail on the BNSF/Grand Avenue corridor, UP Main/Yuma West corridor, and UP Main/Southeast corridor.

Recognizing that commuter rail corridors could serve a critical function in addressing future travel needs in the region, MAG completed Phase I of the *Commuter Rail Strategic Plan* in 2008 to assess local and regional support for commuter rail in Maricopa County and northern Pinal County.

The Phase I *Commuter Rail Strategic Plan* identified customer needs and possible rail services. It also reviewed commuter rail technology and systems across the country to determine the best approach to regional rail in the MAG region. The resulting approach was to focus on using existing freight lines: BNSF/Grand Avenue, UP Main/Chandler, UP Main/Southeast, UP Main/Tempe South, and UP Main/Yuma West. Potential future rail alignments were also identified in developing areas, including extension of the Tempe Branch to Maricopa, extension of the Chandler Branch to Coolidge, the UP Phoenix Subdivision/Magma

Arizona Railroad/Copper Basin Railway to Apache Junction, and a north-south corridor from the UP Sunset Route to the BNSF Peavine line through the Hassayampa and Hidden valleys (Figure 13).

The MAG *High-Capacity Transit Study* and *Commuter Rail Strategic Plan* envisioned the proposed commuter rail system for construction in a series of phases that incrementally increase service. Phased service was proposed for implementation in a series of different approaches.

Phase II of the *Commuter Rail Strategic Plan* is moving forward with the starter system approach. Phase II consists of three studies – a corridor development plan for the BNSF/Grand Avenue corridor, a corridor development plan for the UP/Yuma West corridor, and a System Study. While the Phase II studies will not be complete until approximately spring 2010, the corridor development plans focus on evaluating future passenger rail, freight rail, and roadway traffic in the corridors, and on developing phased implementation plans for commuter rail implementation. The System Study will contain more detailed modeling and ridership projections for the buildout of a commuter rail system, with estimated costs and benefits, as well as a ranked list of commuter rail corridors and a sequence for future corridor development plans.

B. PAG Regional Planning Context

PAG is the MPO charged with regional transportation planning in Pima County. In an effort to foster a multimodal transportation system, PAG is in the process of updating its Regional Transportation Plan and conducting a high-capacity transit study to determine options for enhancing the long-term economic vitality of the county and the mobility of its citizens. One of these options is a commuter rail system in the PAG region.

The PAG *High-Capacity Transit System Plan* was initiated in 2008 and is still underway. The plan will prioritize a series of high-capacity transit corridors based on potential ridership, costs, right-of-way availability, land use compatibility with transit, and socioeconomic factors. The proposed system elements are tied to highly traveled corridors in the Tucson metropolitan area.

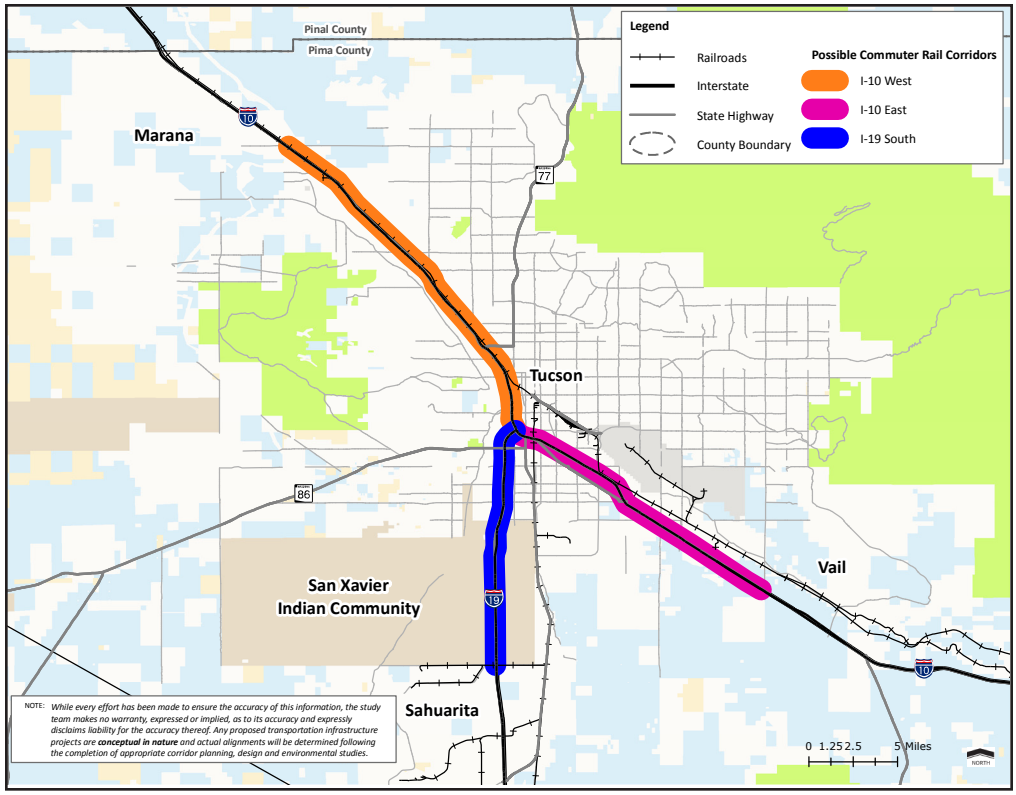
Preliminary recommendations propose commuter rail along I-10 and I-19 (Figure 14). Development of commuter rail is not anticipated until the 20+ year timeframe. In the interim, express bus is proposed along I-19 within 10 years, upgrading to bus rapid transit or light rail along both I-19 and I-10 in 10 to 20 years. Supporting this system will be additional bus corridors and the buildout of the Tucson modern streetcar system.

Recognizing the importance of a commuter system and the potential to tie into a regional intercity service between Tucson and Phoenix, the I-10 commuter rail route north of Tucson is being labeled a "priority corridor" and will go to the Regional Transportation Plan (RTP) 2040 Task Force for potential recommendation of more immediate study, possibly accelerating the development timeframe of this corridor.

C. ADOT Planning Context

Constructing high-speed or intercity rail between Phoenix and Tucson has been a vision within Arizona for several decades. ADOT has conducted many feasibility studies, the latest completed in 2008 – the *High-Speed Passenger*

Figure 14 Possible PAG Commuter Rail Corridors



Rail Strategic Plan. The study cites both the MAG and PAG commuter rail planning efforts, and suggests consideration of the interaction among all potential rail corridor users. The purpose of either high-speed or conventional intercity rail would be to develop a multimodal system that connects Arizona while linking the state nationally and globally. These options offer an alternative transportation choice – meeting the first guiding principle identified in the Statewide Transportation Planning Framework Program.

Using the MAG *Commuter Rail Strategic Plan*, the ADOT *High-Speed Passenger Rail Strategic Plan* recommends an integrated operations plan. Constructing the two commuter rail systems and an ICR/HSR corridor in tandem would provide many future opportunities. Use of a rail segment by ICR/HSR passenger and commuter rail service, or by two or more commuter services, offers opportunities to spread improvement and maintenance costs over more than one service, reducing individual costs. Additionally, such an approach allows phased implementation from commuter rail to ICR to HSR, as future population and employment needs warrant.

Current MAG and PAG planning efforts will help solidify their recommended commuter rail corridors and potential phasing and implementation. ADOT will continue to explore a Phoenix to Tucson rail passenger connection through a recent FRA grant to conduct an AA and EO/EIS. The findings of this study will help determine the most feasible MAG and PAG commuter rail corridors to connect to a future intercity or HSR corridor.

D. Amtrak Planning

While Amtrak's long-distance rail passenger service has not served Phoenix since the mid-1990s, there is discussion by Amtrak at the national-level of reestablishing the legacy Phoenix connection on the UP Wellton Branch. If this occurs, acquiring trackage rights, or potentially buying out the rail corridor, provides the state an opportunity to upgrade the Yuma West portion of the Wellton Branch for future MAG commuter rail service. Reestablishing passenger rail on the UP Sunset Route between Phoenix and Tucson could also herald improvements to the line and future intercity service between Phoenix and Tucson. Alternatively, Amtrak could also be used as an initial service provider of commuter or intercity rail service in the metropolitan areas. A more detailed discussion on enhancement of Amtrak intercity rail passenger services can be found in Section 5.4.

E. Comparative Commuter/Intercity Rail System

The concept of evolution of commuter rail to intercity rail is not new in the Southwest. The Rail Runner Express was initiated as a commuter rail system serving the metropolitan area of Albuquerque, New Mexico. Phase I of the project served local commuting between Belen and Bernalillo, passing through the City of Albuquerque. Phase II of the project extended the corridor north to Santa Fe with limited stations between the two cities. The portion of the corridor north of Albuquerque serves more of an intercity role. The entire corridor is approximately 100 miles long, similar to the distance between Phoenix and Tucson.

The Rail Runner Express is administered by the New Mexico Department of Transportation (NMDOT) and the Mid-Region Council of Governments (MRCOG) – the MPO for the Albuquerque metropolitan area. While the NMDOT owns the system, MRCOG is the lead agency for implementation and operation of the rail passenger service. The local governments are responsible for participating in determining station locations and designs; enhancing vehicle, pedestrian, and bicycle connections to the platforms; and ensuring that the rail system is well integrated into municipal planning, the local community, and the local economy.

5.5.3 Proposed Strategic Opportunity

MAG and PAG have realized that commuter rail could serve a critical function in addressing future travel needs in their regions. The fact that a commuter rail corridor to the southeast in the MAG region and to the north in the PAG region could provide the foundation for – or become a later service to – an intercity or high-speed Phoenix/Tucson rail route makes coordination between MAG, PAG, ADOT, and CAAG – the council of government in between – important.

Issues with constructing commuter rail in any corridor can include limited right-of-way options, at-grade crossing issues, potential capacity conflicts with freight operations, determining liability for shared right-of-way, dealing with station impacts such as increased traffic, capital needs, operating costs, and governance.

This proposed strategic opportunity consists of the following strategies:

A. Support and coordinate with MAG commuter rail recommendations
   - BNSF/Grand Avenue Corridor
   - UP/Yuma West Corridor
   - East Valley Corridor
   - Potential Extensions

B. Support and coordinate with PAG commuter rail recommendations
   - I-10 West
   - I-10 East
   - I-19 South

C. Coordinate MAG and PAG commuter rail planning with the pending ADOT Intercity Rail AA and EO/EIS study efforts

A. Support and Coordinate with MAG Commuter Rail Recommendations

At this time, MAG has not prioritized the commuter rail corridors under study. The three primary corridors are the BNSF/Grand Avenue corridor, the UP Main/Yuma West corridor, and an East Valley corridor (UP Main/Southeast, UP Main/Tempe, or UP Main/Chandler) (Figure 12). Selection of the East Valley corridor will depend on UP negotiations and the outcome of the FRA grant sponsored ADOT Intercity Rail AA and EO/EIS. Several other conceptual corridors have been discussed for future regional connections. Coordination between MAG, PAG, and ADOT (or another statewide or regional governing agency charged with coordinating rail development in Arizona) is essential in creating a comprehensive passenger rail system for the state.

BNSF/Grand Avenue Corridor

The study corridor for this segment is from downtown Phoenix to Wickenburg along the BNSF Peavine corridor, an approximate distance of 54 miles. Currently, this line serves freight traveling between downtown Phoenix and the BNSF Transcon in northern Arizona, as well as southern California traffic via a junction at the Arizona and California Railroad. Eight to ten freight trains a day travel on this corridor. This number could be reduced in the future, however, due to the potential relocation of the downtown Phoenix Mobest Yard to a site in the Surprise or Wickenburg area. By removing through freight from the Mobest Yard, track occupancy by freight trains could be reduced, thus opening capacity for potential commuter services.

Even with a yard relocation, potential conflicts with freight could still occur, as a limited number of trains will be required to travel to Phoenix to serve local customers based at Mobest Yard. One solution might be for a state rail organization or private short line to purchase the Peavine, upgrade the corridor, and manage operations and track usage for freight delivery and commuter traffic. This option has been discussed between ADOT, MAG, and BNSF in the past and is further elaborated in Section 6.1.

UP/Yuma West Corridor

The study corridor for this alignment is from downtown Phoenix to Buckeye along the active portion of the UP Wellton Branch, a distance of 31 miles. Currently, local freight service is limited along this line, amounting to one train per day. The branch could see increased freight traffic with the potential relocation of the downtown Phoenix Harrison Yard to Buckeye, at a location where the UP has recently purchased land near the Buckeye Airport.

A strategy to expedite commuter rail in this corridor is for a state rail organization to purchase the UP Wellton Branch, allowing control of local passenger rail. This option is further elaborated in Section 6.4.

East Valley Corridor

A southeast commuter rail corridor is being explored more generally as part of the MAG system study. Potential locations for this corridor are the UP Main/Chandler Branch, UP Main/Southeast Branch, and UP Main/Tempe Branch. All share common tracks from downtown Phoenix to downtown Tempe. The UP Main/Southeast was considered the preferred route for HSR service in the ADOT High Speed Rail Passenger Strategic Plan. The Southeast line sees eight to ten freight trains per day in this corridor. Numerous improvements would need to be made to share trackage with freight service, especially if this passenger route evolves to intercity service between Phoenix and Tucson.

Potential Extensions

Rapid growth in the outlying areas of Maricopa County and northern Pinal County has led to preliminary planning for future infrastructure to support these areas. The critical consideration of this effort was to identify these corridors so that rights-of-way can be preserved in advance of new development. While little funding is likely to be available in the near future to undertake further study of these corridors, coordination with MAG and other regional stakeholders should continue in the event that a funding source is identified.

Additionally, in 2010, ADOT is expected to begin an AA/EIS for a portion of the Hassayampa Freeway corridor, running from the junction of US 93 in Wickenburg to I-10 in Buckeye. As part of this corridor, MAG has proposed a new parallel freight/passenger rail route (e.g., in the median or alongside, to be determined in the AA/EIS). This new rail line could connect the BNSF/Grand Avenue and UP/Yuma West corridors, providing an additional line in the commuter rail system.

B. Support and Coordinate with PAG Commuter Rail Recommendations

Preliminary recommendations from PAG show the I-10 corridor heading northwest towards Phoenix as the priority corridor over I-10 to the east and I-19 to the south (Figure 13). This recommendation aligns with the potential Phoenix/Tucson ICR route, to be further studied in the pending ADOT ICR AA and EO/EIS. Coordination between PAG, MAG, and ADOT (or another statewide or regional agency charged with coordinating rail development in Arizona) is essential.

I-10 West

The study corridor for this alignment is from downtown Tucson to Tangerine Road along the I-10 corridor, a distance of 20 miles. Currently, I-10 is being widened to six lanes to accommodate additional vehicular traffic, as part of an interim widening, before complete reconstruction to a 10-lane cross-section with two-lane parallel frontage roads, expected to occur by 2030. Outside the Tucson metropolitan area, I-10 has an open median with potential to host a rail line. Although the median has been closed in the I-10 segment under study for commuter rail, it could be reopened when the ultimate I-10 footprint is constructed to accommodate passenger rail. Other parallel options within the ADOT right-of-way can also be explored, or alternatively, an entirely new corridor could be studied.

Right-of-way options parallel to I-10 are limited, however. The UP Sunset Route currently runs to the north of I-10. Negotiations with UP for shared right-of-way or track use could occur; however this route is the transcontinental line (Sunset Route) and therefore carries a great deal of freight traffic. The Sunset Route will accommodate even more freight traffic when UP finishes double-tracking across Arizona. UP has stated that it is not interested in more passenger service on its existing tracks. Therefore, additional intercity or commuter service in this corridor would likely require construction of new tracks, either within or outside the I-10 right-of-way.

I-10 East

The study corridor for this alignment is from downtown Tucson to Vail along the I-10 corridor, a distance of 15 miles. Development of this commuter rail is not expected for at least 20 years, so detailed planning has not been conducted. This corridor faces many of the same constraints as the I-10 West Corridor, although freeway vehicular traffic congestion is not as great as west of Tucson.

I-19 South

The study corridor for this alignment is from downtown Tucson to Sahuarita along the I-19 corridor, a distance of 13 miles. Development of this potential commuter rail corridor is also not expected for at least 20 years.

C. Coordinate MAG and PAG Commuter Rail Planning with the Pending ADOT Intercity Rail AA and EO/EIS Study Efforts

ADOT is expected to begin the Phoenix/Tucson ICR AA and EO/EIS in 2010. This study will identify and evaluate all potential alignment and technology options for an ICR corridor between Phoenix and Tucson, concluding with a single regionally preferred alignment. As this route may tie into both Phoenix and Tucson along proposed commuter rail corridors, coordination with both MPOs is necessary. MAG and PAG are key stakeholders and will remain so in any follow-up studies.

Relative to MAG commuter rail planning, the preferred East Valley commuter rail corridor in Maricopa County to be used for future passenger service could be determined in the ADOT AA and EO/EIS. If this corridor is not the East Valley corridor recommended by MAG, further coordination between the two agencies must occur. Using the same corridor could reduce cumulative physical costs and environmental impacts among the two systems; however, utilizing different corridors could provide additional passenger rail access to more parts of the metropolitan area. Future direction on this issue must be resolved before railroad negotiations occur.

The same coordination process ought to occur with PAG in the development of its commuter system, of which one leg could provide the southern ICR connection to Tucson. While this leg is likely to be in the same corridor as the intercity segment, commuter rail service may not be initiated until after ICR between Phoenix and Tucson is operational. Regardless of whether commuter or ICR is constructed first, coordinated system development should occur upfront. While both commuter and intercity rail can share the same physical equipment such as tracks, from an operations perspective coordinated signaling, dispatching, and crossings create better synergy and efficiency in running parallel systems. Additionally, it would not be sensible from an economic standpoint to duplicate railroad improvement financial investments.

5.5.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- Arizona State Parks
- MAG
- CAAG
- PAG
- Maricopa County
- Pinal County
- Pima County
- GRIC
- Municipal, county, tribal, and regional governments, as impacted
- Greater Phoenix Economic Council
- Tucson Regional Economic Opportunities, Inc.
- Phoenix Sky Harbor International Airport
- Phoenix-Mesa Gateway Airport
- Tucson Airport Authority

B. Interstate Context

- UP Railroad
- BNSF Railway
- FHWA
- FRA
- FTA
- BLM

5.5.5 Risks of Pursuing Strategic Opportunity

Risks of not coordinating with MAG and PAG commuter rail planning include the potential for duplication of effort, raising costs and delaying implementation unnecessarily. If an unified plan for an evolutionary commuter to intercity (or intercity to commuter) rail system is not put in place early on, the lack of coordination runs the risk of different preferred rail alignments or inconsistent operation systems – negating the opportunity for an integrated regional system.

5.5.6 Estimated Costs

The only cost of this strategic opportunity for ADOT is staff cost. ADOT currently has four staff assigned to rail issues: three in the Multimodal Planning Division (ADOT-MPD), and one in the Intermodal Transportation Division (ADOT-ITD). They are in the process of hiring one additional ADOT-MPD staff member as well. These positions are:

- **Assistant Director for State Rail Services (ADOT-MPD):** Intergovernmental coordination with cities, towns, counties, COGs/MPOs, and tribal governments regarding rail planning and program development of ADOT projects; ADOT liaison to FRA and FTA regarding federal coordination of state rail funding, systems, corridor planning and program development; ADOT liaison with U.S. border states and Sonora, Mexico, as well as special interest groups (e.g., Western High-Speed Rail Alliance) on rail planning, funding, and program development; and coordination with other state agencies (e.g., ACC, Departments of Commerce, Environmental Quality, Water Resources, Game and Fish, State Land) on rail-related issues and opportunities, planning, and program development.

- **Director of Community and Grant Services (ADOT-MPD):** Administration of the state railroad grant process; oversight of technical aspects of passenger rail corridor planning.

- **Rail Planner (ADOT-MPD):** Technical development of ADOT rail program; project manager of Phoenix/Tucson AA and EO/EIS.

- **State Railroad Liaison (ADOT-ITD):** Management of the Section 130 program including meetings and coordination, environmental clearance/agreements administration, and closeout inspections; oversight of the state grade crossing inventory and coordination with FRA; liaison between ADOT project managers and railroad companies in support of the ADOT Construction Program; and coordination of railroads with other government agencies.

A new rail division of ADOT is anticipated. With a full rail planning group, coordination efforts with MAG and PAG could occupy a full-time rail planner.

5.5.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail

Commuter rail could be the first element in a unified passenger rail vision for Arizona. The MAG and PAG commuter rail systems may provide the foundation for rail negotiations and system development. Interstate coordination of future HSR through the Phoenix and Tucson metropolitan areas should be coordinated with rail planning in both MPOs.

Phoenix/Tucson intercity rail

Coordination with MAG and PAG commuter rail planning is directly related to future intercity rail as either intercity or commuter rail will provide the first step in the evolution of a passenger rail system within and between the Phoenix and Tucson metropolitan areas.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor

As intercity rail is planned to connect Phoenix with Tucson, eventual extensions north of Phoenix to Prescott or Flagstaff, and south of Tucson to Nogales or Sierra Vista may be warranted by future growth. Coordination with MAG and PAG is necessary to determine the appropriate linkages.

Enhancement of intercity rail passenger service

Reestablishing Amtrak service to Phoenix will bring a travel option that the Phoenix metropolitan area has not seen for over ten years. For those staying in Phoenix, interconnections between the Amtrak station and Phoenix commuter rail will make travel connections simpler.

More reliable Amtrak service through Tucson could bring larger ridership numbers. For those staying in Tucson or traveling north to Phoenix, interconnections between the Amtrak station and Tucson commuter rail will also make travel connections simpler.

BNSF Phoenix metropolitan area system development and operations

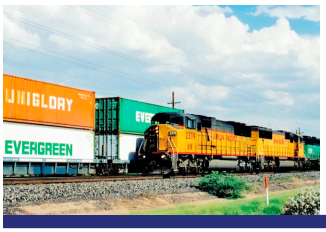
The BNSF Peavine line is the railroad's only link from the Traanscon in northern Arizona to the Phoenix metropolitan area. (A more direct route from southern California is available via the Arizona & California Railroad.) Future improvements, changes in freight traffic, or a potential change in ownership may directly affect development of a commuter rail system in the MAG region. This corridor also provides a logical route for an ICR extension north to the Prescott area.

UP Tucson metropolitan area system development and operations

The UP Sunset Route and Nogales Subdivision could provide the foundation for commuter rail in the Tucson metropolitan area, as well as an ICR connection between Phoenix and Tucson. Future improvements, changes in freight traffic, or a potential change in ownership may directly affect passenger rail development in the PAG region.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley

While a new rail corridor in the Hassayampa Valley is first envisioned to be freight rail – connecting the two Class I railroads – as population growth continues in western Maricopa County, this corridor could also accommodate passenger rail. Preliminary population forecasts project approximately 2.8 million people in the Hassayampa Valley, and approximately 2.5 million people in the Hidden Valley at buildout. In the Hassayampa Valley, this corridor could connect the already proposed BNSF/Grand Avenue and UP/Yuma West MAG commuter rail corridors, which will become important to a population with limited high-capacity roadway options due to the location of the White Tank Mountains. Extending south into the Hidden Valley, this corridor could extend from the UP/Yuma West corridor to Gila Bend, connecting with the UP Sunset Route (see Section 6.7 for more details). In all of these situations, passenger service in the Hassayampa Valley is dependent upon commuter rail connections into central Phoenix.



6.0 Freight Rail Strategic Opportunities

Freight service in Arizona is currently provided by two Class I railroads, namely UP and BNSF, and a few short line railroads throughout the state. The current level of investment by all freight railroads, including Class I and short lines, is somewhat constrained at the time of writing (2009) by the economic recession. Such levels of investments can be improved if the right opportunities are clearly defined and identified. Based on input from the railroads and other stakeholders, the following freight rail strategic opportunities have been developed:

- BNSF Phoenix Metropolitan Area system development and operations
- BNSF statewide system development and operations
- UP Tucson Metropolitan Area system development and operations
- UP statewide system development and operations
- Development/expansion of Mexican deep-water ports
- Development/expansion of inland ports
- Development of new rail freight/passenger rail corridor in the Greater Hassayampa Valley
- Development/expansion of short line railroads

6.1 BNSF Phoenix Metropolitan Area System Development and Operations

6.1.1 Introduction

Arizona could benefit from partnering with BNSF to establish the BNSF Peavine line as a major artery in a comprehensive statewide rail system, to alleviate roadway congestion and utilize this strategically located rail corridor to its highest and best use.

This strategic opportunity provides Arizona the following:

- Allows for establishment of an integrated transportation system within the northern portion of the Sun Corridor.
- Fosters focused economic opportunities along the railroad around freight-related facilities (e.g., classification yards).
- Allows for commuter rail along the BNSF/Grand Avenue corridor (between Phoenix and Wickenburg) corridor, establishing station locations as key economic activity centers.
- Provides the foundation for future intercity rail to the northern portion of the Sun Corridor, and potentially for high-speed rail to California and Nevada.
- Achieves highest and best use of rail infrastructure and adjacent railroad and private properties.
- Relieves local railroad congestion and improves vehicular safety.

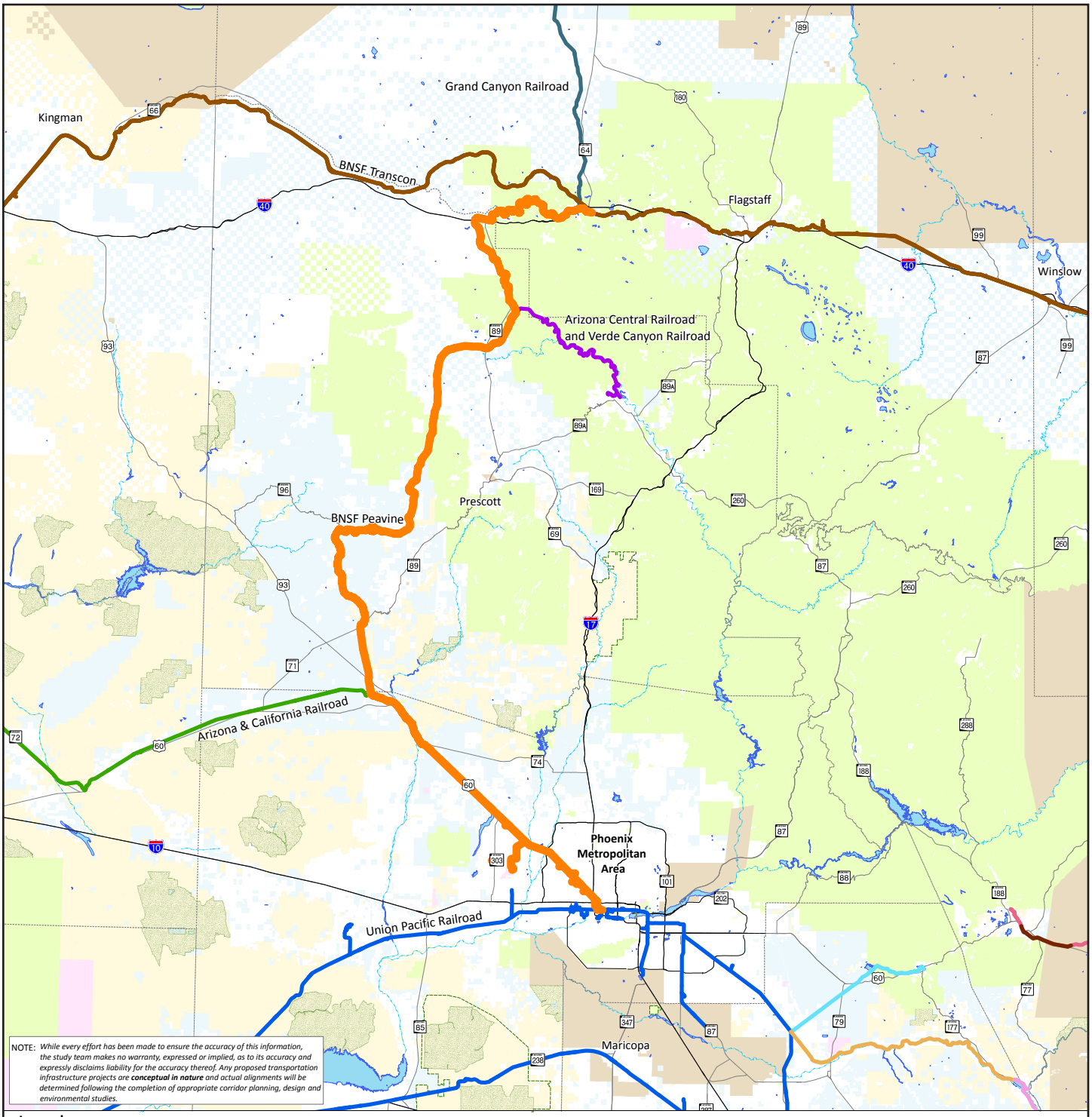
6.1.2 Background

The BNSF Railway provides rail freight service to metropolitan Phoenix using its Phoenix Subdivision (Figure 15), which operates less than ten trains a day. The BNSF's major route through Arizona, the "Transcon," runs east to west through the northern portion of the state, parallel to I-40 for much of the way. The Transcon passes through Topock, Kingman, Peach Springs, Williams, Flagstaff, Winslow, and Holbrook. The Phoenix Subdivision (Peavine) connects with the heavily traveled Transcon just east of Williams, Arizona (known as Williams Junction) and generally runs in a southerly direction for approximately 209 miles to the Mobest Yard, just west of downtown Phoenix and the Arizona State Capitol. In addition to interchanging with the UP in Phoenix, the Peavine connects with three of Arizona's short line railroads, the Arizona & California Railroad near Wickenburg, the Arizona Central in Drake, and the Grand Canyon Railway at Williams.

