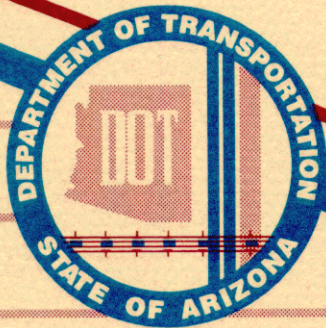


The cover features a large outline of the state of Arizona. The outline is composed of two lines: an outer blue line and an inner red line. The text is centered within the red outline. The title 'Arizona State Transportation Plan' is written in a large, blue, serif font. Below the title, the date 'December, 1994' is written in a smaller, blue, serif font. In the bottom left corner, there is a circular logo for the Department of Transportation, State of Arizona. The logo contains the letters 'DOT' and a stylized map of Arizona.

# Arizona State Transportation Plan

December, 1994





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# 1. INTRODUCTION

## BACKGROUND

Since pre-Columbian times, transportation has left its mark on Arizona. In this land of limited available surface water, travel routing and timing was critical. With the coming of the Spanish, explorers like Coronado, Escalante, Fray Marcos de Niza, and Father Eusebio Kino further charted this area. In southern Arizona, wagon ruts from the Butterfield Overland Express stagecoaches can still be found along the route of the older Gila Trail. Arizona became a United States Territory following the Treaty of Guadalupe Hidalgo in 1848, and the Gadsden Purchase in 1853. The Southern Pacific railroad was built through Arizona between 1877 and 1882, and the Atchison, Topeka and Santa Fe railroad was built through Arizona between 1882 and 1905.

On February 14, 1912 Arizona became the 48th state. The Arizona Highway Department, the precursor of the Arizona Department of Transportation (ADOT), was established in 1909, three years before statehood. The fact that the Arizona Highway Department was explicitly called for in the State Constitution showed the founders' early recognition of the importance of transportation to Arizona's future. This fact has not changed in the past 85 years. In 1975, the Arizona Highway Department became a Department of Transportation, incorporating planning and management of all transportation modes.

The purpose of this report is to present the first Arizona multimodal State Transportation Plan (STP). This Plan includes all surface modes of transportation: highways, railways, public transit, bicycles, and pedestrians. The Plan considers linkages between the modes of transportation facilities covered in the Plan. The State Transportation Plan has been coordinated fully among the transportation planning agencies within the State.

## FEDERAL POLICY ISSUES

With the enactment of the Intermodal Surface Transportation Act of 1991 (ISTEA) and the Clean Air Act Amendments, the United States embarked upon new and fundamental changes for transportation planning, financing, development, and operations by federal, state, regional and local governments. Some of the most significant of these new policies are embodied in the transportation planning process requirements and the new partnerships which are necessary to achieve their intents.



This new policy direction requires significantly greater breadth in transportation decisions to achieve and maintain transportation solutions resulting in greater system performance, efficiency, improved mobility, reduced congestion, improved environmental quality, and committed system preservation. Further, new emphasis has been placed on flexible application of modal alternatives and operational efficiencies as opposed to the strict adherence to the modal programmatic priorities inherent in federal-aid transportation programs of the past. Federal priority seems to have shifted from the traditional commitment to efficiency in the administration of transportation assistance programs to new flexibility in developing solutions aimed at improved transportation systems performance.

Significantly, the laws have vastly expanded the process by conferring broader decision-making powers to various jurisdictional levels and requiring closer coordination, cooperation, and commitment to achieving consensus among decision-makers. Also expanded has been the required participation of the public, various interest groups, governmental jurisdictions and organizations. Finally, these landmark laws require a series of technical processes and procedures which must be established by state, metropolitan and local jurisdictions and which are designed to support and inform those new decision-making processes. In short, federal law intends to improve the way transportation decisions are made, in the context of limited resources, to both enhance the efficiency of and protect the investment in transportation systems and to ensure that those systems are tailored to the particular needs of the states and regions they serve.

Nowhere will the fundamental policy change be more dramatically felt than at the statewide level. For the first time, long-range state transportation plans are mandated on an ongoing basis. State transportation improvement programs are required to establish priorities for project implementation. Also for the first time, states are required to broaden the bases for their transportation decisions to include multiple modes, to broaden ranges of potential transportation solutions, to pay greater attention to performance expectations including both transportation and environmental impacts, and to maintain funding flexibility committed to support such decisions. Finally, the states are required to more fully include and consider a vastly broader range of perspectives of government and non-government interests and to continually involve the general citizenry through stronger public involvement initiatives.

Three important pieces of federal legislation are impacting transportation and transportation planning. The recent passage of the North American Free Trade Agreement (NAFTA) has focused attention on trade corridors between Mexico and Canada which currently do, or potentially might align through Arizona. The Clean Air Act Amendments of 1990 (CAAA) address air quality concerns including those caused by vehicle emissions and construction. The Americans with Disabilities Act (ADA) addressed the disabled community's access to barrier free facilities, services, and transportation. ISTEA reauthorized the programs of the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA).

## **STRUCTURE OF THE PLAN DOCUMENT**

The report is structured into ten remaining chapters. Chapter 2 presents the transportation planning process used to develop the Plan and discusses the future implementation of the Plan. The public involvement process followed in developing the Plan is presented in Chapter 3, followed by a discussion in Chapter 4 of the six management systems required by ISTEA. Chapter 5 discusses Arizona's future as it relates to the State's transportation system. The next chapter presents an analysis of the existing and future transportation conditions. Chapter 7 presents an assessment of the multimodal transportation needs within the State. The goals, opportunities and policies to meet these needs are presented in Chapter 8. Chapter 9 then presents system implementation strategies. Statewide significant corridors are identified and prioritized in Chapter 10. Chapter 11 presents the conclusions and recommendations.

## **2. STATE TRANSPORTATION PLAN DEVELOPMENT PROCESS**

As was noted earlier, federal law mandates new initiatives and processes upon states and metropolitan planning organizations as well as local jurisdictions to improve transportation planning and decision-making processes. In response to federal policy as well as ongoing State policy to strengthen the effectiveness of its decision-making processes, management, and operations, ADOT is embarking upon broad and fundamental changes to its transportation planning and decision-making process. These changes include both the addition of new processes and procedures called for in federal statutes, as well as the improvement of previously established ADOT initiatives.

This chapter presents the integrated transportation process which was followed to develop the State Transportation Plan (STP). The following section describes the steps taken to develop the STP. In addition, the steps needed to further develop, implement, and monitor the results of the Plan are also discussed.

### **THE STATE TRANSPORTATION PLANNING PROCESS**

The STP serves as the center piece of the integrated transportation planning process. Covering a twenty-year planning horizon and to be regularly updated, the STP presents a strategic vision which drives and is supported by the other process components. As such, it represents the formal statement of State policy, statewide significance, and priority input to the other transportation planning activities of both the State planning process as well as regional and local planning processes.

The approach for developing the STP is presented in Figure 2-1. The planning process includes six elements: Public Participation, Database, Analysis, Development of the STP, Adoption of the STP, and State Transportation Improvement Program (STIP). The first three of these elements, plus the STIP, are discussed below. The development and adoption of the STP are covered in other sections of this report.



# STATE TRANSPORTATION PLAN

**MISSION STATEMENT:** To develop consensual planning and programming processes which will be the guiding vision of Arizona's transportation systems for the next 20 years. These systems will be planned to fully utilize state-of-the-art technologies and to position Arizona as a key partner in North America and Pacific Rim economic growth.

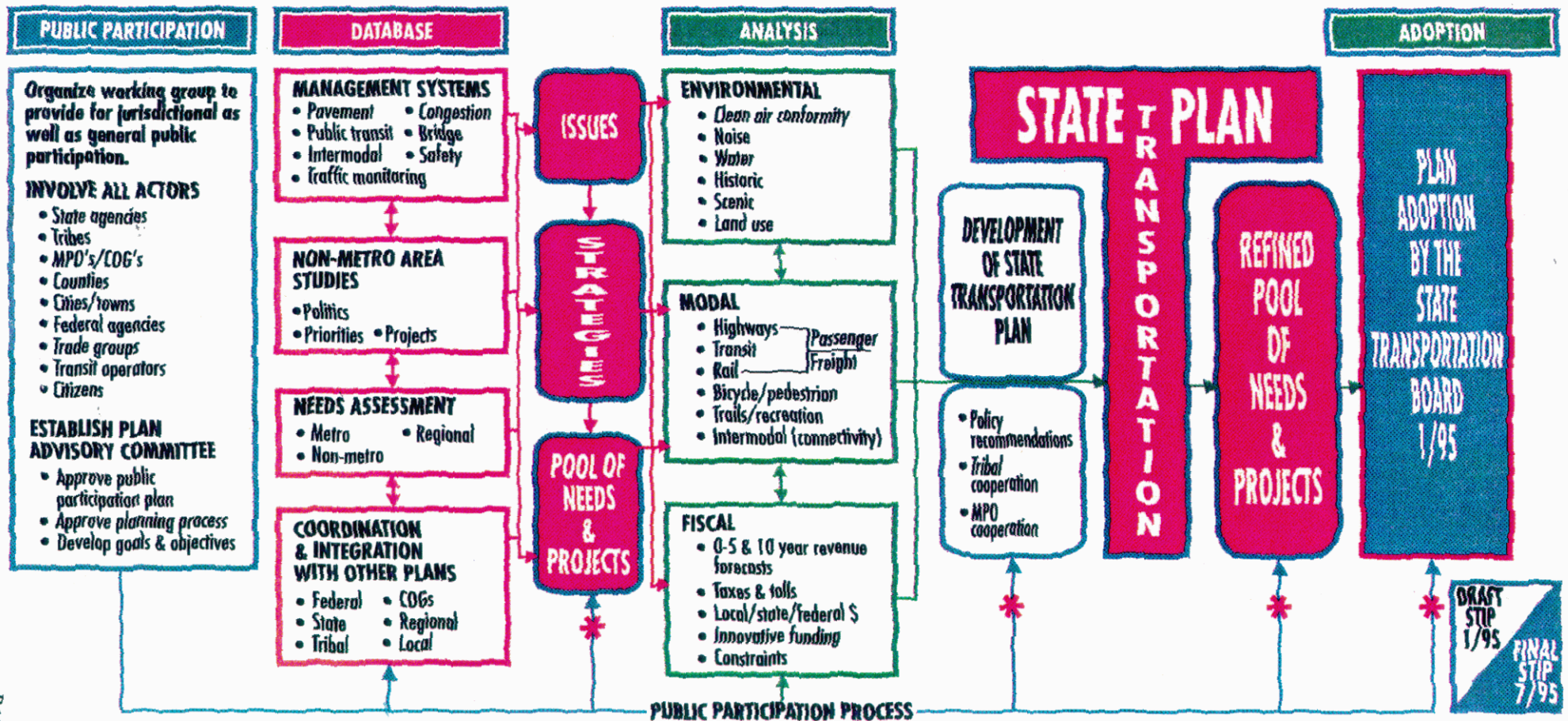


Figure 2-1  
PLAN DEVELOPMENT PROCESS

## **Public Participation**

The State Transportation Plan was developed within the context of an extensive public participation process designed to include local and regional jurisdictions, interest groups, and the general public throughout the process. The public participation process was designed to:

- Provide for public review and comment on products and proposals emerging during development of the Plan;
- Provide ADOT the mechanisms to inform the public regarding issues, proposals and planning requirements;
- Provide ADOT the mechanisms to assess public reaction and opinion regarding issues, options and solutions; and finally;
- Develop consensus on issues, solutions and expectations.

Chapter 3 presents a detailed description of the public involvement process carried out for the State Transportation Planning process.

## **State Transportation Plan Advisory Committee**

The State Transportation Plan Advisory Committee (STPAC) was established to help guide the development of the State Transportation Plan. The STPAC served as a forum for input from various perspectives. The STPAC discussed issues, reviewed and commented on working papers, and provided input on policies and decisions. An "open membership" policy resulted in 84 individuals representing 58 governmental agencies, businesses, and private citizens serving on the STPAC (Table 2-1). This wide range of membership allowed interaction between public and private sector representatives and promoted coordination. The entire range of surface transportation modes were represented on the STPAC. Participant's comments were recorded and consensus on issues was sought. Committee members were charged with keeping each representative's group informed of planning progress; expressing their organization's position concerning goals and objectives for transportation, environmental values, and economic development; and bringing appropriate issues that required State Transportation Plan direction to the attention of the planning team. STPAC meetings were open to the general public and generally held on a monthly basis.

**Table 2-1. State Transportation Plan Advisory Committee Membership**

American Automobile Association	Governor's Liaison Office
Arizona Airports, Inc.	Governor's Office of Highway Safety
Arizona Bridge to Independent Living	Grand Canyon Trust
Arizona Department of Environmental Quality	Grubb & Ellis Company
Arizona Department of Transportation	Harson, Voss Associates
Airport Operators Association	Highway User's Federation
American Planning Association	Hispanic Chamber of Commerce
Arizona Community Foundation	Hotel/Motel Association
Arizona Mexico Commission	Institute of Transportation Engineers
Arizona State Parks	League of Arizona Cities & Towns
Attorney General's Office	Maricopa Association of Governments
Arizona Committee on Trails	Maricopa County
Arizona Department of Public Safety	Northern Arizona Council of Governments
Arizona Department of Commerce - Energy	National Park Service
Arizona Indian Affairs Commission	Nature Conservancy
Arizona Motor Transport Association	Navajo Nation
Arizona Rail Passenger Association	Northern Gila County Highway Committee
Arizona Transport Improvement Association	Pima Association of Governments
Arizona Transit Association	Pinal County
Central Arizona Association of Governments	Santa Fe Railroad
Central Arizona Home Builders' Association	Southeast Arizona Governments Organization
Coalition of Arizona Bicyclists	Sierra Club
Cocopah Tribe	State Land Department
Common Cause	The Community Forum
Federal Highway Administration	Tucson Airport Authority, Inc.
First National Bank	United Parcel Service
Federal Transit Authority	Western Arizona Council of Governments
General Public	White Mountain Apache Tribe
Gila River Indian Community	Womens Transportation Seminar
Governor's Arizona Bicycle Task Force	Yuma Metropolitan Planning Organization



## **Database**

Data collection and coordination brought together results of the broadest possible range of data input to support the development of the Plan. This included:

- The transportation planning and decision-making of the jurisdictions within the State such as the Metropolitan Planning Organizations (MPOs) for the major metropolitan regions, the rural Council of Governments (COGs), tribal governments, federal agencies responsible for federal lands, and local jurisdictions.
- Coordination with the development of the six federally mandated management systems being established by the State and the MPOs.
- Non-metropolitan planning, especially through inclusion of the Small Area Transportation Studies (SATS).
- The multimodal Transportation Needs Assessment process.
- The assessment of the present conditions of the surface transportation system.
- The results of public opinion polling and the assessment of public comments and inputs from the public meetings.

As part of the data collection phase, a review was made of the plans, programs, and policies of public and private agencies throughout the State to determine their relevance to the State Transportation Plan. They included transportation, land use, resource management, environmental, and energy elements.

In order to obtain transportation-related plans, programs, and policies, a letter was sent to over 260 agencies throughout the State. The letter briefly described the requirements of ISTEA, and requested the submittal of plans and programs. The letter was an open-ended request for information that the agencies felt could be relevant to the statewide transportation study. The letter was mailed to the administrative officer for:

- All of Arizona's 87 cities and towns, each of the three MPOs, and all four COGs.
- Each of Arizona's 22 American Indian Nations.
- Directors of State and federal agencies.
- Private transportation services, freight carriers, and special interest groups.

- The transportation underserved, modal groups, and military and law enforcement agencies.
- Major labor/union groups and professional organizations.

The response included 193 documents from 65 respondents.

### **Analysis**

As the Plan's goals and objectives, strategic alternatives and various components are further developed, they will be subjected to analyses and evaluations from modal, environmental and fiscal perspectives. These evaluations will result in both the assessment of implications and effectiveness of proposed strategies.

### **State Transportation Improvement Programming (STIP)**

The final component of the transportation planning process includes project selection, project refinement, budgeting and scheduling leading to development of the State Transportation Improvement Program. This three-year annually updated program initiates project implementation. Another critical component of this element is the monitoring of project status.

### **Further Development of the Plan**

Upon completion, adoption and distribution of the STIP, ADOT will continue to develop the Plan. Not only will this require refinements, evaluations and analyses related to other planning both within and outside of ADOT, but proposals for amendments and other required changes must be anticipated and addressed. In addition, the further development of the Plan should include the evaluation and improvement of the Plan development process in preparation for future updates.

### **STATE TRANSPORTATION INVESTMENT PROCESS**

Future transportation investment decisions in the State of Arizona will be derived with input from five source elements: Management Systems, Needs Assessment, Metropolitan (MAG, PAG, YMPO) Plans, Non-Metropolitan Area Studies, and Statewide Significant Corridors. These source elements comprise the Transportation Investment Process (Figure 2-2).

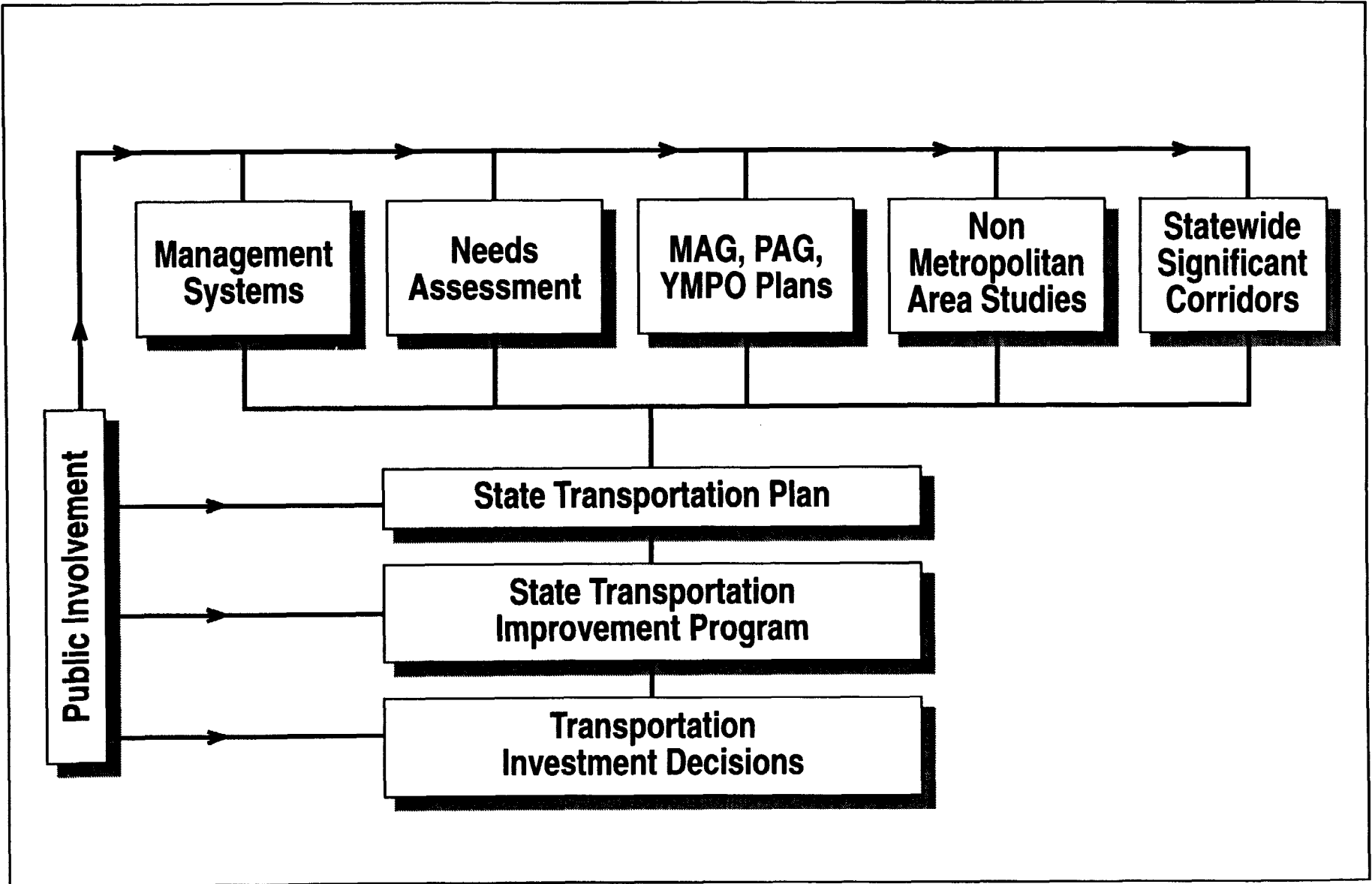


Figure 2-2  
TRANSPORTATION INVESTMENT PROCESS

Each of these elements will provide opportunities for public involvement, and each will identify issues, opportunities, and specific transportation needs as well as alternative approaches to address those needs. These five elements will contribute to future iterations of the State Transportation Plan to a larger degree as they are more fully developed and matured. Each of these elements is described below.

### **Management Systems**

The management systems will monitor the performance of the transportation system in Arizona. Based on the level of performance, the management systems will identify improvement needs and identify strategies to meet those needs. The planning for the significant corridors will incorporate the results of the management systems. The management systems will provide information on the following performance characteristics: 1) pavement; 2) bridges; 3) safety; 4) congestion; 5) intermodal linkages; and 6) public transportation. Management systems development in Arizona is discussed in Chapter 4.

### **Transportation Needs Assessment**

The Transportation Needs Assessment process and 1994 results are presented in detail in Chapter 7. The Needs Assessment, expanded to include all modes, will continue to be a valuable source of input into the planning process.

### **Metropolitan (MAG, PAG, YMPO) Plans**

The third source of input for the State Transportation Plan are from the metropolitan areas. As of today there are three metropolitan areas within the State of Arizona: Maricopa Association of Governments (MAG), Pima Association of Governments (PAG), and Yuma Metropolitan Planning Organization (YMPO). Each has an adopted transportation plan which identifies transportation strategies to meet regional needs. These plans are included, by reference, in the State Transportation Plan.

### **Non-Metropolitan Area Studies**

The non-metropolitan area studies (Small Area Transportation Studies) are a partnership of federal, State, and local agencies which sponsor transportation planning in Arizona's small urban areas and rural counties. The program will continue to be an integral part of the State

transportation planning process by identifying multimodal transportation needs in non-metropolitan areas throughout the State.

### **Statewide Significant Corridors**

The future State transportation planning process will include the evaluation of corridors of statewide significance as described in Chapter 10. These corridors will be evaluated from a multimodal perspective and will result in a definition of transportation needs for each corridor. Based on the corridor needs, long-range strategies will be defined.

### **State Transportation Improvement Program**

Projects defined through the State transportation investment process will be included for consideration in the State Transportation Improvement Program (STIP). As in the case with the development of the STP, the STIP will be developed within an expanded and ongoing public participation process to allow for timely public review, discussion and input into programming decisions.

Not only will the new STIP have to be consistent with the STP, it will also have to be compatible with the Transportation Improvement Programs of the MPOs. In addition, the new STIPs will include a wider range of modal projects, capital and non-capital initiatives, intergovernmental coordination, and more extensive project monitoring. Finally, the STIPs will need to be financially constrained to include only projects where resources and funding are or will be available.

### **Transportation Investment Decisions**

Based upon input from the five source elements discussed above, transportation investment decisions will be made by the State Transportation Board.

## **CONCLUSIONS**

The transportation planning process for Arizona is designed to implement the new federal mandates associated with ISTEA while building upon the long established transportation planning programs and activities of the Arizona Department of Transportation and the regional and local jurisdictions within the State.

### **3. PUBLIC INVOLVEMENT**

#### **INTRODUCTION**

The State Transportation Plan guides transportation decisions that will have lasting impacts on Arizona's economic, social, and environmental future. To ensure that as many viewpoints as possible were considered in the planning process, ADOT developed an aggressive public involvement process.

In late 1993, ADOT prepared a draft Public Involvement Process designed to obtain and consider public and intergovernmental input in the development of the State Transportation Plan. This document was submitted for formal 45 day public review. The State Transportation Board approved the draft public involvement process in January 1994.

A review of this process was conducted in the Spring of 1994. This review necessitated a revision to the Public Involvement Process which underwent a 45 day public review. The revised process was approved by the State Transportation Board in October 1994.

#### **PUBLIC INVOLVEMENT TECHNIQUES**

The State Transportation Plan Advisory Committee, which was described in detail in Chapter 2, is a notable component of the public involvement process. The balance of the public involvement process followed in developing the State Transportation Plan encompassed the techniques as discussed below.

##### **Public Opinion Survey**

To gather Arizona residents' input on transportation-related issues to aid in the development of the Department's Statewide Transportation Plan, a Public Opinion Survey was conducted in April 1994. The survey consisted of 1,423 in-depth telephone interviews conducted with Arizona residents 18 years of age or older. All of the interviewing was conducted by professional interviewers of the Behavior Research Center. A brief summary of the findings of the survey is presented near the end of this chapter.



## **Public Meetings**

Public meetings provided a forum for presenting information to interested citizens and for receiving their comments. The informal open house format allowed planning team members to converse with citizens in a one-on-one environment. Attendees were provided an opportunity to complete questionnaires regarding State planning issues.

Public meetings were scheduled at key points in the planning process, and announced through public notices, news releases, and direct mail. As shown in Table 3-1, Public Meetings were held throughout the state to ensure broad-based citizen review and comments.

## **Mailing List**

As part of the process, a mailing list of all agencies, businesses, and individuals expressing interest in the STP was created. The initial list was developed through an ADOT brainstorming session to identify agencies and businesses which might be interested in the State Transportation Plan. The agencies/businesses were called for specific names to put on the list. Names were added through public meeting attendance and through telephone conversations with key public and private officials throughout the state. The continually evolving mailing list includes about 3,200 names.

## **Newsletters**

Through two newsletters, ADOT informed citizens about the State Transportation Plan. The first newsletter, mailed in August, included a discussion on the status of the plan, summarized results of the public opinion survey, and announced the September public meeting schedule. The second newsletter summarized the results of the study and announced the November State Transportation Board Hearing on the Plan.

## **State Transportation Board Hearing**

The State Transportation Board is a seven member panel appointed by the Governor. Board members serve a six-year term and each represents a specific geographic region of the state. The Board is responsible for the establishment of ADOT's governing policies and spending priorities. A State Transportation Board Hearing on the State Transportation Plan was held in

**Table 3-1. Public Meetings**

<b>Date</b>	<b>Place</b>	<b>Topics</b>
11/3/93	Mesa	State Transportation Plan - Process
11/4/93	Peoria	State Transportation Plan - Process
11/6/93	Phoenix	State Transportation Plan - Process
2/15/94	Mesa	ADOT open house on State Transportation Issues
2/17/94	Peoria	ADOT open house on State Transportation Issues
2/23/94	Phoenix	ADOT open house on State Transportation Plan - Process and Issues
4/12/94	Tucson	ADOT open house on State Transportation Plan - Process and Issues
4/25/94	Yuma	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
5/24/94	Safford	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
5/25/94	Sierra Vista	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
5/26/94	Camp Verde	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
5/31/94	Florence	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
6/1/94	Show Low	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
6/9/94	Kingman	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
7/14/94	Phoenix	ADOT open house on State Transportation Plan - Issues, Goals & Objectives
9/1/94	Window Rock	ADOT public meeting on Draft State Transportation Plan
9/6/94	Florence	ADOT public meeting on Draft State Transportation Plan
9/7/94	Tucson	ADOT public meeting on Draft State Transportation Plan
9/8/94	Nogales	ADOT public meeting on Draft State Transportation Plan
9/12/94	Glendale	ADOT public meeting on Draft State Transportation Plan
9/12/94	Yuma	ADOT public meeting on Draft State Transportation Plan
9/13/94	Lake Havasu City	ADOT public meeting on Draft State Transportation Plan
9/13/94	Prescott	ADOT public meeting on Draft State Transportation Plan
9/14/94	Flagstaff	ADOT public meeting on Draft State Transportation Plan
9/14/95	Parker	ADOT public meeting on Draft State Transportation Plan
9/15/94	Kingman	ADOT public meeting on Draft State Transportation Plan
9/15/94	Page	ADOT public meeting on Draft State Transportation Plan
9/16/94	Phoenix	ADOT public meeting on Draft State Transportation Plan
9/19/94	Mesa	ADOT public meeting on Draft State Transportation Plan
9/20/94	Safford	ADOT public meeting on Draft State Transportation Plan
9/21/94	Douglas	ADOT public meeting on Draft State Transportation Plan
9/21/94	Pinetop - Lakeside	ADOT public meeting on Draft State Transportation Plan
9/22/94	Benson	ADOT public meeting on Draft State Transportation Plan
9/22/94	Globe	ADOT public meeting on Draft State Transportation Plan
9/23/94	Payson	ADOT public meeting on Draft State Transportation Plan
9/28/94	Casa Grande	ADOT public meeting on Draft State Transportation Plan
11/10/94	Phoenix	State Transportation Board Hearing
12/16/94	Phoenix	State Transportation Board Plan Adoption

November prior to its adoption in December 1994. In addition, presentations were made to the Board periodically throughout the plan development process.

### **Other Approaches**

In addition to the public involvement approaches listed above, ADOT used a number of other ways to communicate STP progress to the public. These included:

- ***Speakers Bureau*** - ADOT staff made a number of presentations to interested professional and service groups throughout the State.
- ***Distribution of Materials*** - STP information was made available to the public in libraries and in ADOT District Engineer offices.
- ***Media Briefings*** - News releases were prepared at key points during the study. In addition, ADOT personnel were provided relevant material so when they appeared on radio or television talk shows as part of regular duties, they could discuss the Plan.
- ***Legislation Briefings*** - Legislators were kept apprised of the process through regular ADOT management briefings.
- ***Governmental Coordination*** - Throughout the planning process, ADOT made intensive efforts to keep other governmental agencies informed of the planning effort. Over 100 meetings were held with city, county, regional, and tribal officials.

### **SUMMARY OF PUBLIC INPUT**

This section of the report includes summaries of the public opinion survey conducted in April 1994, of the questionnaire distributed at the eight public meetings held throughout the State in the Spring, and of the questionnaire distributed at the 21 public meetings held throughout the State in September 1994.

#### **Public Opinion Survey**

An overview of the Public Opinion Survey reveals the following statewide attitudes on transportation issues:

- **Most Important Transportation Problems** - Lack of public transportation (29%) and traffic congestion (28%) are singled out by residents as the two most important transportation problems in their area today.
- **Overall Evaluation of Area Transportation System** - Residents' evaluation of the overall transportation system in their area is lukewarm with less than a majority rating

it in positive terms—excellent (4%) or good (43%). In comparison 37 percent rate the system as only fair, while 16 percent rate it as poor.

- **Evaluation of Local Transportation System Components** - When residents are asked to evaluate their local transportation system on 13 different components, six components receive positive readings of either excellent or good from a majority of residents: condition of bridges; physical condition of major highways; availability of passenger air service; adequacy of freeways; physical condition of local streets; and, availability of pedestrian walkways. Receiving the lowest ratings from residents are: availability of passenger rail service; availability of local bus service; availability of bus service between Arizona cities; and, availability of bikeways.
- **Seriousness of Selected Transportation-Related Problems** - When residents are asked how serious each of five transportation-related problems are in their area of the state, automotive air pollution surfaces as far more serious than any of the other four problems, with a majority of residents (52%) indicating it is a serious problem. In comparison, none of the other factors generates a serious problem rating over 30 percent.
- **Transportation Spending Priorities** - Residents place freeways and public transit on the top of their spending priority list with these two categories occupying the top four spots among 15 priorities tested. Leading the list of priorities is freeways (**asked only in urban areas**) followed by increased frequency of bus service, expanded transportation services for the elderly and handicapped, and beginning regular local bus service in areas where it does not currently exist.

On the opposite end of the spectrum, four improvements receive the lowest spending priority: landscaping Arizona's major highways; expanding air service in your area; improving the condition of bridges in your area; and increasing passenger rail service in Arizona.

- **Transportation Financing Options** - Those transportation funding options which receive the strongest support from residents are smog fees, increased developer fees, and the use of State general fund monies.
- **Air Pollution Reductions** - Those air pollution reduction measures which urban residents most strongly support out of 18 alternatives are: (1) offering incentives to encourage those employees who can to work at home using computers; (2) expanding public transit systems; (3) requiring employers to offer their employees incentives to carpool; and (4) targeting the vehicle emissions testing program at the worst polluters.

Those pollution reduction measures which residents most strongly oppose are: raising the price of gasoline; instituting a mandatory program whereby people are not allowed to drive their vehicle one weekday each week; raising vehicle registration fees to encourage the use of less polluting vehicles; and, imposing mandatory parking fees for employees who drive to work alone.

Urban residents indicated that the combining of automobile trips and walking for short trips or errands are two steps they are most willing to take to reduce air pollution in their area. Utilization of a dial-a-ride service and regular bus service are the two steps they are least willing to take.

- **Traffic Congestion** - When urban residents are asked how much impact they feel each of 17 steps would have on traffic congestion in their area, four steps are believed by residents to have the most impact. These steps are: telecommuting; traffic light coordination; expanded public transit; and carpooling.

### Spring Public Meetings

Between April 25 and July 14, ADOT held eight Public Meetings throughout the State on transportation issues, goals, and objectives (see schedule in Table 3-1). The purpose of these meetings was to introduce the State transportation planning process to the public and to obtain public input on major transportation issues and on the draft set of goals and objectives.

All of the goals and objectives received the support of the majority of the meeting attendees, most with a percentage of support exceeding 70 percent. The goals and objectives presented in this Plan are based on this public input plus comments from the State Transportation Plan Advisory Committee.

Three specific questions were also asked at the spring meetings. These questions and the responses are presented below.

- Almost any proposal to improve transportation in Arizona includes spending tax dollars. Please tell us how much spending priority you feel each proposal should receive in the State's transportation plan—high priority, moderate priority, or low spending priority.

	High	Moderate	Low	Not Sure
A. Beginning regular local bus service in your area where it does not currently exist.	27.9%	27.9%	36.1%	8.1%
B. Improving the major highways in your area.	77.0%	19.7%	3.3%	0%
C. Adding bike lanes on major streets in your area.	24.6%	27.9%	37.7%	9.8%
D. Improving the transportation systems in the rural areas of the state to encourage economic development.	63.9%	23.0%	11.5%	1.6%

- New transportation improvements in Arizona require payment. There are a number of ways to pay for improvement, let us know if you support or oppose each one.

	Support	Oppose	Not Sure
A. Increase the state sales tax by one-half cent	62.7%	27.1%	10.2%
B. Increase parking fees for commuters.	33.9%	32.2%	33.9%
C. Increase gasoline tax by 10 cents a gallon.	35.6%	49.2%	15.2%
D. Begin charging tolls on some major highways.	27.1%	47.5%	25.4%
E. Take money from the states general fund budget.	52.5%	20.4%	27.1%

- If the air quality in your area were to become considerably worse than it is now, how willing would you be to do each of the following—very willing, somewhat willing or not very willing.

	Very	Somewhat	Not Very	Not Sure
A. Make fewer automobile trips.	37.9%	44.8%	10.4%	6.9%
B. Combine automobile trips.	53.5%	37.9%	6.9%	1.7%
C. Use the bus more often.	27.6%	17.2%	22.8%	22.4%
D. Use Dial-A-Ride transit service.	15.5%	19.0%	53.4%	12.1%
E. Walk for short trips or errands.	55.2%	29.3%	6.9%	8.6%
F. Use a bicycle for short trips or errands.	43.1%	19.0%	25.9%	12.0%
G. Carpool more often.	32.8%	46.5%	17.2%	3.5%
H. Use electric vehicles.	36.2%	24.1%	15.6%	24.1%

### September Public Meetings

During the month of September 1994, ADOT conducted public meetings at 21 locations throughout the State. The purpose of these meetings was to brief members of the general public, elected officials and other interested parties on the draft of the State Transportation Plan, and to elicit comments and suggestions on the various components of the Plan.

