

# CHAPTER 1

## Purpose and Need

### PURPOSE OF THE DOCUMENT

The Arizona Department of Transportation (ADOT), the project sponsor, working in close consultation with the Federal Highway Administration (FHWA), the lead federal agency for the proposed action, and in cooperation with the U.S. Army Corps of Engineers (USACE), the U.S. Bureau of Indian Affairs (BIA), and the Western Area Power Administration (Western), has prepared this Draft Environmental Impact Statement (DEIS) and Section 4(f) Evaluation in accordance with:

- ▶ the National Environmental Policy Act (NEPA) of 1969 [42 United States Code (U.S.C.) § 4332(2)(c)]
- ▶ Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. § 303, as amended)
- ▶ Section 404 of the Clean Water Act of 1977 (33 U.S.C. § 1251)

The DEIS and Section 4(f) Evaluation 1) satisfies FHWA and ADOT's environmental analysis requirements; 2) provides a comparison of the social, economic, and environmental impacts that may result from implementation of the proposed action—construction and operation of a major transportation facility; and 3) identifies measures to avoid, reduce, or otherwise mitigate adverse impacts. The DEIS includes sufficient preliminary design information to compare alternatives.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was passed into law on August 10, 2005. This legislation addresses improving transportation safety, reducing

traffic congestion, improving freight movement efficiency, increasing intermodal connectivity, and protecting the environment. Moving Ahead for Progress in the 21st Century (MAP-21) was passed into law on July 6, 2012. This legislation creates a streamlined performance-based surface transportation program. The South Mountain Freeway Environmental Impact Statement (EIS) was initiated prior to the passage of SAFETEA-LU and MAP-21 and is not subject to their procedural directives. Certain aspects of the legislations have, however, been incorporated within this document.

### PURPOSE OF THE CHAPTER

A major transportation facility (the South Mountain Freeway) has been included in past and current regional transportation planning efforts. At the beginning of the EIS process, the need for a major transportation facility was reexamined to determine whether such a facility is still needed.

Sections of the chapter are presented to provide the reader an overall understanding of the analyses used to determine the purpose and need for the proposed action. Table 1-1 on the following page provides a summary of topics, content, and intended benefit to the reader.

### CONTEXT OF PURPOSE AND NEED IN THE EIS PROCESS

An early step in preparing an EIS is to determine whether there is a purpose and need for the proposed action (see sidebar on this page regarding purpose and need content

guidance). If the lead agency concludes through analysis that there is no need, an EIS would not be prepared. If the lead agency concludes through analysis that there is a need, the EIS process would continue with evaluation of a range of reasonable alternatives for a transportation facility in the Study Area. The Study Area for this proposed action has been defined as the southwestern portion of the Phoenix metropolitan area (see Figure 1-1).

The analysis used to determine the possible purpose and need for the proposed action followed FHWA guidance. The following may assist in explaining some items to be considered in establishing the purpose and need for a proposed action. They are not intended to be all-inclusive; they are intended as guides.

- ▶ **Capacity** – Is the capacity of present facilities adequate for the present and/or projected traffic? What capacity is needed? What are the existing and proposed facilities' current and/or projected level(s) of service (LOS) (see text box on page 1-14)?
- ▶ **Transportation demand** – Is the proposed action related to any statewide plan or adopted urban transportation plan? Are the proposed action's traffic forecasts substantially different from those estimates from the region's transportation planning process?
- ▶ **Social demands or economic development** – What projected socioeconomic, demographic, and/or land use changes indicate the need to improve or add to the transportation system capacity?

### *A proposed action's purpose and need documentation should:*

“Identify and describe the proposed action and the transportation problem(s) or other needs which it is intended to address (40 Code of Federal Regulations [C.F.R.] § 1502.13). This section should clearly demonstrate that a ‘need’ exists and should define the ‘need’ in terms understandable to the general public. This discussion should clearly describe the problems which the proposed action is to correct. It will form the basis for the ‘no action’ discussion in the ‘Alternatives’ section, and assist with the identification of reasonable alternatives and the selection of the preferred alternative. Charts, tables, maps, and other illustrations (e.g., typical cross-section, photographs, etc.) are encouraged as useful presentation techniques.”

*Source: FHWA Technical Advisory T 6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents (U.S. Department of Transportation, T-FHWA, 1987)*

### **Attention readers!**

Acronyms, abbreviations, a glossary, a list of preparers, references, and an index can be found in the back of the DEIS.

**Table 1-1** Purpose and Need Content Summary, Chapter 1

Topic	Page	Highlights	Reader Benefit
Context of Purpose and Need in the EIS Process	1-1	<ul style="list-style-type: none"> <li>Context of purpose and need in the EIS<sup>a</sup> process</li> <li>Context of the proposed action relative to the ADOT<sup>b</sup> mission</li> </ul>	<ul style="list-style-type: none"> <li>An understanding of the issues and factors considered in assessing the proposed action's purpose and need</li> <li>General guidance on how to assess the purpose and need for a proposed action</li> <li>An understanding of the documentation of the proposed action's purpose and need as a step in the EIS process</li> <li>An understanding of ADOT's obligation to Arizona citizens in relation to meeting transportation needs</li> </ul>
Project Location, Description, and Current Status	1-4	<ul style="list-style-type: none"> <li>Overview of proposed action location and description</li> <li>Establishment of the proposed action as a distinct action</li> <li>Definition of the RTP<sup>c</sup></li> </ul>	<ul style="list-style-type: none"> <li>Orientation of the reader to the Study Area</li> <li>Information the reader can use regarding a major transportation facility in the context of the region's current transportation planning</li> </ul>
Historical Context of the Proposed Action	1-5	<ul style="list-style-type: none"> <li>Factors contributing to growth of the region</li> <li>Historical population, employment, and housing growth rates</li> <li>Evolution of the region's transportation network and its relationship to the proposed action</li> <li>Transportation planning in conjunction with the region's growth</li> <li>Voter support relative to transportation planning efforts</li> </ul>	<ul style="list-style-type: none"> <li>An understanding of the region's historical growth patterns and factors contributing to that growth</li> <li>Identification of the stakeholders responsible for regional planning efforts</li> <li>An understanding of how the idea for the proposed action originated and how it evolved over time</li> <li>The role of the public in regional transportation planning efforts in recent history through voter approval and regional transportation plan development</li> </ul>
Context of the Proposed Action in Current Regional Transportation Planning	1-9	<ul style="list-style-type: none"> <li>The proposed action as part of the RTP</li> </ul>	<ul style="list-style-type: none"> <li>An understanding of the proposed action as one of many interdependent components that make up the planned transportation network in the MAG<sup>d</sup> region</li> <li>An understanding of the proposed action as a key piece of the RTP since the mid-1980s</li> </ul>
Need Based on Socioeconomic Factors	1-11	<ul style="list-style-type: none"> <li>Projected population, housing, employment, and vehicle miles traveled</li> <li>Relationship of the proposed action to projected growth</li> </ul>	<ul style="list-style-type: none"> <li>An understanding of the region's projected growth patterns and factors contributing to the growth</li> <li>An understanding of why a major transportation facility is needed in this area of the MAG region</li> </ul>
Need Based on Regional Transportation Demand and Existing and Projected Transportation System Capacity Deficiencies	1-13	<ul style="list-style-type: none"> <li>Existing traffic conditions in the Study Area and immediate surroundings</li> <li>2035 forecast traffic conditions in the Study Area and immediate surroundings</li> </ul>	<ul style="list-style-type: none"> <li>An understanding of 2010 and 2035 traffic volumes on freeways and arterial streets in the region and Study Area</li> <li>An understanding of 2010 and 2035 operational characteristics of the region's transportation network</li> <li>An understanding of 2010 and 2035 travel times at representative locations in the region</li> <li>An understanding of projected deficiencies in the planned transportation network</li> </ul>
Conclusions	1-21	<ul style="list-style-type: none"> <li>Determination of need for a major transportation facility</li> </ul>	<ul style="list-style-type: none"> <li>Summary of the conclusions reached regarding the need for a major transportation facility in the Study Area</li> </ul>

<sup>a</sup> environmental impact statement <sup>b</sup> Arizona Department of Transportation <sup>c</sup> *Regional Transportation Plan* <sup>d</sup> Maricopa Association of Governments

The chapter analyzes these questions to determine whether purpose and need for the proposed action exist. A conclusion section, presented at the end of the chapter, summarizes findings regarding the proposed action's purpose and need.

**Context of the Proposed Action Relative to the ADOT Mission**

ADOT's mission is to provide a safe, efficient, cost-effective transportation system that links Arizona to

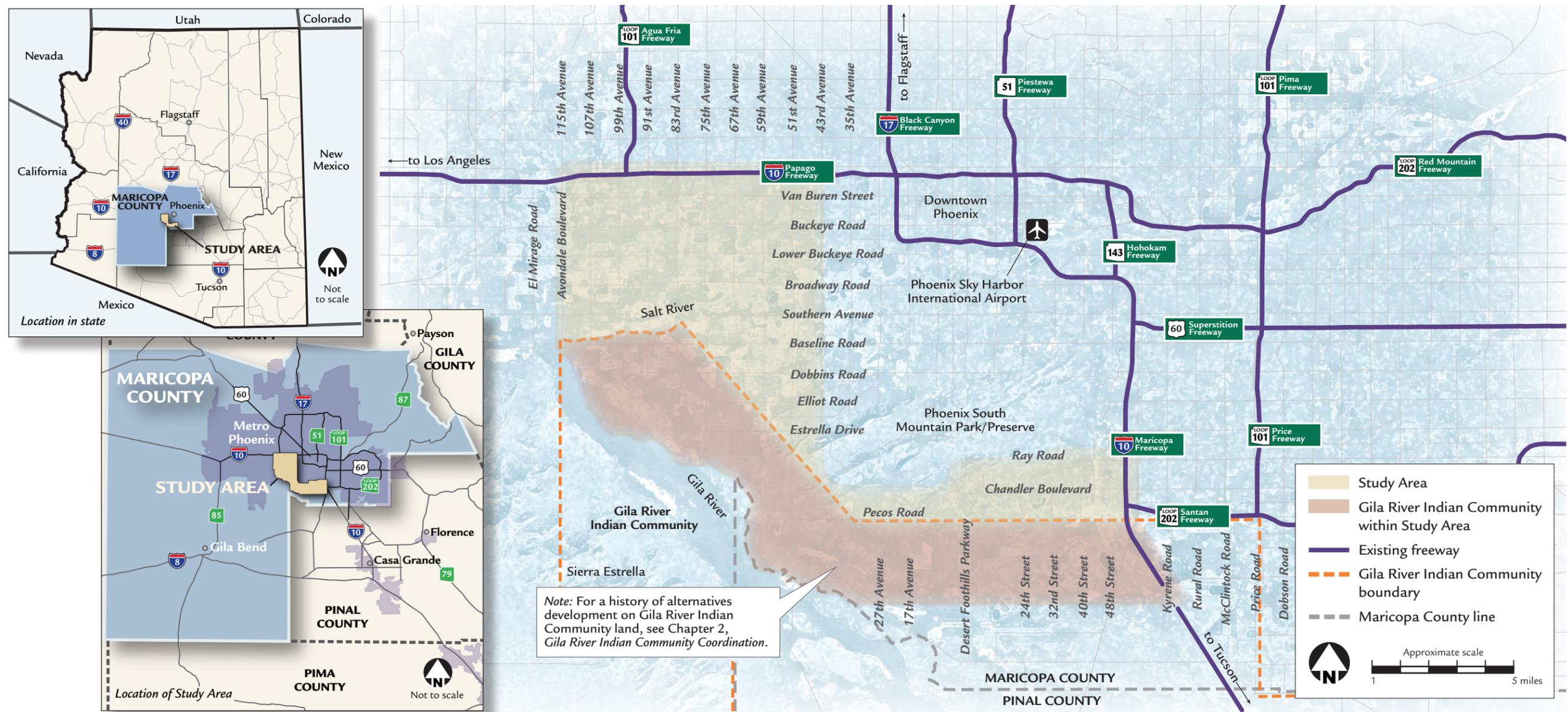
the global economy, promotes economic prosperity, and demonstrates respect for Arizona's environment and quality of life. Its stated goals relating to the proposed action are to:

- ▶ improve the movement of people and products throughout Arizona
- ▶ increase the quality, timeliness, and cost-effectiveness of ADOT's products and services
- ▶ optimize resource use

- ▶ enlist public and political support necessary to meet Arizona's transportation needs

ADOT's mission and stated goals are important in the context of determining the purpose and need for the proposed action. As the project sponsor, ADOT is obligated to continue to study the proposed action if analysis concludes there is purpose and need for the action.

Figure 1-1 Study Area



The Study Area for the proposed action encompasses the southwestern portion of the Phoenix metropolitan area.

**What are logical termini and independent utility?**

*Logical termini* refer to rational end points for a transportation project and for a review of environmental impacts. Often, termini are points of major traffic generation, such as intersecting roads or major population centers, but other rationales can support determination of logical termini for a project. Such considerations include establishing a corridor of sufficient length to compare a range of alternatives and ensuring the project will not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

*Independent utility* means the ability of the proposed action to function independently of other planned transportation-related projects in the region.

The proposed facility must be usable and be a reasonable expenditure even if no additional transportation improvements are made within the area.

**How are MAG data used in the DEIS?**

As a key stakeholder and data source for the project, MAG has provided critical resources for compiling background information and developing data for the DEIS analyses. To identify the use of MAG resources, three forms of citation are used throughout this document:

- This citation is used when information was extracted directly from a MAG-developed document.  
*Source:* Maricopa Association of Governments, year
- This citation is used when data are presented as received from MAG.  
*Source:* Maricopa Association of Governments, year; used with permission
- This citation is used when analysis was performed using MAG data as inputs.  
*Source:* Maricopa Association of Governments, year; extrapolated analysis

**PROJECT LOCATION, DESCRIPTION, AND CURRENT STATUS**

**Location and Description**

The geographic area for which a major transportation facility has been identified in the past is in the southwestern portion of Maricopa County, Arizona (see Figure 1-1). The general area includes the southern and western city limits of Phoenix, Arizona. The logical termini (see sidebar on this page) for a project in the area are:

- ▶ In the west, Interstate 10 (I-10, Papago Freeway) is a major east–west Interstate highway and a major transportation corridor serving regional and interstate travel. The project would terminate at I-10 between 115th Avenue/Avondale Boulevard (milepost 131.7) and 43rd Avenue (milepost 140.7).
- ▶ In the east, State Route (SR) 202L (Santan Freeway) and I-10 (Maricopa Freeway) are major transportation corridors serving regional and interstate travel. The project would terminate near the system traffic interchange (see discussion of traffic interchanges, on page 3–48) connecting those freeways at milepost 161.3 on I-10.