In the very recent past, representatives of BNSF approached ADOT representatives to explore whether ADOT had an interest in acquiring the Peavine. One could assume that this was the earliest communications to determine the possibility of completing an arrangement with the State of Arizona that would parallel the arrangement between BNSF and the State of New Mexico that led directly to the creation of the Rail Runner Express commuter/intercity rail service between Santa Fe, Albuquerque, and Belen.

The discussion of implementing this concept explores the elements of institutional cooperation and financial support. Interface with BNSF, as well as connecting short

Figure 15 BNSF's Phoenix Subdivision or Peavine Corridor



line railroads, is key for several potential passenger line alternatives. Accordingly, the first and foremost issue in developing this concept is establishment of an effective working relationship with the existing railroad companies.

6.1.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following related strategies:

A. Work to gain access to the Peavine Corridor
B. Relocate BNSF classification activities out of the center of the Phoenix metropolitan area
C. Construct safety improvements along the Peavine Corridor
D. Pursue commuter rail on the southern portion of the Peavine Corridor
E. Pursue intercity and/or high-speed rail along the entire Peavine Corridor to northern Arizona

A. Work to Gain Access to the Peavine Corridor

The Peavine corridor could provide a crucial link in a future statewide passenger rail system. Not only could it provide a leg of the proposed MAG commuter rail system, but it could also be used to develop a northward extension of intercity rail outside the central Sun Corridor Megapolitan region. To make such a passenger rail system successful, access to, or potentially control of, the Peavine corridor is critical.

Ownership of this line by the state (or other suitable public entity) would bring several advantages:

- As owner of the line, the state would control the switching schedule, allowing the state to schedule freight trains during late night hours to allow passenger trains exclusive or priority use of the tracks throughout the day. If freight volumes are too high to be so limited, additional sidings or double-track could be constructed to allow freight and commuter rail to operate simultaneously.
- Since the rail line is adjacent to ADOT right-of-way for Grand Avenue, as the owner of both, the State of Arizona could "mix and match" the rights-of-way to its best advantage. If expansion of Grand Avenue is needed beyond the current ADOT right-of-way, for example, an expansion could be built using some of the former BNSF right-of-way.
- The state would be free to construct grade separations along the corridor as it deems necessary.
- Ownership of the railroad corridor and the Mobest Yard would allow the state and its municipal partners to benefit from any economic redevelopment or revitalization opportunities.

New Mexico was presented with a similar opportunity before implementing the state's Rail Runner Express passenger service. In this situation, New Mexico negotiated with BNSF to outright purchase track. Pursuant to its New Mexico contract, BNSF has continued to provide freight service on that line. While the BNSF has historically been receptive to the concept of a sale in Arizona, further negotiations would be necessary to understand the railroad's continuing needs on the line.

If discussion with the BNSF occurs, the Ennis Subdivision could also be part of Arizona's negotiation of the Peavine line. It may be strategic for commuter rail in the area, as well as industrial development. Luke Air Force base is located along this subdivision but is not currently served. If the military base remains open, it may be possible to restore service for military equipment. If the base is closed, it could become a commercial airport or be converted for other commercial or industrial development uses. In either case, it would be advisable to maximize the potential of the rail line.

Additionally, BNSF, together with other industrial partners, has plans of developing a transloading facility for building materials on the Ennis Subdivision. With the current state of the economy, there is no progress on this plan. However, as the economy and construction in central Arizona recovers, the need will increase and construction of a wye at the interchange of the Ennis Subdivision and Peavine line would result in the least impact on the Grand Avenue corridor. Currently, the Ennis Subdivision is accessed from the south, though most of the incoming traffic originates from the north. Accordingly, trains must pass Ennis, travel to Mobest Yard and come back north to enter the Ennis Subdivision. The BNSF has been discouraged from constructing a wye from the north in order to avoid additional at-grade crossings. While traffic volume is low, the situation can be alleviated with an additional siding to the south of the interchange. Should traffic volume increase, however, as it could if an industrial park or other development is built, a grade-separated wye interchange may be needed.

B. Relocate BNSF Classification Activities out of the Center of the Phoenix Metropolitan Area

Along the Peavine, a new classification yard near the junction of the Arizona and California Railroad near Wickenburg could present an opportunity to minimize out of direction railcar movements and improve safety.

Current train operations include numerous conflicts with at-grade crossings on heavily travelled roadways. The Peavine handled about 41,000 carloads in 2007, with the vast majority terminating in the Phoenix metropolitan area rather than interchanging with the UP at the junction of the two railroads in central Phoenix. Mobest Yard, the major switching yard located at the south end of the Peavine, handles many cars more than once. Loaded cars on the Peavine travel about 52 miles south of Wickenburg to be switched at Mobest, then are taken back north by a local train to be spotted at various industries located on sidings connected to the Peavine corridor. Empties are picked up by the local, taken back to Mobest for switching, and then travel north to Wickenburg and beyond.

As an example, a railcar destined for an industry in Wickenburg travels over 200 miles along the Peavine that could be avoided if the switching yard were located out of the central Phoenix area. To get to Mobest Yard, that railcar passes more than 160 grade crossings (over 40 public grade crossings exist between Wickenburg and Mobest Yard, and each crossing is traversed four times). Relocating the yard would reduce the number of potential conflicts at public grade crossings if switching were performed near Wickenburg. Similarly, car cycles for autoracks destined for the auto transload facility in El Mirage could be shortened by 68 miles and the number of grade crossing traversals reduced.

In addition to a site near Wickenburg, the BNSF has already acquired land in the planning area of Surprise for a potential new classification yard. However, a site 30 to 40 miles farther northwest of the Phoenix metropolitan area and closer to the interchange with the Arizona and California Railroad may be more practical in addressing long-term needs in providing an integrated rail system (Figure 16).

Current forecasts indicate that Arizona's population and employment centers will continue to grow northwest of Phoenix. Accordingly, it is reasonable to assume that more rail-served industries will be located along this line in the future. If railcars can be switched in the vicinity of the Arizona and California Railroad interchange, then out-of-route miles can be avoided for cars destined north of the interchange. Furthermore, relocation of the yard farther out of the metropolitan area helps to minimize the transport of hazardous materials into populous areas. For BNSF, relocation of the yard would increase the efficiency of freight traffic and free up rail capacity. Such efficiencies could promote growth with current industries and may attract new industries along the Peavine line. The increased capacity could also allow rail passenger service (commuter, intercity and, potentially, future high-speed) along the line into central Phoenix.

Relocating BNSF's switching activities, discussed above, would also allow for the reuse of Mobest Yard. Mobest Yard could be an ideal site for development of a multimodal transportation hub, with potential connections between the other passenger rail modes (e.g., light rail, commuter rail, ICR), as well as redevelopment opportunities for transit-oriented development.

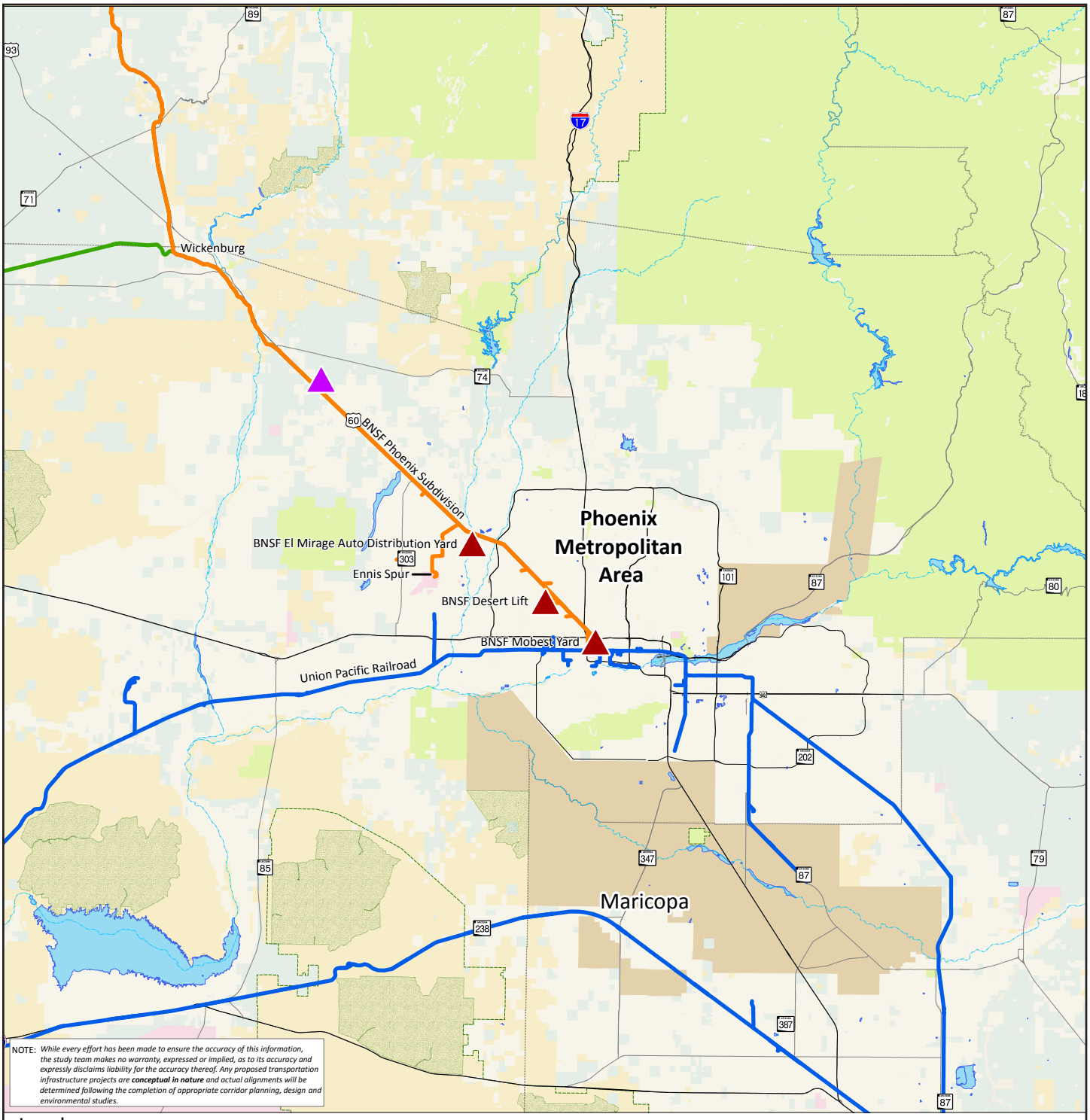
C. Construct Safety Improvements on the Peavine Corridor

ADOT currently uses an "exposure index number" to prioritize railroad grade crossings for allocation of Section 130 funds for grade crossing improvements. In addition, ADOT should periodically review the incident history of all of its at-grade railroad crossings. Doing so can uncover particular crossings in need of safety improvements that would not be expected merely based on the volume of train and vehicle traffic. Arizona has 1,058 public at-grade railroad crossings and there have been 453 reported incidents at these crossings between 1992 and 2008. The area with the worst accident history, incurring 194, or 43 percent, of these grade crossing incidents is along the BNSF Peavine line approaching Phoenix. (Further details of grade crossings can be found in Section 3.3, Grade Crossing Analysis, of *Technical Report #1, Summary of Key Issues and Background Data*.) In addition to exposure indices and incident history, other issues which should be considered when prioritizing safety improvements include vehicular traffic delay, particularly for emergency vehicles, and access to emergency services, such as hospitals, fire stations, etc.

Most streets in Phoenix run north-south and east-west, forming a standard grid, except for Grand Avenue (US 60), which runs diagonally northwest to southeast with the BNSF parallel to it. This creates a series of complicated six-way street intersections accompanied by railroad at-grade crossings that are the location of many accidents. For example, the 35th Avenue at-grade crossing alone has had 56 train-vehicle incidents in the past 17 years.

Where an entire corridor is experiencing safety issues, a corridor-wide solution may be called for, rather than addressing each grade crossing separately. As discussed earlier, establishing a new classification yard as an alternative to Mobest Yard would, in itself, constitute a huge safety improvement along the Peavine line since it would greatly reduce conflicts between railcars and vehicles, perhaps eliminating the need for grade separations. This would

Figure 16 Existing and Potential Rail Yards on the BNSF Phoenix Subdivision



Legend

U.S. Railroads
- Arizona & California Railroad
- Union Pacific Railroad
- BNSF Phoenix Subdivision

Railroad Facilities Along Peavine Corridor
- Existing Railroad Yard
- Proposed New Surprise Yard (Consolidate BNSF Yards)

- River
- Water Body

Major Roads
- Interstate/Freeway
- State Highway

Land Ownership
- Bureau of Land Management
- State Trust Land
- National/State/Local Park, USFS, USFWS
- Military
- Tribal Lands
- Private
- National Monument
- Wilderness Area

0 2 4 8 Miles

NORTH

not only minimize the opportunities for grade crossing incidents, but also eliminate much of the vehicular traffic delay currently experienced and the resulting emissions from idling vehicles. If this relocation does occur, ADOT and MAG should continue to monitor the condition and accident history of the BNSF grade crossings to prioritize and construct additionally desired safety improvements as funding allows, such as signals, gates, flashers, grade separations, or flyovers.

Where Grand Avenue has been raised above or lowered under intersections, such as at 43rd Avenue and Camelback Road, as illustrated in Figure 17, the parallel railroad tracks could also be elevated, if needed.

Figure 17 At-Grade Crossing, 43rd Avenue and Camelback Road

The intersection of Bell Road and Grand Avenue is one example of recent development leading to increased vehicular traffic without adequate improvements to major intersections or railroad grade crossings. Traffic backs up for miles on Bell Road with signal operations at the junction of Grand Avenue. The situation is exacerbated when a train is passing. The City of Surprise recently counted 70,000 vehicles per day on Bell Road in this area. With ten BNSF trains daily, coupled with the volume of vehicular traffic, Bell Road's exposure index (number of trains per day times daily vehicle count) may well be 700,000. By comparison, an index of 100,000 often warrants review.

ADOT has prioritized interchange improvements at Bell Road and Grand Avenue based on its Grand Avenue Feasibility Study, although it is unclear exactly what improvement will occur. Both a diamond interchange and overpasses have been suggested as possibilities in the 2011-2015 Regional Transportation Plan. City of Surprise staff advocated separation of the railroad from Bell Road at a July 2008 meeting of the Surprise Transportation Commission. ADOT may consider elevating both Grand Avenue and the BNSF tracks over Bell Road to open up this major thoroughfare. This grade separation, if extended far enough, could also eliminate the at-grade crossing at Dysart Road, less than one mile away, constituting a flyover – raising the railroad over a series of city streets, coupled with closing of other grade crossings, improving safety and street traffic flow. As illustrated in Figure 18, the BNSF has successfully installed a flyover in Olathe, Kansas, to alleviate train-vehicle conflicts in this Kansas City suburb, at a cost of roughly $15 million per mile, paid for by the City of Olathe and the Kansas Department of Transportation.

D. Pursue Commuter Rail on the Southern Portion of the Peavine Corridor

Within the Phoenix metropolitan area, the Peavine runs from downtown Phoenix northwest directly through densely populated areas of Glendale, Peoria, El Mirage, Youngtown, the Sun Cities, and Surprise, and lies in the path of Arizona's forecast Sun Corridor population growth. Its location is ideal for commuter rail service between these municipalities into central Phoenix and MAG is currently undertaking detailed planning to examine the feasibility of developing a commuter rail system. The current and forecast population shows a larger commuter base than that of either the FrontRunner (in Utah) or Rail Runner Express (in New Mexico), suggesting potentially higher ridership than either of these existing systems. Pursuit of commuter rail on the Peavine line could provide a foundation for a future intercity rail extension to the north of Phoenix.

In order to pursue commuter rail on the Peavine line, the state or other public entity would either need to gain control of the line or, at least negotiate a shared use agreement with the BNSF (or a short line that purchased the line from

Figure 18 BNSF Flyover in Olathe, Kansas

BNSF). Track and signals would have to be upgraded to allow passenger rail. The introduction of passenger rail would also necessitate additional sidings along the line.

E. Pursue Intercity and/or High-Speed Rail along the Entire Peavine Corridor to Northern Arizona

In the more distant future, the Peavine line could be used as an intercity and/or high-speed passenger corridor. The Sun Corridor Megapolitan area is projected to extend as far north as Prescott or Flagstaff. Accordingly, intercity passenger service between Phoenix and the Prescott area is likely to be in high demand over the next few decades.

As discussed in Section 5.2, ICR service could be a normal outgrowth of successful commuter rail service along this corridor, utilizing similar locomotives and rolling stock, as well as the same track and related infrastructure. The Peavine line might also be studied in the future to determine if portions of it could be utilized for HSR corridor development to California or Nevada.

6.1.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- MAG
- Northern Arizona Council of Governments (NACOG)
- Phoenix, Glendale, Peoria, Youngtown, El Mirage, Surprise, Wickenburg and Maricopa County
- METRO and Valley Metro

B. Interstate Context

- FRA
- FHWA
- FTA
- BNSF Railway
- UP Railroad
- Arizona and California Railroad
- Passenger rail coalitions

6.1.5 Risks of Pursuing Strategic Opportunity

A risk of Arizona purchasing the Peavine line and pursuing passenger rail on it is the increased exposure to liability issues. The state can attempt to limit this exposure by placing commuter rail and intercity rail systems under a different governing agency, rather than directly under ADOT. Alternatively, the state might negotiate a PPP wherein a private operator assumes some of the liability. Another risk is that after the investment is made, Arizona residents refuse to change their mode of transportation and the passenger systems are under-utilized, resulting in the system operating at a deficit. A strong informational and marketing campaign, coupled with other incentives for using the system can help mitigate this risk.

If a purchase agreement cannot be negotiated with BNSF, Arizona could pursue the Peavine line concept with a short line railroad purchasing and operating the line, with BNSF retaining ownership and continuing to operate it itself, or under contract to a short line railroad. With any of these alternatives, however, especially with BNSF retaining ownership, the state runs the risk that the rail owner would not fully cooperate with its transportation plans, or would demand a higher fee for using the corridor or track than the state may be willing to pay.

If Arizona does nothing with the BNSF and the Peavine line, it is unlikely that MAG will achieve its goals for a commuter rail corridor parallel to Grand Avenue. At-grade crossing accidents along this corridor, already the highest in the state, could be expected to increase. Further, the risk of hazardous commodity spills in Mobest Yard or along the corridor in densely populated urban areas would continue.

6.1.6 Estimated Costs

The costs to implement the Peavine line concept have been estimated in 2009 dollars. Because of the scope of the concept and its early stage of development, most estimates are shown in $5 million increments. For individual line elements that are estimated to be less than $5 million, the cost is shown rounded to the nearest $1 million. The costs have been arranged to coincide with the action steps previously described.

A. Step 1 – Gaining Control of the Peavine and Relocating Mobest Yard

This step involves the purchase of the Peavine line (or of the right to use it) from BNSF, as well as incurring costs to relocate Mobest Yard. The cost of the line purchase, based on New Mexico's purchase of a BNSF branch, plus the yard relocation, based on industry averages, is estimated to range between $125 and $150 million. An optional relocation of the Desert Lift facility (Glendale intermodal yard) could also occur at a cost of approximately $35 million. This relocation is considered optional because it would be desirable, although not imperative, for operation of commuter rail service.

B. Step 2 – Preparing for Commuter Rail (Phoenix to Wickenburg)

This step involves bringing the physical elements of a portion of the Peavine line to conditions suitable for operating commuter trains. These tasks include the following:

CTC/PTC signaling	$20 million
Sidings (Ennis)	$5 million
Track improvements	$2 million
Subtotal	$27 million

Other costs will be incurred with commuter rail startup (whether by a new governing entity or state rail organization), for rolling stock, stations and maintenance/storage facilities, as well as operating and maintenance costs for personnel and equipment. These costs are dependent upon the vehicle choice and service provided. The net operating cost also depends on ridership and service design. Consequently, these costs will need further evaluation to be determined, so they are not included.

C. Step 3 – Further Expansion

The remainder of the Peavine line to Williams Junction, is mandated to have signal control by 2015 as it qualifies as a "Class I mainline" that carries hazardous materials. This cost is estimated at $50 million, to be borne by BNSF if it retains ownership. If owned by a short line railroad or the state, however, this requirement may possibly be delayed until 2018 or until passenger service is implemented on the line.

If ICR, in addition to commuter rail, is pursued on the Peavine corridor, double-tracking from Phoenix to Wickenburg may be necessary at an estimated cost of $125 million. Additional track upgrades beyond Wickenburg, passenger rail stations, and rolling stock would also be required. These costs have not been estimated since they are dependent upon the intercity passenger rail system selected, equipment type and quantity, etc.

6.1.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail
The Peavine line may serve as a link for high-speed rail options between Phoenix and Los Angeles via the Arizona and California Railroad and I-10, and between Phoenix and Las Vegas via US 93 or the proposed I-11.

Phoenix/Tucson intercity rail
Intercity rail between Phoenix and Tucson is assumed to precede any expansion of intercity service to the north along the Peavine line. Commuter service, however, may precede Phoenix-Tucson intercity passenger rail.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor
The Peavine line could be used for ICR between Phoenix, Prescott, Chino Valley, the Grand Canyon, and eventually Flagstaff.

Incorporation of MAG and PAG commuter rail planning
As the Peavine is a recommended corridor for commuter rail in the Phoenix metropolitan area, coordination with MAG planning is imperative.

BNSF statewide system development and operations
The Peavine line extends beyond the Phoenix metropolitan area. Some of the possibilities for ICR, such as service to the

Grand Canyon, may entail allowing short lines to operate on it.

Development/expansion of inland ports
A good site for an inland port may be near a new BNSF switching yard located away from the Phoenix metropolitan area, particularly if a Hassayampa rail corridor is built as a north-south CANAMEX alignment, providing rail linkages to existing or future Mexican deep-water ports.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley
The proposed Hassayampa rail corridor would connect the UP to the BNSF along the Peavine line.

Development/expansion of short line railroads
If the state or other public entity purchased the Peavine line, it could be operated by a short line or the BNSF could outsource operations along the corridor to a short line railroad.

6.2 BNSF Statewide System Development and Operations

6.2.1 Introduction

Arizona could benefit from partnering with BNSF to maintain the BNSF Transcon across Arizona as a major artery in the statewide rail system, alleviating congestion on the rails and highways.

This strategic opportunity provides Arizona the following:

- Fosters focused economic opportunities along the railroad around freight-related facilities.
- Achieves highest and best use of rail infrastructure and related properties.
- Relieves railroad congestion in communities and improves vehicular safety.
- Captures a larger portion of the domestic freight market on rail.
- Preserves right-of-way for future bypasses, once appropriate studies have established the need and preferred alignment.
- Helps strengthen short line railroad development.

6.2.2 Background

A. BNSF Transcon

The BNSF Railway operates east-west across northern Arizona on its transcontinental route, the Transcon, which runs between the Los Angeles basin, and Chicago. Its operations provide long-haul intermodal and carload service, most of which travels through Arizona between California and destinations to the east. BNSF's Transcon interchanges with the Apache Railway at Holbrook, and the Camp Navajo Railroad (not a common carrier) west of Flagstaff. The two BNSF branches off the Transcon in Arizona are the Phoenix and the Coronado/Springerville Subdivisions.

Double-tracking of the BNSF Transcon is complete in Arizona, while still in progress in other areas across the country. Handling 120 trains per day at its peak in 2008 however, the Transcon in Arizona is near its capacity. BNSF has begun triple-tracking through New Mexico and, when traffic levels recover, will pursue triple-tracking through Arizona. Now is the time for the State of Arizona to coordinate with BNSF to complete advance planning for an expansion of the Transcon.

6.2.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following strategies:

A. Facilitate BNSF Transcon capacity improvements
B. Implement safety improvements along the BNSF Transcon
C. Determine infrastructure solutions for heavy freight traffic through local communities along the BNSF Transcon
D. Facilitate coordination with environmental interests to mitigate habitat fragmentation and enable wildlife migration

A. Facilitate BNSF Transcon Capacity Improvements

BNSF's eventual triple-tracking of the Transcon will increase its capacity and improve its efficiency. Recognizing that private investments in freight transportation infrastructure benefits not only the private companies themselves but the public at large, an American Association of State Highway and Transportation Officials (AASHTO) recommends that governments "encourage maximum private investment." The economic reality of rail capacity expansions is that the state can reap benefits from investments of others. Accordingly, ADOT may want to consider establishing a policy that requires any improvements to local, regional or state roadways to accommodate the eventual triple-tracking of BNSF's Transcon. By accommodating BNSF's future plans, Arizona can encourage freight traffic to move in a more environmentally-friendly and resource-sensitive method, as well as improve roadway capacity issues.

B. Implement Safety Improvements along the BNSF Transcon

ADOT currently uses an "exposure index number" to prioritize railroad grade crossings for allocation of Section 130 funds for grade crossing improvements. In addition, ADOT should periodically review the incident history of all of its at-grade railroad crossings. Doing so can uncover particular crossings in need of safety improvements that would not be expected merely based on the volume of train and vehicle traffic. For example, there are a few BNSF crossings on the Transcon that have experienced repeated incidents, discussed below. Other issues which should be considered when prioritizing safety improvements include vehicular traffic delay, particularly for emergency vehicles, and access to emergency services, such as hospitals, fire stations, etc.

Based upon grade crossing incident history, safety improvements are needed along the rail corridor in Flagstaff. In Flagstaff, San Francisco Street and Enterprise Road have been the sites of nine and eleven grade crossing crashes, respectively, since 1991. Both crossings have crossbucks, gates, and flashers. Both San Francisco Street and Enterprise Road have major intersections with Santa Fe Avenue approximately 65 feet north of their BNSF crossings. Northbound traffic stopped at the traffic signals at these intersections often extends over the railroad tracks, despite the "Do Not Stop on Tracks" signs. Drivers stopped on the tracks have nowhere to go when a train approaches (see Figure 19). At these and other grade crossings traffic queuing at signals should be stopped behind the BNSF tracks. Traffic signals should be timed to flush traffic before a train approaches the crossings. These relatively minor changes should reduce train-vehicle collisions.

Pedestrian traffic crossing the tracks in Flagstaff is high, posing a safety risk. Five of the nine crossing incidents at San Francisco Street have involved pedestrians, resulting in two fatalities. Grade separations would help, but a better long-term solution may be a BNSF Transcon bypass around town, as discussed below.

The only other main BNSF crossing on the Transcon with repeated safety incidents in recent years is the Navajo Boulevard crossing in Holbrook. The crossing is already equipped with gates and flashers, so a grade separation may be warranted there.

C. Determine Infrastructure Solutions for Heavy Freight Traffic through Local Communities along the BNSF Transcon

Flagstaff, Winslow, Holbrook, and Kingman have long been frustrated with the volume of BNSF freight traffic through their communities and have suggested railroad mainline bypasses. Traffic volumes will increase as BNSF triple-tracks the Transcon through Arizona. Bypasses, costing about $15 million per mile including right-of-way, are expensive. Accordingly, other options, such as grade separations or flyovers, should be considered.