A slide show presented by staff members outlined the purpose of the Plan, the legal mandates driving Plan development, and the overall planning process. A key element of the presentation focused on the proposed Transportation Investment Process. The formal staff



presentation was followed by a question and answer period. A series of presentation boards served to illustrate key components of the plan.

A questionnaire was also developed and handed out at the meetings to elicit public comment on the draft plan. Of the 471 persons who attended the 21 open houses, 175 completed the questionnaire. The questionnaire requested comment on five areas: transportation investment options, corridor definition factors, ranking criteria, proposed corridor ranking, public involvement process. The results of the Transportation Investment Options and Public Involvement Process are summarized below. The other three categories—dealing with the corridor analysis reported in Chapter 10 of this document—were used in finalizing that analysis.

It should be noted that this analysis is not intended to be statistically valid, but is simply a sampling of general opinion from self-selected individuals who expressed comments on the draft Plan. Not surprisingly, the questionnaire often reflected concerns of regional emphasis. The information however is valuable in identifying regional issues of importance and gleaning Statewide general opinion on the recommendations presented in the draft plan and comment on the open houses.

The Transportation Investment Option questionnaire was divided into five categories. The results are presented in Table 3-2 and summarized below (percent indicates the percentage of people who feel the strategy type is very important or important).

Highway Improvements - Improve Roadways (82%) and Roadway Preservation (77%) were the two highest ranked.

Local Transit - Bus Service for the Elderly (66%) and Disabled (65%) were the highest ranked.

Inter-City Travel - Not surprisingly, most people listed highways (80%) as the most important.

Alternate Travel Modes - Bicycling (60%), Carpool/Vanpool (58%), Walking (57%), and Telecommuting (53%), all ranked about the same.

Innovative Techniques - Only Advanced Driver Information (63%) was felt to be important by a majority of the respondents.

**Table 3-2. Transportation Investment Options**

Option	Very Important or Important	Not Important
<b><i>Highway Improvements</i></b>		
1. Improved Roadways	82%	1%
2. Roadway Preservation	77%	2%
3. New Roadways	68%	10%
4. High Occupancy Vehicle Lanes	44%	33%
5. Park and Ride Lots	41%	35%
<b><i>Local Transit</i></b>		
1. Bus Services for the Elderly	66%	13%
2. Bus Services for Persons with Disabilities	65%	10%
3. Fixed Route	58%	17%
4. Dial a Ride Bus Services	47%	25%
5. Light Rail	35%	38%
<b><i>Inter-City Travel</i></b>		
1. Highway	80%	9%
2. Bus Service	70%	11%
3. Air Service	59%	17%
4. Rail Service	56%	23%
<b><i>Alternate Travel Modes</i></b>		
1. Bicycling	60%	25%
2. Carpool/Vanpool Programs	58%	19%
3. Walking	57%	26%
4. Telecommuting	53%	15%
5. Voluntary No Drive 1 in 5 Days	33%	36%
6. Mandatory No Drive 1 in 5 days	17%	50%
<b><i>Innovative Technologies</i></b>		
1. Advanced Driver Information to Guide Travel to Avoid Weather and Congestion Problems	63%	9%
2. Ramp Metering	36%	22%
3. Time of Day Pricing	27%	30%

In response to the questions regarding the Public Involvement Process, a strong majority of respondents indicated that they found the various elements of the presentation either Very Helpful or Helpful. When asked about the most effective ways to keep the public informed of State transportation planning activities, the methods cited, in order of preference, were periodic public meetings in the area (93 responses); periodic newsletters (82 responses); stories in media (76 responses); presentations to local elected officials (54 responses); and public hearings (41 responses). Additional ideas included cable television, an 800 telephone number, and computer access to information.

When asked about the most effective way to obtain general public comments on issues and concerns, the preferred methods, in order of preference, were discussions with staff at open house/public meetings (93 responses); direct mail questionnaires (87 responses); questionnaires at public meetings (79 responses); telephone surveys (38 responses) and formal public hearing testimony (24 responses). Other ideas included newspaper questionnaires, an 800 number, and partnering meetings.

A majority of respondents were residents of the area (127). Others included concerned taxpayer (83), business in area (47), elected/appointed official (39), and governmental employee (34). The two primary sources for learning about the meeting were notices in the mail (71 responses) and newspaper (57 responses). Other methods included, in order of frequency cited, were Friend/Word of Mouth (32 responses), Radio (12 responses), and Television (3 responses). Other sources included flyers, regional planning agencies, local governments, and chambers of commerce.

Those responding to the questionnaire indicated their areas of interest, ranked as follows:

Recreation	175 respondents
Economic Development	85 respondents
Highway Planning	84 respondents
Tourism	52 respondents
Environmental Issues	43 respondents
Alternate Modes	35 respondents
Innovative Technologies	25 respondents

There were multiple responses in several sections of the public involvement component of the questionnaire. As a corollary, not every respondent answered each component of the full questionnaire.

## **CONCLUSIONS**

Throughout the development of the State Transportation Plan, ADOT participated in 164 meetings with a wide variety of individuals and groups. Additionally, the planning team spoke with hundreds of citizens, both within the public meetings/open houses and individually. The public opinion poll and the formal questionnaires completed by the participants in the public meetings/open houses significantly informed the planning team and directly influenced the development of the Plan. As the Plan undergoes further development in subsequent years, the extensive public involvement will continue.

## **4. STATEWIDE MANAGEMENT SYSTEMS**

This chapter describes and discusses the development of the statewide management and monitoring systems which are an integral part of the Arizona State transportation planning and transportation improvement process. The following sections of the chapter first present a brief overview of the management and monitoring systems including the federal requirements. The current activities to develop and implement the management systems statewide are then described. Next, the relationship of the management systems to the State transportation planning process is discussed. The role of the Metropolitan Planning Organizations (MPOs) in implementing management systems within the metropolitan regions is then discussed. The chapter concludes with a discussion of the future direction in implementing the management systems.

### **OVERVIEW OF MANAGEMENT SYSTEMS**

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) brought about revolutionary changes with far reaching implications on metropolitan transportation planning, state transportation planning, and management systems. The overall objective of the ISTEA is the improved performance of the state and metropolitan transportation systems through preservation, operation, and capacity enhancements. ISTEA required that the states implement management and monitoring systems to evaluate the performance of state transportation systems. In meeting the demands of the current and future transportation system users, the state transportation planning process must address the results of the management systems as well as the other factors specified by the ISTEA.

The federal rules issued for state transportation planning and the management systems intend that the management systems be an integral part of state transportation planning and improvement programming. The management systems are not intended to stand alone, but rather they are intended to provide information and strategies to the planning and improvement process. As discussed in the previous chapter, the management systems are currently incorporated into the Arizona State transportation planning process. The management systems will be implemented on facilities which fall under state, local, or federal jurisdiction.

ISTEA requires that the following six state management systems be implemented:

1. Pavement Management System (PMS)
2. Bridge Management System (BMS)
3. Safety Management System (SMS)
4. Congestion Management System (CMS)
5. Intermodal Management System (IMS)
6. Public Transportation Management System (PTMS)

In addition to the six management systems, a Traffic Monitoring System for Highways (TMS/H) is also under development.

A statewide management system is a systematic process designed to continuously monitor and evaluate the multimodal transportation facilities in the state. Through this continuous monitoring and evaluation of multimodal transportation facilities, the management systems are intended to improve the overall efficiency of the statewide transportation system. The products of the statewide management systems are transportation projects, actions to implement those projects, and strategies for implementing the transportation system. A complete management system will include the following elements:

- **Data collection and analysis.** Each management and monitoring system will collect data, store the data in some type of database, and analyze that data. The traffic monitoring system, for example, will collect daily traffic volumes, hourly turning movement counts, and vehicle classification counts, as well as other types of traffic data. Statistical reports on the traffic conditions will then be output from the traffic monitoring system.
- **Transportation system performance measures.** Performance measures for each management system will be used to evaluate the performance of the transportation facility. For example, a pavement condition index will be used to evaluate the performance of roadway pavements. A high pavement condition index might indicate excellent pavement condition whereas a low index number might indicate poor pavement condition. Other performance measures will need to be developed to evaluate other transportation characteristics such as the multi-modal aspects of the transportation system.
- **Transportation needs.** Transportation facility needs will be identified by the management systems based on how well the transportation facility performs. A certain pavement condition index, for instance, may indicate that the pavement needs an asphalt overlay at a certain cost. A lower index number may indicate, on the other hand, that the pavement needs to be reconstructed at a higher cost.



- **Transportation projects, actions, and strategies.** As noted above, projects, actions, and strategies are the products of each management system. Based on the needs identified by each management system, projects will be defined for meeting those needs. Actions and strategies will then be developed by the management systems for implementing the respective projects. A pavement management strategy identified by the PMS might be to preserve the existing condition of all pavements on Interstate highways at a certain level of pavement condition.

A brief summary of each management and monitoring system required by ISTEA follows.

### **Pavement Management System (PMS)**

The purpose of a PMS is to evaluate the condition of roadway pavements, to identify pavement condition deficiencies, and to identify pavement project needs. A statewide PMS must be implemented for all roadways eligible for federal funds which include all roadways on the federal classification system excluding rural minor collectors and local roads. Roadways to be included in the PMS are further subdivided into those roadways on the National Highway System (NHS) and the Non-National Highway System (Non-NHS). Specific PMS requirements are defined for those NHS and non-NHS pavements. The State currently operates a PMS on State highways which will be enhanced in the future to comply with all the federal regulations. Local governments are also responsible for implementing a PMS on roadways under local jurisdiction which are eligible for federal funds. The State is responsible for the implementation of the statewide PMS and must certify that local jurisdictions have complied with the regulations.

### **Bridge Management System (BMS)**

The goals of the BMS are similar to that of the PMS. The BMS will evaluate the condition of bridges, identify bridge condition deficiencies, and identify bridge project needs. The coverage will include all bridges on and off Federal-Aid highways within the State, except for federally owned bridges which will be directly evaluated by federal agencies. The federal regulations require that the National Bridge Inspection Standards which require the inspection of bridges on all public roads, be applied in the BMS. The statewide BMS, therefore, extends to all public roads through all State and local jurisdictions. The State currently conducts a comprehensive bridge inventory on state, county, and local roadways as part of The National

**Bridge Inventory.** Current bridge inventory procedures will be modified to conform to the federal regulations.

### **Safety Management System (SMS)**

The underlying goal of the SMS is to reduce highway related accidents and improve safety on transportation facilities. The scope of the SMS goes well beyond that of monitoring accidents and incorporates the roadway, human, and vehicle safety elements. The SMS must be coordinated among a wide variety of disciplines involved in safety including engineering, law enforcement, emergency response services, public health services, motor carrier safety, and motor vehicle administration, and State and local railroad and/or trucking regulatory agencies. The SMS will be implemented on all public roads within Arizona. The State currently operates a statewide accident records system for all public roads in the State. A variety of safety programs are also currently implemented by different agencies throughout the State.

### **Congestion Management System (CMS)**

The goal of the statewide CMS is to alleviate congestion and enhance the mobility of persons and goods on roadways throughout the State. The State is required to include all transportation corridors which are either currently congested or are expected to have future recurring congestion. The statewide CMS must consider a broad range of strategies including those that reduce single-occupant-vehicle (SOV) use in both metropolitan and non-metropolitan areas in the State. In all Transportation Management Areas (TMAs) a CMS must be part of the metropolitan transportation planning process. A CMS in a TMA which is designated as nonattainment for carbon monoxide and/or ozone must provide an analysis of all reasonable travel demand reduction and operational management strategies for the corridor which includes a significant increase in SOV capacity. The statewide CMS must integrate the CMS developed in TMAs into the overall CMS process covering metropolitan areas, non-metropolitan areas, and rural areas. A statewide CMS is a new process and entails major development and implementation activities.

### **Intermodal Management System (IMS)**

An intermodal transportation system is a transportation network of public and private infrastructure for moving people and goods by various combinations of transportation modes. The intent of the statewide IMS is to improve the linkages between the different transportation modes. For example, the improvement of the coordination of the rail and trucking interfaces at freight stations. Intermodal facilities include those portions of highways providing terminal access, pipeline farms, airports, rail terminals, major truck terminals, transit terminals including park and ride facilities, and intercity terminals. The statewide IMS is a new process which requires significant work to inventory intermodal facilities and to define an IMS process.

### **Public Transportation Management System (PTMS)**

The purpose of the PTMS is to evaluate the condition and costs of public transportation facilities and equipment. Public transportation facilities include transit maintenance facilities, station terminals, and transit structures. Public transportation equipment includes transit rolling stock and associated maintenance and operation equipment. The PTMS will cover both urban and rural areas, and include local jurisdictions, public transportation agencies and authorities, and private transit operations. The PTMS is being developed in coordination with the jurisdictional recipients of federal transit funds. The State currently maintains a comprehensive database for non-metropolitan and rural areas. Transit agencies in the metropolitan regions maintain separate databases. However, additional work is needed to convert current processes to the federal PTMS requirements.

### **Traffic Monitoring System for Highways (TMS/H)**

The TMS/H will collect traffic data on highways throughout the State. The monitoring system will also collect data for public transit facilities and equipment on public roads and highways. The types of traffic data to be collected include, for example, daily traffic volumes, hourly turning movement counts, vehicle weight data, and vehicle occupancy counts. The traffic data collected by the TMS/H are also basic data elements in the other management systems; therefore, the TMS/H plays a vital support role in the six management systems. For example, traffic volumes are a basic input to the PMS. The State currently conducts comprehensive traffic

data collection. But, enhancements to the current counting process are needed to comply with the federal requirements.

The management and monitoring systems described above are not stand alone systems. Rather, the interrelations of the various systems must be considered in the development and implementation of the management and monitoring systems. For example, the CMS, IMS, and PTMS have interrelated goals and components and these interrelationships must be addressed in the three management systems.

### **DEVELOPMENT OF STATEWIDE MANAGEMENT SYSTEMS**

ADOT is responsible for implementing the six statewide management systems and the traffic monitoring system. The federal regulations require that workplans be prepared to identify the activities which must be accomplished to implement the systems. The workplans for the six Arizona statewide management systems were prepared in 1994 as part of an extensive partnering process including a wide variety of federal, State, regional, and local agencies, and American Indian Nations and private organizations. In addition, the statewide management systems are being coordinated with the management systems being developed and implemented by the Metropolitan Planning Organizations (MPOs).

The partnering approach included eight ISTEA committees to develop and implement the management systems. A planning committee oversaw the activities for seven technical committees, one for each of the six management systems plus a computer information systems committee. The partnering approach also included the conduct of partnering workshops to help develop the management systems. The workshops included individuals representing a variety of interested bodies with often different goals for a particular management system. In addition, a monthly newsletter has been widely distributed throughout the state to provide information and to solicit comments on the management systems. Each management and monitoring system will be implemented based on the respective workplan in accordance with the time schedule shown in Table 4-1.

**Table 4-1. Management Systems Compliance Dates**

	Oct. 1, 1994	Oct. 1, 1995	Oct. 1, 1996	Oct. 1, 1997	Oct. 1, 1998
<b>PMS NHS</b>	Completed Workplan	Full Operation and Use			
<b>PMS Non-NHS</b>	Completed Workplan			Full Operation and Use	
<b>SMS</b>	Completed Workplan		Full Operation and Use		
<b>BMS</b>	Completed Workplan				Full Operation and Use
<b>CMS</b>	Completed Workplan	Full Operation and Use in Non-attainment TMAs	Full Operation and Use in all areas		
<b>PTMS</b>	Completed Workplan		Full Operation and Use		
<b>IMS</b>	Completed Workplan		Full Operation and Use		
<b>TMS</b>	Completed Workplan	Full Operation and Use on NHS	Full Operation and Use on all Public Highways		

- NHS = National Highway System
- Non-NHS = Non-National Highway System
- TMA = Transportation Management Association

Other ongoing ADOT activities related to the management systems include the existing PMS, Bridge Inventory, the Transportation Needs Assessment, the Highway Performance Monitoring System (HPMS), and the Accident Location Information Surveillance System (ALISS). Currently the state has an operational PMS which identifies pavement conditions. ADOT has a program for bridge inspections and bridge inventory which identifies bridge conditions. The ongoing Transportation Needs Assessment identifies transportation needs for both State and local facilities. The HPMS provides highway condition data on state highways. ALISS provides information on accidents on State and local roads. These ongoing ADOT



ALISS provides information on accidents on State and local roads. These ongoing ADOT activities provide information on roadway condition, deficiencies and roadway needs which have been used as input to the State Highway System Plan. Although these activities are currently not a part of a formal management system, they do provide information on needs and do identify projects. The current activities are readily adaptable to the broader context of the six statewide management systems.

## **ROLE OF THE METROPOLITAN REGIONS**

The metropolitan regions within the State have significant transportation problems involving all transportation modes. Management systems can play an important role in identifying and solving those problems. The federal regulations require the CMS, IMS, and PTMS to be integral parts of the metropolitan transportation planning process. The federal regulations require the CMS, IMS, and PTMS to be integral parts of the metropolitan transportation planning process, and for TMAs (metropolitan planning regions with populations in excess of 200,000) to implement these systems within their respective regions. Both the Maricopa Association of Governments (MAG) and the Pima Association of Governments (PAG) are developing these required systems. In addition, the Yuma Metropolitan Planning Organization (YMPO) has a Traffic Monitoring program, and is in the process of using the results of that program in the analysis of safety, intermodal and congestion issues for the area. The output from these cooperative efforts will be provided as input to the statewide management systems.

The State and the MPOs must coordinate with each other in the development and implementation of the CMS, IMS, and PTMS. In this regard, MAG, PAG, and YMPO are involved in the development of the statewide management systems. The management systems developed by the MPOs must also be approved by the State as part of the overall Statewide Management Systems. The MPOs are also closely involved in the development of the other three management systems; the PMS, BMS, and SMS. Although, the MPOs are not required to implement these three management systems, they are playing, and will continue to play, a significant role in implementing the management systems.

## **FUTURE DIRECTION**

The management systems and related activities play an important part in the Arizona State Transportation Planning Process and will remain vital to the statewide process. The further development and implementation of all the management and monitoring systems will continue under the aegis of a comprehensive statewide partnering process. Close coordination between federal, state, regional, and local agencies will ensure that the management systems evolve into continuing effective processes which enable all the interested parties to assess and to improve the statewide transportation system. The workplans are establishing the future direction of the management and monitoring systems and the relationship of those systems to the state transportation planning process. The current State Transportation Plan incorporates the concept of the management systems. The state transportation planning process will continue to evolve as the management systems mature and are fully implemented within the State. The implementation of the management and monitoring systems will be phased in over the next several years. However, the smooth and stable operation of the management and monitoring systems may take several more years beyond the point when all the management and monitoring systems are fully implemented. At that point in time, the statewide management systems and the State transportation planning process will be fully effective tools to assess and to improve Arizona's transportation system.

## **5. ECONOMIC AND TRANSPORTATION FUTURES**

### **INTRODUCTION**

The purpose of this chapter is to describe Arizona's economic future and how it affects the State's transportation system. The short-term, mid-term and long-term economic outlooks are discussed followed by a brief look at visions of Arizona's future beyond 20 years.

### **SHORT-TERM ECONOMIC OUTLOOK (1 TO 3 YEARS)**

Arizona, like the rest of the nation, is currently in a recovery period from the recent prolonged recession. There are however, some notable differences between this and previous recovery periods. First, there will be long term structural changes based on changes in the global economic and political environment. Because these structural changes take time, the recovery will be slower. In addition, this recovery is unique, because it is not motivated by artificial forces such as a war or increased government spending. This lack of an artificial stimulus will also result in slower, but perhaps more sustainable economic growth.

While current growth levels in Arizona could be stronger compared to the State's performance in the early stages of previous recoveries, Arizona is doing quite well compared to the nation as a whole. The State's relative position is expected to continue to improve through at least 1995.

The following short-term changes in population, employment, income, inflation, and retail sales are anticipated by economists in Arizona.

#### **Population**

Arizona's population growth between 1990 and 1993 of 7.4 percent was seventh among the 50 states. Annual population growth is expected to increase slightly from 2.7 percent currently to 2.9 percent in 1995 and 1996 raising Arizona's population to over 4.2 million people by 1996. Net migration will account for about 232,000 new residents over the next three years.

## **Employment**

Recent historic employment growth, although not as strong as population growth, was still 2.1 percent during 1993, ranking Arizona tenth among the 50 states. This compares to 1.5 percent growth at a national level. Employment growth was lead by the construction sector. Manufacturing employment declined, although by only 0.4 percent, which is about average compared to other states. Beginning in late 1993, manufacturing employment growth started turning around, particularly in the durable goods sector.

During the past year, the construction sector led the State's job growth with an 11.2 percent increase in the number of jobs (8,900 new jobs created). This was primarily due to the boom in single-family home construction. The housing boom also impacted the finance, insurance and real estate; and stone, clay and glass sectors of the economy.

Sectors with recent job losses include aircraft/missiles/space vehicles, food stores, primary metals, mining, government, utilities, and other durable goods manufacturing. However, gains in overall manufacturing employment outweighed losses in defense and aerospace in 1993 for the first time in five years.

Employment projections for Arizona are strong over the next two years as the nation continues its recovery. As of April 1994, projections for annual employment growth have been revised upward to 3.9 percent for 1994, and 4.1 percent for 1995. The next two years could be the best years for Arizona since 1985, in terms of economic growth. Leading sectors will include construction, services and trade. The manufacturing sector will continue to recover with annual growth between 2.3 and 3.4 percent over the next three years.

## **Income**

Total personal income in Arizona grew by an estimated 6.4 percent in 1993, which is significantly higher than the national average. Over the next three years, personal income growth is expected to increase from 6.4 percent annual growth in 1993, to a high of 10.1 percent growth in 1995, and back to 9.6 percent growth in 1996.

## **Inflation**

Inflation will increase gradually through 1994 and 1995, to around 4 percent in 1995. The current expansion has led to a higher local inflation rate which is likely to remain above the national average, as the local economy continues to outperform the national economy.

## **Retail Sales**

Another sign of recovery is retail sales performance. Retail sales were very strong in the last quarter of 1993 and first quarter of 1994, despite anticipation that consumers would try to keep debt levels low. Upcoming employment and population gains will fuel growth in retail sales over the next year and a half. The current growth cycle should continue at least through the first half of 1996. Arizona will likely lag national trends, if the national economy goes into another recession.

## **MID-TERM OUTLOOK (3 TO 5 YEARS)**

In addition to population growth, the primary forces that will influence Arizona's economy in the mid-term will be related to foreign trade, particularly with Canada and Mexico. Mexico is currently America's third largest trading partner behind Canada and Japan. Given the passage of the North American Free Trade Agreement (NAFTA), it is likely that trade with Mexico will exceed trade with Japan by the end of the decade. A favorable balance of trade with Mexico is expected to continue with growing consumer demand for U.S. goods as the Mexican economy develops. This will result in increased export demand, and corresponding job increases for American firms.

There are nearly 9,000 products covered by the NAFTA treaty. Tariffs on half these products ended January 1, 1994. These include microchips, medical equipment, and telecommunications. Over the next five years tariffs will be phased out on an additional 1,350 products including light trucks, auto parts, oil field equipment, paper products, and heating and cooling equipment. By 2004, nearly all the tariffs will have been lifted. Industries that will benefit the most from this agreement include industrial equipment, financial services, telecommunications, electronics, automakers, and environmental cleanup industries. In addition to these incentives for increased export production, Arizona will also benefit from the transportation of goods to and

from Mexico through the State. There are also some potential negatives associated with NAFTA including job losses in particular sectors and particular communities, although net job change will be strongly positive.

Trade between Canada and the U.S. is also expected to increase with the General Agreement for Tariff and Trade (GATT). Currently, imports from Canada exceed exports by about 9 percent. The GATT treaty will eliminate or reduce tariffs on construction equipment, engines, tractors, pharmaceuticals, cars, electronic memory chips, chemicals, furniture, and other goods.

In general, exports of \$1 billion create about 25,000 jobs. As of 1992, Arizona firms were exporting \$1.8 billion dollars of goods and services to Mexico, resulting in an economic impact of approximately 45,000 jobs. One notable factor which would significantly improve Arizona's access to these markets would be the improvements to the Cana-Mex trade corridor through Arizona.

In addition, Arizona needs to solidify its position as a gateway to California and the Pacific Rim. The State is an ideal location for firms from other parts of the U.S., and the world, who want to serve these markets without being located in California.

#### **LONG-TERM OUTLOOK (5 TO 20 YEARS)**

As shown in Figure 5-1, population growth will continue to be important to the State's economic future, although it will be less of a driving force than in the past decades as in-migration slows. Population growth over the next several decades in Arizona is expected to be twice the national average. International migration will become an increasingly significant component of growth. Immigrants will primarily flow from Mexico, Central America and the Pacific Rim.

Arizona's economy has been impacted by a number of external forces which will have permanent long term effects on the State's economic structure. These forces include national economic restructuring, increasing global competition, free trade agreements with Canada, and with Mexico, and defense restructuring. As a result, Arizona's economy must adjust from being an economy driven by growth to an economy with a base of industries that produce higher value added products and services. The focus will shift from natural resources to human resources.

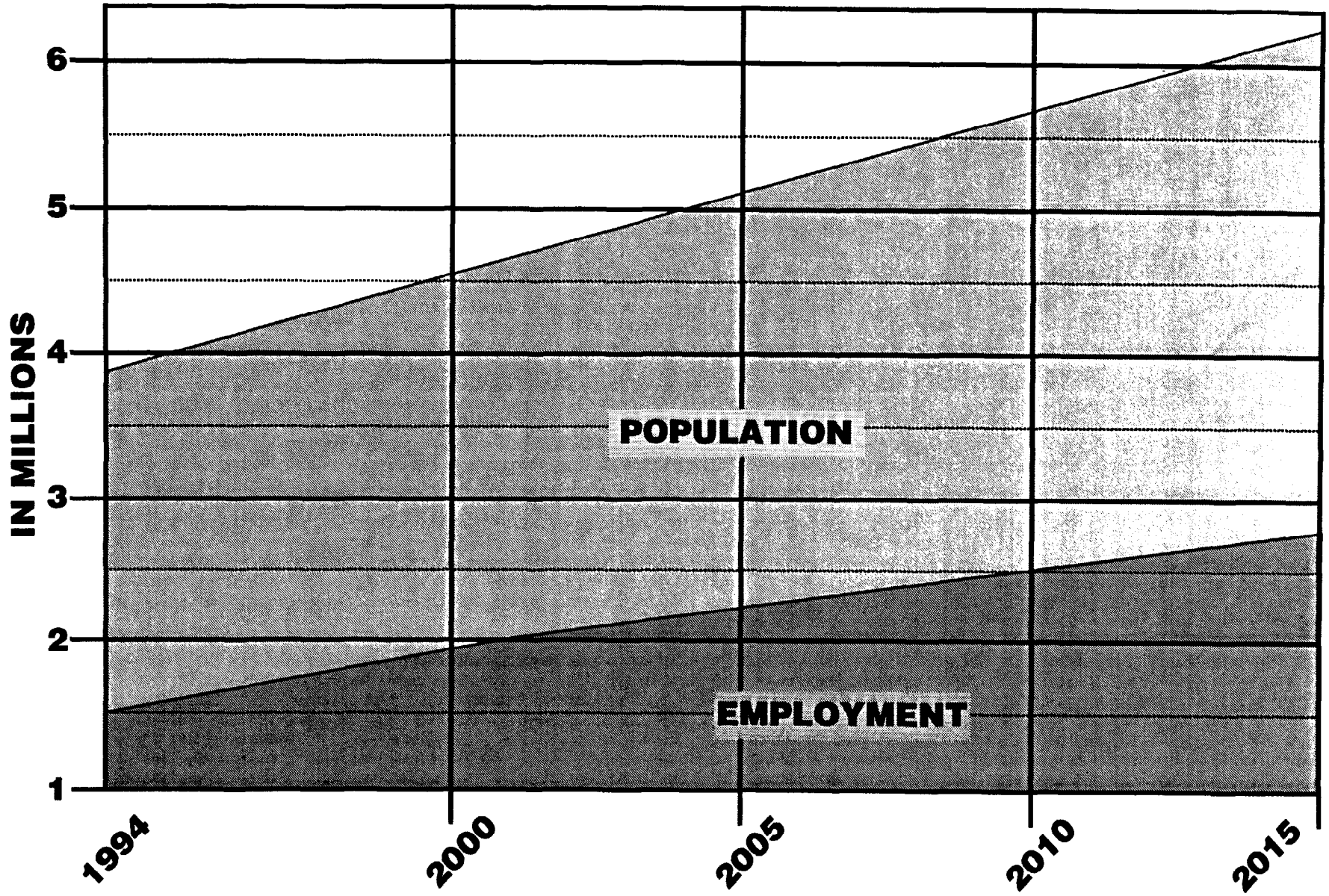


Figure 5-1  
ARIZONA POPULATION/EMPLOYMENT PROJECTIONS

## **External Forces**

***National Business Restructuring*** - Nationally, most industries are undergoing structural changes to reduce the number of employees and increase productivity.

***Globalization*** - To a great extent, industries that prosper in Arizona over the next 20 years will be those that serve international markets, as well as domestic markets. This challenge to move toward economic globalization will affect almost every industry. Key markets will include Mexico, Eastern Europe, Japan, and Canada. Local industries must gear their market research towards finding products that meet the needs of these foreign markets, and that can feasibly be produced in Arizona.

As far as importing, adequate transportation infrastructure, especially distribution systems, will be critical to success. These transportation and distribution systems include physical infrastructure, as well as services such as customs facilities, freight forwarding, banking, and accounting. Physical infrastructure at border crossings will directly impact Arizona's ability to facilitate trade with Mexico. Most border crossings are operating at capacity, even at current trade flow levels, and are in need of expansion and improvement.

Foreign direct investment is also an important component of globalization. Arizona has about 200 foreign-owned companies in a variety of industries including semiconductors, copper mining, and services. Foreign direct investment in Arizona is currently about \$4 billion, which on a per capita level is about equivalent to California.

Although international trade will be key to the State's future economy, it also poses some new threats. As the level of foreign trade and investment increases, the State will become more vulnerable to changes in exchange rates and trade policy. In addition, there will be new threats as Arizona deals with the competitive realities of a global economy.

In the case of Mexico, Arizona's economic linkages represent potential for enhanced competitiveness. These linkages can take advantage of lower wages in Mexico, and higher skills and more advanced technology in Arizona. It is likely that many labor-intensive industries and low-tech production technologies will develop in Mexico rather than in the U.S. because of cost advantages. However, Arizona has comparative advantages upon which it can capitalize in higher paying, capital and technology intensive production.



***Defense Restructuring*** - Arizona has benefited from a high concentration of defense related industries, in addition to large military base operations in the State, during the 1980's when defense spending was at its peak. These activities had significant multiplier effects on the State's economy. Recent defense cutbacks are likely to be permanent, and will significantly affect this driving force in Arizona's economy. Defense industries are currently in the process of trying to increase their competitiveness for remaining defense contracts, and seeking new commercial applications for defense-related technologies.

## **Internal Forces**

### **Industry Clusters**

In addition to the external forces noted above, Arizona's future will be driven by the economic viability of the local economy and the synergies that are created within the State. Arizona has a very diverse economy with several distinct regions throughout the state from the urban economies of Phoenix and Tucson, to tourism and recreation industries in northern Arizona, to the mining industry base in southeastern Arizona, and agricultural base in the southwestern part of the state. The State can build on this diversity by creating linkages between these various types of industries. Transportation will be especially critical in fostering these linkages.

Key driving sectors in the State's economy are those which are bringing in money from outside the state, have strong backward linkages to supplier industries, and have significant multiplier effects. There are ten basic clusters which fall into this category and account for about 50 percent of total output in the local economy. The long term economic outlook for Arizona will depend on the State's ability to develop and maintain a competitive advantage in these areas.

***Information industries*** include electronics and computers which have experienced high growth rates over the last decade. These are also high value industries in that they account for 14 percent of the State's output, but only 2.5 percent of total employment. The concentration of information industries in Arizona is currently at 5.9 times the national average. Growth projections for this industry cluster are the strongest among all the clusters with estimated annual output growth of 6.6 percent over the next decade.

***Aerospace industries*** include communication equipment, missiles, aircraft, and instruments. These are also high value, rapidly growing industries although not to the same extent as information industries. Recently there have been declines in missile and aircraft production due to cuts in defense spending, however, new markets and new commercial applications will fuel future growth in this cluster. Increased stability in the airline industry will also help bring about a turnaround for aerospace suppliers. Both output and employment growth in this industry are expected to be fairly high, compared to the other clusters.

***Tourism and experience industries***, unlike the first two clusters, are very labor intensive and account for over 10 percent of the State's employment, but only 4.7 percent of output. Although this sector has created a significant number of jobs, they are primarily low paying and frequently seasonal. The tourism industry is expected to continue to have strong employment growth in Arizona, projected at 4 percent annually, and moderate output growth.

***Business and financial services*** account for 12 percent of the State's employment and about 10 percent of total output. These industries have remained fairly stable throughout recent economic cycles. The business services sector is projected to experience the highest level of employment growth among the clusters, at 5.5 percent annually. Output growth projections are also strong at 4.7 percent annually.

***Health and biomedical technology*** includes both service providers, and manufacturers of medical products and equipment. This cluster currently accounts for 6.5 percent of employment and close to 4 percent of output in Arizona. As baby boomers reach retirement age and require more medical services, demand will increase in these industries. Arizona already has an established retirement base that will fuel growth in medical services. Output growth in health and biomedical technologies is projected to be 4.9 percent annually. Employment projections are equally strong at 5.2 percent annually.

***Transportation and distribution services*** are strongly linked to the tourism sector. They also are likely to benefit from increased foreign trade with Mexico through Arizona ports of entry. Currently, transportation and distribution accounts for 2.7 percent of employment and 3.2 percent of output. Moderate output and employment growth are projected for this sector.

***Agriculture and food processing*** has grown slowly, but has remained an important part of Arizona's basic economy. Although employment in this sector accounts for only 2.3 percent

of total employment, the concentration of agriculture and food processing employment in Arizona is well above the national average. Projections for future employment and output growth in this cluster are positive, but below average compared to other industries. The most labor-intensive types of farming and food processing are more likely to develop in Mexico given the comparative cost advantages.

***Minerals and mining industries*** have declined significantly over the previous decade due to international copper market conditions. However, in recent years, new mining technology has been developed which will allow for increased production in existing mines at lower costs. Although mining accounts for only 1 percent of State's employment and 3.4 percent of output, it is much more concentrated in Arizona than the national average. Copper mining is still the primary basic industry in much of eastern Arizona. This cluster is also projected to have positive but slow growth in employment and output.

***Optics*** is an emerging industry cluster. Electro-optics is one of the most rapidly growing areas of technology with high potential for the future. This is also a high value added industry in terms of ratio of employment to output value.

***Environmental technology*** is another emerging industry cluster and is one of the world's fastest growing industries. There are global markets for environmental technology products such as pollution control and monitoring, pollution remediation, alternative energy and fuels, and environmental consulting and services. In addition, more stringent environmental regulations in the United States, especially in California, create increasing domestic demand for these products. There are currently a high proportion of small environmental technology firms in Arizona where the industry is growing much faster than the nation as a whole. The majority of these firms were established in the past 10 years. Currently, this cluster accounts for 2.5 percent of gross state product in Arizona, with strong increases projected for output growth.

## **VISIONS OF THE FUTURE**

The State Transportation Plan is designed to address Arizona's transportation systems development over the next 20 years. In an effort to assess the future challenges to be faced by the State, it will be useful to give some attention to a longer term view of issues and

opportunities. In other words, assuming that the STP is fully implemented, will the State be positioned to address the major challenges it will be facing in the ensuing two to three decades.