**Current Status of the Proposed Action**

A major transportation facility (the South Mountain Freeway) has been included in the Maricopa Association of Governments' (MAG, see text box on this page) adopted transportation planning documents since 1985 and is in the current MAG *Regional Transportation Plan* (RTP, see text box on next page). Since 1985, the South Mountain Freeway has also been part of long-range planning efforts of local jurisdictions (e.g., the City of Phoenix) throughout the Study Area. Adopted in 2003 and last updated in 2010, the RTP is a comprehensive regional multimodal plan that addresses needs for all transportation modes and for planned transportation improvements in the MAG region beginning in 2006 and ending in 2026. Figure 1-2 illustrates the freeway network as proposed in 1985 and as presented in the

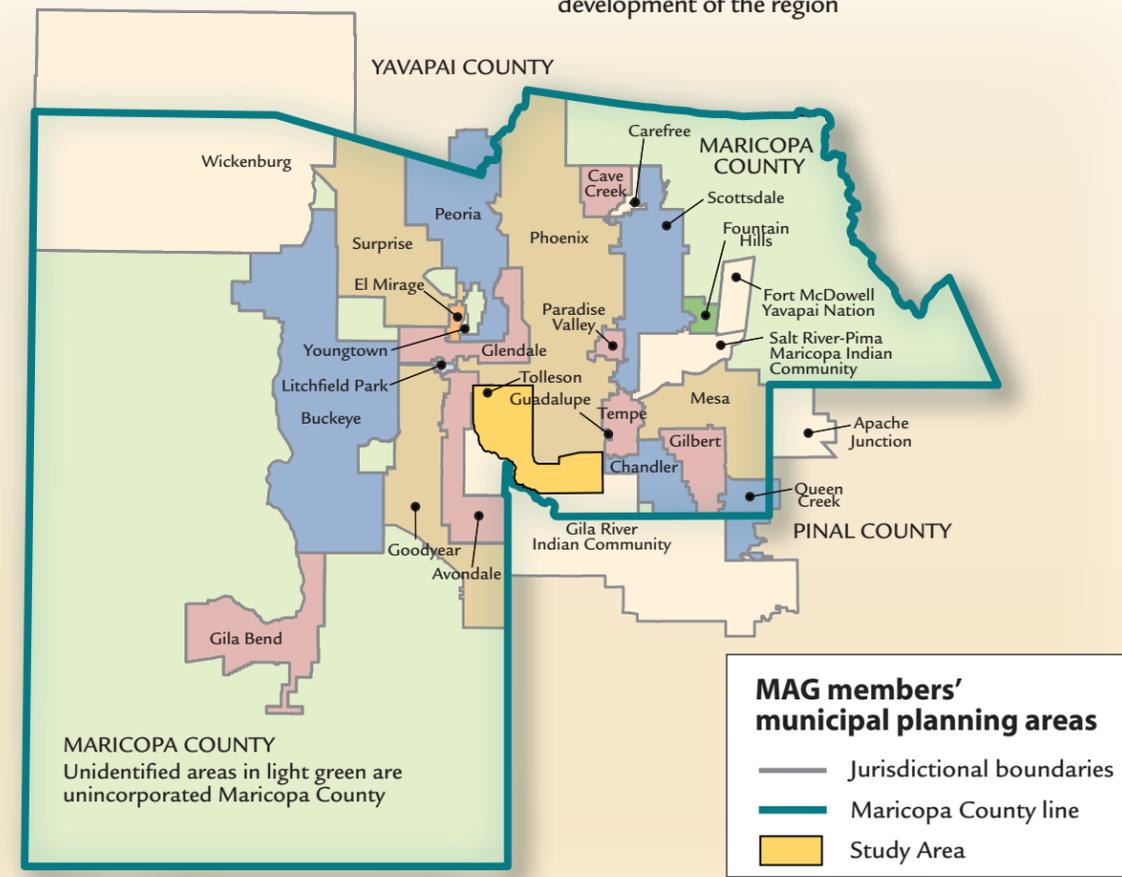
**What Is the Maricopa Association of Governments?**

MAG was created in 1967 to foster regional cooperation and address regional challenges in the greater Phoenix metropolitan area. In 1973, MAG became the designated metropolitan planning organization for regional planning in the Maricopa County region. Its current membership includes Maricopa County and the 25 incorporated towns and cities and 3 Native American Indian communities within Maricopa County and the contiguous urbanized area. ADOT and the Citizens Transportation Oversight Committee serve as ex-officio members for transportation-related issues.

MAG is at the service of its members (the local governments and citizens in the region); the association does not make decisions on behalf of its members without member majority approval. By fostering communication, planning, policymaking, coordination, advocacy, and technical assistance, MAG serves to facilitate and create an environment for its members to address issues and needs that cross city, town, county, and even state boundaries.

The Articles of Incorporation for MAG state that the association was formed to:

- provide a forum for discussion and study of regional problems of mutual interest to the governments in the region
- ensure, through cooperation and the pooling of common resources, maximum efficiency and economy in governmental operations that will provide every citizen with the utmost value for every dollar expended
- identify and comprehensively plan for the solution of regional problems (including transportation) requiring multicity, town, and county cooperation
- facilitate agreements among the governmental units for specific projects or other interrelated developmental actions or for the adoption of common policies with respect to problems common to its members
- attain the greatest degree of intergovernmental cooperation possible to prepare for future growth and development of the region



Note: MAG serves member agencies whose jurisdictions include those in Maricopa County and some whose jurisdictions extend into portions of Pinal and Yavapai counties.

### What Is the Regional Transportation Plan?

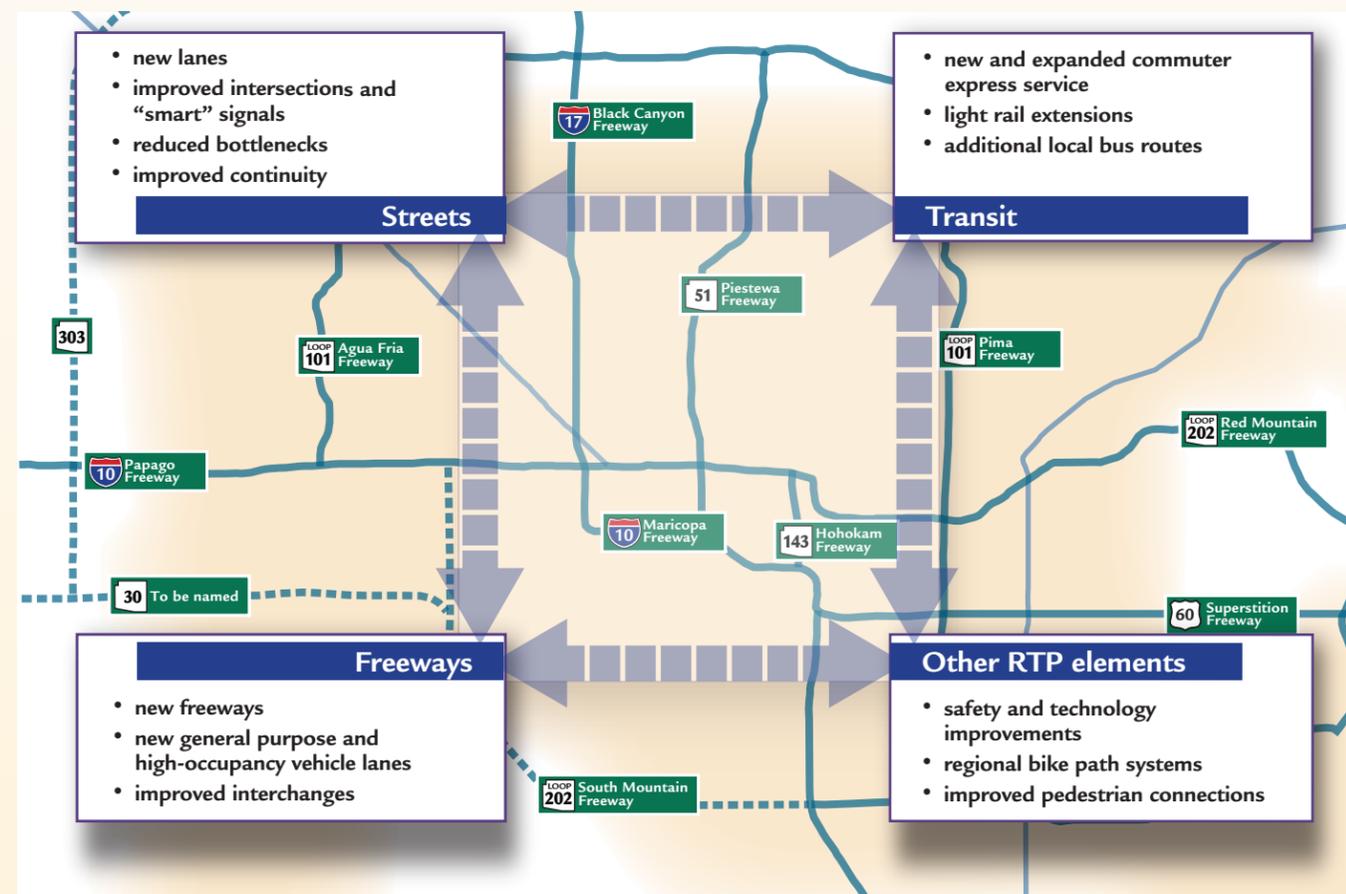
The result of a major planning effort initiated in 2001 and completed in late 2003, the RTP provides a broad, integrated vision for the regional transportation system through 2026, addressing freeways, streets, transit, airports, bicycle and pedestrian facilities, freight, demand management, system management including intelligent transportation systems, and safety. The plan received unanimous support from the MAG Transportation Policy Committee, approval from the MAG-appointed Regional Council, and successful passage of federally required air quality conformity tests. The plan includes only projects for which funding is available or is reasonably expected. Every 5 years through the life of the plan, the RTP will be reevaluated, giving consideration to new information, RTP adjustments, and relevant new studies.

As the “blueprint for future transportation investments in the region for the next several decades” (MAG 2003), the RTP is a performance-based, integrated plan that

recognizes different transportation needs in different areas of the MAG region. The planning process for the RTP, among other things, included:

- evaluation of the region’s population, economic, and planned land use development trends
- analysis of the condition of the transportation system
- assessment of transportation needs for its 20-year planning horizon
- identification of transportation investments to best meet future regional needs

MAG members consider the RTP to be vital in addressing transportation needs in response to and in support of continued growth and economic sustainability in the MAG region. The Regional Freeway and Highway System, an integrated system of beltway and arterial freeways, is a principal component of the RTP.



*The RTP is an integrated, multimodal plan—meaning planned improvements made to one element of the regional transportation system provide benefits to and improve operation of the entire system.*

current RTP. Some notable observations pertaining to Figure 1-2 are:

- The Grand Avenue portion of U.S. Route 60 (US 60) is maintained as a major arterial street, providing access to most intersecting streets and some access to adjacent properties.
- The 1985-proposed Paradise Parkway is no longer included in the RTP.
- Most of SR 202L is completed and operating.
- The general location for the South Mountain Freeway has remained unchanged since 1985.

The decision to study the proposed action in this document is based on logical termini, sufficient length, independent utility, projected travel needs, and construction priorities. This document recounts the analysis used to determine whether the proposed action could meet regional transportation needs in an environmentally acceptable manner and at a reasonable cost.

### HISTORICAL CONTEXT OF THE PROPOSED ACTION

Over the course of its Euro-American history, the Phoenix metropolitan area has experienced continuous growth. Several factors have substantially contributed to the area being a popular destination for people and industry, and several of these factors are expected to contribute to the area’s future growth. It is important to understand:

- how these factors have driven growth and will continue to drive growth
- how much of the historic growth occurred without the presence of a freeway system
- how this growth, in turn, has driven the need for transportation infrastructure
- how a major transportation facility would be part of an integrated response to both historical and projected growth

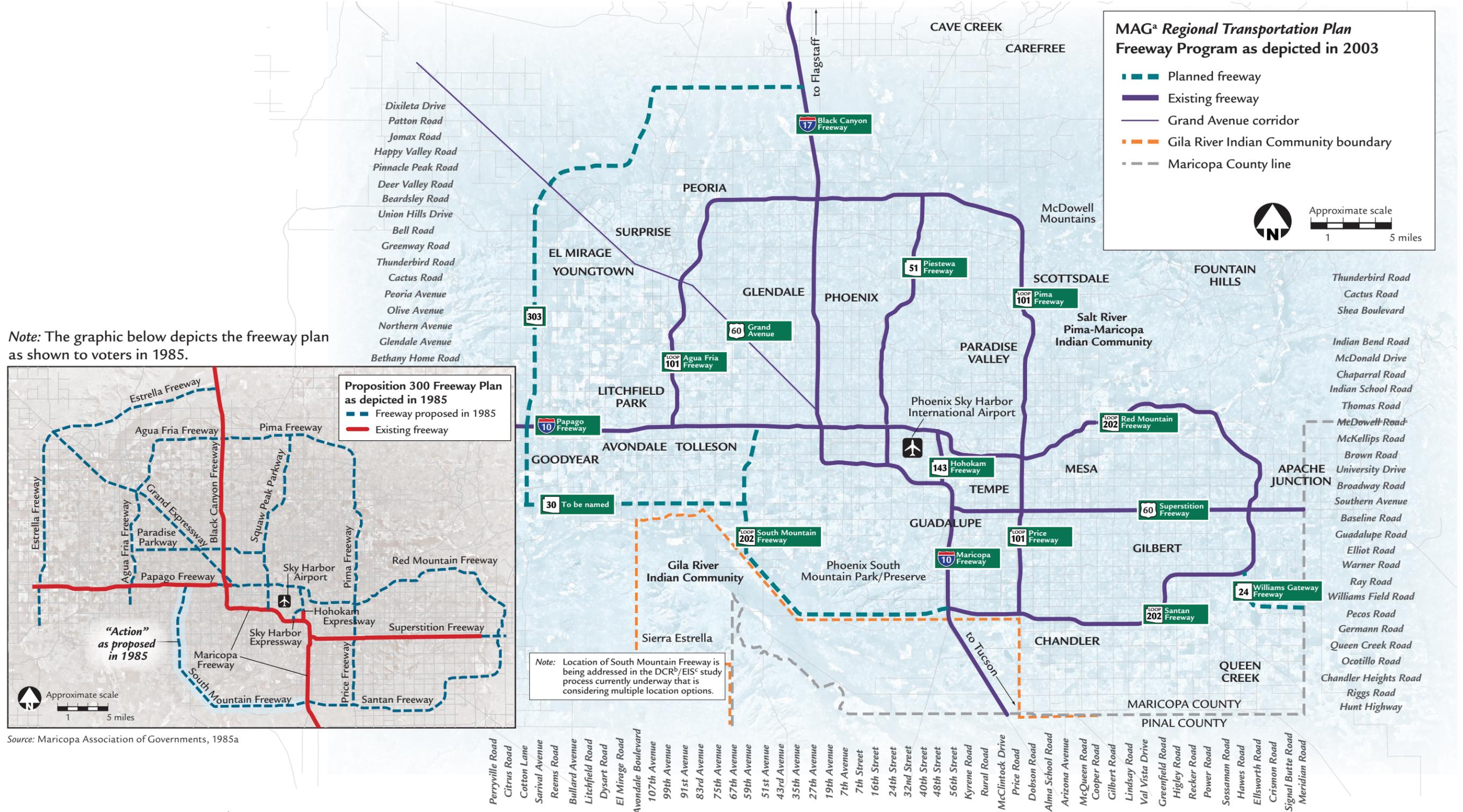
### What is the MAG regional travel demand model?