The most difficult and costly area for BNSF to triple-track in Arizona will be through the City of Flagstaff because the Transcon travels through the center of the city with rather tight curves. For this reason, BNSF may find that building a bypass around Flagstaff is more economical than adding a third track to its existing mainline. Constructing the bypass in the right-of-way of I-40 could offer a potential cost savings. This detour from the existing mainline would be for approximately 12 miles, from near North A-1 Mountain Road to near North El Paso Flagstaff Road, as illustrated in Figure 20. Such a bypass route would be comparable in length to the route through the city, so should be no more costly to operate. With fewer curves on the bypass route, trains may be able to operate at higher speeds. ADOT is currently initiating a DCR to examine opportunities to increase capacity

Figure 19 Traffic Stopped on Tracks in Flagstaff on San Francisco Street

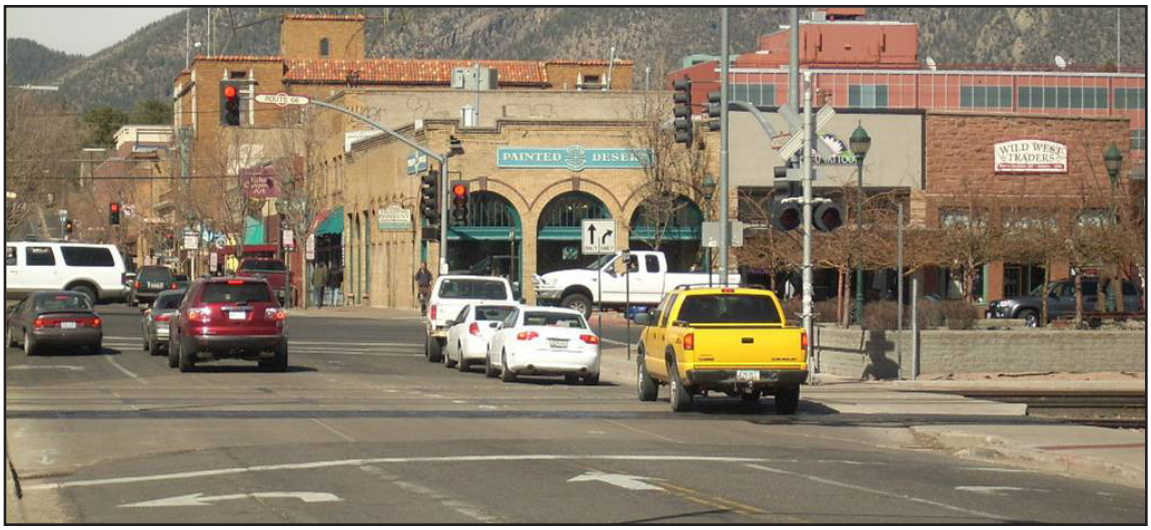
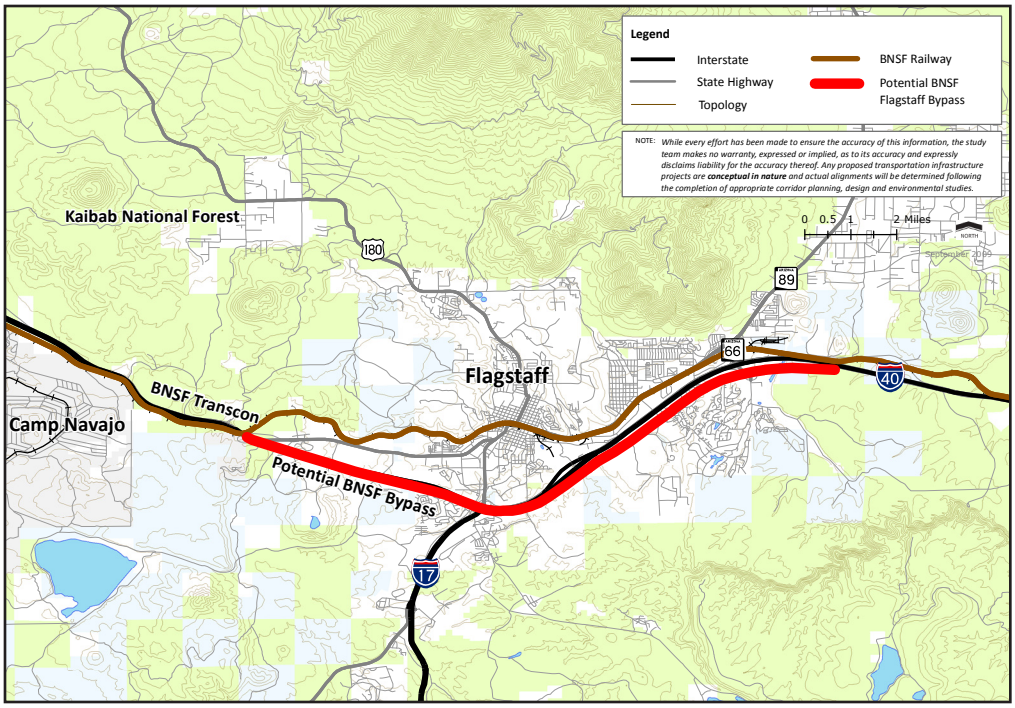


Figure 20 Potential BNSF Flagstaff Bypass



on I-40 through the Flagstaff urbanized area. The scope of this DCR should also include examining the feasibility of accommodating a relocated BNSF Transcon within the I-40 right-of-way in the future and should solicit BNSF's participation in this planning and preliminary design effort. While this effort proposes moving BNSF freight operations around Flagstaff, Amtrak service through the community should be maintained.

According to 2050 projections, Winslow and Holbrook are projected to grow, but much less than the Sun Corridor. Triple-tracking the Transcon through Winslow and Holbrook should be much easier than in Flagstaff, as urban development is concentrated north of the rail line, with the areas to the south relatively open or undeveloped. BNSF tracks are relatively straight through these cities, as well.

In communities like Winslow and Holbrook, a less costly alternative to a bypass may be a flyover and quiet zones. A flyover entails raising the railroad over a series of city streets, coupled with closing of other grade crossings. It would improve safety and street traffic flow. The BNSF has installed a flyover in Olathe, Kansas, to alleviate train-vehicle conflicts in this Kansas City suburb (Figure 18 in Section 6.1). In lieu of a flyover, improvements such as grade separations could be built at selected grade crossings in communities along the Transcon.

The FRA oversees the implementation of quiet zones which entail implementation of a combination of safety measures such as crossing closures, raised medians, four quad-gates, lights, and wayside horns. The goal of these safety measures is to eliminate the possibility of drivers driving around gates when a train is approaching, improving safety. Security fencing between crossings can eliminate the risk of pedestrian accidents by forcing people to cross the tracks at designated street crossings. The combination of all safety improvements lessen the need for train whistles, enhancing the quality of life for people in the surrounding community.

In Kingman, there is development both north and south of the BNSF tracks. Between Kingman Airport and Louise Avenue, all railroad crossings are already grade separated. There are several at-grade crossings including and west of Louise Avenue, but only three incidents have been reported at them between 1992 and 2008. The Transcon does make a sweeping curve southeast of the intersection of Highway 66 and East Andy Devine Avenue. If desired, the City of Kingman may want to study the feasibility of bypass around this area.

D. Facilitate Coordination with Environmental Interests to Mitigate Habitat Fragmentation and Enable Wildlife Migration

The BNSF Transcon runs parallel to I-40 though northern Arizona. This transportation corridor passes through forest lands, BLM, State Trust lands, and Indian communities – all of which are prime habitat locations due to their rural nature. At the peak of the global economy, over 120 trains per day traversed the BNSF Transcon – approximately one train every six minutes. Coupled with the interstate, this transportation corridor can form a "moving wall" for wildlife migration. As studied by the AZGFD, telemetry data from a variety of species show that animals approach this transportation corridor, but do not cross, thereby blocking their movements and fragmenting their populations. Double- or triple-tracking railroad corridors will only further exacerbate this problem.

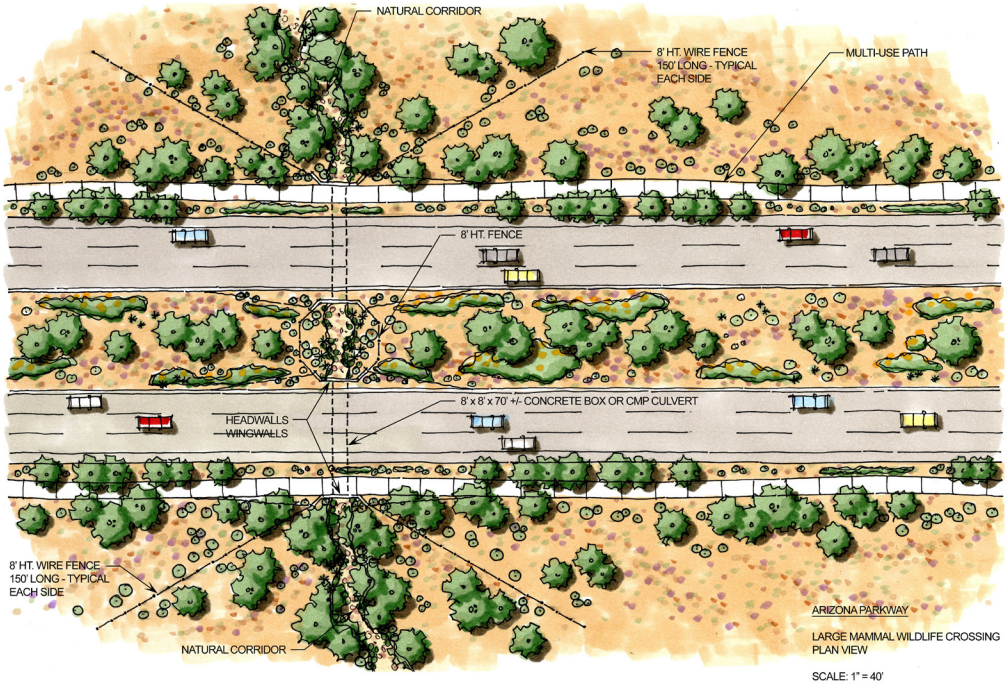
In future improvement efforts to the railroad such as double- or triple-tracking, grade separations, flyover construction, or bypass development, coordination should

occur with AZGFD to understand and incorporate potential mitigation measures. AZGFD has recently implemented wildlife crossings on a series of roadway projects in the state, and is planning for several others.

To accommodate desert bighorn sheep on US 93, three wildlife bridges will be constructed over the highway, to appeal to the sheep's desire to be up high. Guided by fencing, the sheep will be steered to the elevated crossing without any fear of the moving traffic below. Alternatively, eleven underpasses were constructed on a 17-mile section of SR 260 between Payson and Show Low, permitting elk to cross the highway after over 100 documented wildlife-vehicle collisions in 2001. Mitigation measures included elk crossing signs along SR 260 between Payson and Show Low and pedestrian-wildlife underpasses with monitoring equipment. Since implementation of these crossings on SR 260, elk-vehicle collisions have fallen as much as 95 percent. Near Superior along the Gonzales Pass segment of US 60, concrete ramps have been constructed at the entrance of each culvert to help tortoises avoid slipping between the riprap entrances to culverts. The ramp guarantees the animals a pathway up to and into the culvert. Many of the abovementioned techniques could be adapted to railroad corridors, allowing animals safe passageways at key locations.

A plan view of a potential wildlife underpass is illustrated in Figure 21, showing the underpass corridor beneath a bifurcated highway, with ample vegetation between each transportation corridor and fencing to guide the animals to a safe passageway.

Figure 21 Sample Plan View – Large Mammal Wildlife Underpass



6.2.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- Cities of Flagstaff, Kingman, Winslow, and Holbrook
- Counties of Mohave, Coconino, Navajo and Apache
- Short line railroads

B. Interstate Context

- BNSF Railway
- FRA
- BLM
- USFS
- Amtrak

6.2.5 Risks of Pursuing Strategic Opportunity

Using the median on I-40 for a rail corridor could preclude its use for additional lanes. If ADOT were to facilitate a BNSF bypass around Flagstaff in the I-40 median, it takes the risk that it will need to acquire more right-of-way for additional interstate capacity in the future.

By not addressing safety issues of grade crossings, more accidents, injuries and fatalities could result. A bypass in Flagstaff not only minimizes rail-vehicle conflicts in that city, but also the risk of spills of hazardous commodities in the center of the community. If BNSF does not complete its triple-tracking project, more freight may be transported by truck, further congesting interstate and state highways.

6.2.6 Estimated Costs

Preliminary costs for a 12-mile Flagstaff bypass are estimated at less than $200 million (at approximately $15 million per

mile). Upon BNSF's initiative to conduct triple-tracking through the Flagstaff area, a public/private partnership could be entered into to facilitate relocation of the Transcon. Costs for other potential community improvements include rough estimates of $5 million per grade separation and $15 million per mile for flyovers. Quiet zones would add to the cost.

6.2.7 Relationship to Other Strategic Opportunities

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor

The BNSF Peavine corridor could be used for intercity rail between Phoenix, Prescott, Chino Valley, the Grand Canyon, and eventually Flagstaff. If this occurs, interchange with the Transcon may be necessary, as well as the need for increased safety improvements at these interchange points.

BNSF Phoenix metropolitan area system development and operations

As part of improvements suggested for the Phoenix metropolitan area, joint use of the Peavine line as a shared freight/passenger rail corridor in the future could require interchange improvements with the Transcon.

Development/expansion of inland ports

Triple-tracking may increase the potential for development of inland ports along BNSF's Transcon or on a short line that interchanges with the BNSF.

Development/expansion of short line railroads

If a bypass around Flagstaff is built, the existing rail line through the community could be operated by a short line railroad. Additionally, any industrial development along intersecting Transcon short lines (e.g., Apache Railway) will require coordination with BNSF, as the interchanging Class I carrier.

6.3 UP Tucson Metropolitan Area System Development and Operations

6.3.1 Introduction

Arizona could benefit from partnering with UP to maintain the UP Sunset Route in Pima County as a major artery in a comprehensive statewide rail system, alleviating both rail and roadway congestion.

Efficient freight transport is vital to the national economy. The strength of a Class I railroad is in its efficiency at moving large volumes of goods long distances. The State of Arizona should exploit this strength, and capitalize on its economic development opportunities.

This strategic opportunity provides Arizona the following:

- Helps develop an integrated transportation system in the Sun Corridor Megapolitan region.
- Focuses economic opportunities along the railroad around freight-related facilities.
- Allows for commuter rail to be established in the Tucson metropolitan area.
- Provides the foundation for future intercity rail to Phoenix and elsewhere northward and southward.
- Achieves highest and best use of rail infrastructure and related properties.
- Relieves railroad congestion and improves highway safety.

6.3.2 Background

UP operates in an east-west direction across southern Arizona on its transcontinental route, the Sunset Route, with approximately 45 trains per day. Its operations provide long-haul intermodal and carload service. The UP Nogales Subdivision branches from the Sunset Route at Tucson and runs south to the Mexican border at Nogales, where UP interchanges with Ferromex. The Phelps Dodge Sierrita Mine Industrial Railroad interchanges with the Nogales Subdivision in Pima County near Sahuarita.

A. Double-Tracking

The completion of double-tracking of the Sunset Route will provide sufficient freight capacity along the mainline track well into the future, even with the forecast growth at the ports of Los Angeles and Long Beach (POLA/POLB). However, progress on this project has been delayed due to ongoing deliberations as a part of the ACC hearing process on grade crossings in the Tucson metropolitan area, and finalizing an approved right-of-way through the Yuma area. Single-tracked sections often create bottlenecks that negate the efficiencies gained from the investment in double-tracking; therefore the line should be double-tracked throughout the state to generate the full benefit of the investment.

B. Red Rock Classification Yard

Even with its Sunset Route double-tracked, UP needs new rail classification facilities along the route to maintain efficiency and system fluidity. One such facility is the

proposed Red Rock Classification Yard, which would allow block swapping of freight cars, particularly those with a destination on eastbound trains, as well as crew changes. This facility, or one like it elsewhere, would increase UP's capacity to handle pass-through train traffic across Arizona to other states – allowing new flexibility and fluidity in the UP system statewide. The switching efficiencies gained are expected to cut one day out of loaded railcar movements in and out of the area, and possibly two days for rail traffic beyond the region. Furthermore, because the design of the classification yard would carefully allow UP to control the speed of the railcars during switching, freight damage could be minimized. Both of these benefits would help to make rail freight more competitive with trucking and, as result, would encourage the shift of truck traffic from highways to rail.

The proposed classification yard at Red Rock is expected to employ 290 people, including the creation of 100 new skilled and high wage jobs in Arizona. Although not in UP's current plans, there is room on site to the north of the proposed yard for a logistics and distribution park, which would be compatible with the yard design and further promote job development.

Currently, there is a trend of moving freight-related development out of city centers and into low-density suburbs or rural areas. Developing these areas is often cheaper because of lower land prices. One idea that takes advantage of the land availability is the concept of freight villages, which typically offer multimodal service, warehousing and distribution facilities, intermodal terminals, and customs facilities in a foreign trade zone (FTZ). Another feature of freight villages is the secondary services associated with them. Some of those services include restaurants, living accommodations, retail and banking services. Freight villages have the potential to optimize the efficiency of freight movement and accommodate increased freight volume. Alliance, Texas, is one of the most successful freight villages and is the model for a CSX development in Winter Haven, Florida. Other examples of successful freight villages include CenterPoint Intermodal Center in Elwood, Illinois and the Mesquite Intermodal Facility/Skyland Business Park in Mesquite, Texas. UP's proposed Red Rock classification yard could be compatible with an adjacent industrial park or freight village.

C. Tucson Yard

One might expect that a new classification yard in Red Rock or elsewhere would eliminate the need for the UP Tucson Yard, but this may not be the case. The Tucson Yard may instead be used differently in order to yield more capacity in the UP transportation network. For example, the Tucson Yard could be used for blocking of westbound container traffic destined to the POLA/POLB. By accumulating and sorting container traffic in Tucson, the UP could provide containers dockside to the appropriate shipping vessels on a just-in-time basis, greatly reducing congestion at the ports.

Alternatively, if a state (e.g., state rail organization) or local interest (e.g., PAG, Regional Transportation Authority) desired use of the yard for another purpose, such as commuter/intercity rail storage and maintenance or redevelopment initiatives, the possibility could exist in the future for negotiations with UP, potentially consolidating railroad activities at Red Rock.

D. Nogales Subdivision/UP Sunset Route Wye

The Nogales Subdivision currently links with the Sunset Route through a direct connection into the Tucson Yard. If a classification yard at Red Rock is built, constructing a wye connection of the Nogales Subdivision and UP Sunset Route could help facilitate direct traffic flow between these two rail facilities, avoiding the congestion of a link inside the Tucson Yard. In addition to benefiting freight traffic, such a wye could benefit a potential Phoenix/Tucson ICR system if the passenger rail corridor utilizes UP right-of-way – allowing a more direct connection from the Nogales Subdivision to the Sunset Route without routing through the Tucson Yard. Anticipating this future need for a wye, it may be beneficial to reserve the right-of-way.

6.3.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following strategies:

A. Facilitate UP Sunset Route capacity improvements
B. Explore and prioritize options for improving freight train movements through or around Tucson
C. Construct safety improvements along UP Sunset Route

A. Facilitate UP Sunset Route Capacity Improvements

Capacity improvements to the UP Sunset Route can provide several benefits to Arizona. By improving UP's capacity, and therefore efficiency through double-tracking, more cargo can be shipped by rail, removing truck traffic from the overburdened highways – relieving congestion and reducing emissions that adversely affect air quality. Additionally, adding capacity to the Sunset Route can

facilitate more timely Amtrak service on its Sunset Limited/ Texas Eagle route, better serving long distance travelers.

Also, development of a new classification yard at Red Rock could alter activities being conducted at the Tucson Yard and open up a new industrial base at the new yard that could provide employment opportunities for a growing population base in Pinal County and the Sun Corridor. While much debate has occurred regarding the development of a new classification yard at Red Rock, the state should continue to facilitate the dialogue for this project, working with UP, the ASLD, various special interest groups, and other state agencies on this opportunity. If a consensus can be reached among all stakeholders regarding proceeding with the project, a variety of transportation and economic development benefits would accrue to the state.

B. Explore and Prioritize Options for Improving Freight Train Movements through or around Tucson

UP's transcontinental Sunset Route travels directly through central Tucson, causing vehicular congestion issues on a daily basis. This congestion and frustration is likely to increase as freight volumes increase with UP's double-tracking of the corridor through Arizona. Several opportunities exist for improving freight movements through central metropolitan areas, including bypasses, flyovers, grade separations, and quiet zones. The City of Tucson and Pima County, in coordination with ADOT, UP, and potentially a state rail organization, should study the feasibility of such improvements to improve vehicular circulation.

The idea of a bypass around Tucson has been suggested by a variety of stakeholders, special interest groups, and public officials. The three scenarios developed in the Statewide Transportation Planning Framework, with input from stakeholders statewide, suggest a potential highway bypass of the Tucson metropolitan area to the west and south, serving to both relieve metropolitan Tucson traffic congestion, and provide an alternative northbound route to Pinal and Maricopa counties. A rail bypass could potentially be paired with this highway bypass, although some disadvantages to an adjacent route include:

- New rail construction is estimated at approximately $15 million per mile – a substantial capital cost.
- A bypass would add mileage compared to UP's existing route through Tucson, increasing railroad operating and maintenance costs.
- Although a bypass would divert freight traffic from the downtown Tucson area today, it would not avoid growth in the future Sun Corridor Megapolitan area, requiring future circulation planning to accommodate a new rail corridor.

If a bypass was deemed feasible, the mainline through central Tucson would experience reduced traffic and could potentially be used for a future passenger rail mode, as well as local freight deliveries to UP clients.

An alternative to a bypass is a flyover or quiet zone. A flyover entails raising the railroad over a series of city streets, coupled with closing grade crossings. It would greatly improve safety and reduce automotive traffic delays, although it would not take through rail freight out of the city. A flyover, like a bypass, costs roughly $15 million per mile, but the number of miles is generally much less than what a bypass requires. The BNSF has installed a flyover in Olathe, Kansas, to alleviate train-vehicle conflicts in this Kansas City suburb (Figure 18 in Section 6.1).

The implementation of quiet zones entail a combination of safety measures such as crossing closures, raised medians, four quad-gates, lights and wayside horns to eliminate the possibility of drivers driving around gates when a train is approaching. Security fencing between crossings can also eliminate the risk of pedestrian accidents by forcing people to cross the tracks at designated street crossings. The combination of all safety improvements lessen the need for train whistles, enhancing the quality of life for people in the surrounding community.

C. Construct Safety Improvements along UP Sunset Route

ADOT currently uses an "exposure index number" to prioritize railroad grade crossings for allocation of Section 130 funds for grade crossing improvements. In addition, ADOT should periodically review the incident history of all of its at-grade railroad crossings. Doing so can uncover particular crossings in need of safety improvements that would not be expected merely based on the volume of train and vehicle traffic. Other issues which should be considered when prioritizing safety improvements include vehicular traffic delay, particularly for emergency vehicles, and access to emergency services such as hospitals, fire stations, etc.

For example, the UP crosses the intersection of West 6th Street and North 9th Avenue in Tucson, (Figure 22). This site has experienced seven train-vehicle crashes since 1992. Tucson's "Downtown Links" project, an improvement program to offer alternative access to downtown Tucson

Figure 22 UP At-Grade Crossing, West 6th Street and North 9th Avenue in Tucson

through multimodal "links" via foot, vehicle, transit, and bicycle, will work to construct new and safer underpasses. For this particular intersection, the project entails a below-grade roadway for West 6th Street with pedestrian and bicycle traffic on a deck over the roadway, correcting this safety hazard. This alignment will effectively separate UP tracks from West 6th Street.

The West 6th Street and North 9th Avenue intersection has experienced the highest level of train-vehicle crashes in Tucson, which is why safety improvements are already in process. Nonetheless, ADOT should continue to monitor all railroad grade crossings and, as deemed necessary, implement other safety improvements, such as signals, gates, flashers or grade separations, along the UP Sunset Route in the Tucson metropolitan area.

6.3.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- Arizona State Parks
- Other state departments, as warranted
- PAG
- Cities of Tucson and South Tucson, Town of Marana
- Pima County

B. Interstate Context

- UP Railroad
- FRA
- FHWA
- FTA
- BLM

6.3.5 Risks of Pursuing Strategic Opportunity

The risk of the UP double-tracking the Sunset Route and building the classification yard at Red Rock can result in more rail traffic through Tucson and other Arizona cities than would be otherwise incurred. Environmental concerns of emissions and noise are raised with construction of a classification yard in Red Rock. The UP, however, plans to mitigate the emissions risk by utilizing Genset locomotives powered by ultra-low emission diesel engines with the potential to reduce emissions of nitrogen oxide and particulate matter. Furthermore, this rail yard will relocate locomotive activity and the resultant emissions out of Tucson. The noise risk would be mitigated by incorporating a new high-technology rail classification system which controls the speed of switching operations. The proposed classification yard at Red Rock would not only be much quieter than flat switching stations, but also quieter than interstate truck traffic.

There are risks associated with inaction, as well. If the state does not come to an agreement with the UP over the land required for the classification yard at Red Rock, there is a risk that the UP will pursue an alternative location east of Arizona and that all related economic development opportunities will be lost to New Mexico or another state.

6.3.6 Estimated Costs

Neither double-tracking the Sunset Route nor building a classification yard in Red Rock poses additional costs to the State of Arizona, since both are private investments initiated by the UP. The sale of land by the ASLD to the UP for classification yard at Red Rock would create significant revenues to the State Trust, used to fund beneficiaries of the State Trust, including education. Additionally, the state would benefit from a variety of taxes levied on the development and operations of the Red Rock Classification

Yard, such as property, income, sales, and fuel taxes. Alternatively, if state policies would allow, Arizona could propose a non-cash transaction to the UP to swap for other UP properties in which the state has an interest (e.g., swap the acreage needed for the Red Rock yard for the Wellton Branch right-of-way).

A flyover is estimated at $15 million per mile, but the cost would vary with the length of flyover considered. Establishing a quiet zone, too, would vary by length and by type and extent of improvements required by the FRA. Accordingly, an estimate has not been made.

6.3.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail
Phoenix/Tucson ICR, a portion of which could be located on UP right-of-way, may establish a foundation for a future southwestern HSR system.

Phoenix/Tucson intercity rail
Possible alignments for Phoenix/Tucson intercity rail include UP right-of-way or along the mainline.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor
Extension of intercity passenger rail to Nogales or Sierra Vista is possible in the more distant future and could interface with the UP Sunset Route.

Enhancement of intercity rail passenger service
Improvements to the efficiency of UP's Sunset Route may result in improved service on the Amtrak Sunset Limited/ Texas Eagle.

Incorporation of MAG and PAG commuter rail planning
A Tucson bypass could free up capacity on the existing mainline through downtown Tucson and may facilitate this segment to be used for both intercity and commuter rail.

UP statewide system development and operations
If the UP does not build a classification yard in Red Rock or elsewhere on the Sunset Route, it may increase the need for and expand plans for its Buckeye yard. If double-tracking is not completed, the UP will not fully achieve the necessary capacity and efficiency improvements.

Development/expansion of inland ports in Arizona
Construction of a new classification yard at Red Rock is compatible with building an adjacent logistics facility.

Development/expansion of short line railroads in Arizona
Any short line corridors in the vicinity of Tucson will likely interface with the mainline and will require coordination.

6.4 UP Statewide System Development and Operations

6.4.1 Introduction

Arizona could benefit from partnering with UP to help maintain the Sunset Route and the Phoenix Subdivision as major arteries in a comprehensive statewide rail system, alleviating rail and roadway congestion.

This strategic opportunity provides Arizona the following:

- Helps to focus economic opportunities along the railroad around freight-related facilities, such as classification yards.
- Achieves highest and best use of rail infrastructure and related properties.
- Relieves railroad congestion in communities and improves automotive safety.
- Captures a larger portion of the domestic freight market on rail.
- Preserves right-of-way for future bypasses, once appropriate studies have established the need and preferred alignment.
- Helps strengthen short line railroad development.

6.4.2 Background

UP operates east-west across southern Arizona on its transcontinental route, the Sunset Route, with approximately 45 trains per day. It provides long-haul intermodal and carload service. UP plans to double-track its entire Sunset Route to provide sufficient future capacity, even with the forecast growth at the POLA/POLB in California.

UP's mainline interchanges with the San Pedro & Southwestern Railroad at Benson, the Arizona Eastern Railway at Bowie, the dormant Tucson, Cornelia & Gila Bend Railroad at Gila Bend, and the Yuma Valley Railway at Yuma. Mainline branches include the Phoenix Subdivision, which includes the Wellton Branch, and the Nogales Subdivision. Interchanges on the Phoenix Subdivision include the Copper Basin Railway at Magma Junction, the dormant Magma Arizona Railroad at Magma Junction, and the BNSF in Phoenix. The north-south Nogales Subdivision between Tucson and Nogales interchanges with Ferromex at the international border.

A portion of the UP's Wellton Branch is used for railcar storage, while about 63 miles of track between Growler and Gillespie are out of service because the track is not signalized or up to current standards. Current rail freight service to Phoenix is provided by UP via the eastern section of the Phoenix Subdivision (from Picacho) through a wye connection at Picacho.

6.4.3 Proposed Strategic Opportunity

This proposed strategic opportunity consists of the following strategies:

A. Facilitate UP capacity Improvements
B. Study feasibility of a freight bypass around Nogales
C. Explore opportunity to reopen Wellton Branch for shared freight and passenger service
D. Monitor at-grade crossings and implement safety improvements
E. Facilitate coordination with environmental interests to mitigate habitat fragmentation and enable wildlife migration

A. Facilitate UP Capacity Improvements

The UP currently conducts switching activities at its yard in central Phoenix and, to a lesser extent, at a small yard in Buckeye. The UP has purchased additional property in Buckeye near the airport and could create a new yard if activity levels warrant. If the new Buckeye Yard is constructed in conjunction with improving the Wellton Branch or utilizing a new north-south railroad in the West Valley (see Section 6.7 on a new freight/passenger rail corridor in the greater Hassayampa Valley), freight traffic could bypass central Phoenix, freeing up capacity through the center of the metropolitan area and opening the possibility for potential shared commuter rail use. This corridor from Buckeye to Phoenix, sometimes referred to as "Yuma West" is a corridor under study by MAG for future commuter rail service. Regardless, a new Buckeye Yard with a western rail access to the UP Sunset Route via a reopened Wellton Branch would reduce the distance freight trains would have to travel to be switched and unloaded.