Thus, the purpose of this section is to identify and open for discussion some of the significant variables that will impact the State of Arizona and its transportation system over the next 25 to 50 years. Transportation needs and the transportation systems designed to accommodate those needs are intimately linked with energy and technological factors. Therefore, each of these factors will be examined in detail. This is followed by a discussion on the probable change in alternative modes of travel.

### **Energy Futures**

The discussion of energy futures focuses on the availability and cost of petroleum and other fuels, as well as the prospects for new energy technologies. The implications for the long range future of the Arizona transportation system will be highlighted.

Today, automotive transportation is almost totally dependent on petroleum, a source that is being depleted and will eventually become unavailable for transportation use. Incremental improvements in the efficiency with which the system uses petroleum will postpone but cannot avert the day of reckoning. Transportation eventually will require the development of vehicles that do not use petroleum.

One school of thought contends that oil availability will decline significantly with dramatic price increases. Personal travel will become more expensive and less attractive, so many people will stay closer to home. This could reduce mobility and hence the quality of life in Arizona's low density cities.

It is likely that in 50 years, gasoline will no longer be as cheap as it is today. But it does not follow that energy will be a necessary constraint on private car ownership or use. For one thing, we already have the ability to produce a perfectly good substitute for gasoline which is not made from crude oil, and that is methanol. Other alternative sources of energy are liquid fuels derived from either coal, tar sands, or shale oil and alcohol fuels or a combination of alcohol and gasoline (gasohol).

Yet another alternative fuel is natural gas. Both the Phoenix and Tucson metropolitan areas have well laid out natural gas pipeline systems. Ease of access of natural gas as an

alternative energy source, coupled with its relatively cheaper cost per mile and cleaner emissions, makes natural gas an attractive alternative to gasoline, particularly for intra-urban travel in Phoenix and Tucson.

The electric car could be a real possibility—not only because it doesn't emit pollution, which even today is a major plus—but also because it is becoming economically feasible. The warm climate and relatively flat terrains of the Phoenix and Tucson metropolitan areas are features that would allow electric vehicles to operate at maximum performance. Of course, it has always been limited by its range, but we soon will have electric vans that can travel 140 miles without recharging making them ideal for fleet van use for intra-urban travel.

Some general predictions about implications of energy futures for transportation are as follows:

1. The enormous efforts that are going into making transportation vehicles more energy efficient will ensure that liquid fueled vehicles will be around in the future.
2. As petroleum becomes increasingly scarce and as the price continues to rise, substitute fuels will be sought and found.
3. The increasing scarcity of petroleum will result in the continued rising cost for fuel, which in the short run will tend to be offset by improved vehicle efficiency, but eventually will lead to less travel, unless cheaper fuels can be developed over the long run.
4. The problems of liquid fuels and resulting high costs will probably lead to a greater use of electricity in the transportation sector to power automobiles and rail systems.
5. The research on hydrogen will eventually pay off so that we can expect to see the evolution of hydrogen-fueled vehicles.

### **Technological Advances**

This section will focus on technological innovation and the future of new and improved technologies. It will emphasize the potential impact of these technologies on the Arizona transportation system, and their implications for the various modes of travel. New directions in technological innovations, and therefore new caused for structural transition, will probably be dominated by information technology, which at present is only used for the optimization of existing transportation systems.

For example, telecommunications enable many production processes to be dispersed spatially by separating them geographically and linking them by means of electronic communications. But they also enable once spread out activities to be more centrally controlled by means of similar communications. Thus, telecommunications play a locationally enabling role, rather than a locationally determining one. This means that telecommunications will tend to reinforce whatever other factors are influencing land use location decisions.

A good example is the communication/transportation trade-off. The substitution of communication for transportation started with the invention of writing, accelerated with Guttenberg's printing press, accelerated again with the telegraph and telephone, and will continue to accelerate with the on-going electronic revolution. Examples of how communications may be used as a substitute for transportation are teleconferencing and facsimile transmission. The telephone really placed everywhere at an equal distance. The developing combination of the computer and the telephone renders distance irrelevant, so that the old concept of geographic isolation has no real meaning.

Some have concluded that work will be done at home in increasing amounts. This will include both telecommuting and home-based businesses. If so, peak-hour traffic problems could be reduced. Another view is that people for social reasons will commute to intermediate, neighborhood locations. This would minimize the physical transport from home to work without losing the social context of the work place. A third view is that the electronic workplace will be a part-time phenomenon. "Teleworkers" would work two or three days a week at home and the balance of the week at the office or at regionally located work centers. Regardless of which of these three scenarios proves to be correct, commuting patterns could be significantly altered.

Drivers of the future will have microprocessors monitoring their engine speed, temperature, workload, and acceleration; radar systems warning them of obstacles and applying the brakes when needed; and the roadway controlling traffic. This means that the automobile of the future will be more fuel efficient, less polluting, and safer. The roadways themselves will be more efficient, i.e., they will be able to safely carry much higher volumes of traffic.

## **Transportation Futures and Modal Split**

The automobile currently dominates passenger transportation in Arizona. It is hard to imagine a scenario in which this dominance does not continue into the 50 year future. No other mode is even close in its technical ability to offer transportation when flow densities are low and travel patterns diffuse.

New metropolitan freeway systems respond to continued low-density growth and hence contribute to the continued predominance of the private auto in urban transportation. Since population in non-metropolitan Arizona will remain widely dispersed among a relatively small number of small cities and towns, the auto will also remain the dominant mode of intercity transportation in our State. The State Highway System will therefore play a major and growing role in both urban and long-distance, travel during the next 25 to 50 years.

Even though the private auto will remain the mode of choice for most people, the non-motorized modes of bicycling and walking, as well as transit, will continue to play a larger role in urban transportation, as metropolitan growth brings continuing traffic congestion and air quality concerns. These modes may play even a larger role in the transportation mode mix if regulatory or market based strategies for clean air are applied to manage travel demands. If such measures as congestion pricing, parking fees or reimbursements, or VMT restrictions are instituted, then drivers will need to have transportation alternatives if they choose to not make the single occupant vehicle their primary mode of transportation. It should be stressed that bicycle and pedestrian trips tend to be of short duration and that connectivity with public transit holds great potential for these two modes. Connectivity with public transit could also pay high dividends for little capital costs in the arena of air quality via elimination of cold start vehicle emissions by developing bike-and-ride and walk-and-ride facilities. Also, because of the short trip lengths, safe and convenient accessibility to shopping areas, medical buildings, business centers, and other common destinations will also promote bicycling and walking and yield air quality benefits.

Other modes will also play crucial roles in intercity transportation. Growing congestion of roads and airports encourages the reconsideration of the role of railways for passenger transportation. High-speed rail, based on either traditional or developing rail technologies, could become an increasingly viable option in high-density corridors between large cities throughout

the United States. In Arizona, however, only the Phoenix-Tucson corridor holds any promise of the necessary concentration and density for a cost-effective intercity rapid rail system in the next 50 years.

Railroads will, however, continue to play a role in freight transportation despite the pre-eminence of trucks as freight carriers. In recent years, deregulation and the expansion of intermodal freight transportation have led to a resurgence of the railroad industry. Railroads will continue to provide transportation in their two strongest areas: the transportation of bulky, low-value commodities and the provision of intermodal (e.g., "piggyback") service involving rail-truck transfers at specialized facilities.

It is unlikely that any other form of transportation will displace aviation as the predominant mode of rapid, long-distance passenger transportation between Arizona and other states. As the metropolitan areas continue their rapid growth, the State can expect to see direct overseas airline service during the next 25 years, particularly to the Pacific Rim countries. Arizona also has the potential to develop into a major Western hub, especially in view of its excellent weather and the growing congestion at existing hubs. In the two major metropolitan areas, we could well see the proliferation of heliports and a significant increase in the use of helicopters for both intra-urban and intra-state travel.

## **CONCLUSION**

This examination of the 25 to 50 year future of Arizona has revealed some important trends that will have an impact on the State's future transportation system.

Given the current trends and anticipated conditions, the future transportation system will be built upon the existing system. Financial investment needs to emphasize maintenance and preservation of the existing system, and accommodate additional system expansion. The system will undergo evolutionary enhancements and not revolutionary change. In the future, improvements to the system will concentrate on operational enhancements. Innovative technology will provide a vital role in providing an effective and efficient transportation system.

An enormous span of innovative technology currently exists. Implementation of microelectronics and computer technology offers the potential for enhancing both the construction and operation of transportation systems. New motor vehicles are being



manufactured to be safer, more fuel efficient, and more compatible with the environment. The addition of more of these vehicles into the fleet will have a significant improvement upon Arizona's air quality. Further advances in intelligent vehicles offer additional benefits in improving highway safety. With avoidance control systems installed in vehicles, improved safety of highway operations is possible.

Intelligent highway systems can alleviate urban traffic congestion through automated traffic signal systems, ramp meters, changeable message signs, reversible flow traffic lanes, "real-time" traffic incident response, etc. Through advanced driver information systems, traffic delays and incidents can be mitigated. Through the use of vehicle identification, communications, and advisory systems, the efficiency of commerce can be enhanced.

Implementation of intelligent vehicle highway systems will ease congestion, improve safety, increase economic productivity and assist with compliance of federal air quality regulations. This approach offers the greatest likelihood of providing near-term public and private benefits to Arizonans.

## **6. CURRENT AND FUTURE CONDITIONS**

In order to develop the State Transportation Plan, it was important to document both current conditions and also where the State appears to be heading. Thus, the purpose of this chapter is to document current and future conditions in transportation in the State of Arizona. This is followed by a discussion of existing and 20 year forecasts for travel levels on highways and streets, border crossings, bus transit, railroads, air travel, bicycle and pedestrian travel, and pipelines. A summary of all data is presented at the end of the chapter.

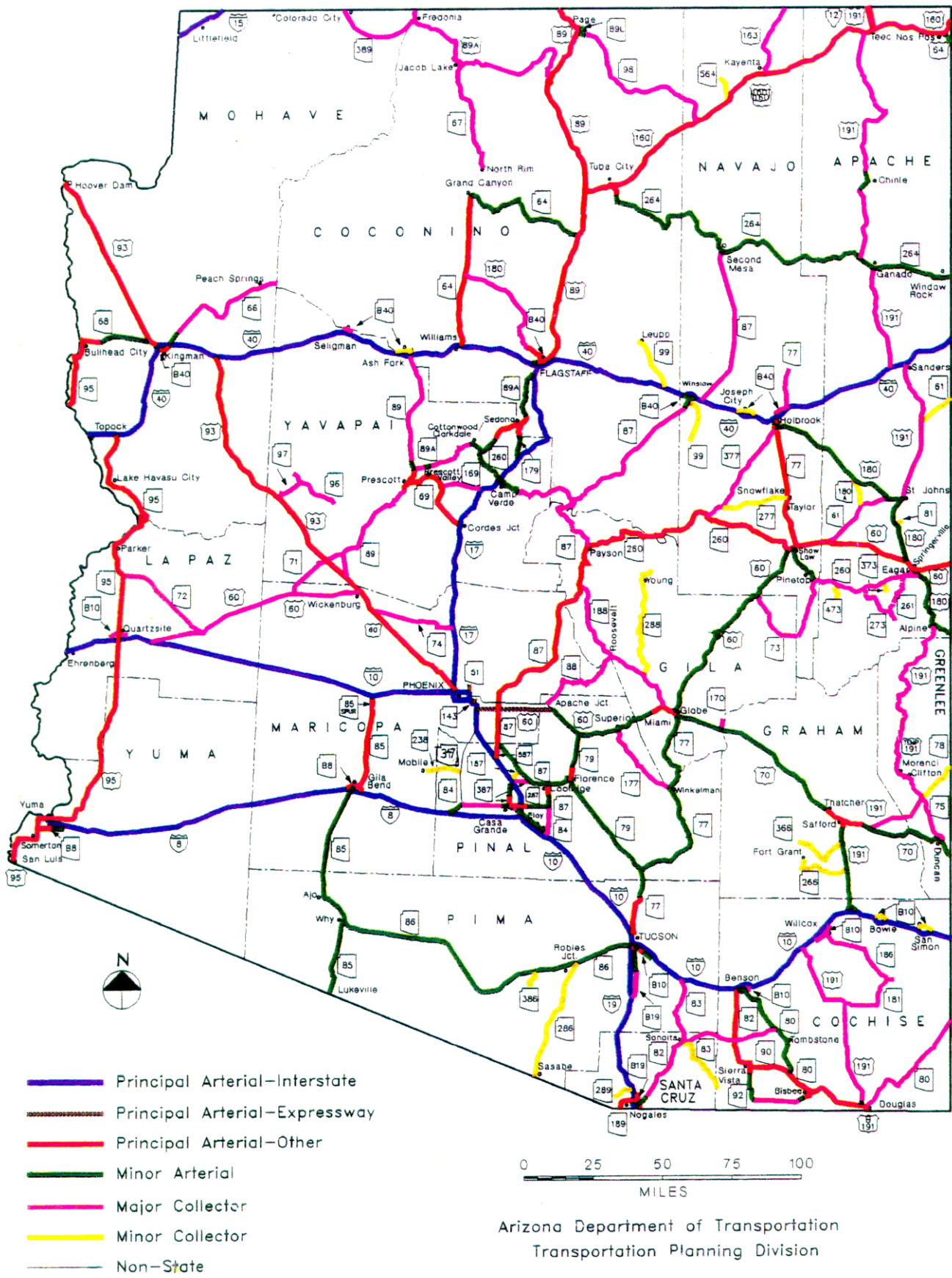
### **ROADWAYS**

An important tool in the development of the roadway component of the transportation system is the functional classification system. This system is intended to stratify the roadways by type of use. The functional classification of the State Highway System is presented in Figure 6-1. The miles of roadway by Functional Classification are shown in Table 6-1.

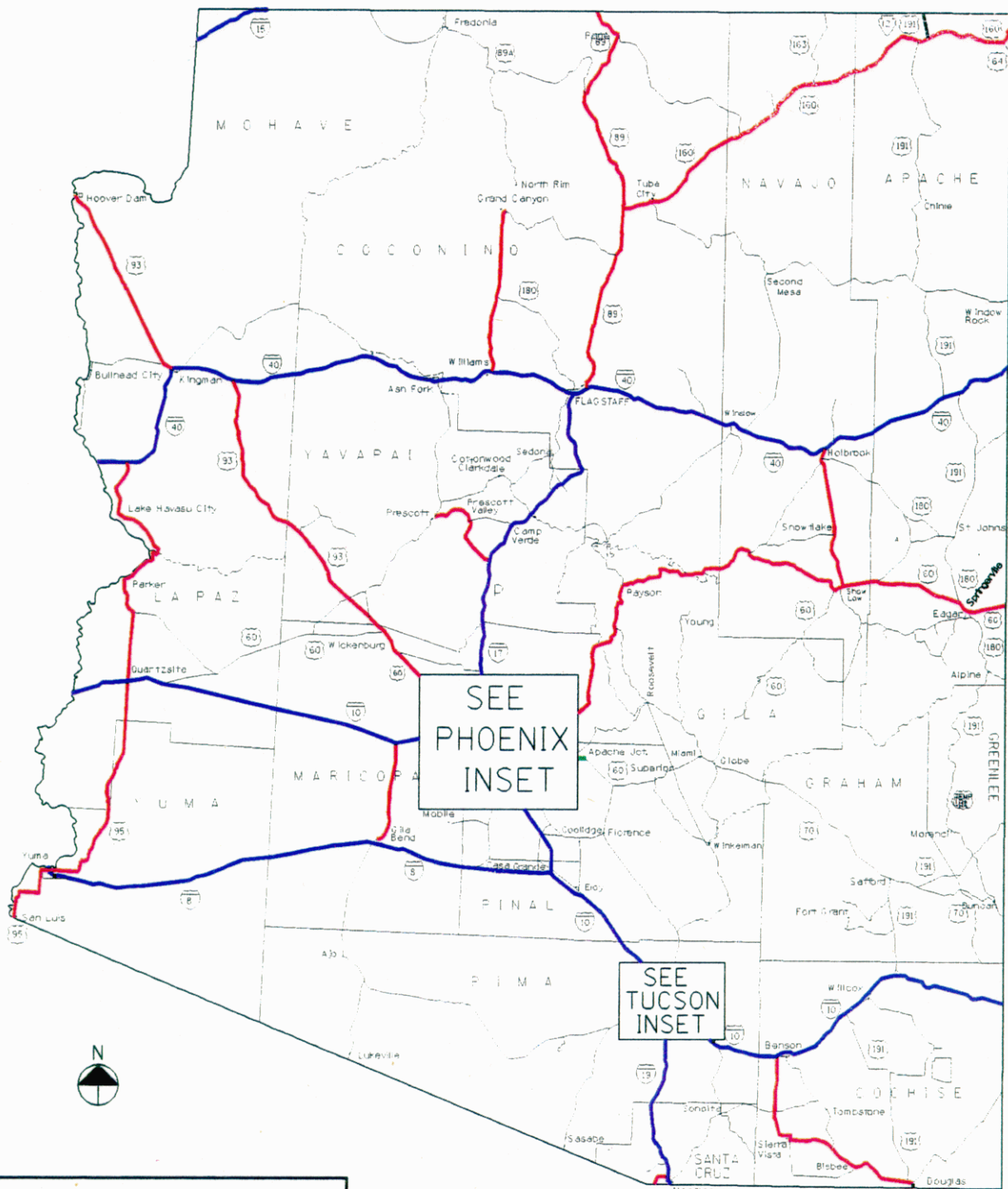
Arizona's recommended portion of the National Highway System is shown in Figure 6-2 (Tucson and Phoenix urbanized areas are shown in Figures 6-3 and 6-4). There are 55,322 officially certified miles of public roadways in Arizona. Of these, 1,221 miles (2.2 percent) are freeways (classified as either Interstate or Freeway/Expressway). Seventy-six percent of the roadways are in rural areas, with 24 percent in urban areas.

In 1992, there were approximately 39,000,000 vehicle miles of travel daily on the State Highway System. Nineteen million (49 percent) were on the Interstate System, 8,000,000 (20 percent) were on U.S. numbered routes, and 12,000,000 were on State Routes. This shows the heavy usage of the Interstate System where 19 percent of the State Highway System mileage carries 49 percent of the vehicle miles traveled.

In 1992, average daily traffic on the Interstate System ranged from a high of 193,221 vehicles per day on I-10 in Tempe to 3,359 on I-8 near Gila Bend. The 1992 ADT on U.S. designated routes varied from 161,000 on U.S. 60 (the Superstition Freeway Segment) to 97 on U.S. 191 near Granville. Traffic on State Highways ran from a high of 115,000 on S. R. 51 (Squaw Peak Expressway) to a low of 89 on S.R. 288 south of Young.



**Figure 6-1**  
**1993 HIGHWAY FUNCTIONAL CLASSIFICATION**

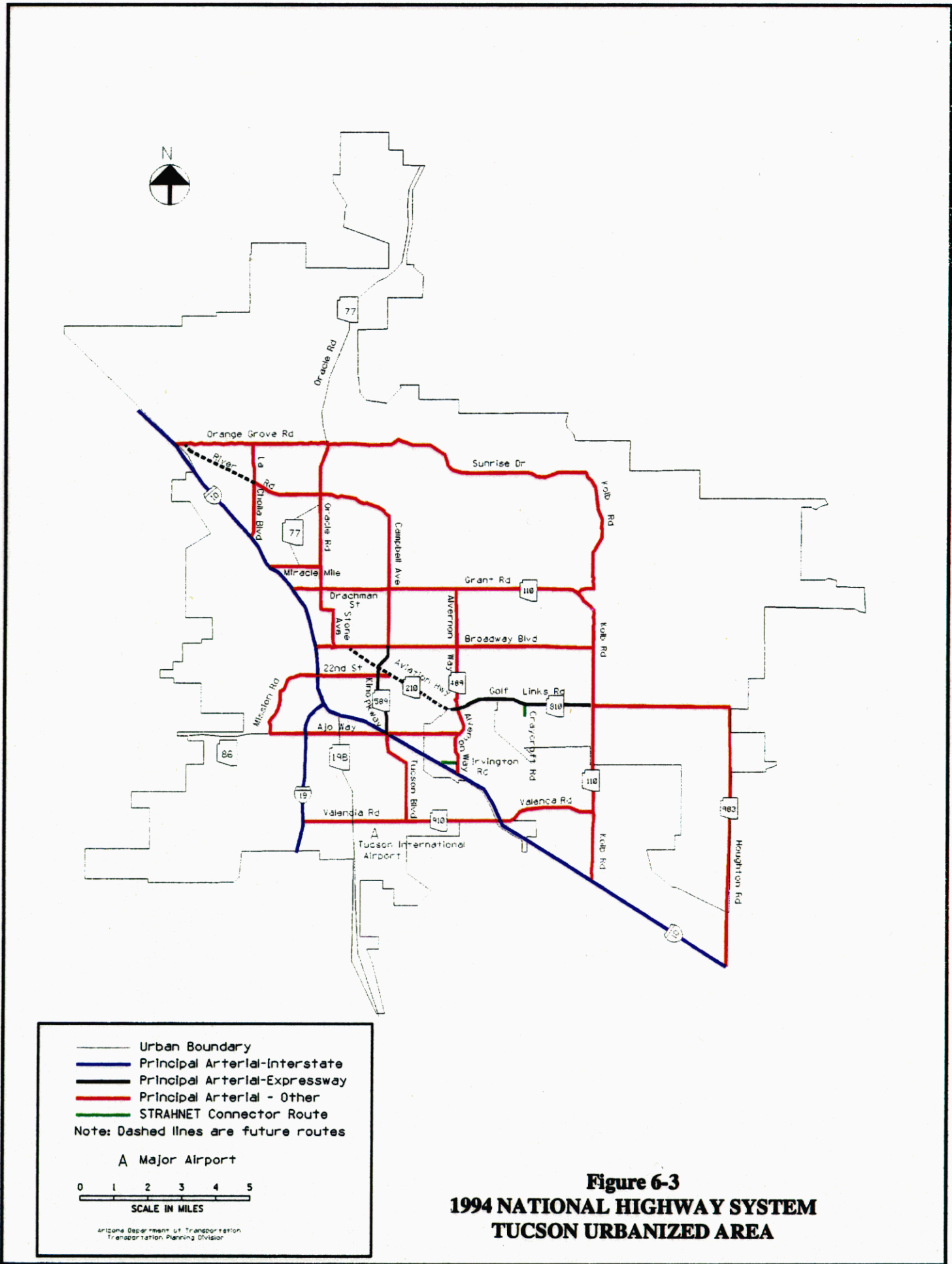


**National Highway System Classifications**

- Principal Arterial - Interstate
- Principal Arterial - Expressway
- Principal Arterial - Other
- STRAHNET Connector

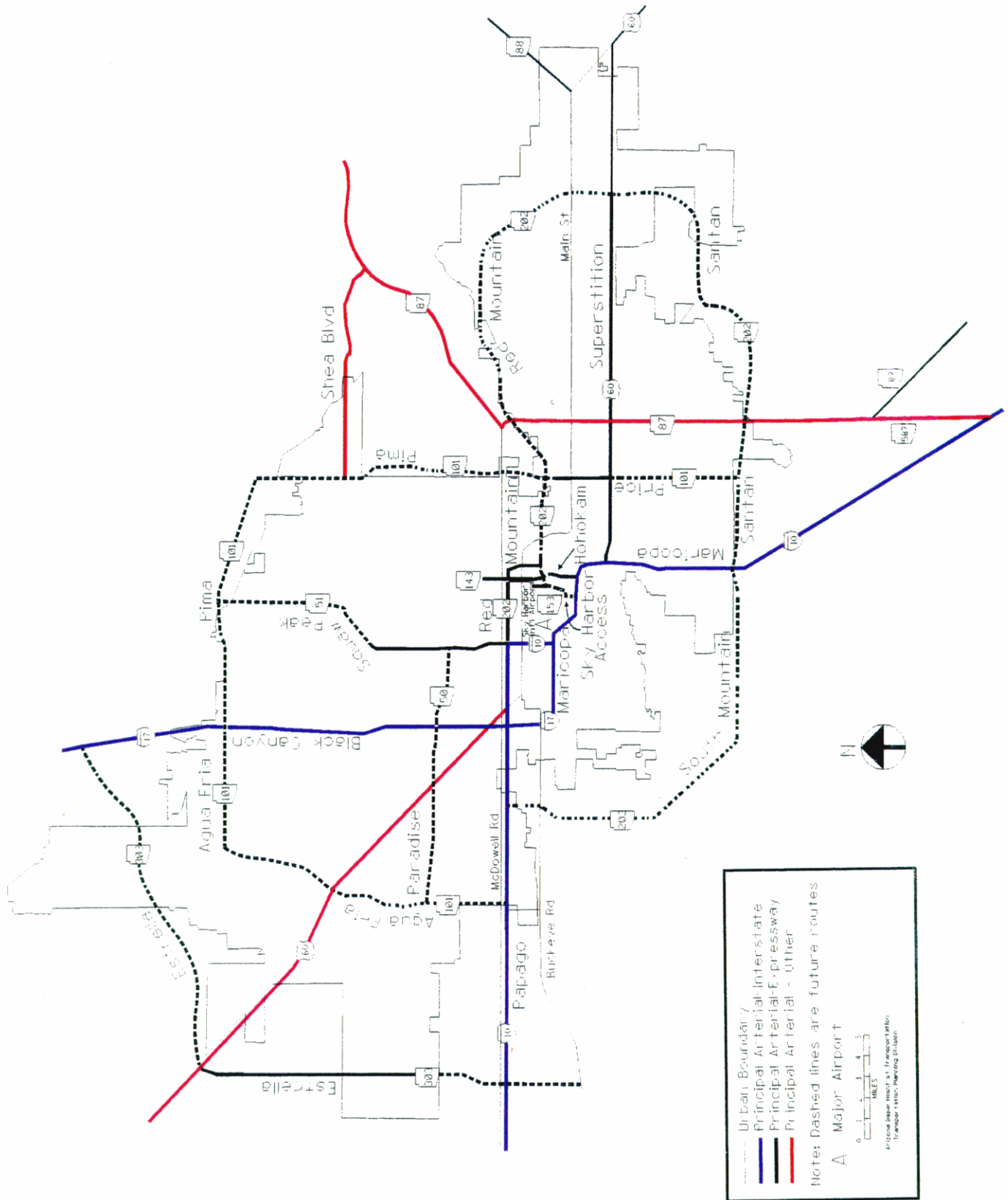
0    25    50    75    100  
 MILES

**Figure 6-2**  
**1994 NATIONAL HIGHWAY SYSTEM**



**Figure 6-3**  
**1994 NATIONAL HIGHWAY SYSTEM**  
**TUCSON URBANIZED AREA**





**Figure 6-4**  
**1994 NATIONAL HIGHWAY SYSTEM - PHOENIX URBANIZED AREA**

**Table 6-1. Functional Classification**

<b>Functional Classification</b>	<b>Urban Miles</b>	<b>Rural Miles</b>	<b>Total</b>
Principal Arterials - Interstate	140.3	1,028.2	1,168.5
Principal Arterials - Freeway/Expressway	53.2		53.2
Principal Arterials - Other	1,098.1	1,260.8	2,358.9
Minor Arterials	1,259.2	1,175.3	2,434.5
Collectors (Urban)	1,460.5		1,460.5
Major Collectors (Rural)		4,645.7	4,645.7
Minor Collectors (Rural)		2,340.3	2,340.3
Local	9,331.5	31,529.4	40,860.9
<b>Total</b>	<b>13,342.7</b>	<b>41,979.6</b>	<b>55,322.3</b>

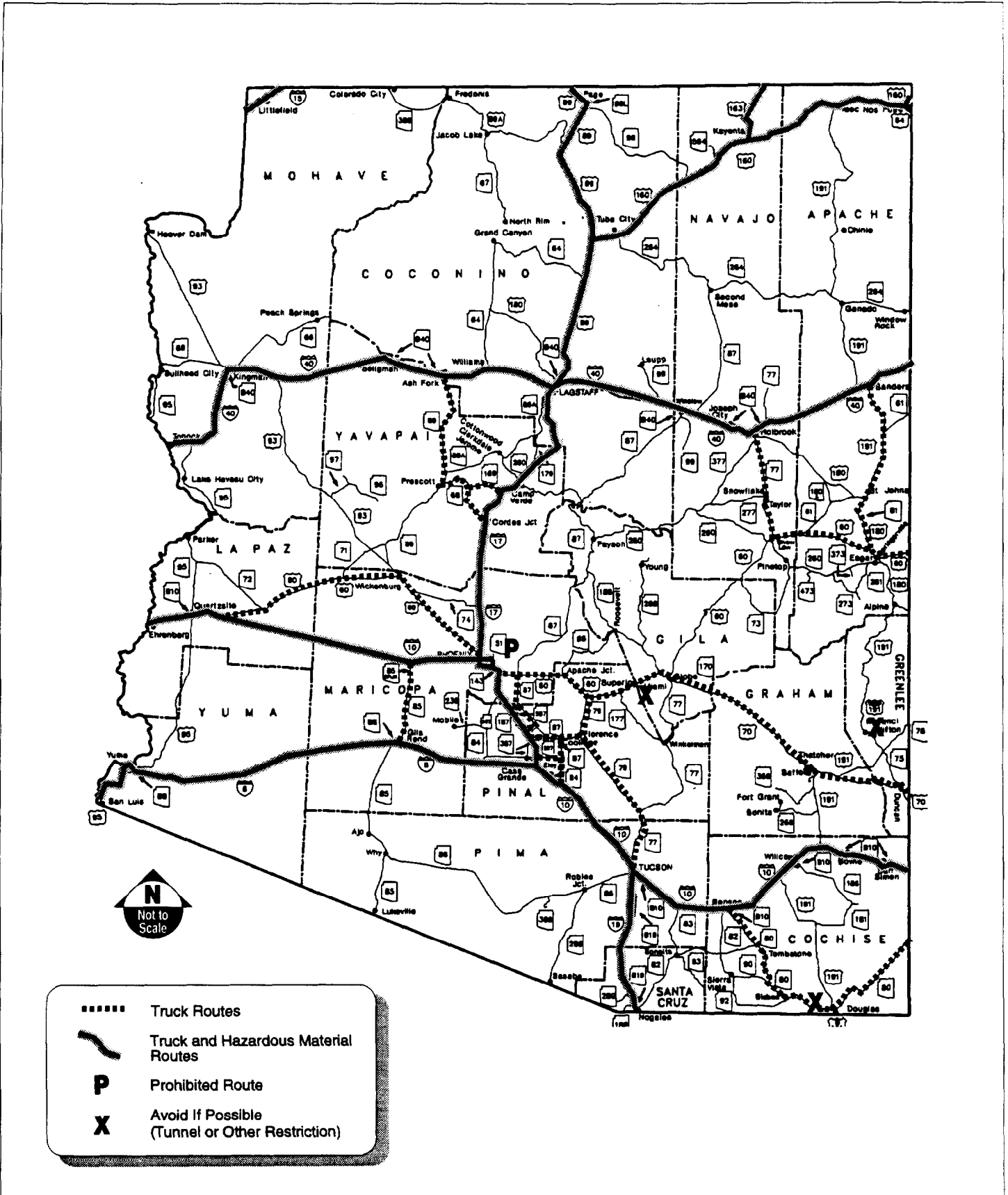
The Interstate System plus selected two-lane highways are designated as National Intercity Truck Routes. The Interstate System plus U.S. 160 and U.S. 163 are designated Preferred Hazardous Material Routes (Figure 6-5). Other State Highways are considered alternate routes for hazardous materials.

### **INTERNATIONAL BORDER CROSSINGS**

There are six international ports of entry along the Arizona, U.S. A./Sonora, Mexico border (Figure 6-6). They are:

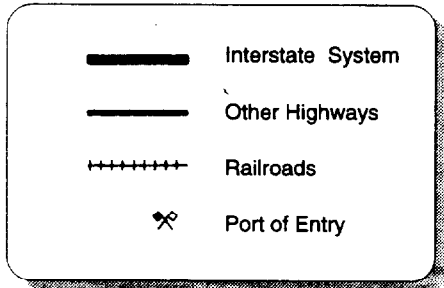
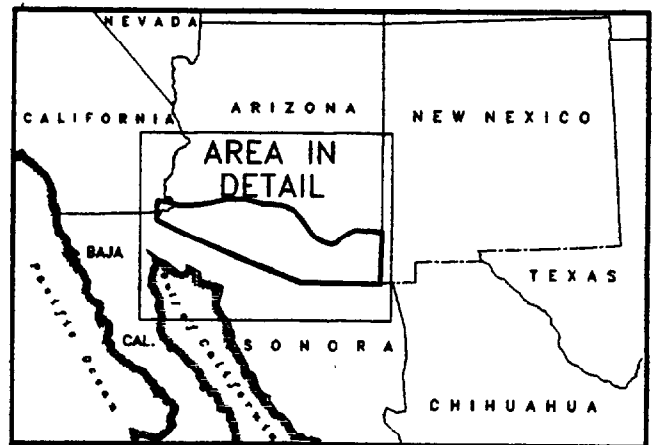
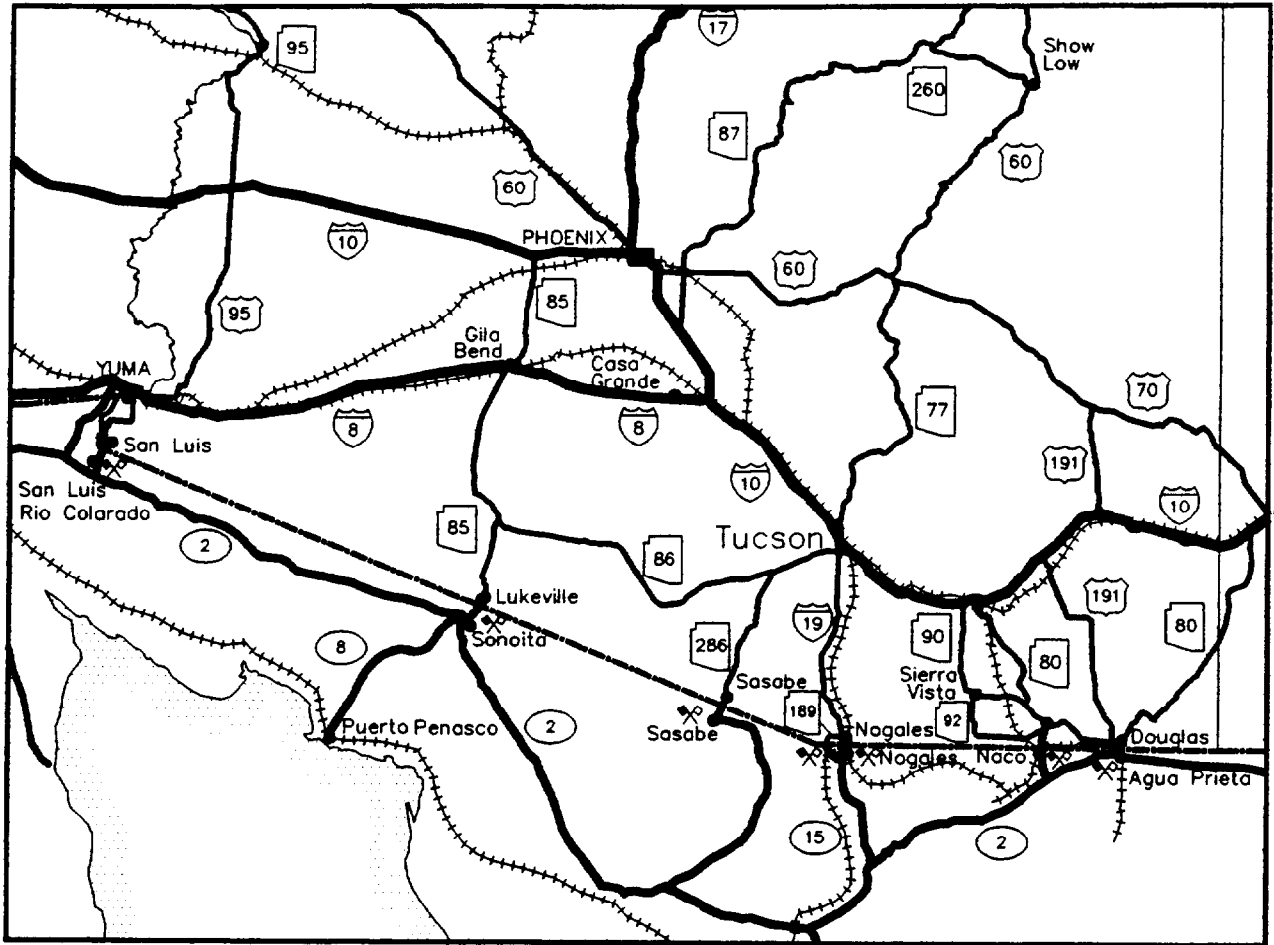
- San Luis, Arizona/San Luis Rio Colorado, Sonora;
- Lukeville, Arizona/Sonoyta, Sonora;
- Sasabe, Arizona/Sasabe, Sonora;
- Nogales, Arizona/Nogales, Sonora (East and West Gate);
- Naco, Arizona/Naco, Sonora; and
- Douglas, Arizona/Agua Prieta, Sonora.