The traffic assessment for the Study Area employed the MAG travel demand model (TransCAD software platform), as certified by FHWA and reviewed by the U.S. Environmental Protection Agency (EPA) for air quality conformity. The model projects demand for multiple modes of travel, including automobile, bus, and light rail. Key model inputs used to forecast travel demand included:

- socioeconomic data based on the adopted general plans of MAG members, along with population and economic forecasts and the existing and planned transportation infrastructure as identified by MAG members
- the anticipated average number of vehicle trips within the region (including those to and from the region’s households) on a daily basis (this number is monitored regularly by MAG)
- the distribution of transportation modes used by travelers in the MAG region (also monitored regularly by MAG)
- the capacity of the transportation infrastructure to accommodate regional travel
- the future transportation infrastructure established using RTP-planned projects and improvements and from known arterial street network improvements assumed to be made by the County, Cities, and private developers

Figure 1-2 Maricopa Association of Governments Regional Freeway and Highway System, 1985 and 2003

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<sup>a</sup> Maricopa Association of Governments <sup>b</sup> design concept report <sup>c</sup> environmental impact statement

Since 1985, the Maricopa Association of Governments Regional Freeway and Highway System has been constructed in reaction to economic and population growth. The South Mountain Freeway has remained an integral part of the region’s planned freeway system—a combination of loop or belt routes and freeway arteries to, from, and around the urban core. The general location for the South Mountain Freeway has remained unchanged since 1985. The inset portrays the map conveyed to Maricopa County voters pertaining to the passage of Proposition 300 in 1985 (see sidebar on page 1-9 regarding Proposition 300).

Figure 1-3 Westward Ho Hotel, 1939



Source: www.acmeron.com

As photographed in 1939, the Westward Ho Hotel depicts some of the initial tourism infrastructure in Phoenix.

From the city’s inception to the mid-1900s, resources specific to the region and its strategic location drove growth in the valley. Agriculture, mining, and product distribution drove economic opportunity and population growth during this period. In the early 1900s, completion of a series of dam projects resulted in controlled flows of the Salt River that allowed the community’s agricultural industry to prosper. This era was a turning point in the area’s economic base:

- ▶ Additional rail lines were completed, allowing other industries to settle in the region.
- ▶ Because of the area’s desirable climate and desert setting, tourism was established as a primary economic force, as evidenced by the openings of the Arizona Biltmore Hotel and the Westward Ho Hotel in 1929 (see Figure 1-3), which coincided with the first scheduled commercial flights between Los Angeles and Phoenix. Tourism remains a key economic driver.
- ▶ Climate and terrain also made the region suitable for military training purposes. In response to the World Wars, military facilities such as Luke Field, Williams Field, Falcon Field, and related ground training centers were built in the area.

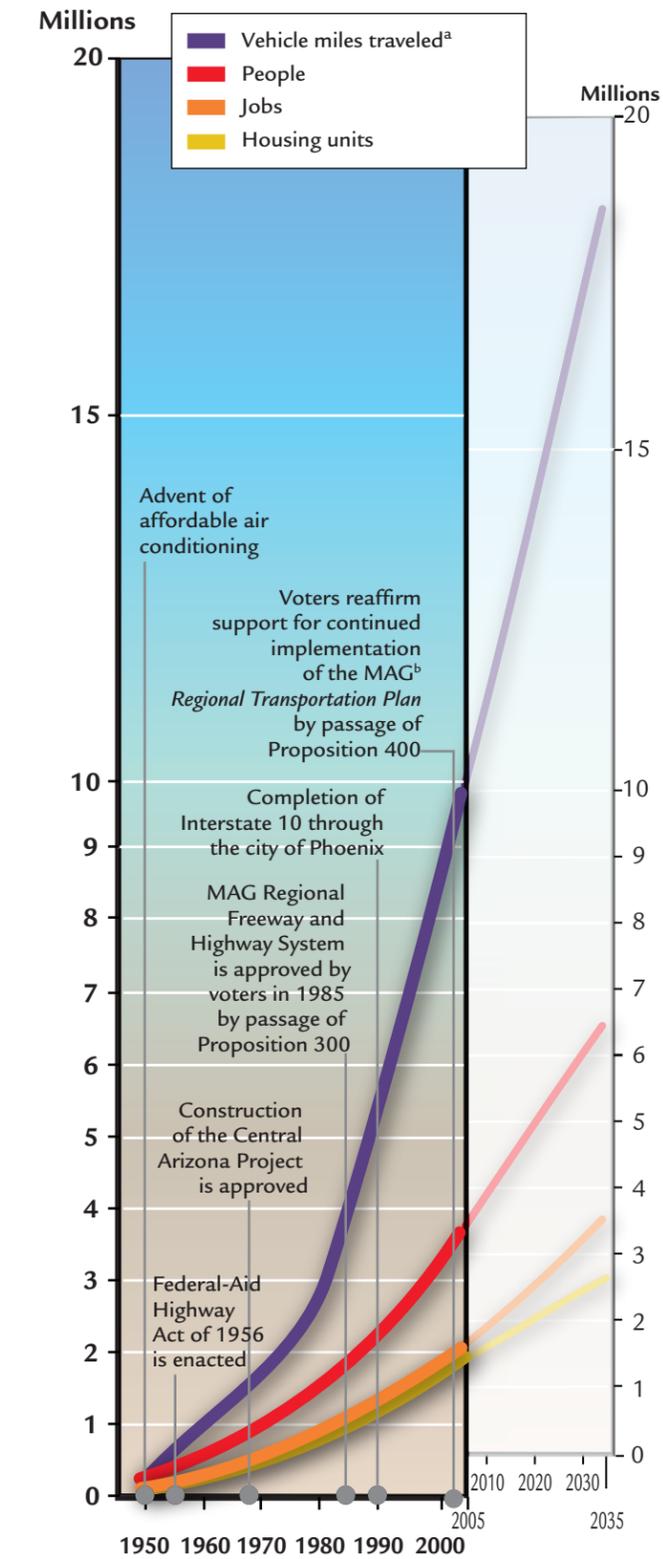
- ▶ In 1948, Motorola opened its first Phoenix research and development center for military electronics. Other related businesses (e.g., Intel, McDonnell Douglas) later established operations in the area.

By 1950, 105,000 people lived in Phoenix, with thousands more settling adjacent to its city limits. From approximately 1900 to 1950, the population had grown by more than 1,800 percent. During that time frame, automobiles became more affordable. The arterial street network grew in support: in 1950, 311 miles of the arterial street grid had been developed.

While the region remained a popular and desirable place to live, certain factors continued to inhibit the rate of growth. This changed, starting in the 1950s:

- ▶ The use of affordable air conditioning in homes and businesses became widespread and dramatically increased the livability of the area. In 1959 alone, the city of Phoenix experienced more construction than in the previous 30 years.
- ▶ The Federal-Aid Highway Act of 1956 called for the creation of the nation’s 42,500-mile national Interstate Highway System (it would not be until 1990 that

Figure 1-4 Growth Rates, 1950–2000



<sup>a</sup> vehicle miles traveled reduced to one-tenth of their actual values to facilitate comparison of growth rates on the same axis  
<sup>b</sup> Maricopa Association of Governments

Sources: 1950–2000 U.S. Census; Maricopa Association of Governments, 2007a and 2009b

**What kind of travel occurs on roads in the MAG region?**

Motorists in the MAG region have different purposes for traveling on the region’s road network. Generally, travel in the MAG region can be categorized into three travel types:

- Local travel is generally short trips to nearby residences, businesses, or some centers of “activity.” Local travel makes up a large portion of the total travel because of the higher frequency of these trips. Local travel is predominantly served by arterial streets and neighborhood collector streets.
- Regional travel is generally longer trips to regional employment and entertainment centers. Commuting is often associated with regional trips. Regional travel makes up a large portion of the total travel in the MAG region. Regional travel is predominantly served by freeways and secondarily by major arterial streets.
- Intrastate and interstate travel generally includes the longest trips between major population centers across the state and to other states. This form of travel is predominantly served by Interstate and state highways.

Road networks in metropolitan areas are often planned and designed to accommodate these different travel needs.

*In recent years, the Maricopa Association of Governments region has maintained some of the fastest population, housing, and employment growth rates in the country. The growth rate of vehicles miles traveled has, however, continually outpaced these growth trends.*

## The National Highway System

The National Highway System consists of roadways important to the nation's economy, defense, and mobility. It features the following subsystems:

- **Interstate:** The Eisenhower Interstate System of highways retains its separate identity within the National Highway System.
- **Other principal arterials:** Highways in rural and urban areas that provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.
- **Strategic Highway Network:** A network of highways that is important to the United States' strategic defense policy and that provides access, continuity, and emergency capabilities for defense purposes.
- **Major strategic highway network connectors:** Highways that provide access between major military installations and highways in the Strategic Highway Network.
- **Intermodal connectors:** These highways provide access between major intermodal facilities and the other four subsystems making up the National Highway System.

Within Arizona, portions or all of US 60, US 89, US 93, US 95, and US 160; portions of SR 85, SR 87, SR 90, SR 95, and SR 260; and the entire Regional Freeway and Highway System are important and substantial links in the National Highway System.

For further information, see the Web site, <[www.fhwa.dot.gov/planning/national\\_highway\\_system/](http://www.fhwa.dot.gov/planning/national_highway_system/)>.

the region would receive its full benefit, with the completion of I-10 through central Phoenix).

- In 1968, a bill approving the construction of the Central Arizona Project was signed, essentially ensuring a long-term supply of water to central Arizona.

With the culmination of enhanced livability, improved access, and assurance of long-term water supply, the population in Maricopa County reached about 700,000 in 1960, just under 1 million in 1970, and just over 1.5 million in 1980 (see Figure 1-4)—all of this growth occurred without the presence of a single freeway. To summarize, from the early 1950s to the mid-1990s, population grew by over 500 percent. (The population in the United States as a whole grew by approximately 70 percent during this time period.)

To address transportation needs in response to the growth, the system of local arterial streets was continually expanded. But growth in the latter half of the 1900s created new challenges—ones that were regional in context. In response, MAG was formed. One of these regional challenges related directly to transportation. With growth, mobility needs expanded from local and interstate to include regional travel (see sidebar regarding travel in the region on previous page). In fact, since the 1940s, annual growth in vehicle miles traveled (VMT, see sidebar on page 1-13) in the MAG region has continued to exceed population growth (see Figure 1-4). The arterial street network that had served transportation needs well was no longer able to meet all the needs and demands of the driving public.

With the ongoing construction of the nation's Interstate Highway System, the concept of a circumferential, or loop, freeway system around the city of Phoenix was introduced. In 1960, a study was published by the U.S. Department of Commerce Bureau of Public Roads for the Arizona State Highway Commission. The study, *A Major Street and Highway Plan, Phoenix Urban Area, Maricopa County*, examined the relative merits of various major street and highway layouts for the urban area and its surroundings. In this study, recommendations were made to plan for outer-belt/loop-highway routes (over the existing arterial street grid) to collect and distribute external and regional traffic from other elements of the transportation system.

The challenge before MAG members was to design an integrated intermodal transportation network to accommodate the region's future transportation needs. In the early 1980s, planners from the local jurisdictions that compose MAG membership evaluated transportation needs in the region. The need for a major transportation facility in the Study Area was first identified in the 1983 *Southwest Area Transportation Study*. In 1985, the MAG Regional Council recommended the final elements of a freeway system to go to the voters for funding through a one-half cent sales tax.