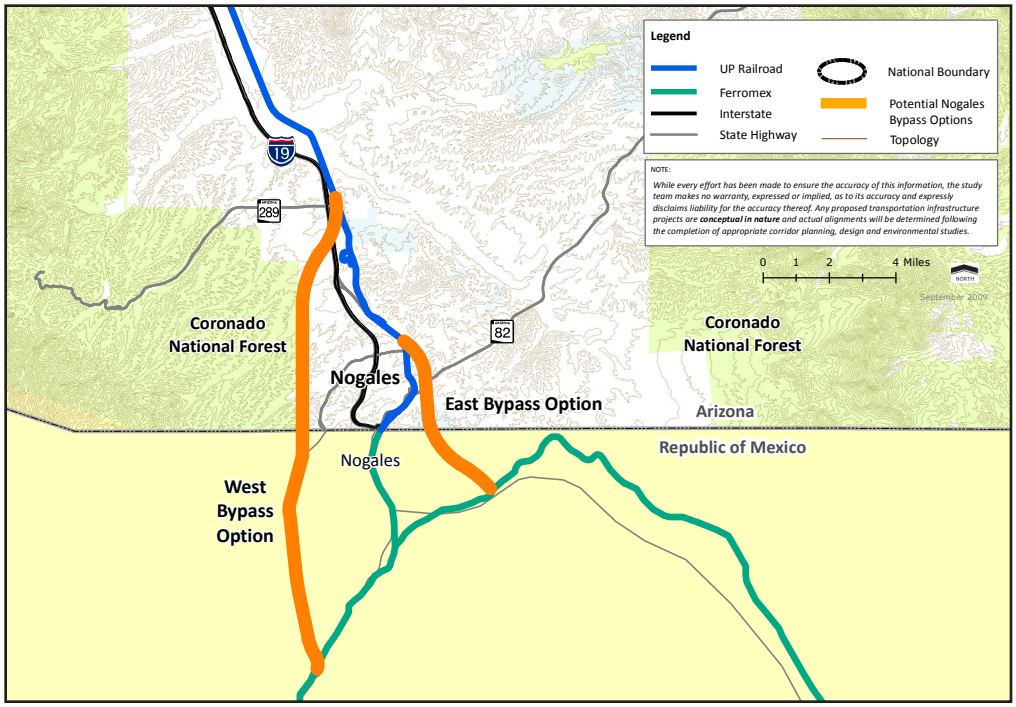
In addition to yard relocation possibilities to improve UP capacity, the railroad is in the process of double-tracking the mainline through Arizona. In order to facilitate this double-tracking, the state should consider establishing a policy that any improvements to roadways crossing the Sunset Route must accommodate future UP double-tracking plans.

B. Study Feasibility of a Freight Bypass around Nogales

The City of Nogales, Arizona, the State of Arizona, the City of Nogales, Sonora, and the State of Sonora could all benefit by studying the feasibility of a freight bypass around both Nogales communities. Accordingly, a collaborative effort to conduct a feasibility study is recommended.

A Nogales freight bypass could improve freight connectivity to Mexico and access to its ports, and possibly facilitate rail passenger service from the border to Tucson and Phoenix. It could also help to alleviate rail congestion through downtown Nogales. Such a concept has been informally discussed both in Nogales, Arizona and Nogales, Sonora – citing the potential for a shared highway/rail bypass to the east to help facilitate more efficient border crossing of cargo. As such a concept has not yet been documented in any studies, two conceptual alignment options for a bypass to the west and to the east have been developed; either would shift freight rail traffic from the core of Nogales (Figure 23). For successful construction of a bi-national bypass, coordination between Arizona and U.S. federal

Figure 23 Nogales Bypass Options



agencies would be required with the appropriate Mexican federal and state entities, including the Mexican State of Sonora, the Mexican federal government's transportation agency – the Secretaria de Comunicaciones y Transportes (SCT), the State of Sonora's transportation agency – the Secretaria de Infraestructura y Desarrollo Urbano (SIDUR), and the City of Nogales.

Relocating the freight line would provide opportunities for increased industrial development and trade exchange, as well as improve safety and crossing issues through both Nogales downtowns. While constructing a bypass serves the previous mentioned benefits, the efficiency of a rail crossing through the border is not resolved with relocation. The core issue with border congestion is not due to capacity, but rather due to tedious customs inspection procedures on both sides of the border. While this is not a transportation issue, it is a factor in solving congestion issues due to train back-ups waiting to be inspected. An eastern bypass would be shorter than a western option, though a western option better displaces freight traffic from the city center and parallels a trucking bypass. Preliminary studies and project construction, should the opportunity be pursued, would be a collaborative effort between appropriate U.S. and Mexican entities.

In addition to the two options presented above that are located within close proximity to the cities of Nogales, the 2007 *ADOT State of Arizona Railroad Inventory and Assessment* cited a potential bypass farther east through Naco, utilizing the San Pedro & Southwestern Railroad short line in Arizona. Because neither the State of Arizona, the State of Sonora, the U.S. Department of Commerce, UP, nor Ferromex could reach an agreement on re-establishing Naco as a rail port, this option is not a likely alternative.

A potential Nogales bypass, or any proposed border rail improvements, should be incorporated into the *Border Master Plan* to be prepared by ADOT and the SCT in 2010-2011.

C. Explore Opportunity to Reopen Wellton Branch for Shared Freight and Passenger service

What is colloquially referred to as the "Wellton Branch" is a segment of the UP Phoenix Subdivision through central Arizona. The eastern 30 miles of the Wellton Branch between Phoenix and Buckeye has significant industrial development along its right-of-way and is currently in service. The McElhaney Cattle Company has trackage rights on six miles of the branch east of Wellton and handles about 11,000 carloads of grain annually. In between, however, the rail corridor is out of service (Figure 24). Although the UP has not filed with the Surface Transportation Board to abandon this line, the lack of activity puts the future of the line in jeopardy.

Existing infrastructure serves as an asset to the state, preservation of the Wellton Branch is a key initiative that could benefit Arizona for several reasons:

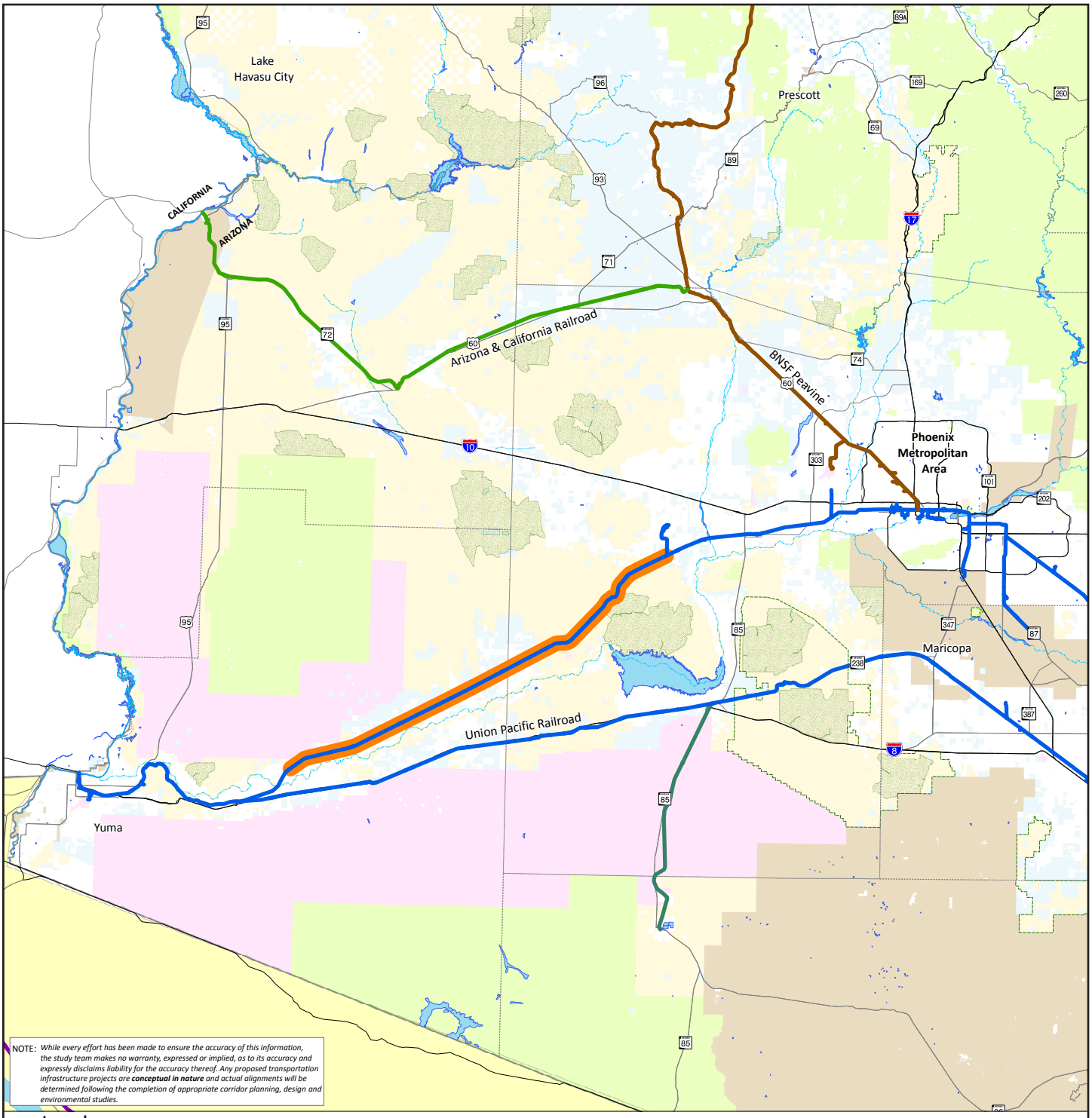
- Yuma's population and employment centers are projected to grow east of the community, where the Wellton Branch can provide logical sites for new rail-served industries to locate.
- Due to projected Sun Corridor Megapolitan area growth, the Wellton Branch, serving the communities of Buckeye, Goodyear, Tolleson, and Avondale in the Phoenix West Valley, could serve as an important commuter rail route, not only for residents working in the central business district, but also for reverse commuters.
- The Wellton Branch provides the most direct route between Yuma and Phoenix, which could be part of a significant international freight route if the proposed deep-water port at Punta Colonet in Baja California ever develops.
- The Wellton Branch could provide the means for renewed Amtrak access to Phoenix.
- The Wellton Branch is part of the most direct route between Phoenix and San Diego, and could potentially be used in the distant future for a high-speed rail connection between these cities.

After ensuring the preservation of the rail corridor, Arizona could explore the opportunity to reopen the Wellton Branch for shared freight and passenger service. One way to ensure the preservation of the corridor would be for the state to gain control of the line. This could be achieved either with a direct purchase or through a non-cash transaction with the UP to swap for other UP properties. For example, the state could swap all or part of the State Trust acreage UP needs for the Red Rock Classification Yard for the Wellton Branch right-of-way. A change in legislation would be required to allow the ASLD to enter into such a transaction.

D. Monitor At-Grade Crossings and Implement Safety Improvements

As discussed earlier, ADOT currently uses an "exposure index number" to prioritize railroad grade crossings for allocation of Section 130 funds for grade crossing improvements. In addition, ADOT should periodically review the incident history of all of its at-grade railroad crossings. Doing so can uncover particular crossings in need of safety improvements

Figure 24 Wellton Branch Track Rehabilitation



that would not be expected merely based on the volume of train and vehicle traffic.

While no UP intersections outside the Tucson metropolitan area historically have a significant accident rate, the state and local jurisdictions should continue to monitor all railroad grade crossings and, as deemed necessary, implement other safety improvements, such as signals, gates, flashers or grade separations, along the UP Sunset Route statewide. For example, the City of Maricopa, in conjunction with ADOT, are studying the feasibility of constructing a grade separation at the crossing of SR 347 and the UP Sunset Route to better facilitate traffic operations and safety.

E. Facilitate Coordination with Environmental Interests to Mitigate Habitat Fragmentation and Enable Wildlife Migration

The UP Sunset Route runs parallel to I-10 though much of southern Arizona. This transportation corridor passes through BLM, State Trust lands, military reservations, Indian communities, and near forest lands – all of which are prime habitat locations due to their rural nature. Coupled with the interstate, this transportation corridor forms a "moving wall" for wildlife migration. As studied by the AZGFD and discussed more thoroughly in Section 6.2, the transportation corridor serves as a barrier, blocking wildlife movement. The state has conducted several mitigation projects to accommodate wildlife crossings along state highways and found them to be a success. Therefore, in future improvement efforts to the railroad such as double- or triple-tracking, grade separations, flyover construction, or bypass development, coordination should occur with AZGFD to understand and incorporate potential mitigation measures.

6.4.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ASLD
- ADEQ
- AZGFD
- Municipal, county, tribal, and regional governments, as impacted
- COGs and MPOs

B. Interstate Context

- UP Railroad
- Ferromex
- Short line railroads
- FRA
- FHWA
- DHS (e.g., Customs and Border Protection)
- Other federal agencies
- Border Trade Alliance
- CANAMEX Coalition
- SCT
- SIDUR
- City of Nogales, Sonora

6.4.5 Risks of Pursuing Strategic Opportunity

A risk associated with constructing a Nogales bypass is that as the city grows, the bypass will no longer be outside the urban area. To mitigate this risk, appropriate planning and policies should be put in place so that all future infrastructure projects accommodate this new rail corridor. Another risk is that Arizona's efforts to move toward a bypass in Nogales may be wasted if the Mexican government or Ferromex is unwilling or unable to fund its share of the project.

Regarding the Wellton Branch, if the corridor itself is not preserved, the state loses an infrastructure asset that could provide future benefits to accommodate projected Sun Corridor growth through a passenger rail option and develop a corridor which could serve inland port or other economic development opportunities as a result of increased freight flow through the state.

If any transaction between the state and UP were to occur with relation to the Wellton Branch, operating agreements should be put in place to create a mutual understanding of the volumes and timeframes of freight and passenger activity on the line. With the Wellton Branch, there is a risk that freight volumes near Phoenix will increase to an extent that will preclude the line's use for commuter and other passenger rail. This risk is less likely if the UP builds its desired classification yard in Red Rock or an alternative site in that general vicinity. If the line is not preserved, there is a risk that the corridor will be abandoned and not be recoverable for rail transportation in the future.

6.4.6 Estimated Costs

The length of a Nogales bypass may vary from five to fifteen miles, depending on whether a location east or west of the existing route and two Nogales communities is chosen. Based on industry averages at roughly $15 million per mile, a bypass could range from $75 to $225 million.

Preservation of the Wellton Branch for future use may not require cash if Arizona can negotiate a swap of properties with UP. The railroad has estimated the cost of renovating the line at $40 to $60 million. The Wellton Branch could also be preserved through rail banking, if and when UP files for abandonment status. This would help ensure the possibility of future restored rail service if improved economic conditions warrant resuming operation. At that time, the state could seek a new operator for possible rehabilitation and reactivation.

6.4.7 Relationship to Other Strategic Opportunities

High-speed interstate passenger rail
Phoenix/Tucson intercity rail (perhaps partly in existing UP corridors) could establish a foundation for later high-speed rail to California, Nevada, and the Front Range.

Phoenix/Tucson intercity rail
Phoenix to Tucson intercity rail may use portions of the Phoenix Subdivision (and its branches), the Sunset Route, or both.

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor
In the long term, intercity rail to Nogales might use UP's Nogales Subdivision.

Enhancement of intercity rail passenger service
Renovation of UP's Wellton Branch would allow Amtrak to resume service to Phoenix, which might help justify more frequent service through Arizona, or lay the groundwork through improvements to the corridor for commuter or intercity rail service.

Incorporation of MAG and PAG commuter rail planning
MAG would like to use the easternmost segment of the UP Wellton Branch for commuter rail in metropolitan Phoenix.

UP system development and operations in the Tucson metropolitan area
Double-tracking of the Sunset Route involves the UP system in the Tucson area, as well as statewide.

Development/expansion of Mexican deep-water container ports
Development of Punta Colonet might make the Wellton Branch a strategic link between this new port, Phoenix, and the BNSF system. Expansion of the Port of Guaymas would increase freight traffic on UP's Nogales Subdivision.

Development/expansion of inland ports
Inland port development could occur along the UP Sunset Route or its subdivisions/branches.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley
The Hassayampa Valley rail corridor would provide another link between BNSF and UP. This new rail corridor would interchange with the Sunset Route and might make it unnecessary to reopen the Wellton Branch.

Development/expansion of short line railroads
The UP recently sold its Clifton Branch (which interchanges with the Sunset Route in western New Mexico) to the Arizona Eastern Railway. The potential for industrial development and passenger rail on UP's Nogales Subdivision and Phoenix Subdivision might be greater if the UP considered a similar sale with an Arizona short line.

6.5 Development/Expansion of Mexican Deep-Water Ports

6.5.1 Introduction

Arizona could benefit from taking advantage of the economic opportunity that may arise with the development or enhancement of deep-water port facilities in Mexico. While the Mexican deep-water port activity may affect the Arizona rail system, many of the potential implications are unknown. Recent cargo volumes moving through the POLA/POLB, along with expensive labor and environmental regulations that limit capacity expansion in California, may provide opportunities for Mexican ports to capitalize on traffic between Asia and the U.S., which is expected to grow as the global recession eases.

While many external factors could impact how Arizona's rail system is affected by the status of these developments, the State of Arizona has the opportunity to focus its efforts internally. This strategic opportunity provides Arizona the following:

- Captures economic benefit of Asian trade through Mexico deep-water port development.
- Focuses industrial and economic development opportunities through inland ports/logistic facility expansion.

By monitoring deep-water port opportunities and actions in Mexico, the state may position itself to capture a share of the freight market by developing inland ports (as discussed further in the inland port strategic opportunity, Section 6.6)

to help facilitate the sorting and processing of containers inland, away from congested seaports. To enable this, the state could begin enhancement of border crossings to accommodate new rail infrastructure and increased rail freight from Mexico. This might include constructing new rail corridors or bypasses around congested cities.

6.5.2 Background

This section will focus on the background of potential Mexican deep-water ports at Guaymas and Punta Colonet, as well as on other initiatives that might impact trade between Asia and the United States. External factors beyond Mexico should also be considered. One such factor is the expansion of the Panama Canal, which will increase the capacity for goods shipped to the eastern U.S. seaboard from Asia via the canal. Another is the expansion of the port at Prince Rupert, British Columbia, which may prove a more efficient gateway than more southerly ports for moving goods from Asia to distribution centers, such as Chicago. These trade route options may have a substantial impact on the feasibility of future Mexican deep-water ports. Figure 25 illustrates the locations of these opportunities and their proximity to Arizona and major U.S. distribution centers.

A. Port of Guaymas

Guaymas is located along Mexico's coast on the Gulf of California, and has the potential to become a deep-water port handling international trade. It is believed that the port's infrastructure, with minor improvements such as the acquisition of additional container-moving equipment, is ready to start a modest container service. Currently, the port authority is deepening the port access corridors and turning basins to accommodate post-panamax ships, which are large ships that currently do not fit through the Panama Canal until completion of the canal's lock expansion project. The port has recently added roadway and rail infrastructure loops to internally serve port transportation needs. Additionally, the port has a Request for Proposal (RFP) out for a public/private partnership (PPP) effort to plan for a new container terminal to handle 100,000 twenty-foot equivalent units (TEUs) annually.

Major barriers to efficient service at Guaymas include the current unavailability of quay cranes, bottlenecks at the Mariposa port of entry in Nogales, and inefficient railroad inspection procedures on the U.S. side of the border. Additionally, an obstacle to the operation of Guaymas-Arizona container service is the lack of an integrated, multimodal network that includes shipping lines, railroads and an "interstate level" highway network. While a highway and railroad linkage exist between Guaymas and Nogales, upgrades are required for both transportation routes to be used efficiently. Furthermore, Guaymas currently lacks a major shipping line.

B. Port of Punta Colonet

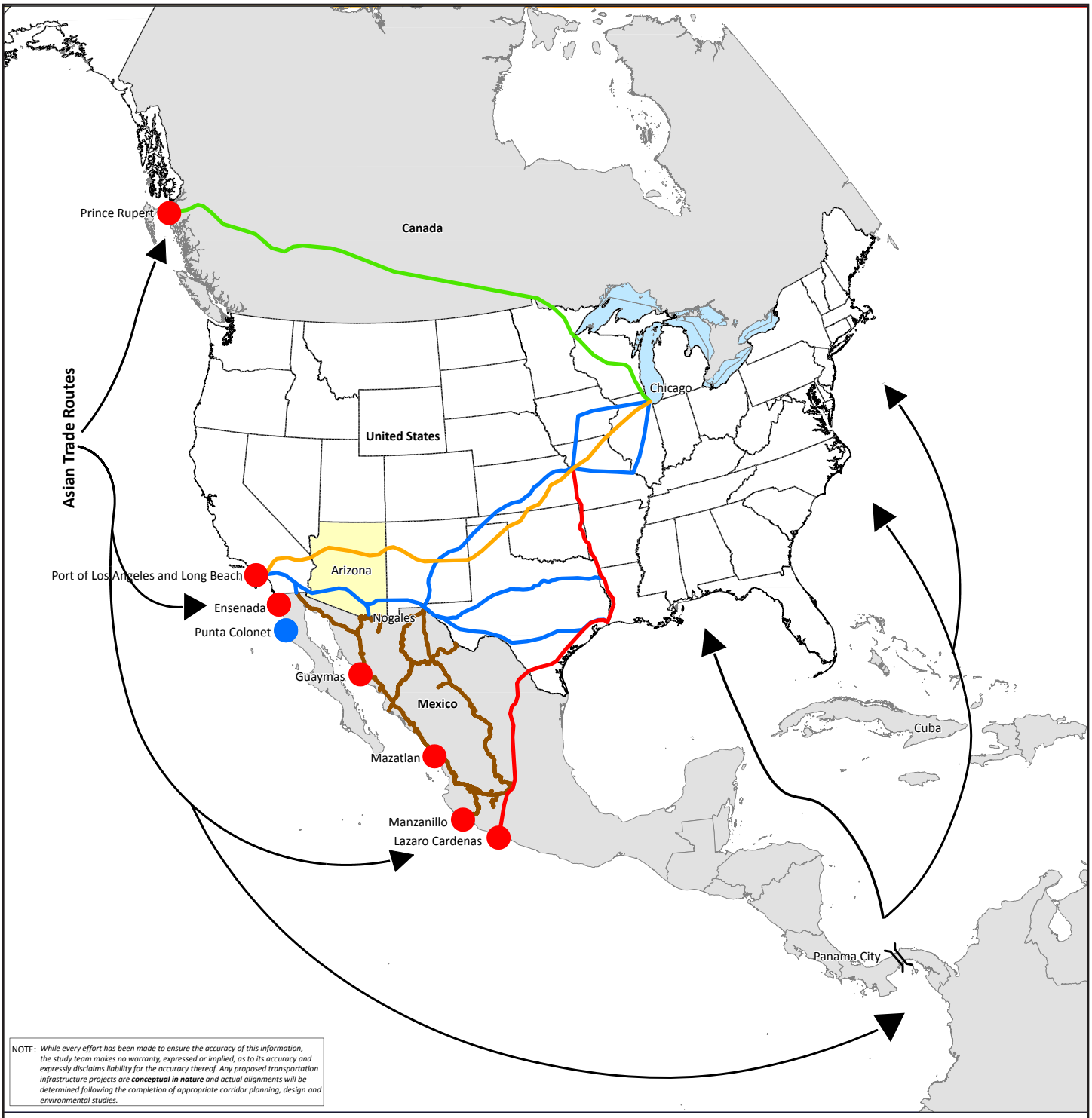
Punta Colonet is located on the west coast of Baja California, south of Ensenada. If constructed, this proposed new port is envisioned to handle six million TEUs annually. While the POLA/POLB are currently only operating at 60 percent capacity on the seaside, they are overloaded on the landside – not having enough capacity to unload and ship containers out of the ports quick enough – creating a backlog of up to two weeks of ships waiting at the port before being divested of their containers, providing an opportunity for Punta Colonet to capitalize on the growing traffic between Asia and the U.S. It is located close to the fast-growing Intermountain West region of the U.S., potentially serving as a bypass to the congested POLA/POLB, with a similar distance to the markets in Arizona, Nevada and Utah. It is more than 500 miles closer to these states than the existing Mexican port at Lazaro Cardenas.

Because of the global economic recession, the SCT of the Mexican federal government put their RFP process on hold in January 2009. Proposals were being solicited from PPPs for development and operations of the port facility, construction of railroad connections to the U.S. rail network, and development of a nearby community to support port operations, an endeavor estimated to cost approximately $5 billion.

While proposal solicitation had been thought to be postponed indefinitely, as of December 2009, SCT has initiated discussions regarding reissuing the RFPs with revised bidding rules. If SCT obtains a successful bidder to move forward to build the port, the project will face several challenges, including:

- Nearby terrain is mountainous and rugged, with some areas experiencing three to four percent grades, which is not desirable for a freight rail line.
- Environmental groups and farmers are strongly opposed to the port because it requires vast development of large rural and pristine lands.
- Potential permitting and land acquisition issues in the U.S. for a rail connection.
- Development of Punta Colonet would require several new highway and bridge crossings that will be required to undergo the environmental review and approval process in the U.S.

Figure 25 North American Trade Corridors



C. Other Mexican Ports

Several other deep-water ports currently exist in Mexico on the west coast of both Baja California and the Mexican mainland.

- Lazaro Cardenas is located just southwest of Mexico City on the Gulf of California. The port handles approximately 160,000 TEUs per year, but expansion is currently underway to increase capacity to about 2.2 million TEUs annually to take advantage of congestion at POLA/POLB. The port is currently a shipping gateway to interior U.S. cities such as Chicago, Kansas City, and Houston. In preparation for the port's increased capacity, railway and highway infrastructure running north-south through the center of Mexico have been upgraded to handle more goods bound for the U.S.
- Manzanillo is located about 1,000 miles south of Guaymas. It is Mexico's busiest port as well as a recreational destination. In 2007, the port moved 1.4 million TEUs. It is a popular transshipment center for automobile exports. The port is connected by Ferromex rail lines to Guadalajara and Mexico City. An expansion project has recently been completed to allow the port to receive post-panamax vessels.
- Mazatlan is located on the west coast of the Mexican mainland, approximately 450 miles south of Guaymas. It does not currently have a full fledged container terminal (i.e., it lacks the quay, sea-to-shore cranes needed to provide efficient service to the newer container ships). Instead, it bases its service on the availability of container ships equipped with their own cranes to unload the containers at the port. Mazatlan handles roughly 30,000 TEUs per year, most of which are destined for domestic markets in northwest Mexico.
- Ensenada is located approximately 70 miles south of Tijuana on the Pacific Ocean. The port has a fully functional container terminal with four quay cranes. It includes general cargo and container shipping, as well as a large terminal dedicated to tourism uses, such as recreational cruise ships. The strongest market for goods shipped into Ensenada is southern California, although a freight rail connection to the U.S. does not exist. Ensenada processes approximately 40,000 TEUs per year. Starting in September 2009, the port will be able to receive post-panamax vessels, potentially expanding Ensenada's trade links with South America.

D. Panama Canal Expansion

Another challenge facing the development of Mexican ports is the expansion of the Panama Canal, currently in progress. According to the 2006 Panama Canal Authority Proposal for the Expansion of the Panama Canal, the canal already has a 38 percent share of the Northeast Asia to U.S. East Coast route, while U.S. intermodal surface transportation carries 61 percent share. Shipments traveling through the Canal are less costly, but navigation times are increased. Goods traveling over the United State's intermodal system experience shorter travel time, but cost greater to transport. There is also variation in the dependability of travel times for goods traveling by rail and truck within the U.S intermodal system, which has many components, such as ports, rail, and highways, that its operation as a cohesive unit can be unpredictable. As such, at various points within the intermodal system, capacity can be overwhelmed.

The expansion of the Panama Canal which is expected to be completed in 2014 will provide access to ships with nearly three times the TEU capacity of the largest ship that the canal can currently accommodate. The expansion will strengthen the canal's competitive position in the shipping industry and allow it to accommodate greater demand and serve more customers. This will reduce the growth and importance of California and Mexican deep-water container ports in moving goods between Asia and the U.S. East Coast.

E. Port of Prince Rupert, British Columbia, Canada

There is a long-range initiative funded with public and private funds to maximize the deep-water port at Prince Rupert, creating an alternative for moving freight across North America that avoids POLA/POLB and ports in Mexico. The Port of Prince Rupert is approximately 1,000 miles, or 68 hours by cargo ship, closer to Shanghai than POLA/POLB, potentially making it a more efficient shipping alternative.

Prince Rupert Port Authority facilities are serviced by Canadian National (CN) Rail, which serves both Canada and the U.S. As the renovation of the port continues, traffic on CN will steadily rise and may have an impact on the need for shipping goods to the U.S. via Mexico. The renovations, which started in 2005, are expected to be ongoing through year 2020 at which time the Port of Prince Rupert is anticipated to be able to handle up to 5 million TEUs annually. CN is also investing heavily in its western Canadian network. Improvements include upgrades to its rail traffic control and a double track system from Prince Rupert to Memphis. Rail capacity is also expanding to accommodate the shipments that Prince Rupert is projecting to handle by 2015. CN has upgraded tunnels and bridges, built new intermodal terminals in metropolitan Prince George

(approximately 450 miles west of the port), and acquired new locomotives specifically to serve Prince Rupert. This added capacity could deter Asian trade from using Mexican deep-water ports.

6.5.3 Proposed Strategic Opportunity

The benefit that Arizona will receive from the development of new, or expansion of existing, deep-water ports in Mexico depends on numerous factors. While Guaymas has existing port facilities, its potential effect on Arizona is limited, because of the modest capacity of its planned expansion. Punta Colonet could have a significant impact on Arizona, but the likelihood of the project moving forward with Mexican federal government support and PPP sponsorship is highly dependent on a resurgent international economy. The initiatives that are most likely are the port at Lazaro Cardenas, the Panama Canal expansion, and activities at the Port of Prince Rupert. All of these routes bypass Arizona when connecting Asia with North American destinations. If deep-water port development does not occur in Mexico, then there are no necessary actions for Arizona. If such development does occur, however, Arizona stands to realize economic benefits, if the right actions are taken. Therefore, this strategic opportunity focuses on monitoring port activity in Mexico.