During fiscal year 1991-92, the latest year for which data is available, northbound traffic from Mexico through Arizona-Sonora border ports of entry included: 233,000 commercial vehicles, more than 8 million passenger cars, and more than 9 million pedestrians. This



**Figure 6-5  
NATIONAL INTERCITY TRUCK ROUTES AND HAZARDOUS MATERIALS ROUTES**





**Figure 6-6**  
**INTERNATIONAL BORDER CROSSINGS**

represents increases of 58 percent in northbound commercial traffic and 25 percent in non-commercial traffic in the five-year period between 1987 and 1992.

Table 6-2 shows the northbound truck movements across the border for each port of entry for 1990 and 2000. No forecasts have been made for 2015 because the longer term impact of NAFTA is not yet fully understood. Truck traffic will double again by the year 2000, thereby placing additional strain on the already overloaded border crossings.

**Table 6-2. Annual Border Entries**

Entry	Number of Trucks	
	1990	2000
Douglas	13,779	64,600
Lukeville	1,826	3,600
Naco	14,043	18,400
Nogales	152,744	277,700
San Luis	33,642	94,900
Sasabe	1,075	1,900
<b>Total</b>	<b>217,109</b>	<b>461,100</b>

Source: Arizona Trade Corridor Study

Nogales accounts for more than two-thirds (67.7 percent) of all commercial traffic entering Arizona from Mexico. San Luis is second, accounting for 15 percent of all commercial traffic, followed by Douglas with 13 percent. The ports of Naco, Lukeville, and Sasabe together account for the remaining four percent of commercial traffic from Mexico. From 1987 to 1992, both the San Luis and the Douglas ports of entry increased their relative share of commercial traffic, while Nogales' share decreased from 73 percent in 1987 to approximately 68 percent in 1992.

Nogales accounts for 44 percent of non-commercial vehicle traffic entering Arizona from Mexico. San Luis accounts for 29 percent, while the third ranking Douglas port of entry accounts for a little more than 20 percent of the total non-commercial traffic. The remaining

three border ports—Naco, Lukeville and Sasabe—account for the remaining seven percent of non-commercial traffic from Mexico to Arizona.

Sixty-three percent of all pedestrians entering from Sonora use the Nogales port, followed by San Luis (29 percent) and Douglas (7 percent).

### **BUS SERVICE**

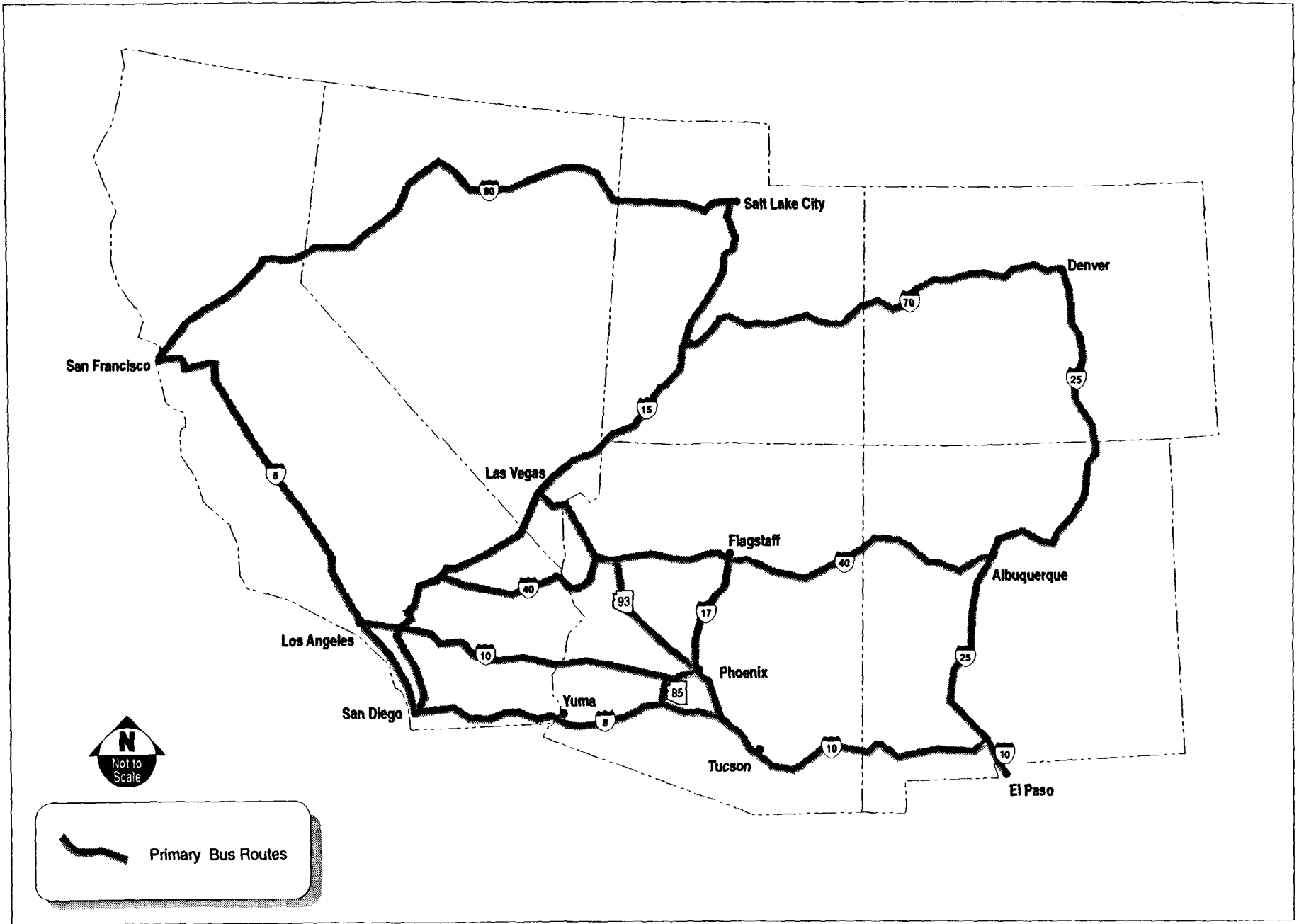
Bus service is provided in 14 rural and/or small urban areas of the State using Section 18 federal funds administered by ADOT. Greyhound Corporation provides service between major cities in Arizona and other states. Bus service connection to metropolitan areas in adjacent states are shown in Figure 6-7.

In 1993, there were over 50 million reported boardings of transit vehicles in Arizona (Table 6-3). The majority were in the Phoenix area with 63.7 percent, 30.9 percent were in Tucson on Suntran, 3.8 percent on Greyhound Lines, 0.3 percent on other intercity lines, and 1.4 percent on lines using Section 18 funding. Current forecasts indicate that bus ridership will increase by 60 percent by the year 2015.

**Table 6-3. Bus Passengers**

	<b>1993</b>	<b>2015</b>
Urban Areas (Phoenix, Tucson)	48,075,800	76,921,300
Interstate Lines (Greyhound)	1,928,800	3,028,200
Intercity Lines (Service within Arizona)	149,000	219,000
Section 18 Funded Lines	701,800	1,031,600
<b>Total</b>	<b>50,855,400</b>	<b>81,200,100</b>

In the Phoenix metropolitan area 400 buses provide fixed route service. These buses operate 11,490,000 fleet miles annually. In addition, 173 vehicles provide paratransit services and special needs operating 312,600 vehicle hours annually. Tucson has 200 buses serving their fixed route service area, which operate 1,725,400 fleet miles annually. Tucson also provides paratransit service.



**Figure 6-7**  
**ADJACENT STATE BUS SERVICE**  
**GREYHOUND BUS LINES**

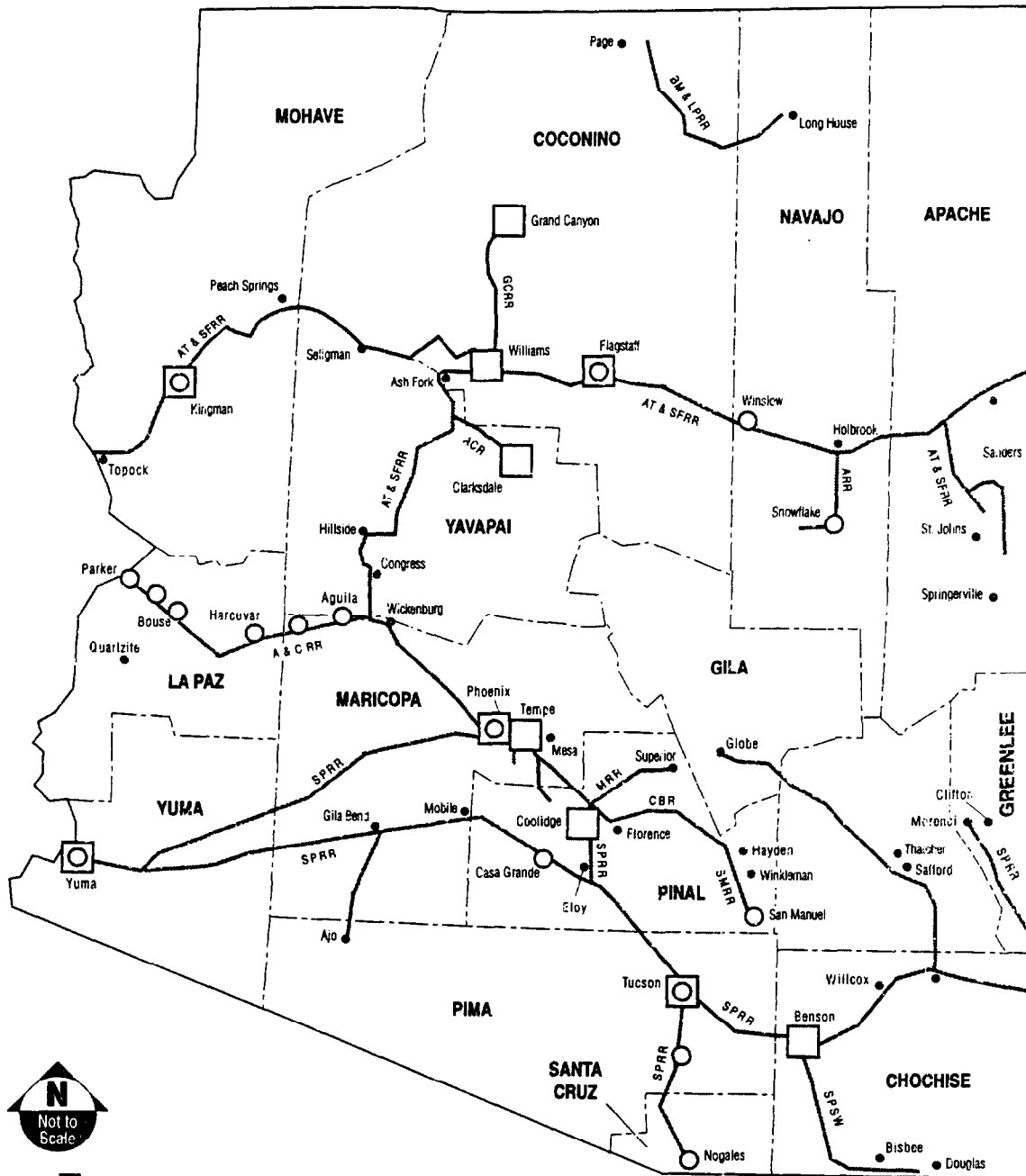
In Phoenix there are 0.25 buses per 1,000 persons, while in Tucson there are 0.51 buses per 1,000 persons. Phoenix operates approximately 7.3 revenue miles per capita per year, and Tucson operates about 15 revenue miles per capita per year. In 1993, Phoenix had 19.6 passenger boardings per capita, and Tucson had 32 boardings per capita.

In Phoenix the average age of the fixed route bus fleet is 11.6 years, and in Tucson the average age is 10 years. Typically, systems seek to replace buses after 12 years, so both systems face major capital investments in the near future.

Transit travel is limited on Sundays. The Phoenix metro area has no fixed route bus service on Sundays, while Suntran provides only about 3.5 percent of their weekday vehicle-miles on Sunday. However, most of the intercity operators do provide Sunday service.

## **RAIL SERVICE**

There are 15 railroad companies currently operating in Arizona, of which 2 are Class 1 carriers, 11 are short line freight railroads, and 2 are tourist railroads (Figure 6-8). Total track mileage, exclusive of yard and siding trackage is 2,034 miles. Passenger rail service is provided by Amtrak on two lines. Both lines are in an east-west direction. One is on the Atchison, Topeka, and Santa Fe (AT&SF) Railroad in northern Arizona, and the other is on the Southern Pacific Railroad (SPRR) in southern Arizona. There are Amtrak stations in Kingman, Flagstaff, and Winslow on the AT&SF Railroad, and in Yuma, Phoenix, Tempe, Coolidge, Tucson, and Benson on the SPRR. There are also stations on tourist railroads in Williams, the Grand Canyon, and Clarkdale. All serve as intermodal facilities between trains and automobiles. The stations in Phoenix and Tucson are located near the Greyhound bus stations. In 1993, 109,700 people boarded Amtrak trains in Arizona (Table 6-4). They ranged from a high of 54,200 at Flagstaff to a low of 700 at Coolidge. A 57 percent increase to 172,200 people is anticipated by the year 2015.



○ Freight    □ Passenger

**RAILROAD COMPANIES**

A&CRR: Arizona & California Railroad Co.  
 ACR: Arizona Central Railroad Co.  
 AER: Arizona Eastern Railroad Co.  
 ARR: Apache Railroad Co.  
 AT & SFRR: Atchison, Topeka & Santa Fe Railway Co.  
 BM & LPRR: Black Mesa & Lake Powell Railroad

CBR: Copper Basin Railway Co.  
 GCRR: Grand Canyon Railway Co.  
 MRR: Magma Arizona Railroad  
 SMRR: San Manuel-Arizona Railroad  
 SPRR: Southern Pacific Railroad  
 SPSW: San Pedro & Southwestern Railroad Co.  
 SRP Spur: Salt River Project Spur  
 TC & GBRR: Tucson, Comelia & Gila Bend Railroad

**Figure 6-8  
 ARIZONA RAILROAD SYSTEM**

**Table 6-4. Railroads**

	<b>1993</b>	<b>2015</b>
<b>Annual Average Amtrak Boardings</b>	109,700 people	172,200 people
<b>Annual Average Freight Hauled</b>	175,000,000 tons	275,000,000 tons

Source: FY 1994 State Rail Plan Update

Freight is forecast to increase from 175,000,000 tons moved by railroads in Arizona in the year 1993 to approximately 275,000,000 tons in the year 2015. This includes material shipped in crates and containers and bulk materials such as coal, copper ore, and liquids.

Rail connections to metropolitan areas in adjacent states are shown in Figure 6-9.

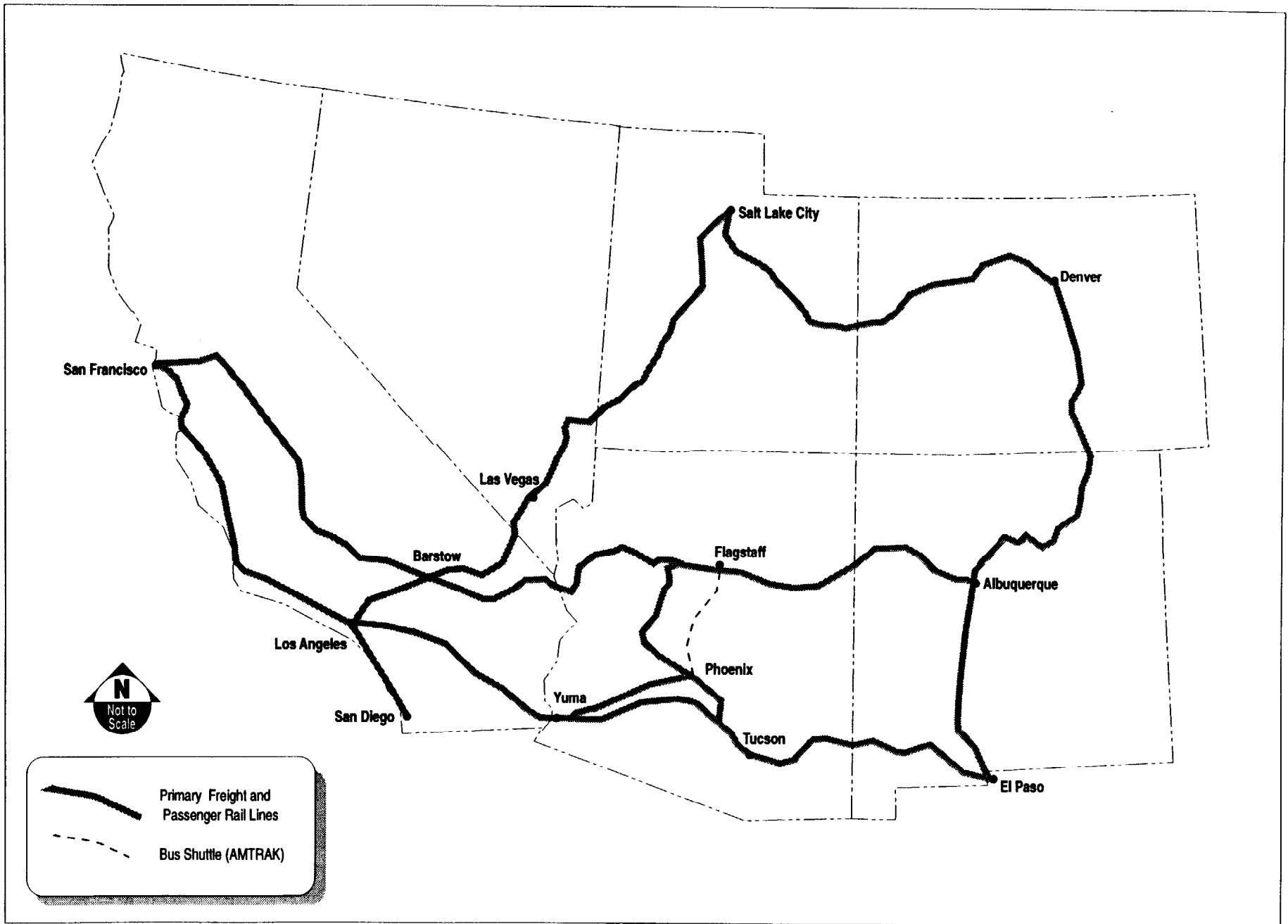
#### **AIR SERVICE**

Primary commercial, other commercial, reliever, and public use Arizona airports are shown in Figure 6-10. Commercial flights are provided at the 14 listed in Table 6-5. As summarized in Table 6-5, in 1993 there were over 13 million enplanements at these airports. They ranged from a low of 9,808 at Sierra Vista to a high of nearly 12 million at Phoenix Sky Harbor International Airport. (Data was not available from several airports.) Air travel is expected to double by 2015 in Arizona. This is 40 percent higher than the forecast increase in population. These are shown in Table 6-5. Air service to Metropolitan areas in adjacent states is shown in Figure 6-11.

Only three airports reported cargo movements for 1993. Yuma reported 2,204 tons, Tucson reported 17,536 tons, and Phoenix Sky Harbor reported 223,411 tons for a total of 214,224 tons.

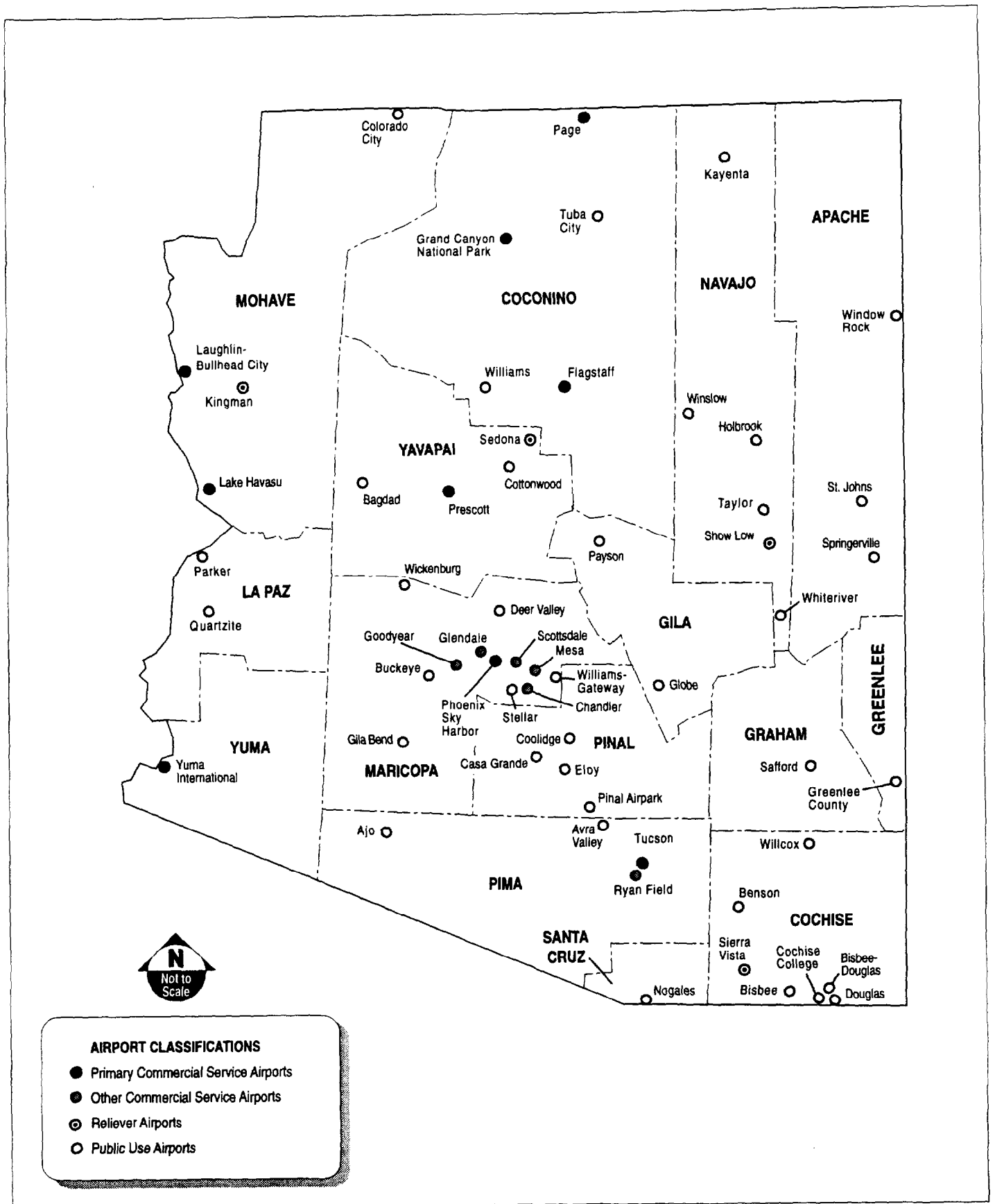
#### **BICYCLE TRAVEL**

The great majority of bicycling takes place in urban areas. As of 1992, the Maricopa Association of Governments reports a total of 192 miles of bikeways within its jurisdiction. The Pima Association of Governments reports 272 miles of bikeways as of January 1992.

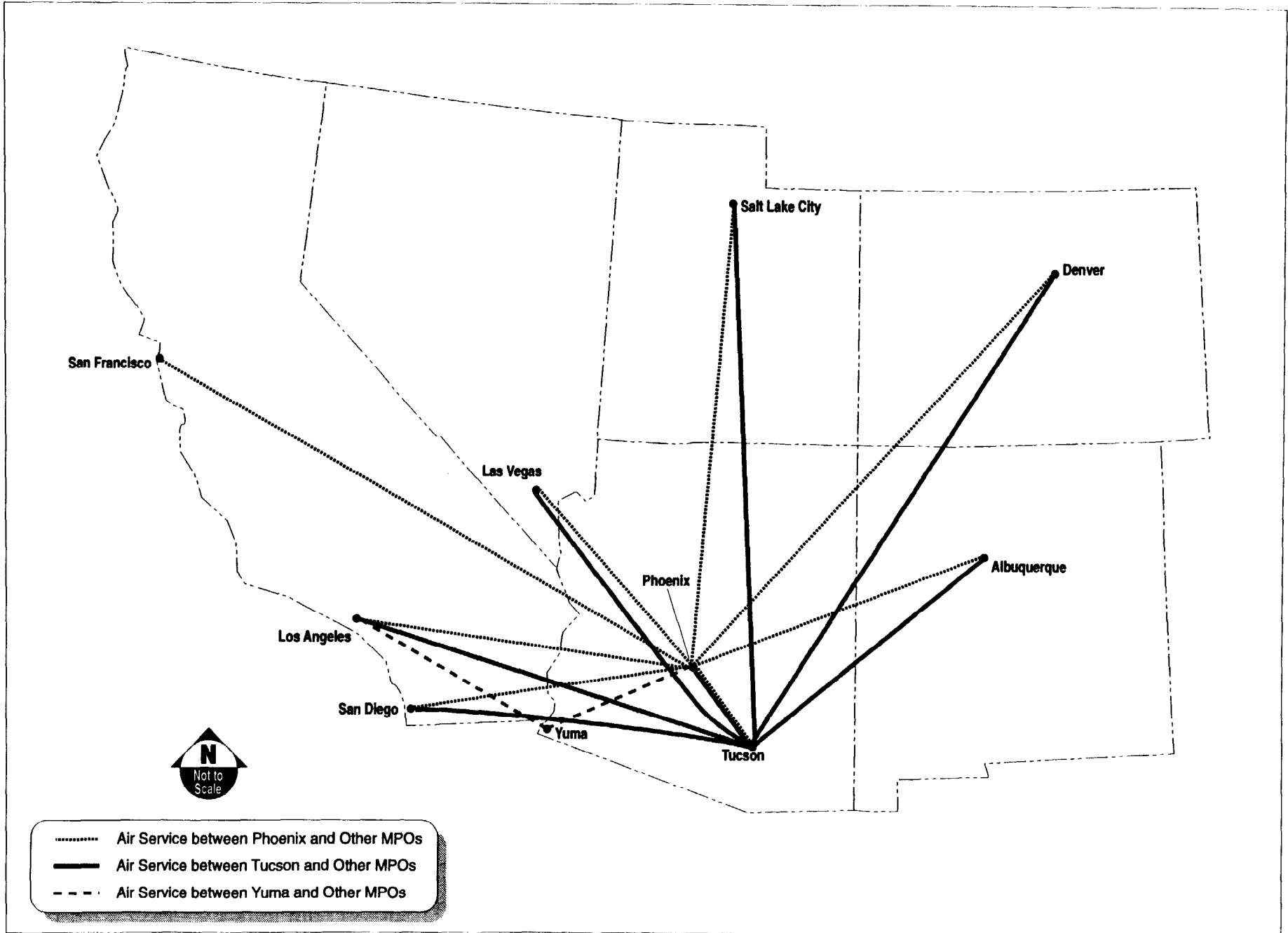


**Figure 6-9**  
**ADJACENT STATE RAILROAD SERVICES**  
**PASSENGER (AMTRAK) AND FREIGHT**





**Figure 6-10**  
**PRIMARY AIRPORT SYSTEM**



**Figure 6-11**  
**INTERSTATE AIR SERVICE**

The Yuma urban area has 15 miles of bikeways for a total of 479 miles for bicycle use in the State's urban areas.

Statewide, there are 31,000 miles of roadway available for bicycling. This would include all paved roads in the State. Approximately 1,000 miles of the total miles of bicycle facilities are on Interstate System shoulders; this does not include areas of the Interstate system prohibited to bicycles in and between the Phoenix and Tucson areas.

**Table 6-5. Air Travel**

Airport	Cargo (Tons)		Passengers	
	1993	2015	1993	2015
Laughlin-Bullhead City	*	*	97,100	194,200
Grand Canyon National Park	*	*	534,500	1,069,000
Kingman	*	*	*	*
Lake Havasu City	*	*	*	*
Page	*	*	*	*
Phoenix Sky Harbor International	203,671	407,300	11,657,100	23,314,200
Prescott	*	*	*	*
Flagstaff	*	*	42,300	84,600
Scottsdale	*	*	*	*
Sedona	*	*	*	*
Show Low	*	*	*	*
Sierra Vista	*	*	9,808	19,616
Tucson International	17,536	35,072	1,305,100	2,610,200
Yuma International	2,204	4,408	*	*
<b>Total</b>	<b>223,411</b>	<b>446,822</b>	<b>13,645,908</b>	<b>27,291,816</b>

\* Data not available.

Source: Arizona State Aviation Needs Study

## PEDESTRIAN TRAVEL

Pedestrian walkways, mostly sidewalks, are located primarily in urban settings. Since sidewalks are invariably adjacent to roadways, it was estimated that approximately half of the total miles of non-controlled access urban roadways in the State have sidewalks. With these assumptions, there are approximately 6,600 miles of sidewalk in the State. Certainly, there are many walkways not located adjacent to roadways such as trails and pedestrian paths, but these facilities do not serve a primarily transportation function and are not counted as walkways for the purposes of this report.

## PIPELINES

Data were obtained on five different products moved in pipelines in Arizona. The products were natural gas, refined petroleum fuel, crude oil, airplane fuel, and propane or LP gas. Natural gas is the major commodity shipped in pipelines (Table 6-6). Refined petroleum fuel was the next major commodity. In 1993, there were approximately 153,235 barrels (bbls) per day distributed within Arizona. Crude oil was next with 126,485 bbls per day. There were also about 24,200 bbls per day of Liquefied Propane Gas and 15,575 bbls per day of airplane fuel distributed in Arizona. The forecast volume in year 2015 is also shown in Table 6-6.

**Table 6-6. Pipelines**

	1993	2015
Natural Gas (cf/day in Arizona)	500,000,000 cf/day	800,000,000
Refined Petroleum Fuel	154,235 bbls/day	242,150
Crude Oil	126,485 bbls/day	198,600
Liquefied Propane Gas	24,200 bbls/day	38,000
Airplane Fuel	16,575 bbls/day	26,000

Natural gas and hazardous liquid pipelines in Arizona are shown in Figures 6-12 and 6-13 respectively.

## SUMMARY

The purpose of this chapter was to document current and future conditions in transportation in the State of Arizona. Information on roadways (including hazardous material and truck routes), border crossings, bus service, railroads, air travel, bicycles, pedestrians, and pipelines has been presented. This base data was used in the evaluation phase of the Plan. To put this all into perspective, a few key transportation indicators are summarized below:

### Miles of Facilities

The total miles of facilities provided for different modes is shown in Table 6-7.

**Table 6-7. Miles of Facilities**

Roadway	55,322
Railroad Tracks	2,034
Bicycle*	479
Pedestrian Sidewalks**	11,830

\* Includes bike lanes plus wide curb lanes, bike routes, bike paths, and shared lanes.

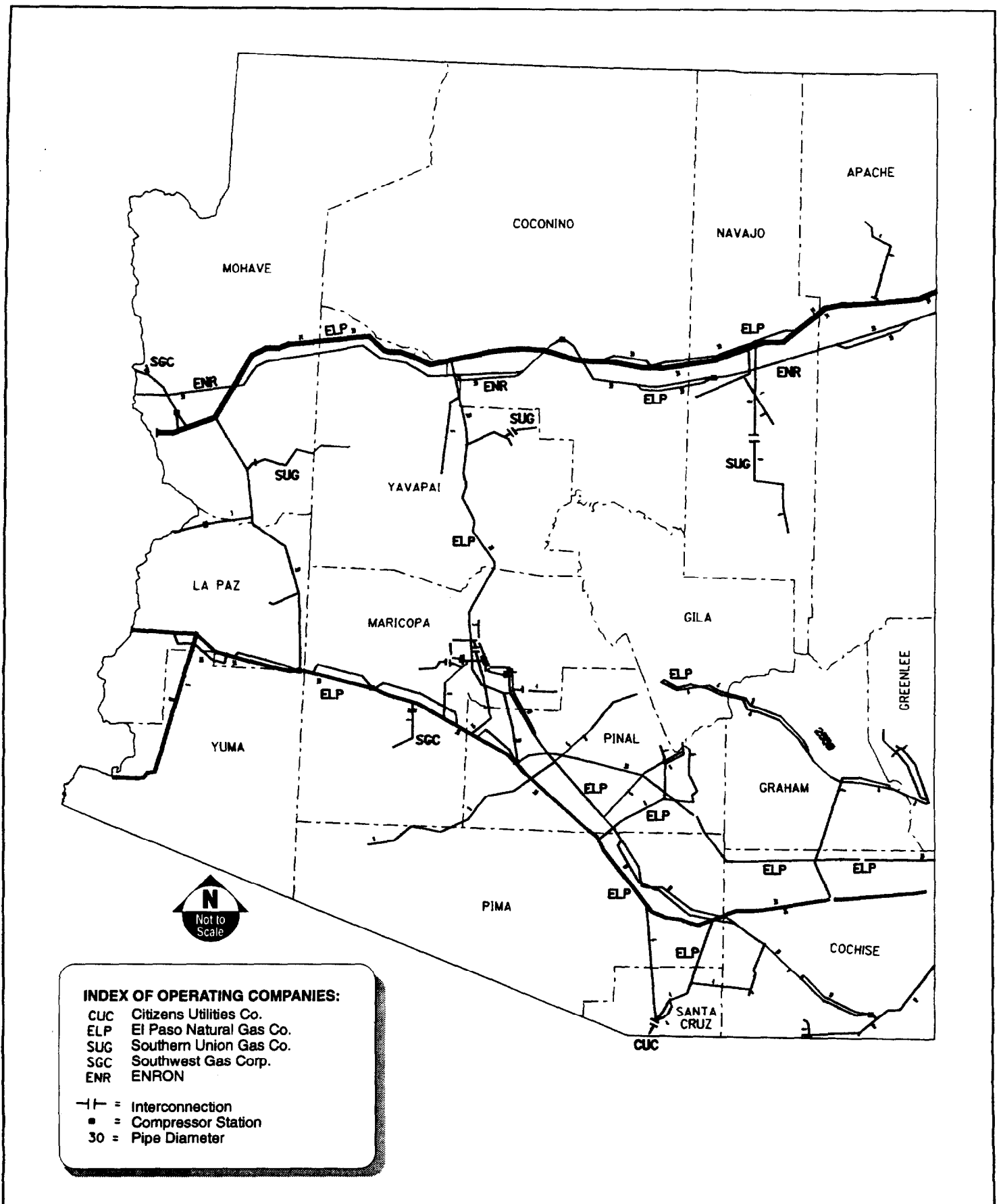
\*\* Assumes 90 percent of non-controlled access urban roadways have sidewalks.