The 232-mile freeway system proposed in 1985 eventually became the Regional Freeway and Highway System. Not unlike many urban freeway systems being planned and constructed in several major cities across the country, the proposed system was to be a series of belt, or loop, highways around the major urban core with major freeway arterials into the urban core of Phoenix. As part of the National Highway System (see sidebar on this page), the system would supplement the urban Interstate Highway System's arterial function—mainly, the role served by I-10 in moving large volumes of intracity and regional traffic. When integrated with the urban Interstate system and major arterial street system, the loop highways would complete a surface transportation system that would:

- reduce increasing congestion on the Interstate Highway System in the urban core
- facilitate and more effectively distribute the regional movement of goods and delivery of services
- more evenly distribute traffic on the major arterial street grid and reduce regional traffic using the grid
- better serve already-occurring regional traffic
- provide an alternate route for pass-through traffic
- provide an integrated intermodal network of freeways strategically located to accommodate local and regional land use planning
- enhance local mobility by removing regional traffic from the local road network
- create infrastructure to support the regional bus transit system component of the intermodal *Long-Range Transportation Plan* (LRTP) (MAG 2001a)
- encourage and direct planned growth

A major element of the region's freeway loop, or beltway system, traversed the Study Area and was originally called the Southwest Loop. It was an integral piece of the Regional Freeway and Highway System approved by Maricopa County voters in the 1985 one-half cent sales tax referendum. The Regional Freeway and Highway System plan was included as a key component in the LRTP.

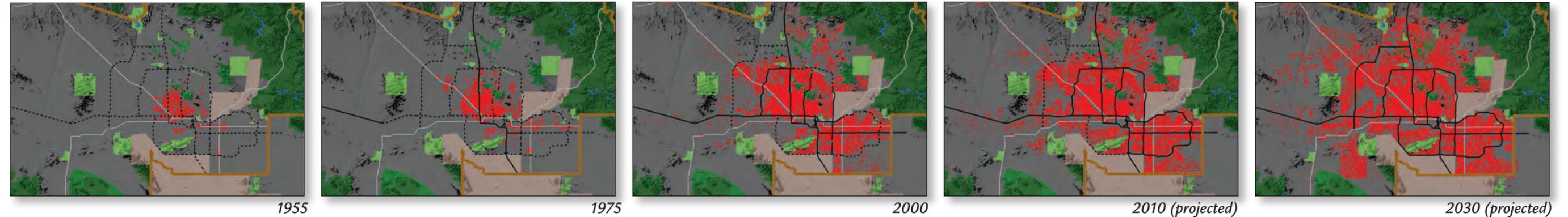
Subsequent location/design and State-level environmental studies were conducted by ADOT for Regional Freeway and Highway System segments. Additional studies were prepared to examine other alternatives in the Study Area. Examples of other studies include:

- *Southwest Loop Highway (SR 218) Final Environmental Assessment* (ADOT 1988a)
- *Southwest Loop Highway (SR 218) Design Concept Report* (ADOT 1988b)
- *Alignment Recommendation, South Mountain Corridor Loop 202* (Arizona Transportation Group and South Mountain Community Highway Association 1997)

The 1988 State-level environmental assessment (EA) and design concept report (DCR) were prepared for what was then known as the South Mountain Freeway. This same route (now designated as part of SR 202L) was approved by the State Transportation Board (STB) in 1988. All these studies provided sufficient design detail to establish an adopted and publicized location for the freeway. The 1988 freeway plan outlined a six-lane freeway.

The Regional Freeway and Highway System has been constructed sequentially to meet the most pressing transportation needs in the MAG region and as funds have become available. Consequently, freeway construction followed geographic patterns of development and population growth. High-growth areas historically were in the northeastern, northwestern, southeastern, and central areas of the MAG region (see Figure 1-5). Available funds were used to build Regional Freeway and Highway System segments in those areas, and completing the Regional Freeway and Highway System in the Study Area (southwestern quadrant of the greater Phoenix metropolitan area) has been a lower priority.

**Figure 1-5** Historic and Projected Population Distribution, 1955–2030, Phoenix Metropolitan Area



Source: Maricopa Association of Governments, 2008a; used with permission

Red area depicts areas of high population density. Population has spread throughout the region, starting from downtown Phoenix, moving to the north and east and eventually to the west. This more recent westward trend in the geographic distribution of population densities is expected to continue. For additional information regarding population growth in the region, see the section, Population and Employment, beginning on page 4-20. (The black dashed and solid lines depict the locations of regional and Interstate freeways in the region. They are shown here as locational aids to the reader.)

During initial implementation of the Regional Freeway and Highway System, population growth in the MAG region continued at a rapid pace. From 1980 to 2005, the population of Maricopa County more than doubled, from 1.5 million to 3.7 million. The MAG region has been one of the fastest-growing metropolitan areas in the United States; by population, Phoenix is the fifth-largest city in the country and the region ranks as the 12th-largest metropolitan area in the country (U.S. Census Bureau 2011).

The number of housing units and the employment base in the region have maintained a similar growth rate. As of 2005, almost 1.5 million housing units (including homes and apartments) were in Maricopa County (MAG 2007a). Employment in Maricopa County increased at a high rate. Between 1980 and 2005, total employment increased by over 1 million jobs, from 690,000 to 1.7 million jobs. In general, the employment base in the region has outpaced the national average. For example, for the 10-year period beginning in 1984, employment in the region increased by 49 percent while the national gain was 24 percent. Employment growth rates from 1970 through the mid-1980s (the period prior to the conception of the Regional Freeway and Highway System) were equal to the growth rates from 1985 to 2005.

Projections of what the region is expected to look like in terms of population, housing, and employment are described in the section, *Need Based on Socioeconomic Factors*, beginning on page 1-11.

While growth continued, ADOT, on behalf of MAG, moved toward completing the Regional Freeway and Highway System. By 2001, ADOT had completed 120 miles of the originally planned 232-mile Regional Freeway and Highway System. Further, the one-half cent transportation sales tax approved in 1985 was set to expire at the end of 2005. In response, in late 2004, a referendum (Proposition 400) to extend the one-half cent sales tax for another 20 years was placed before and approved by Maricopa County voters (see sidebar regarding Propositions 300 and 400 on this page). The funds to be generated by this tax are planned to ensure completion of the remaining segments of the Regional Freeway and Highway System and to support other regional transportation projects as programmed in the RTP. The 2003 RTP and its annual updates serve as the “next generation” of the LRTP.

In this context, the following conclusions can be made:

- ▶ Historical, rapid growth in population, employment, and housing has been driven by mild climate, affordable cost of living, and economic opportunities.
- ▶ With regional growth came regional mobility needs. Motorists who earlier had only local or intra-/interstate travel needs wanted to be able to travel efficiently and conveniently within the region.
- ▶ The region’s transportation infrastructure evolved in response to growth to one that included a regional freeway system to meet these regional needs.

- ▶ Planning continued for one of the “missing” Regional Freeway and Highway System segments: the South Mountain Freeway.

### CONTEXT OF THE PROPOSED ACTION IN CURRENT REGIONAL TRANSPORTATION PLANNING

According to Arizona Revised Statutes (A.R.S.) § 42-6105E, the Transportation Policy Committee (TPC) is mandated to develop a plan to readdress long-range transportation needs in the region and to do so in cooperation with the Regional Public Transportation Authority (RPTA) and ADOT. The TPC is a public-private partnership established by MAG. It consists of a cross section of MAG member agencies and representatives from business, transit, freight, the Citizens Transportation Oversight Committee, and ADOT. From TPC recommendations, the RTP evolved; it was submitted to the MAG Regional Council for final adoption in 2003. In preparing the RTP, MAG offered 150 public input opportunities and held 117 agency meetings and 173 stakeholder meetings. Opportunities for public input included expert panels, focus groups, special events and workshops, and public hearings (see the MAG Web site, <www.azmag.gov>, for additional information).

#### What do the results of Propositions 300 and 400 tell us?

Voter approval of the one-half cent sales tax in 1985 (Proposition 300) and its continued endorsement in 2004 (Proposition 400) underscore continued public support for investment in regional transportation projects. Results from the Maricopa County Official Canvas (Maricopa County 2004a) indicate voters in 90 percent of the county’s 1,058 voting precincts voted in favor of Proposition 400 and the projects it would fund. Voters in 81 percent of the 31 voting precincts in the Study Area favored Proposition 400 and the projects it would fund.

**What are TSM and TDM?**

Transportation system management (TSM) and transportation demand management (TDM) are programs and strategies that seek to maximize existing roadway efficiency without incurring the costs of substantial physical improvements.

TSM attempts to maximize the safety and efficiency of the existing transportation network using such traffic management tools as electronic message signs, signals to meter traffic flow at on-ramps, closed circuit television cameras, and vehicle detectors.

TDM seeks to reduce travel demand in the existing transportation network by promoting alternative modes of travel, including carpooling, van pooling, walking, bicycling, alternative work schedules and compressed work schedules to reduce the number of trips, and telecommuting.

Table 1-2 shows the highlights of the RTP. Three agencies implement three major RTP programs: ADOT – freeway/highway program; RPTA – transit program; and MAG – arterial street program. Each agency is required to regularly report on the status of the projects within its program and update revenue projections and cost opinions so that the programs remain fiscally balanced.

In 2009, MAG and ADOT began the process of making a substantial update to the freeway program of the RTP (the transit and arterial street programs underwent similar reviews). The update became necessary in response to both declining sales tax revenues resulting from the national economic downturn and to rising project cost estimates for the freeway program. *Tentative Scenario for the MAG Regional Freeway and Highway Program* (MAG 2009a) presents the bleak financial situation. The original, 2003 RTP balanced projected revenues and project cost opinions at approximately \$9.4 billion. Since that

time, the cost opinions have increased to approximately \$16 billion, with \$2.7 billion obligated or spent to date. With declining revenues and softer revenue projections, it is anticipated that only \$6.6 billion in revenues will be collected through the end of the RTP horizon to fund the remaining \$13.2 billion in projects. That left a program deficit of approximately \$6.6 billion.

The TPC held meetings throughout 2009 to discuss options for bringing the freeway program into balance. In developing its recommended scenario, the TPC considered numerous options, including removing projects, reprioritizing projects, scaling projects back, and deferring projects outside of the 2026 funding horizon. The recommended changes were presented at a public hearing on October 13, 2009, and adopted by the MAG Regional Council later that month. The recommended scenario maintained the core enhancements and priorities of the RTP and balanced the budget by deferring a number of projects to an “unfunded” status beyond the plan’s funding horizon.

The projects that remained funded by the RTP, including the proposed action, were repackaged with new budgets and cost savings recommendations (MAG 2010a). The *RTP 2010 Update* included a fiscally balanced plan for completing the identified freeway/highway, arterial street, and transit programs (MAG 2010a). The cash flow projections continued to be reviewed annually. In 2012, a similar rebalancing effort was completed to address an additional projected shortfall of \$390 million. Program changes were approved by the MAG Regional Council in May 2012. The approved program includes \$1.9 billion for design, right-of-way, and construction of the proposed action. Also of note is that funding for project-related activities are included in the immediate 5-year programs identified in the regional *Transportation Improvement Program* (TIP) as well as the *State Transportation Improvement Program*.

**Table 1-2** Regional Transportation Plan Highlights

Element <sup>a</sup>	Highlights	Plan Benefit	
		Specific	Overall
Freeway	<ul style="list-style-type: none"> <li>• Add new freeway corridors, providing approximately 490 lane-miles</li> <li>• Improve existing freeways—add 530 lane-miles of general purpose lanes and 300 lane-miles of HOV<sup>b</sup> lanes</li> </ul>	<ul style="list-style-type: none"> <li>• Increase Regional Freeway and Highway System capacity</li> <li>• Reduce travel time and delay</li> <li>• Improve regional continuity, connectivity, and efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Form integrated transportation system and transportation services to provide accessibility, mobility, and modal choice for residents, businesses, and the economic development of the region</li> <li>• Create integrated transportation system and services with safety as a core value and feature</li> <li>• Plan and implement improvements for each modal and system element to augment and enhance the service performance of other Regional Freeway and Highway System elements</li> </ul>
Arterial Street System	<ul style="list-style-type: none"> <li>• Add through- and turning lanes to existing streets with one to three lanes in each direction</li> <li>• Improve intersections</li> <li>• Construct new arterial street segments</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce travel time and delays</li> <li>• Improve local continuity, connectivity, and efficiency</li> </ul>	
Transit	<ul style="list-style-type: none"> <li>• Add new 58-mile light rail system through central MAG<sup>c</sup> region</li> <li>• Expand bus rapid transit and regional bus grid</li> <li>• Expand paratransit, rural/nonfixed-route transit and commuter van pools</li> </ul>	<ul style="list-style-type: none"> <li>• Shorten bus wait times</li> <li>• Lengthen duration of bus service</li> <li>• Improve regional transit continuity, connectivity, and efficiency</li> </ul>	
TSM/TDM <sup>d</sup>	<ul style="list-style-type: none"> <li>• Promote ridesharing, van pool programs, telecommuting</li> <li>• Increase real-time traffic management technology</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce travel demand</li> <li>• Improve Regional Freeway and Highway System, arterial street network, and transit efficiency</li> </ul>	

<sup>a</sup> Features listed in this table are not comprehensive; the reader is referred to the *Regional Transportation Plan* for all proposed plan improvements. See <www.azmag.gov>.

<sup>b</sup> high-occupancy vehicle <sup>c</sup> Maricopa Association of Governments <sup>d</sup> transportation system management/transportation demand management—see sidebar on this page

## NEED AND PURPOSE FOR THE PROPOSED ACTION

The section, *Context of Purpose and Need in the EIS Process*, beginning on page 1-1, provides several elements useful in explaining the purpose and need for a proposed action. The proposed action is needed to serve projected growth in population and accompanying transportation demand and to correct existing and projected transportation system deficiencies. These needs are discussed in the following sections. The purpose of the proposed action—implementation of a major transportation facility—is to meet these identified needs.

### NEED BASED ON SOCIOECONOMIC FACTORS

#### Projected Growth in Population, Housing, Employment, and Vehicle Miles Traveled

MAG projections (conducted in collaboration with the Arizona Department of Economic Security) indicate Maricopa County’s population will increase from 3.7 million in 2005 to 6.5 million in 2035 (MAG 2009b) (see Figure 1-6). This equates to almost 100,000 additional people per year. In turn, the housing unit numbers are projected to maintain a similar growth rate to meet population growth demand. The number of housing units is projected to increase from 1.5 million in 2005 to 2.7 million in 2035.

MAG regional employment is projected to increase at a high rate. Similar to the county’s population, employment is projected to increase from 1.7 million jobs in 2005 to 3.6 million jobs in 2035.