This proposed strategic opportunity consists of the following strategies:

A. Monitor deep-water port opportunities and actions in Mexico
B. Continue transportation improvement coordination through the Arizona-Mexico Commission with transportation and freight interests in Mexico
C. Engage in partnerships with the private sector to take advantage of port development/enhancement activities

A. Monitor Deep-Water Port Opportunities and Actions in Mexico

It would benefit ADOT and other Arizona officials to monitor deep-water port actions in Mexico so that the state can be prepared to react and take advantage of any opportunities if they arise. This action requires only an effort to remain updated on such activity through regularly established transportation and economic development coordination meetings and communication.

B. Continue Transportation Improvement Coordination through the Arizona-Mexico Commission with Transportation and Freight Interests in Mexico

One efficient means of monitoring Mexican port activity is maintaining active participation in the Arizona-Mexico Commission. The semi-annual meetings of this group, along with its Transportation, Ports, and Infrastructure Committee, allow the state to remain involved in Mexican economic activities, including port development and enhancement in the State of Sonora. Additionally, maintaining regular communications with the SCT, the Mexican federal government's transportation agency, and SIDUR, the State of Sonora's transportation agency, allow Arizona to monitor potential port development activities as well.

C. Engage in Partnerships with the Private Sector to Take Advantage of Port Development/ Enhancement Activities

If Mexican port projects progress, Arizona can partner with the private sector to capitalize on any economic opportunities. This could occur through development of inland ports or other supportive industrial/commercial development. Additionally, partnerships between the state and the private sector could spur construction of the necessary transportation linkages in Arizona, as well as Mexico. With the globalization of industry, numerous opportunities have been discussed in the past for establishing final assembly and testing of finished products in Arizona with sub-assemblies built throughout the world and shipped to Arizona by container, potentially reaching the state through Mexican ports. Undoubtedly these potential opportunities will continue to be explored.

6.5.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ADOC
- Other state agencies (as necessary)
- Regional economic development organizations
- Private sector entities involved in rail
- Municipal, county, tribal, and regional governments, as appropriate

B. Interstate Context

- UP Railroad
- BNSF Railway

- FRA
- Ferromex
- Short line railroads
- FHWA
- U.S. Department of Commerce
- Arizona-Mexico Commission
- DHS (e.g., Customs and Border Protection)
- International governments (national and state)
- CANAMEX Corridor Coalition
- Bureau of Trade Alliance
- Mexican Federal Government
- SCT
- SIDUR
- Mexican municipal, tribal, and regional governments, as appropriate

6.5.5 Risks of Pursuing Strategic Opportunity

At this point, since no substantial action is suggested, the risks to Arizona are minimal. If Arizona fails to monitor future development at Mexican ports, however, it may fail to recognize and capitalize on inland port and other economic development opportunities that new Asian trade routes and deep-water ports can offer.

6.5.6 Estimated Costs

Since no substantial action is recommended in the near term, the cost to the state would be minimal staff time (to ADOT or another agency) to attend any related meetings (e.g., Arizona-Mexico Commission) and stay in communication with Mexican transportation and economic development agencies, as well as stay on top of pertinent economic news.

6.5.7 Relationship to Other Strategic Opportunities

BNSF statewide system development and operations
If Mexican deep-water port activity increases, BNSF may want to gain access to the international border to take advantage of increased shipping opportunities.

UP Tucson metropolitan area system development and operations
If the Port of Guaymas is expanded, the most logical connection to this port is through Nogales and into Tucson. The additional Asian trade could stimulate development of a logistics facility adjacent to the proposed Red Rock classification yard, in addition to providing expansion opportunities for the Port of Tucson.

UP statewide system development and operations
The need for a freight rail bypass around Nogales will increase as freight traffic increases. Enhancement of the Port of Guaymas might contribute to such an increase. In addition, since the UP Sunset Route runs through southern Arizona – the closest of the two Class I railroads in the state to the international border – it would appear that UP might have the easier opportunity to improve or construct new rail linkages to the border to connect with similar Mexican rail lines.

Development/expansion of inland ports
Arizona's biggest opportunity to benefit from Asian trade routes via new Mexican deep-water ports is through the development of inland ports and logistics facilities.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley
If the deep-water port at Punta Colonet is built, a Hassayampa Valley rail corridor could be key to linking the new Asian trade route with other shipping routes nationwide, as this rail corridor may become part of the CANAMEX system.

Development/expansion of short line railroads
Short line railroads could play a role in distributing freight loads from Class I railroads to ancillary facilities, such as inland ports, if freight traffic increases due to Mexican deep-water port development.

6.6 Development/Expansion of Inland Ports

6.6.1 Introduction

Arizona could benefit from facilitating freight-related economic development opportunities through the expansion and development of inland ports and associated logistics facilities (e.g., distribution, warehousing, or transloading facilities), as well as attraction of industrial development that can capitalize on such transportation access along Class I and short line railroads, or at transportation junctions.

Freight rail can provide an important component to economic development through value-added activities that may include manufacturing, distribution, warehousing, and transloading of products. One of the most promising avenues for infrastructure investment related to freight rail is the development of intermodal inland ports and associated logistics facilities (e.g., warehouse/distribution). Inland ports allow containerized freight to be shipped directly from the port terminal to an inland facility for trade processing, sorting, and other value-added services.

The ability to develop inland port and logistic facilities in Arizona is ultimately dependent on meeting warehousing/distribution location requirements, particularly in relation to "just-in-time" product delivery needs.

The following points summarize the attractiveness of locating inland port and warehouse/distribution facilities in Arizona, forming the base of this strategic opportunity for Arizona:

- Arizona has several locations capable of serving the Class I railroads (UP and BNSF) operating at the POLA/POLB.
- POLA/POLB are forecast to reach capacity by 2020, off-loading containers from ships and directly transferring them to trains headed for inland ports, with customs facilities and FTZs potentially providing some relief.
- Inland port facilities located in Arizona can accommodate northbound and southbound NAFTA traffic.
- Sites in Arizona provide direct access to I-40, I-10, I-8, I-17 and I-19 for intermodal truck movements.
- Arizona has no state inventory tax for distribution facilities.
- FTZs created as part of the inland port facility could receive property tax relief through existing Arizona state legislation allowing eligibility for an 80 percent reduction in state real and personal property taxes.
- Costs of doing business in Arizona are below the national average and about one-third lower than in California.
- By 2030, the Sun Corridor Megapolitan area is projected to be almost as large as the current Los Angeles market (12 million residents, 6 million jobs); implying that substantial freight moving through POLA/POLB and new/improved Mexican ports will be destined for Arizona.

The main benefit of inland port development to the Arizona public is the creation of jobs that will occur as a result of the inland port/logistics facilities, as well as supportive industrial development. If an inland port is paired with a FTZ, the related tax advantages will attract certain industries – creating an industrial agglomeration. For example, transshipment companies, such as Wal-Mart, Home Depot, Best Buy, or other big box retailers, locate in FTZs to defer import taxes until the products are "shelf-ready" and prepared for transport. Paying these taxes right before selling products enables the company to reduce potential holding costs in the time lag between product import into the U.S. and product vending in retail stores.

Likewise, manufacturing industries often choose to locate plants in FTZs where they can obtain raw materials, build or assemble products, and either pay import taxes when the finished product leaves the FTZ, or avoid paying any import taxes if the product is then shipped internationally. An excellent example of such a location in Arizona is the Port of Tucson, which serves as an inland port – providing switching and intermodal transfer activities for UP Railroad. This site is also an FTZ, including approximately 1.6 million square feet of warehousing, where several large companies rent out space, including WalMart, Kimberly Clark, Motorola, and several Mexican companies. Other successful examples can be found across the U.S. at major transportation junctions, with one of the more prominent located at Alliance, Texas on the BNSF and UP mainlines.

Regarding the advantage for private sector investment in inland port/logistics facilities, generally investors can take advantage of existing transportation infrastructure put in place by the public sector. As noted above, such facilities typically locate at major transportation junctions, allowing facilities to be placed directly adjacent to either rail or interstate corridors. Smaller infrastructure investments, such as railroad sidings or access roads may be required. Equally important, the tax advantages in place with FTZ designations often attract ready clients.

Three scenarios might foster the development of rail-supported inland ports and related logistics facilities in Arizona. First, if construction of a new deep-water port occurs in Mexico, the prospects improve for intermodal inland port development at Class I railroad junctions (e.g., interstate, state highway, major airport, other Class I railroad junctions) in Arizona, providing an economic opportunity for the state. Currently, UP is the only Class I railroad with access to Mexico through Arizona (Nogales). Development of a new deep-water port might spur a new international rail connection. While many port development plans are currently on hold (in part because of the weak economy), long-range proposals reflect the potential for a new rail corridor in Mexico parallel to the U.S. border to serve Mexican freight traffic. Even without a new port, the ability will exist to connect with the Ferromex rail system to take advantage of existing Mexican port freight traffic bound for the U.S.

The second scenario is coordination with California to relieve congestion at the busy POLA/POLB by constructing inland ports in Arizona to serve overflow freight traffic from the west coast.

Third, continued growth of the Phoenix-Tucson market may make the Sun Corridor at buildout comparable to the Los

Angeles basin today – positioning Arizona to become a major destination for imported goods, not just a pass-through state en route to larger midwestern and eastern markets. Additionally, the growing Sun Corridor will have to diversify its economy, potentially developing new manufacturing industries with commodities for export (e.g., photovoltaic panels). To prepare for these situations, Arizona must become educated on the economic benefits of inland ports and approaches to take advantage of opportunities as they arise.

6.6.2 Background

A. Economic Impact Analysis

An economic impact analysis conducted for this study indicates that intermodal inland ports and associated warehouse/distribution facilities provide a means whereby Arizona can maximize opportunities to capture a share of increasing containerized freight traffic at POLA/POLB and Mexican deep-water ports. Such facilities would help to relieve overcrowding at POLA/POLB. If economic activity quickly returns to 2005 levels, and if POLA/POLB capacity expansion projects are completed, POLA/POLB could reach capacity as early as 2020, but due to the 2008-09 global economic recession, this date is likely to be delayed. The containerized freight would be taken directly off cargo ships and placed on rail cars for delivery to the inland port facilities in Arizona. Once at the facilities, the containers would be processed through customs, sorted, and receive any other required services.

The extent of economic benefits resulting from the inland port and associated facilities would change over time. The initial impacts would be due to the direct expenditures associated with constructing and purchasing services for the inland port, and the resulting employment and income generated for Arizona residents. Subsequent economic benefits would arise from operation of the intermodal rail and warehouse/distribution facilities, allowing the economic benefit to result from a variety of investments, not just inland port development.

The construction and operation of a prototypical inland port and warehouse/distribution facility in Arizona could generate approximately $19 billion in earnings in 2009 dollars and 480,000 full-time jobs (each equivalent to a full-time position for one year) for Arizona between 2023 (first year of operation; approximately when POLA/POLB reach capacity) and 2050. The physical construction of the facilities would amount to approximately 65,000 jobs per inland port and associated warehouse/distribution facilities.

Most important are the continuing jobs associated with operation of the intermodal inland port and warehouse/distribution facilities, which at full buildout (2050) would amount to approximately 360,000 full-time jobs per year for intermodal inland ports and 55,000 full-time jobs per year per each warehouse/distribution facility, as estimated by AECOM economic analysts.

B. Development/Expansion of Mexican Deep-Water Ports

A major opportunity for freight expansion in Arizona involves the development of a new deep-water port facility in Mexico. Five functional ports exist today: Ensenada, Guaymas, Mazatlan, Manzanillo, and Lazaro Cardenas. Several proposals for additional deep-water ports exist, including the new development of the Port of Punta Colonet. Both Punta Colonet and Guaymas would provide direct freight connections to Arizona via an existing or proposed railroad. If any of the above ports are developed or expanded, freight traffic coming through Arizona could provide the foundation for inland port development. See the Mexican deep-port strategic opportunity (Section 6.5) for more details on port specifics.

C. Ports of Los Angeles and Long Beach

A primary opportunity to capture more rail freight in Arizona may result from the capacity constraints facing POLA/POLB. The current annual capacity of these ports is approximately 28.5 million TEUs. With substantial capital investment (about $3 billion), capacity could nearly double. Forecasts of POLA/POLB container traffic demand range from 36.2 million TEUs to 56.4 million TEUs by 2020 – potentially exceeding the ultimate capacity. In the long run, trade with Asia will continue to grow, and while POLA/POLB may not reach capacity in 2020, the ports may reach capacity in the more distant future. Given the large deficiency projected at POLA/POLB, there may be opportunities for the development of inland ports in Arizona to take advantage of freight overflows.

D. Phoenix-Tucson Market

While Arizona has historically served primarily as a "bridge state" to serve through freight, its growth will increasingly lead carriers to view the state as a destination. Therefore, freight carriers and logistics providers will likely move away from combining Arizona loads with loads for other markets. Instead, they will increasingly build whole loads (trucks, rail cars, unit trains) of Arizona-bound cargo. The Phoenix-Tucson market predicts population in the Sun Corridor to increase to 8.5 million by 2030 and more than 10 million by

2040, representing approximately 70 and 83 percent of the size of the 2005 Los Angeles Metropolitan Statistical Area (MSA).

6.6.3 Proposed Strategic Opportunity

Arizona is well positioned to take advantage of economic development opportunities resulting from the development of inland port facilities in the state. First, inland ports in Arizona provide an opportunity to move containerized freight quickly out of POLA/POLB, increasing POLA/POLB efficiency and benefiting Arizona by creating new jobs and earnings. Based on increase of goods shipment from Asia and the likelihood that the POLA/POLB will eventually reach capacity, an additional Mexican deep-water port may eventually be necessary. There is no way to know which Mexican port will develop, if any. But it could benefit Arizona to position itself to support development of a Mexican deep-water port, should it occur. Lastly, inland port development allows Arizona to capture some value from shipments between other states.

This proposed strategic opportunity consists of the following strategies:

A. Facilitate education and coordination of state agencies and the private sector regarding the economic development benefits of inland ports
B. Monitor deep-water port opportunities and actions in Mexico
C. Monitor capacity issues and Improvements for the ports of Los Angeles and Long Beach
D. Identify infrastructure improvements that could support inland port development
E. Develop incentives/funding mechanisms for inland port development in Arizona, and jointly promote with other public and non-profit entities

A. Facilitate Education and Coordination of State Agencies and the Private Sector Regarding the Economic Development Benefits of Inland Ports

Awareness and education is the first step toward inland ports benefiting the Arizona economy. A designated state agency or authority should take the lead in establishing coordination between Class I railroads, short line railroads, other agencies, and the private sector to develop a mutual understanding and education of how best to take advantage of inland port opportunities that may arise. Coordination meetings may result in such action items or implementation needs such as constructing necessary transportation linkages between deep-water ports and inland port facilities, working with cities and towns to enact appropriate zoning for such facilities, and forging intermodal partnerships with freight carriers and shippers. Together, these organizations will be able to establish the roles and responsibilities needed to capture freight-related economic development in a timely and efficient manner.

B. Monitor Deep-Water Port Opportunities and Actions in Mexico

Participation in the Arizona-Mexico Commission provides a conduit for staying informed on Mexican development proposals, specifically related to construction or expansion of deep-water ports. The Commission is a cross-border non-profit organization that works to facilitate cross-border trade, business and community networking, and bi-national information sharing.

In the near term, this strategic opportunity should be primarily a monitoring task. If a new deep-water port in Mexico becomes imminent, Arizona could support development of this port by improving existing and constructing new transportation connections, as necessary. This will require involvement of many U.S. and Mexican state and federal agencies.

C. Monitor Capacity Issues and Improvement Solutions for the Ports of Los Angeles and Long Beach

A designated state agency should take the lead in establishing regular communication with both the POLA/POLB to understand its needs regarding freight support. Preliminary analysis shows that the seaports in California may not reach capacity for 15 years or more, although the ports currently experience significant delays of unpacking cargo (up to two weeks) due to landside capacity issues. However, active monitoring is required to develop a relationship with the ports in California and keep informed of future development plans.

D. Identify Potential Infrastructure Improvements that Could Support Inland Port Development

A designated state agency should be kept informed of potential opportunities for increased freight traffic. Having an understanding of strategic locations for inland port development can allow the necessary entities to proactively plan for potential infrastructure improvements. This may result in attracting private sector investment or working with local communities to set aside land and coordinate master plans and zoning with future freight-supportive facility prospects.

For example, the City of Flagstaff and the Flagstaff Metropolitan Planning Organization (FMPO) undertook the *Northern Arizona Regional Freight Facility Market Analysis* in 2004 to compare two finalist sites – Winslow and Bellmont-Camp Navajo – for a potential inland port/ intermodal facility in northern Arizona. A process for site development was outlined at each facility, as well as a comparison to local and regional land use and zoning ordinances, citing changes that would be required with implementation.

ADOT may choose to become a partner with regional entities and local communities to assist with planning and implementation of transportation infrastructure associated with inland ports. For example, ADOT and the Department of Commerce have jointly commissioned a study through the Greater Yuma Port Authority to evaluate the potential for development of an inland port facility outside Yuma, along the UP Sunset Route. If development of an inland port becomes imminent elsewhere in the state, ADOT may choose to help sponsor and participate in another such study.

E. Develop Incentives/Funding Mechanisms for Inland Port Development in Arizona and Jointly Promote with other Public and Non-Profit Entities

The Department of Commerce, or another state agency charged with leading economic development related to inland ports, should work to establish an incentive system to help attract industrial investment to the state. These efforts could involve state programs, facilitation of federal grant programs, private sector investment, and PPPs. While the state currently offers a series of state incentive programs, the ability to utilize these incentives strongly depends on locating in specific geographic areas, such as the Tucson Empowerment Zone, Phoenix Enterprise Zones, military reuse zones – or is geared towards small business development, which typically does not characterize inland port development. Therefore, this strategic opportunity requires making a specialized effort towards attracting inland port industrial development. Additionally, the nature of inland ports could provide a good foundation for the application of PPPs. For instance, the public sector could pay for infrastructure improvements leading to the port property, while a private entity pays for the construction and operation of the port itself.

Other states, such as Texas, Louisiana, and Kansas, provide various state incentives supporting inland port development, such as tax rebates, industrial property tax exemptions, economic development award programs, tax equalization programs, etc. Arizona could support inland port development in a series of ways. The state could provide an expedited planning review process for inland port developers, using state staff to work with cities and towns. The state could subsidize or provide grants towards infrastructure needs, such as access roads and utilities. Or, Arizona could utilize State Trust lands for inland port development offering this land at an attractive lease rate. This last endeavor would require authorizing legislation to change current state land disposition policy.

6.6.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ADOC
- ASLD
- ACC
- ASLD
- Other state agencies
- FMPO
- Municipal, county, tribal, and regional governments, as impacted
- Regional economic development organizations

B. Interstate Context

- UP Railroad
- BNSF Railway
- FHWA
- FRA
- BLM
- Other federal land management agencies
- DHS
- POLA/POLB
- Other border states, including Sonora
- Mexican Federal Government
- Arizona-Mexico Commission
- Short line railroads
- Private shippers and carriers

6.6.5 Risks of Pursuing Strategic Opportunity

The risk of not taking advantage of inland port and logistic facility development in Arizona is a loss of economic development opportunities. The development of inland ports in Arizona would allow the state to capture economic benefits from the traditional pass-through freight traffic. Analysis conducted by AECOM shows that the economic impacts to Arizona of inland port development can produce

earnings of $19 billion over a 25-year period and employ over 400,000 people a year per facility.

Not much risk would be incurred in conducting ongoing monitoring/coordination activities in the interim to understand the need and feasibility for inland port development in Arizona.

6.6.6 Estimated Costs

The immediate cost to ADOT of this strategic opportunity is only staff costs for monitoring of inland port opportunities and possibly assistance in education of and coordination with stakeholders. Longer-term costs could include annual consultant fees for conducting feasibility and planning studies such as the current efforts with the Greater Yuma Port Authority or Camp Navajo, but are not expected to include construction costs – unless the state enters into an agreement to assist with access roads or other incentivized infrastructure needs.

6.6.7 Relationship to Other Strategic Opportunities

BNSF Phoenix metropolitan area system development and operations
Several sites in the Phoenix metropolitan area are approved FTZs. FTZs and inland ports are often paired together, forming clusters of trade and industrial activity. The Phoenix metropolitan area has the potential to build on its current FTZs or create new ones in strategic locations, depending on future BNSF activities (e.g., relocation of downtown classification yard, other new BNSF freight facilities, new Hassayampa Valley freight rail line).

BNSF statewide system development and operations
Because of its connection into POLA/POLB and its role as a major freight distribution artery, the BNSF Transcon has the potential for several inland port or logistics facilities, including existing proposals near Flagstaff (Camp Navajo) and Kingman. Physical and operational changes to BNSF corridors statewide can affect the timing and location of these facilities.

UP Tucson metropolitan area system development and operations
The Port of Tucson is a functioning inland port, serving the Tucson metropolitan area and other regions of southern Arizona. Physical and operational changes to the UP Sunset Route, other UP corridors, or UP-supported freight facilities will be important to its functionality, and to the prospects for freight-supportive development. The Tucson metropolitan area also has the potential to build on its current FTZs or create new ones in strategic locations, depending on future UP activities.

UP statewide system development and operations
Because of its connection into POLA/POLB and its role as a major freight distribution artery, the Sunset Route has the potential for several inland port or logistics facilities, besides the existing port in Tucson. Physical and operational changes to UP corridors statewide can affect the timing and location of these facilities.

Development/expansion of Mexican deep-water ports
The opening of a new Mexican deep-water port nearer Arizona than current ports may open a huge economic opportunity for Arizona. It would provide the opportunity for expanded or new rail connections into Mexico, taking advantage of international freight traffic from the port, and of new inland port or logistics facilities to serve this traffic. Coordination with port activities is key to this strategic opportunity.

Development of new rail freight/passenger rail corridor in the greater Hassayampa Valley
A new rail freight/passenger rail corridor in the greater Hassayampa Valley would connect the two Class I railroads and possibly provide additional opportunities for inland ports or logistics facilities. Additionally, the extension of such a new rail corridor to Mexico would provide another access point to the Mexican rail and roadway system and a new linkage to future Mexican port development.

Development/expansion of short line railroads
Short line railroads could become major players in distribution between the Class I railroad corridors and freight logistics centers. While many logistics facilities adjoin Class I railroads, the opportunity for participation of short lines should not be ruled out. For example, other states have developed a single short line railroad company to link larger railroads with inland ports, allowing mainline trains to simply drop off and pick up intermodal cars, avoiding delays in the switching and blocking process.

6.7 Development of a New Rail Freight/Passenger Rail Corridor in the Greater Hassayampa Valley

6.7.1 Introduction

Arizona could benefit from constructing a new north-south rail corridor through the state. This corridor could create

an additional connection to Mexico, link the two Class I railroads and their ancillary facilities, promote increased economic development opportunities, and serve as a high-capacity transit corridor in the MAG Hassayampa and Hidden valleys*. A state or regional rail organization may be responsible for governance and oversight of such a corridor, which could become part of a much larger regional rail system.

This strategic opportunity provides Arizona the following:

- Develops a major north-south rail corridor in Arizona, combined with part of the existing BNSF Peavine line.
- Links two major Class I railroads, connecting potentially relocated classification yards for more efficient interchange service.
- Provides a western freight bypass to the Phoenix metropolitan area.
- Accommodates future commuter rail services in the MAG Hassayampa and Hidden valleys.
- Enables BNSF to reach the UP Sunset Route, and both Class I railroads to potentially reach the Mexican border.
- Supports rail-related CANAMEX activities.

While such a corridor has only been proposed in the Hassayampa and Hidden Valleys (from approximately Surprise to Gila Bend), this corridor could extend farther south to Lukeville in the SR 85 right-of-way, providing a new rail connection opportunity to Mexico and thereby benefiting Arizona freight mobility, as well as tourism to various visitor destinations only 60 to 70 miles south of Arizona on the Gulf of California.

**In the existing MAG studies, the Hassayampa Valley is bounded by SR 303L on the east, the 459th Avenue section line on the west, the SR 74 alignment on the north, and the Gila River on the south. The Hidden Valley is located just south of this, bounded by the Gila River on the north, the I-8 corridor on the south, Overfield Road (east of I-10) on the east, and 459th Avenue on the west. For the sake of this strategic opportunity, the study areas cited above will be referred to as the "Hassayampa Valley" and "Hidden Valley". The greater Hassayampa Valley, as referred to in the strategic opportunity title, will refer to the region stretching from Wickenburg to Lukeville.*

6.7.2 Background

A. Freight Transportation

Because of the increase in freight entering the U.S. through the POLA/POLB, both BNSF and UP are undertaking facility improvements to streamline rail freight shipping. For both of these railroads, these include improvements in the Phoenix metropolitan area, which help build a case for a freight rail connection in the greater Hassayampa Valley. Such a connection can remove significant rail freight activities from central Phoenix and thereby free rail capacity for implementation of a regional commuter rail system.

BNSF Railway

The 209-mile Phoenix Subdivision of the BNSF runs between the BNSF Transcon at Williams Junction and Mobest Yard, just west of the Arizona State Capitol. This line is currently single-tracked.

The Phoenix Subdivision, or "Peavine" line, enters the Phoenix metropolitan area parallel to US 60/Grand Avenue and handles approximately 41,000 carloads annually. While some carloads are interchanged with UP, many cars travel to the Mobest Yard (near the State Fairgrounds) to be block swapped and sent back toward Wickenburg to be distributed to customers along the Grand Avenue corridor. The journey along the Grand Avenue corridor includes many major streets crossing the route at four- and six-point intersections. In an effort to improve safety along the entire corridor, BNSF is proposing the relocation of its main switching yard (Mobest) to a potential site in the Surprise planning area. This would reduce the rail/auto conflicts along the corridor and free up capacity for potential rail passenger service along the line into central Phoenix.

A spur of the Peavine, the Ennis Subdivision, runs from Ennis – a junction on the Phoenix Subdivision in El Mirage – west and south to Fennemore siding, where a fertilizer plant is located. The City of Surprise is working with BNSF and private developers to create a new industrial park along the Ennis Subdivision. New warehouse districts, distribution centers, and commercial enterprises are expected to nearly double the business capacity of this BNSF branch. The proposed relocation of the BNSF classification yard to the northwest will concentrate these rail activities and help avoid the long, circuitous trips up and down the Grand Avenue corridor in the future.

UP Railroad

The Phoenix Subdivision of the UP runs from Picacho through the Phoenix metropolitan area to Buckeye and Arlington. The line is currently single-tracked. The west end of the line was formerly operated as a loop that connected back into the Sunset Route at Wellton, east of Yuma. This track still exists, but the portion from Palo Verde west is out of service and used only for storage purposes. UP has made no decision regarding the possible reopening of this

track, which would allow trains to travel over the former Picacho-Phoenix-Arlington-Wellton-Yuma route, allowing renewed freight service from the west into the Phoenix metropolitan area, renewed Amtrak service to Phoenix, and other possible passenger rail opportunities on this route.

The UP has discussed a potential relocation of its Harrison Street classification from east of downtown Phoenix to a site in Buckeye to reduce congestion in the central metropolitan area and to better serve West Valley customers. This yard could free up operating capacity into central Phoenix, allowing the potential for passenger service along MAG's proposed Yuma West corridor – but only if a western connection to the yard is created, either through a new rail corridor, as proposed in this strategic opportunity, or through reopening of the Wellton Branch. Otherwise, the new yard will result in an increase in UP traffic through Phoenix and west to Buckeye.

B. MAG Commuter Rail Planning

MAG has undertaken several studies to foster a regional multimodal transportation system in Maricopa County. As part of these studies, a recommendation has been made to explore commuter rail implementation on the BNSF/Grand Avenue corridor, UP Main/Yuma West corridor, and one or more East Valley corridors (see Section 5.5). The first two routes would serve the West Valley via the freight corridors described above. Corridor development plans are currently underway for both the BNSF/Grand Avenue corridor and UP Main/Yuma west corridor. These plans focus on evaluating passenger rail, freight rail, and roadway traffic projected within the corridors, and on developing phased commuter rail implementation plans. Both corridors depend upon reduced freight traffic heading into switching yards in central Phoenix each day.

C. MAG Framework Studies

MAG has undertaken two transportation framework studies, the Hassayampa and Hidden Valley studies, in rapidly developing areas of Maricopa County and western Pinal County – the Hassayampa and Hidden Valley regions are expected to equal or exceed both Pinal and Pima counties individually in population and employment by 2050. This leads to the conclusion that this region may be able to sustain passenger rail in the future.

The purpose of these studies was to establish a conceptual network of freeways, parkways, arterials, and transit facilities that will be capable of meeting long-range travel demand. As part of these plans, MAG proposed a rail connector through both study areas to connect the two Class I railroads west of the central Phoenix area – diverting switching/blocking traffic from the congested metropolitan core and providing an alignment for shared-use passenger rail. This Hassayampa rail corridor stretches north-south from the BNSF near Morristown (within the Surprise municipal planning area), running south along the proposed Hassayampa Freeway to the UP Wellton Branch, and continuing south parallel to SR 85 and proposed Hidden Waters Parkway to Gila Bend, where it would connect to the UP Sunset Route. This corridor is very conceptual in nature and requires additional study to determine a formal alignment, but north of the Gila River, this area may contain several large master-planned communities. It would be logical to couple the proposed freeway and railroad rights-of-way. The land south of the Gila River is environmentally sensitive, and positioning a new rail line along an existing roadway appears to be the least intrusive alternative. However, this is subject to change depending on the outcome of future alignment and environmental studies.