### Persons Served

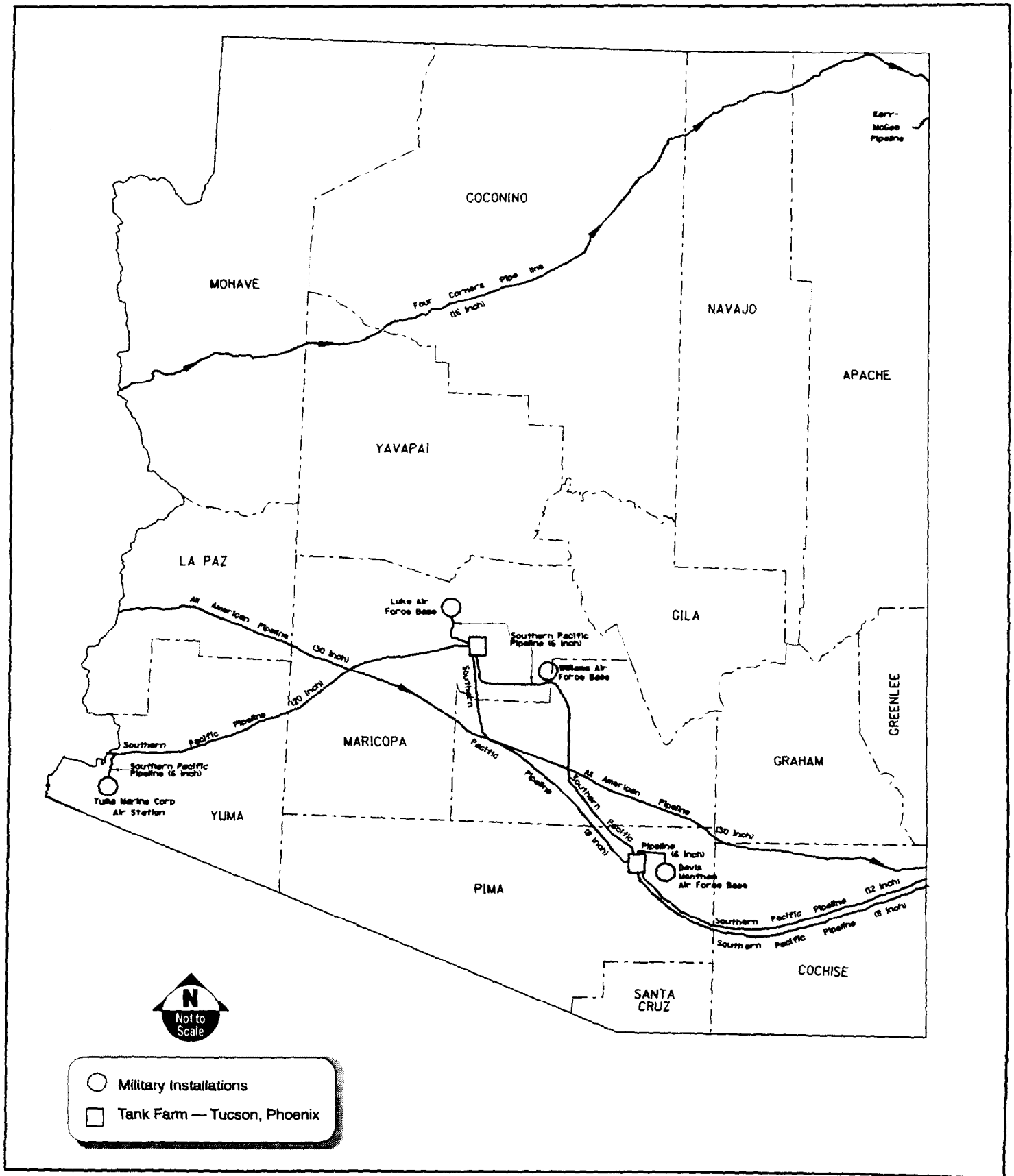
Work trip data (for ages 16 and older) by county from the 1990 Census is shown in Table 6-8 (student trips are not included). According to the census statistics, in Arizona about 77 percent (1,178,320) trips to work were by lone drivers; about 16 percent were in carpools, and the other 7 percent were split among bicycling, walking, and transit. Interestingly, statewide more people walked to work than took the bus or rode their bike combined.

### Cargo Carried

The amount of cargo carried by different modes is shown in Table 6-9. In addition, pipelines carry 500 million cubic feet per day (182.5 million cubic feet per year) of natural gas and another 321,495 barrels per day (117 million barrels per year) of other liquids.



**Figure 6-12  
NATURAL GAS PIPELINES**



**Figure 6-13**  
**HAZARDOUS LIQUID PIPELINES**

**Table 6-8. Non-Motorized and Transit Trips to Work\***

County	Drive Alone	Carpool	Bicycle	Walking	Bus**	Total
Apache	65.8%	20.7%	0.2%	11.7%	1.6%	100.0%
Cochise	76.2%	15.4%	0.9%	6.1%	1.4%	100.0%
Coconino	70.5%	14.9%	2.1%	11.9%	0.6%	100.0%
Gila	79.1%	13.2%	0.7%	6.7%	0.3%	100.0%
Graham	76.3%	17.4%	0.5%	5.7%	0.2%	100.0%
Greenlee	79.4%	17.6%	0.1%	3.0%	0.0%	100.0%
La Paz	71.9%	20.1%	0.8%	6.8%	0.4%	100.0%
Maricopa	78.6%	15.1%	1.5%	2.8%	2.1%	100.0%
Mohave	77.0%	19.1%	0.5%	3.3%	0.1%	100.0%
Navajo	70.1%	21.1%	0.3%	7.9%	0.6%	100.0%
Pima	75.6%	15.8%	2.0%	3.4%	3.3%	100.0%
Pinal	76.1%	19.0%	0.7%	3.9%	0.3%	100.0%
Santa Cruz	74.7%	18.8%	0.3%	5.5%	0.7%	100.0%
Yavapai	79.1%	15.9%	0.6%	4.3%	0.0%	100.0%
Yuma	72.3%	19.1%	1.5%	5.8%	1.2%	100.0%
Total	77.3%	15.7%	1.5%	3.6%	2.0%	100.0%

\* Total Work Trips = 1,525,018

\*\* Does not include school bus trips.

**Table 6-9. Cargo Carried**

Mode	Volume
Trucks	106,103,000 tons
Railroads	175,000,000 tons
Air	223,411 tons



## **CONCLUSIONS**

The forecasts presented here indicate significant increases for all transportation modes. Therefore, it will be necessary to accommodate this projected growth over the next 20 years by constructing new transportation facilities, increasing the carrying capacity of existing facilities, more efficiently utilizing existing facilities, and through improving inter-modal transfer capabilities.

## **7. REVENUE AND NEEDS ASSESSMENT**

### **INTRODUCTION**

This chapter summarizes the significant findings of the current Transportation Needs Assessment process as well as the latest transportation revenue forecasts. It provides perspectives regarding future revenue levels that can be anticipated to support the State's transportation systems development. Further, it anticipates the types of needs and extent of revenue shortfalls which can be expected in the future for all transportation modes without new funding sources.

Finally, the chapter advances some ideas regarding the need for expanded strategic financial planning on a statewide basis. Such planning is required, in part, because of the different federal planning requirements for statewide and metropolitan planning. Metropolitan plans must show conformity with air quality standards, and with the State Implementation Plan (SIP) for air quality. Because of this need to show conformity, MPO plans' financial components are both more stringent and more project specific than the State Plan. (Note: All financial data presented in this chapter is preliminary data which was available in October 1994.)

### **REVENUE SOURCES**

There are four major sources of state, city and county highway revenue. These sources are the Arizona Highway User Revenue Fund, the Regional Area Road Fund, the Local Area Transportation Assistance Fund and federal funds. Highway funding sources are by far the major transportation revenue base. Each of these are briefly described below. Non-highway revenue sources include federal funds, transit fares, rail passenger revenues, and airport fees, among others. Forecasting tools for these sources are less sophisticated, and so the discussion here emphasizes highway revenue forecasts. Bicycle and pedestrian facilities are typically part of major roadway construction projects. The current cost accounting programs do not delineate these costs. They are imbedded in the total project expenditures.

## **Highway User Revenue Fund (HURF)**

The cornerstone of highway financing in Arizona is the Highway User Revenue Fund. The State of Arizona taxes motor fuels and collects a variety of fees and charges relating to the registration of motor vehicles operated on the public highways of the State. These collections include gasoline and fuel taxes, motor carrier taxes, vehicle license taxes, motor vehicle registration fees, and other miscellaneous fees. These revenues are deposited in the Arizona Highway User Revenue Fund and are then distributed to the cities, towns, and counties of the State and to the State Highway Fund which is administered by ADOT. These taxes represent the primary source of revenues available to the State for highway construction and improvements and other related expenses. The State Constitution restricts the use of these funds to highway purposes.

ADOT develops annual forecasts of HURF collections using a sophisticated econometric model. This model, like all such models, relies on the estimation of certain independent variables to produce an estimated level of collections for any given tax source in any given year. These individual estimates are aggregated to give ADOT a total estimate for the fund. The major independent variables utilized in ADOT's econometric modeling process are:

- Population
- Vehicle Efficiency
- Driving Age Population
- New Vehicle Percent of Total
- Average Price Growth of New Vehicles
- Real Personal Income
- Gross Domestic Product
- Commercial Vehicle Registrations

For the past several years, the Department has utilized a technique known as "Risk Analysis" in its revenue estimation process. Risk Analysis is designed to deal with uncertainty in the forecasting process. It does so by producing a series of forecasts, each with an associated probability of attainment. The forecaster is then able to pick an appropriate level of "risk" for inclusion in the forecast.

Because HURF revenues are relatively stable, ADOT has chosen to use a forecast with a 60 percent probability level of attainment during the forecast period. For a more volatile tax (i.e., the Transportation Excise Tax) ADOT utilizes a higher probability level of attainment. This selection contributes to the Department's strategic goal of "maintaining a conservative, yet realistic posture."

### **Local Transportation Assistance Fund (LTAF)**

The LTAF is a fund derived from Arizona Lottery receipts. A maximum of \$23 million may be deposited in the LTAF from the State lottery fund each fiscal year. LTAF revenue is allocated only to cities and towns upon request in amounts proportionate to the relative population of all cities and towns that have requested funds, (each requesting city or town is guaranteed a minimum of \$10 thousand). Cities and towns with populations in excess of 300,000 must use LTAF funds for public transportation. In addition, up to 10 percent of funds may be used for the arts, or disabled and handicapped assistance.

In the Needs Assessment, the proportion of State lottery revenue allocated to LTAF is projected to remain at \$23 million per year. Since future revenue is estimated in constant 1993 dollars, the real value of the allocation will decline over time. LTAF revenue, which can only be allocated to cities and towns, is considered part of city revenue.

Revenues from the new multi-state Powerball Lottery have not been projected herein. It is too soon to estimate levels of revenue for transportation projects from this activity. While Powerball may generate revenues, it is also possible that this game, along with the state lottery and newly expanded casino gaming on American Indian reservations, is competing for a relatively fixed amount of discretionary gambling expenditures by the public. Even optimistic forecasts would address about one percent of the unmet needs over the next ten years.

### **The Regional Area Road Fund (RARF)**

State law (ARS 42-1482 through 42-1484) grants some counties authority to enact transportation excise taxes, subject to voter approval. An increase in existing transaction privilege (sales) taxes by as much as 10 percent can be directed to transportation projects. The beneficiary of RARF monies is the county levying the transportation excise tax. Maricopa and Pinal Counties have enacted such taxes. Proceeds from taxes are placed in Regional Area Road

Funds. ADOT administers the program in Maricopa County, while the Pinal County program is under county control.

Other than financial obligations such as bond related expenses, RARF revenues in Maricopa County are used for the design, right-of-way purchase, and construction of controlled-access highways and to subsidize public transportation. RARF funds collected in Pinal County must be used by the county and the cities within the county for projects that are part of a regional transportation plan. Although Maricopa County RARF revenues are used for the benefit of the county, roads that are constructed from revenue generated by this source will, by and large, become a part of the State Highway System. For this reason, Maricopa County RARF revenues are treated as part of State, not county, revenue.

### **Federal Funds**

Federal roadway revenue forecasts assume that new legislation will be enacted which continues federal support for transportation programs. The forecasts assume that the new program will be similar to the current ISTEA program. For the period from fiscal year 1995 to fiscal year 1999, total federal dollars are based on current ISTEA levels assuming a 95 percent obligation authority. From fiscal year 2000 onward, a three percent annual growth rate was assumed. The division of funds to the entities is assumed to remain unchanged.

### **THE NEEDS ASSESSMENT PROCESS**

Every five years the Arizona Department of Transportation is required by state law (Arizona Revised Statutes, Title 28, Section 1598.I) to submit to the Arizona Legislature a report evaluating the status and condition of transportation systems within the State and providing an analysis of transportation needs for all modes projected for five and ten years. Since publication of the *1990 Arizona Transportation Needs Assessment*, transportation planning in Arizona, as elsewhere, continues evolving rapidly with the implementation of ISTEA. Reflecting those changes, the Arizona transportation needs assessment is expanding, both in study scope and participation breadth. The effort now falls under the Arizona state transportation planning process. The transportation needs assessment provides key contributions to the State Transportation Plan development by:

- Providing a forum for public input in the planning process;

- Identifying transportation needs and appropriate improvements; and
- Spotlighting important issues.

A Technical Advisory Committee (TAC) appointed by the Arizona Legislative Council oversees the transportation needs assessment process. The Committee membership is comprised of six public and three private sector representatives, as follows:

- two representatives each from:
  - ADOT;
  - the counties;
  - the cities; and
- one representative from each of the following:
  - the financial sector;
  - the road building industry (the representative must be no longer active);
  - the general business community.

The responsibilities of the TAC are established by State law (Arizona Revised Statutes, Title 28, Section 1598). The TAC establishes standards and develops criteria to assess the status, condition, and needs of transportation systems. The TAC also advises ADOT during the evaluation process and approves the report prior to its presentation to the Legislature.

Previous needs assessments developed information the Arizona Legislature required for important transportation funding decisions. Those studies identified improvements needed on public roadways receiving State funding: State highways, county roads, and city streets. Excluded were the extensive public roadway systems on federal lands and reservations. This needs assessment is the first encompassing all public roadways in Arizona.

### **Highway Needs**

Beginning in early 1994 and continuing into the fall, ADOT surveyed all agencies with jurisdiction over public roadways in Arizona. ADOT planners met with transportation officials from each county, city and town to present the needs survey, solicit cooperation, and offer technical assistance. In addition, survey contacts were made with representatives of all American Indian Nations in the State, and all federal agencies with jurisdiction over roadways in Arizona: the Bureau of Indian Affairs; the Bureau of Land Management; the National Forest Service; and the National Park service.

Each agency was asked to report its annual roadway administrative and maintenance budget. Transportation officials from each agency reported roadway deficiencies, corrective

actions required, and their costs. For the State Highway System, ADOT determined the investments required to achieve acceptable levels of service, roadway conditions, and safety.

### **Highway Cost Estimates**

Table 7-1 presents projected costs for State highways. For the decade ahead total costs are \$9.6 billion (all estimates of roadway costs, revenues, and needs are expressed in constant 1993 dollars). One-fifth of that total (\$2.1 billion) will be needed to continue MAG Freeway System construction. The largest expenditure category consists of the capital improvements needed for State Highway System preservation, reconstruction and additional capacity. These capital improvements account for three-fifths of estimated costs. Operations and maintenance account for the remaining fifth of all costs.

Total projected expenditures for county roads within the ten year period are \$2.5 billion. Capital Improvements will account for six out of every ten dollars spent next decade (Table 7-2). Estimated expenditures for city streets total \$5.4 billion in the next ten years. Capital Improvements will account for seven out of every 10 dollars spent (Table 7-3).

### **Highway Revenue Estimates**

Table 7-4 summarizes revenue projections expressed in constant 1993 dollars for the State, counties, and cities. A total of \$8.5 billion is anticipated from all sources in the coming decade.

### **Highway Financial Needs**

Table 7-5 presents the financial need for state highways. Over half of the \$9.6 billion required in the decade ahead for State highway expenditures is unfunded, resulting in a total need estimate for State highways of \$5.0 billion. As presented in Table 7-6, financial needs for county roads total \$1.1 billion. Nearly half of the \$2.5 billion required for county road expenditures between 1996-2005 is currently unfunded. City financial needs total \$2.9 billion in the next decade. Similar to the State and counties, about half of the \$5.4 billion required in the next ten years is unfunded (Table 7-7). The total financial need for Arizona's State, county, and city roadways is \$9 billion (Table 7-8). Nearly half the expenditures which will be necessary for Arizona's roads and streets are currently unfunded.

**Table 7-1. State Highway System Costs  
(Millions)\***

	1996-2000	2001-2005	Total
Operations/Maintenance	\$ 950	\$ 950	\$1,900
Capital Improvements**	\$3,000	\$2,600	\$5,600
MAG Freeway System	\$1,100***	\$1,000	\$2,100
<b>Total</b>	<b>\$5,050</b>	<b>\$4,550</b>	<b>\$9,600</b>

\* Constant 1993 dollars.

\*\* Includes system preservation, reconstruction and new construction, excluding the MAG Freeway System.

\*\*\* If bonding is used, a greater share of the \$2.1 billion 10-year total cost will occur in this first five year period.

**Table 7-2. County Road System Costs  
(Millions)\***

	1996-2000	2001-2005	Total
Operations/Maintenance	\$ 550	\$ 550	\$1,100
Capital Improvements*	\$ 700	\$ 700	\$1,400
<b>Total</b>	<b>\$1,250</b>	<b>\$1,250</b>	<b>\$2,500</b>

\* Constant 1993 dollars.

**Table 7-3. City Street System Costs  
(Millions)\***

	1996-2000	2001-2005	Total
Operations/Maintenance	\$ 800	\$ 800	\$1,600
Capital Improvements*	\$1,800	\$2,000	\$3,800
<b>Total</b>	<b>\$2,600</b>	<b>\$2,800</b>	<b>\$5,400</b>

\* Constant 1993 dollars.



**Table 7-4. Revenue Forecasts\***  
(Millions)

	1996-2000	2001-2005	Total
Cities	\$1,300	\$1,200	\$2,500
Counties	\$ 700	\$ 700	\$1,400
State	\$2,300	\$2,300	\$4,600
<b>Total</b>	<b>\$4,300</b>	<b>\$4,200</b>	<b>\$8,500</b>

\* Less payment of debt service. Constant 1993 dollars.

**Table 7-5. State Financial Needs\***  
(Millions)

	1996-2000	2001-2005	Total
Cost	\$5,050	\$4,550	\$9,600
Revenue	\$2,300	\$2,300	\$4,600
<b>Need</b>	<b>\$2,750</b>	<b>\$2,250</b>	<b>\$5,000</b>

\* Financial needs equal costs less revenues and are expressed in constant 1993 dollars.

**Table 7-6. County Financial Needs\***  
(Millions)

	1996-2000	2001-2005	Total
Cost	\$1,250	\$1,250	\$2,500
Revenue	\$ 700	\$ 700	\$1,400
<b>Need</b>	<b>\$ 550</b>	<b>\$ 550</b>	<b>\$1,100</b>

\* Financial needs equal costs less revenues and are expressed in constant 1993 dollars.

**Table 7-7. City Financial Needs\***  
(Millions)

	1996-2000	2001-2005	Total
Cost	\$2,600	\$2,800	\$5,400
Revenue	\$1,300	\$1,200	\$2,500
Need	\$1,300	\$1,600	\$2,900

\* Financial needs equal costs less revenues.

**Table 7-8. Total State, County and City Financial Needs\***  
(Millions)

	1996-2000	2001-2005	Total
Cost	\$8,900	\$8,600	\$17,500
Revenue	\$4,300	\$4,200	\$8,500
Need	\$4,600	\$4,400	\$9,000

\* Financial needs equal costs less revenues.

Action to meet these needs over the next ten years would represent a substantial commitment to State highways, county roads, and city streets. The commitment will make it possible to preserve the enormous investment in public roads statewide. It will enable the new highway construction, and the roadway reconstruction and widening, needed to increase the traffic carrying capacity of our roads and streets. The capacity improvements are essential to reduce congestion and maintain safety. In addition, investment in Arizona's public roads and streets is crucial for the economic well being of the State. Convenient, safe, and uncongested roads and streets attract business investment and tourists. Investment in the transportation infrastructure will more than pay for itself in the long run.

Fostering a sound transportation system which meets customer needs requires significant financial resources. To meet those needs, Arizonans will have to rely on the initiative and

resources of private firms, taxpayers, and system users. Conventional sources of financing, as well as innovative approaches to finance must be brought to bear. Changing public attitudes concerning transportation finance will allow government officials to try unconventional methods in their attempt to attract additional investment.

Benefit assessments on the added value of public investment in transportation systems to adjacent land use may be captured through special assessments with money returned to the transportation system. Peak hour pricing of travel could reduce traffic congestion and increase revenue to the transportation system. Joint public-private initiatives can continue to be used to fund transportation projects. These and other measures will be necessary to alleviate the pressing need for investment in our transportation system if we are to enhance economic productivity, meet global competition, and increase our standard of living.

### **Transit Needs**

Recent major federal initiatives and unfolding socio-demographic trends point toward evolving roles for transit services across Arizona. The Americans with Disabilities Act is focusing attention on the mobility needs of disabled Americans, and mandating levels of services in some cases. As highway capacity projects face scrutiny under the Clean Air Act, transit is seen as a positive alternative, especially in urban areas. Population trends such as increased longevity and the aging of the "Baby Boom" generation will increase demands for assisted mobility.

The transit needs assessment gathered information from four categories of transit services:

- major transit services serving the Phoenix and Tucson metropolitan areas;
- rural public transit services funded under the FTA Section 18 program;
- transit services for the elderly and disabled funded under the FTA Section 16 program; and
- private over-the-road motor coach operators.

Metropolitan Phoenix and Tucson transit operators responded to a detailed survey. Rural public and elderly/disabled service needs were ascertained by evaluation of databases maintained by ADOT which manages the FTA Section 16 and 18 programs, and by evaluation of historical trends in requests for grant fund assistance. Private over-the-road operators were interviewed regarding their system needs. Public funding is not available for private-for-profit operations.

However, it is possible that specific improvements in the public right-of-way may be beneficial to these operators.

Arizona's transit systems are divided into major metropolitan transit, small urban and rural transit, and inter-urban transit systems. This chapter reports the financial needs of the first two classes of transit systems. Information required to determine inter-urban transit system financial needs is being acquired and will be addressed once the necessary data is compiled.

### **Major Metropolitan Transit**

The transit needs analysis considers two alternatives. The first projects service and funding needs to maintain the current level of service in the coming decade. The second alternative projects service and funding needs to provide improved service.

To maintain service levels, increases in service will be needed in metropolitan Phoenix and Tucson to accommodate anticipated population growth. Moreover, the Phoenix and Tucson transit systems will need to increase paratransit service substantially in order to comply with the Americans with Disabilities Act.

The improved metropolitan transit alternative for the Phoenix service area would double miles of service and would provide service seven days per week. In Tucson, improved service would increase the fixed route and paratransit fleets by 50 percent.

The anticipated transit financial needs for the metropolitan Phoenix and Tucson areas are presented in Table 7-9 and Table 7-10. Cells with two entries reflect the range of costs (or needs) under the two service scenarios.

For both Metropolitan Phoenix and Tucson, projected revenues equal costs when current levels of service are maintained over the next decade. To maintain current levels of service in Phoenix, however, desired capital replacement would need to be delayed. To improve service, both systems will require additional financing. Metropolitan Phoenix will need an additional \$700 million; metropolitan Tucson will require \$150 million.

**Table 7-9. Phoenix Metropolitan Area Transit Financial Needs  
(Millions)**

	1996-2000	2001-2005	Total
Cost	\$500 - \$800	\$400 - \$800	\$900 - \$1600
Revenue	\$500	\$400	\$900
Need	\$0 - \$300	\$0 - \$400	\$0 - \$700

**Table 7-10. Tucson Metropolitan Area Transit Financial Needs  
(Millions)**

	1996-2000	2001-2005	Total
Cost	\$150 - \$200	\$150 - \$250	\$300 - \$450
Revenue	\$150	\$150	\$300
Need	\$0 - \$50	\$0 - \$100	\$0 - \$150

**Small Urban and Rural Transit**

Arizona's small urban and rural transit services are funded by two federal programs administered by ADOT. One is the Section 18 program for general public service in rural areas. The other is the Section 16 program which funds vehicles for organizations providing specialized transportation services for the elderly or disabled. The total cost of general public systems in Arizona's rural and small urban areas is approximately \$3.8 million annually. Each year requests for funding exceed available revenue, and an estimated \$1.4 million is unfunded annually.

Small urban and rural transit financial needs over the decade ahead are listed in Table 7-11. Cells with two entries reflect the range of costs (or needs) to maintain existing service levels and to improve service sufficiently to meet projected demand. In the next ten years financial needs are estimated to range from approximately \$20 million, to maintain current levels of service, to about \$180 million to meet fully projected demand. One out of every three dollars that will be required to maintain current levels of service for small urban and rural transit is

currently unfunded. Eight out of every ten dollars of expenditures necessary to meet projected demand is currently unfunded.

**Table 7-11. Small Urban and Rural Transit Financial Needs  
(Millions)**

	1996-2000	2001-2005	Total
Cost	\$30 - \$110	\$30 - \$110	\$60 - \$220
Revenue	\$20	\$20	\$40
Need	\$10 - \$90	\$10 - \$90	\$20 - \$180

**Table 7-12. Total Transit Financial Needs, 1996 - 2005  
(Millions)**

	Maintain Current Level of Service	Fully Meet Projected Demand
Cost	\$1,260	\$2,270
Revenue	\$1,240	\$1,240
Need	\$ 20	\$1,030

**Total Financial Needs: Transit**

Arizona's major metropolitan transit systems, and small urban and rural transit systems, will require an additional \$20 million to maintain current levels of service over the next ten years. An additional \$1 billion will be necessary to meet fully projected demand (Table 7-12). These total financial needs will be further augmented by estimates of intercity transit needs yet to be developed.

## Rail Needs

Arizona's roadway and transit systems are predominantly public facilities eligible for federal assistance. By contrast, the Arizona rail network consists of 15 private carriers potentially eligible for very restricted federal funding. In reality, of the 15 railroad companies, only 7 are potentially eligible for the Federal Railroad Administration Assistance which averages \$400,000 annually. Limited federal assistance is available for capital projects only on Arizona's railroads which move less than five million tons of freight annually. Qualifying railroads may also provide passenger service, providing freight transport requirements are met.

The objective of the rail needs assessment is to identify unfunded capital projects that are potential candidates for federal funding. Three recent studies provide that information: ADOT's survey of light density rail capital improvement needs and two investigations at the behest of the Arizona State Legislature exploring new commuter and intercity rail passenger service.

Table 7-13 presents the total railroad costs, revenue, and financial needs over the next decade. Qualifying projects eligible for federal assistance will cost \$700 million. By contrast, the anticipated revenue totalling approximately \$4 million is relatively insignificant. Thus, essentially all of the nearly \$700 million in financial needs identified is currently unfunded.

**Table 7-13. Total RR Financial Needs  
(Millions)**

	1996 - 2005
<b><i>Cost</i></b>	
Passenger	\$660
Freight	\$ 26
Total	\$686
<b><i>Revenue</i></b>	
Passenger	\$ 0
Freight	\$ 4.0
Total	\$ 4.0
<b><i>Need</i></b>	
Passenger	\$660
Freight	\$ 22
Total	\$682

## **CONCLUSION**

Present projections show that approximately \$1 billion per year will be available to support Arizona's transportation systems. Information emerging from the Arizona Needs Assessment, Statewide long range planning, metropolitan transportation planning and other planning throughout the State, show that this level of commitment will be insufficient to keep pace with the State's present and future requirements. The extent of any funding shortfalls would be further exacerbated over the next decade by failure of current finance proposals which would have substantial impacts on transportation development throughout the State.

In light of the significant funding constraints being placed upon the State's transportation systems, new approaches for planning, operating, financing and coordinating the elements of the systems and services available in Arizona will be essential. Based upon the challenges, visions and approaches emerging from this State Transportation Plan, it is clear that near and long range strategies must be developed which will ensure that the present transportation systems and services are preserved and made more efficient and that future transportation improvements are planned, financed and operated to serve and sustain the State's future economic, social and demographic growth.

A major component of this new approach will be the development of a more comprehensive State transportation financing strategy that is tailored to the coordinated planning and programming processes emerging between and among State, metropolitan and local jurisdictions within Arizona. Such a plan will support the timely availability of financial resources to support future systems improvement and will assist decision makers in ensuring that only the highest priority services will be implemented.



## **8. GOALS, OBJECTIVES, AND POLICIES**

This chapter describes goals, objectives, and policies for the Arizona State Transportation System. For purposes of this chapter, the following definitions of these terms are used:

**Goals:** Statements concerning desirable long-range achievements. These goal statements are general in nature and express the ideal situation desired.

**Objectives:** More specific and measurable statements concerning desirable end states. These objectives are intermediate milestones that are essential to achieve the goals. Wherever possible, they are expressed in terms that are measurable and achievable. Several objectives are provided for each goal. They provide additional details related to the goals.

**Policies:** Approved courses of action to be followed. Policy statements are included for each objective. These policies will be the basis for actions that will be needed to achieve the objectives.

A goal statement (designated by roman numerals) is provided for each of the following six general categories: transportation system, economic development, land use, environmental considerations, implementation and financing, and coordination. Several objectives (designated by capital letters) are provided for each of these six goals. Policy statements (designated by numbers) are then included for each of the objectives.

### **GOAL I: TRANSPORTATION SYSTEM**

To develop and maintain an integrated, balanced, and multi-modal State Transportation System that meets the needs of Arizona.

#### **Objectives and Policies**

- A. To establish and maintain a safe, effective, and efficient State Highway System as a component of the overall State Transportation System.
  - 1. Maintain the State Highway Plan as the mechanism for the development and maintenance of the highway system.

2. Support the development of highway services and facilities at all levels of government that will serve to promote the economic vitality of Arizona communities.
  3. Employ value engineering techniques to ensure efficient, effective, and economical designs of highway facilities.
  4. Coordinate the provisions of the State Highway Plan with plans for all transportation modes and facilities.
  5. Maintain compatibility between the State Highways and the adjacent land use and surrounding environment.
- B. To support the improvement of a rail system for the movement of freight and passengers as a component of the overall State Transportation System.**
1. Prepare and maintain the State Rail Plan as the mechanism for assisting in the improvement of the rail system in the State.
  2. Coordinate with rail operators to maintain the condition, safety, and accessibility of rail lines for both freight and passenger service.
  3. Maintain line system inventories on all of the State's light density rail lines in order for them to continue to qualify for federal assistance.
  4. Support the development and maintenance of intermodal facilities that assist in the transfer of freight and passengers between rail and other modes.
- C. To provide for a safe and effective aviation system as a component of the overall State Transportation System.**
1. Maintain the State Aviation System Plan as the mechanism for providing a safe and effective aviation system.
  2. Continue to use the five-year airport development program as the basis for programming state aviation funds.
  3. Provide for the needed access between airports and other transportation modes.
  4. Minimize the noise and air quality impacts of air facilities on their surroundings.

5. Provide for the development and operation of airports in a manner compatible with the surrounding land uses.
  6. Promote demand management actions that will assure the efficient and effective use of the existing air facilities system.
- D. To promote the establishment and maintenance of reliable transit systems in all appropriate areas of the State.
1. Prepare and maintain the State Transit Plan as the mechanism for the development of transit services.
  2. Augment the State Transit Plan through the incorporation of transit development plans from the metropolitan planning organizations and the rural planning areas.
  3. Identify and implement appropriate facilities and intermodal linkages within roadway corridors to support the effective operation of private over-the-road motor coach services in appropriate locations.
- E. To encourage the development of a coordinated system of pipelines for the conveyance of commodities that are appropriate for this method of transport.
1. Coordinate with private pipeline operations to assure the needed capacity to serve the economic needs of the State.
  2. Support measures to ensure the safe operation of all pipeline facilities.
  3. Support the development and maintenance of intermodal facilities that assist in transfers between pipelines and other transportation modes.
- F. To provide for the incorporation of bicycle facilities into the plans and designs of the other components of the transportation system.
1. Prepare and maintain a State Bicycle Plan.
  2. Encourage the preparation of bicycle plans at the State, regional and local levels that provide the basis for the provision of bicycle facilities as part of the overall transportation system,
  3. Incorporate bicycle facilities into the planning and design of highways and other transportation facilities.

- G. To provide for pedestrian circulation and safe and comfortable pedestrian access to intermodal connections.**
- 1. Incorporate pedestrian facilities as an integral part of the transportation system as defined by the plans and designs related to other transportation modes.**
  - 2. Ensure safe pedestrian access to other modes of transportation.**
  - 3. Encourage the planning and design of public buildings and private development to allow for safe and convenient pedestrian access.**
- H. To create and maintain a balanced multi-modal transportation system that provides choices among all of the modes, reduces reliance on any single mode, and takes advantage of the inherent advantages of each mode.**
- 1. Identify and evaluate transportation needs with reference to the mode that can best accommodate the need.**
  - 2. Design systems and facilities that accommodate a combination of transportation modes.**
- I. To establish an intermodal transportation system that provides connectivity among all modes.**
- 1. Encourage all State, regional, and local transportation plans to identify means of connecting passenger and freight facilities among modes.**
  - 2. Provide for the effective transfer of goods and services among modes.**
- J. To develop a Statewide system of corridors and facilities that provides connectivity among all areas of the State and ensures access to all areas of the nation.**
- 1. Identify through the transportation planning process a multi-modal network of facilities to meet the need for the movement of people, good, and services throughout the State.**
  - 2. As rapidly as financially feasible, develop in-depth corridor profiles, and subsequent multi-modal corridor studies of priority corridors identified through the State transportation planning process.**

3. **Assure an effective and reliable system to connect the major population centers of the State and to provide access between the major population centers and the rural areas of the State.**
  4. **Develop the statewide transportation corridors by the use of the most appropriate combination of surface modes, including highway, transit, rail, air, and bicycle, and pedestrian.**
  5. **Identify transportation needs that extend beyond the borders of the State.**
  6. **Define methods of ensuring access to the State system.**
- K. To develop a transportation system that is accessible to all potential users and all segments of the population, including the economically-disadvantaged, physically-challenged, youth, and elderly.**
1. **Implement the accessible transportation requirements of the Americans with Disabilities Act.**
  2. **Ensure that transportation facilities are readily accessible and easy to use by all segments of the population.**
  3. **Encourage multi-modal accessibility to employment, education, housing, commercial, medical, and recreational areas.**
  4. **Develop public transit, bicycle, and pedestrian facilities in conjunction with other elements of the transportation system.**
  5. **Coordinate the services of private and public transportation providers.**
- L. To improve and maintain at the higher level the safety of all components of the transportation system for all users.**
1. **Consider safety for multi-modal users in the design and construction of all transportation facilities.**
  2. **Develop and implement a public awareness program related to the safe use of all modes of the transportation system.**
  3. **Encourage the appropriate agencies to improve the enforcement of transportation safety laws and regulations, including those related to excessive speed, alcohol and drug use, and use of safety belts and helmets.**

4. Improve the system for the provision of emergency medical services to transportation-related accidents in both the urban and rural areas of the state.
  5. Maintain records of traffic accidents and hazardous materials incidents on a statewide basis for general analysis and site-specific studies.
  6. Monitor the State Transportation System to ensure that locations with high accident rates are considered for remedial action.
- M. To provide an efficient transportation system that meets the needs of the users and maximizes the benefits of the investments in the system.
1. Include an evaluation of economic, social, energy, and environmental impacts in the planning and design of transportation facilities of all modes.
  2. As part of the overall transportation planning process, assess the relative costs and benefits on a system-wide basis including a comparison of all modes.
- N. To promote transportation system management techniques to increase the capacity of the existing transportation system.
1. Identify and implement road improvements that will increase traffic capacity, including intersection improvements, high-occupancy vehicle (HOV) capacity, intelligent vehicle highway systems (IVHS), access control management, and traffic circulation measures.
  2. Encourage the provision of transit improvements, including fixed-route bus service, express bus service, dial-a-ride, busway HOV facilities, park-and-ride lots, and transit centers.
  3. Continue to communicate with metropolitan planning organizations and local governments concerning methods of increasing the traffic capacity of existing facilities.
- O. To promote transportation demand management techniques to reduce the number of vehicle miles traveled in single occupant vehicles and to reduce congestion at peak times.
1. Support employer-based programs to reduce travel demand, including ridesharing, vanpooling, preferential parking for carpools and vanpools, encouragement of pedestrian and bicycle use, telecommuting, and staggered work hours.