Although growth trends have been relatively flat since 2007, the long-term rates of population, housing, and employment growth experienced since the 1950s are projected to continue through 2035 (see sidebar on this page). And as has been the case in the past, VMT are projected to annually outpace the three socioeconomic trends discussed in this section (Figure 1-6).

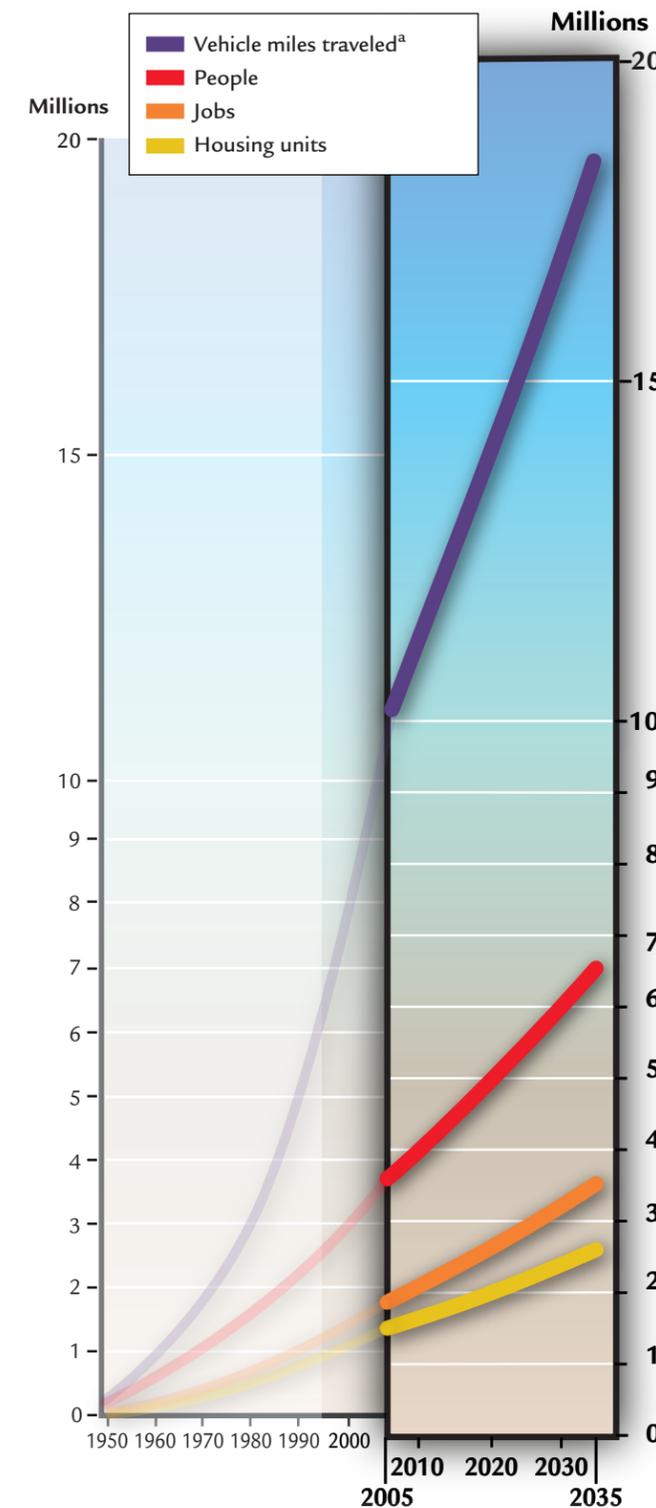
In response to the projections, MAG developed the RTP to specify what future transportation investments would be needed in the region through 2026. Almost 50 percent of the projected increases in population, housing, and employment from 2005 to 2035 are expected in 4 of 14 geographic areas, as shown in Figure 1-7, for the entire MAG region. These 4 contiguous areas are located primarily in the southern and southwestern portions of the MAG region.

#### Relationship of the Proposed Action to Projected Growth

Based on the above, the following conclusions are reached:

- ▶ Socioeconomic forecasts show population, housing, and employment increasing at high rates. Projections for 2035 are of a population of 6.5 million, housing of 2.7 million dwelling units, and an employment level of 3.6 million jobs (MAG 2009b).
- ▶ Increases in VMT are expected to outpace growth of the three socioeconomic trends.
- ▶ Almost 50 percent of the projected regional growth is expected to occur in areas that would be immediately served by the proposed action.
- ▶ Planned multimodal, integrated transportation improvements in the RTP are fiscally constrained responses to past and projected growth in the MAG region.
- ▶ The identified Study Area is an appropriate area for assessing the need for a major new transportation infrastructure project when considering past and existing regional transportation planning and in the context of projected socioeconomic trends in the southwestern MAG region.

Figure 1-6 Projected Growth Rates, 2000–2035



<sup>a</sup> vehicle miles traveled reduced to one-tenth of their actual values to facilitate comparison of growth rates on the same axis

Sources: 1950–2000 U.S. Census; Maricopa Association of Governments, 2007a and 2009b

#### How will the economic downturn affect growth rates?

The worldwide recession that began in late 2007 has generated a sustained and substantial downturn in growth rates for new housing and employment across the United States. While opinions and predictions vary, economic recovery may not be well underway until 2012 or later. The recession may be the worst since the Great Depression of the 1930s.

Arizona has particularly suffered the effects of this recession because, beginning in the early 2000s, Arizona in general and Maricopa County specifically enjoyed some of the fastest population, housing, and employment growth rates in the country. Local economies suffering the most in the current recession are those, like Phoenix, that enjoyed a boom period linked to robust housing markets, became overbuilt, and are now stagnant. Past recessions, such as the savings and loans scandals of the late 1980s, substantially impaired the region’s growth. Many savings and loan institutions closed, commercial real estate became drastically overbuilt, and businesses left Arizona daily. Yet, in a matter of years, dramatic economic growth resumed.

Because the need for the proposed action is predicated in part on projected growth, one might conclude the current recession will reduce that need. An economic downturn associated with a given recession is, however, generally considered a short-term phenomenon with respect to the longer-term planning horizon established for the proposed action. As described in the main text and as shown in Figure 1-4, socioeconomic indicators have steadily and consistently increased in the region since the early 1900s. The critical factors underlying these indicators remain unchanged.

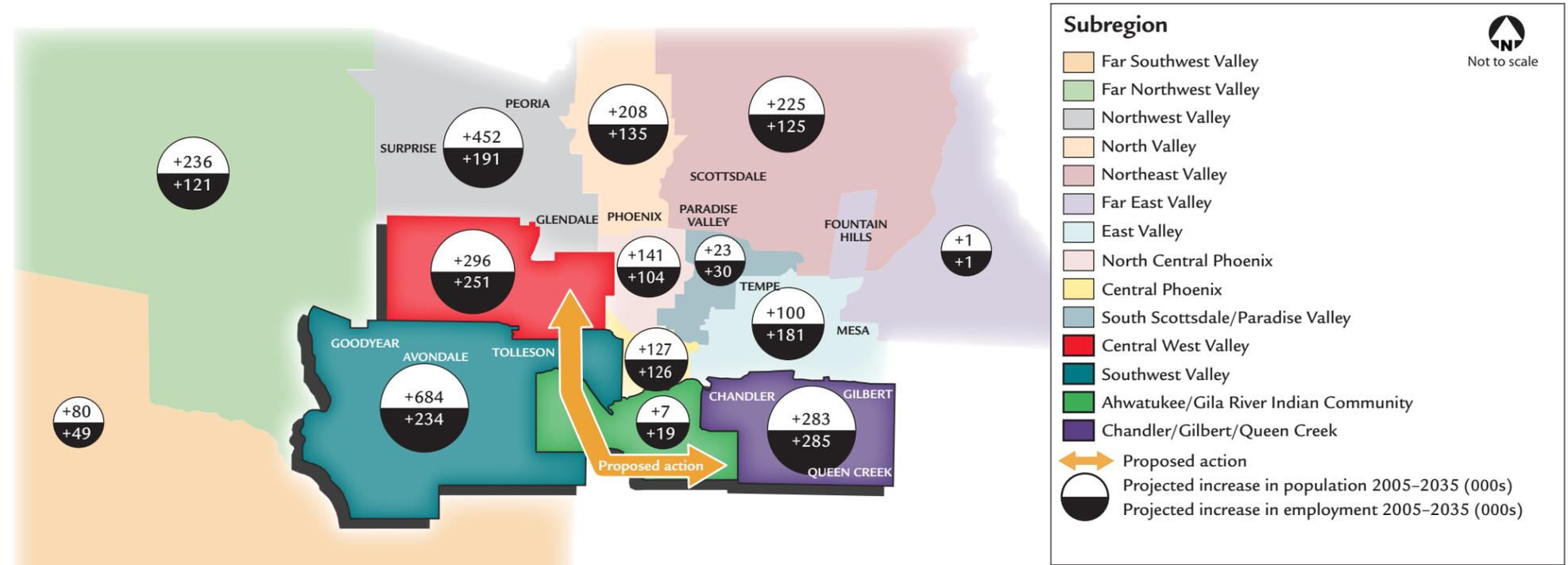
*Population, housing, and employment growth rates are projected to continue to rise through 2035. As with the historical trend, vehicle miles traveled are projected to outpace these socioeconomic growth trends.*

1

**How does growth in adjacent counties affect traffic volume projections?**

Growth in areas outside the MAG region has become an important factor in forecasting travel demand in the MAG region. Growth in Pinal and Yavapai counties, for example, contributes to increased traffic in the MAG region. To help assess the effects of external travel on the regional travel demand model, a study was conducted in 1999 (*Phoenix External Travel Summary* [MAG 2001b]). Since the study, the region's travel demand model network has been extended to include a large portion of Pinal County, including Queen Creek, Apache Junction, East Mesa, Casa Grande, and Maricopa. A travel study (*MAG and PAG External Travel Study* [MAG 2009c]) was conducted in 2008 using video cameras and license plate-matching technology to assess the number of external-to-internal (commuting) trips and the external-external (pass through) trips for passenger cars and heavy trucks. The results of this and many other studies help analysts predict travel demand in the MAG region.

**Figure 1-7** Geographic Distribution of Projected Growth by Subregion, 2005–2035



Activity Area	Population (000s)			Employment (000s)		
	2005	2035	Projected Increase	2005	2035	Projected Increase
Central West Valley	513	809	296	127	378	251
Southwest Valley	125	809	684	48	282	234
Ahwatukee/Gila River Indian Community	82	89	7	26	45	19
Chandler/Gilbert/Queen Creek	588	871	283	246	531	285
<b>Total for the proposed action activity area</b>	<b>1,308</b>	<b>2,578</b>	<b>1,270</b>	<b>447</b>	<b>1,236</b>	<b>789</b>
<b>Total Maricopa County</b>	<b>3,681</b>	<b>6,545</b>	<b>2,864</b>	<b>1,748</b>	<b>3,600</b>	<b>1,852</b>
<b>Percentage contribution – proposed action corridor activity area</b>	<b>36%</b>	<b>39%</b>	<b>44%</b>	<b>26%</b>	<b>34%</b>	<b>43%</b>

Source: Maricopa Association of Governments, 2007a and 2009b; extrapolated analysis

Almost 50 percent of the projected population and employment growth in the Maricopa Association of Governments region is expected to occur in areas that would be immediately served by the proposed action.

### NEED BASED ON REGIONAL TRANSPORTATION DEMAND AND EXISTING AND PROJECTED TRANSPORTATION SYSTEM CAPACITY DEFICIENCIES

Every day, people travel to and from various destinations throughout the MAG region. The purposes of the travel vary—work-related, personal, and the movement of goods and delivery of services. People in the region use various means for travel. Cars, buses, bicycles, and walking are all forms, or modes, of travel occurring every day in the MAG region. Taken in its entirety, the amount of travel occurring in the MAG region is referred to as transportation “demand.” To allow individuals to meet the purposes of their travel with any travel mode(s) chosen, the region must have appropriate transportation infrastructure and systems in place. The extent of transportation infrastructure and the number of systems in place to accommodate travel demand are referred to as the transportation “capacity.”

Taken in its entirety, the MAG region transportation network (including freeways, arterial streets, etc.) has the ability to accommodate a certain volume of travel during a given time frame and still manage to operate at an acceptable level of efficiency. Once that volume is exceeded (or, demand exceeds capacity), the network begins to operate inefficiently. This is referred to as “capacity deficiency.”

If the transportation network is, or is projected to be, deficient in its capacity and unable to efficiently serve existing and future transportation needs in the MAG region, analysts would determine what aspects of the network are, or are projected to be, deficient (e.g., arterial street network, Regional Freeway and Highway System, a combination) and where in the system the deficiencies would occur. To make the assessment, analysts would need to know:

- existing and projected demand for the network
- the types, modes, lengths, and durations of travel that occur in the region today and in the future (e.g., local, regional, interstate, a combination)
- where the travel occurs now and would occur in the future

If deficiencies are found in the network, analysts can suggest the types of improvements to the region’s transportation network necessary to address the deficiencies and test the suggested improvements to assess their effectiveness. The tools used by analysts to assess the need for improvements are summarized in Table 1-3.

### Existing and Future Traffic Conditions in the Study Area and Immediate Surroundings

The following presents operational characteristics of the existing and future road network in the Study Area and surroundings without a major transportation facility in place. Assessment of traffic volumes, traffic conditions, travel distributions, capacity deficiency, and travel times provides analysts a basis for evaluating the need for a major transportation facility in the Study Area.

### Traffic Volumes in the Study Area and Immediate Surroundings

The transportation network in the Study Area currently and in the future would contain mostly arterial streets. Exceptions would be sections of I-10 (Papago and Maricopa freeways) and SR 101L (Agua Fria Freeway) located along the periphery of the Study Area.

Average daily traffic (ADT) volumes at locations in and around the Study Area for existing conditions (2010) and future conditions (2035) are presented in Figure 1-8. The upper portion of the figure shows the change in traffic on representative segments of the Interstate and regional freeways, while the lower portion shows the change in traffic on representative arterial street segments. Freeways are intentionally designed to handle much higher ADT volumes than arterial streets. Based on lane capacities used in the MAG travel demand model, a typical six-lane arterial street could carry 51,000 vehicles per day (vpd), while a typical six-lane freeway could carry 165,000 vpd. Traffic for the two types of facilities is presented on a single scale to spotlight this difference in overall capacity and utility.