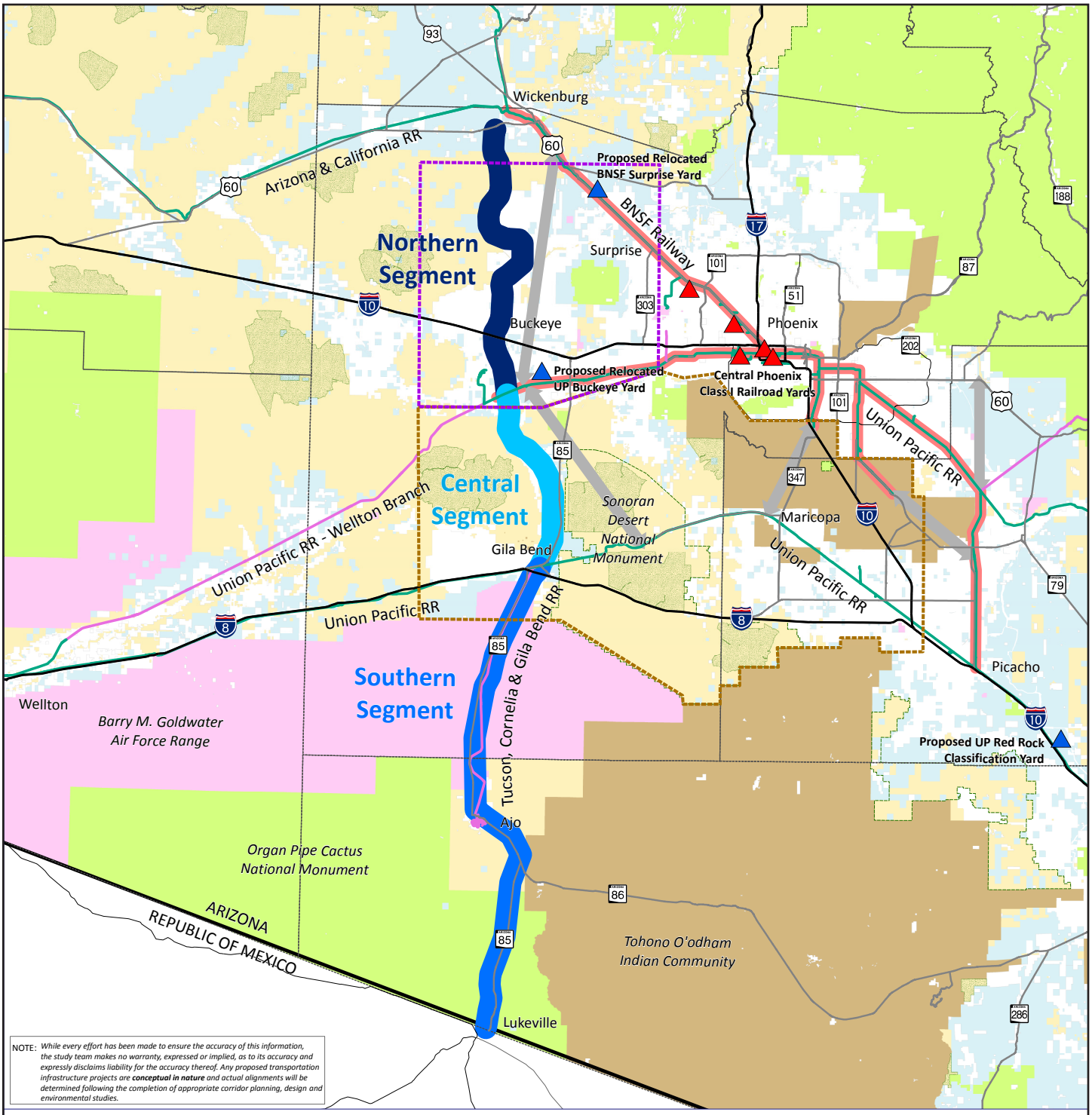
No matter where this proposed rail line is located, implementing future commuter rail along this north-south spine requires successful realization of the proposed east-west commuter rail corridors discussed earlier (see Section 5.5), which would provide connections to central Phoenix.

6.7.3 Proposed Strategic Opportunity

The two MAG framework studies propose a freight/passenger corridor in the far West Valley. The strategic opportunity presented here recommends exploring the feasibility of constructing a potential new shared freight and passenger rail line from the Surprise area as far south as Lukeville (on the Mexican border) in three segments (Figure 26): (1) connection of the BNSF Grand Avenue/Peavine from Wickenburg on the north through the MAG Hassayampa Valley to the UP Wellton Branch (northern segment); (2) connection from the Wellton Branch to the Sunset Route at Gila Bend (central segment); and (3) continuation south to the border near Lukeville (southern segment). The entire route would require new right-of-way, with the possible exception of using the former Tucson, Cornelia, & Gila Bend Railroad right-of-way from Gila Bend to Ajo. These segments would not necessarily be constructed in the order listed. Rather, each could be initiated as certain trigger points are met. Meanwhile, right-of-way preservation should be encouraged in anticipation of future corridor development.

The suggested relocation of both the BNSF and UP main classification yards from central Phoenix to locations in

Figure 26 Potential New Rail Corridor in the Greater Hassayampa Valley



the West Valley would support such a rail connection. This corridor would provide a north-south rail connection, supporting future CANAMEX freight activities and connecting the UP and BNSF.

This proposed strategic opportunity consists of the following strategies:

A. Explore the feasibility of constructing a new rail corridor to connect the BNSF Peavine to the UP Wellton Branch
B. Explore the feasibility of constructing a new rail corridor to connect the UP Wellton Branch to the UP Sunset Route along SR 85
C. Explore the feasibility of constructing a new rail corridor to connect the UP Sunset Route to Mexico along SR 85

The dissection of the greater Hassayampa rail corridor in three segments does not assert that each segment should, or should not, stand alone, but rather it provides a reasonable breakdown for future planning and design into corridors with logical termini. The northern and central segments are linked in purpose and advantages to both UP operations and growth within the Phoenix metropolitan area.

A. Explore the Feasibility of Constructing a New Rail Corridor to Connect the BNSF Peavine to the UP Wellton Branch

One segment of a rail corridor running through the greater Hassayampa Valley from Wickenburg to the Wellton Branch could connect the BNSF Peavine and UP Wellton lines. As proposed in the MAG *I-10 Hassayampa Valley Transportation Framework Study*, this corridor could follow the proposed Hassayampa Freeway, running west of the White Tank Mountains. A connection in this vicinity would intersect with both railroads, possibly near their relocated classification yards. This connection west of downtown Phoenix would provide a freight bypass of the Phoenix metropolitan area to the west and reduce the amount of local and through freight traffic in central Phoenix and adjoining communities.

From a freight perspective, if this segment were constructed independent of and prior to the central segment, UP would have to reactivate the Wellton Branch, allowing freight to travel to Buckeye via the Wellton Branch, intersecting with the UP Sunset Route east of Yuma. However, from an efficiency standpoint, constructing both northern and central segments at the same time allows UP a direct connection between the Wellton Branch and potential Buckeye Yard to the mainline in Gila Bend and links BNSF and UP outside of central Phoenix. This does not negate a potential future reopening of the Wellton Branch for other uses, but does not rely on its reopening to facilitate freight interchange opportunities in the greater Hassayampa Valley. Construction of this new rail facility and potential relocation of Class I classification yards provides the advantage to Arizona of induced economic development along the freight corridor and surrounding the yards.

In addition to freight advantages, this new rail corridor could provide a transit spine through the MAG Hassayampa Valley, supporting future population and employment growth. A north-south connection would link the proposed commuter rail routes on the BNSF/Grand Avenue and UP/Yuma West corridors – allowing commuters in the middle of this growth area to gain access into central Phoenix. Additionally, the new rail corridor would connect the many future major activity centers planned in the MAG Hassayampa Valley, including the town centers of the Douglas Ranch and Belmont master-planned communities, each of which is expected to have more than 100,000 residents at buildout.

ADOT should initiate an AA/EIS on the Hassayampa Freeway corridor, which was recommended as a shared freeway/rail corridor in the MAG studies. This study provides the first opportunity to determine the feasibility of a rail corridor in this vicinity.

Trigger points for construction of this segment might include significant progress in buildout of the Hassayampa Valley, justifying industrial/economic/commercial development and inciting the need for alternative passenger travel options; reopening of the Wellton Branch; or relocation of the Class I railroad yards west of central Phoenix.

B. Explore the Feasibility of Constructing a New Rail Corridor to Connect the UP Wellton Branch to the UP Sunset Route along SR 85

Another segment of this Hassayampa rail corridor extends from the UP Wellton Branch to the UP Sunset Route in Gila Bend. Particularly if the Wellton Branch does not reopen, this would provide a more direct connection to the potential UP Buckeye Yard from the Sunset Route than the circuitous route through Picacho.

Like the northern segment, this segment would provide a transit opportunity for an area expected to experience rapid growth. The new rail line might pass through numerous master-planned communities and future activity centers between Buckeye and Gila Bend. Passenger service along this corridor could connect to the proposed UP/Yuma West corridor, serving the West Valley of Maricopa County.

Freight activity at the junction of the new rail line, the UP Sunset Route, and I-8 could spur freight-related economic development near Gila Bend.

As an independent section, this segment is primarily advantageous to UP, as BNSF already has a western link to the Phoenix area, via the Peavine line. When constructed in tandem with the northern segment, it provides greater benefits, serving both UP and BNSF, as well as reducing the freight impact in the central metropolitan area. This segment, when viewed as one link in the whole corridor, creates the larger portion of a north-south rail corridor in the state – the strategic vision of this opportunity.

Trigger points for construction of this segment might include relocation of UP's downtown Phoenix classification yard to the Buckeye area and significant progress in buildout of the MAG Hassayampa and Hidden Valley areas.

C. Explore the Feasibility of Constructing a New Rail Corridor to Connect the UP Sunset Route to Mexico along SR 85

The southern segment of this new rail corridor could extend south to the Arizona-Mexico border near Lukeville. Implementation of this corridor depends on reconstruction or replacement of the Tucson, Cornelia, and Gila Bend Railroad, which historically ran from Gila Bend to the former ore processing facilities south of Ajo. It was constructed for use by Phelps Dodge Copper to transport mining equipment and ore, as well as passengers, and while some of the track still exists, it is in a deteriorated and unusable state.

If reactivation and improvement to this railroad were deemed economically feasible, new track would have to be laid from Gila Bend to the Mexican border. The land between Ajo and the border is relatively flat and the route straight. However, it crosses BLM land and the Organ Pipe Cactus National Monument, so from an environmental standpoint, it may make the most sense to locate within the existing SR 85 right-of-way. Limited opportunity exists to divert around the National Monument, as the Tohono O'odham Indian Community is immediately adjacent to the eastern monument boundary, and the western boundary is approximately 70 miles away from SR 85.

This segment of the rail corridor, creating a connection to Mexico, is desirable only if one of a few situations arises; which also could be trigger points for construction. First, if a new deep-water port is constructed at the northern end of the Gulf of California, this rail line may be part of a direct connection for Arizona railroads to the new seaport. However, the need for such a port does not appear imminent. Second, the southern segment may be desirable if a rail line is constructed in Mexico parallel to the international border, connecting Pacific Ocean ports to points east. If this occurs, the new rail line through Arizona could connect into the Mexican rail system, taking advantage of increased freight traffic, and, if built as part of the larger Hassayampa rail corridor, could become the CANAMEX rail connection through the Southwest. Lastly, increased tourism between Arizona and Mexico through continued coastal development in the Puerto Penasco area could spur a joint effort to construct this rail corridor as a passenger transportation option.

6.7.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ADOC
- ASLD
- ADEQ
- AZGFD
- Arizona Department of Water Resources (ADWR)
- MAG
- PAG
- Maricopa County
- Pima County
- Municipal, county, tribal, and regional governments, as impacted

B. Interstate Context

- UP Railroad
- BNSF Railway
- FHWA
- FRA
- FTA
- DHS
- BLM
- Tohono O'odham Indian Community
- Barry M. Goldwater Air Force Range (DOD)
- NPS
- Ferromex
- CANAMEX Corridor Coalition
- Arizona-Mexico Commission
- State of Sonora, Mexico
- Mexican Federal Government

6.7.5 Risks of Pursuing Strategic Opportunity

The risk of not constructing a new rail corridor in the greater Hassayampa Valley is three-fold. First, this north-south rail connection jeopardizes Arizona's ability to have a competitive advantage over other Southwestern states, which also are primarily served by east-west rail Class I rail corridors. Furthermore, it denies a rail component to the proposed CANAMEX corridor, reducing the maximum potential economic gain from an ideal multimodal corridor. Last, it negates a public transit opportunity/connection into the proposed MAG commuter rail system for the forecast population growth in the far West Valley – exacerbating congestion on the rails and intersecting roadways in central Phoenix.

The risk of constructing this corridor can only be hypothesized, depending on several future outcomes. If the BNSF and UP do not relocate their classification yards outside of downtown Phoenix, this new rail corridor does provide the benefit of removing freight traffic from the center of the Phoenix metropolitan area, in turn, not reducing freight flow for the potential for shared commuter rail service along the UP/Yuma West and BNSF/Grand Avenue corridors. If the housing market continues to decline, or a change in land use patterns cause the MAG Hassayampa and Hidden Valleys not to develop to currently forecast estimates, future industrial and economic growth, as well as the population to staff these industries, may not be warranted to support freight-related development, negating the need for a new passenger corridor as well. If the CANAMEX corridor does not achieve its full potential, a north-south rail connection may not provide the state its intended economic benefits.

6.7.6 Estimated Costs

Taking advantage of this strategic opportunity would begin by setting aside right-of-way for future development of a new rail or rail/highway corridor through the greater Hassayampa Valley. The cost to trigger right-of-way preservation is the completion of approved environmental documentation for the corridor segments. This will require one or more AA/EIS for the segments described above. Funds for a portion of the northern segment have been earmarked within the proposed FY 2010 Federal Budget, which, if funded, have a matching requirement by ADOT. The project is actually an AA/EIS for the Hassayampa Freeway corridor from US 93 near Wickenburg to I-10 in Buckeye, but in much of this corridor MAG has proposed a new freight/passenger rail corridor to run parallel to the freeway, possibly in the same right-of-way.

Additional AA/EIS will be required for planning and designing the rest of the proposed rail corridor. Discussions will be necessary later to determine ownership and operations of the new corridor, which would include shared-use agreements for freight and passenger rail.

6.7.7 Relationship to Other Strategic Opportunities

Megapolitan extensions of the Phoenix/Tucson intercity rail corridor

As intercity rail is planned to connect Phoenix with Tucson, an eventual extension north of Phoenix to Prescott or Flagstaff may be warranted by future growth. If this occurs, the connection will likely follow the BNSF Peavine line. This provides an opportunity for a passenger rail connection of the Peavine with the new rail corridor proposed in this strategic opportunity. Coordination of planning efforts, specifically station locations and rail junctions, should occur within a state and/or regional rail organization.

Incorporation of MAG and PAG commuter rail planning

Coordination between ADOT (or a state rail organization), MAG, and PAG should be one concerted effort moving forward. For the realization of a true Sun Corridor rail system, including the commuter systems in the metropolitan areas and the intercity service connecting them, all three entities need to be planning a cohesive system with agreed upon standards, technologies, and phasing. The proposed Hassayampa/Hidden north-south line would become an integral part of this system.

BNSF Phoenix metropolitan area system development and operations

The BNSF Peavine line is the railroad's only direct link from the Transcon in northern Arizona to the Phoenix metropolitan area. Future improvements, changes in freight traffic, or a future change in ownership (of the Peavine) can all affect development of a new shared-use rail corridor through the greater Hassayampa Valley, as a junction between the UP and the BNSF is central to its purpose.

BNSF statewide system development and operations

The new north-south rail corridor might provide BNSF the means for a freight connection to Mexico, providing new opportunities for shipping routes and customers.

UP statewide system development and operations

Future improvements, changes in freight traffic or commuter opportunities, or a potential change in ownership (of the

Wellton Branch) would affect development of a new rail corridor through the greater Hassayampa Valley, as the new route would intersect the Sunset and the Wellton Branch.

6.8 Development/Expansion of Short Line Railroads

6.8.1 Introduction

In the U.S., railroads are classified into three types. Class I railroads have an annual operating revenue exceeding $319.3 million per year. There are seven such railroads in the U.S.—including the BNSF and UP, which traverse Arizona. Class II railroads have an annual operating revenue between $25.5 million and $319.3 million and are referred to as regional railroads. Class III railroads have an annual operating revenue less than $25.5 million and all terminal and switching railroads are considered members of this class regardless of revenue. Class III railroads are also typically referred to as "short line railroads", with thirteen in Arizona.

Arizona could benefit from preserving short line railroad right-of-way for freight and/or passenger use and increased economic development opportunities through the determination of a funding assistance program for short line railroads. Short line railroads are an essential component of a fully-functioning rail network for Arizona. To work most effectively, the rail network needs a healthy balance of Class I/Class II and short line railroads. Class I/Class II carriers (which will be collectively called "larger railroads") provide a highly efficient mode for transporting goods long distances, but they are less efficient for hauling over shorter distances on branch lines with less demand. As a result, the larger railroads have sold off many of these branches to short lines. These short lines can often foster community and economic development in places that may be less economical for larger carriers to serve. In some cases, short lines may also be more open to sharing rail corridors with passenger service.

This strategic opportunity provides Arizona the following:

- Expands industrial and economic development opportunities along short line railroads.
- Supports manufacturing, mining, and other new industries located away from the major Class I railroads.
- Supports Class I railroad switching/blocking activities; could potentially serve as distribution link between Class I railroads and inland port facilities.
- Allows for potential passenger rail along short lines.

6.8.2 Background

A. Existing Statewide Short Line Railroad Funding Assistance Programs

Assistance programs for short line railroads have been implemented in 19 states across the country. These states have provided funding for short lines and have thereby taken the lead in strengthening a vital connection in the national freight system. A synopsis of state short line programs is provided below to show the types of programs that Arizona may want to consider. Only two of the states – Oregon and Washington – are in the west.

Florida

The State of Florida offers loans through its Strategic Intermodal System. This program identifies statewide and regionally significant facilities relating to all modes of transportation, with the goal of joining all modes into one seamless system. Funding is available for all types of railroads including short lines.

Illinois

Illinois offers both loans and grants through its Rail Freight Program to help assist all types of railroads. Loans vary in length from 5 to 25 years, with loan repayments made annually. This program is paid for out of the General Fund, from which no new funding has been forthcoming since 2002. In order to keep the program operating, the loans have been constantly recycled.

Indiana

The Industrial Rail Service Fund offers grants only to Class II and III railroads in Indiana. This program was established by the state legislature to help with capital improvements and rehabilitation of railroad infrastructure throughout the state. The fund has awarded over $20 million through 90 grants since 1999.

Kansas

In 1999, Kansas established the State Rail Service Improvement Fund, which is part of the Comprehensive Transportation Program but tailored specifically to short line railroads. The program offers special prime interest rates for loans relating to rehabilitation of railroad infrastructure, with the goal of improving the overall state system. The program began in 2000 and has provided $3 million per year as recently as last year. Monthly payments are made to repay the loans over a 10-year period after the project is completed. The goal of the State Rail Service Improvement Fund was to become self-sufficient (e.g., fully revolving or recycling) at the end of 2008.

Maine
Maine created the Industrial Rail Access Program with a budget of $1 million in 2007. The program requires a 50 percent match from the railroads. The purpose of these funds is to help increase the movement of goods via freight railroads throughout the state, while increasing economic development.

Michigan
Since 2002, Michigan has offered non-interest-bearing loans through the Michigan Rail Loan Assistance Program, which is open to all types of railroads. A funding match of at least 10 percent is required, and loans are limited to $1 million per project. Loan uses range from rehabilitation of tracks to acquiring additional right-of-way.

Minnesota
The Minnesota Rail Service Program has provided loans through the issuance of bonds for short line railroads since 1976. The Rail Line Rehabilitation Program and the Capital Improvement Loans Program are its components. The former program helps with the rehabilitation and/or preservation of rail lines, while the latter assists with improvements to rail facilities. The program currently recycles the loans, staying self-sufficient.

New Hampshire
Since 1997, New Hampshire has offered loans to short line railroads only. The funding comes from bonds and the money has been used for track repair and purchase of new locomotives.

New Jersey
New Jersey has been distributing state funds for projects through the State Rail Plan since 1983. The program is open to both Class II and Class III railroads, with the state funding 90 percent of the total cost and the railroad providing the remaining 10 percent. After a project has been deemed eligible, it competes against other eligible projects until it is prioritized for funding.

New York
New York has four types of programs under its Rail Capital Improvement Program. These funds provide assistance for rail projects and are open to all types of railroads throughout the state. The Passenger and Freight Rail Assistance Program can provide up to $20 million per year until 2010 for rail improvement projects. The funding for Amtrak Adirondack service (City of New York to Montreal) has come from this program since 2003. The Rebuild and Renew New York Transportation Bond Act of 2005 can provide up to $27 million each year for five years until 2010 for projects that include rail as a component. A difference between these two programs is that a 10 percent match is required for projects funded by the bond program. The third program is the Industrial Access Program, which provides assistance made up of 60 percent grants and 40 percent loans. Projects that can prove their ability to create or retain jobs are eligible for up to $1 million. The loan must be paid back within five years. Lastly, the State Legislature can appropriate money for loans to improve transportation, including rail, via the sale of bonds by either the New York Thruway Authority or the New York State Dormitory Authority.

North Carolina
The Rail Industrial Access Program administers grants for the sole purpose of rehabilitating or constructing spur tracks. The program is open to all types of railroads; railroads receiving assistance have to front 50 percent of the project costs.

Ohio
Starting in 1994, the Ohio Rail Development Commission offered grants and loans for short line railroads. Short lines can apply for the Rail Line Acquisition/Preservation Program or the Rail Line Rehabilitation Program. Funding for these programs comes from the state general revenue fund; if grade crossing upgrades are included, federal funds can be used. Successful projects range from construction of new spurs to mainline track rehabilitation.

Oregon
The Oregon legislature designated $2 million in 2001 to create a short line infrastructure program offering loans and grants. In 2003, the legislature approved an additional $2 million for the original program and began an $8 million rail spur program for all types of railroads. The legislature authorized $100 million each in 2005, 2007, and 2009 for Oregon's Multimodal Transportation Program, known as ConnectOregon I, II, and III. From these three authorizations, the fund for railroads received $50 million, $45 million and an amount still to be determined.

Pennsylvania
The State of Pennsylvania offers two programs under its Rail Freight Funding Program. The first is the Rail Freight Assistance Program, which offers grants to Class II and III railroads and requires a 30 percent match in funds with each grant not exceeding $700,000. These grants are to assist railroads in expanding and rehabilitating their rail lines throughout the state. The second program, called the Rail Transportation Assistance Program, involves railroads lobbying their local state representative to obtain an earmarked line item in the annual Capital Budget. This option also requires a 30 percent match.

Tennessee
The Short Line Railroad Rehabilitation Program is funded by a tax on diesel fuel used by aeronautics, railroads, and towboats. From this tax, the short line program is financed. The program is split into two parts; track rehabilitation, and bridge rehabilitation, with both requiring a 10 percent match. Over the past ten years, the program has awarded $66.87 million to short lines in Tennessee.

Vermont
Vermont provides assistance to railroads to help strengthen their customer base. Vermont pays up to one-third of the project cost while the railroad and shippers share the remaining cost.

Virginia
Since 2005, Virginia has offered grants and loans through its Rail Enhancement Fund. The fund established a dedicated funding source for rail, offering two types of funds: Rail Industrial Access Grants and Rail Preservation Grants. Both programs provide grants and loans to all types of railroads, and both require a 30 percent match.

Washington
The State of Washington has a State Rail Grant and Loan Program, which is made up of a Rail Bank Program and a Freight Rail Assistance Program. The Rail Bank was allocated $2.5 million for years 2007-2009 and offers loans with a minimum 20 percent match. The state hopes to allocate $5 million to the program starting this year. The Freight Rail Assistance Program has no matching requirement, provides $2.5 million in loans and grants every two years, and is awarded for larger capital projects.

Wisconsin
The Wisconsin Rail Assistance Program, created in 1992, is made up of two parts: the Freight Railroad Infrastructure Improvement Program (FRIIP) and the Freight Rail Preservation Program (FRPP). The FRIIP offers loans to all types of railroads for improvements to rail lines, and has loaned $72 million since 1992. There is no match requirement and the program currently recycles the loans to stay self-sufficient. The FRPP offers grants for preserving existing rail lines. Since 1980, $92 million in grants have been awarded; a 20 percent match is required.

B. Existing Short Line Railroads in Arizona

The following short lines are currently in service within Arizona and illustrated on Figure 27:

Freight:
- Apache Railway
- Arizona and California Railroad
- Copper Basin Railway
- San Pedro & Southwestern Railroad

Freight and Passenger:
- Arizona Central Railroad and Verde Canyon Railroad
- Arizona Eastern Railway and Copper Spike Railroad

Passenger Only:
- Grand Canyon Railway

Non-Common Carriers:
- APS-Cholla Railroad
- Phelps Dodge Clifton Railroad
- Camp Navajo Railroad
- McElhaney Cattle Company Railroad
- Black Mesa & Lake Powell Railroad

Additional information on short lines in Arizona, such as ownership, miles of track, annual carloads and location of operations can be found in *Technical Report #1: Summary of Key Issues and Background Data, April 2009, Appendix B*.

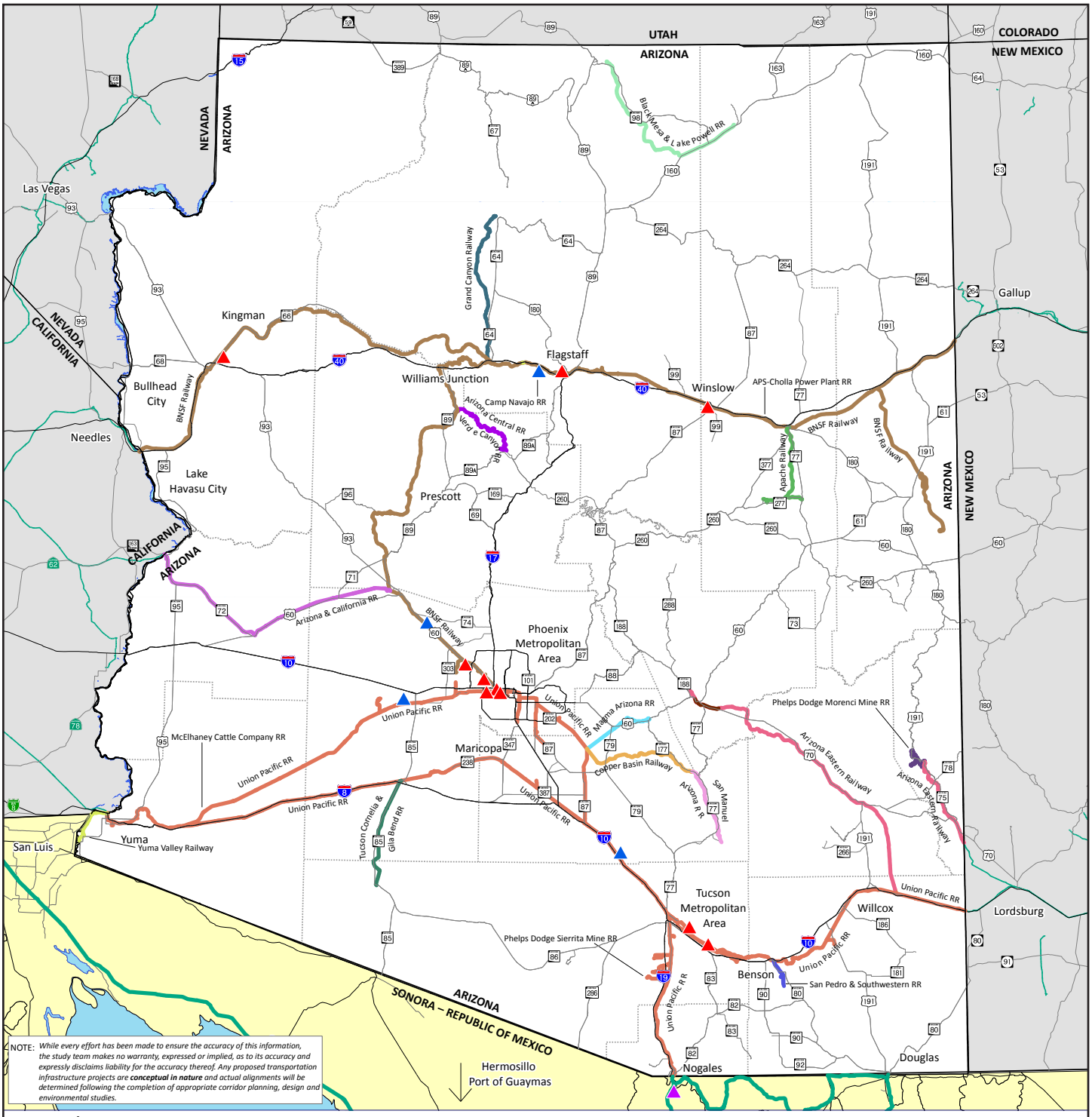
C. Federal Safety Standards

The FRA sets minimum safety standards, but railroads often set more stringent standards for themselves because a higher degree of safety is in their best interest. This is generally the case on high density mainlines of the Class I railroads. Short line railroads, on the other hand, often have less traffic volume and limited resources for track maintenance and capacity improvements, so they usually maintain their lines to federal safety standards. Track and structure conditions often limit the weight of cars and the speed of trains, posing capacity constraints.