2. Encourage public sector programs to reduce travel demand, including public transit improvements, congestion pricing by tolls or traffic fees, and the application of employer-based programs to public agencies.
  3. Consider market incentives that seek to improve the financial attractiveness of alternatives to single occupant vehicle travel, including employer subsidies, parking charges, preferential parking, transportation allowances, taxes, and fees.
  4. Continue communication with metropolitan planning organizations concerning their regional transportation demand management programs.
- P. To promote the development and use of innovative technologies, management practices, and safety measures that will lead to new approaches to meeting the transportation needs of the state.
1. Maintain current information and knowledge of new technologies that are identified, tested, and used throughout the nation.
  2. Provide a forum for sharing information on new technologies with responsible transportation entities in the State.
  3. Continue to incorporate new technologies into transportation plans and projects when feasible. Tailor the plans and projects to take advantage of new technologies.

## **GOAL II: ECONOMIC DEVELOPMENT**

To develop a transportation system that promotes Arizona's economic development, accommodates the State's population growth, and serves permanent and part-time residents and tourists.

### **Objectives and Policies**

- A. To expand the elements of the transportation system in order to meet population and economic demands.
1. Coordinate transportation planning with economic development activities, such as the Governor's Strategic Planning for Economic Development (GSPED), to address economic issues and infrastructure concerns.

2. Consider economic development objectives when assigning priority to transportation projects.
  3. Consider the employment impacts of transportation decisions.
- B. To assure effective transportation linkages for goods and passengers in order to attract a larger share of international and interstate trade to Arizona.**
1. Maintain and continue to improve the existing major east-west transportation corridors through the state.
  2. Provide increased north-south mobility on a high-level highway facility through the state that forms the Arizona segment of a continuous interstate commerce and trade route between Canada and Mexico.
  3. Improve the efficiency and effectiveness of the ports-of-entry along the Arizona-Sonora border through the addition of needed infrastructure and the development of improved border-crossing procedures.
  4. Establish a mechanism for the coordination of transportation planning between Arizona and Sonora.
  5. Continue the study of the need to improve air service and airport facilities, including the upgrading of existing facilities and the development of international air service.
- C. To provide a transportation system that supports and enhances the potential for economic growth and development of all areas of the State in a manner consistent with local plans and policies.**
1. Complete the construction of planned freeway and arterial street improvements in the metropolitan areas of the State.
  2. Continue the development of a program for the improvement of rural roadways throughout the State for economic development purposes.
  3. Improve access between the remote areas of the State and the centers of economic activity.
  4. Upgrade general aviation facilities in rural areas.



- D. To develop a transportation system that supports recreational and tourism travel throughout the State and improves access to recreational destinations in a manner consistent with the maintenance of the integrity of the attraction.
1. Coordinate the development and maintenance of transportation facilities with the agencies responsible for the management of recreational areas, including the National Park Service, U.S. Forest Service, U.S. Bureau of Reclamation, Arizona State Parks, Salt River Project, Arizona Department of Tourism, and other recreational entities.
  2. Maintain consistency between the development and management of the state transportation system and the circulation plans of the various recreational areas.
  3. Specifically maintain consistency of the portion of the State Transportation System serving the Grand Canyon National Park with the internal park circulation system.

### **GOAL III: LAND USE**

To develop a transportation system that is compatible with existing and planned land uses.

#### **Objectives and Policies**

- A. To plan and implement the transportation system in a manner consistent with adopted land use plans and policies.
1. Continue to base the definition of need for transportation facilities on population and employment projections that are consistent with those used in adopted land use plans.
  2. Coordinate the planning and design of transportation facilities with adopted land use and general plans of all local governmental jurisdictions in the State.
  3. Provide technical assistance to local and regional agencies in the coordination of transportation and land use plans.
- B. To assure balanced multi-modal accessibility to existing and planned new development in all areas of the State.
1. Coordinate transportation and land use planning with private development entities.

- C. To provide for the protection and preservation of rights-of-way that will be needed for future transportation facilities in a manner consistent with planned growth and development.
  - 1. Identify the needs for future transportation corridors as a part of transportation planning activities at all levels of government.
  - 2. Design and implement a corridor preservation program, which may include the advance purchase of needed land, the use of police powers to preserve the corridor, and governmental incentives to the landowners.
  
- D. To promote land use patterns that are conducive to the provision of an effective and efficient transportation system.
  - 1. Encourage land use planning and project design that provides improved mobility through a variety of modal options and thus reduces the dependence on the single occupant vehicle.
  - 2. Encourage development densities that are compatible with transit, bicycle, and pedestrian access.

#### **GOAL IV: ENVIRONMENTAL CONSIDERATIONS**

To develop a transportation system that preserves and enhances Arizona's environmental conditions and values.

##### **Objectives and Policies**

- A. To assure that the transportation system is developed and maintained in a manner that has positive impacts on the natural, social, cultural, and economic environment of the State.
  - 1. Include the consideration of environmental impacts in the planning and design of all transportation facilities and programs.
  - 2. Meet the requirements of the National Environmental Policy Act for all actions and projects that receive federal funding or relate to other federal programs and responsibilities.
  - 3. Conduct environmental studies of non-federal actions and projects in a manner similar to the federal process, as provided by the Arizona State Action Plan.

4. Where adverse environmental impacts cannot be avoided, identify measures to minimize or mitigate the effects.
- B. To reduce the air pollution that may be generated by transportation activities.**
1. Develop plans and programs that define proactive State and local actions to improve the air quality throughout the state.
  2. Meet the requirements of the Clean Air Act Amendments of 1990.
  3. Encourage the use of efficient vehicles and clean-burning motor fuels.
  4. Encourage transportation programs and projects that lessen the dependence on the single occupant vehicle.
  5. Coordinate transportation planning and design activities among agencies with responsibilities for air quality, including the metropolitan planning organizations, the Arizona Department of Environmental Quality, and the U. S. Environmental Protection Agency.
- C. To promote the efficient use of energy resources.**
1. Minimize transportation-related energy consumption through the encouragement of efficient vehicles.
  2. Encourage the use of fuel efficient transportation modes, including transit, rail, bicycling, and walking.
  3. Coordinate transportation planning with the programs of the State Energy Office.
- D. To design, maintain, and operate transportation facilities in a manner consistent with adopted State and area water quality management plans.**
1. Ensure that the design of transportation projects includes provisions for properly conveying the runoff associated with project construction and operation.
  2. Coordinate the water quality aspects of transportation planning and design with the Arizona Department of Environmental Quality and the Arizona Department of Water Resources.

- E. To minimize the effects of potentially-hazardous materials, with regard to both existing sites that may be impacted by transportation facilities and contaminants that may be generated by the use of the transportation facilities.**
- 1. Include the identification and assessment of potential hazardous materials sites in all transportation planning and design activities.**
  - 2. Provide for coordination with federal, State, and local agencies that have information or responsibilities related to hazardous materials.**
  - 3. Require that all State and regional transportation systems provide for the safe routing of hazardous materials in accordance with federal guidelines.**
  - 4. Incorporate pollution prevention measures into the construction and maintenance activities of transportation systems and facilities to minimize the generation of potentially hazardous materials.**
- F. To minimize the negative effects of the construction of transportation facilities on established residences, businesses and other developed land uses.**
- 1. Include the evaluation of residential and business impacts in the environmental studies for all transportation projects.**
  - 2. Identify the need for future transportation corridors in advance of major developments in order to allow the inclusion of the transportation facilities in development plans.**
  - 3. Where residential and business impacts are unavoidable, minimize the number of necessary relocations and follow all State and federal guidelines in the necessary relocations.**
- G. To protect and enhance the aesthetic values of transportation corridors in order to preserve quality of life and contribute to positive economic development.**
- 1. Consider aesthetic values in the design and maintenance of transportation corridors and facilities for all modes. Include such factors as existing vegetation, historic context, facility design, and the dedication of a portion of funds for artistic treatments.**
  - 2. Consider the impacts on the natural aesthetic values in the preparation of transportation plans and the location of transportation corridors and facilities.**

## **GOAL V: IMPLEMENTATION AND FINANCING**

To develop an effective system for implementing the elements of the planned transportation system on a stable and equitable funding basis.

### **Objectives and Policies**

- A. To provide for the construction, management, and maintenance of needed transportation facilities in a timely and cost-effective manner.**
  - 1. Emphasize the effective management of existing transportation infrastructure and services in order to lessen the need for new facilities.**
  - 2. Protect statewide transportation corridors and facilities from encroachment by controlling access to State Highways, minimizing at-grade rail crossings of State Highways, and discouraging incompatible land use around airports.**
  - 3. Continue a strong enforcement of size and weight restrictions in order to preserve and protect the existing infrastructure.**
  - 4. Develop and implement management systems for highway, pavement, bridges, public transportation facilities, safety, and intermodal transportation facilities.**
  - 5. Consider life-cycle costs in the planning and design of transportation facilities.**
  
- B. To develop and maintain sufficient revenues for the identified and proven transportation needs of the State, including federal, State, local, and private funding sources.**
  - 1. Maintain eligibility for and take full advantage of available federal transportation funds, including ISTEA and other programs.**
  - 2. Monitor the effectiveness of existing funding programs at the State and local levels.**
  - 3. Monitor funding trends through the Transportation Needs Assessment.**
  - 4. Analyze the relative costs and benefits of potential new facilities on a system-wide basis, including a comparison of the effectiveness of different modes in meeting the defined needs.**
  - 5. Explore the feasibility and desirability of alternative funding sources.**

- C. To develop and operate a system that accurately forecasts future revenues in order to provide for the appropriate scheduling and construction of needed transportation facilities.
  - 1. Coordinate revenue forecasting with regional and local transportation organizations for consistency.

## **GOAL VI: COORDINATION**

To establish a coordinated transportation system that is compatible among all transportation modes and all governmental jurisdictions.

### **Objectives and Policies**

- A. To assure an effective and efficient division of responsibility for transportation planning and implementation among governmental levels throughout the State.
  - 1. Maintain a definition of the elements of the transportation system that are of statewide significance, regional significance, and local significance.
  - 2. Establish criteria and guidelines for the development and refinement of statewide plans, regional plans, and local plans.
  
- B. To provide for the coordination of transportation planning and implementation among all governmental jurisdictions.
  - 1. Maintain a close communication with the Federal Highway Administration, the Federal Transit Administration, the Federal Aviation Administration, the Federal Railroad Administration, and other relevant federal agencies with responsibility and authority related to the transportation system.
  - 2. Establish agreements to guide the development and coordination of regional transportation plans by metropolitan planning organizations in a manner consistent with State and federal requirements.
  - 3. Maintain a close coordination with all American Indian Nations in the State to ensure compatibility between their transportation facilities and the State system.
  - 4. Continue the development and coordination of small-area transportation studies (non-metropolitan are transportation studies).

5. **Assure consistency and appropriate linkages among local, regional, tribal, and State transportation plans.**
- C. To assure the compatibility of plans for all modes of the integrated transportation system, including highway, rail, air, transit, pipeline, bicycle, and pedestrian elements.**
1. **Establish a mechanism for communication among the entities that are individually responsible for each transportation mode that comprise the overall system.**
  2. **Include provisions for all transportation modes in State, regional, and local transportation plans.**
  3. **Provide for the review and coordination of all specific modal plans and intermodal activities to assure consistency and compatibility.**
- D. To involve the private sector in the planning and implementation of the transportation system.**
1. **Establish procedures to encourage private sector participation in the State transportation planning process.**
  2. **Identify incentives to be used to foster private sector participation in the implementation of transportation plans and projects.**
  3. **Coordinate the long-term funding plans for transportation facilities with private sector development plans.**
- E. To provide information to the public concerning transportation issues and plans and assure the opportunity for public involvement in all transportation decisions.**
1. **Prepare and maintain public involvement guidelines that describe the specific procedures to be used to assure opportunities for public review and comment on transportation plans and policies.**
  2. **Include in the public involvement guidelines all relevant requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA) and the National Environmental Policy Act (NEPA).**
  3. **Assure that the public involvement guidelines are followed for State transportation planning activities.**
  4. **Develop and implement a public awareness program related to the safe use of all modes of the transportation system.**

## **9. SYSTEM IMPLEMENTATION STRATEGIES**

### **INTRODUCTION**

The purpose of this chapter is to present the alternative strategies for improving the Arizona multimodal transportation system. The future direction of the transportation system is evaluated within the broader context of the major transportation issues, opportunities, and challenges confronted by the citizens of Arizona. Major issues include fairly rapid population and economic growth, costs of providing transportation, level of transportation services, improving the mix of modes, environmental concerns, energy, and free trade issues. The major transportation issues set the stage for developing a vision of Arizona's future transportation fabric and a direction for implementing system strategies.

The chapter then discusses the strategic areas which can affect the multimodal transportation system including strategies such as preserving transportation facilities, using alternative transportation modes, and implementing innovative financial mechanisms. The possible levels of commitment by the State for each strategic area are also discussed such as a high level versus a low level of commitment to reserve future facility right-of-way. Based on the array of possible individual strategies, system strategies are recommended for Arizona's transportation system.

### **STATE TRANSPORTATION ISSUES, OPPORTUNITIES, AND CHALLENGES**

The State Transportation Plan must be developed upon a strategic foundation designed to respond to critical transportation issues and to seek out the opportunities available to Arizona in developing a solid transportation system which will serve the State well into the next century. This section provides an overview of the major issues which have been identified and are likely to impact upon the future development of the State's transportation system. In addition, a more focused discussion is provided of some of the more important opportunities, from which advantages might be sought, as well as challenges, which may need to be overcome.



## **State Transportation Issues**

Major issues which influence and impact Arizona's transportation system have been identified throughout the planning process through public and agency review and discussion. These issues are addressed here in order to provide a basis for developing and evaluating the strategic components of the Plan.

### **Financial Capacity**

Current transportation needs exceed available funding. The issue boils down to how to meet high transportation needs and demands with limited funds. This issue leads to a critical challenge to the citizens of Arizona in finding innovative ways to finance, operate, preserve and enhance their high priority transportation systems and services and thereby to keep pace with anticipated growing transportation demand.

### **Level of Transportation Service**

The performance of the State's transportation system is obviously very important to the users of the system. As congestion levels increase, travel time increases and safety often degrades, air quality gets worse and energy consumption increases. As pavements deteriorate, speed often decreases and ride quality becomes poor, thereby deteriorating safety, vehicular mechanical condition and performance efficiency. As the condition of bridges deteriorates, safety becomes a problem as does the functional performance of the structure. System performance in terms of use, condition and function must be continuously monitored and strategies must be defined to maintain adequate levels of service.

### **Accessibility of Transportation**

Access of the citizens of Arizona to transportation is a major issue. Every person's mobility is affected by access to highways, the availability and access to transit, and the access to other transportation modes such as airports, bicycling and walking. In addition, all of the goods and services used and consumed by Arizonans are dependent upon and sensitive to, transportation systems and service availability, cost and efficiency.

Another important issue is providing transportation service to all population groups within Arizona. The youth, the elderly, and the handicapped need access to transportation facilities and services. Recent federal law requires that transportation facilities and services be accessible to disabled persons. Special transit services are often needed to provide access to a varied group of people with special needs. These more recent accessibility demands will place further pressure upon priority-setting and financing of transportation system improvements in the future and will establish new criteria for development and performance of the State's transportation system.

Accessibility will become a major factor in providing increased mobility for all of our citizens while providing consistent performance levels on existing and future facilities.

### **Competition for Transportation Resources**

Another major determinant of mobility is the timely availability of transportation service. Especially in times of high demand and limited financial resources, competition between and among transportation proposals becomes acute. This creates ongoing controversy among areas having similar needs as well as between areas of vastly differing requirements. For instance, such a competitive condition makes allocation of limited funding to smaller cities or rural areas extremely difficult in the face of great unmet urban demand, even when the proposed transportation improvement is designed to address transportation problems created by greater use by urban residents or businesses (e.g., rural highway improvements necessitated by increased recreational use by urban populations). Another example of difficulty associated with increased competition for limited transportation resources is experienced within a single urban region, where timing of projects and improvements is critical to the economic or environmental conditions of the particular portions of the region. Even though travel demand may be equal, priorities must be established due to limitations on resources and various areas within the region must delay or even cancel improved transportation service.

Thus, it will become increasingly critical that inter-jurisdictional cooperation, building of consensus between and among decision-makers, and greater flexibility and coordination in resource use be achieved in the transportation planning and development process. Only through a greater resulting partnership between providers, operators and decision-makers can the highest priority transportation systems and services be developed, tailored to the greatest need and timed

for the greatest effect. As with any resource allocation issue, the State and its partners in this endeavor must maintain a strong objective of equity as well as efficiency in their transportation planning and decision-making processes.

### **Costs of Transportation**

Transportation facilities often have high costs. Historically, transportation costs have inflated at a substantially greater pace than have general inflation rates. Facility construction costs vary significantly depending on the complexity, timing and location of construction. Right-of-way costs, particularly in urban areas, are often a significant proportion of the total facility cost and frequently constrain the extent of transportation improvements. The users of Arizona's transportation system also pay private vehicle operation costs and have a cost in travel time. These private costs increase as both travel distance and congestion increase. Therefore, it is critical that priorities be agreed upon and established for early construction of facilities and services which achieve the highest degree of lasting performance. In addition, it is also crucial that financial mechanisms be tailored to accelerated improvement where highest demand can be anticipated and performance improvements justified. Finally, it must be recognized that there is a significant cost of deferral or delay in providing necessary transportation improvements, either in terms of accelerating deterioration of facilities, causing substantially greater future work, or by delaying capacity improvements. Such delay will lead to a greater future cost and will result in poorer performance, air pollution, increased congestion and lost productivity for the traveling public during the delay period.

### **Environment**

A whole array of environmental issues face the citizens of Arizona. National Ambient Air Quality Standards (NAAQS) must be met in order to comply with federal law as well as to ensure receipt of federal transportation funds by the State and its jurisdictions. Carbon monoxide and ozone are air quality problems in the State's two largest metropolitan areas—Phoenix and Tucson. Although other areas of the state do not have problems with carbon monoxide and ozone, some non-metropolitan and rural areas do have elevated levels of particulates from various sources including unpaved roads. Transportation facilities and services often create noise problems for

their surrounding or adjacent areas which require mitigation. The construction of transportation projects sometimes impact a community's social structure and sometimes causes disruption to a community. The construction of a project may also have adverse impacts on surrounding aesthetics and may not always blend well with the physical environment. Construction also creates dust and increases air pollution from congestion activated by detouring traffic.

A strong commitment is required to achieving the NAAQS at the earliest possible time and to maintain transportation and air quality conformity on an ongoing basis. In terms of water quality, flood control, noise, aesthetics and reduced community disruption, meeting or exceeding federal requirements should be viewed as good business and a direct benefit to the people of the State. In most cases these requirements can be met with little additional cost or delay.

This commitment to environmental quality can best be achieved through an integrated transportation planning process which produces consensus between state and local decision-makers, supported by an active and continuing public participation process which solicits public input prior to project commitment and design.

### **International Trade**

Arizona has benefitted in the past from a close relationship with Mexico. The passage of the North American Free Trade Agreement (NAFTA) encourages even stronger international trade between Arizona and both Mexico and Canada. A large portion of the growth in the State's economy will result of this increase international trade. Increase in such trade will have significant impacts on Arizona's transportation system. Air, rail and truck freight traffic will grow at a high rate. North-South transportation connections to Mexico and intermodal facilities at the border crossings will need to be improved to keep pace with increasing travel demand. Increased demand for passenger capacity at border crossings can also be anticipated as more people take advantage of freer access between the two nations.

Frequently the case is that increases in demand for freight or rural corridors improvements, such as those which would be associated with these trade routes, have difficulty in achieving high priority during times of high competition for limited funds. People carrying capacity projects normally receive greater priority in the decision-making process. Again, improved trade, tailored modal commitments appropriate to the need, and route priority must

receive due recognition within the integrated transportation planning and decision-making process.

### **Impact of Future Technologies on Transportation Demand and Service**

Technological advances have had significant impacts on improving transportation services throughout the nation. Technology will continue to influence both the transportation demand and transportation service. Ten years ago most people never heard of the term telecommuting. But the rapid growth in computer technology combined with long distances and high congestion levels have made telecommuting a reality which impacts transportation demand. Intelligent Vehicle Highway Systems (IVHS) which bring the best of technology to control transportation operations will improve transportation service in both urban and rural areas. Ramp metering will help to improve traffic flow on freeways. Vehicle incident detection and management will provide response to accidents and vehicle breakdowns to clear highways quickly. Advanced driver information in rural areas will aid tourists to select the best route and to avoid highway congestion and incidents. High speed rail is a technology which may be suitable in some well traveled corridors.

### **Opportunities**

Special conditions or situations in Arizona provide opportunities to improve the transportation system. The types of strategies and responses to such opportunities generally fall within three types: 1) strategies which maintain or continue solid and proven performance; 2) strategies which take advantage of unique situations or conditions; and 3) strategies which maximize or improve upon strengths. Strategic action in this regard may take the form of program initiation and/or development, policy support, financial commitment, legislative initiatives, intergovernmental partnerships or other significant action.

Examples of opportunities which appear to lend themselves to effective solution within the context of the STP include:

- Arizona's experience in meeting growth challenges.
- A strong tradition of intergovernmental and public/private cooperation.
- A growing robust economy supported by a solid work force.

- The State's strategic location as a critical bridge for East-West interstate travel and a border state for international transportation with Mexico.
- The uniqueness of the State in terms of physical and recreational assets.
- A relatively new infrastructure.
- Strong national, state and local policy and legislative authority.
- IVHS

### **Challenges**

Challenges, conditions, issues or needs which do not readily lend themselves to resolution through strategic or other policy action. Therefore, they must be addressed either by actions which minimize or avoid their adverse impacts, or through the development of new or innovative approaches. Some significant examples of challenges include:

- Accommodation of exploding transportation demand along with low density development patterns in the major metropolitan regions.
- Meeting national air quality standards for particulates in a desert setting.
- Generating consistent, sufficient and flexible funding to meet needs.
- Short-term economic downturns which impact transportation revenue sources.
- The growing disparity between urban and rural interests and needs.
- Maintaining and expanding mobility and performance in high growth areas.

The issues, opportunities and challenges presented here are intended to provide a foundation for developing and evaluating the transportation strategies which will emerge in the State Transportation Plan. They are intended to indicate the breadth of concerns which the Plan must accommodate or address.

### **STRATEGIC AREAS OF IMPROVEMENT**

This section discusses the types of strategic actions which can be taken to improve Arizona's transportation system.

## **Preservation of Statewide Transportation Facilities**

One of the most significant aspects of transportation at the state or any other governmental level, is the ongoing major maintenance and preservation of facilities and services. Preservation is critical to protect the vast public investments and to ensure that the facilities or services perform as intended throughout their service life.

A hierarchy of strategies based upon Level of Development for maximizing preservation of statewide transportation facilities might include:

- Commitment to preservation needs (e.g., pavement, transit and bridge) for both the State owned components, other systems of statewide significance and systems of regional significance.
- Commitment to preservation needs on the State owned components of the statewide and regionally significant systems.
- Commitment to preservation needs on the highest priority portions of the statewide systems based upon functional classification, facilities life cycle costs and other priority setting methodologies.
- Prioritized commitment to preservation needs on selected prioritized facilities and services to the extent that the State's preservation budget will allow.

Present practice regarding preservation of the State Highway System provides for a budget driven prioritized approach, informed by various management systems, needs assessments, sufficiency ratings, and other methodologies. Coordination between jurisdictional levels or between modal priorities is neither consistent nor cross-cutting except where project costs are competing for funding priority.

## **Person Carrying Capacity**

A major emphasis of the State Transportation Plan is to enhance mobility and reduce traffic congestion on the State's transportation system. To attain these ends, the State's transportation system must be designed, operated and utilized in the most efficient and effective possible manner. An important component in the achievement of such efficiencies is the provision of sufficient transportation system capacity to meet and keep pace with travel demand in terms of both people and goods. Such capacity can be designed and planned through transportation systems construction and facilities expansion, as well as through more efficient use of existing and future capacity. In the higher demand area, transportation service must give priority to projects

with the potential for high person carrying capacity. A commitment to providing high person capacity will result in greater efficiency in system use over time and greater return on public investments in transportation systems.

Capacity increases which encourage or support multiple occupancy vehicular use could include:

- High Occupancy Vehicle (HOV) Lanes, HOV ramps and facilities, within existing highway corridors, and other associated park and ride, transit, ride sharing and associated facilities.
- Traffic management systems designed to increase existing system efficiencies, flows, driver information services and service priority and enhancement to shared or multiple rider alternatives.
- Commitment to new technology applications designed to improve efficiencies.
- Corridor improvements and programs designed to encourage greater vehicular occupancies and greater vehicular use efficiencies.
- Light/commuter rail.

### **Transportation Demand Management**

While the previous discussion dealt primarily with the basis for, and the approach to providing the capacity on the State's transportation systems, it addresses only one, albeit important, component of the equation. As important as providing capacity sufficient to the needs of the citizens is the protection of the public investment in the transportation system.

A real question exists as to whether the three to four percent growth in travel demand that has been experienced for nearly twenty years can be sustained into the future decades at any price, much less under highly constrained financing scenarios. The State's population is not only increasing, but each person is travelling more each year. Much of this travel can be attributed to greater individual choice in travel behavior by the citizens, and as such should be seen as a positive result of greater freedom and mobility.

Demand management mechanisms include: 1) transportation system pricing such as peak hour pricing to reduce the peaking of demand on the State's transportation system; 2) parking supply and pricing strategies; 3) employer based travel demand management; 4) trip avoidance strategies including telecommuting and work week compression to reduce peak hour travel; and 5) use of alternate modes.



## **Transportation System Operational Efficiency**

Efficient operations of the State's transportation system, especially the State Highway System, can best be accomplished through an integrated program of traffic management strategies designed to improve traffic flow on existing and new roadways. Such an approach would improve recurring congestion, reduce air pollution resulting from traffic flow problems, and improved safety performance, especially within high traffic corridors. Some of the most effective strategies which should be considered for implementation or expansion include:

- Surveillance and control strategies including freeway management systems, monitoring and management systems and driver information systems.
- Incident response teams to remove and clear accidents or breakdowns.
- Arterial signal coordination to improve traffic flow.
- Construction traffic coordination to reduce the delays and improve flow.

## **Environmental Impacts**

A major goal of the State is to reduce adverse environmental impacts associated with the State's transportation system. A strong coordinating role in achieving consensus on a State Implementation Plan will help to improve air quality. In addition, the State should continue to pursue approaches to reduce other environmental hazards associated with transportation systems including noise, water, threatened species of flora and fauna and historic and archeological protection.

## **Safety**

Safety is a strong concern in the planning, design and implementation of Arizona's transportation systems. While the improvement of safety on the State Highway System has been aggressively pursued, safety will continue to be a growing concern in future programs such as the Safety Management System. Some areas of particular concern include:

- Roadway design, geometrics, safety features and design speeds for various functional classifications of the State Highway System.
- Safety problems associated with higher speed, two lane rural roadways.

- Impaired vehicular operations due to intoxication, physical impairment, inexperienced operators or other causes.
- Hazardous materials spills and incidents (both response and prevention).
- Increased accident rates due to lack of access control highway facilities.
- Construction and maintenance work zone safety.

### **Use of Alternative Modes**

One goal of the State Transportation Plan is to provide a multi-modal transportation system which gives users alternative choices among the array of transportation modes. Alternative transportation modes include the automobile, bus transit, light rail transit, pedestrians, bicycles, and passenger and freight rail. The automobile mode is further divided into the single-occupant vehicle (SOV), shared automobiles, multi-occupant vans, and taxis.

The high level commitment to the use of alternative modes would include a wide mix of all the modes, offering alternative choices to the various user groups. The moderate level would include some additional choices to the SOV. The low level commitment would primarily focus on providing for the SOV.

### **Urban and Rural Transit**

Urban transit includes local and express buses, dial-a-ride services, light rail, and commuter rail. The mix of urban transit can vary significantly depending upon the transit goals and objectives. Urban transit services could range from practically no service to a very high level of bus and commuter rail service. The mix of urban transit services could include:

- Base day fixed bus route service with no express bus service
- Base day fixed bus route service plus express bus service
- Dial-a-ride service
- Extensive dial-a-ride service
- Light rail
- Commuter rail
- High occupancy vehicle (HOV) facilities

The high intensity urban transit commitment could comprise a high capacity transit system component, extensive base day fixed route service, and a broad range and high frequency of specialized transit services. The high capacity transit system component could also include passenger rail, commuter rail, express bus service and HOV facilities.

The moderate intensity urban transit commitment could include express bus service, some HOV facilities, limited base day service, and limited specialized transit services. The low intensity urban transit commitment could include a limited level of base day service and a limited range and frequency of specialized transit service.

Rural transit predominantly includes bus transit and shuttle service. Rural transit service could range from practically no service to a fairly wide geographic coverage of services. Rural transit could include a mix of base day fixed route system; dial-a-ride services; and specialized transit services.

### **Intermodal Relationships**

An intermodal system is a transportation network of public and private infrastructure for moving people and goods by various combinations of transportation modes. Transportation efficiency can be enhanced by improving the linkages between the various transportation modes.

### **Accessibility of Transportation to All groups**

Various groups of people needing accessibility to transportation include the handicapped, elderly, youth, economically disadvantaged; and the transit dependent. The American Disabilities Act requires facilities to be accessible to disabled people.

A high level of commitment would include a wide range of both urban and rural programs aimed toward all user groups. A moderate commitment level might include Federal mandated programs and existing State programs. A low commitment level might include federally mandated programs and minimum state programs.

### **Financing Mechanisms to Achieve Strategies**

The array of potential financial mechanisms to achieve the system strategies includes:

- Federal funds

- User taxes such as the tax on gasoline--Highway User Revenue Fund (HURF)
- General fund revenues
- Sales taxes
- Use and congestion pricing
- Impact and special exaction fees
- Local property taxes, value capture financing
- Privatization and partnering with public and private sectors
- Accelerated bonding
- Local Transportation Assistance Funds
- Enhancement Program
- Border Area Transportation Program

The financial mechanisms used to fund the statewide system strategies could range from an almost total reliance on user funds to a well balanced array of financial mechanisms which would include a mix of user funds, sales taxes, use pricing, and impact fees.

#### **Reserve Future Right-of-Way for Transportation Purposes**

The preservation of right-of-way for future transportation purposes will ensure that transportation facilities can be expanded and/or enhanced as future travel demand grows. The preservation of right-of-way will not only allow for expansion, but will also minimize the adverse future impacts on surrounding development. The preservation of future right-of-way could range from providing only the minimum right-of-way required for a new facility to reserve the ultimate right-of-way for the ultimate facility expansion based on future travel projections. The ability to preserve right-of-way depends on the amount of vacant land within a corridor, the number of existing dwellings and businesses within possible future right-of-way and the amount of current funds. Right-of-way preservation could also be based on facility classification. A high level of commitment to right-of-way preservation could include the preservation of right-of-way on designated high potential demand corridors. A moderate commitment level might include the preservation of right-of-way for urban freeway corridors. A low commitment would be limited preservation of future right-of-way.

## **Access Control**

The control of access on transportation facilities improves traffic flow on the facility, minimizes conflicts with turning vehicles, and improves overall traffic and pedestrian safety. The control of access on transportation facilities could range from no control of access to full control of access. Controlling access to transportation facilities will help to minimize the difficulty and costs in both operating and providing future expansion. Good access control will maintain good traffic operations and slow down the need to expand the facility. Access control may be integrated into land use and design plans.

A high level of commitment would include access control and management plans for all State Highways. A moderate level of commitment might include access control on all State Highways classified as major collectors and above. A low level of commitment would be limited access control on State Highways classified as minor arterials and above.

## **STATE TRANSPORTATION PLAN SYSTEM STRATEGIES**

This section presents a set of recommended strategies designed to serve as the foundation for the Arizona STP. The recommended STP strategies were selected based on a set of basic principles for the State transportation system and were framed within the implementation constraints.

### **Principles for Selecting System Strategies**

The set of strategies selected for the STP should be based on the following set of principles. One major principle is that the transportation system will be multimodal providing a range of modal choices to Arizona's citizens. Intermodal connections will also be improved to capture modal efficiencies. Another major principle is that planning for the system will include both passenger and freight transportation. Arizona's transportation system will also be planned, designed and implemented to minimize impacts on air quality and other environmental elements. The STP will be developed and maintained in close partnership with federal, state, regional, and local transportation planning and operating agencies. Another important principle is that the preservation of existing and future facilities will have a high priority. The transportation system will also be planned to maximize efficiency, effectiveness and function of existing and future

facilities. The transportation system will be planned to improve system performance, safety and congestion levels to maintain mobility for all Arizonans. The STP will also be developed and maintained through an ongoing inclusive planning and decision making process which seeks broad public input.

### **Major Components Of the STP Strategy**

The components defined in the previous section of this chapter are grouped by the following categories: 1) statewide components; 2) metropolitan components; 3) non-metropolitan urban area components; and 4) rural components. The following lists the major facility types within each component. The *Statewide Components* include multimodal corridors of statewide significance; international border crossings; and major passenger and freight intermodal terminals. The *major metropolitan area* components include regionally significant highways; segments of state and nationally significant highways; urban transit service and facilities; and major intermodal terminals. The *non-metropolitan urban area* components include segments of statewide significant highways; local jurisdiction highways on the federal functional classification system above rural minor collectors; small area transit; and economic strength highways. System components in the *rural areas* include lower volume highway corridors; recreational access routes; rural transit; and economic strength highways and related transportation facilities.

### **Recommended STP Implementation Strategies**

The following set of strategies are recommended to be implemented as a strategic foundation of Arizona's transportation system for all transportation components:

1. Preserve existing facilities of national, statewide and regional significance.
2. Maximize person carrying capacity.
3. Manage the system with traffic operational strategies, freeway management strategies and Intelligent Vehicle Highway Systems (IVHS).
4. Optimize access control in significant corridors.

5. Expand transportation capacity in critical areas of high existing or projected demand and congestion. In metropolitan areas, high priority will be given to expand high occupancy capacity in high demand, high congested areas.
6. Reserve right-of-way for all significant corridors to accommodate future expansion and minimize future disruptive impacts.

The following additional strategies are recommended for specific geographic areas. Statewide strategies should also emphasize the improvement of international trade corridors including the border crossings to stimulate the State's economy. In addition, statewide strategies should maintain the safety of state transportation facilities. Metropolitan area strategies should also aggressively implement transportation management demand strategies. Metropolitan areas should give high priority to expanding high occupancy capacity in high demand, high congested areas. In the Phoenix metropolitan area, a high priority will be to complete the urban freeway system. Non-metropolitan area strategies should also implement transportation management demand strategies where applicable. In addition, non-metropolitan strategies should maintain existing transit services and implement new services where needed. Rural area strategies should also develop and maintain access of low volume facilities to other facilities. Moreover, rural area strategies should maintain the safety of rural two-lane high speed roads. Table 9-1 illustrates the levels of emphasis required for the various strategic areas.