The 2035 network includes all of the improvements from the RTP except for the proposed action in the Study

Table 1-3 Traffic Analysis Tools

Issue Identification	Analysis Tool <sup>a</sup>	Tool Purpose
Is there currently a deficiency in network capacity and will there be a deficiency in future network capacity?	• Existing and Future Traffic Volume Projections (Travel Demand Analysis) (TransCAD <sup>b</sup> )	• Establish overall demand for use of the future network, <sup>c</sup> including mode, trip type, and durations; determine capacity deficiency of the network, including freeway, arterial street, and modal deficiencies
	• Level of Service Analysis (TransCAD)	• Determine performance of the network in terms of quality of service and efficiency
	• Trip Distribution (Cut-line Analysis)	• Evaluate traffic distribution between arterial streets and freeways
	• Existing and Projected Travel Time and Congestion Analysis (TransCAD)	• Determine projected level of delay and associated congestion
	• Trip Distribution (Select Link Analysis)	• Identify origins and destinations of trips to establish the types of trips occurring in a given area of the MAG <sup>d</sup> region

<sup>a</sup> Analytical tools are further described in the section, *Key Traffic Modeling Definitions*, on page 3-27.

<sup>b</sup> TransCAD is the travel demand modeling software platform used by MAG.<sup>d</sup>

<sup>c</sup> future transportation network analyzed without the proposed action

<sup>d</sup> Maricopa Association of Governments

Area. Notable observations regarding the freeway traffic volumes in Figure 1-8 include:

- On I-10 (Papago Freeway) between SR 101L (Agua Fria Freeway) and Interstate 17 (I-17), at the two locations shown (11 and 12), traffic is projected to increase by 33,000 and 22,000 vpd, respectively, between 2010 and 2035.
- Through the downtown area (location 10), traffic on I-10 is projected to increase by 38,000 vpd between 2010 and 2035.
- Through the “Broadway Curve” area (location 9), traffic on I-10 is projected to increase by 103,000 vpd between 2010 and 2035.
- On I-10 (Maricopa Freeway) between US 60 and SR 202L (Santan Freeway) (location 8), traffic is projected to increase by 67,000 vpd between 2010 and 2035.
- Overall, at the 13 freeway locations shown, the average increase in traffic is 52,000 vpd, representing an increase of approximately 28 percent between 2010 and 2035.

### Measurements of Traffic

Regional travel is generally reported in VMT because it combines the total number of vehicles and the length of the trip. This provides a true measure of the total travel occurring in a large area. The traffic on a road segment is generally reported as ADT. The unit of ADT is vehicles per day. Daily traffic gives an overall metric for comparing different road segments in a region. Peak traffic is generally reported as vehicles per hour. The LOS rating is based on traffic conditions during the peak hour. For more information on LOS, see the text box on page 1-14.

### What Is Level of Service?

Transportation analysts have developed a uniform way of describing the overall quality provided by a given transportation facility, service, or network. In 1965, an LOS “report card” method was introduced, where highway quality of service was “graded” using six letters, “A” through “F,” with “A” being the best and “F” being the worst. With the LOS approach, traffic engineers were better able to explain operating and design concepts of highways to the general public and elected officials. The LOS letter approach is now commonly used throughout the United States.

LOS is most often modeled during the morning and evening commuting periods. These are the times when

most motorists are on the roads, when traffic volumes are highest. As a result, the operational efficiency of the network can be assessed under “worst-case” conditions.

For the traffic analysis, widely accepted LOS qualitative measures were applied to characterize operational conditions of traffic flow. These measures characterize traffic conditions using factors such as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. For freeways, LOS E describes operation at capacity. Operational characteristics at this level are volatile, because there are virtually no usable gaps in the

traffic. Vehicles are closely spaced, leaving little room to maneuver at speeds that still exceed 45 miles per hour (mph). Any disruption, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a “disruption wave” that affects traffic flow. At capacity, the traffic has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive traffic back-up. Maneuverability within the traffic stream is extremely limited and the levels of physical and psychological comfort afforded the driver are poor. Because of this, most transportation planners strive to design freeways to achieve LOS D or better.

#### Levels of service



LOS A



LOS B



LOS C



LOS D



LOS E



LOS F

Source: Arizona Department of Transportation, 2007b

- ▶ The highest percentage increase would occur between Pecos Road and Wild Horse Pass Boulevard on I-10 (Maricopa Freeway) (location 7).

The arterial street volumes shown in Figure 1-8 represent spot locations in the Study Area. Changes between the 2010 and 2035 arterial street network would be planned improvements to be made by the City of Phoenix, Maricopa County, or by private developers (with jurisdictional approval) to address local traffic needs associated with future development. The change in traffic volumes between 2010 and 2035 on the arterial street network would vary throughout the Study Area. Some locations may have large increases in projected traffic volumes, others small, and some might even experience reduced traffic. Projected traffic volumes would likely vary because motorists may seek alternative routes in response to changes in land use, such as new construction or abandonment of employment, commercial, or retail centers. When taken in its entirety, traffic on the arterial streets in the Study Area would increase at a rate comparable to that of the arterial street network in the entire MAG region.

The largest change in traffic would be anticipated on arterial streets that are:

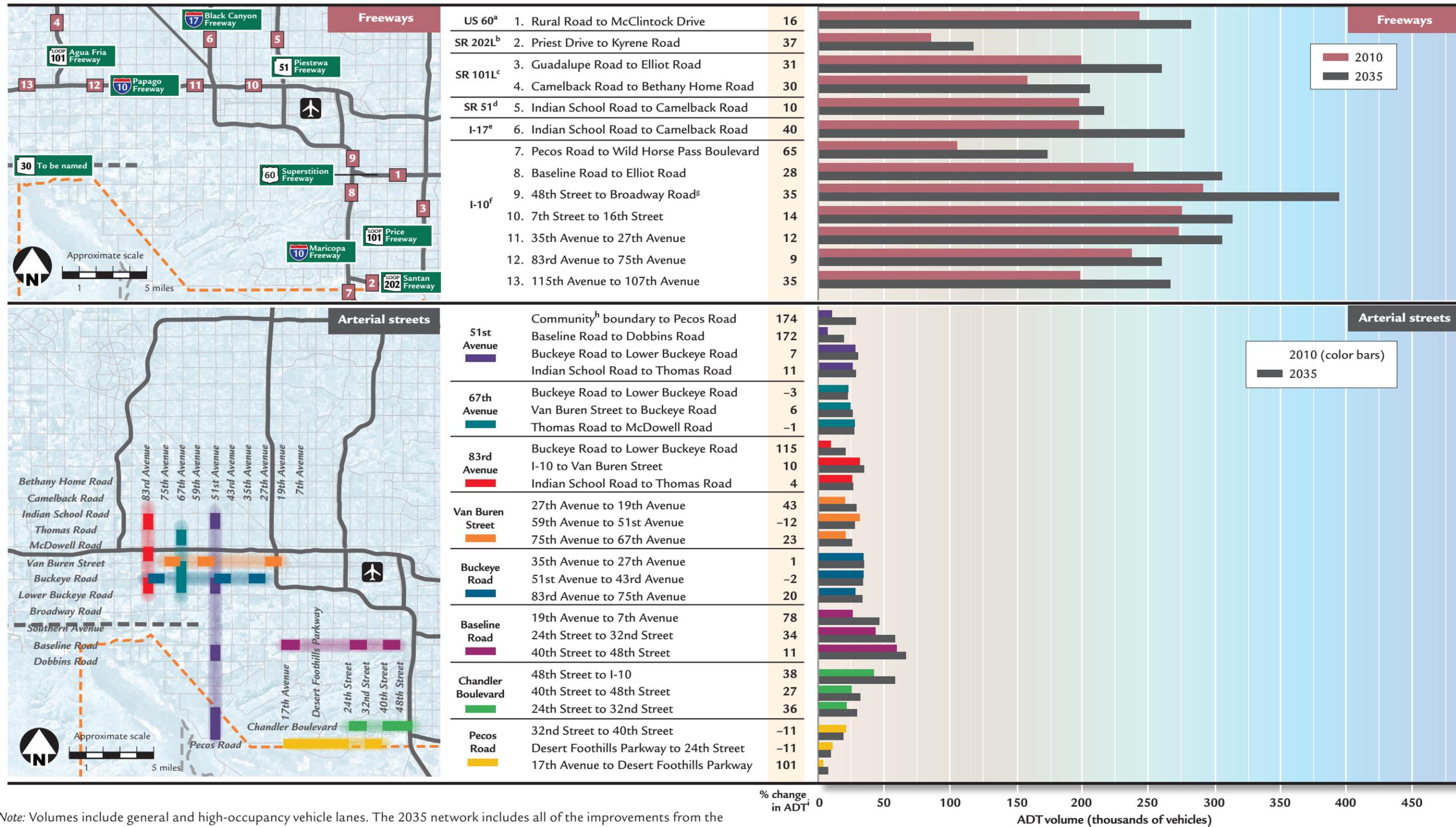
- ▶ located in areas that are currently undeveloped but are planned to be developed in the future
- ▶ currently two lanes wide but are planned to be widened to four, five, or six lanes in the future

From observation, traffic volumes are typically higher on an arterial street when the street:

- ▶ is closer to a major freeway
- ▶ has more lanes provided in each direction and, therefore, can accommodate more vehicles
- ▶ is located within urbanized areas or near areas where land is subjected to more intensive uses

As a general observation, traffic volumes experienced on arterial streets and freeway segments in the Study Area are typical of volumes experienced throughout the MAG region.

Figure 1-8 Average Daily Traffic Volumes on Freeways and Arterial Streets (without the Proposed Action), 2010 and 2035



Note: Volumes include general and high-occupancy vehicle lanes. The 2035 network includes all of the improvements from the Regional Transportation Plan except for the proposed action.

<sup>a</sup> U.S. Route 60 <sup>b</sup> State Route 202L (Loop 202) <sup>c</sup> State Route 101L (Loop 101) <sup>d</sup> State Route 51 <sup>e</sup> Interstate 17 <sup>f</sup> Interstate 10 <sup>g</sup> "Broadway Curve" <sup>h</sup> Gila River Indian Community  
<sup>i</sup> average daily traffic

Source: Maricopa Association of Governments, 2010b; extrapolated analysis

Freeways are designed to handle much higher average daily traffic volumes than arterial streets. Regardless, high travel demand on Study Area freeway and arterial street segments is expected to continue through 2035.

**What is congestion?**

*Congestion* refers to undesirable traffic conditions. Generally, congestion exists when the LOS is E or F, when traffic on a freeway is moving at an average speed of 45 mph or less, and/or the traffic flow is often stop-and-go.

**Operational Conditions on Freeways in the MAG Region**

The previous section concluded that traffic volumes would increase between 2010 and 2035 because of increases in capacity and demand. The following text describes how the changes in traffic volumes would affect system efficiency in terms of LOS.

Existing and future road network and socioeconomic conditions were modeled to determine operational conditions on the existing and future road network. Planned improvements from the RTP (excluding the proposed action) and other planned improvements from local, county, and private agencies make up the future road network. The duration of current and projected LOS E or F (congested) conditions on freeway sections in the MAG region during the morning and evening commute periods are shown in Figures 1-9 and 1-10, respectively.

In both periods in 2010, the region's freeways are noticeably congested and operate poorly.

Notable observations about the morning commute (Figure 1-9) include:

- ▶ The worst conditions are found with freeway traffic inbound to downtown Phoenix.
- ▶ Congestion (see sidebar on this page) lasts over 3 hours in some freeway sections, including eastbound I-10 (Papago Freeway) approaching I-17, westbound I-10 north of US 60 (the Broadway Curve), and westbound I-10 between approximately SR 143 (Hohokam Freeway) and 40th Street.
- ▶ Even with RTP-planned improvements (without the proposed action), congestion would continue to worsen through 2035.
- ▶ Implementation of RTP-planned improvements (such as widening of I-10 and construction of the SR 30 freeway) would result in only localized improvement in operational performance between 2010 and 2035.

Notable observations about the evening commute (Figure 1-10) include:

- ▶ The amount and duration of congestion on freeways in the MAG region are substantially greater in

the evening than in the morning because more non-work-based trips are occurring (e.g., trips to stores, restaurants, events).

- ▶ In 2010, congestion of more than 3 hours occurred in outbound directions from downtown Phoenix on almost every freeway. Conditions were especially poor on I-10 north of US 60 (the Broadway Curve) and in areas around system traffic interchanges between I-10 (Papago Freeway) and I-17, I-10 (Maricopa Freeway) and US 60 (Superstition Freeway), and SR 202L (Red Mountain Freeway) and SR 101L (Pima Freeway).
- ▶ Operational conditions in 2035 would be substantially worse than those in 2010.
- ▶ In 2035, undesirable LOS would occur along both directions of I-10, with few exceptions, for almost 30 miles between SR 101L (Agua Fria Freeway) and SR 202L (Santan Freeway). Large portions of the segment would experience LOS E or F for over 3 hours. In 2010, the congestion was mostly in the peak direction and for a shorter duration.
- ▶ Alternative routes to I-10 for eastbound travel, including SR 202L (Red Mountain Freeway) and SR 101L (Pima and Price freeways), would experience LOS E or F in 2035.
- ▶ Based on the projected duration of congested conditions in 2035, travelers using the I-10 corridor would experience substantial regional mobility constraints. Even with RTP-planned major transportation improvements to I-10 and construction of the planned SR 30 freeway, motorists would experience LOS E or F conditions for almost the entire peak evening commuting period.

**Capacity Deficiency of Existing and Future Conditions**

As presented in the previous sections, the region's freeways and arterial street network will continue to be heavily congested; in fact, congested conditions will worsen.

Another way to illustrate travel demand is through use of a cut-line analysis. A cut line is an imaginary line used to represent the total traffic on freeways and arterial streets that cross (or would cross) this given line. A cut-line

analysis is used to determine both the existing and future distribution of traffic on the freeway and arterial street networks. Six cut lines were identified through the Study Area to assess changes in total traffic on arterial streets and freeways between 2010 and 2035. In the analysis, the 2035 road network included planned improvements from the RTP (excluding the proposed action) and other planned improvements from local, county, and private agencies. Figure 1-11 presents the cut-line analysis.