The federal Rail Safety Improvement Act (RSIA) of 2008 mandates Class I railroads that carry passengers or hazardous materials, and short lines that carry passengers, deploy positive train control (PTC) on their mainlines by December 31, 2015. While PTC does provide improved safety, it is very expensive to implement. Centralized traffic control (CTC) is a prerequisite for some types of PTC. CTC and PTC are each estimated to cost $100,000 per mile. For a railroad to equip a non- signaled line with PTC, an investment of $200,000 per mile may be required. Such investment may not be cost-effective for a lower density line and may indirectly lead to Class I railroad divestitures of branch lines.

In 2009, FRA issued new requirements for accurate railroad bridge records and annual railroad bridge inspections.

Figure 27 Existing Arizona Railroads



FRA states that this is to "prevent the deterioration of railroad bridges and reduce the risk of human casualties, environmental damage and disruption to the Nation's railroad transportation system that would result from a catastrophic bridge failure" (Rail Safety Improvement Act of 2008, Section 417). Generally, Class I railroads already keep good records of their bridges and will likely have little trouble complying with the new requirements. Short line railroads, however, may have difficulty implementing the new regulations.

D. Current Condition of Arizona Short Lines

Class I connections are vital to the success of Arizona's short lines, but the Class I railroads have a strong advantage over short lines in negotiating business terms. They can raise rates in areas where service at lower rates is not preferable. Such actions can deter efforts of short lines to increase business opportunities. Several of Arizona's short lines have raised concerns about the operating procedures and policies of Class I railroads, and may need assistance negotiating with the Class I railroads.

Capacity is increased not only with additional tracks or with track improvements, but also with modernization of the communication network; PTC and updated traffic control signal systems. Short lines may have capacity constraints if their tracks are not suitable for the weight of cars that the Class I railroads typically carry. The trunk lines of Arizona's Class I railroads already have CTC, but their branch lines and the independent short lines typically do not. PTC is expected to further increase track capacity. Capital is often tight for short line railroads, so they may not have the funds to improve their network. Arizona's short lines may require financial assistance for replacing ties and rail, for upgrading bridges and installing signal systems (where the latter exist) traffic control and PTC. Often the loads that bridges can safely bear are the greatest capacity constraint.

6.8.3 Proposed Strategic Opportunity

It would be beneficial for Arizona to develop a long-range rail strategy that exploits both the efficiency of larger railroads in moving large volumes of goods for long distances and the flexibility of short lines in providing direct deliveries and pickups of freight cars to commercial and industrial customers. Right-of-way of short lines that are no longer in service could be preserved for future transportation corridors. A funding assistance program for short line railroads could be created to support industrial and economic development opportunities statewide. Short lines could (and do) support manufacturing, mining and other industries, serve as a link between larger railroads for switching and blocking activities, and serve inland port facilities. Finally, preserved right-of-way could serve as a vital link for future development of a comprehensive passenger rail system for the Sun Corridor Megapolitan area.

This proposed strategic opportunity consists of the following strategies:

A. Develop a qualitative and quantitative inventory of short line rail infrastructure in Arizona
B. Preserve out-of-service right-of-way
C. Preserve out-of-service short line right-of-way through rail banking
D. Attract industry to existing short lines
E. Monitor legislation for state or federal funding opportunities

A. Develop a Qualitative and Quantitative Inventory of Short Line Rail Infrastructure in Arizona

To fully understand the status of the rail system in Arizona and existing opportunities, the state would benefit from developing an inventory of short line rail infrastructure. The 2007 *State of Arizona Railroad Inventory and Assessment* prepared by ADOT serves as a starting point, but additional research should be conducted to create a more accurate and comprehensive inventory of short line railroad infrastructure and operations.

Operating railroads are fairly straightforward to identify. For those lines that are no longer in service, Arizona should determine whether the Surface Transportation Board or its predecessor, the Interstate Commerce Commission, has officially approved abandonment. Further research may be warranted on abandoned lines to determine who owns the property and whether it is possible for the routes to be re-established for rail or other transportation.

B. Preserve Out-of-Service Right-of-Way

Railroads will become even more vital to Arizona as its population increases. Existing highway systems will not be able to accommodate the auto and truck traffic, and building additional highways may be infeasible for financial and environmental reasons. In order to allow some of this growing traffic to be diverted to rail, the rail network should be preserved, not only for freight traffic, but also for passenger service. It would be beneficial for Arizona to ensure that the lines are preserved for future transportation. Examples are the Magma Arizona Railroad and San Manuel Arizona Railroad, which are currently out of service. The State of Arizona may offer incentives to

encourage industrial development along the lines to build a more diverse customer base that would allow the lines to reopen. Also, Class I divestures of branch lines such as the Nogales Subdivision or Peavine line could be preserved and be later used as part of a future passenger rail system.

Other states have encouraged preservation of rail rights-of-way by providing financial assistance to short lines or others for the purchase of branch lines, rather than letting them be abandoned, or have directly purchased lines themselves. The railroad lines that states have taken over have been used as trails, leased out to and operated by short lines, or held for future use. The objective of rail preservation is to prevent the loss of any additional rail corridors. Rail corridors can prove to be valuable assets for future freight or passenger rail use, economic development activities, and for providing recreational opportunities through a Rails to Trails Program. The Rails to Trails Program involves a trail being constructed using existing railroad right-of-way for recreational purposes, with the understanding that the corridor can revert back to a railroad line if necessary.

C. Preserve Out-of-Service Short Line Right-of-Way through Rail Banking

Once abandoned, railroad right-of-way can be difficult or impossible to recover for future transportation use. Some railroad rights-of-way were acquired through government land grants that may be conditional on continuous operation of the line, while others are merely an easement that reverts to the property owner if the line is not used for transportation purposes. If Arizona anticipates any future transportation use for the rail lines within its borders, it should, at a minimum "rail bank" the lines in order to preserve them for that potential use. Rail banking preserves the rail line, generally does not cost the state anything, but relieves the railroad from maintaining the line.

D. Attract Industry to Existing Short Lines

An accurate rail inventory can help to identify short lines that could serve existing and future industries (manufacturing, mining), and link them to the larger rail system. The state could then work to attract new rail-served industries to locations along short lines rather than on a Class I mainline. Class I railroads often discourage new businesses from locating near mainlines through strict policies and regulations, in order to maintain uninterrupted interstate movements. These industries could then offer employment to residents of the area without generating a great deal of additional truck traffic.

E. Monitor Legislation for State or Federal Funding Opportunities

Short line railroads are required to maintain infrastructure and pay taxes on dormant rail corridors. This expenditure on inactive corridors can often burden a short line railroad company to the point of abandonment. To avoid railroad abandonment, a rail assistance program for short line railroads could provide them with capital investments and to help them comply with FRA regulations. Arizona would require new legislation to form and fund a rail assistance program. Political support needs to come from both the local and state levels. In addition to state funding opportunities, states that monitor legislation at the federal level have taken advantage of emerging opportunities for the development of their own state rail systems.

6.8.4 Stakeholders

A. State Agencies/Regional and Local Organizations

- ADOT
- ACC
- ADEQ
- ASLD
- Short line railroads
- COGs and MPOs
- Municipal, county, tribal, and regional governments, as impacted
- Regional economic development organizations
- Rail-related industries including tourism, gaming, and mining
- State, county, and city parks departments (for potential rails to trails)

B. Interstate Context

- BNSF Railway
- UP Railroad
- FRA
- Surface Transportation Board
- FHWA

6.8.5 Risks of Pursuing Strategic Opportunity

The greatest risk of this strategic opportunity is not investing in the short line railroad system in Arizona. If investments are made in the railroad companies and they subsequently fail from an operations standpoint, the state still has the right-of-way and infrastructure at their disposal. Every transportation corridor is an asset to the state and should be preserved for future multimodal usage, as once

the railroad is abandoned, the right-of-way may never be recovered.

6.8.6 Estimated Costs

The cost of purchasing or even assisting short lines can vary greatly. To have a strong short line rail system in the state, four types of capital investment are needed:

- **Track Improvements:** Upgrades of existing track so that all short line railroads can handle larger and heavier railroad cars and construction of new tracks to access new markets.
- **Bridge Improvements:** Repairing, reconstructing and constructing bridges to improve safety and capacity.
- **Traffic and Train Control:** Installing PTC as required by the FRA.
- **Right-of-way Preservation:** Preserving short line right-of-way for future transportation corridors statewide.
- **Operations and Maintenance:** Ensuring that locomotives, freight rail cars and railroad facilities are in good repair.
- **Administration Cost to a State Rail Organization:** Creating and staffing a portion of a state rail organization to oversee the financial assistance program.

6.8.7 Relationship to Other Strategic Opportunities

BNSF Phoenix metropolitan area system development and operations

If BNSF consolidates their Mobest, Desert Lift, and El Mirage Yards to the proposed new yard in Surprise, or another location northwest of the Phoenix metropolitan area, the Peavine line would be freed up for other rail activity between the new yard and downtown Phoenix to Union Station. These changes would allow the possibility of BNSF divesting this branch line to a short line railroad.

BNSF statewide system development and operations

Arizona could purchase the Peavine line from BNSF if the railroad were willing to sell. This branch could become a short line used for rail passenger service and local freight deliveries. Another alternative consists of a PPP between the state and a private contractor, in which the state would purchase the branch, but the contractor would operate both freight and passenger service, and possibly control the line through a renewable long-term lease. The PPP could provide incentives for capital investment and rail operations by offering the private partner some or all of the line's operating revenue during the term of the lease. Such an agreement would enable the state to reserve time slots for commuter and intercity passenger rail, leaving the line open for freight operations at other times. Or the line could remain in private hands, with a public entity purchasing specific slots for passenger operations. Recently enacted state legislation, known as House Bill 2396, gives ADOT wide latitude to structure PPPs that meet passenger and freight transportation needs.

UP Tucson metropolitan area system development and operations

The Tucson Yard will still be used for blocking trains on the UP Sunset Route even if the yard at Red Rock is built. However, there could be potential to utilize short line railroads for distribution of freight from both yards to other industries.

UP statewide system development and operations

Purchase of the Wellton Branch by the state could create an opportunity for a short line railroad to provide passenger and freight service.

Development/expansion of inland ports

Short lines can take advantage of the inland port market by encouraging them to be constructed near their lines and then transport goods to the Class I railroad mainlines. Inland ports might also establish their own short lines to switch inbound freight cars throughout their facilities, as well as block cars for pickup by Class I railroads along their mainlines. Class I railroads can then quickly receive the railcars and leave for the destination immediately.

7.0 Implementation Pursuits and Actions

This section proposes a number of actions that ADOT (or other responsible state agency) can embark on to take advantage of the thirteen strategic opportunities identified in Sections 5.0 and 6.0. These actions are grouped into six key pursuits, recommended for implementation either immediately (by 2010), in the near-term (2010 to 2015), or in the long-term (2015 to 2050). While the six pursuits are designed to be mutually reinforcing, they are also independent in their focus on different elements of the existing and envisioned statewide rail system. Each track contains a series of implementation actions designed to take advantage of one or more strategic opportunities, as appropriate. These pursuits and implementation actions will be incorporated into the larger Statewide Transportation Planning Framework program recommendations to form a comprehensive and multimodal long-range vision and action plan for the state.

Two of the pursuits for system development address passenger rail and four address freight rail. Because Arizona now has substantial rail freight activity but minimal passenger service, the first two pursuits tend to emphasize new initiatives, while the other four deal more with improving existing infrastructure and operations. All, however, are intended primarily to benefit the citizens of Arizona and stimulate new and expanded economic development, while also enabling the railroads to operate more safely and efficiently. The goal is to create outcomes of mutual benefit to both Arizona and the railroads.

Of the two pursuits for passenger rail, the first focuses on development of service in the Sun Corridor between metropolitan Phoenix and Tucson, eventual extension farther north and south, and integration with commuter rail being planned in Maricopa, Pinal, and Pima counties. The second track consists of planning for future interstate high-speed rail service, its evolution from conventional intercity rail, and coordination with neighboring states.

The first of the four freight pursuits is oriented toward strengthening the role of the state in supporting rail transportation as a critical element of the Arizona economy. The second is geared toward making all modes of transportation safer and more efficient by reducing occasions for conflict between railroads, motorists, and pedestrians, especially in congested urban areas. The third and fourth lay out actions that the state can take to enhance economic development through cooperation with both the Class I railroads and the short lines, which face different sets of challenges, needs, and opportunities.

A separate section recommends implementation actions with regard to organization and governance of the state role in rail planning. The recommendations are general and there is no attempt to choose between different approaches to governance.

Finally, a matrix presents implementation timeframes – immediate, near-term, and long-term – for each implementation action listed.

The pursuits and their implementation actions are labeled with a "P" for passenger rail, "F" for freight rail, or "G for governance; a track number; and a lower-case letter for the implementation action. These labels correspond with the table that proposes a timetable for each action.

7.1 Passenger Rail Pursuits

Passenger rail will provide an important alternative mode of transportation as Arizona's population and employment more than double over the next 40 years. It will enable adequate connectivity between activity centers, thereby allowing efficient movement of people throughout the state and stimulating future economic development. The following pursuits lay the foundation for implementation of an integrated high-speed rail (HSR), intercity rail (ICR), and commuter rail system, with connectivity throughout the state and the southwestern U.S.

P1. Implement an integrated passenger rail corridor as a multimodal spine to create and support focused growth and sustainable development in the Sun Corridor Megapolitan region

Growth of the Sun Corridor Megapolitan region will lead to increased transportation demand for both passengers and goods. It will not be possible to solve congestion by

improving either roadways or rail alone. Constructing a passenger rail corridor that traverses the Sun Corridor, starting with a Phoenix to Tucson link, will give travelers a new modal option, improve regional connectivity, support focused growth, and reduce impact to the environment by using existing rail corridors and clean technologies.

P1(a) Complete a State Rail Plan that satisfies Federal Railroad Administration (FRA) requirements and serves as the basis for federal and state funding investments, based on the 40-year vision provided by the Statewide Rail Framework Study.

P1(b) Establish and maintain a Statewide Passenger and Freight Rail Advisory Committee, made up of private and public sector stakeholders, as a forum for discussion of topics that relate to rail, such as land use, transportation, and urban form relationships; economic development; intermodal connectivity; station-focused urban development patterns; environmental conservation; climate change/ sustainable technologies; and affordable housing.

P1(c) Initiate a NEPA-compliant Alternatives Analysis (AA) that builds community consensus for the Phoenix/ Tucson ICR corridor, establishes a regionally preferred alternative, and sets the stage for documentation required under the National Environmental Policy Act (NEPA). As part of this process, initiate discussions with key stakeholders (e.g., host railroads; host communities; local, state, and federal agencies).

P1(d) Pursue funding to complete the AA with a full Environmental Impact Statement (EIS) and Record of Decision (ROD) for a preferred Phoenix/Tucson ICR alignment.

P1(e) Study the feasibility of ICR as a potential component of a new multimodal corridor for the Pinal North-South Freeway corridor in the recently initiated ADOT Design Concept Report (DCR). If determined feasible, this option could then become an alternative alignment considered in P1(c) and P1(d), above.

P1(f) Adopt an ADOT policy that requires all future major corridor and system studies to evaluate multimodal opportunities within highway rights-of-way. This might mean another transportation mode in a freeway median or outside the roadway envelope; or added lanes for transit or high-occupancy vehicles.

P1(g) Promote a rail culture among state agencies and other stakeholders, so that rail is viewed as a viable transportation mode for varied trip lengths and purposes.

P1(h) Once an alignment for Phoenix/Tucson ICR has been established, negotiate agreements with stakeholders regarding such activities as railroad or right-of-way purchases, trackage and/or operating rights, land exchanges, transit oriented development planning within station impact areas, and municipal rezoning.

P1(i) Continue to work with MAG to coordinate commuter rail and ICR planning in Maricopa County and northern Pinal County. Examine implications of track-sharing between commuter rail and ICR (e.g., station locations, system design, operations, infrastructure requirements, funding). Ensure transit connectivity at rail access points, implementing local transit linkages and feeder service to transport travelers from station locations to destinations.

P1(j) Coordinate with other regional planning entities to examine implications of integrating ICR with other regional transit systems being planned (e.g., PAG commuter rail, Sun Tran, METRO light rail, RTPA/ Valley Metro, etc.). Ensure transit connectivity at rail access points, implementing local transit linkages and feeder service to transport travelers from station locations to destinations.

P1(k) Coordinate with local and regional planning entities to establish responsibilities for construction, finance, operation, and governance of commuter rail and ICR systems in regions that may have both types of service (e.g., coordination among METRO, RPTA, MAG, and ADOT in Maricopa County, for example).

P1(l) Examine system connectivity and infrastructure design implications of constructing ICR and HSR as part of an integrated passenger rail system. Maintain coordination between ICR planning in Arizona and HSR planning in the southwestern U.S.

P1(m) In collaboration with MAG, work to gain access to, and potentially control of, the BNSF Phoenix Subdivision ("Peavine") for implementation of commuter rail along US 60/Grand Avenue, and ultimately of ICR toward Prescott and Flagstaff. A feasibility study, AA, and EIS will be required for both commuter rail and ICR, if federal funds are to be utilized or federal lands affected.

P1(n) Partner with BNSF to construct infrastructure improvements in the Peavine corridor to facilitate shared freight and passenger use. Examples are additional freight sidings, a new "wye" at the Ennis Subdivision, and smoothing of curves and grades, as well as related roadway improvements.

P1(o) Explore the feasibility of partnering with Amtrak as a potential operator for ICR service.

P1(p) Use the Statewide Rail Framework Study and Phoenix/Tucson AA/EIS to begin discussions with stakeholders and the public on a dedicated state funding source for rail and transit.

P1(q) Pursue all opportunities to maximize federal funding for rail in Arizona, recognizing the need for a State Rail Plan, community consensus on Phoenix/Tucson ICR, state matching funds, and ADOT staff capacity. Near-term funding opportunities may include American Recovery and Reinvestment Act of 2009 (ARRA) grants and resources that may become available through SAFETEA-LU reauthorization.

P1(r) Work with all key stakeholders to plan, create, and implement transit-oriented development at rail access points, creating true mixed use economic activity centers at appropriate station locations, through encouragement of changes to local and regional land use and zoning regulations, as well as potential development incentives.

P1(s) Finance and construct Phoenix/Tucson ICR corridor, as warranted by population and employment growth; purchase locomotives and rolling stock; obtain necessary permits; and begin operations.

P1(t) Work with UP regarding potential shared use of the Nogales Subdivision as a possible extension of ICR from Tucson to Nogales. A feasibility study, AA, and EIS will be required, if federal funds are to be utilized or federal lands affected. Activities may need to be planned to prepare a seamless linkage of corridors, including freight bypasses around both Tucson and Nogales and a wye connection of the UP Sunset Route and Nogales Subdivision.

P1(u) Once the Peavine passenger route is established, work with BNSF to coordinate ICR extension north to link with the Grand Canyon Railway at Williams and east along the Transcon to link with Flagstaff. A feasibility study, AA, and EIS will be required, if federal funds are to be utilized or federal lands affected. Activities may need to be planned to prepare a seamless linkage of corridors, including a freight bypass around Flagstaff.

P1(v) Finance and construct feasible megapolitan extensions of Phoenix/Tucson ICR, as warranted by population and employment growth.

P2. Pursue an integrated HSR network in the southwestern U.S.

A Phoenix/Tucson ICR corridor may serve as the foundation for eventual HSR. It will show the state's commitment to passenger rail and prove the practicality of ICR between the two major metropolitan areas – thereby encouraging the federal government and bordering states to integrate Arizona into a southwestern U.S. HSR network.

P2(a) Participate in regional and national HSR organizations to conduct planning and solicit funding for HSR throughout Arizona. Such organizations may include the Western High-Speed Rail Alliance (WSHRA), States for Passenger Rail Coalition (S4PRC), U.S. High-Speed Rail Authority, Southwest Rail Corridor Coalition, and Arizona Rail Passenger Association.

P2(b) Continue dialogue with bordering states and Amtrak to build support for intercity passenger rail improvements. Consider negotiations with the UP regarding future use of the Wellton Branch of the UP Phoenix Subdivision for Amtrak, which could restore intercity service directly to the Phoenix area and provide greater flexibility for UP freight traffic.

P2(c) Collaborate with the Arizona business community to build support for HSR statewide.

P2(d) Establish a working relationship with bordering states to lobby for federal designation of western HSR corridors that include linkages to and within Arizona.

P2(e) Work with bordering states to study the feasibility and cost-effectiveness of western HSR corridors, establishing high-priority corridors for implementation. These may include connections from within Arizona to Los Angeles, Las Vegas, San Diego, Albuquerque, and the Front Range.

P2(f) Work toward future implementation of HSR in priority corridors through such actions as preserving right-of-way, securing state enabling legislation to use State Lands for right-of-way, and seeking state and federal funding opportunities.

7.2 Freight Rail Pursuits

Freight service in Arizona is currently provided by two Class I railroads, UP and BNSF, and fourteen short line railroads throughout the state. Investment by the freight railroads is currently (in 2009) somewhat constrained by the economic climate. Steps that could be taken to improve these conditions are defined and identified in the following four pursuits.

F1. Facilitate freight railroad investments statewide by laying the groundwork for public sector participation

Railroads, as private, for-profit corporations, are an important asset to the state that cannot easily be replaced. To integrate private railroads in public infrastructure plans, the state should establish a unified communication structure between public entities and private railroad companies, keep an adequate inventory of railroad assets, determine the appropriate level of public investment, and partner with the railroads to continually plan and implement projects of mutual benefit.

F1(a) Build better relationships with Class I railroads through a coordinated state communication structure, joint strategic planning that benefits the state and railroads, and continuous coordination (e.g., a new State Freight Advisory Committee).

F1(b) Establish a state funding source and explore alternative funding options (e.g., public/private partnerships) to contribute to critical freight rail investments that benefit all parties and address key concerns. Improvements to freight rail can reduce traffic congestion, enhance vehicular safety, and open opportunities for rail passenger service. This should supplement the existing Section 130 program.

F1(c) Adopt an ADOT policy that ensures multimodal consideration in highway projects through a project's life cycle (planning, design, and construction). Provide tools to ensure consideration of rail needs in highway projects (e.g. bridge specifications to accommodate a double-stacked container car versus building only for truck clearances, in recognition of future double- and triple-tracking plans of the Class I railroads).

F1(d) Update Arizona's state railroad asset inventory comprehensively on a regular basis, with information on facilities, ownership, infrastructure conditions, etc. of Class I and short line railroads.

F2. Relocate freight rail operations out of the central metropolitan areas of Phoenix and Tucson to improve safety and facilitate transportation efficiency

There are more than 450 public at-grade railroad crossings in the Phoenix metropolitan area, and approximately 100 crossings in the Tucson metropolitan area. Both areas have experienced numerous crashes due to growing numbers of both rail and automotive vehicles, as well as pedestrians and bicyclists. Reducing rail freight traffic in the central metropolitan areas can enhance traffic safety, as well as decrease air pollution and conserve energy. Additionally, removing freight traffic to areas where higher speeds can be achieved and less backtracking is required to switch and block freight cars can improve efficiency on the rails and roadways.

F2(a) Initiate discussions with BNSF to relocate switching activities from the Mobest Yard. Discussions would include participation by key stakeholders, such as cities and towns along the BNSF Grand Avenue corridor, and would cover such topics as the advantages and disadvantages of such a relocation; benefits to other rail modes, such as commuter rail and light rail; and the relationship of the classification yard to other BNSF facilities such as the Ennis Spur, El Mirage Auto Distribution Facility, Glendale Intermodal and Auto Yard, and the Peavine corridor.

F2(b) Work with UP to continue state agency and public dialogue on the proposed Red Rock Classification Yard. Benefits to the state may include improved UP system efficiency, rail-related economic development opportunities in the heart of the Sun Corridor, increased capacity at other rail facilities (such as the Phoenix and Tucson classification yards), and less future need to bring freight cars through the Phoenix metropolitan area.

F2(c) Study the feasibility and cost-benefit (to the railroad and the state) of a UP bypass around Tucson to help facilitate efficient freight transportation, alleviate metropolitan traffic congestion, and free up capacity through central Tucson for future commuter rail or ICR service.

F2(d) Explore (with UP) the opportunity for rehabilitation, shared use, or potential purchase of the UP Wellton Branch to serve as a western rail bypass of central Phoenix, thereby decreasing congestion on the Sunset Route and intersecting roads, and opening a new corridor for future passenger rail opportunities.

F2(e) Initiate the Hassayampa Freeway AA/EIS and plan for rail as part of this corridor, which would become the northern segment of the proposed Hassayampa rail corridor. This corridor could link with potentially relocated Class I railroad yards and connect with the proposed MAG commuter rail system.

F2(f) Facilitate development of a north-south rail corridor in the greater Hassayampa Valley, if economically justified, by conducting feasibility studies, design, and environmental documentation of each segment (BNSF Peavine line to UP Wellton Branch, UP Wellton Branch to UP Sunset Route, UP Sunset Route to Mexico) as warranted. Such a corridor could link existing facilities and potentially extend to Mexico, supporting CANAMEX trade, railroad interchange traffic, tourism, and other freight and passenger movements.

F2(f) Initiate the Hassayampa Freeway AA/EIS and plan for rail as part of this corridor, which would become the northern segment of the proposed Hassayampa rail corridor. This corridor could link with potentially relocated Class I railroad yards and connect with the proposed MAG commuter rail system.

F3. Facilitate expansion of transcontinental railroad routes and other Class I facilities, while minimizing impacts on adjacent communities.

Both the UP and BNSF are undergoing expansion of their transcontinental routes, double- and triple-tracking, respectively, to achieve greater freight capacity. Throughout Arizona, these routes traverse many communities, both large and small, causing traffic delays and safety problems. Mitigation measures as part of railroad improvements can improve safety and circulation for communities, while increasing the efficiency of railroads.

F3(a) Include studying the feasibility of BNSF Transcon relocation in the Flagstaff area (i.e., Flagstaff bypass) as part of the ADOT I-40 DCR to plan and evaluate upgrades to the I-40 corridor.

F3(b) Actively collaborate with railroads and adjacent communities to plan for and safely accommodate corridor enhancements. Establish guidelines for different levels of improvements (e.g., grade crossing enhancements, flyover/grade separation, bypass).

F3(c) Work with Class I railroads to close public and private at-grade crossings wherever possible. Establish a policy that does not allow construction of new at-grade roadway crossings of mainline railroad corridors.

F3(d) Study the feasibility of a UP bypass around Nogales to facilitate safe and efficient international freight movement, alleviate traffic congestion and potential hazards from derailments or cargo spills through downtowns on both sides of the border; and free up capacity through Nogales for future extended ICR service. Coordinate with local rail, roadway, and port of entry infrastructure planning in Arizona as well as Sonora, Mexico. Ensure that potential border rail improvements are incorporated into the Border Master Plan to be prepared by ADOT and the SCT in 2010-2011.

F3(e) Collaborate with the Arizona Game and Fish Department to ensure that future railroad improvements include safe corridors to facilitate wildlife movement and not fracture habitat blocks.

F4. Use railroad and related investments to stimulate economic development in Arizona.

Improvements to railroad infrastructure can spur economic development by better serving businesses that locate near the railroad and helping to attract additional business for the railroad. Ancillary railroad facilities such as deep-water ports or inland ports provide opportunities to serve railroad customers while increasing local job growth and clustering auxiliary industries.

F4(a) Continue to monitor deep-water port projects through participation in the Arizona-Mexico Commission, and through communication with the Mexican federal and Sonora state transportation agencies, to take advantage of economic development opportunities by creating north-south links to Class I railroad corridors in Arizona if port projects move ahead.

F4(b) Work with other Arizona state agencies and Mexican transportation agencies to identify project opportunities (e.g., relocation of major manufacturing facilities) that might require port access, and would benefit both Arizona and Mexico. Partner with sponsors to implement such projects, as appropriate.

F4(c) Work with the Surface Transportation Board and the ACC to discourage railroad abandonment, and work to preserve, out-of-service rail corridors in Arizona for potential future reuse through such initiatives as rail banking.

F4(d) Develop a Short Line Railroad Assistance Program to aid in financing critical short line investments that have economic benefit to Arizona. This could take the form of finance options such as state loans, matching grants, bond issuance, legislative

earmarks/authorizations, and tax incentives. (*Technical Report #3, Strategic Opportunities Summary* contains a full review of short line assistance programs in other states).

F4(e) Maintain opportunities for shared use or purchase of the UP Wellton Branch to support rail-related economic development opportunities in the Phoenix and Yuma metropolitan areas.

F4(f) Work with other state agencies, local and regional governments, economic development organizations, and private sector investors to formulate a plan to take advantage of inland port opportunities to support growth in the Sun Corridor as the economy diversifies. This may include support such as tax incentives or infrastructure investments.

F4(g) Continue to monitor inland port development opportunities through direct communication with the Mexican state and federal governments, the State of California, the POLA/POLB, and the private industrial development community regarding planning, improvement activities, and capacity issues at the seaports.

7.3 Rail Organization/Governance Pursuits

Arizona could benefit from establishing an effective governance structure to carry out and coordinate multiple passenger and freight rail programs in partnership with relevant public and private organizations. To carry out the recommendations of the Statewide Rail Framework Study, the state will need to address the organizational structure and governance issues below.