**Table 9-1. STP Strategy Components**

Strategic Areas	Geographical Area			
	Statewide	Major Metro	Non-Metro Urban Areas	Rural Areas
Preservation of Statewide Facilities	●	●	●	●
Person Carrying Capacity	⊖	●	⊖	○
Transportation Demand Management	⊖	●	⊖	○
Transportation System Operational Efficiency	●	●	●	○
Environmental Impacts	●	●	●	●
Safety	●	●	●	●
Use of Alternative Modes	⊖	●	⊖	○
Urban and Rural Transit	○	●	●	⊖
Intermodal Relationship	○	●	⊖	○
Accessibility to all Groups	●	●	●	●
Financing Mechanism	●	●	●	●
Reservation of Right-of-Way	●	●	⊖	○
Access Control	●	●	⊖	⊖

Note: The range of activities within each strategic area will vary depending on geographical area.

- = Major Strategic Emphasis Required
- ⊖ = Strategic Emphasis Required
- = Some Strategic Emphasis Required



## **10. TRANSPORTATION CORRIDORS**

### **INTRODUCTION**

Prior chapters provided information regarding the existing status of the multimodal transportation system in Arizona. The future conditions of the system in terms of traffic, freight movements and transit patronage are outlined in Chapter 6. The emphasis of these investigations has been on the transportation system as a whole rather than specific corridors. In this chapter, the focus is on multimodal corridors of statewide significance. Future State planning efforts will be conducted on a corridor level as well as a system level, so that the specific needs, deficiencies, and investment opportunities of the surface transportation facilities in the corridors can be investigated in more detail than can be accomplished on a statewide and/or network level. The goal of these future planning studies is to develop specific strategies that include all modes to accommodate the transportation needs in the key corridors in Arizona.

The purpose of this chapter is to identify the key multimodal corridors and to recommend future planning activities to be undertaken in these corridors. As presented in the prior chapters, there are thousands of miles of roadways, rail lines, and pipelines in the State. These facilities are generally concentrated in identifiable corridors throughout the State. The importance of these corridors in terms of satisfying statewide goals vary and the statewide and public interest for future investments in these corridors also vary. Funding constraints preclude all these corridors being investigated immediately. Therefore, in this chapter, a process for establishing corridors of statewide significance and prioritizing these multimodal transportation corridors for future study are presented. The process utilized for identifying the major corridors is based on the goals of the State Transportation Plan, ISTEA planning requirements, citizen input, and other factors, as will be described. A description of the transportation components of the corridors (ranging from the types of rail service to the different classifications of highways) is provided, because these categories are utilized for selection of key corridors. Finally, recommendations are included regarding the planning process to be followed and analyses to be conducted for the recommended corridor studies.

This chapter contains five sections that describe the process used to achieve the recommendations related to corridors:

- Corridor definition

- Corridors of statewide significance
- Corridor Evaluation
- Suggested corridor profiles and strategies
- Summary

## **CORRIDOR DEFINITION**

In order to develop, maintain, and preserve an integrated, balanced, and multimodal State Transportation System that meets the needs of the people of Arizona (Goal I, Chapter 8), it is necessary to develop a process for transitioning from the plans and policies of the State Transportation Plan into improvement projects and/or investment opportunities such as intermodal facilities, expanded transit service, and highway projects. This process begins by establishing transportation corridors that can be analyzed and evaluated to develop investment opportunities that fulfill the goals of the State Transportation Plan.

Corridors are defined as broad geographic bands through which various modal links provide important connections for transportation movement. The corridors consist of public facilities (highways and some public transit services), and facilities owned and operated by private enterprise (railroads, intercity bus service and pipelines). While some of these transportation corridors are not owned and operated by the State, the State does have a special interest in their operation and access to these facilities because of their importance to the entire transportation system and the economic vitality of the state. Therefore, protection and development of these corridors should be included in the planning and performance criteria for State modal plans and regional and local transportation plans.

A typical example of a multimodal corridor that exists within Arizona is the Tucson to Phoenix corridor which, within approximately a half-mile band width, includes Interstate 10 (a major truck route), Southern Pacific Transportation Company rail freight service, Amtrack, and intercity bus service.

## **CORRIDORS OF STATEWIDE SIGNIFICANCE**

This section describes the sources and process used to identify the corridors of statewide significance. Reports from several agencies were reviewed (as discussed in Chapter 2). Also, the 23 planning factors identified in the ISTEA transportation planning regulations, and several

recent statewide modal plans and reports such as the *State Highway System Plan*, September 1990 and the FY 1994 State Rail Plan Update were used. Data from these documents were also used to develop criteria for ranking corridors of statewide significance as described in the next section.

The following six planning factors from the ISTEA legislation, which must be considered in the statewide planning process, relate to transportation corridors:

- "International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation and scenic areas, monuments and historic sites, and military installations." Access to all six official border crossings with Mexico; access to all airports serving commercial passenger flights; and routes providing access to all national parks, national monuments, national historic sites, and military installations are included as transportation corridors of statewide significance.
- "Connectivity between metropolitan planning areas within the State and with metropolitan planning areas in other States." The three MPO's of MAG, PAG, and YMPO are connected to each other and to the borders of adjacent states by transportation corridors of statewide significance.
- "Recreational travel and tourism." Access roadways serving Arizona's major recreation areas such as Sunrise, Snow Bowl, Lake Powell, the Verde Valley, the Colorado River, and the Grand Canyon are considered transportation corridors of statewide significance.
- "Methods to expand and enhance appropriate transit services and to increase the use of such services (including commuter rail)." Roadways used by companies providing intercity transit service in rural and small urban areas; roadways used by Greyhound Corporation to provide transit service in Arizona and to adjacent states; and railroad lines used for Amtrak passenger service are considered transportation corridors of statewide significance.
- "Methods to enhance the efficient movement of commercial motor vehicles." Highways identified as being National Intercity Truck Routes, and Class 1 railroads which provide piggyback service for commercial motor vehicles are considered transportation corridors of statewide significance.
- "The concerns of Indian tribal governments having jurisdiction over lands within the boundaries of the State." Corridors which provide access to American Indian Nations are considered transportation corridors of statewide significance.

The following proposed goal of the State Transportation Plan (Chapter 8) relates to transportation corridors:

- "To develop a transportation system that promotes Arizona's economic development, accommodates the State's population growth, and serves both permanent and part-time residents". The primary future transportation related issue in Arizona pertaining to economic development is serving the anticipated increases in passenger and freight traffic generated by NAFTA. Therefore, highways and railroads connecting the international border crossings of Arizona with Mexico to Tucson, Phoenix, and Yuma; and to Arizona's neighboring states are considered transportation corridors of statewide significance. To accommodate Arizona's population growth, transportation corridors that connect those urban areas forecast by the Arizona Department of Economic Services to become MPO's (population 50,000 or more) by 2010 are also considered of statewide significance.

Several transportation planning studies recently completed in Arizona contain information that was incorporated into the development of transportation corridors of statewide significance. Criteria developed from these reports are discussed below.

- The FY 1994 State Rail Plan Update report prepared for ADOT identified 2 Class 1 railroads, 10 short line freight railroads, and 3 tourist railroads operating in Arizona. The Class 1 railroads, both of which provide Amtrak service, and other railroads which provide passenger service are considered transportation corridors of statewide significance.

Even though the National Highway System has not yet been officially adopted, the transportation corridors on the proposed system are considered to be of statewide significance.

The functional classification of the State Highway System provides eight classifications for roadways depending upon their use (see Chapter 6). All highways classified as principal arterials are considered to have statewide significance.

Major pipelines carrying natural gas, petroleum, and hazardous materials were identified in Chapter 6. Access to those pipelines for maintenance, repair, and terminals used for transfer to other modes are considered transportation corridors of statewide significance.

Routes rated for bicycle usage have been identified by the Governor's Arizona Bicycle Task Force. Therefore, highways that can be used as bicycle routes are considered to have statewide significance.

The criteria that were developed from these sources were placed in three categories: mode of transportation, connectivity, and economic development and recreational areas, to ascertain if there were corridors that emerged from the various criteria. The criteria utilized for the mode of transportation included the following :

- Routes on National Highway System
- Principal arterials on the Functional Classification System
- Major truck routes
- Accessibility for existing intercity transit service
- Class 1 railroads
- Major pipelines
- Bicycle routes

The criteria relating to connectivity include the following items:

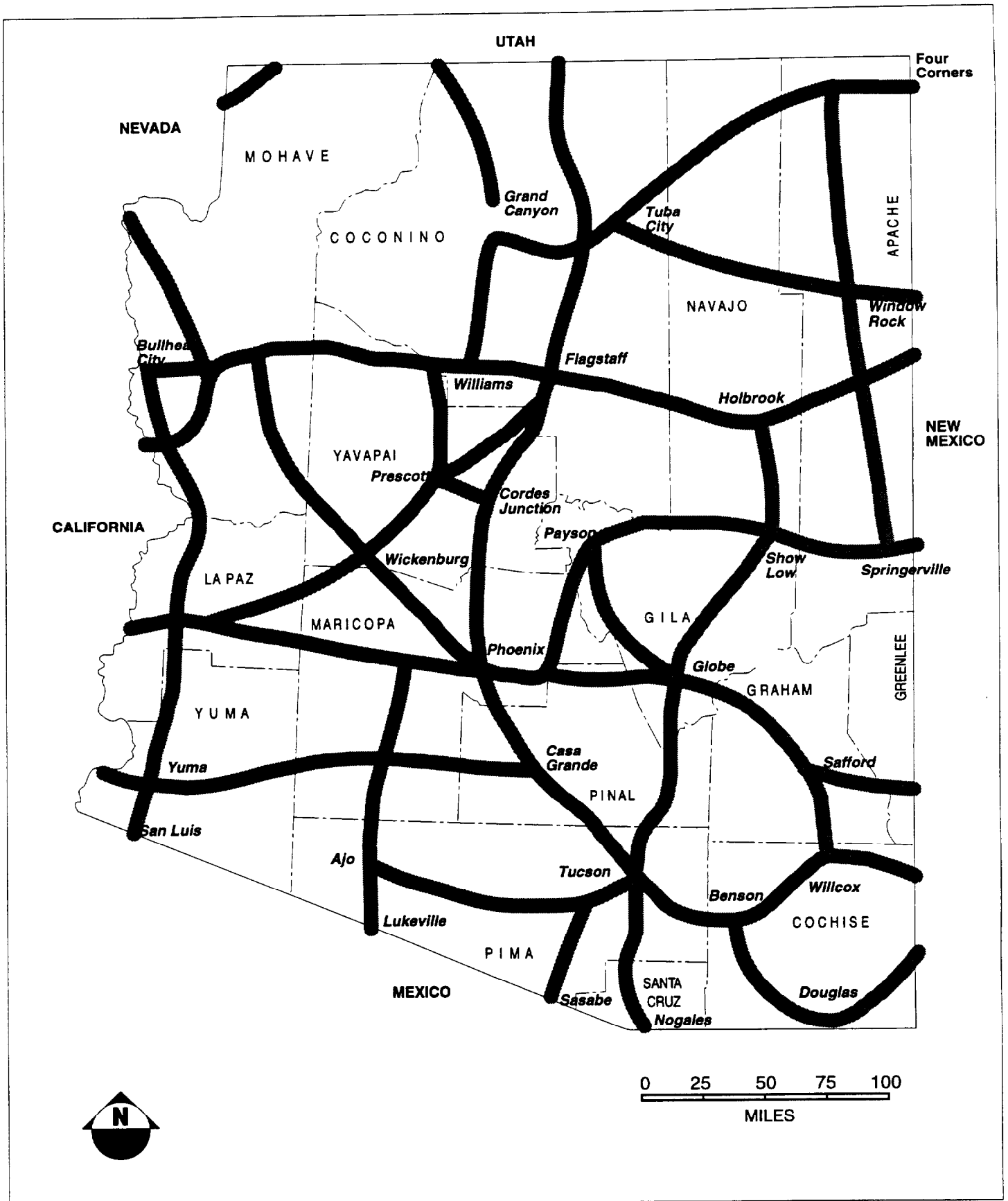
- Access to international border crossings
- Access to tribal government headquarters
- Connectivity between MPO's
- Connectivity between future MPO's
- Access to airports serving commercial passenger flights
- Access to national parks, national monuments, and military installations.

Lastly, criteria relating to other factors, specifically economic development and access to state recreation areas were used.

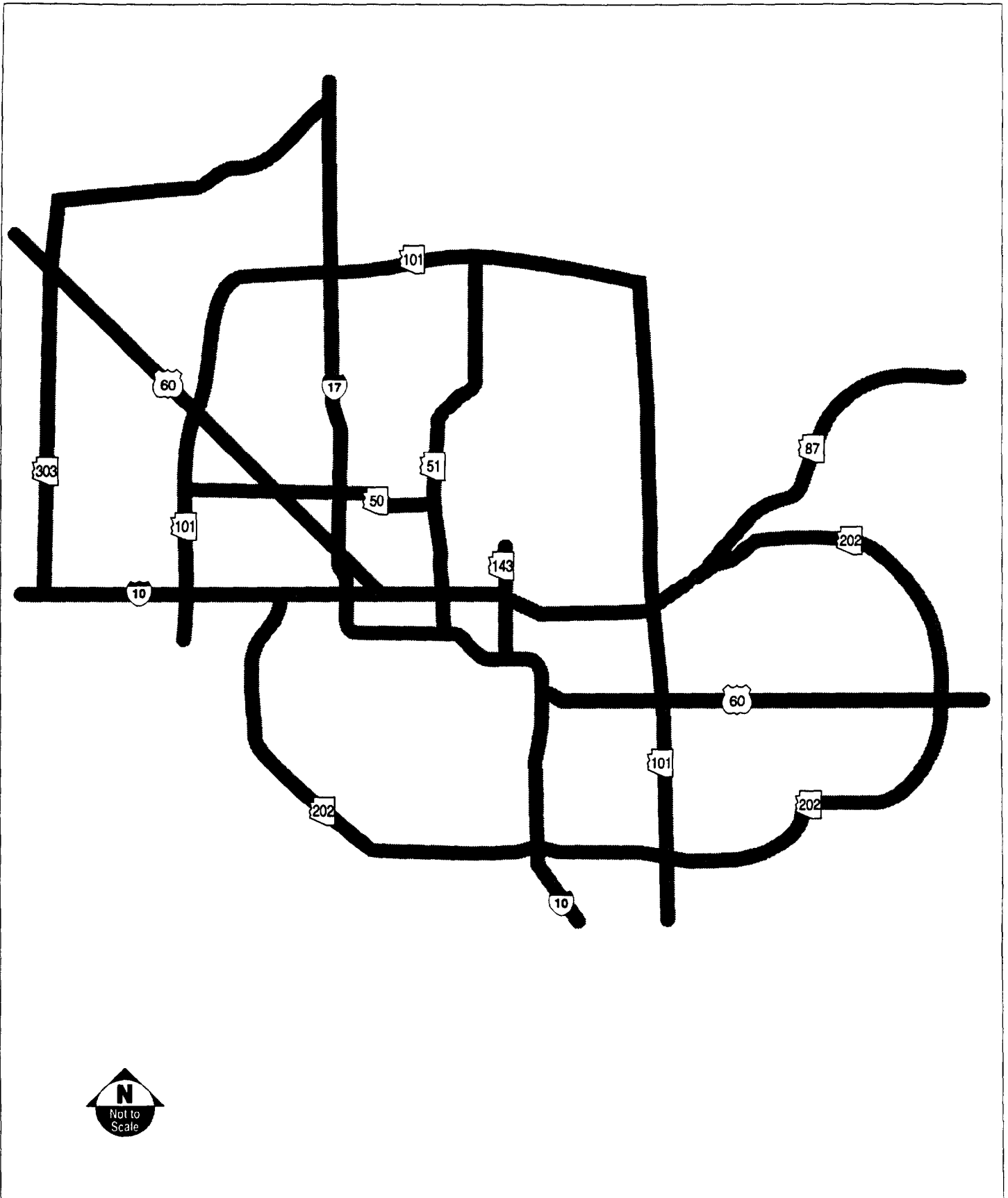
Figure 10-1 shows the corridors of statewide significance identified with the factors described above. This corridor system also includes the MAG, PAG and YMPO corridors of regional significance identified in their respective transportation plans. Since these MPO plans are included herein by reference, the regional corridors identified as significant in those regional plans are also displayed herein. They are shown in Figures 10-2, 10-3, and 10-4.

## **CORRIDOR EVALUATION**

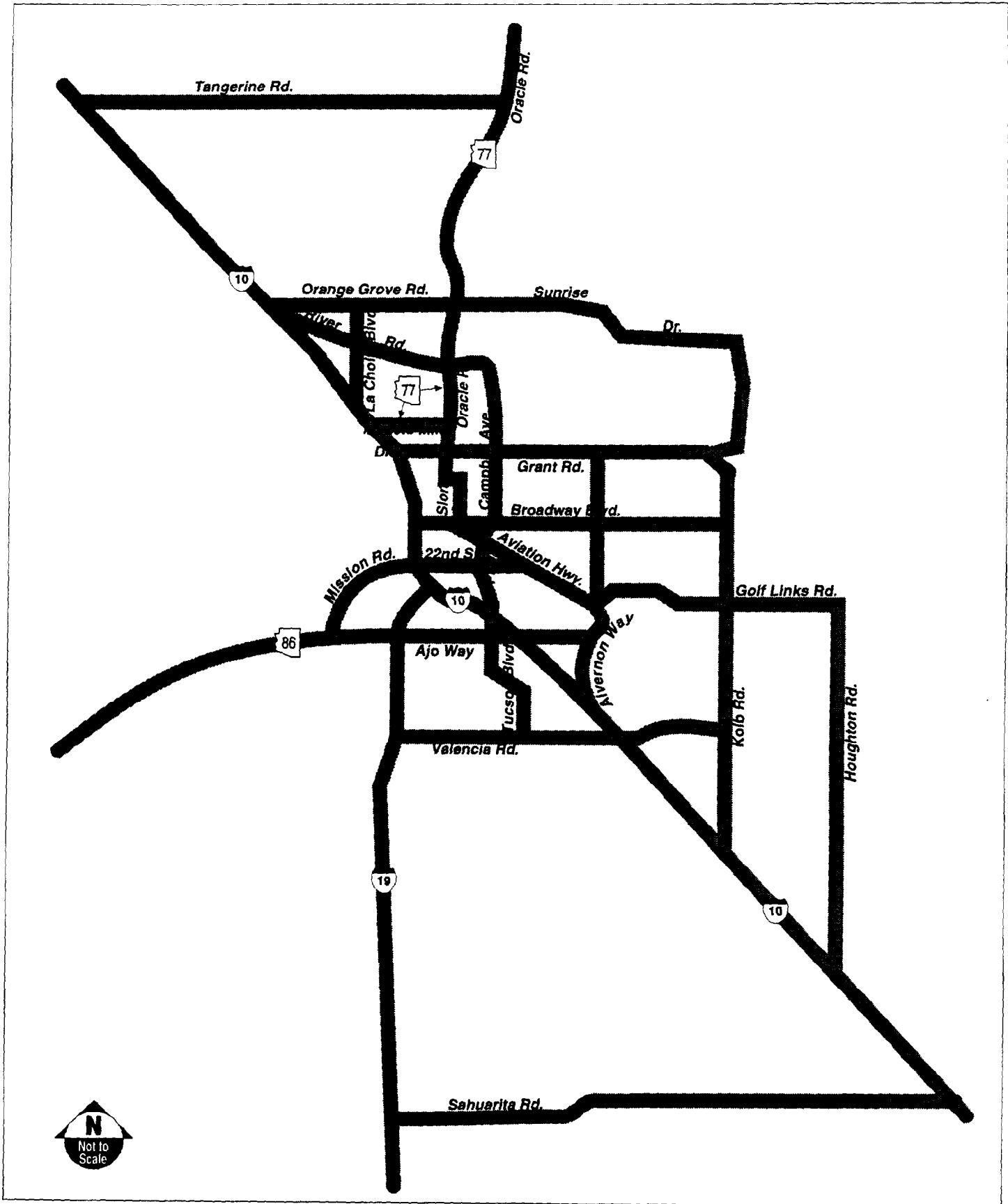
Figure 10-1 shows over 50 corridor segments of statewide significance. Several of these segments were linked to form continuous routes that generally connected municipalities with each other and/or with state borders. This resulted in the identification of 33 corridors for the first level evaluation. With the establishment of these multimodal transportation corridors of statewide significance, ADOT will undertake studies to identify the needs and investment opportunities that exist in each corridor. However, due to ADOT's funding limitations, all corridors cannot be studied at this time. So a methodology was developed to prioritize the corridors for more in-depth studies and analysis of their needs. In this section, the corridors are



**Figure 10-1**  
**TRANSPORTATION CORRIDORS**  
**OF STATEWIDE SIGNIFICANCE**

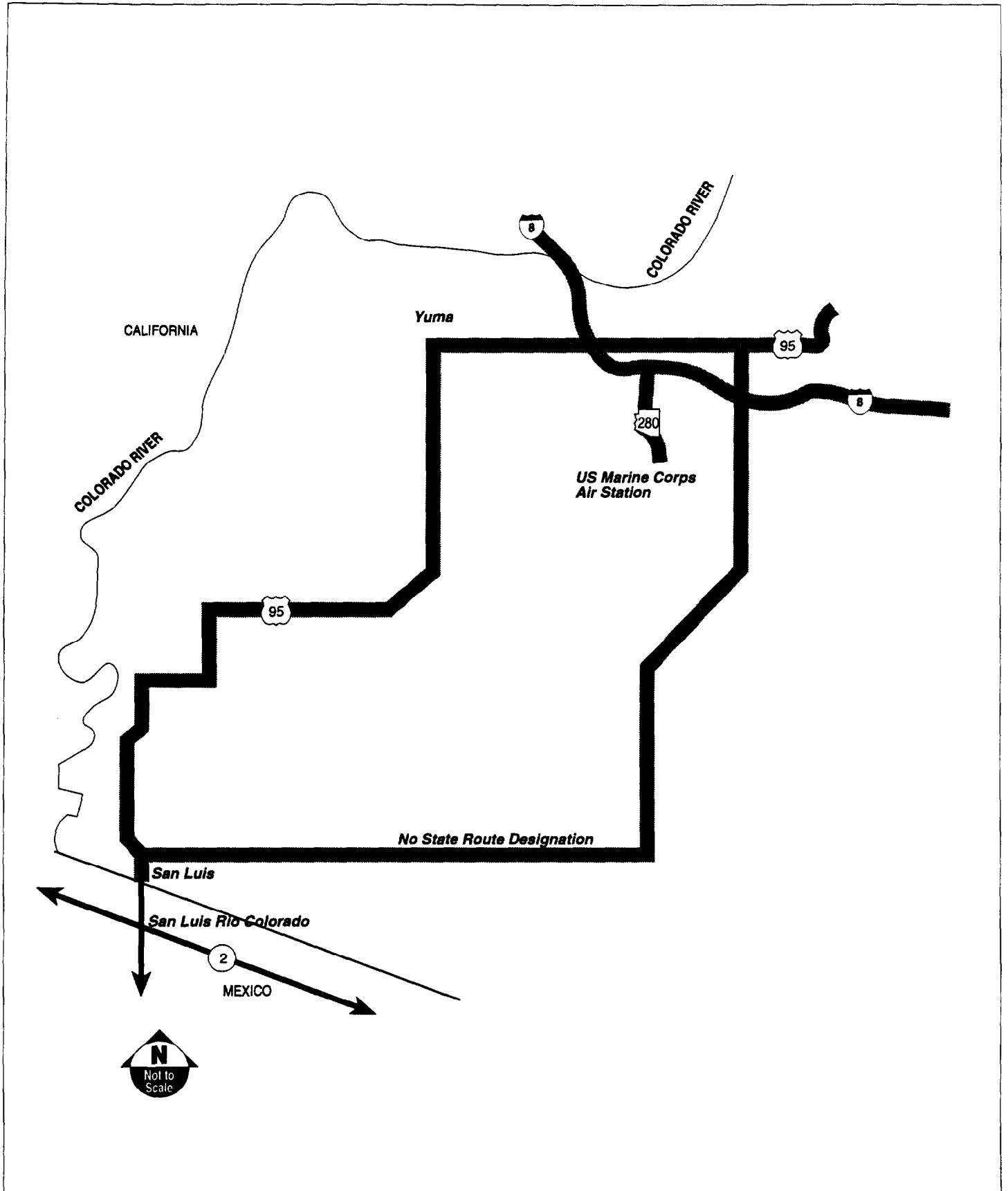


**Figure 10-2**  
**MAG AREA CORRIDORS**  
**OF STATEWIDE SIGNIFICANCE**



**Figure 10-3  
PAG AREA CORRIDORS  
OF STATEWIDE SIGNIFICANCE**





**Figure 10-4**  
**YMO AREA CORRIDORS**  
**OF STATEWIDE SIGNIFICANCE**

evaluated and prioritized. The following paragraphs describe the methodology utilized to rank the corridors.

It is important to note that the corridors of statewide significance identified in the MAG, PAG, and YMPO regions are not included in the ranking process. Ranking of these corridors is more appropriately carried out by the respective MPOs.

### **Non-Traffic Related Criteria**

To facilitate the prioritization process, the criteria used to identify corridors of statewide significance were modified and combined to establish non-traffic related criteria for evaluating the corridors. The resulting criteria used in the evaluation and prioritization process are:

- Access to, and/or connectivity between, international border crossings, tribal government headquarters, airports, MPO's and future MPO's, national parks, national monuments, historic sites, state recreation areas and major pipelines; and
- economic development.

For each criterion, a value between 3 and 0 was assigned to each corridor as described below.

***International Border Crossings*** - Due to the heavy commercial traffic using the crossings at San Luis, Nogales, and Douglas, a value of 3 was assigned to the corridors serving these ports of entry. A value of 2 was assigned to the other ports of entry, and to corridors that connect to corridors assigned a value of 3. A value of 1 was assigned to those corridors that can be used as international trade routes and that connect directly with corridors assigned a value of 2. All other corridors were assigned a value of 0.

***Airports*** - Because Phoenix Sky Harbor Airport handles the most air traffic in Arizona, corridors radiating from Phoenix were assigned a value of 3. Corridors radiating from Tucson were assigned a value of 2 because Tucson International Airport handles the second highest volume of air traffic in Arizona. Corridors radiating from the other cities having airports serving commercial air traffic were assigned a value of 1, and corridors not serving cities with commercial airports were assigned a value of 0.

***National Park Service Facilities and Military Reservations*** - The 1993 public use attendance figures received from the National Park Service were used to assign weights to National Parks, Monuments, Historic Sites, and Recreation Areas. The attendance ranged from

9,265,520 at Lake Mead National Recreation Area to 9,192 at Fort Bowie National Historic Site. A value of 3 was assigned to corridors serving those locations having an annual attendance of more than 500,000; a value of 2 to those corridors serving locations having an annual attendance between 100,000 and 500,000; a value of 1 to those corridors serving locations having an annual attendance of less than 100,000; and a value of 0 to those corridors not serving any of these locations.

Routes serving an active military installation (Luke Air Force Base, Davis-Monthan Air Force Base, Fort Huachuca, and Yuma U.S. Marine Corps Air Station) received a value of 3. All others received a value of 0. The higher value between parks attendance and military installation access was used.

***Metropolitan Planning Areas*** - A value of 3 was assigned to corridors connecting existing MPO's. A value of 2 was assigned to corridors connecting future MPO's with each other or to existing MPO's; and a value of 1 to corridors serving only one future MPO. All other corridors received a value of 0.

***Recreational Areas*** - A value of 3 was assigned to corridors directly serving major recreational areas such as snow ski areas, state parks, major campsites, and major lakes. Only those recreation areas not previously included under National Park facilities were valued here. A value of 2 was assigned to corridors that connect to corridors with a value of 3. A value of 1 was assigned to corridors having a minor role in directing traffic to these major recreational facilities, and all other corridors received a value of 0.

***American Indian Nations*** - A value of 3 was assigned to corridors directly serving the locations of tribal government headquarters. A value of 2 was assigned to those routes serving the tribal reservation but not connecting directly to the headquarters. All other routes received a value of 0.

***Major Pipelines*** - A value of 3 was assigned to corridors in which major lines are located. A value of 2 was assigned to corridors adjacent to these lines, and other corridors received a value of 0.

***Economic Development*** - All corridors containing an Interstate highway, all corridors connecting Arizona with any of its neighbors, and all corridors that were identified as trade routes in the *Arizona Trade Corridor Study* prepared by ADOT, were assigned a value of 3. A value of 2 was assigned to corridors that can be used as a portion of a trade route and that

connect directly with a corridor assigned a value of 3. A value of 1 was assigned to corridors that can be used as part of a trade route and that connect to corridors assigned a value of 2. Corridors not connecting the commerce of Arizona with its neighbors were assigned a value of 0.

### **Traffic Related Criteria**

In addition to these non-traffic criteria, five traffic related criteria were developed. These were:

- Average daily traffic
- Number of trucks
- Number of busses
- Amount of freight hauled on Class 1 railroads
- Availability of passenger rail service
- Bicycle suitability

The ADOT publication, *Traffic on the Arizona State Highway System, 1992*, was used to compile data for average daily traffic and the number of trucks. The number of buses came from information supplied during the inventory phase of this study. No differentiation was made between bus sizes. The amount of freight hauled on Class 1 railroads was taken from the *FY 1994 State Rail Plan Update*. The values for each of these criteria for each corridor are shown in Table 10-1. Bicycle suitability was defined by the Governor's Arizona Bicycle Task Force and designated rural state highways as more suitable, less suitable, or prohibited for bicycle usage. For each of these criteria, a value of 3 or less was assigned to each of the corridors shown in Figure 10-1, as explained below.

**Average Daily Traffic** - The ADT values ranged from a high of 27,000 to a low of 900. A value of 3 was assigned to corridors having an ADT of more than 20,000. A value of 2 was assigned to those corridors with an ADT between 10,000 and 24,000, which is the warrant used to consider four-lane roadways. A value of 1 was assigned to corridors having an ADT of less than 10,000.

**Number of Trucks** - Daily truck volumes as reported in *Traffic on the Arizona State Highway System, 1992*, ranged from a high of 6,500 to a low of 100. A value of 3 was assigned to corridors having daily truck traffic volumes exceeding 1,500. A value of 2 was assigned to

**Table 10-1. Transportation Corridor Traffic Criteria**

Corridor	ADT	Trucks	Buses	RR Tonnage
California - Flagstaff	12,000	4,200	4	60,000
Flagstaff - New Mexico	12,500	4,400	8	62,000
California - Phoenix	15,500	2,300	20	4,300
California - Casa Grande	8,000	2,200	6	47,000
Phoenix - Tucson	27,000	6,500	70	51,000
Phoenix - Flagstaff	27,000	4,300	4	0
Phoenix - Nevada	7,000	1,100	4	0
Phoenix - Payson - Mogollon Rim	5,000	400	2	0
Florence Jct. - Globe	8,500	300	6	0
Nogales - Tucson	22,000	1,800	0	3,300
Tucson - New Mexico	12,000	3,000	24	50,000
Tucson - Globe	5,500	900	0	0
Douglas - Benson	4,200	400	6	600
Douglas - New Mexico	6,000	N.A.	0	0
Globe - Payson	1,000	N.A.	0	0
Globe - Holbrook	7,000	2,200	0	0
Globe - Willcox	3,300	300	6	700
Show Low - New Mexico	2,500	200	0	0
Springerville - 4 Corners	1,500	100	0	0
Bullhead City - Kingman	9,100	200	0	0
Yuma - Bullhead City	6,000	900	0	0
Lukeville - Phoenix	3,200	300	0	0
I-10 - Wickenburg	1,400	N.A.	2	1,200
Wickenburg - Williams	4,000	300	0	4,500
Prescott - Flagstaff	3,000	200	0	0
Flagstaff - Utah	6,400	800	0	0
Williams - Grand Canyon	3,500	400	0	0
Grand Canyon - Utah	1,500	100	0	0
Grand Canyon - 4 Corners	2,800	200	0	0
I-15/California - Utah	12,000	3,000	0	0
Ajo - Tucson	900	N.A.	0	0
Safford - New Mexico	1,200	N.A.	0	0
Prescott - Cordes Junction	13,000	900	0	0
Sasabe-Three Points	270	N.A.	0	0

Note: N.A. denotes "Not Available"

corridors having daily truck volumes between 500 and 1,500, and a value of 1 was assigned to corridors having less than 500 trucks per day. A value of 0 was assigned to corridors where truck traffic data was not available.

**Number of Buses** - The number of commercial intercity buses using a corridor ranged from a high of 70 to a low of 2. This information was obtained from the Greyhound Corporation and from *Russell's Guide*. A value of 3 was assigned to the corridor having 70 buses per day. A value of 2 was assigned to the corridors having between 20 and 69 buses per day, and a value of 1 assigned to corridors having between one and 19 buses per day. A value of 0 was assigned to those corridors not used by commercial intercity bus operations.

**Railroad Cargo and Passenger Service** - The annual freight hauled by railroads in Arizona ranged from a high of one hundred million tons to a low of 600 thousand tons. A value of 3 was assigned to those corridors carrying 50 million annual tons or more. A value of 2 was assigned to corridors carrying between 3 million and 50 million tons per year, and a value of 1 was assigned to those corridors carrying less than 3 million tons per year. Corridors not handling any rail freight were assigned a value of 0. A value of 1 was also assigned to corridors with rail passenger service.

**Bicycle Suitability** - A value of 3 was assigned to corridors where nearly all of the route is considered "more suitable" for bicycle usage. A value of 2 was assigned to corridors where most of the route was considered "less suitable", and a value of 1 was assigned to corridors where the mileage is nearly evenly divided between "less suitable" and "not suitable". A value of 0 was assigned to corridors considered "not suitable" for bicycle usage.

Table 10-2 shows the values assigned to each non-traffic related and traffic related criteria for each alternative.