Overall, ADT volumes through the six cut lines displayed an increase of approximately 1.16 million vehicles (684,000 on freeways and 474,000 on arterial streets), or a 36 percent increase between 2010 and 2035.

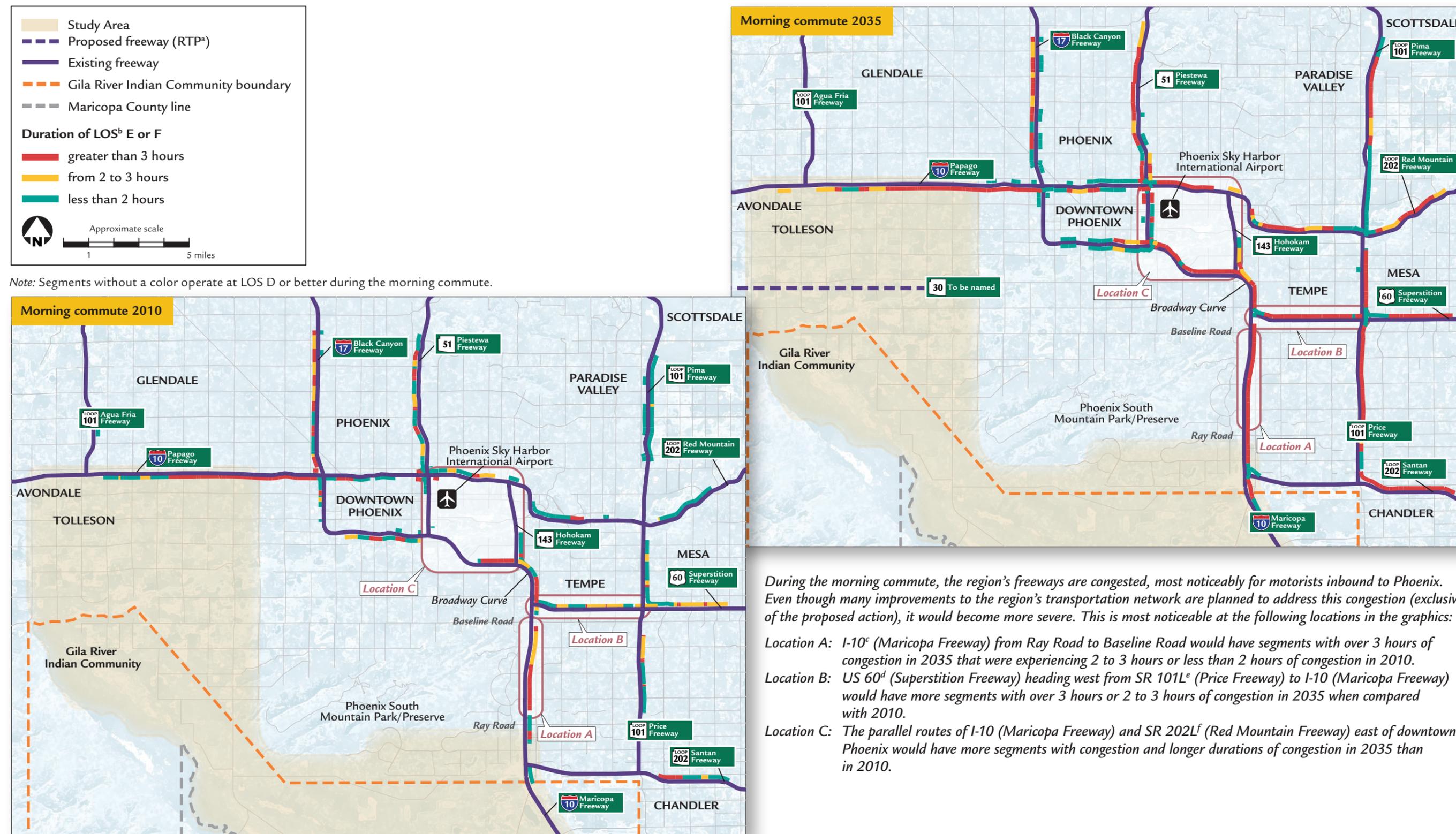
Data from the cut-line analysis presented in Figure 1-11 were used to calculate the capacity deficiency of the MAG region's road network in 2010 and 2035, assuming the network were to operate at LOS D during the peak hour of a given day. Capacity deficiency was calculated by comparing the total capacity and the total demand of all of the roads that would cross the 41st Street cut line (see Figure 1-11). Data are extrapolated from the 41st Street cut-line analysis to characterize performance for the entire MAG transportation system. According to the assessment (see Figure 1-12), the 2010 road network was able to serve 81 percent of the total demand while operating at LOS D. In 2035, however, the network would be able to serve only 76 percent of the total demand while operating at LOS D.

Between 2010 and 2035, RTP-planned major transportation improvements outside of the Study Area are to be constructed, adding additional capacity across the 41st Street cut line. Even with these improvements, travel demand will outpace the added capacity provided by RTP-planned improvements, resulting in an increase in unmet demand between 2010 and 2035.

**Travel Time in the Study Area and Immediate Surroundings**

In the Study Area, increased traffic congestion has resulted in decreased travel speeds throughout much of any given day on the region's road network. The amount of time a driver spends driving each day to and from the same origin and destination continues to increase. Travel time is

Figure 1-9 Duration of Level of Service E or F, Morning Commute on Freeways, 2010 and 2035

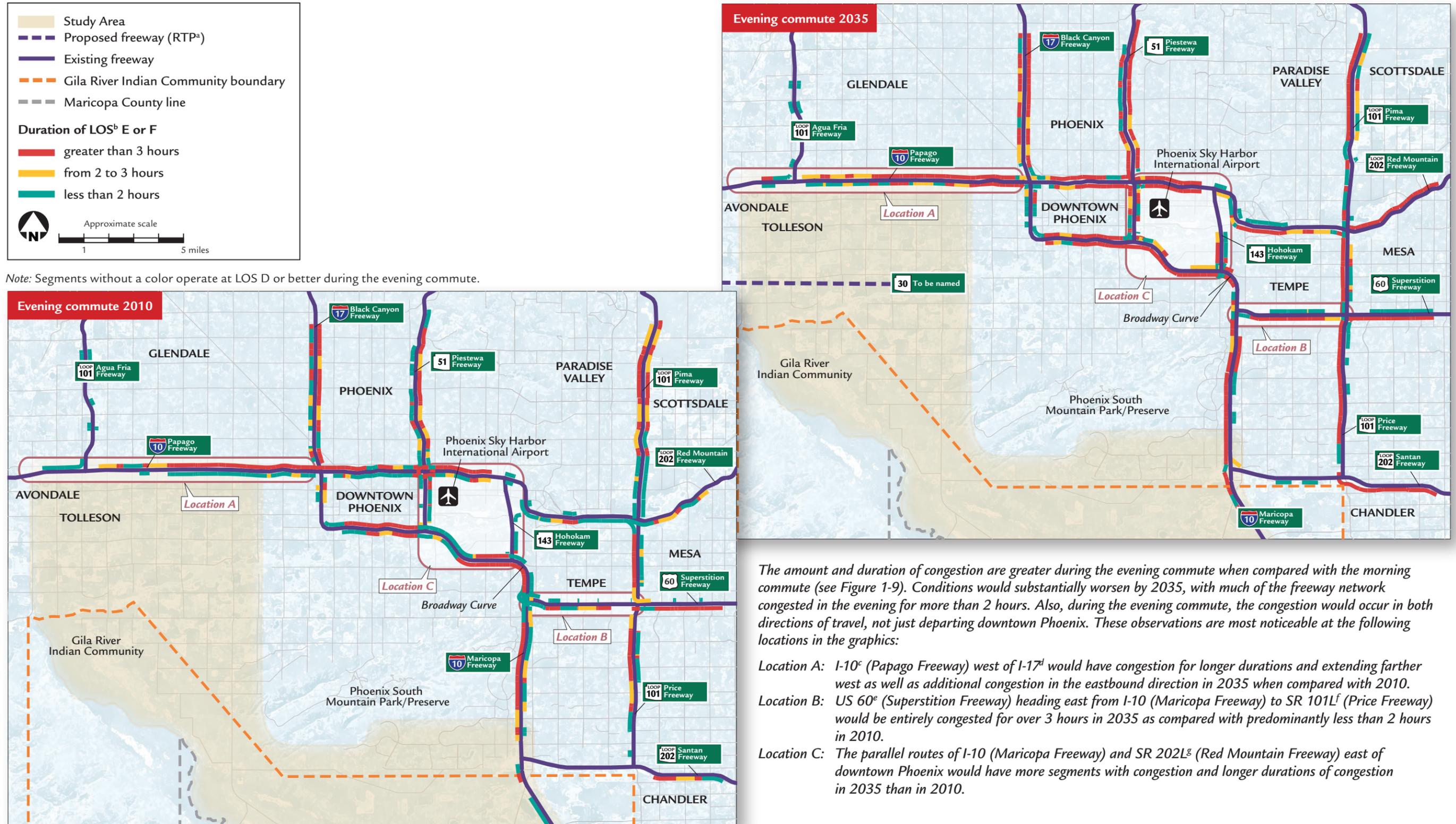


<sup>a</sup> Regional Transportation Plan <sup>b</sup> level of service <sup>c</sup> Interstate 10 <sup>d</sup> U.S. Route 60 <sup>e</sup> State Route 101L (Loop 101) <sup>f</sup> State Route 202L (Loop 202)

Source: Maricopa Association of Governments, 2010b; extrapolated analysis

1

Figure 1-10 Duration of Level of Service E or F, Evening Commute on Freeways, 2010 and 2035



The amount and duration of congestion are greater during the evening commute when compared with the morning commute (see Figure 1-9). Conditions would substantially worsen by 2035, with much of the freeway network congested in the evening for more than 2 hours. Also, during the evening commute, the congestion would occur in both directions of travel, not just departing downtown Phoenix. These observations are most noticeable at the following locations in the graphics:

- Location A: I-10<sup>c</sup> (Papago Freeway) west of I-17<sup>d</sup> would have congestion for longer durations and extending farther west as well as additional congestion in the eastbound direction in 2035 when compared with 2010.
- Location B: US 60<sup>e</sup> (Superstition Freeway) heading east from I-10 (Maricopa Freeway) to SR 101L<sup>f</sup> (Price Freeway) would be entirely congested for over 3 hours in 2035 as compared with predominantly less than 2 hours in 2010.
- Location C: The parallel routes of I-10 (Maricopa Freeway) and SR 202L<sup>g</sup> (Red Mountain Freeway) east of downtown Phoenix would have more segments with congestion and longer durations of congestion in 2035 than in 2010.

<sup>a</sup> Regional Transportation Plan <sup>b</sup> level of service <sup>c</sup> Interstate 10 <sup>d</sup> Interstate 17 <sup>e</sup> U.S. Route 60 <sup>f</sup> State Route 101L (Loop 101) <sup>g</sup> State Route 202L (Loop 202)

Source: Maricopa Association of Governments, 2010b; extrapolated analysis

important to most drivers; further, increases in travel time translate to more congestion. It is important, therefore, to examine representative travel times in different locations and project what travel times would be in 2035.

Travel times to and from specific locations were calculated using the results from the TransCAD model, which predicts average speed based on the road type and LOS. Two trip locations were identified as representative of travel times occurring in the Phoenix metropolitan area, particularly in the urbanized and urbanizing areas of the region. The two trips shown in Figure 1-13 are representative of the expected increase in travel time between 2010 and 2035. They do not represent every trip taken within and around the Study Area, but give an indication of potential impacts on future travel time. Notable observations from the information are:

- Travel time of 22 minutes for the morning commute in 2010 for Trip 1 would increase to 31 minutes in 2035; travel time of 23 minutes in the evening would increase to 32 minutes in 2035.
- Travel time of 17 minutes for the morning commute in 2010 for Trip 2 would increase to 31 minutes in 2035; travel time of 19 minutes in the evening would increase to 32 minutes in 2035.

When considered in the context of hundreds of thousands of trips per day, over the course of more than 25 years, total time lost because of increased congestion—plus related personal and financial costs—would be substantial.

### Major Points Regarding Projected Traffic Volume, Level of Service, Capacity Deficiency, and Travel Time

Based on the assessment of existing and projected traffic volume, LOS, capacity deficiency, and travel time, the following conclusions are reached:

- Traffic volume
  - Between 2010 and 2035, total daily VMT in the entire MAG region are projected to nearly double, from 101 million to 185 million. Daily VMT in the Study Area are projected to increase substantially during the same period.