- Current rail-related activities of the state are limited in scope and depth, and lack program areas needed to carry out the recommendations of the Statewide Rail Framework Study.
- Current rail-related activities are fragmented in different state departments and divisions. The economic development, land use, safety, and environmental objectives of the rail framework concern a range of state government agencies. Proposed new rail programs will require increased coordination among state agencies, (e.g., ASLD, ADOC, ADEQ, and ACC).
- Proposed new rail programs will require close coordination and negotiation with the railroads (Class I, short lines, Amtrak) regarding shared use of right-of-way, coordinated track improvements, and many other issues. A new organizational structure that can negotiate with railroads as a unified voice would be beneficial.
- Intercity and interstate rail will interact with commuter rail systems being planned by regional and local governments, notably in the MAG and PAG regions. Coordination between the state, local governments, COGs/MPOs will be critical to planning an integrated passenger rail system.
- Potential implementation of intercity rail could be construed to be competitive for federal funding with regional transit and rail projects. A single organization responsible for statewide rail interests could work closely with regional rail and transit interests to insure the state speaks with one voice to the federal government and that all project planning, funding, and implementation is achieved in a coordinated and seamless manner.
- Many new rail projects may depend on coordination with highway projects to obtain right-of-way. Coordination of multimodal planning within ADOT will facilitate more cost-effective highway and rail projects.
- New safety requirements such as PTC will require significant investment and coordination among regulators (state and federal), railroads, and operating agencies.
- State rail programs, like highway programs, will need to diversify revenue sources to meet future investment needs and prepare for uncertainties in traditional funding sources.

Statewide Rail Functions

Currently, rail planning and programming functions in Arizona are carried out by several state departments and divisions within them. ADOT's current rail functions include state rail planning, federal grant coordination, grade crossing improvement, coordination with railroads, and light rail safety oversight. These functions are located in different divisions (Multimodal Planning, Intermodal Transportation) and different offices within those divisions. The ACC regulates grade crossings and other aspects of railroad safety (except light rail). Other state agencies provide input and regulatory oversight, including the Department of Commerce, AZGFD, and ADEQ. Federal agencies also have regulatory and other interests.

Regional/Local Rail Planning

MPOs such as MAG and PAG conduct regional transportation planning within the state's two major metropolitan areas, including planning for commuter rail. MAG has recently completed their Transit Framework Study for the region, as

well as the *Commuter Rail Strategic Plan* and is currently undertaking corridor development studies and a system study on the proposed commuter rail system. Likewise, PAG is planning for potential long-range implementation of commuter rail in the Tucson metropolitan area through the PAG High Capacity Transit Study. Cities and counties individually conduct transportation planning and operations functions.

Both metropolitan areas have separate transportation authorities that plan, design, and operate various forms of light rail transit, including METRO in Phoenix and the Regional Transportation Authority (RTA) in Tucson. Both organizations are composed of member cities and towns. These jurisdictions are represented by an elected official, together who form the organization's board of directors.

Multi-State Rail Organizations

Nationally, the States for Passenger Rail Coalition is an umbrella group of state DOTs seeking federal support for passenger rail activities; ADOT is a member of this organization. The Western High-Speed Rail Alliance is a recently formed association of MPOs and local governments that has begun to organize and lobby for interstate, high-speed passenger rail in the Intermountain West. MAG has joined the WHSRA, and PAG is considering joining. Other regions of the country have multi-state rail planning efforts for specific corridors or networks; the Midwest High-Speed Rail Initiative is an example of a broad cooperative effort among multiple states. Currently there is no organization specifically for the Intermountain West composed of DOTs and other state-level government organizations to plan, seek funding, or pursue implementation of interstate rail projects.

7.3.1 Statewide Rail Organizational Structures

This section outlines two models of how statewide rail responsibilities could be organized and cites examples of states with each organizational structure. The two examples include a state DOT as a lead agency, and a separate statewide rail authority.

A. State DOT as Lead Agency

Under this model, rail planning, development, oversight, safety and other programs for both passenger and freight rail would be consolidated in a single office of the state DOT. Some states use outreach and technical steering committees to assist this office in coordinating its activities with other DOT divisions and state agencies. Grade crossing improvement and regulation, and overall safety oversight and inspections are typical state rail safety functions. Implementation of new safety requirements such as PTC, and of new rail modes such as HSR, may require an even larger role for the state in rail safety. Several state DOTs have expanded their roles beyond safety oversight to include a range of other functions, such as planning and project implementation.

Representative Examples

State departments that are the lead organizations for rail planning and development include:

- **North Carolina Department of Transportation (NCDOT), Public Transit and Rail Division:** This division includes programs for both local public transit and statewide passenger and freight rail. The rail activities are divided into three branches: statewide rail planning and development, engineering and safety, and operations (Figure 28). The state helped create a separate entity, the North Carolina Railroad (NCRR), to purchase and manage a high-priority rail corridor that runs 317 miles from Morehead City on the Atlantic coast to Charlotte. NCRR is a private real estate investment trust, of which the state of North Carolina is now the sole shareholder.
- **Virginia Department of Rail and Public Transportation:** This is a separate department from the Virginia

Figure 28 North Carolina DOT Rail Division Organizational Structure

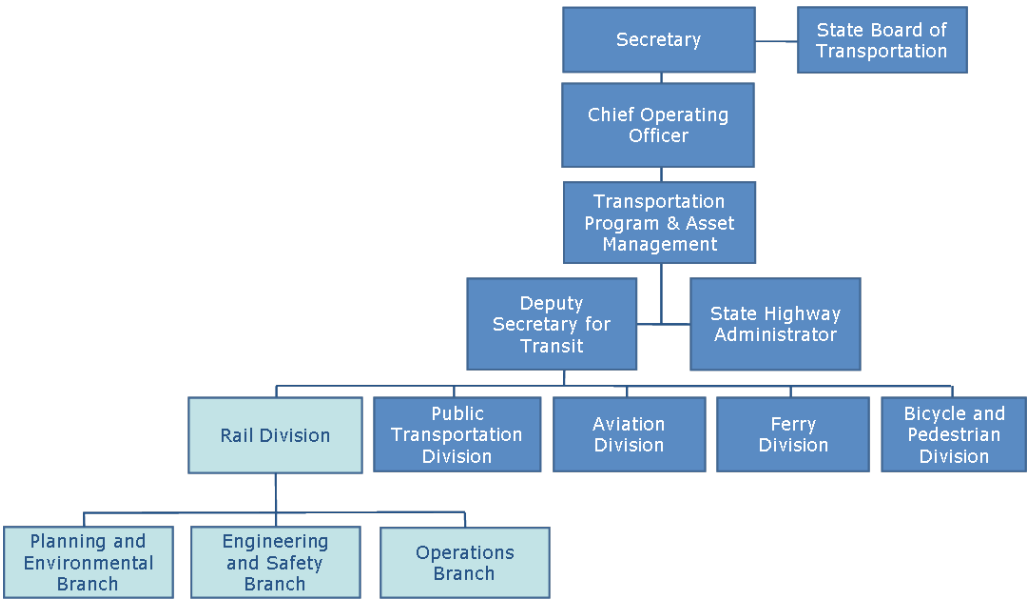
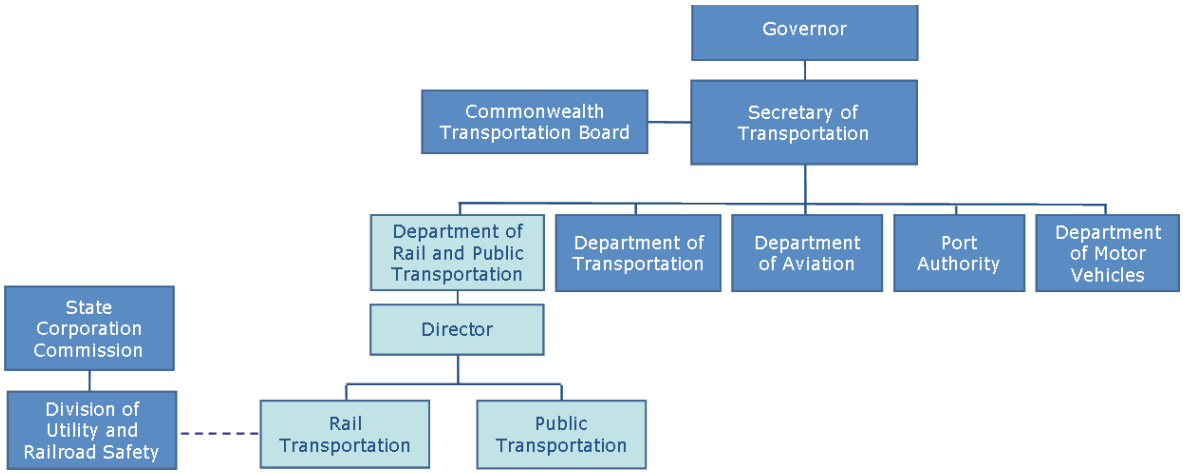


Figure 29 Virginia Department of Rail and Public Transportation Organizational Structure



Department of Transportation, but the two report to a single State Cabinet member, the Secretary of Transportation, and work closely together to coordinate multimodal system planning (Figure 29).

- **Colorado Department of Transportation (CDOT), Transit and Rail Division:** In the spring of 2009, the Colorado governor signed Senate Bill 94 into law, establishing a new division to conduct rail-related activities. This division, charged with planning, promoting, and implementing statewide rail and transit systems, is currently adding staff and building its program to support forthcoming recommendations of the Rocky Mountain Rail Authority HSR Feasibility Study.
- **Ohio Rail Development Commission:** This organization is an independent commission within the Ohio Department of Transportation, with its own Board of Commissioners. It plans, promotes, and implements rail activities through its programs: safety, freight rail, passenger rail, high-speed rail initiatives, and rail tourism. Rail transit safety oversight is provided separately by the Ohio Department of Transportation through its Transportation System Development Division.

B. Statewide Rail Authority

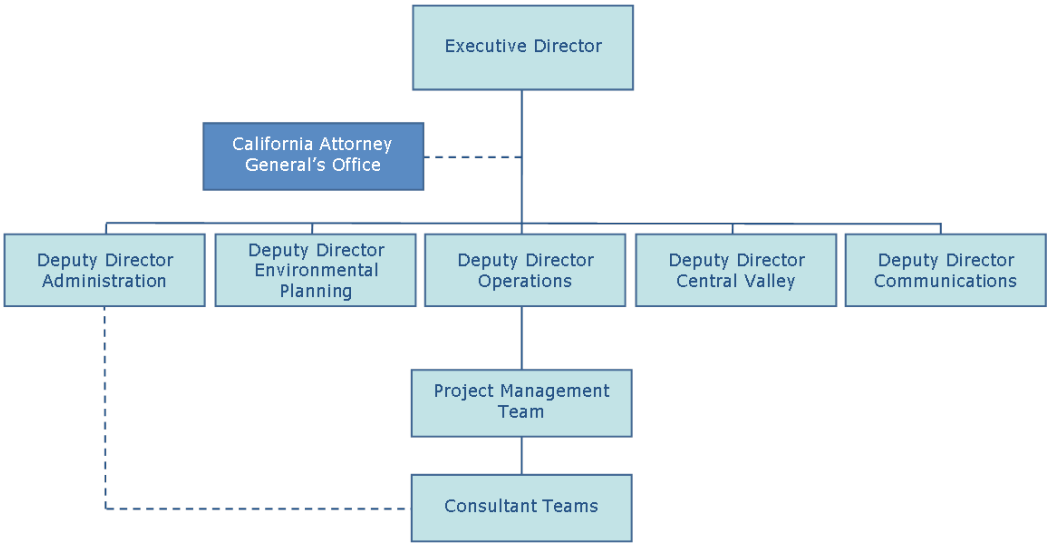
Under this model, a separate rail authority would be created to plan and develop major statewide rail projects. The authority would be governed by an elected or appointed board, would be empowered to take full control of rail projects under its purview, and would interact directly with the FRA, railroads, state agencies, COGs/MPOs, local governments, bordering states, and other entities. The authority may have its own staff, or use state DOT personnel to perform technical analyses, conduct day-to-day operations, and carry out the policy directives of the Board of Directors.

Representative Examples

Several states use separate authorities for managing rail projects and statewide systems, including:

- **Florida High Speed Rail Authority (FHSRA) and California High Speed Rail Authority (CHSRA):** These authorities are the lead agencies in planning and development of the states' designated HSR corridors. Planning is coordinated with the DOTs. In California,

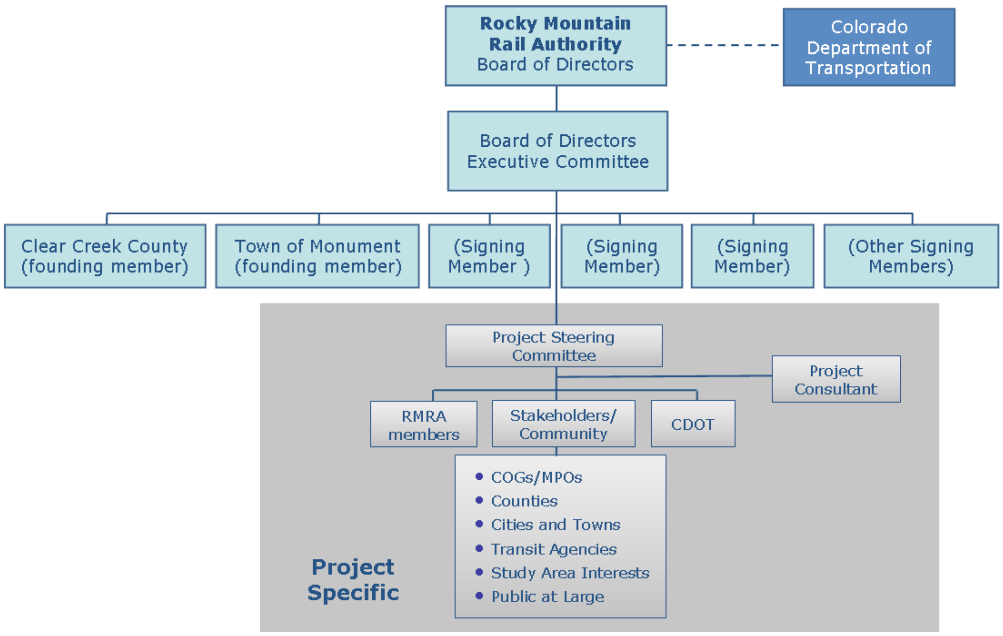
Figure 30 California High Speed Rail Authority Organizational Structure



CHSRA is a special purpose political subdivision of the State of California with a legislative mandate to design, build, operate, and maintain a high-speed rail system in the state (Figure 30). The state DOT, Caltrans, takes the lead on rail initiatives that are not high-speed, such as commuter rail service and intercity (Amtrak) passenger rail improvements. Caltrans has applied for federal grants not available to authorities, such as certain ARRA funding tracks and is a cooperating agency to the CHSRA.

- **Rocky Mountain Rail Authority (RMRA):** The organization was set up by local governments in Colorado to receive a state planning grant for a HSR feasibility study commissioned by the Colorado Department of Transportation. The authority was created by intergovernmental agreement and the membership of its Board of Directors, and is open to all local governments that sign the RMRA contract (Figure 31). At the completion of the study, the RMRA will consider its future role, if any. The State of Colorado hopes to use the study results to gain FRA designation for HSR corridors within the state.

Figure 31 Rocky Mountain Rail Authority Organizational Structure



- **South Dakota State Railroad Authority:** In the 1980s the state government wanted to prevent abandonments of its extensive network of freight lines that serve agricultural activities throughout the state. The legislature created the authority, empowering it to purchase freight rail lines and construct, maintain, and equip facilities as needed. The authority has no passenger rail activities. It has helped consolidate freight lines in its ownership and sold some of them back to private railroads. Its activities are coordinated with the South Dakota Office of Railroads in the Department of Transportation, which conducts planning, safety and rail assistance programs.

- **New Jersey Transit:** This is the state-chartered corporation that manages public transportation across New Jersey. It manages and plans a statewide commuter rail system (primarily in the greater New York and Philadelphia areas), but is not involved in freight or intercity passenger rail. It coordinates long-range passenger rail planning with the New Jersey Department of Transportation.

7.3.2 Metropolitan/ Regional Rail Governance and Programming Models

Governance of metropolitan/ regional rail systems will likely be decided at the metropolitan level, with input from MPOs, local governments, and (for projects that cross MPO/COG boundaries) the statewide rail organization. Development of a metropolitan or regional rail governance organization is not mutually exclusive of a statewide rail organization. Because of the different scales of passenger rail proposed in the state (e.g., commuter rail, ICR, HSR), various governance organizations will likely be created to manage and operate the separate systems.

On a metropolitan scale, new commuter rail systems may require state enabling legislation to address multi-jurisdictional governance, or could be created by local compact without new legislation, like the METRO light rail transit agency in Maricopa County.

Types of commuter rail governance and programming structures used in other states include:

- Regional Transit District (or Authority) model: State legislation creates an authority to implement a multimodal system that covers multiple local jurisdictions (e.g. Regional Transportation Authority in

the Tucson metropolitan area).

- Transit operating entity with state or regional oversight: Some degree of oversight is provided by a state or regional agency (e.g. DOT, COG). The entity could be created by local agreement among cities and counties (e.g. METRO in Maricopa County). It could also be created by expanding the charter of an existing state-chartered entity such as a COG, which would require state legislative action.
- State implementation/state-operated rail system: The state is empowered to develop commuter rail systems, as in Maryland, New Jersey, and Connecticut. The state can serve as the operating agency or contract operations to another entity, such as a regional transit agency.

7.3.3 Multi-State Rail Organizational Structures

An organizational structure for multi-state rail planning and development is likely to evolve according to the initial plans and agreements between states involved in a variety of proposed HSR projects in the near future. Currently, several interstate initiatives involve two or more state DOTs. These may involve a memorandum of understanding between governors, or more precisely defined cooperative agreements that guide work between DOTs of different states to advance a specific project. Such an organization could promote regional interests at the federal level and coordinate planning and implementation of interstate rail projects. A steering committee/governing board sets policy and interacts with federal agencies and the railroads; a technical advisory committee provides technical support. Staff support could be provided contractually through lead transportation agencies of the states. The most prominent case of multi-state planning is the Midwest High-Speed Rail Initiative, which involves nine states. There are also joint state programs to support interstate Amtrak service, such as the Hiawatha route between Chicago and Milwaukee, which is funded by the states of Illinois and Wisconsin.

7.3.4 Implementation Actions

G1. Develop a rail organization with a statewide perspective to promote rail interests

Development of a statewide rail organization can benefit the state by promoting economically beneficial rail interests, pursuing funding for strategic rail investments, and partnering with other state agencies, regional entities, and railroads to develop a comprehensive freight and passenger rail system. The purview of the organization will be statewide, but the agency can coordinate and collaborate with both multi-state and metropolitan rail organizations to implement a cohesive rail system throughout Arizona.

G1(a) Define the organizational needs of the State of Arizona for implementation of the Statewide Rail Framework Study and subsequent planning efforts.

G1(b) Work with other state agencies that have an interest in rail to define a mutually acceptable organization and governance model for the state. Secure legislative authority, if required.

G1(c) Recommend appropriate organization and governance structures for Arizona, based on an evaluation of other state rail programs and national best practices.

G1(d) Apply the organization and governance model to an initial rail project or program, and assess its performance.

G1(e) Build on successes of the initial project or program to generate broader support for a statewide rail entity to implement rail programs.

7.4 Implementation Action Timeframes

Table 7 includes each rail pursuit and implementation action in a matrix format, which proposes implementation timeframes for each action. The timeframes are immediate (2010), near-term (2010-2015), and long-term (2015-2050). Actions are highlighted in yellow for the beginning and continuation of the implementation item. The immediate actions generally consist of initiatives that are already underway, or those that ADOT can take with no new funding or legislative authorization. Many of the longer-term measures are not achievable with currently available resources. Some recommendations can be initiated immediately or in the near term, but will need to continue through 2050 and beyond as the state rail system matures.

Table 7 Implementation Action Timeframes

Implementation Action		Immediate (2010)	Near-Term (2010-2015)	Long-Term (2015-2050)
Passenger Rail Pursuits				
P1	Implement an integrated passenger rail corridor as a multimodal spine to create and support focused growth and sustainable development in the Sun Corridor Megapolitan region.			
P1(a)	Complete a State Rail Plan			
P1(b)	Establish and maintain a Statewide Passenger and Freight Rail Advisory Committee			
P1(c)	Initiate Alternatives Analysis/environmental document for the Phoenix/Tucson intercity rail corridor			
P1(d)	Complete Alternatives Analysis/Environmental Impact Statement for the initial Phoenix/Tucson intercity rail corridor			
P1(e)	Study the feasibility of including ICR as part of the Pinal North-South Freeway Corridor DCR			
P1(f)	Draft and adopt new ADOT policy on multimodal corridor evaluation			
P1(g)	Promote a rail culture within state agencies and key stakeholders			
P1(h)	Negotiate agreements with stakeholders regarding intercity rail			
P1(i)	Work with MAG regarding coordinated commuter rail planning and ICR planning			
P1(j)	Coordinate with other regional planning entities regarding intercity rail			
P1(k)	Determine administration and governance of intercity rail system			
P1(l)	Examine system and design implications of intercity rail and high-speed rail			
P1(m)	Work to gain access to BNSF Peavine corridor			
P1(n)	Partner with BNSF to conduct infrastructure improvements on BNSF Peavine			
P1(o)	Explore the feasibility of partnering with Amtrak as a potential intercity rail operator			
P1(p)	Determine dedicated state funding source for rail construction and operations			
P1(q)	Pursue all opportunities for federal funding for intercity rail			
P1(r)	Plan for and implement transit-oriented development at rail access points			
P1(s)	Construct Phoenix/Tucson intercity rail corridor			
P1(t)	Work with UP regarding planning a southern intercity rail extension			

Table 7 Implementation Action Timeframes (cont.)

Implementation Action		Immediate (2010)	Near-Term (2010-2015)	Long-Term (2015-2050)
P1(u)	Work with BNSF regarding planning a northern intercity rail extension			
P1(v)	Construct Phoenix/Tucson ICR megapolitan extensions (if feasible)			
P2	Pursue an integrated high-speed network in the southwestern U.S.			
P2(a)	Participate in regional and national high-speed rail organizations			
P2(b)	Build support for intercity passenger rail improvements			
P2(c)	Collaborate with business community to build high-speed rail support			
P2(d)	Work with bordering states to federally designate high-speed rail in Arizona			
P2(e)	Work with bordering states to plan high-speed rail in Arizona and adjacent states			
P2(f)	Work towards future implementation of high-speed in Arizona, linked into the southwestern U.S. network			
Freight Rail Pursuits				
F1	Facilitate freight railroad investments statewide by laying the groundwork for public sector participation.			
F1(a)	Build better relationships with Class I railroads to coordinate investments, projects and programs that will benefit both the public and the railroads			
F1(b)	Establish a state funding source for strategic freight rail investments			
F1(c)	Adopt new ADOT policy to ensure project continuity			
F1(d)	Update state railroad asset inventory			
F2	Relocate freight rail operations out of the central metropolitan areas of Phoenix and Tucson to improve safety and facilitate transportation efficiency.			
F2(a)	Initiate discussions with BNSF to relocate Mobest Yard			
F2(b)	Work with UP to continue dialogue within state government in regard to the proposed classification yard at Red Rock			
F2(c)	Study feasibility of a UP bypass around Tucson			
F2(d)	Explore opportunity with UP for rehabilitation and reopening of Wellton Branch			
F2(e)	Initiate Hassayampa Freeway Alternatives Analysis/ Environmental Impact Statement; with rail as a considered mode			
F2(f)	Facilitate development of a new Hassayampa rail corridor			

Table 7 Implementation Action Timeframes (cont.)

Implementation Action		Immediate (2010)	Near-Term (2010-2015)	Long-Term (2015-2050)
F3	Facilitate continuing expansion of transcontinental railroad routes and other Class I facilities, while minimizing impacts on adjacent communities.			
F3(a)	Include studying the potential feasibility of a Flagstaff rail bypass in the I-40 DCR, working with BNSF			
F3(b)	Plan and accommodate rail corridor enhancements			
F3(c)	Work with Class I railroads to close at-grade railroad crossings			
F3(d)	Study feasibility of a rail bypass around Nogales, working with UP and the Mexican federal and state transportation agencies			
F3(e)	Collaborate with the Arizona Game and Fish Department regarding wildlife mitigation measures			
F4	Use railroad and related investments to stimulate economic development in Arizona.			
F4(a)	Monitor Mexican deep-water port opportunities that can benefit Arizona			
F4(b)	Monitor project-specific opportunities for port access, and partner with sponsors to implement			
F4(c)	Preserve abandoned rail corridors; deny future abandonments			
F4(d)	Develop a short line assistance program for strategic rail investments			
F4(e)	Maintain opportunity for shared use or purchase of Wellton Branch			
F4(f)	Formulate a plan to make use of inland port economic development opportunities			
F4(g)	Monitor inland port development opportunities			
Governance Pursuits				
G1	Develop a rail organization with a statewide perspective to promote rail interests.			
G1(a)	Define rail organizational needs for the state			
G1(b)	Work with state agencies to define organization and governance model			
G1(c)	Recommend appropriate statewide organizational/ governance structure			
G1(d)	Apply governance model to a project or program; assess performance			
G1(e)	Implement statewide rail governance structure			

Initiation and continuation of action item

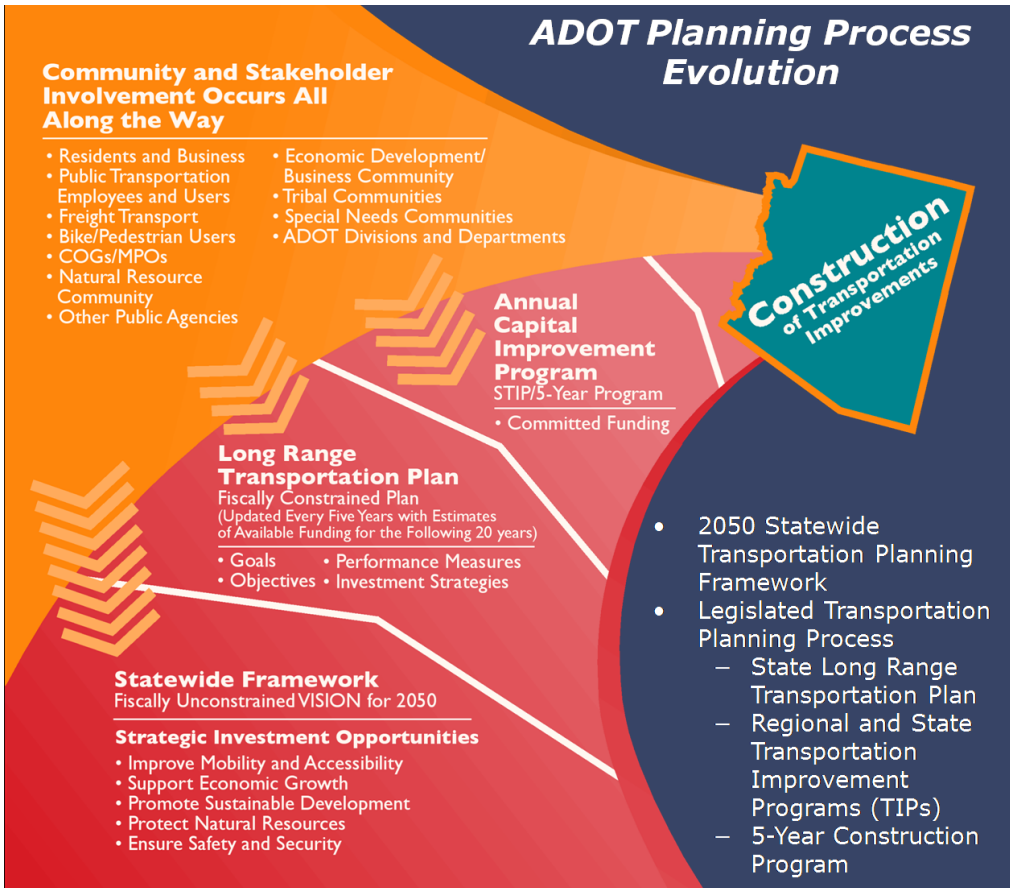
8.0 Next Steps

The implementation pursuits and actions from the Statewide Rail Framework Study are incorporated into the final Statewide Transportation Planning Framework recommendations. From there, two planning processes will take the next steps in identifying specific projects and funding for the future – the state's Long Range Transportation Plan and the State Rail Plan.

8.1 Long Range Transportation Plan

The recommendations from the Statewide Transportation Planning Framework Program provide a "fiscally unconstrained" vision for 2050 – meaning that the recommendations are not tied to available funding, but encompass all the capacity-related transportation investments needed for a connected and functional transportation system. "What Moves You Arizona," the long-range transportation planning process, will take the input and recommendations from the Statewide Transportation Planning Framework Program and match projects to a time line with available funding. The Long Range Transportation Plan will use performance measures to evaluate recommended projects and determine investment strategies to fund them. The plan will be updated every five years with estimates of available funding for the following 20 years. Figure 32 shows how the Statewide Framework and LRTP fit into ADOT's comprehensive planning and programming process.

Figure 32 ADOT Planning Process Evolution



8.2 State Rail Plan

A State Rail Plan addresses current and future needs for passenger and/or freight rail investment at a statewide level. With the recent enactment of the Passenger Rail Infrastructure Investment Act in October 2008, the nation is experiencing a surge in statewide rail planning as DOTs mobilize to become eligible for federal funding. To obtain funding for such projects as intercity and high-speed rail planning and design, states are required to have a FRA-approved state rail plan. With the Statewide Rail Framework Study providing the foundation, ADOT has embarked on developing its first Arizona State Rail Plan, to be published in 2010.

ADOT

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