### **Weighting of Criteria**

Based on comments received at public meetings held throughout Arizona, the criteria were weighted to reflect the concerns of the public. All non-traffic related criteria were assigned a value of 1 because they were considered to be less important than traffic related issues. Transit service, economic development, and bicycle suitability were assigned values of 2 because they were considered more important than the non-traffic related issues. Economic development was

**Table 10-2. Transportation Corridor Evaluation  
Unweighted Criteria**

Corridor	International Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recrea-tional Areas	Transit Service	Truck Routes	Tribal Governments	Economic Development	R.R. Cargo and Passengers	ADT	Major Pipeline	Bicycle Route
California - Flagstaff	0	1	0	1	3	1	3	0	3	4	2	3	1
Flagstaff - New Mexico	0	1	3	1	3	1	3	0	3	4	2	3	0
California - Phoenix	0	3	3	3	0	2	3	2	3	3	2	1	0
California - Casa Grande	2	1	3	2	0	1	3	0	3	4	1	1	0
Phoenix - Tucson	2	3	3	3	0	3	3	3	3	4	3	3	2
Phoenix - Flagstaff	1	3	3	3	3	1	3	3	3	3	3	0	0
Phoenix - Nevada	1	3	3	3	0	1	2	0	3	0	1	0	3
Phoenix - Mogollon Rim	0	3	0	3	3	1	1	3	0	0	1	0	3
Phoenix - Globe	1	3	0	3	3	1	1	0	2	0	1	0	3
Nogales - Tucson	3	2	3	3	0	0	3	3	3	2	2	0	2
Tucson - New Mexico	2	2	3	3	0	2	3	0	3	4	2	3	0
Tucson - Globe	2	2	0	3	1	0	2	0	2	0	1	0	3
Douglas - Benson	3	1	3	1	0	1	1	0	3	1	1	0	2
Douglas - New Mexico	3	1	0	0	0	0	0	0	3	0	1	0	2
Globe - Payson	0	0	1	0	3	0	0	0	0	0	1	0	2

**Table 10-2. Transportation Corridor Evaluation (Continued)  
Unweighted Criteria**

Corridor	International Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recreational Areas	Transit Service	Truck Routes	Tribal Governments	Economic Development	R.R. Cargo and Passengers	ADT	Major Pipeline	Bicycle Route
Globe - Holbrook	1	0	0	0	2	0	3	2	2	0	2	0	2
Globe - Willcox	0	0	0	0	0	1	1	3	2	1	1	0	2
Show Low - New Mexico	0	0	0	0	3	0	1	2	3	0	1	0	2
Springerville - 4 Corners	0	0	3	0	2	0	1	2	3	0	1	0	1
Bullhead City - Kingman	0	1	3	1	0	0	1	0	3	0	1	0	1
San Luis - Bullhead City	3	1	3	2	3	0	2	3	3	0	1	0	2
Lukeville - Phoenix	2	3	3	3	0	0	1	0	3	0	1	0	1
I-10 - Wickenburg	0	0	0	0	0	1	0	0	2	1	1	0	1
Wickenburg - Ash Fork	0	1	0	1	2	0	1	0	2	0	1	0	2
Prescott - Flagstaff	0	1	2	1	3	0	1	0	2	0	1	0	2
Flagstaff - Utah	0	1	3	1	2	0	2	2	3	0	1	0	1
Williams - Grand Canyon	0	1	3	0	2	0	1	0	2	1	1	0	1
Grand Canyon - Utah	0	0	3	0	3	0	1	2	3	0	1	0	1
Grand Canyon - 4 Corners	0	1	3	0	3	1	1	2	3	0	1	0	1



**Table 10-2. Transportation Corridor Evaluation (Continued)  
Unweighted Criteria**

Corridor	International Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recrea-tional Areas	Transit Service	Truck Routes	Tribal Governments	Economic Development	R.R. Cargo and Passengers	ADT	Major Pipeline	Bicycle Route
I-15/California - Utah	0	0	0	0	0	0	3	0	3	0	2	0	0
Ajo - Tucson	1	2	2	3	3	0	0	3	2	0	1	0	1
Safford - New Mexico	0	0	0	0	0	0	0	0	0	0	1	0	2
Prescott - Cordes Junction	0	1	0	1	3	1	2	3	2	0	1	0	2

considered traffic related because of NAFTA. Truck routes and railroad tonnage were assigned values of 4 because public comments suggested they were more important than transit, economic development, and bicycle suitability. Average daily traffic was assigned a value of 8 because it was considered the single most important criteria relating to roadway needs of all the criteria used based on the public comment received. These weighted scores were then totaled.

## **Evaluation**

In the corridor evaluation matrix shown in Table 10-3, the weighted values for each criterion were summarized by corridor. With the methodology used, the highest score receives the highest priority. The ranking of the corridors is shown in the last column of Table 10-3.

A subsequent consolidation of corridor elements was done to form corridors consisting of common highway numbers, common truck routes, common railroad routes, and common pipeline routes. After this consolidation, those links that received a score of 30 or lower in the previous evaluation were dropped from further analysis. The resulting corridors are shown in Figure 10-5.

The highest value for each weighted criteria in Table 10-3 which was assigned to any segment which became part of a consolidated corridor was used in the final evaluation. These top priority corridors are as follows:

- California - Phoenix - Tucson - New Mexico
- Phoenix - Utah
- California - Flagstaff - New Mexico
- Tucson - Nogales
- California - Casa Grande
- Tucson - Globe - Holbrook
- San Luis - Bullhead City
- Phoenix - Nevada
- Douglas - Benson
- I-15/Nevada - Utah
- Prescott - Cordes Junction
- Phoenix - Globe
- Phoenix - Payson - Mogollon Rim
- Phoenix - Lukeville

**Table 10-3. Transportation Corridor Evaluation  
Weighted Criteria**

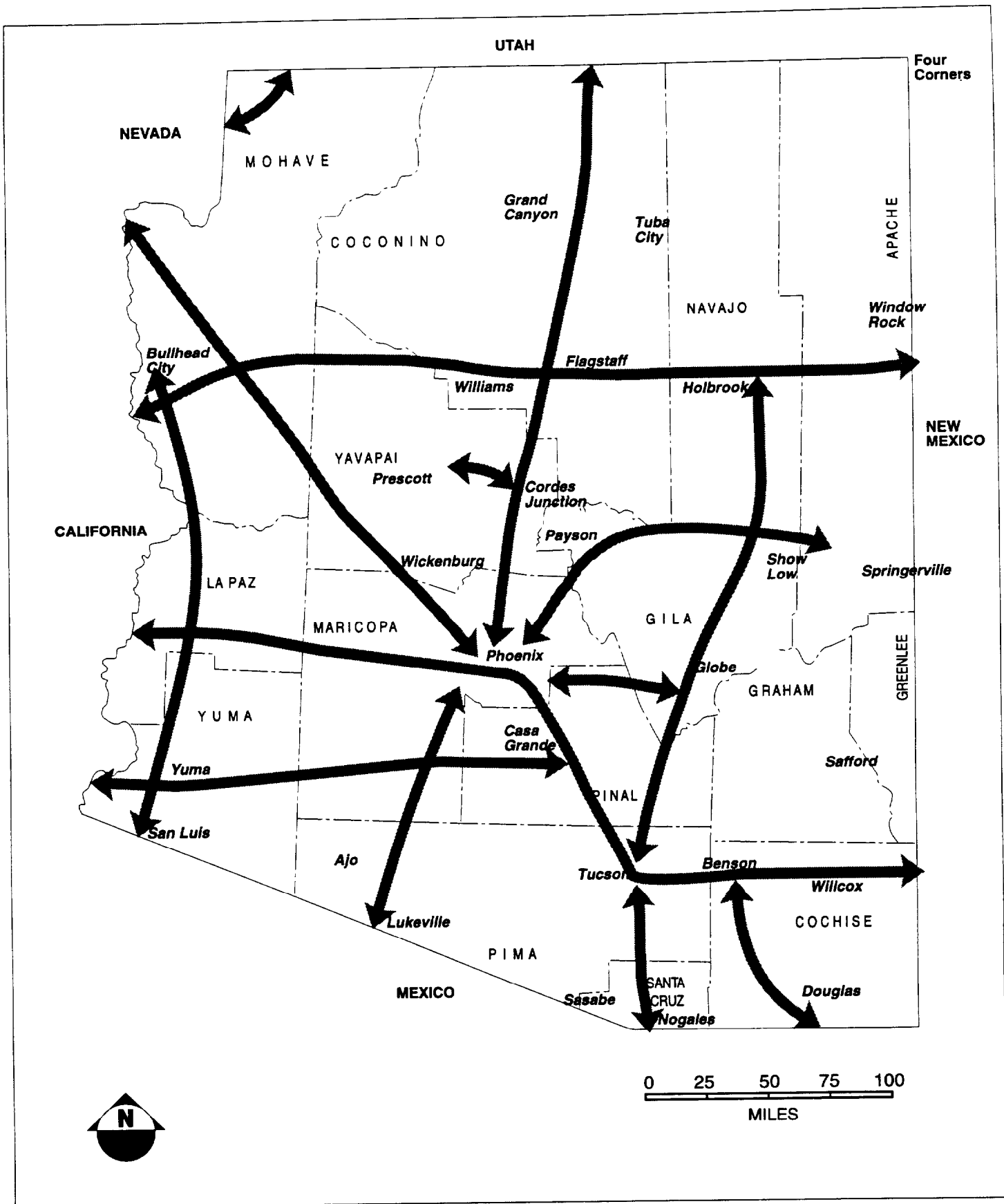
Corridor	Inter-national Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recrea-tional Areas	Transit Service	Truck Routes	Tribal Governments	Economic Develop-ment	R.R. Cargo and Passenger	ADT	Major Pipe-line	Bicycle Route	Total Score	Ranking
California - Flagstaff	0	1	0	1	3	2	12	0	6	16	16	3	2	62	5
Flagstaff - New Mexico	0	1	3	1	3	2	12	0	6	16	16	3	0	63	4
California - Phoenix	0	3	3	3	0	4	12	2	6	12	16	1	0	62	5
California - Casa Grande	2	1	3	2	0	2	12	0	6	16	8	1	0	53	8
Phoenix - Tucson	2	3	3	3	0	6	12	3	6	16	24	3	0	81	1
Phoenix - Flagstaff	1	3	3	3	3	2	12	3	6	12	24	0	0	72	2
Phoenix - Nevada	1	3	3	3	0	2	8	0	6	0	8	0	6	40	11
Phoenix - Payson - Mogollon Rim	0	3	0	3	3	2	4	3	0	0	8	0	6	32	18
Phoenix - Globe	1	3	0	3	3	2	4	0	4	0	8	0	6	34	13
Nogales - Tucson	3	2	3	3	0	0	12	3	6	8	16	0	4	60	7
Tucson - New Mexico	2	2	3	3	0	4	12	0	6	16	16	3	0	70	3
Tucson - Globe	2	2	0	3	1	0	8	0	4	0	8	0	6	34	13
Douglas - Benson	3	1	3	1	0	2	4	0	6	4	8	0	4	36	12
Douglas - New Mexico	3	1	0	0	0	0	0	0	6	0	8	0	4	22	30
Globe - Payson	0	0	1	0	3	0	0	0	0	0	8	0	4	16	33

**Table 10-3. Transportation Corridor Evaluation (Continued)  
Weighted Criteria**

Corridor	Inter-national Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recrea-tional Areas	Transit Service	Truck Routes	Tribal Governments	Economic Develop-ment	R.R. Cargo and Passenger	ADT	Major Pipe-line	Bicycle Route	Total Score	Ranking
Globe - Holbrook	1	0	0	0	2	0	12	2	4	0	16	0	4	41	9
Globe - Willcox	0	0	0	0	0	2	4	3	4	4	8	0	4	29	20
Show Low - New Mexico	0	0	0	0	3	0	4	2	6	0	8	0	4	27	25
Springerville - 4 Corners	0	0	3	0	2	0	4	2	6	0	8	0	2	27	25
Bullhead City - Kingman	0	1	3	1	0	0	4	0	6	0	8	0	2	25	28
San Luis - Bullhead City	3	1	3	2	3	0	8	3	6	0	8	0	4	41	9
Lukeville - Phoenix	2	3	3	3	0	0	4	0	6	0	8	0	2	31	19
I-10 - Wickenburg	0	0	0	0	0	2	0	0	4	4	8	0	2	20	32
Wickenburg - Ash Fork	0	1	0	1	2	0	4	0	4	0	8	0	4	24	29
Prescott - Flagstaff	0	1	2	1	3	0	4	0	4	0	8	0	4	27	25
Flagstaff - Utah	0	1	3	1	2	0	8	2	6	0	8	0	2	33	17
Williams - Grand Canyon	0	1	3	0	2	0	4	0	4	4	8	0	2	28	21
Grand Canyon - Utah	0	0	3	0	3	0	4	2	6	0	8	0	2	28	21
Grand Canyon - 4 Corners	0	1	3	0	0	2	4	2	6	0	8	0	2	28	21

**Table 10-3. Transportation Corridor Evaluation (Continued)  
Weighted Criteria**

Corridor	Inter-national Crossings	Airports	National Parks and Military	Metro-politan Planning Areas	Recrea-tional Areas	Transit Service	Truck Routes	Tribal Governments	Economic Develop-ment	R.R. Cargo and Passenger	ADT	Major Pipe-line	Bicycle Route	Total Score	Ranking
I-15/California - Utah	0	0	0	0	0	0	12	0	6	0	16	0	0	34	13
Ajo - Tucson	1	2	2	3	3	0	0	3	4	0	8	0	2	28	21
Safford - New Mexico	0	0	0	0	0	0	2	0	0	0	8	0	4	14	34
Prescott - Cordes Junction	0	1	0	1	3	2	8	3	4	0	8	0	4	34	13
Sasabe - Three Points	2	0	0	0	0	0	0	0	6	0	8	0	6	22	30



**Figure 10-5  
TOP PRIORITY CORRIDORS**

## **CORRIDOR PROFILES AND STRATEGIES**

The 14 identified strategic corridors will be subject to a "corridor profile" process. The purpose of this corridor profile process will be threefold: first, to determine the extent of problems identified within the corridor(s) relative to developed performance criteria, local and environmental concerns, and statewide strategic investments; second, fulfillment of the strategic goals of the State relative to the enhancement of the mobility of goods and services, economic trade and benefits, and other matters will be a guiding factor in the corridor profile process; and third, the corridor profile process will result in enhancing the selection of priorities for the State overall when allocating scarce resources.

Presented in the following sections is an overview of the identified corridors and the applicable strategies and strategic components discussed in Chapter 9 that are associated with each. It is important to note that this is an initial assessment of the corridors and provides a strategic context in which each corridor is placed. A more detailed assessment of the corridors will occur beginning in 1995 and the assessments will rely, in part, on the data being developed from the six statewide management systems required under the ISTEA. This more-detailed assessment of the corridors will constitute the "corridor profiles". Items to be used in the profiles include right-of-way and travel way widths, maximum vertical grade, average daily traffic, commercial vehicle traffic, daily train movements, accident rate, pavement and/or rail condition, shoulder type and condition, sufficiency ratings of structures, railroad/highway crossings, intercity transit routes, environmental considerations, roadway functional classification, type of access control, and intermodal transfer points.

Corridor profiles will be compared to applicable standards to identify corridor deficiencies. Projects will then be recommended for inclusion in the State Transportation Improvement Program (STIP). Once in the STIP, they can be programmed for improvements. Items used to set priorities may include average daily traffic per lane, commercial vehicle traffic per lane, commercial vehicle traffic in relation to vertical grade over 5 percent, daily train movements per rail line, accident rate, forecast average daily traffic per lane, pavement and shoulder sufficiency ratings, structural deficiencies, number of public transportation passengers served, order of magnitude cost estimate of work to be done, and constraints to project implementation. Recognition of the strategic goals and areas of improvement such as system preservation, person-capacity improvements, minimizing environmental impacts, safety, accessibility, etc. will be recommendations resulting from the corridor profiles.

The top priority corridors identified earlier are presented below with an initial profile of the corridor. This sets the basis for more detailed corridor profiles to be prepared beginning in 1995. The corridor profiles will be used to identify candidates for more in-depth corridor studies to address the needs and specific improvements required in the corridors. The corridor studies to be undertaken should consider the transportation strategies identified in Chapter 9 that may be the most effective in responding to the needs and issues specific to each corridor. Strategies may have statewide, metropolitan, non-metropolitan or rural components. The strategies should be evaluated with the input of all stakeholders including affected governmental agencies, tribal governments, and the general public. Long term opportunities in the corridors should be identified , and the improvement of all appropriate modes to enhance these opportunities should be considered.

### **California-Phoenix-Tucson-New Mexico Corridor**

This corridor is approximately 390 miles long and presently serves as a major transportation element with key recreation and economic development components. Existing concerns include the levels of recreation travel and trucking usage with the resulting conflicts and safety concerns. Long-term economic opportunities exist in this corridor particularly as it relates to NAFTA and improvement of access and travel opportunities to other states and Canada.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance, safety, and congestion levels is required;
- Planning will include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

The nature of this corridor is such that it consists of statewide, major metropolitan, and rural components. Hence strategies tailored to each of these components need to be recognized and included in the development of an overall strategy for this corridor.



### **Phoenix-Utah Corridor**

The Phoenix-Utah corridor is approximately 300 miles in length and is a corridor of economic significance for tribal entities, international trade concerns, and recreational concerns. Existing concerns include lack of system continuity outside of Arizona, environmentally and culturally sensitive concerns, vertical grades, and 'spot' safety and capacity concerns. Key strategic principles to be applied in selecting system strategies in this corridor are:

- Identification of value as an international trade corridor;
- Planning will include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function of the corridor;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.
- Sensitivity to tribal needs and desires.

The corridor consists of non-metropolitan and rural components of the STP and may also include a statewide component if identified as an international trade corridor.

### **California-Flagstaff-New Mexico Corridor**

This corridor is approximately 360 miles long and presently serves as a major transportation element with key recreation, interstate and economic development components. Existing concerns include the levels of recreation travel and trucking usage with the resulting safety concerns, and concerns associated with travel in ice and snow conditions.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance and safety is required;
- Planning will include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

The nature of this corridor is such that it consists of statewide, metropolitan, and rural components. Hence strategies tailored to each of these components need to be recognized and included in the development of an overall strategy for this corridor.

### **Tucson-Nogales Corridor**

This corridor is approximately 60 miles long and presently serves as a major transportation element with key recreation and economic development components. This corridor serves the major international border crossing with Mexico. Long-term economic opportunities exist in this corridor particularly as it relates to NAFTA and completion of a Mexico-Canada link.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance, safety, and congestion levels is required;
- Planning will include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, economic development opportunities, with inclusive planning and public input being required as part of the decision making process.

The nature of this corridor is such that it consists of statewide, major metropolitan, and rural components. Hence strategies tailored to each of these components need to be recognized and included in the development of an overall strategy for this corridor.

### **California-Casa Grande Corridor**

This corridor is approximately 175 miles long and presently serves as a major transportation element with key recreation and economic development components. Existing concerns include the levels of recreation travel and trucking usage with the resulting conflicts and safety concerns. Long-term economic opportunities exist in this corridor particularly as it relates to movement of goods in and out of southern California, and expansion of trade with Mexico.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance and safety;
- Planning will include both passenger and freight transportation and the opportunities presented by NAFTA;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

The nature of this corridor is such that it consists of statewide, major metropolitan, and rural components. Hence strategies tailored to each of these components need to be recognized and included in the development of an overall strategy for this corridor.

### **Tucson-Globe-Holbrook Corridor**

The Tucson-Globe-Holbrook corridor is approximately 240 miles long and serves a statewide function principally in terms of economic development and recreation. The corridor consists of Non-Metropolitan and Rural components. Key strategic principles to be applied in selecting system strategies in this corridor are:

- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function of the corridor;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

### **San Luis-Bullhead City Corridor**

This corridor is approximately 220 miles long and serves as a significant facility in terms of connectivity because of the border crossing with Mexico and NAFTA and recreation. Key strategic principles to be applied in selecting system strategies in this corridor should include:

- Provision of a range of modal choices;
- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Partnering with federal and international entities along with local and state jurisdictions.

The corridor includes statewide, non-metropolitan and rural components of the STP strategy and must include the opportunities presented by the NAFTA.

### **Phoenix-Nevada Corridor**

This corridor is approximately 255 miles long and presently serves as a major transportation element with key recreation and economic development components. Existing concerns include the levels of recreation travel and trucking usage with the resulting conflicts and safety concerns. Long-term economic opportunities exist in this corridor particularly as

it relates to completion of a Mexico-Canada link and improvement of access and travel opportunities in Northwest Arizona.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance, safety, and congestion levels is required;
- Planning will include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

The nature of this corridor is such that it consists of statewide, major metropolitan, and rural components. Hence strategies tailored to each of these components need to be recognized and included in the development of an overall strategy for this corridor.

### **Douglas-Benson Corridor**

The Douglas-Benson corridor is a corridor with both statewide/international trade significance, as well as local economic development and access significance. The corridor is approximately 85 miles in length. The long-term opportunities for this corridor to increase as a high travel corridor of both goods and people movement is tied to economic development actions related to international border crossings, NAFTA, and Ft. Huachuca, and could be significant. Key strategic principles related to this corridor are:

- Provision of access to the City of Sierra Vista and Ft. Huachuca military installation;
- Planning for both passenger and freight transportation;
- Provision of intermodal connections to capture operational efficiencies;
- Partnering with federal and international entities, along with private entities, and local and state agencies;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process;
- Evaluating new rail connections into Mexico.

The corridor consists of statewide, non-metropolitan and rural components of the STP.

### **I-15/Nevada-Utah Corridor**

This corridor is approximately 25 miles long and presently serves as a major transportation element with key recreation and economic development components. Existing concerns include conflict and safety issues associated with high levels of recreational travel and truck usage. Long-term economic opportunities exist in this corridor particularly as it relates to movement of goods in and out of southern California, and expansion of trade with Mexico.

It is recognized that among the key principles to be used in selecting system strategies in this corridor, the following are most important:

- Improvement of system performance and safety;
- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

This corridor consists of statewide and rural components. Hence strategies tailored to each of these components need to be identified and included in the development of an overall strategy for this corridor.

### **Prescott-Cordes Junction Corridor**

The Prescott-Cordes Junction corridor is approximately 35 miles long and principally serves a statewide economic development and recreation function. This corridor connects two major north-south freight transportation corridors, and consists of non-metropolitan and rural components. Key strategic principles to be applied in selecting system strategies in this corridor are:

- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function of the corridor;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

### **Phoenix-Globe Corridor**

The Phoenix-Globe corridor is approximately 87 miles long and principally serves a statewide economic development and recreation function. The corridor consists of

non-metropolitan and rural components. Key strategic principles to be applied in selecting system strategies in this corridor are:

- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function of the corridor through the elimination of congestion and bottlenecks in the Globe-Miami area;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

### **Phoenix-Payson-Mogollon Rim Corridor**

The Phoenix-Payson-Mogollon Rim corridor serves central and Eastern Arizona as a key economic development link with local access and recreational components. The corridor is approximately 160 miles in length. Preservation of this corridor, particularly as a result of recreational peaks, development pressures, and environmental events, is key. Strategic principles to be applied in selecting system strategies in this corridor include:

- Provision of a range of modal choices;
- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function of the corridor;
- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process;
- Sensitivity to tribal needs and desires.

The implementation of strategies should be done in a cooperative manner with the various governmental jurisdictions and American Indian Nations.

### **Lukeville-Phoenix Corridor**

The Lukeville-Phoenix Corridor is of statewide significance particularly as it relates to economic development and recreational access. The corridor is approximately 115 miles long and, in addition to the statewide component, consists of non-metropolitan and rural components.

Key strategic principles to be applied in selecting system strategies in this corridor are:

- Provision of a range of modal choices;
- Planning to include both passenger and freight transportation;
- Maximizing efficiency, effectiveness, and function;

- Identifying environmental issues, with inclusive planning and public input being required as part of the decision making process.

## **SUMMARY**

The prior sections recommend corridors of statewide significance and identify the future planning activities to be undertaken in these corridors. Suggested strategies for accommodating future travel demands in these corridors are also provided as well as suggested phasing of the corridor studies. These planning efforts must be incorporated into the programming of all transportation projects resulting from the Management Systems and ADOT's regular Priority Planning Process.

The corridor analysis methodology provides the best opportunity to integrate the needs of each mode into a multi-modal solution. Each mode can be evaluated to determine the most effective option or array of options for addressing demand in a given corridor.

## 11. CONCLUSIONS AND RECOMMENDATIONS

### INTRODUCTION

The purpose of this chapter is to present the conclusions and findings of the State Transportation Plan. This chapter concludes with a series of policy recommendations related to the continuing development and implementation of the Plan. These recommendations are based on the Goals and Objectives identified in Chapter 8 of this document. The goals are repeated below:

- I. **Transportation System:** Develop, maintain, and preserve an integrated, balanced and multimodal State transportation system that meets the needs of Arizona.
- II. **Economic Development:** Develop a transportation system that promotes Arizona's economic development, accommodates the State's population growth, and serves both permanent and part-time residents.
- III. **Land Use:** Develop a transportation system that is compatible with existing and planned land uses.
- IV. **Environmental Considerations:** Develop a transportation system which preserves and enhances Arizona's environmental conditions and values.
- V. **Implementation and Financing:** Develop an effective system for implementing the elements of the planned transportation system on a stable and equitable funding basis.
- VI. **Coordination:** Establish a coordinated transportation system that is compatible among all transportation modes and governmental jurisdictions.

### CONCLUSIONS

The major conclusions of this initial State transportation planning effort are listed below. The first four conclusions are from the Public Opinion Survey.

**Conclusion #1:** The public perceives that highways are in good condition but additional highway capacity and improved transit services are needed.

**Conclusion #2:** Although the public would like to see greater availability of public transit, the majority indicated they are unwilling to use transit.



**Conclusion #3:** The public is willing to accept transportation demand management strategies as ways to help solve urban congestion problems.

**Conclusion #4:** The public appears unwilling to accept direct pricing mechanisms as a means to resolve air pollution problems in the urban areas. Lifestyle and travel behavior changes are more acceptable.

**Conclusion #5:** The economic growth of the State will be influenced significantly by trade, particularly with the enactment of the North American Free Trade Agreement.

**Conclusion #6:** Even with the implementation of travel demand strategies, population growth will generate significant new travel needs and congestion pressures on the Arizona transportation systems—particularly in the urban areas.

**Conclusion #7:** In both Phoenix and Tucson, major transit vehicle replacement investments are required over the next few years.

**Conclusion #8:** Driving alone remains the preferred mode of travel to and from work in Arizona.

**Conclusion #9:** The cost of needed transportation projects over the next ten years is nearly double the estimated revenues.

**Conclusion #10:** With limited resources, the use of transportation demand management strategies should be pursued to minimize growth in travel demand to maintain mobility and air quality standards.

**Conclusion #11:** The State transportation planning process will continue to evolve as the management systems are implemented. Changes will be required in the transportation planning process to incorporate the results and recommendations of the systems. The State management systems will identify needs, strategies and projects for inclusion in future STP's.

## **RECOMMENDATIONS**

The conclusions and findings of the State Transportation Plan provide the basis for the following recommendations. The recommendations are divided into four categories: funding, coordination, corridors, and State Transportation Plan.

### **Funding**

**Recommendation #1:** ADOT should continue to identify and proactively develop new partnerships for transportation funding.

**Recommendation #2:** ADOT should continue to support funding programs and policies that meet the multimodal needs of the State.

**Recommendation #3:** Transportation agencies statewide rely on the four major funding sources: federal, HURF, RARF, LTAF. There is a need to reevaluate these funding sources within the context of a statewide financial transportation strategy.

**Recommendation #4:** The Phoenix and Tucson metropolitan areas require major transportation investments to accommodate growth, relieve congestion, and mitigate air pollution problems. Plans for the MPOs need to be financially feasible, and the TIPs must be financially constrained. Future updates to the State Transportation Plan need to more fully integrate the MPO's financial plans, including local financing initiatives and private funding options.

### **Coordination**

**Recommendation #5:** ADOT should continue to facilitate and increase the communication and coordination between various non-traditional transportation interests.

**Recommendation #6:** ADOT should continue to provide opportunities for public involvement in transportation decisions.

**Recommendation #7:** ADOT will encourage and support the MPOs in their transportation planning and programming efforts in order for them to satisfy federal requirements placed upon

them, including those directed at achieving regional mobility and air quality performance objectives.

### **Corridors**

**Recommendation #8:** Mechanisms, procedures, and guidelines for consideration of alternative modes, intermodal linkages, and commercial freight requirements need to be formally incorporated into the corridor and project analyses undertaken by ADOT, to assure that the focus in future years is modal-inclusive, investment oriented, and cost-effective.

**Recommendation #9:** ADOT should pursue access control to maintain the integrity of the existing and future transportation systems.

**Recommendation #10:** ADOT should be committed to preservation of right-of-way in the highest priority corridors of the State system.

**Recommendation #11:** The identified top priority multimodal transportation corridors in the State should be studied in detail to meet the travel and goods movement needs in future years.

### **State Transportation Plan**

**Recommendation #12:** The Small Area Transportation Studies program should continue as a key strategic planning effort.

**Recommendation #13:** Consideration must be given to improvement of linkages between various modes to achieve a coordinated intermodal system in the State. This would include development and implementation of strategies to coordinate intermodal terminal connections among modes, including highway, rail and air.

**Recommendation #14:** Environmental considerations should continue to be considered in the planning, design, and construction of transportation facilities of all modes.

**Recommendation #15:** Policies and programs addressing energy conservation and contingency planning prepared by the Arizona Energy Office should be included in transportation projects.

**Recommendation #16:** Emergency Response Plans and Hazardous Materials Routing Plans are incorporated into the State Transportation Plan by reference. There should be continued coordination with appropriate agencies in the implementation of these plans.

**Recommendation #17:** In so far as the Long Range Transportation Plans of the three Metropolitan Planning Organizations (MAG, PAG, and YMPO) are included in the State Transportation Plan by reference, implementation of these plans are supported by the State Transportation Plan.

### **SUMMARY**

This STP was developed in accordance with the mandates of ISTEA and was submitted to the U.S. Department of Transportation prior to the legislative deadline of January 1, 1995. This is only the beginning of the development of the State Transportation Plan. ADOT will continue to develop the Plan over the coming years.

# *Glossary*

**STATE TRANSPORTATION PLAN  
GLOSSARY OF TERMS**

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**ABBREVIATIONS / ACRONYMS**

<b>AASHTO</b>	<b>American Association of State Highway and Transportation Officials</b>
<b>ADA</b>	<b>Americans with Disabilities Act.</b> Mandates changes in building codes, transportation facilities, and hiring practices to prevent discrimination against persons with disabilities.
<b>ADEQ</b>	<b>Arizona Department of Environmental Quality.</b> State agency for environmental issues; including air quality, water quality, and waste programs.
<b>ADOT</b>	<b>Arizona Department of Transportation</b>
<b>BMS</b>	<b>Bridge Management System .</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>CAAA</b>	<b>Clean Air Act Amendments (of 1990).</b> Federal clean air legislation with new requirements for metropolitan areas that fail to attain the National Ambient Air Quality Standards (NAAQS).
<b>CAAG</b>	<b>Central Arizona Association of Governments.</b> Council of Governments for central Arizona that oversees transportation planning in the region. Includes Gila and Pinal Counties. See COG.
<b>CMS</b>	<b>Congestion Management System.</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>COG</b>	<b>Council of Governments.</b> A regional association of municipal, county and tribal governments formed to cooperate on common planning and common development problems in their area. Arizona has four rural COGs (NACOG, WACOG, SEAGO, and CAAG).
<b>FAA</b>	<b>Federal Aviation Administration.</b> The arm of the United States Department of Transportation (USDOT) which administers aviation programs.
<b>FHWA</b>	<b>Federal Highway Administration.</b> The agency of the U.S. Department of Transportation (USDOT) with jurisdiction over the federal highway system and federal funding for highways.

<b>FTA</b>	<b>Federal Transit Administration.</b> The agency of the USDOT that administers programs of financial assistance for the providers of urban and rural public mass transportation.
<b>GABTF</b>	<b>Governor's Arizona Bicycle Task Force</b>
<b>GATT</b>	<b>General Agreement for Tariff and Trade</b>
<b>GSA</b>	<b>General Services Administration.</b> The federal agency responsible for procuring buildings and materials for federal agencies.
<b>HAZMAT</b>	<b>Hazardous Materials.</b> Term used to refer to hazardous materials.
<b>HOV</b>	<b>High Occupancy Vehicle</b>
<b>HURF</b>	<b>Highway User Revenue Fund</b>
<b>IMS</b>	<b>Intermodal Management System.</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>ISTEA</b>	<b>Intermodal Surface Transportation Efficiency Act of 1991.</b> Federal legislation which provides funding authorizations for highways, highway safety, and mass transportation through 1997. ISTEA contains numerous rule makings that impact State and MPO transportation planning.
<b>IVHS</b>	<b>Intelligent Vehicle Highway System.</b> New technologies that use vehicle guidance, monitoring, and roadway information systems to anticipate and avoid congestion problems.
<b>LTAFF</b>	<b>Local Transportation Assistance Funds</b>
<b>MAG</b>	<b>Maricopa Association of Governments.</b> Metropolitan Planning Organization for the Maricopa County metropolitan area. See MPO.
<b>MPO</b>	<b>Metropolitan Planning Organization.</b> Agency which administers the federally required transportation planning in a metropolitan area. MPOs in Arizona are MAG, PAG, and YMPO (Maricopa, Pima, and Yuma county metropolitan areas). MPOs must develop long-range transportation plans in cooperation with ADOT's State Plan.
<b>NAAQS</b>	<b>National Ambient Air Quality Standards</b>
<b>NACOG</b>	<b>Northern Arizona Council of Governments.</b> Council of Governments in northern Arizona that oversees transportation planning in the region. Includes Apache, Coconino, Navajo, and Yavapai Counties. See COG.

<b>NAFTA</b>	<b>North American Free Trade Agreement</b>
<b>NEPA</b>	<b>National Environmental Policy Act</b>
<b>NHS</b>	<b>National Highway System.</b> A system of major roads in the United States to be designated by law by September 30, 1995.
<b>PAG</b>	<b>Pima Association of Governments.</b> Metropolitan Planning Organization for the Pima County metropolitan area. See MPO.
<b>PMS</b>	<b>Pavement Management System.</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>PPC</b>	<b>Priority Planning Committee.</b> A committee appointed by the ADOT Director to assist the State Transportation Board in setting priorities for transportation improvements and projects.
<b>PTMS</b>	<b>Public Transportation Management System.</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>RARF</b>	<b>Regional Area Road Fund</b>
<b>SATS</b>	<b>Small Area Transportation Study.</b> Local or regional transportation studies in non-metropolitan areas of Arizona. (Non Metropolitan Area Transportation Studies)
<b>SEAGO</b>	<b>Southeastern Arizona Governments Organization.</b> Council of Governments in southeastern Arizona that oversees transportation planning in the region. Includes Cochise, Graham, Greenlee, and Santa Cruz Counties. See COG.
<b>SIP</b>	<b>State Implementation Plan.</b> A federally mandated plan for improving air quality in a state or non-attainment metropolitan area.
<b>SMS</b>	<b>Safety Management System.</b> One of six management systems mandated by ISTEA. See Management Systems.
<b>SOV</b>	<b>Single Occupant Vehicle</b>
<b>STIP</b>	<b>State Transportation Improvement Program.</b> A state level multi- and one year program of highway and transit projects on the federal highway funding system.
<b>STP</b>	<b>State Transportation Plan</b>
<b>STPAC</b>	<b>State Transportation Plan Advisory Committee</b>



- TIP**            **Transportation Improvement Program.** A local level multi- and one year program of highway and transit projects on the federal highway funding system.
- TMA**            **Transportation Management Areas.** The urbanized areas of the State with population greater than 200,000, i.e., The Phoenix and Tucson Metropolitan areas.
- TMS**            **Traffic Monitoring System.** An ISTEA mandated system to monitor highway traffic. See Management Systems.
- WACOG**        **Western Arizona Council of Governments.** Council of Governments for western Arizona that oversees transportation planning in the region. Includes La Paz, Mohave, and Yuma Counties. See COG.
- YMPO**        **Yuma Metropolitan Planning Organization.** Metropolitan planning organization for the Yuma County metropolitan area. See MPO.

## **TERMS**

**Enhancement Funds** -- Federal highway funds available for projects that are not normally funded by other types of highway funds Examples of eligible projects are; bike and pedestrian projects, landscaping, water runoff, scenic by-ways, historic preservation, etc.

**Intermodal** -- Refers to the connections between modes of transportation, e.g., trucking to rail or air freight depots, or bicycle to bus facilities.

**Intercity Transit** -- Bus service between cities which may be operated by public agencies or by private-for-profit operations.

**Management and Monitoring Systems** -- ISTEA mandates that states must develop, establish, and implement six management systems and one monitoring system.

- Pavement
- Bridge
- Safety
- Congestion
- Public Transportation
- Intermodal
- Traffic Monitoring System

**Multimodal** -- Refers to transportation systems with more than one mode of transportation such as highways, rail, transit, walkways, etc.

**Needs** -- Costs of needed projects less available revenues equals needs.

**Needs Assessment** -- A statewide assessment of transportation project needs for the next five and ten years. The scope of this assessment includes all cities and towns, counties, tribal areas, and federal facilities in Arizona.

**Nonattainment** -- A term used to designate that an area has not met one or more of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. In Arizona, only the MAG region is in nonattainment (for carbon monoxide, ozone, and particulate matter).