Figure 1-11 Cut-line Analysis, 2010 and 2035



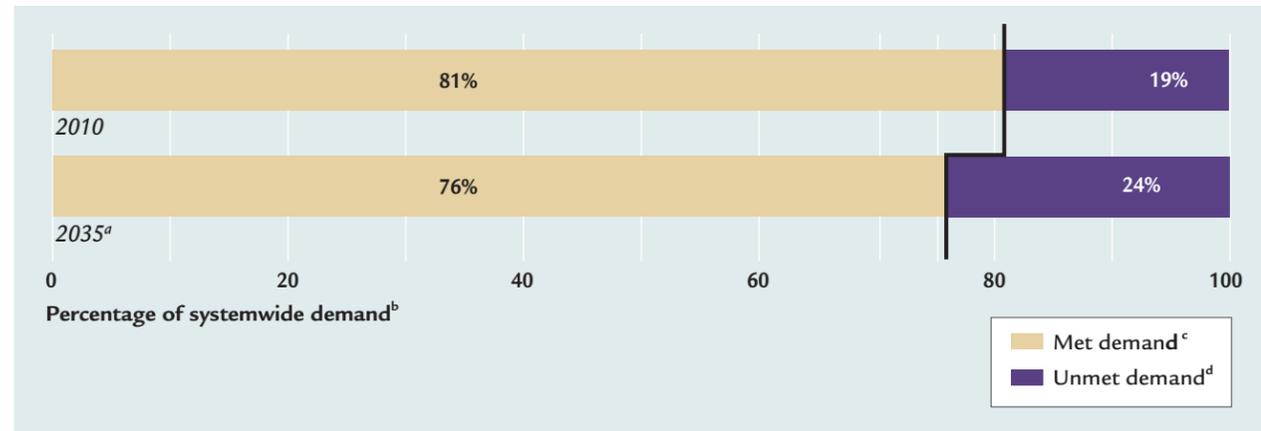
Cut line	Year	Volume (000s)			Split (%)	
		Total	Freeways	Arterials	Freeways	Arterials
1 87th Avenue: I-10 <sup>b</sup> (Papago Freeway) to Baseline Road	2010	301	232	69	77	23
	2035	464	366	98	79	21
2 Salt River: 99th Avenue to SR 143 <sup>c</sup> (Hohokam Expressway)	2010	669	438	231	65	35
	2035	1,001	654	347	65	35
3 South Mountain: 83rd Avenue to I-10 (Maricopa Freeway)	2010	314	239	75	76	24
	2035	458	307	151	67	33
4 47th Avenue: I-10 (Papago Freeway) to Estrella Drive	2010	392	265	127	68	32
	2035	530	287	243	54	46
5 12th Street: I-10 (Papago Freeway) to Pecos Road	2010	729	508	221	70	30
	2035	898	612	286	68	32
6 41st Street: SR 202L <sup>d</sup> (Red Mountain Freeway) to Pecos Road	2010	798	489	300	62	38
	2035	1,001	629	372	63	37
All six cut lines	2010	3,194	2,171	1,023	68	32
	2035	4,352	2,855	1,497	66	34

<sup>a</sup> Regional Transportation Plan <sup>b</sup> Interstate 10 <sup>c</sup> State Route 143 <sup>d</sup> State Route 202L (Loop 202)

Source: Maricopa Association of Governments, 2010b; extrapolated analysis

The volume of traffic on local arterial streets would increase at a greater rate than would the volume on freeways. Therefore, a desired outcome of the Regional Transportation Plan—to redistribute traffic appropriately based on travel needs—would not be achieved in the Study Area and its immediate surroundings without a new major transportation facility constructed in the Study Area.

**Figure 1-12** Met and Unmet Demand, 2010 and 2035



Source: Maricopa Association of Governments, 2010b; extrapolated analysis

<sup>a</sup> The analysis assumes that the Maricopa Association of Governments (MAG) *Regional Transportation Plan* is fully implemented in 2035 (except for any major transportation facility in the Study Area).

<sup>b</sup> Data are extrapolated from the 41st Street cut-line analysis (see text and Figure 1-11) to characterize performance for the entire MAG transportation system.

<sup>c</sup> The demand met by the region's transportation system.

<sup>d</sup> Unmet demand means delays and congestion for travelers on the MAG transportation network.

*Even with improvements planned in the Regional Transportation Plan (excluding the proposed action), capacity deficiency (unmet demand) is projected to increase by 5 percentage points from 2010 to 2035.*

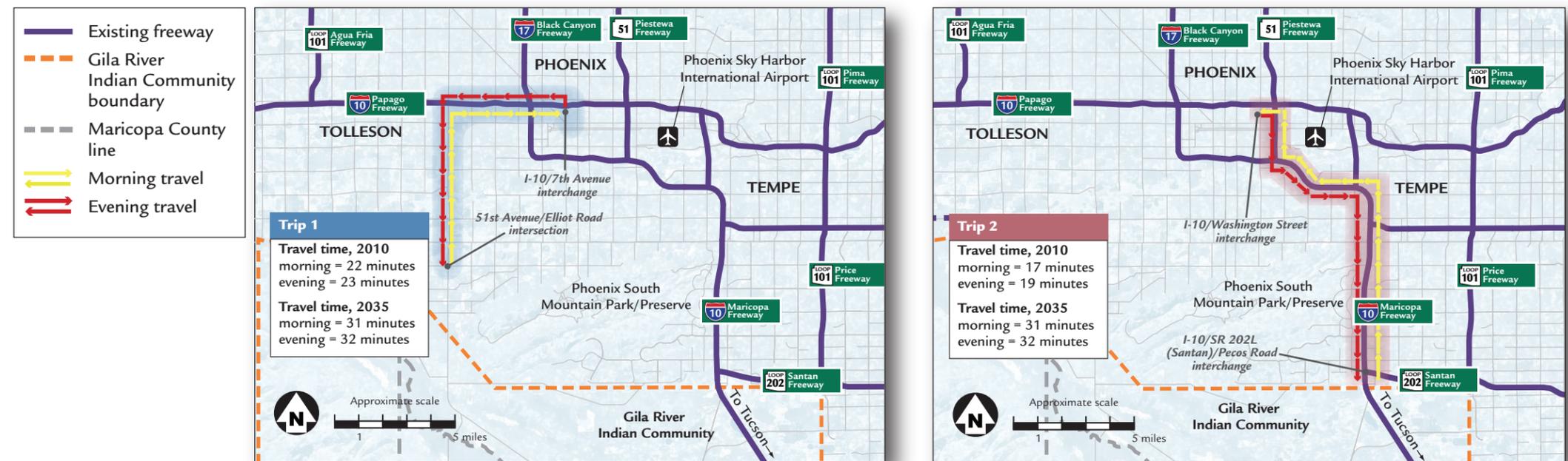
- > Traffic volumes on freeways and arterial streets in the Study Area and its immediate surroundings are projected to increase substantially between 2010 and 2035.
- > LOS
  - > During the morning and evening commutes in 2010, the region's freeways were noticeably congested and operated poorly.
  - > Even with RTP-planned improvements (without the proposed action), congestion conditions in 2035 would be worse than those in 2010.
- > Capacity deficiency
  - > The transportation system will continue to be unable to meet regional travel demand.
  - > In 2010, the regional transportation system's operating capacity was able to meet 81 percent

of existing travel demand. Even with the major transportation improvements planned in the RTP (except for the proposed action), the 2035 system would be able to meet only 76 percent of projected travel demand.

- > Travel time
  - > Trips between locations in the Study Area and downtown Phoenix would take much longer in 2035 than they did in 2010; the projected travel time would increase by between 39 and 82 percent.

Based on the consideration of existing traffic conditions in the MAG region and the Study Area, the need for a major transportation facility in the Study Area exists today. Based on projections of 2035 traffic conditions, the need for such a facility will be even greater in the future.

**Figure 1-13** Modeled Travel Times without the Proposed Action, 2010 and 2035



Source: Maricopa Association of Governments, 2010b; extrapolated analysis

*The changes in travel time represent what can be expected throughout the Maricopa Association of Governments region. When considered in the context of hundreds of thousands of trips per day, over the course of more than 25 years, total time lost because of increased congestion—plus related personal and financial costs—would be substantial.*

## CONCLUSIONS

The information in this chapter shows that without a major transportation facility in the Study Area, the region's transportation network will suffer. As recognized in over 25 years of transportation planning, the region's transportation network will not be able to efficiently move goods and people throughout the region without major investments in the network. Projected growth in population, housing, and employment will force motorists to drive longer distances and will push more traffic onto regional freeways and arterial streets, especially within the Study Area. These increases in the number of vehicles and in longer-distance drives will cause increased congestion. In extreme cases, drivers could experience their afternoon commute extending well into precious evening hours. In all cases, stop-and-go traffic on the region's freeways and arterial streets would increase and delays in getting to and from destinations would result. Correspondingly, productivity would decline.

Major points establishing the need for a major transportation facility are:

- ▶ Regional plans have recognized the need for completing the loop system around the Phoenix metropolitan area for over 25 years. The Southwest Loop Highway, a major element of the region's freeway loop, or beltway, system was integral to the Regional Freeway and Highway System approved by Maricopa County voters in 1985. In 1988, this plan was carried forward as a State-level EA and DCR for the Southwest Loop Highway (now known as the South Mountain Freeway). The same route was approved by the STB in the same year. Although other facilities were considered a higher priority early in the Regional Freeway and Highway System, the South Mountain Freeway was a part of the initial Regional Freeway and Highway System in 1985 and has been included in every subsequent update. In 2004, Maricopa County voters approved Proposition 400, which was designed to fund completion of the remaining segments of the Regional Freeway and Highway System, including the South Mountain Freeway. A major transportation facility in the Study Area would implement the facility recognized in over 25 years of planning.
- ▶ Since the 1950s, the MAG region has experienced rapid growth in population, housing, and employment, and this growth is expected to continue. Between 2005 and 2035, Maricopa County is projected to experience an increase in population, going from 3.7 million to 6.5 million, and in the number of housing units, going from 1.5 million to 2.7 million. Regional employment is projected to double, going from 1.7 million to 3.6 million jobs during the same period. Because of the substantial increase in population, homes, and jobs, people will drive greater distances for work, school, and recreation. As a result, VMT are expected to increase even faster than population, housing, and employment. A major transportation facility in the Study Area is needed to accommodate or displace the ever-increasing VMT.
- ▶ MAG projects that over the next 25 years, daily VMT in the entire MAG region will increase from 101 million to 185 million. Over that same period, MAG anticipates that daily VMT in the Study Area will increase at a similar high rate, from 27 million to 42 million. The increased VMT will mean more traffic on regional freeways and arterial streets. This increased transportation demand must be met; otherwise, the available lanes on the region's roads will be at capacity, causing an unacceptable degree of congestion. A major transportation facility in the Study Area would provide an additional method of serving this increased transportation demand by removing traffic from existing freeways and arterial streets, resulting in better traffic flow on surface transportation networks of all types. All surface transportation systems in the MAG region were designed to function optimally only with implementation of a major transportation facility in the Study Area.
- ▶ Providing a major transportation facility in an area where it would not be fully used would be an unwise expenditure of public funds. Of the projected 76 percent increase in population, 80 percent increase in housing units, and 112 percent increase in jobs between 2005 and 2035, nearly half of these increases are expected in areas that would be immediately served by the proposed action. A major transportation facility in the Study Area would provide highly needed services precisely where they will be needed.
- ▶ Without a major transportation facility in the Study Area, the increased VMT described previously will cause systemwide inefficiencies in the ability to move people and goods and will result in suboptimal performance characteristics on other RTP facilities, both existing and planned:
  - Even though the region's freeways are now congested and operate poorly, conditions in 2035 would be substantially worse. Although some areas of severe congestion currently exist, they are limited (e.g., eastbound I-10 [Papago Freeway] approaching I-17 and eastbound and westbound I-10 [Maricopa Freeway] at the Broadway Curve). By 2035, eastbound and westbound motorists on I-10 between SR 101L (Agua Fria Freeway) and SR 202L (Santan Freeway) are expected to experience stop-and-go driving for over 3 hours every day. This is a distance of nearly 30 miles. A major transportation facility in the Study Area would distribute commuters over additional facilities. As a result, the duration of stop-and-go traffic on the region's freeways would be reduced and motorists would spend less time in the morning trying to get to work or appointments and less time in the evening trying to get home from work.
  - Congestion in 2035 will not be limited to regional freeways. In the Study Area, an increase in daily traffic volumes of approximately 32 percent on

freeways and 46 percent on arterial streets is projected between 2010 and 2035. Therefore, in addition to the stop-and-go traffic on freeways, these conditions would be replicated on arterial streets—and compounded by traffic signals. This 46 percent increase in daily traffic on arterial streets correlates to a need for 55 additional lanes of arterial street capacity in the Study Area. Constructing an additional 55 street-lanes would not likely occur because of the right-of-way (R/W) that would be needed and accompanying impacts on existing residential and commercial properties. A major transportation facility in the Study Area would provide an additional means to serve this increased transportation demand by removing traffic from arterial streets, which would result in better traffic flows and less congestion on arterial streets.

- Another way of looking at the negative effects of the projected increase in VMT is the delays experienced by the daily commuter. Increased traffic congestion would extend the amount of time spent driving to and from the same origin (home) and destination (work or school). According to transportation analyses, depending on location and time of trip, increases of up to 88 percent in the time needed to complete the same trip would be expected between 2010

and 2035. It is important to note that this is a single trip. Considering the hundreds of thousands of drivers on area roads each day, the total lost time and associated cost of increased congestion would be substantial over the course of more than 25 years. A major transportation facility in the Study Area would distribute commuters over additional facilities. As a result, delays experienced on the region's freeways and arterial streets would be reduced and commuters could spend the time savings in more productive and/or enjoyable endeavors than sitting in congestion on regional freeways and roads.

Population, housing, and employment forecasts for the Study Area and Phoenix metropolitan region show tremendous growth in the region during the next 25 years. This includes a population increase of 2.8 million people, a housing increase of 1.2 million units, and an employment increase of 1.9 million jobs. This projected growth will affect not only the freeway system but will also cause many of the arterial streets in the Study Area to experience additional congestion and traffic backups onto the existing freeways, worsening travel conditions on an already-burdened transportation system.

In 2010, the region's freeways were congested and operated poorly, but conditions in 2035 would be substantially worse than the limited areas of stop-and-go

driving experienced in 2010. By 2035, eastbound and westbound motorists on I-10 between SR 101L (Agua Fria Freeway) and SR 202L (Santan Freeway) will experience stop-and-go driving for at least 3 hours every day.

Today's freeways and arterial streets will not operate efficiently with the population, housing, and employment increases forecast for 2035. Combined, these increases will translate into higher demand for use of the existing freeway and arterial street systems. In 2010, the existing road network could serve only 81 percent (34,400 of 42,500 trips during the peak hour) of the total demand on the transportation system. During the next 25 years, daily traffic volumes in the Study Area are expected to increase by approximately 36 percent (from 3.19 million to 4.35 million daily trips) on freeways and arterial streets. Individually, the 684,000 trip increase on freeways would equate to the capacity of 26 freeway lanes, and the 474,000 trip increase on arterial streets would equate to the capacity of 55 arterial street lanes. By 2035, without the proposed action, the network will be able to accommodate only 76 percent (40,700 of 53,900 trips during the peak hour) of total transportation needs. Without a major transportation facility in the Study Area, the region will suffer even greater congestion, travel delays, and limited options for moving people and goods safely through the Phoenix metropolitan region.